User's Manual

FN510
Field Wireless
Multi-Function Module
(Accelerometer Input)

IM 01W03E03-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01W03E03-01EN
3rd Edition

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1. Introduction

This manual describes how to use the FN510 Field Wireless Multi-Function Module (hereafter simply referred to as FN510) with Measurement code C. For Measurement code A, refer to IM 01W03E01-01EN.

FN510 was precisely calibrated at the factory before shipment. To ensure both safety and efficiency, please read this manual carefully before you operate this product.

FN510 works by utilizing the FN110 Field Wireless Communication Module (hereafter simply referred to as FN110). Please attach FN110 before use.

Table1.1 summarizes the related document list of this manual.

Table 1.1 Related Document List

Title	Document No.
FieldMate Versatile Device Management Wizard User's Manual	IM 01R01A01-01E
YFGW410 Field Wireless Management Station User's Manual	IM 01W02D01-01EN
FN110 Field Wireless Communication Module General Specifications	GS 01W03B01-01EN
FN510 Field Wireless Multi-Function Module General Specifications	GS 01W03E01-01EN
LN01 Piezoelectric Accelerometer (For FN Series) User's Manual	IM 01W03H01-01EN

■ Regarding This Manual

- This manual should be provided to the end user.
- This manual and the identification tag attached on packing box are essential parts of the product; keep them in a safe place for future reference.
- 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, please 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 products. When products whose suffix code or optional codes contain code "Z" and an exclusive document is attached, please read it along with this manual.
- Please note that changes in the specifications, construction, or component parts of this 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.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.
- The following safety symbols are used in this manual:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or physical damage. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

1.1 Safe Use of This Product

This product is designed to be used by a person with specialized knowledge. For the safety of the operator and to protect this product and the system, please be sure to follow this manual's safety instructions when handling this product. If these instructions are not heeded, the protection provided by this product may be impaired. In this case, Yokogawa cannot guarantee that this product can be safely operated. Please pay special attention to the following points:

(a) Installation

- This product may only be installed by an engineer or technician who has an expert knowledge of this product. Operators are not allowed to carry out installation unless they meet this condition.
- With high process temperatures, care must be taken not to burn yourself by touching this product or its casing.
- All installation shall comply with local installation requirements and the local electrical code.

(b) Wiring

- This product must be installed by an engineer or technician who has an expert knowledge of this product. Operators are not permitted to carry out wiring unless they meet this condition.

(c) Maintenance

- Please carry out only the maintenance procedures described in this manual. If you require further assistance, please contact the nearest Yokogawa office.
- Care should be taken to prevent the build up of dust or other materials on the display glass and the nameplate. To clean these surfaces, use a soft, dry cloth.

(d) Explosion Protected Type Instrument

- Users of explosion protected instruments should refer first to section 2.6 (Installation of an Explosion Protected Instrument) of this manual.
- The use of this instrument is restricted to those who have received appropriate training in the device.
- Take care not to create sparks when accessing the instrument or peripheral devices in a hazardous location.
- Repair or modification to this instrument by customer will cause malfunction of explosion protect function and hazardous situation. If you need to repair or modification, please contact the nearest Yokogawa office.

(e) Modification

- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this product by the customer.

(f) Authorized Representative in EEA

- The authorized representative for this product in the EEA is:
  Yokogawa Europe B.V.
  Euroweg 2, 3825 HD Amersfoort, THE NETHERLANDS.

1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurring during the warranty period shall basically be repaired free of change.
- If any problems are experienced with this product, the customer should contact the Yokogawa representative from which this product was purchased or the nearest Yokogawa office.
- If a problem arises with this product, please 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.
- The party responsible for the cost of fixing the problem shall be determined by Yokogawa following an investigation conducted by Yokogawa.

■ **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.
- Malfunction or damage due to a failure to handle, use, or store this product in accordance with the design specifications.
- 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 Trademark and Patent Notice

■ Trademarks

In this document, trademarks or registered trademarks are not marked with “™” or “ ® ”. Product names and company names in this document are trademarks or registered trademarks of the respective companies.

■ Notice

NO RIGHTS OR LICENSES, EXPRESS OR IMPLIED, ARE GRANTED TO USE THIRD-PARTY DEVICES IN COMBINATION WITH THESE PRODUCTS IN A WIRELESS MESH NETWORK, OR TO USE THIRD-PARTY SERVICES TO ACCESS, MONITOR OR CONTROL THESE PRODUCTS IN A WIRELESS MESH NEWORK VIA THE INTERNET OR ANOTHER EXTERNAL WIDE AREA NETWORK.

■ Patent Marking

Covered by one or more claims of patents: http://sipcollc.com/patent-list/ and http://intusiq.com/patent-list/.

1.4 Control of Pollution Caused by the Product

■ EU RoHS

This product is in conformity with the following standard:
EN IEC 63000 (Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances)

■ China RoHS

This is an explanation for the product based on “Control of Pollution caused by Electronic Information Products” in the People’s Republic of China.

電子情報製品汚染制御管理弁法（中国版 RoHS）

产品中有害物质或元素的名称及含量

型号	部件名称	有害物质					
		铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
FN510 现场无线多功能模块	壳体（金属）	×	○	○	○	○	○
	壳体（塑料）	○	○	○	○	○	○
	基板组件	×	○	○	○	○	○
	电缆	×	○	○	○	○	○

○：表示该部件的所有均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以下。

×：表示至少该部件的某些均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以上。

环保使用期限：



该标识适用于 SJ /T11364 中所述，在中华人民共和国销售的电子电气产品的环保使用期限。

注）该年数为“环保使用期限”，并非产品的质量保证期。

2. Notes on Handling

The FN510 is fully factory-tested before shipment. When the FN510 delivered, check the appearance for damage, and also check that the mounting parts shown in Figure 2.1 are included with your shipment. If “No Mounting Bracket” is indicated, no mounting bracket is included.

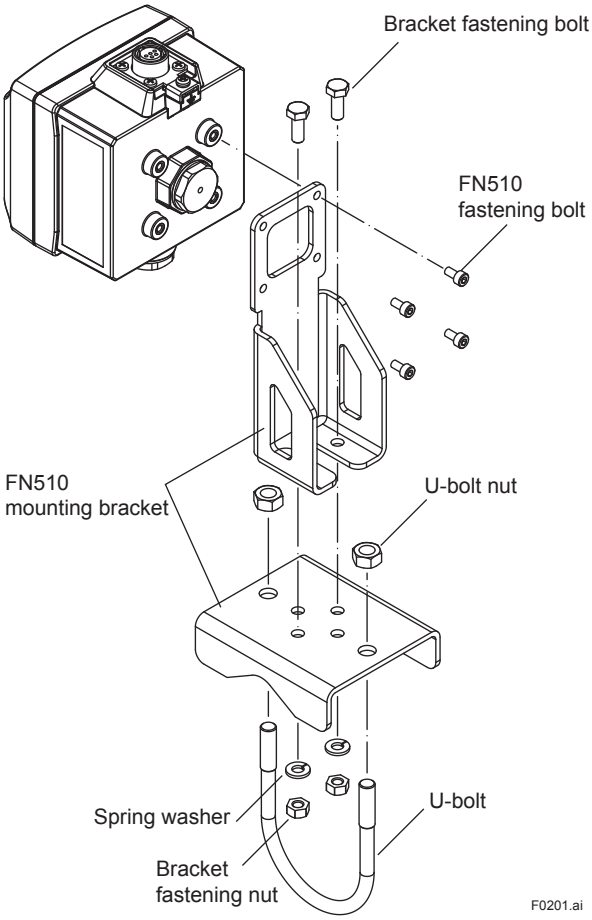


Figure 2.1 FN510 Mounting Hardware

Table 2.1 FN510 Mounting Hardware

Item	Qty
FN510 mounting bracket	1
FN510 fastening bolt	4
Bracket fastening bolt	2
Bracket fastenig nut	2
Spring washer	2
U-bolt	1
U-bolt nut	2

■ Bundled Items

- User’s Manual (IM01W03E03-01EN)
- FN510 mounting hardware

  When specified mounting bracket.
- Protection cap (optional specifications)
- Wired tag plate(optional specifications)
- EU DECLARATION OF CONFORMITY (F9091HZ), if optional specification /KS27 is specified.

2.1 Check the Model Name and Configuration

The model name and configuration are indicated on the nameplate. Verify that the configuration indicated in the “Model and Suffix Code” in subsection 11.2 is in compliance with the specifications written on the order sheet. Manual number omitting the language code at the end is printed on the nameplate.

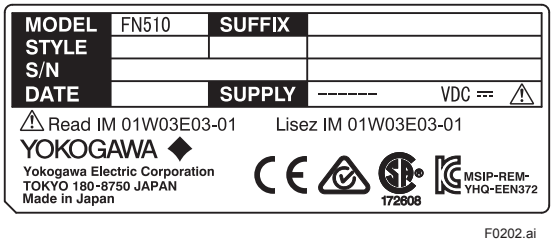


Figure 2.2 Nameplate

MODEL: Specified model code.
SUFFIX: Specified suffix code.
STYLE: Style code.
S/N: Serial number.
DATE: Date of manufacture.
SUPPLY: Supply voltage.
TOKYO 180-8750 JAPAN: The manufacturer name and the address*1.

*1 “180-8750” is a zip code which represents the following address. 2-9-32 Nakacho, Musashino-shi, Tokyo Japan

2.2 Transport

To prevent damage while in transit, leave the FN510 in the original shipping container until it reaches the installation site. For transportation of batteries, refer to subsection 8.5 “Handling Batteries”.

2.3 Storage

When storing this product, observe the following precautions.

1. Chose a storage location that satisfies the following requirements.
   - A location that is not exposed to rain or water.
   - A location subject to a minimum of vibration or impact.
   - The following temperature and humidity range is recommended. Ordinary temperature and humidity (25°C, 65%) are preferable.
     Temperature: -40 to 85°C
     Humidity : 0 to 100% RH
     (no condensation)
2. If at all possible, store the FN510 in factory-shipped condition, that is, in the original shipping container.
3. Preferably remove the batteries for storage. For maximum battery life, the storage temperature should not exceed 30°C.

NOTE

When storing FN510 with a battery pack, it is recommended to put the FN510 in Deep Sleep mode to conserve the batteries. For details on how to switch to Deep Sleep mode, refer to subsection 7.3.14 “Switching to the Deep Sleep Mode”.

2.4 Selecting the Installation Location

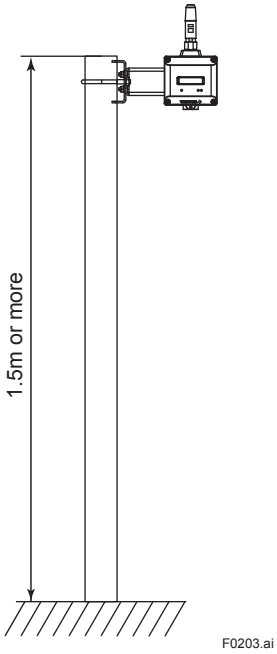
Although this product is designed to operate in a harsh environment, to maintain stability and accuracy, the following is recommended.

■ Wireless Communication

NOTE

The installation location of this product must meet the following conditions:

- Install this product to be perpendicular to the ground.
- When using a remote antenna cable, regardless of the installing direction of the FN510, install the FN110 to be perpendicular to the ground.
- Install the FN110 at least 1.5 m above the ground or floor.



- Ensure that there are no obstacles such as walls or pipes within a 30 cm radius of the FN110.
- Confirm that each field wireless equipment can see the antenna of other devices which locate within its own communication range.

■ Ambient Temperature

It is preferable to not to expose the instrument to extreme temperatures or temperature fluctuations. If FN510 is exposed to radiation heat a thermal protection system or appropriate ventilation is recommended.

■ Environmental Requirements

Do not allow FN510 to be installed in a location that is exposed to corrosive atmospheric conditions. When using this product in a corrosive environment, ensure the location is well ventilated.
The unit and its wiring should be protected from exposure to rainwater.

■ Impact and Vibration

It is recommended that the FN510 be installed in a location that is subject to a minimum amount of impact and vibration.

■ Installation of Explosion Protected Products

An explosion protected products is certified for installation in a hazardous area containing specific gas types. See subsection 2.6 “Installation of an Explosion Protected Instrument”.

2.5 Use of a Transceiver

IMPORTANT

Although FN510 has been designed to resist high frequency electrical noise, if a radio transceiver is used near the FN510 or its external wiring, the FN510 may be affected by high frequency noise pickup. To test this, start out from a distance of several meters and slowly approach the FN510 with the transceiver while observing the measurement loop for noise effects. Thereafter use the transceiver outside the range where the noise effects were first observed.

2.6 Installation of an Explosion Protected Instrument

If a customer makes a repair or modification to an intrinsically safe instrument and the instrument is not restored to its original condition, its intrinsically safe construction may be compromised and the instrument may be hazardous to operate. Please contact Yokogawa before making any repair or modification to an instrument.

WARNING

- Electrostatic charge may cause an explosion hazard. Avoid any actions that cause the generation of electrostatic charge, such as rubbing surface of the product with a dry cloth.
- To satisfy IP66, IP67 and Type 4X,
  - Connect to a connector JR13WPI-5P (Hirose Electric) and tightened with a specified torque.
  - Apply waterproof glands to the electrical connection port, at models FN510-xx-x00, FN510-xx-x01, and FN510-xx-x02.
- The instrument modification or parts replacement by other than an authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.
- When replacing the battery pack, be sure to minimize the risk of explosion from electrostatic discharge. Avoid any actions that cause the generation of electrostatic charge, such as rubbing surface of the battery pack and product with a dry cloth.

CAUTION

- This instrument has been tested and certified as being intrinsically safe. Please note that severe restrictions apply to this instrument’s construction, installation, external wiring, maintenance and repair. A failure to abide by these restrictions could make the instrument a hazard to operate.
- Be careful to make sure that an intrinsically safe apparatus, intrinsically safe devices, and wiring to connect them are arranged so that current and voltage are not induced by electromagnetic or electrostatic induction in the intrinsically safe circuit in order to prevent impairment of the intrinsically safe and explosion protected performance of the intrinsically safe circuit.

2.6.1 FM Approval (United States)

(1) Technical Data

Caution for FM Approval (US) Intrinsically safe type.

Note 1. Model FN510 Field Wireless Multi-Function Module with optional code /FS17 for potentially explosive atmospheres:

- Applicable Standards:
  FM 3600, FM 3610, FM 3810,
  ANSI/UL 60079-0 Ed. 7 (2020),
  ANSI/UL 60079-11 Ed. 6 (2018),
  ANSI/UL 61010-1, NEMA 250,
  ANSI/IEC 60529
- Certificate number: FM21US0046X
- Specific Ex marking:
  IS CL I/II/III GP CDEFG T4
  For connection to CL I/II/III GP ABCDEFG
  CL I ZN 0 AEx ia [ia IIC] IIB T4
- Enclosure: Type 4X and IP66
- Temperature Class: T4
- Ambient Temperature:
  –40 to 70°C (–40 to 158°F)

Note 2. Electrical Parameters
(Refer to the Control Drawing)

Note 3. Installation

- Installation should be in accordance with local installation requirements. (Refer to the Control Drawing)

Note 4. Signals
Terminals: RS485 Modbus communication
Connector: RS485 Communication

Note 5. Dielectric strength
Dielectric strength≥ 500 V AC, r.m.s.,1 min

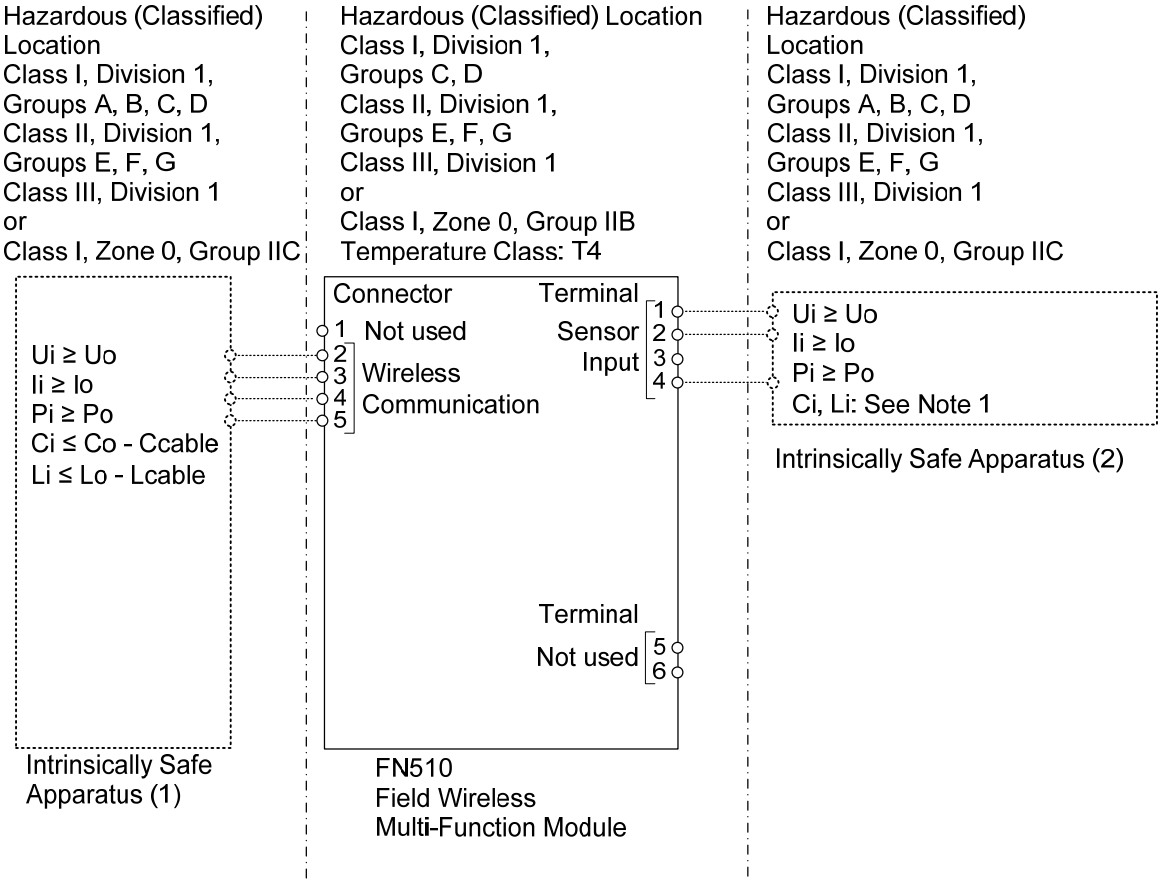
Note 6. Specific conditions of use

- Precaution shall be taken to minimize the risk from electrostatic discharges on the non-metallic parts of the equipment.
- The connector (FN110 terminal) on the enclosure contains aluminum and is considered a potential risk of ignition caused by impact or friction. When the equipment is mounted in Zone 0, it shall be installed in such a way that, even in the event of rare incidents, an ignition source due to impact and/or friction sparks is excluded.
- Rigid type conduit shall not be used as the wiring method.

Note 7. WARNING

- A modification of the equipment would no longer comply with the construction described in the certificate documentation.
- Only personnel authorized by Yokogawa Electric Corporation can repair the equipment
- USE ONLY YOKOGAWA BATTERY PACK F9090FC or F9090GC
- THE BATTERY PACK CAN BE REPLACED IN A HAZARDOUS LOCATION.
  THE BATTERY PACK HAS SURFACE RESISTIVITY GREATER THAN 1G OHM AND MUST BE PROPERLY INSTALLED IN THE ENCLOSURE OF THE EQUIPMENT.
  CARE MUST BE TAKEN DURING TRANSPORTATION TO AND FROM THE POINT OF INSTALLATION TO PREVENT ELECTROSTATIC CHARGE BUILD-UP
- CELLS MUST BE CHANGED IN A NON-HAZARDOUS AREA ONLY
- SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
- Be sure to use the specified battery pack and batteries. For details, refer to section 8.5 “Handling Batteries.”
- With an intrinsically safe products, the battery pack is replaceable in a hazardous area. During the replacement work, make sure that dust and water droplets do not enter inside the products.
  For details on how to replace the battery pack, refer to section 8.3 “Replacing the Battery Pack.”

Yokogawa Electric Corporation		Model		FN510, FN310 (Modbus)			
Title	Control drawing of FN510 (FN510-xx-AxxB, FN510-xx-AxxC, US / Canada)						
No.	IFM045-A82	Page	1	Revision	1	Date	2020-09-11



Wireless Communication
(Connector)
Uo : 5.88 V
Io : 483 mA
Po : 779 mW
Co : 5.82 µF
Lo : 25 µH

Sensor Input
(Terminal 1 to 4)
Uo : 5.88 V
Io : 145 mA
Po : 213 mW
Co : 43 µF
Lo : 1.6 mH

Yokogawa Electric Corporation		Model		FN510, FN310 (Modbus)	
Title	Control drawing of FN510 (FN510-xx-AxxB, FN510-xx-AxxC, US / Canada)				
No.	IFM045-A82	Page	2	Revision	1

Notes:

1. As allowable connection values of an Intrinsically Safe Apparatus (2),
   the following conditions of (a) or (b) must be satisfied.
   (a) {(Li × 100 ≤ Lo) or (Ci × 100 ≤ Co)} and {Li ≤ (Lo - Lcable) and Ci ≤ (Co - Ccable)}
   (b) { Li ≤ (Lo / 2 - Lcable) and Ci ≤ (Co / 2 - Ccable)} and
   [{(Ci + Ccable) ≤ 600 nF for Group IIC} or {(Ci + Ccable) ≤ 1 µF for Group IIA, IIB}]

2. (For US) No revision to this drawing without prior approval of FM.

3. (For US) Installation must be in accordance with the National Electrical Code (NFPA 70), ANSI/ISA-RP12.06.01, and relevant local codes.

4. (For Canada) Installation must be in accordance with the Canadian Electrical Code Part I (C22.1), ANSI/ISA-RP12.06.01, and relevant local codes.

5. (For US) IS Apparatus (or Associated Apparatus) must be FM approved.

6. Control equipment connected to IS Apparatus (or Associated Apparatus) must not use or generate a voltage more than Um of the control equipment.

7. The equipment satisfies the requirements for IP66 and Type 4X only when it is connected to a connector JR13WPI-5P (Hirose Electric) and tightened with a torque of 1.2-2.0 N·m. Appropriate type of plug must be used in accordance with the instructions.

8. The control drawing of IS Apparatus (or Associated Apparatus) must be followed when installing the equipment.

2.6.2 FM Approval (Canada)

(1) Technical Data

Caution for FM Approval (Canada) Intrinsically safe type.

Note 1. Model FN510 Field Wireless Multi-Function Module with optional code /CS17 for potentially explosive atmospheres:

- Applicable Standards:
  CAN/CSA-C22.2 No.0
  C22.2 No. 60079-0:19
  CAN/CSA-C22.2 No. 60079-11:14
  CAN/CSA-C22.2 No. 61010-1
  CAN/CSA-C22.2 No. 94.1
  CAN/CSA-C22.2 No. 94.2
  CAN/CSA-C22.2 No. 60529
- Certificate number: FM21CA0032X
- Specific Ex marking:
  Ex ia [ia IIC Ga] IIB T4 Ga
  IS CL I/II/III GP CDEFG T4
  For connection to CL I/II/III GP ABCDEFG
- Enclosure: IP66, Type 4X
- Ambient temperature: −40 °C ≤ Ta ≤ +70 °C
- Temperature Class: T4

Note 2. Electrical Parameters
(Refer to the Control Drawing)

Note 3. Installation

- Installation should be in accordance with local installation requirements.
  (Refer to the Control Drawing)

Note 4. Signals
Terminals: RS485 Modbus communication
Connector: RS485 Communication

Note 5. Dielectric strength
Dielectric strength≥ 500 V AC, r.m.s.,1 min

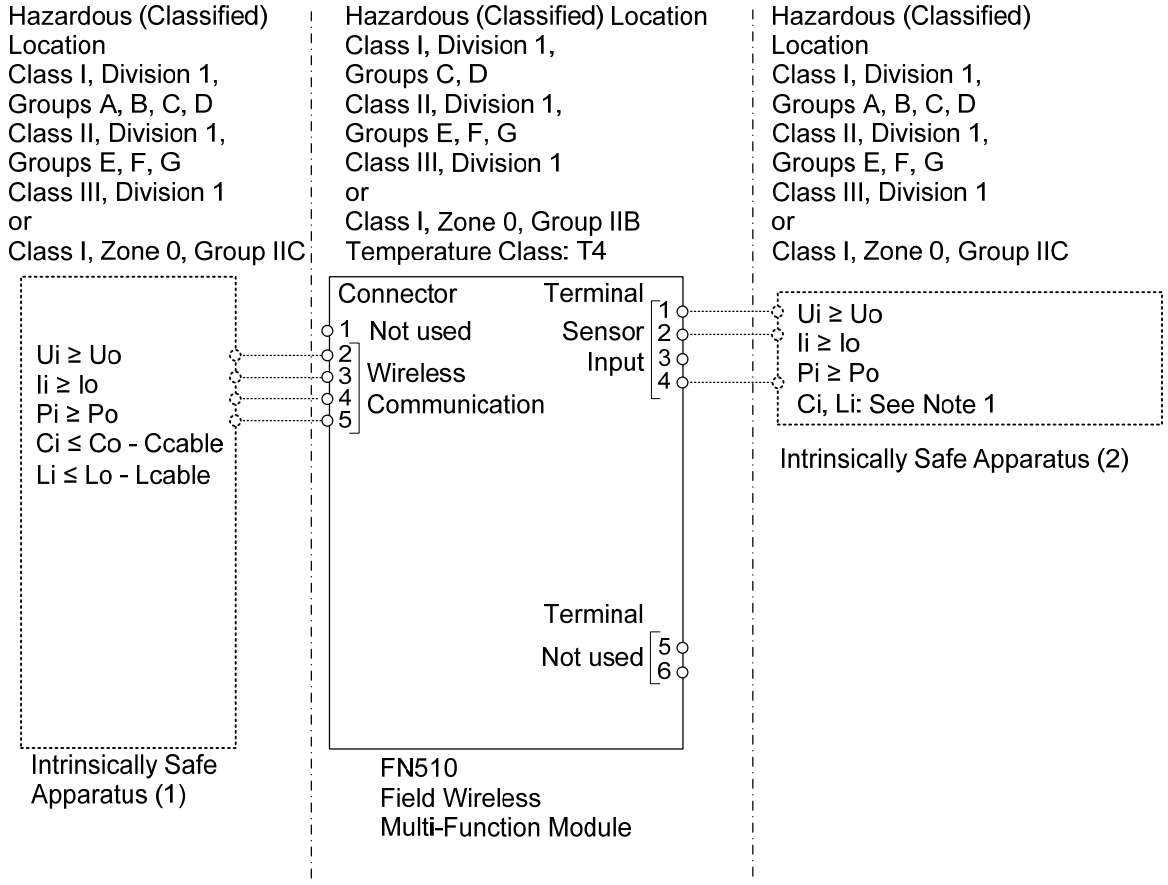
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- The connector (FN110 terminal) on the enclosure contains aluminum and is considered a potential risk of ignition caused by impact or friction. When the equipment is mounted in Zone 0, it shall be installed in such a way that, even in the event of rare incidents, an ignition source due to impact and/or friction sparks is excluded.
- Rigid type conduit shall not be used as the wiring method.

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  CARE MUST BE TAKEN DURING TRANSPORTATION TO AND FROM THE POINT OF INSTALLATION TO PREVENT ELECTROSTATIC CHARGE BUILD-UP
- CELLS MUST BE CHANGED IN A NON-HAZARDOUS AREA ONLY
- SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
- Be sure to use the specified battery pack and batteries. For details, refer to section 8.5 “Handling Batteries.”
- With an intrinsically safe products, the battery pack is replaceable in a hazardous area. During the replacement work, make sure that dust and water droplets do not enter inside the products.
  For details on how to replace the battery pack, refer to section 8.3 “Replacing the Battery Pack.”

Yokogawa Electric Corporation		Model		FN510, FN310 (Modbus)			
Title	Control drawing of FN510 (FN510-xx-AxxB, FN510-xx-AxxC, US / Canada)						
No.	IFM045-A82	Page	1	Revision	1	Date	2020-09-11



Wireless Communication
(Connector)
Uo : 5.88 V
Io : 483 mA
Po : 779 mW
Co : 5.82 µF
Lo : 25 µH

Sensor Input
(Terminal 1 to 4)
Uo : 5.88 V
Io : 145 mA
Po : 213 mW
Co : 43 µF
Lo : 1.6 mH

Yokogawa Electric Corporation		Model		FN510, FN310 (Modbus)	
Title	Control drawing of FN510 (FN510-xx-AxxB, FN510-xx-AxxC, US / Canada)				
No.	IFM045-A82	Page	2	Revision	1

Notes:

1. As allowable connection values of an Intrinsically Safe Apparatus (2),
   the following conditions of (a) or (b) must be satisfied.
   (a) {(Li × 100 ≤ Lo) or (Ci × 100 ≤ Co)} and {Li ≤ (Lo - Lcable) and Ci ≤ (Co - Ccable)}
   (b) { Li ≤ (Lo / 2 - Lcable) and Ci ≤ (Co / 2 - Ccable)} and
   [{(Ci + Ccable) ≤ 600 nF for Group IIC} or {(Ci + Ccable) ≤ 1 µF for Group IIA, IIB}]

2. (For US) No revision to this drawing without prior approval of FM.

3. (For US) Installation must be in accordance with the National Electrical Code (NFPA 70), ANSI/ISA-RP12.06.01, and relevant local codes.

4. (For Canada) Installation must be in accordance with the Canadian Electrical Code Part I (C22.1), ANSI/ISA-RP12.06.01, and relevant local codes.

5. (For US) IS Apparatus (or Associated Apparatus) must be FM approved.

6. Control equipment connected to IS Apparatus (or Associated Apparatus) must not use or generate a voltage more than Um of the control equipment.

7. The equipment satisfies the requirements for IP66 and Type 4X only when it is connected to a connector JR13WPI-5P (Hirose Electric) and tightened with a torque of 1.2-2.0 N·m. Appropriate type of plug must be used in accordance with the instructions.

8. The control drawing of IS Apparatus (or Associated Apparatus) must be followed when installing the equipment.

WARNING / AVERTISSEMENT

- DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES
  - QUAND LE MATÉRIEL EST UTILISÉ DANS DES ENDROITS DANGEREUX, ÉVITER TOUTE ACTION QUI GENERENT CHARGES ELECTROSTATIQUES, COMME FROTTANT AVEC UN CHIFFON SEC
- QUAND LE MATÉRIEL EST UTILISÉ DANS LA ZONE 0, IL DOIT ÊTRE INSTALLÉE TELLE QUE, MÊME EN CAS D'INCIDENTS RARE, SOURCES D'ALLUMAGE DUE AUX IMPACTS ET SPARKS FRICTION EST EXCLUE
- POUR ÉVITER ALLUMAGE DES ATMOSPHÉRES INFLAMMABLES OU COMBUSTIBLES, LISEZ, COMPRENDRE ET RESPECTER ELS PROCÉDURES D'ENTRETIEN DU CONSTRUCTEUR
- UTILISER UNIQUEMENT DES ACCUMULATEUR F9090FC OU F9090GC (YOKOGAWA)
- LA BATTERIE PEUT ÊTRE REMPLACÉ DANS DES ENDROITS DANGEREUX. BATTERIE POSSÈDE UNE RÉSISTANCE DE SURFACE QUI EST SUPÉRIEURE À 1 G OHM ET DOIT ÊTRE INSTALLÉ DANS L'ENVELOPPE DE L'ÉQUIPEMENT, SOIN PENDANT LE TRANSPORT ET DEPUIS LE POINT DE L'INSTALLATION POUR ÉVITER CHARGE ÉLECTROSTATIQUE BUILD-UP
- CELLULES DOIVENT ÊTRE CHANGÉ DANS UN ENDROIT UNCLASSIFIED SEULEMENT
- SUBSTITUTION DE COMPOSANTS PEUT IMPAIR LA SÉCURITÉ INTRINSÈQUE
- Be sure to use the specified battery pack and batteries. For details, refer to section 8.5 "Handling Batteries."
- With an intrinsically safe products, the battery pack is replaceable in a hazardous area. During the replacement work, make sure that dust and water droplets do not enter inside the products. For details on how to replace the battery pack, refer to section 8.3 "Replacing the Battery Pack."

2.6.3 ATEX Certification

(1) Technical Data

Caution for ATEX Intrinsically safe type.

Note 1. Model FN510 Field Wireless Multi-Function Module with optional code /KS27 for potentially explosive atmospheres:

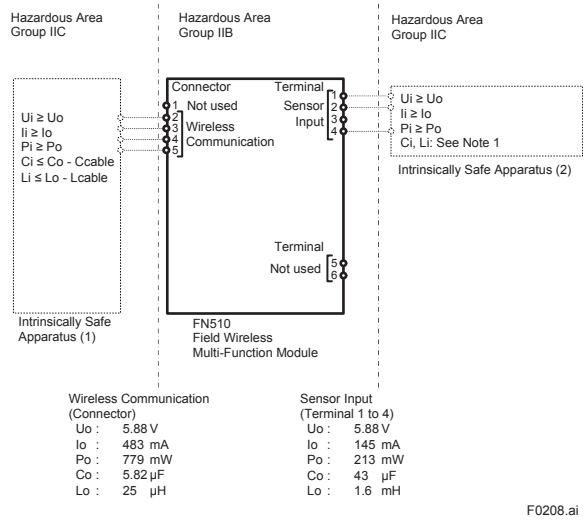
- Certificate number: FM15ATEX0071X
- Applicable Standards: EN IEC 60079-0, EN 60079-11, EN 60079-28
- Type of Protection and Marking code: II 1G Ex ia op is [ia IIC Ga] IIB T4 Ga
- Group: II
- Category: 1 G
- Amb. Temp.: –40 to 70°C (–40 to 158°F)
- Enclosure: IP66 in accordance with only IEC 60529
- Signals
  Terminals: RS485 Modbus communication
  Connector: RS485 Communication
- Dielectric strength
  Dielectric strength≥ 500 V AC, r.m.s.,1 min

Note 2. Electrical Parameters (Refer to the Control Drawing)

Note 3. Installation

- Installation should be in accordance with local installation requirements. (Refer to the Control Drawing)

[Control Drawing, IFM045-A85 for ATEX Certification]



F0208.ai

*1 In allowable connection of an Intrinsically Safe Apparatus (2), the following conditions of (a) or (b) must be satisfied.
(a) {(Li × 100 ≤ Lo) or (Ci × 100 ≤ Co)} and {Li ≤ (Lo - Lcable) and Ci ≤ (Co - Ccable)}
(b) { Li ≤ (Lo / 2 - Lcable) and Ci ≤ (Co / 2 - Ccable)} and [{(Ci + Ccable) ≤ 600 nF for Group IIC} or {(Ci + Ccable) ≤ 1µF for Group IIA, IIB}]

Note 4. Battery Pack

- Use only YOKOGAWA battery pack F9090FC or F9090GC.

WARNING

- Be sure to use the specified battery pack and batteries. For details, refer to section 8.5 “Handling Batteries.”
- With an intrinsically safe Products, the battery pack is replaceable in a hazardous area. During the replacement work, make sure that dust and water droplets do not enter inside the Products. For details on how to replace the battery pack, refer to section 8.3 “Replacing the Battery Pack.”

Note 5. Specific conditions of use

- Precaution shall be taken to minimize the risk from electrostatic discharges on the non-metallic parts of the equipment.
- The connector (FN110 terminal) on the enclosure contains aluminum and is considered a potential risk of ignition caused by impact or friction. When the equipment is mounted in a potentially explosive atmosphere requiring Equipment Category 1 G, it shall be installed in such a way that, even in the event of rare incidents, an ignition source due to impact and/or friction sparks is excluded.

(2) Operation

WARNING

Take care not to generate mechanical sparking when access to the instrument and peripheral devices in a hazardous location.
OTENTIAL ELECTROSTATIC CHARGING HAZARD
In hazardous areas, avoid any actions which generate electrostatic charges, such as rubbing the equipment with a dry cloth.
To prevent electrostatic discharge caused by static charge built up on the operator, ground the operator through conductive shoes and floors and by wearing antistatic work clothes to prevent charge build-up.
Avoid any actions that cause the generation of electrostatic charge, such as rubbing surface of Battery Pack and product with a dry cloth.
If static electricity cannot be suppressed, check that the surrounding atmosphere does not contain explosive gas or steam before replacing the Battery Pack.

(3) Maintenance and repair

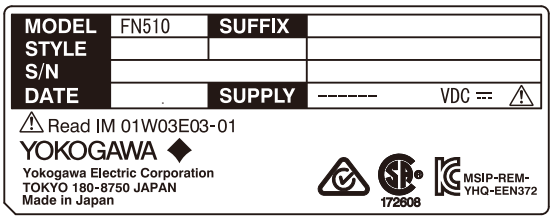
WARNING

The instrument modification or parts replacement by other than an authorized Representative of Yokogawa Electric Corporation is prohibited and will void the certification.

- A modification of the equipment would no longer comply with the construction described in the certificate documentation.
- Only personnel authorized by Yokogawa Electric Corporation can repair the equipment
- USE ONLY YOKOGAWA BATTERY PACK F9090FC or F9090GC
- THE BATTERY PACK CAN BE REPLACED IN A HAZARDOUS LOCATION. THE BATTERY PACK HAS SURFACE RESISTIVITY GREATER THAN 1G OHM AND MUST BE PROPERLY INSTALLED IN THE ENCLOSURE OF THE EQUIPMENT. CARE MUST BE TAKEN DURING TRANSPORTATION TO AND FROM THE POINT OF INSTALLATION TO PREVENT ELECTROSTATIC CHARGE BUILD-UP
- CELLS MUST BE CHANGED IN A NON-HAZARDOUS AREA ONLY
- SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY

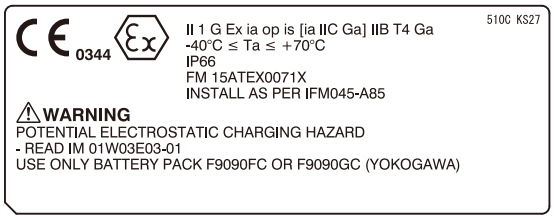
(4) Name Plate

- Name Plate



F0209.ai

- Name Plate for intrinsically safe type



F0210.ai

2.6.4 IECEx Certification

(1) Technical Data

Caution for IECEx Intrinsically safe type.

Note 1. Model FN510 Field Wireless Multi-Function Module with optional code /SS27 for potentially explosive atmospheres:

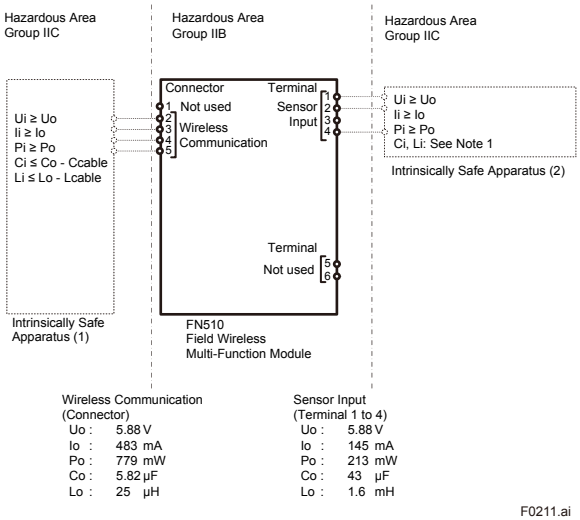
- Certificate number: IECEx FMG 15.0042X
- Applicable Standards: IEC60079-0, IEC60079-11, IEC60079-28
- Type of Protection and Marking code: Ex ia op is [ia IIC Ga] IIB T4 Ga
- Enclosure: IP66 in accordance with only IEC 60529
- Ambient Temperature: –40 to 70°C (–40 to 158°F)
- Signals
  Terminals: RS485 Modbus communication
  Connector: RS485 Communication
- Dielectric strength
  Dielectric strength≥ 500 V AC, r.m.s.,1 min

Note 2. Electrical Parameters
(Refer to the Control Drawing)

Note 3. Installation

- Installation should be in accordance with local installation requirements.
  (Refer to the Control Drawing)

[Control Drawing, IFM045-A85 for IECEx Certification]



F0211.ai

*1 In allowable connection of an Intrinsically Safe Apparatus (2), the following conditions of (a) or (b) must be satisfied.

(a) {(Li × 100 ≤ Lo) or (Ci × 100 ≤ Co)} and
{Li ≤ (Lo - Lcable) and Ci ≤ (Co - Ccable)}

(b) { Li ≤ (Lo / 2 - Lcable) and Ci ≤ (Co / 2 - Ccable)} and
[{(Ci + Ccable) ≤ 600 nF for Group IIC} or
{(Ci + Ccable) ≤ 1µF for Group IIA, IIB}]

Note 4. Battery Pack

- Use only YOKOGAWA battery pack F9090FC or F9090GC.

WARNING

- Be sure to use the specified battery pack and batteries. For details, refer to section 8.5 “Handling Batteries.”
- With an intrinsically safe products, the battery pack is replaceable in a hazardous area. During the replacement work, make sure that dust and water droplets do not enter inside the products. For details on how to replace the battery pack, refer to section 8.3 “Replacing the Battery Pack.”

Note 5. Specific conditions of use

- Precaution shall be taken to minimize the risk from electrostatic discharges on the non-metallic parts of the equipment.
- The connector (FN110 terminal) on the enclosure contains aluminum and is considered a potential risk of ignition caused by impact or friction. When the equipment is mounted in a potentially explosive atmosphere requiring EPL Ga, it shall be installed in such a way that, even in the event of rare incidents, an ignition source due to impact and/or friction sparks is excluded.

(2) Operation

WARNING

Take care not to generate mechanical sparking when access to the instrument and peripheral devices in a hazardous location.
POTENTIAL ELECTROSTATIC CHARGING HAZARD
In hazardous areas, avoid any actions which generate electrostatic charges, such as rubbing the equipment with a dry cloth.
To prevent electrostatic discharge caused by static charge built up on the operator, ground the operator through conductive shoes and floors and by wearing antistatic work clothes to prevent charge build-up.
Avoid any actions that cause the generation of electrostatic charge, such as rubbing surface of Battery Pack and product with a dry cloth.
If static electricity cannot be suppressed, check that the surrounding atmosphere does not contain explosive gas or steam before replacing the Battery Pack.

(3) Maintenance and repair

WARNING

The instrument modification or parts replacement by other than an authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

- A modification of the equipment would no longer comply with the construction described in the certificate documentation.
- Only personnel authorized by Yokogawa Electric Corporation can repair the equipment
- USE ONLY YOKOGAWA BATTERY PACK F9090FC or F9090GC
- THE BATTERY PACK CAN BE REPLACED IN A HAZARDOUS LOCATION. THE BATTERY PACK HAS SURFACE RESISTIVITY GREATER THAN 1G OHM AND MUST BE PROPERLY INSTALLED IN THE ENCLOSURE OF THE EQUIPMENT. CARE MUST BE TAKEN DURING TRANSPORTATION TO AND FROM THE POINT OF INSTALLATION TO PREVENT ELECTROSTATIC CHARGE BUILD-UP
- CELLS MUST BE CHANGED IN A NON-HAZARDOUS AREA ONLY
- SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY

2.7 EMC Conformity Standards

EN61326-1 Class A Table 2, EN55011 Class A

CAUTION

This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

2.8 Safety Requirement Standards

Applicable standard:
EN61010-1, CAN/CSA-C22.2 No.61010-1

(1) Pollution Degree 2

“Pollution degree” describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. “2” applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation must be expected.

(2) Installation Category I

“Overvoltage category (Installation category)” describes a number which defines a transient overvoltage condition. It implies the regulation for impulse withstand voltage. “I” applies to electrical equipment which is supplied from the circuit when appropriate transient overvoltage control means (interface) are provided.

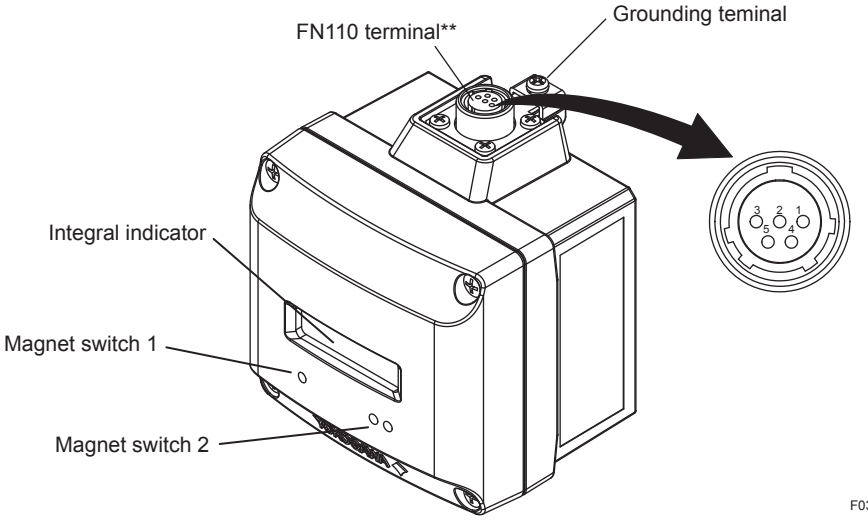
(3) Indoor/Outdoor use

It can be used in indoors and outdoors.

(4) Altitude of installation site

Max. 3,000 m above sea level

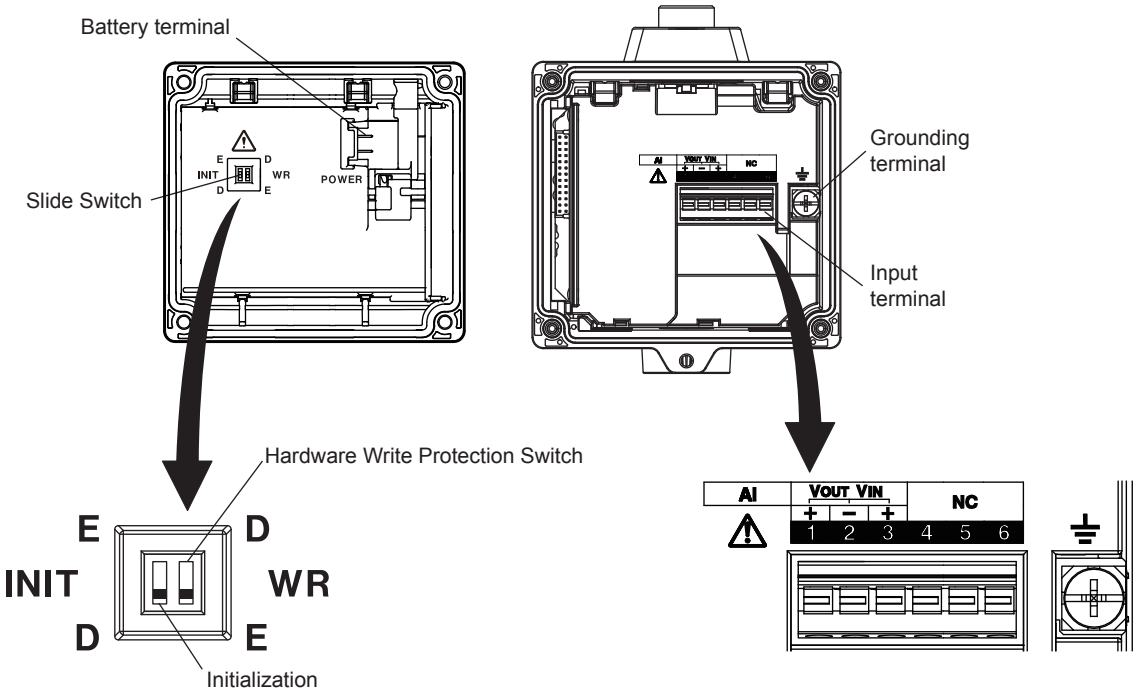
3. Component Names



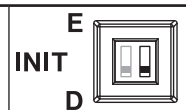
F0301.ai

Pin	Signal
1	Frame Ground *
2	Signal Ground
3	Power Supply
4	Transmit/Receive Data positive
5	Transmit/Receive Data negative

* Wired to the grounding terminal inside the FN510 housing.
** Connector type of FN510: JR13WRI-5S (connector mating with type of JR13WPI-5P)



F0302.ai

Hardware Write Protection Switch (WR)		
Write Protection Switch Position *1	 F0303.ai	 F0304.ai
Write Protection	No (Write enabled)	Yes *2 (Write disabled)

*1: Initialization switch is not used. Set to D side (disabled) always.
*2: When the switch is D side (write protection setting), provisioning is acceptable. For details of provisioning, refer to subsection 6.3 “Connecting to the Field Wireless Network”.

Terminal	Signal
	AI
1	Power Supply +
2	Power Supply GND and Input Signal -
3	Input Signal +
4	No Connection
5	No Connection
6	No Connection
⏚	Frame Ground

4. Installation

4.1 Precautions

- Before installing FN510, read the cautionary notes in subsection 2.4 “Selecting the Installation Location”.
- For additional information on the ambient conditions allowed at the installation location, refer to subsection 11.1 “Standard Specifications”.

IMPORTANT

Connector Protection

The FN110 terminal is covered with a cap during shipping. Keep the cap attached until connecting the FN110 or remote antenna cable to protect the inside connection part. The unscrewed cap should be stored in order to replace it immediately after the FN110 or remote antenna cable is removed. If there is a possibility that get wet with water, order FN510 with optional specification for a protection cap.

Installation Work

- When performing on-site pipe fitting work that involves welding, use case to prevent the welding current to damage the FN510.
- Do not use the FN510 as a foothold.

NOTE

- Before using FN510, install FN110. For detail on how to install FN110, refer to subsection 4.2.1 “Installation of FN110”.
- To connect FN510 to the field wireless network, information for connecting to the field wireless devices needs to be set beforehand. Refer to subsection 6.3 “Connecting to the Field Wireless Network”.

4.2 Mounting

FN510 is installed on a 50A (2-inch) pipe with mounting bracket. Refer to subsection 4.2.2 “Mounting of FN510” for details. For detail on how to install FN110, refer to subsection 4.2.1 “Installation of FN110”. For using remote antenna cable, refer to subsection 5.3 “Installation and Connection of FN110”.

4.2.1 Installation of FN110

Install FN110 to the FN110 terminal of FN510. Before installation, remove the unscrewed cap attached to the connector and remove the battery pack from FN510.

The installation procedure is as follows.

1. Check the direction of the pin, connect FN110 to FN510.
2. Tighten the lock nut to torque of 1.2 N•m.

Removal is the reverse procedure of the installation.

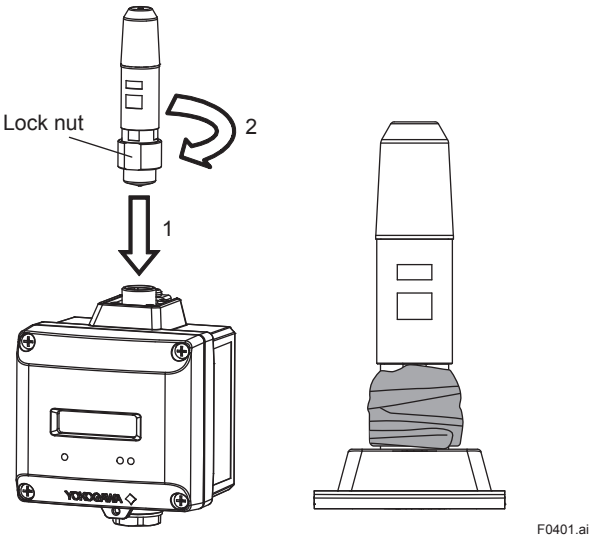


Figure 4.1 Installation of FN110 and Sealing of the Connector

CAUTION

- To maintain a good connection between the modules, protect the connector from the corrosive atmosphere by the following treatment.
  1. Clean the connection to be protected.
  2. Wind the butyl rubber self-bonding tape around the connection. See the manual of the tape about the winding.
  3. To protect the butyl rubber self-bonding tape from the environment such as ultraviolet rays and so on, wind vinyl tape (or a vinyl type self-bonding tape) on it.
  4. When the tape is necessary, prepare appropriate tape for the installing environment.

  Do not cover the nameplate by the tapes.
- When a remote antenna cable is used for installing FN110, refer to subsection 5.3 “Installation and Connection of FN110”.
- Remove the battery pack before installing FN110. Refer to subsection 8.3 “Replacing the Battery Pack” for the battery pack removing.
- When installing FN110, fix the FN110 by tightening the lock nut. Screwing by holding the FN110 housing may cause failure such as cable disconnection. The same manner should be taken when removing the FN110.

4.2.2 Mounting of FN510

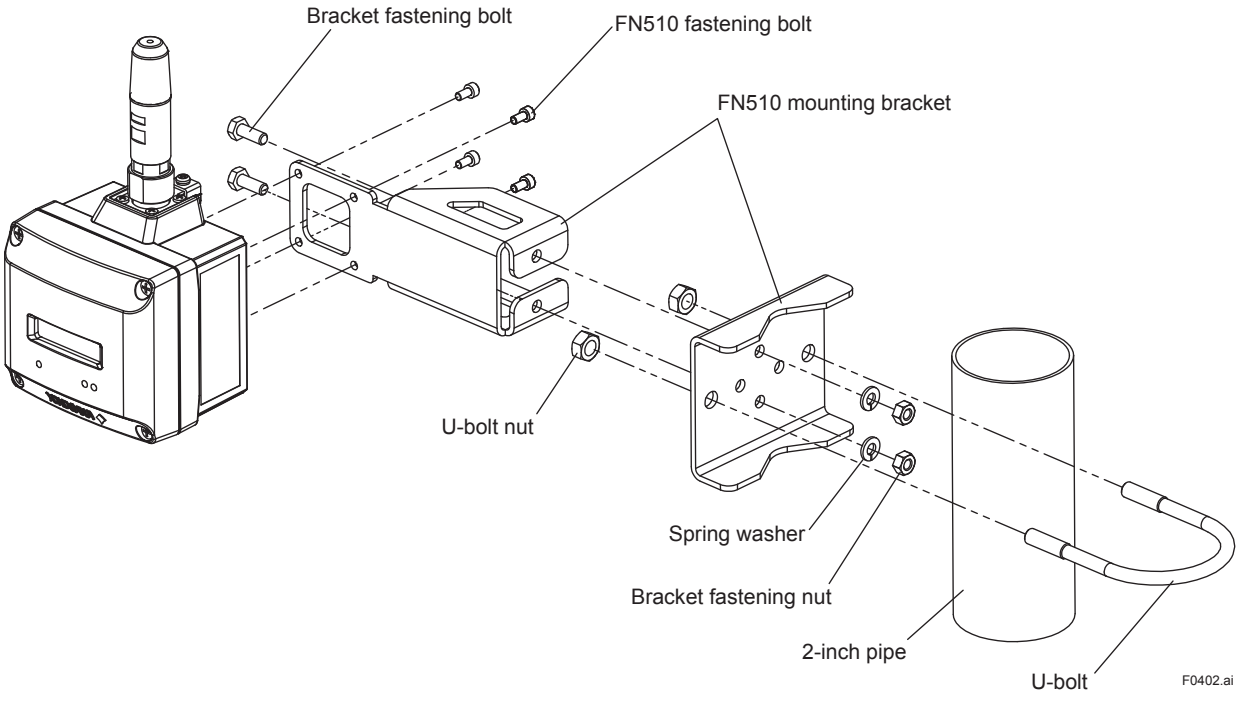


Figure 4.2 Vertical Pipe Mounting

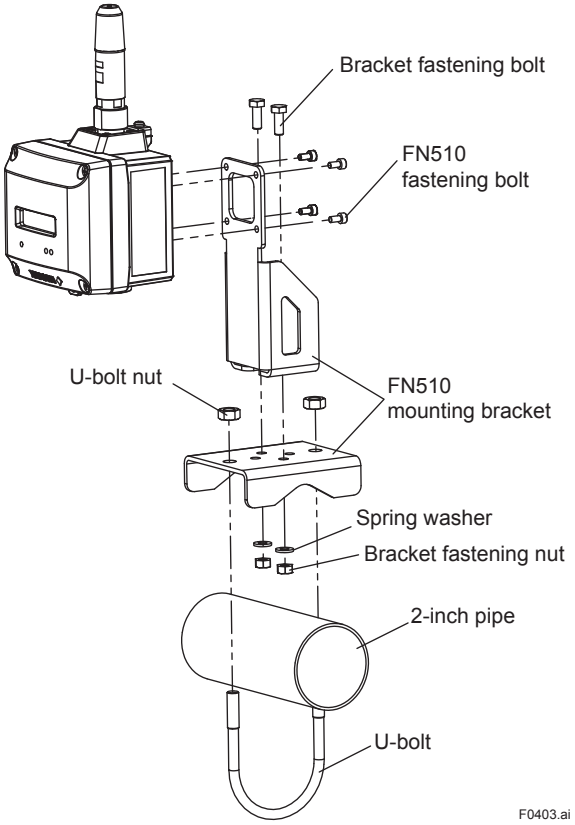


Figure 4.3 Horizontal Pipe Mounting

■ To install FN510 on a 50A (2-inch) pipe, follow the procedure below.

1) Assemble the FN510 mounting bracket.
2) Install FN510 to the mounting bracket using provided bolt (4) with a torque 1.4 N•m.
3) Install FN510 mounting bracket to the 2-inch pipe by U-bolt.

5. Wiring

5.1 Notes on Wiring

IMPORTANT

- Apply a waterproofing sealant to the threads of the connection port. (It is recommended that you use non-hardening sealant made of silicon resin for waterproofing.)
- Lay wiring as far away as possible from electrical noise sources such as large transformers, motors and power supplies.
- Remove the wiring connection dust-caps before wiring.
- When you open the front panel, pay great attention to the environmental conditions in order to prevent dust and water droplets entering inside the product.
- To run wiring to the sensor, pay sufficient attention to the wiring parameters described in section 2.6 “Installation of an Explosion Protected Instrument.”
- To prevent electrical noise, the signal cable and the power cable must not be housed in the same conduit.

NOTE

- When wiring where the ambient temperature is high or low, use the cable or wire that appropriate to that place.
- When the maximum operating temperature is more than 60°C, use the cable of 85°C or higher temperature rating.

5.2 Cable Selection

For wiring the sensor and the FN510, use a shielded multi-core cable of AWG24 to 14.

■ Applicable Cables

Cables for industrial equipment such as;

- Control cable

Use the following grounding cable.

■ Applicable Cables

Insulated cables for industrial equipment such as;

- 600 V polyvinyl chloride insulated wires (IV); JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV); JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV); JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL1015/ UL1007) Wire size
- Core: AWG14 to 13 (2 mm^2 to 2.6 mm^2)

Termination

- Use a ring tongue terminal for M4 terminals: with an insulation sleeve

5.3 Installation and Connection of FN110

IMPORTANT

The FN110 terminal is covered with a cap at the time of deliverty. Keep the cap attached until connecting the FN110 or remote antenna cable to protect the inside connection part. The unscrewed cap should be stored in order to replace it immediately after the FN110 or remote antenna cable is removed. If there is a possibility that get wet with water, order FN510 with optional specification for a protection cap.

5.3.1 Installation of FN110

■ Location of FN110

Mount the FN110 at the proper location according to the wireless environment described in subsection 2.4 “Selecting the Installation Location”. The mounting to the pipe such as 50A (2-inch) pipe needs to secure the enough strength to endure a strong wind, vibration and so on. The FN110 must be mounted vertically.

■ Fixing of FN110

Fix the FN110 on a 50A (2-inch) pipe with the mounting bracket provided as the remote antenna cable option.

■ To install FN110 with mounting bracket, follow the procedure below.

1) Assemble the mounting bracket and fix it on a 50A (2-inch) pipe.
2) Connect the remote antenna cable to the FN110.
3) Protect the connection as necessary. For details of the protection, refer to subsection 4.2.1 “Installation of FN110”.
4) Fix the FN110 to the mounting bracket.

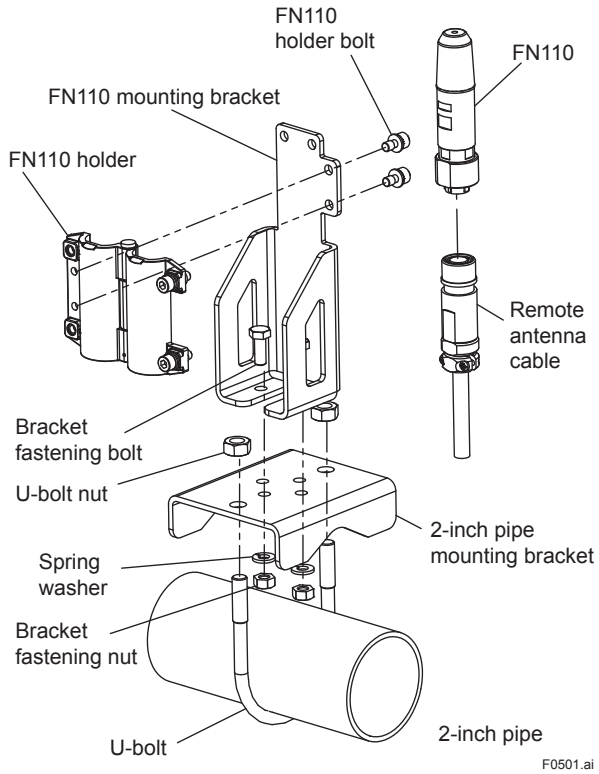


Figure 5.1 Horizontal Pipe Mounting of FN110

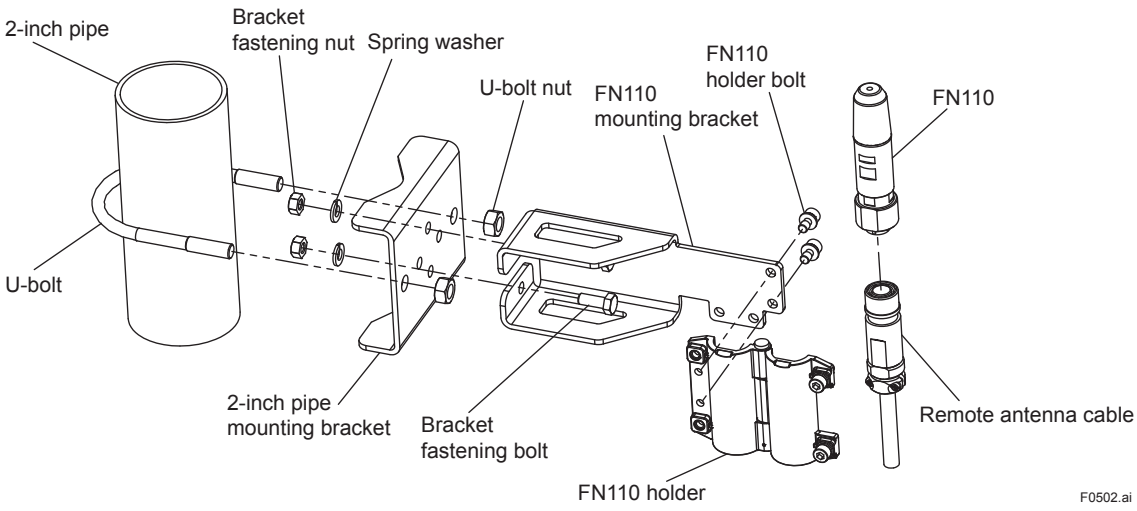


Figure 5.2 Vertical Pipe Mounting of FN110

5.3.2 Connection of FN110

■ To install FN110 with remote antenna cable, follow the procedure below.

Remove the battery pack from FN510 before connecting the remote antenna cable.

1. Connect the FN110 and the FN510 with the dedicated remote antenna cable. Tighten the connector of the remote antenna cable with a torque of 1 to 1.2 N•m. The minimum bending radius should be more than 100 mm.
2. Protect the connectors of the FN110 and remote antenna cable as necessary. For details of the protection, refer to subsection 4.2.1 “Installation of FN110”.
3. Fix the remote antenna cable to an appropriate structure to protect the cable from the vibration, wind, and so on. The minimum bending radius for fixing in the state maintained for a long period should be more than 100 mm.

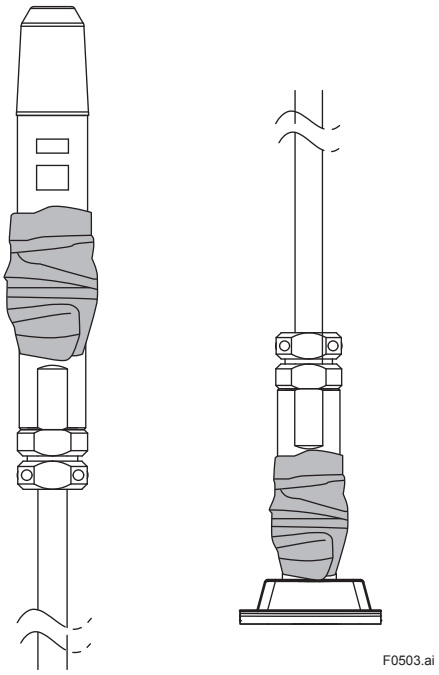


Figure 5.3 Sealing of the Remote Antenna Cable

CAUTION

Use the dedicated remote antenna cable provided by Yokogawa as accessories for FN110.

- The remote antenna cable and other cables should not be bundled together.
- Remove the battery pack before installing FN110. Refer to subsection 8.3 “Replacing the Battery Pack” for the battery pack removing.

5.4 Connection of Accelerometer

Strip the insulated cover of the cable end.

5.4.1 Connecting Input Terminal and Grounding Terminal

■ Vertical Connection

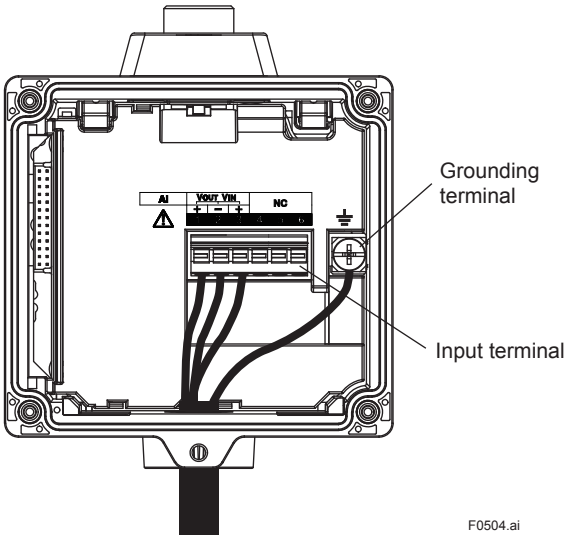


Figure 5.4 Connection example

The cable gland is not included. Prepare a cable gland with a flat gasket matching the electrical connection.
When M20 female is selected for vertical connection, tighten the cable gland with a torque of 2 N•m. When G 1/2 female or 1/2 NPT female is selected for vertical connection, fix the hexagonal shape part by tool and tighten the cable gland as shown in Figure 5.5.

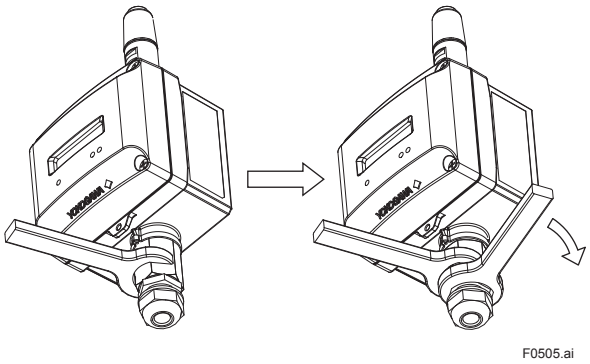


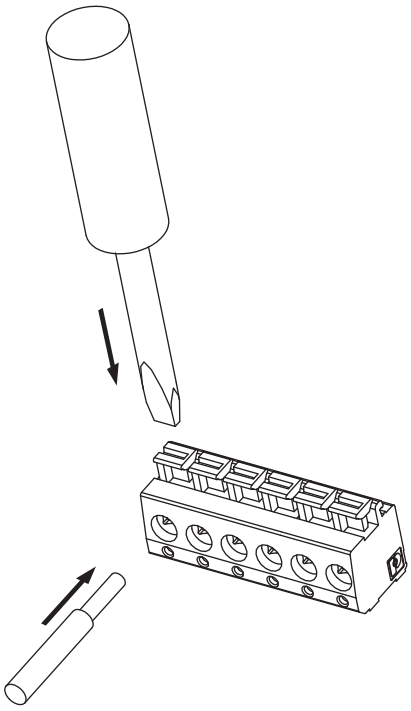
Figure 5.5 Tightening the Cable Gland

IMPORTANT

When using a cable gland, apply a water proofing sealant to the threads of the cable gland. (It is recommended that you use non-hardening sealant made of silicon resin for waterproofing.)

■ Input Terminal

Input terminal is a spring terminal. When using a solid conductor cable or with sleeve, connect the cable to the input terminal. When using a standard conductor, push down the top of a cable inlet and insert the cable. To unplug the cable, push down the top of a cable inlet and unplug the cable.



F0506.ai

Figure 5.6 Connecting to the Input Terminal

■ Wiring external device

When wiring LN01, connect LN01 to FN510 shown as Figure 5.7.

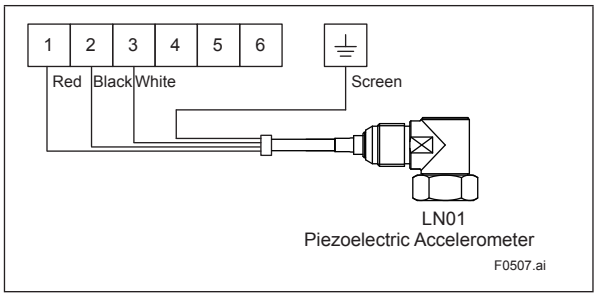


Figure 5.7 External Device Connection Diagram

CAUTION

- Remove the battery pack before wiring. Refer to subsection 8.3 “Replacing the Battery Pack” for the battery pack removing.
- Connect the devices to the correct terminals. Operating with incorrect connection may cause damage to FN510 or connected devices.

5.5 Grounding

Class D grounding with the grounding resistance of 100Ω or less is necessary. To connect the grounding cable to FN510 directly, use the ground terminal on the top of the housing.

Do not share the ground wiring with other devices.

■ Ground Wiring

Connect the grounding cable to ground terminal on the top of the housing.

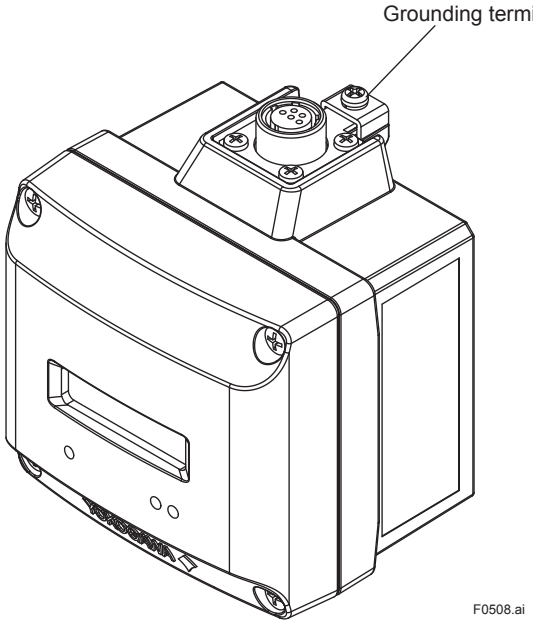


Figure 5.8 Grounding Terminal

CAUTION

Grounding is required for safe operation.

■ Input Cable Wiring

The input cable shield should be connected to grounding terminal inside of the housing.

Please refer to Figure 5.4 and Figure 5.7.

IMPORTANT

Proper grounding is necessary to maintain the function and performance of this product. When the grounding is inadequate, the equipment may be damaged.
Refer to TI 01W01A58-01EN for details of grounding method and precautions.

- Use a grounding cable of AWG 14 (2 mm^2) or more between the grounding electrode and the grounding terminal of this product, and connect with the shortest route.
- Select the grounding cable that has a structure of adequately protects against mechanical damage, chemical or electrical degradation, electrodynamic force and thermodynamic force for connection of the grounding electrode and the ground terminal of this product.

6. Operation

6.1 Preparation for Starting Operation

NOTE

- Before using FN510, connect FN110. For detail on how to install the FN110, refer to subsection 4.2.1 “Installation of FN110”.
- It is required to set security and network information to enable this product to be connected to the field wireless network. For more details, refer to subsection 6.3 “Connecting to the Field Wireless Network”.

(1) Checking Installation and Wiring

Ensure that the FN510, FN110 and the connected device are installed correctly according to the procedures described in section 4 “Installation”, and section 5 “Wiring”.

(2) Power On and Connecting to the Field Wireless Network

Insert batteries into the battery case, and install to the FN510. For details of installation of battery, refer to subsection 8.3 “Replacing the Battery Pack” and subsection 8.4 “Replacing the Batteries”. Provisioning is to set the security and network information. For details of provisioning, refer to section 6.3 “Connecting to the Field Wireless Network”.

(3) Checking the parameter of the FN510

Use the device configuration tool and confirm that the connected device and the FN510 operate properly. Check parameter values or change the setpoints as necessary.

IMPORTANT

Use the device configuration tool and confirm that the Sensor Type parameter setting in TRANCEDUCER block matches the input wiring. If the parameter is not properly set, change the parameter to match the input type. After changing the parameter, FN510 will restart automatically.

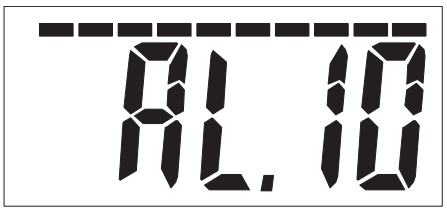
The integral indicator can be used to confirm that this product is operating properly. For details on how to confirm this, refer to subsection 7.4 “Self-Diagnostics”.

ISA100 devices display self-diagnostic information in an easy-to-understand manner using four categories (Function check, Maintenance required, Failure, and Out of specification) according to NAMUR NE107*

* NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”

■ Confirm operation status by integral indicator

If the FN510 is faulty, an error code is displayed.



F0601.ai

Figure 6.1 Integral Indicator with Error Code

NOTE

If any of the above errors are indicated on the display of the integral indicator or the device configuration tool, refer to subsection 8.10.3 “Errors and Countermeasures” for the corrective action.

■ Verify and Change the FN510 Setting and Values

The followings are the required settings of the FN510. These parameters must be set before starting operation.

- TRANSDUCER block:Sensor Type
  Select the type of sensor to be connected to FN510.
  Select “Not Used” when using as a routing device without the connected sensor.
- TRANSDUCER block: Sensing Mode
  Select when connecting the accelerometer. For more detail, refer 7.3.8 “Sensor Input”.

6.2 Starting Operation

Ensure that the installation, the wiring, the network connection, and the behavior of the FN510 are correct before starting operation.

IMPORTANT

Close the front panel. Tighten each screws to a torque of 0.7 N•m.

6.3 Connecting to the Field Wireless Network

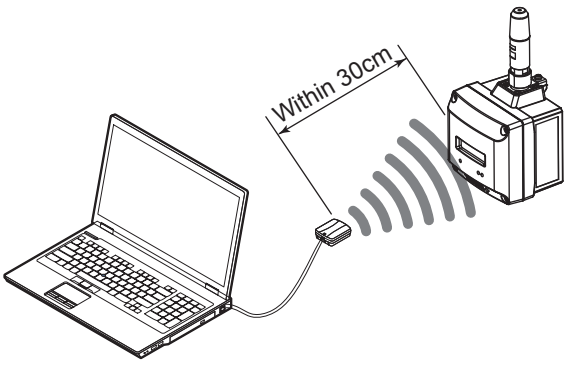
■ Preparation Work Prior to Connecting to a Field Wireless Network

FN510 does not need to be connected with a physical wire. Instead of physical wiring, to set security and field network information is required. This procedure is called a provisioning.
FN510 supports provisioning via infrared communication using a provisioning device and can be securely connected to a network. If the provisioning information is not set, the FN510 cannot be connected to the field wireless network.

NOTE

Before provisioning, connect the FN110. For detail on how to install the FN110, refer to subsection 4.2.1 “Installation of FN110”.

For details on provisioning using a provisioning device, connecting to a field wireless network and the setting procedure, refer to the User’s Manual, FieldMate Versatile Device Management Wizard (IM 01R01A01-01E), and YFGW410 Field Wireless Management Station (IM 01W02D01-01EN).



F0602.ai

Figure 6.2 Provisioning Example

■ Provisioning Work

This subsection describes provisioning work using FieldMate as the provisioning device.
Provisioning work performs provisioning for each field wireless device using FieldMate and an infrared adapter.
When using the Yokogawa recommended near infrared adapter for the provisioning device, the distance between the front panel of this product and the infrared surface of the near infrared adapter should be within 30 cm. For details on the Yokogawa recommended infrared adapter, refer to subsection 8.2 “Recommended Products List”.
Perform the following provisioning tasks.

- Setting provisioning information
- Creating a provisioning information file

(1) Setting provisioning information

Set the device tag and Network ID using a FieldMate provisioning function. The device tag, Network ID, and join key are set in the field wireless device. It is not necessary to input a join key because FieldMate automatically generates it.

- Setting device tag
  The device tag is used for the user to recognize the field wireless device.
- Setting Network ID
  This is the Network ID for the field wireless network to which the field wireless device is connected. Set a value from 2 to 65535.

The field wireless device is connected to the field wireless network corresponding to the Network ID set by provisioning work.

(2) Creating a provisioning information file

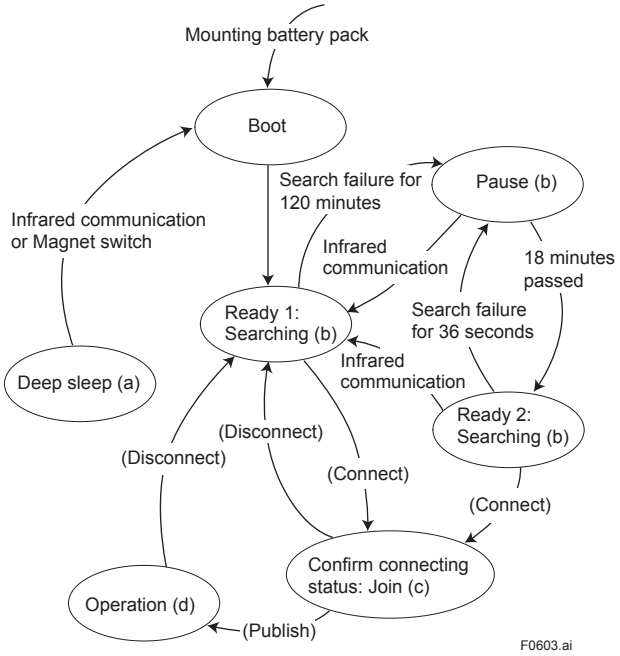
The following provisioned information is stored in the provisioning information file.

- Network ID
- Device tag
- EUI64
- Join key
- Provisioner (name of the user who performed provisioning work by Field Mate)
- Date (Time and date when provisioning was performed by FieldMate)

This provisioning information file is required to load from the field wireless configurator to the field wireless integrated gateway. Store the file carefully.

■ Connecting to a Field Wireless Network

The action after installing the battery pack varies depending on the silence setting.
Mounting the battery pack automatically starts a search for the field wireless network and the device goes into the join state when the field wireless gateway is found. If the field wireless gateway is not found and a specified time based on the silence mode has elapsed, a cycle of 18-minute pause and 36-second search is repeated until the device can join the field wireless network.
For details on the silence setting, refer to subsection 7.3.15 “Switching to the Silence Mode”.



* By using a magnet switch or field device configuration tool, transitions to the Deep sleep state from any state.

Figure 6.3 Wireless Status Transition

(a) Deep Sleep



Figure 6.4 Display showing Deep Sleep State

Displays for 2 seconds in deep sleep setting, and then turns off.

(b) Ready and Pause



Figure 6.5 Display showing Ready and Pause State

(c) Confirm Connecting Status



Figure 6.6 Display showing Confirm Connecting Status State

(d) Join



Figure 6.7 Display showing Join State

NOTE

If the FN510 searches the field wireless network for long time low ambient temperature condition, sometimes error “AL.20 LOWBAT” is displayed on the integral indicator. It occurs because of battery characteristics even when using new batteries. After joining to the field wireless network, this error will be cleared within one hour if battery has no failure.

6.4 Display Contents of the Integral Indicator

■ Write Protect Status



When the write protection is enabled, the lock icon is displayed in the upper left corner of the integral indicator. For details on how to enable write protection, refer to subsection 7.3.13 “Write Protect”.

■ Wireless Communication Status

The status of wireless communication is indicated by the segments on the top of the integral indicator. Possible status are shown in Table 6.1.

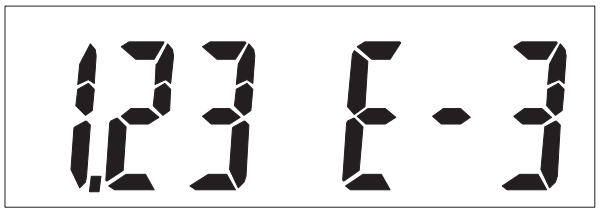
Table 6.1 Wireless Communication Status List

Integral Indicator	Wireless Communication Status
No display	• RePause (Silence mode) • ReOperation (Published)
	• Ready • Joining
	• Confirm connecting status
	• Startup • Alert

■ Process Value

The process value obtained from the sensor is displayed. For detail information about the display settings, refer to section 7 “Setting Parameters”.

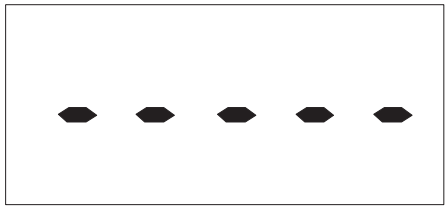
When sensor data is more than five orders of magnitude, scroll automatically after 2 seconds.



F0608.ai

Figure 6.8 Example of Data Scrolling

When publish is not configured, following is displayed.

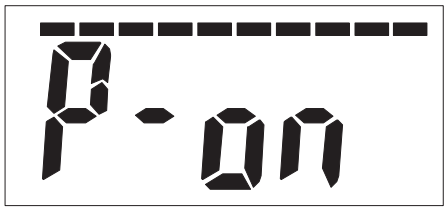


F0609.ai

Figure 6.9 Display when Publish is not Configured

■ Startup

When the FN510 powers on or recovers from the deep sleep mode, the following is displayed for 2 seconds.

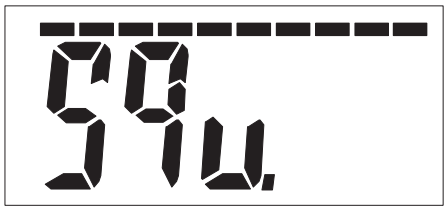


F0610.ai

Figure 6.10 Display after Power On

■ Setting the Find Device

When UAPMO.Find Device is set from FieldMate or PRM, following is displayed. The duration the display can be changed. For detail on how to display, refer to section 7 “Setting Parameters”.



F0611.ai

Figure 6.11 Display when Find Device is set

6.5 Shutting Down

When shut down the FN510, remove the battery pack or set the FN510 to deep sleep mode by the device configuration tool or magnet switch.

NOTE

- Refer to subsection 8.3 “Replacing the Battery Pack” for the battery pack removing.
- When storing the FN510 with a battery pack inserted, it is recommended to put the FN510 into deep sleep mode to conserve battery power. For details on how to switch to deep sleep mode, refer to subsection 7.3.14 “Switching to the Deep Sleep Mode”.

7. Setting Parameters

FN510 can remotely handle sensor type changes, Tag No. setup, monitoring of self-diagnostic results, according to communication with the field wireless configuration tool or the device configuration tool.

7.1 Preparation for Parameter Setting

This product can be set parameters via infrared port or field wireless network.
When setting parameters via field wireless network, connect this product to the field wireless network.
For details on how to connect to the field wireless network, refer to subsection 6.3 “Connecting to the Field Wireless Network”.
When setting parameters via infrared port, use the infrared port on front of this product.

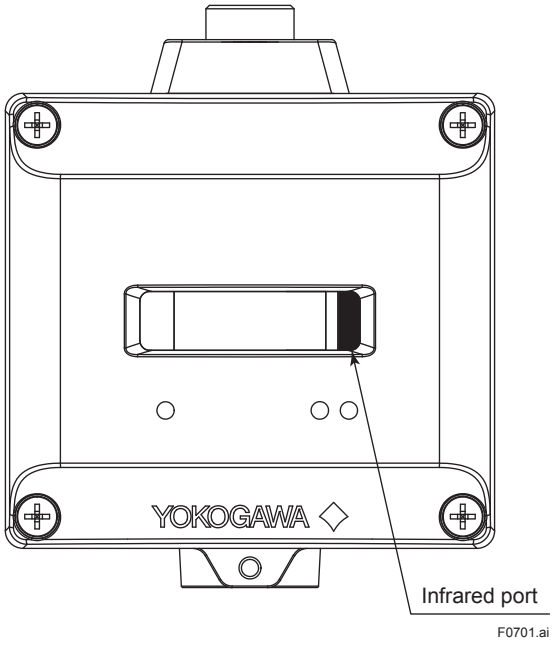


Figure 7.1 Connecting the Configuration Tool

7.2 Preparing Software

7.2.1 Softwares for the Field Wireless Configuration Tool and the Device Configuration Tool

Before using the device configuration tool, confirm that CF/DD and DeviceDTM for this product are installed in the device configuration tool.
Refer to the following website for the latest information on CF/DD and DeviceDTM.
<http://www.field-wireless.com/>

CF(Capabilities File)/DD(Device Description)

A CF file contains information, such as the vendor of the field device, its model and revision, available types of process data (flow rate, temperature, pressure, etc.), and number of data items. A DD file contains the information on parameters, such as data structures and attributes.

DeviceDTM

DeviceDTM, (Device Type Manager) is driver software for field devices provided based on the FDT (Field Device Tool) technology.

The field wireless configuration tool or the device configuration tool allows to read the device information.
Refer to subsection 8.2 “Recommended Products List” for the field wireless configuration tool or the device configuration tool of our recommendation.
Refer to the following website for the latest configuration tool and DeviceFile.
<http://www.field-wireless.com/>

7.2.2 Software Download

Software download function allows to update wireless field device software via ISA100.11a wireless communication. For details, refer to YFGW410 Field Wireless Management Station (IM 01W02D01-01EN).

7.3 Setting Parameters

7.3.1 Parameter Usage and Selection

Before setting a parameter, please see the following table for a summary of how and when each parameter is used.

IMPORTANT

After setting and sending data with the field wireless configuration tool or the device configuration tool, wait 30 seconds before turning off the FN510. If it is turned off too soon, the setting will not be stored in the FN510.

Table 7.1 Parameter Usage and Selection

Item	Description
Tag No.	Sets the Tag No. for Device Tag (software tag). The Tag No. can be set sixteen characters (alphanumeric characters, including –).
Output mode	Allows outputting process value and self-diagnostic information via field wireless network. Either or all of sensor value (AI1/AI2/AI3 block: Process Value), and self-diagnostic information (UAPMO block: Diagnostic Status) can be set output data.
Sensing function settings	Select the Sensing mode, Sampling Frequency, and Sampling Points depending on the vibration to measure.
Integral indicator display setting	Sets the process value to display on the LCD.
Software write protect	Prohibit writing the setting data.
Memo field	Memo field available to write the check date, checker and others (as an adjustment information), or anything.
Operational mode	Set the operational mode of the sensor and integral indicator, etc.

NOTE

Some of the parameter setting are in the dialogue form called method, by following the on-line instructions you can configure the parameters easily.

7.3.2 Parameter Setting Flow

Figure 7.2 shows the flow of setting parameter. Please set these parameter according to the function to use.

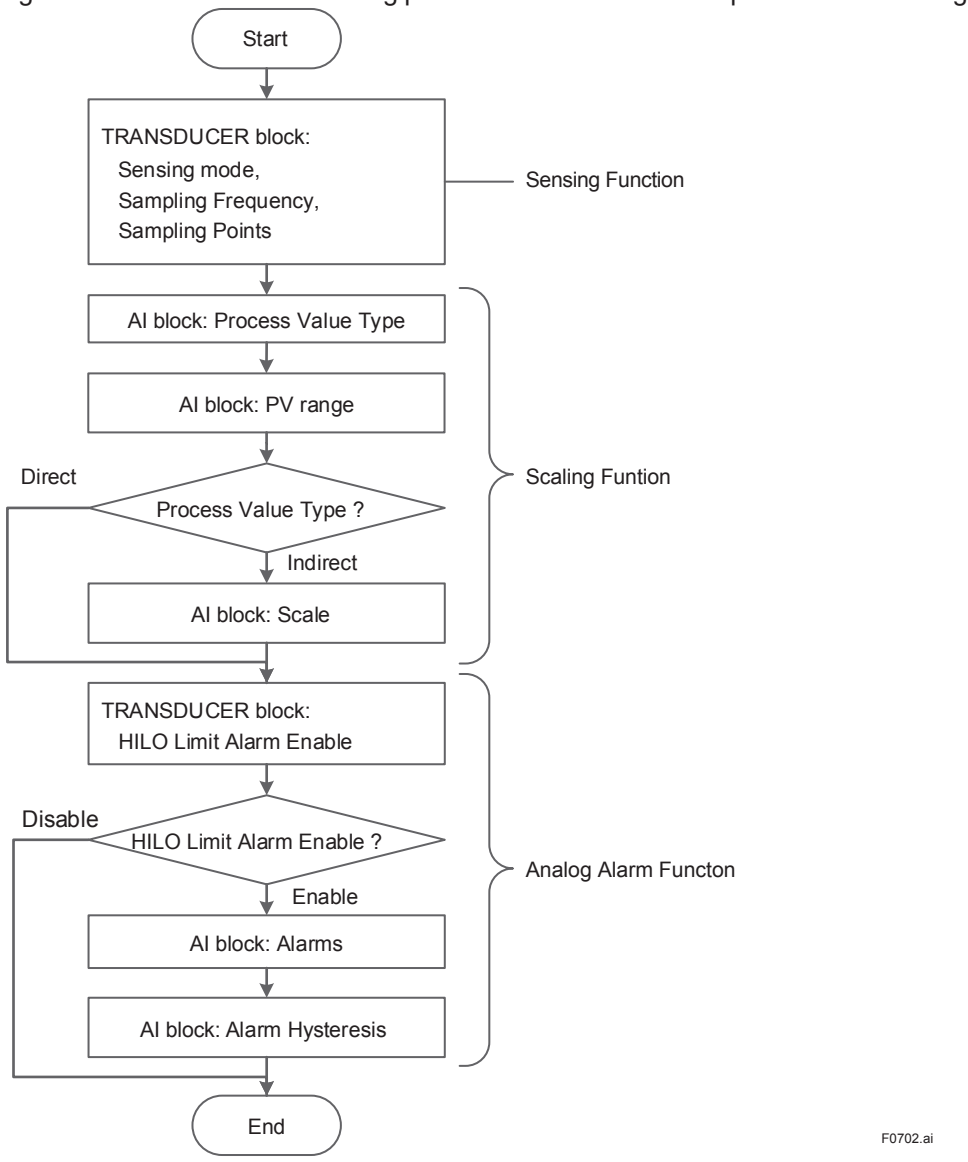


Figure 7.2 Parameter Setting Flow

(1) Sensing Function
If you want to connect the accelerometer set the Sensing Function depending on the vibration to measure. For more information please refer to Section 7.3.8 “Sensor input”.

NOTE

Select sensing function parameter when connecting the accelerometer.

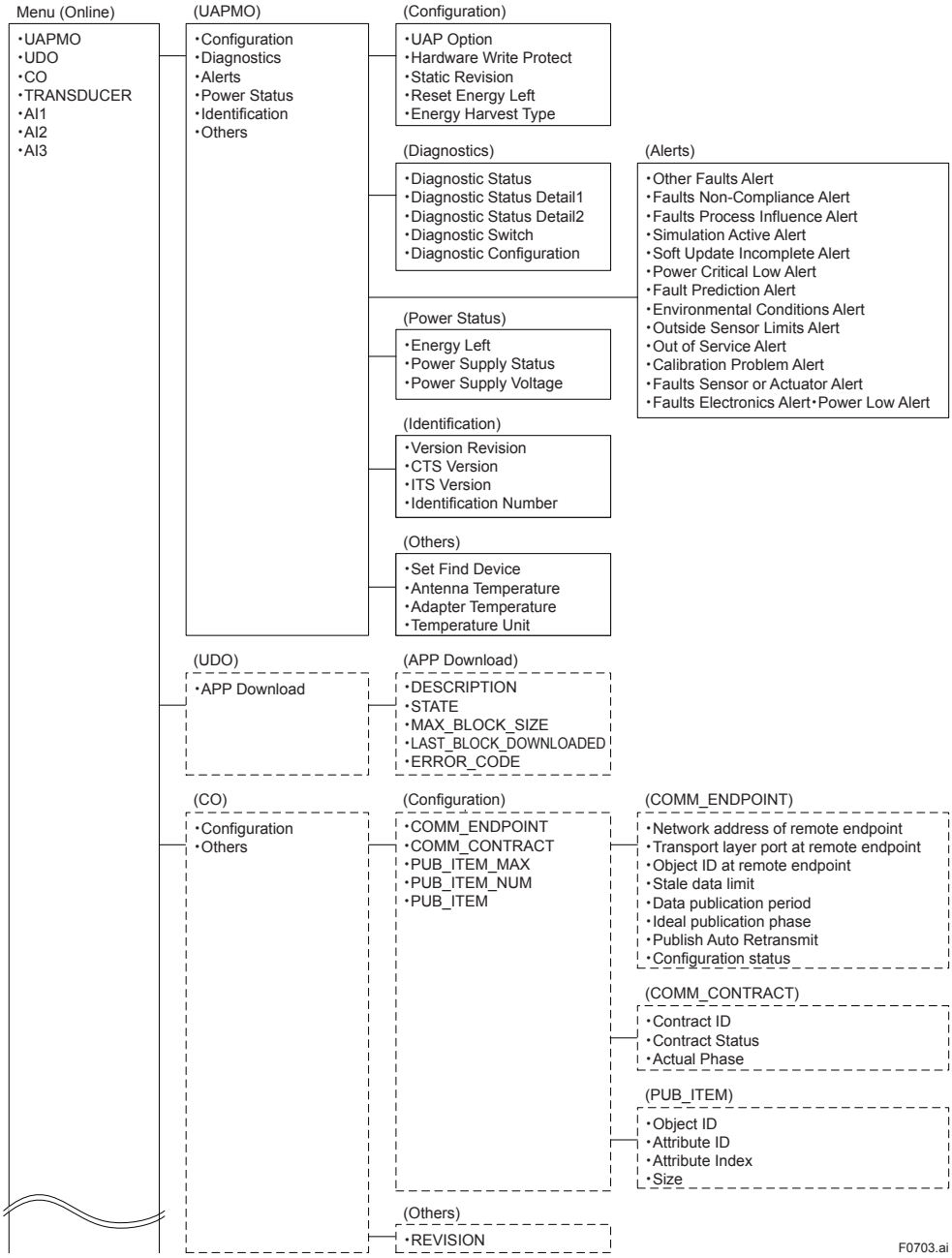
(2) Scaling Function
Scaling Function is used to adjust offset or gain of measured value. For more information please refer 7.3.9 “Scaling”.

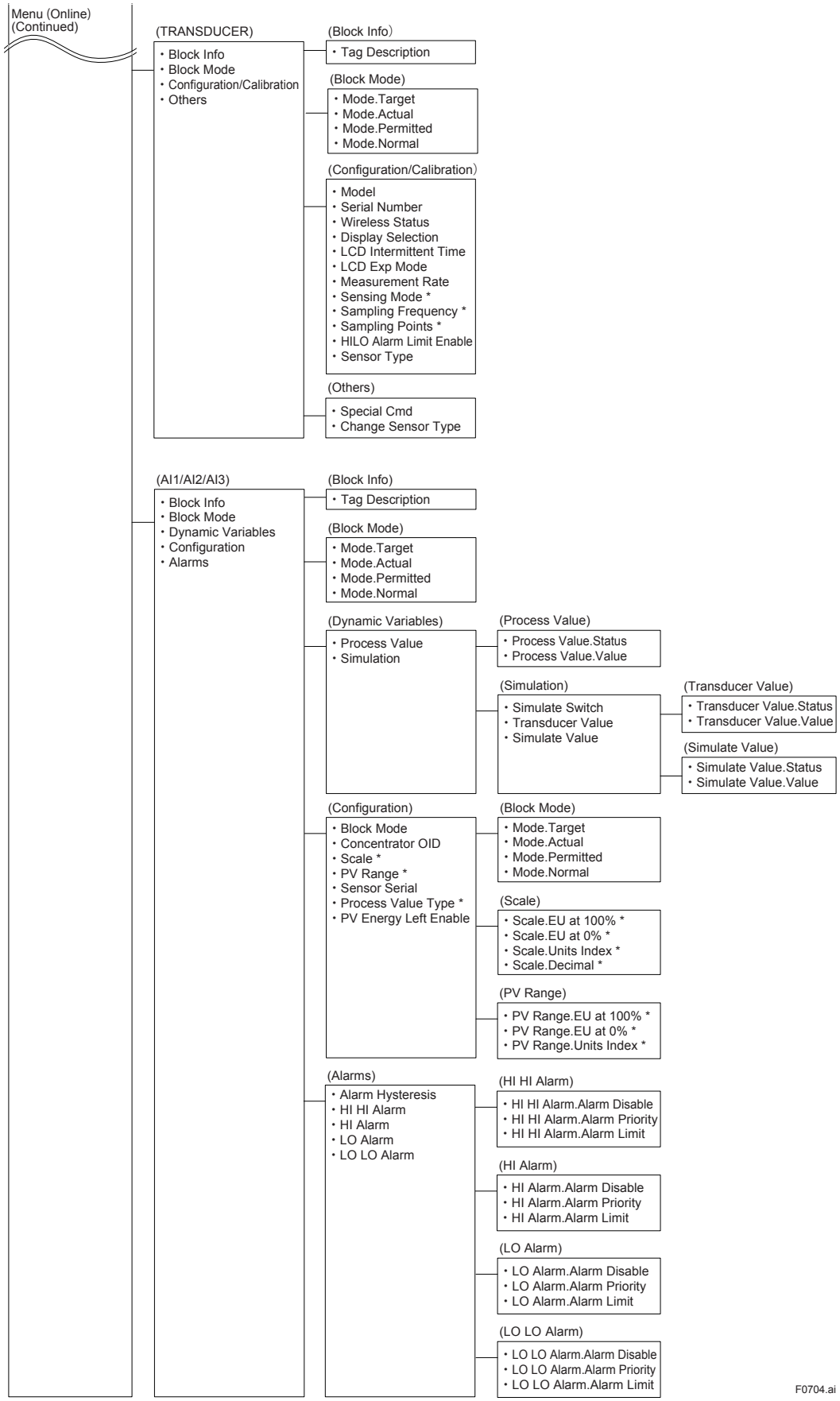
(3) Analog Alarm Function
This function is used to inform that the process value has exceeded the threshold. Use in such cases to ensure the detection of the abnormal vibration in device patrol function of “PRM”. For more information please refer 7.3.10 “Analog Alarm Function”.

7.3.3 Function Block and Menu Tree

(1) Function Block

The function of FN510 is shown below. Some functions may not be available depending on the device configuration tool used. When the device configuration tool of our recommendation is used, the software attached to the Field Wireless Integrated Gateway or Field Wireless Management Station is necessary for setting the dotted line part. Refer to subsection 8.2 “Recommended Products List” for the field wireless configuration tool of our recommendation.

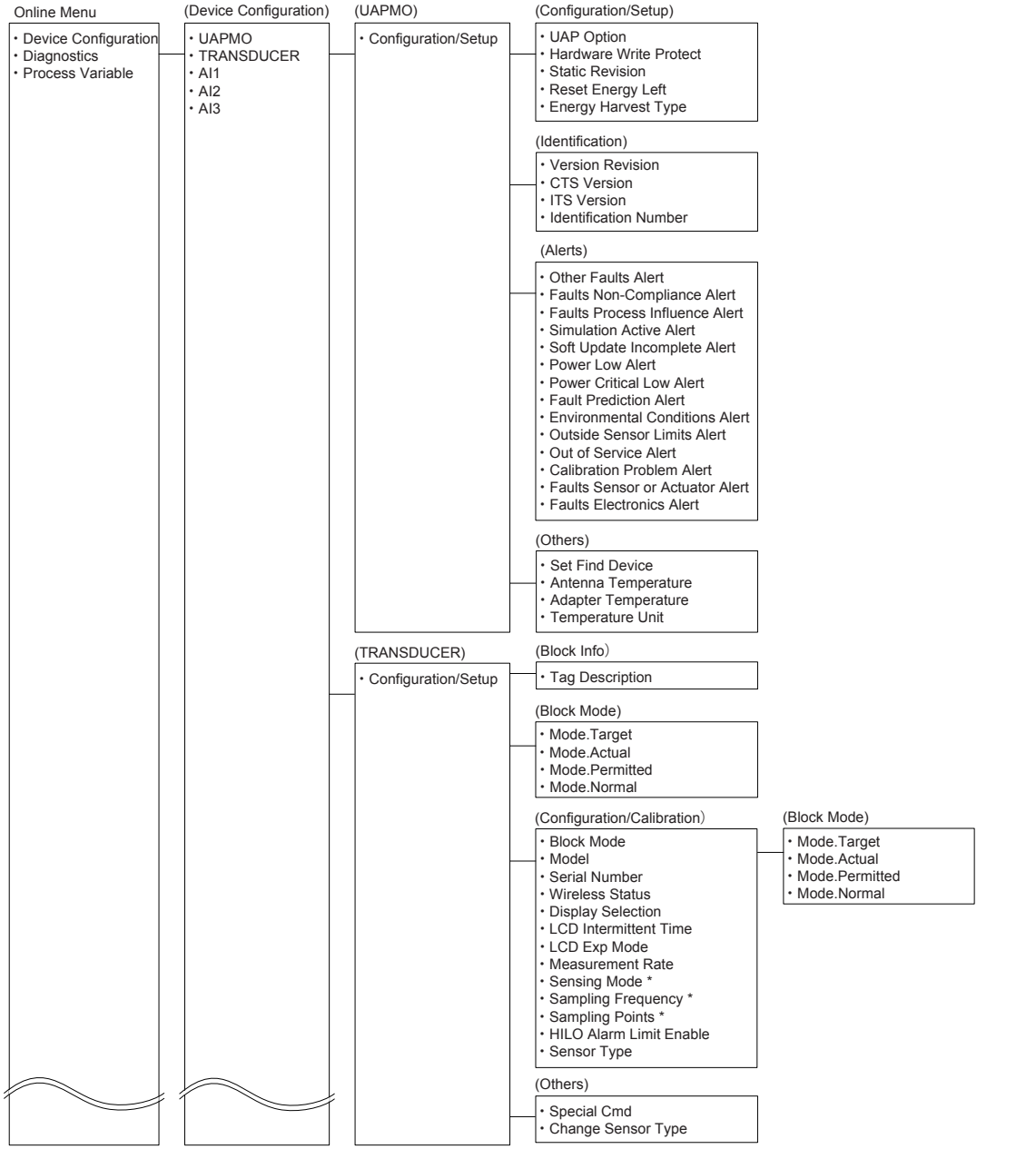

Menu (Online)
・UAPMO
・UDO
・CO
・TRANSDUCER
・AI1
・AI2
・AI3
(UAPMO)
・Configuration
・Diagnostics
・Alerts
・Power Status
・Identification
・Others
(Configuration)
・UAP Option
・Hardware Write Protect
・Static Revision
・Reset Energy Left
・Energy Harvest Type
(Diagnostics)
・Diagnostic Status
・Diagnostic Status Detail1
・Diagnostic Status Detail2
・Diagnostic Switch
・Diagnostic Configuration
(Alerts)
・Other Faults Alert
・Faults Non-Compliance Alert
・Faults Process Influence Alert
・Simulation Active Alert
・Soft Update Incomplete Alert
・Power Critical Low Alert
・Fault Prediction Alert
・Environmental Conditions Alert
・Outside Sensor Limits Alert
・Out of Service Alert
・Calibration Problem Alert
・Faults Sensor or Actuator Alert
・Faults Electronics Alert・Power Low Alert
(Power Status)
・Energy Left
・Power Supply Status
・Power Supply Voltage
(Identification)
・Version Revision
・CTS Version
・ITS Version
・Identification Number
(Others)
・Set Find Device
・Antenna Temperature
・Adapter Temperature
・Temperature Unit
(UDO)
・APP Download
(APP Download)
・DESCRIPTION
・STATE
・MAX_BLOCK_SIZE
・LAST_BLOCK_DOWNLOADED
・ERROR_CODE
(CO)
・Configuration
・Others
(Configuration)
・COMM_ENDPOINT
・COMM_CONTRACT
・PUB_ITEM_MAX
・PUB_ITEM_NUM
・PUB_ITEM
(COMM_ENDPOINT)
・Network address of remote endpoint
・Transport layer port at remote endpoint
・Object ID at remote endpoint
・Stale data limit
・Data publication period
・Ideal publication phase
・Publish Auto Retransmit
・Configuration status
(COMM_CONTRACT)
・Contract ID
・Contract Status
・Actual Phase
(PUB_ITEM)
・Object ID
・Attribute ID
・Attribute Index
・Size
(Others)
・REVISION
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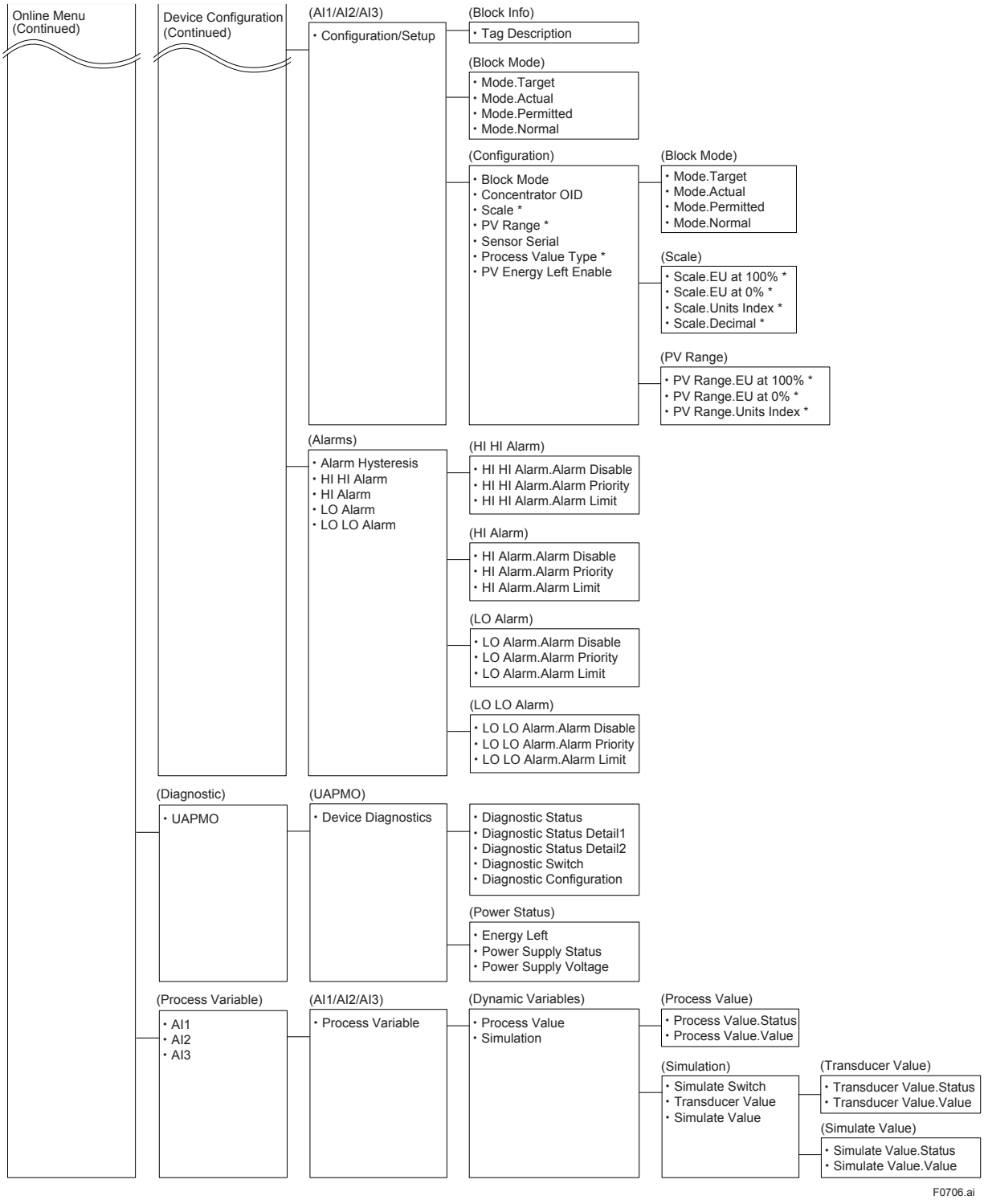
* When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).

(2) Menu Tree

The menu tree of our recommended device configuration tool is shown below.
Refer to subsection 8.2 “Recommended products list” for the device configuration tool of our recommendation.



* When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).



* When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).

7.3.4 Parameters for Wireless Communication

(1) Network Information

CO block: Configuration
The network-related information can be checked.

(2) Update Time

CO block: Data publication period
Set the update time value to the data publication period in the CO block within the range of 10 to 3600 seconds.

NOTE

If you set the update time less than 10 sec, publication setting error will occur.

The setting affects the battery life.
When update time is set 0 second, FN510 stops updating process variables via the field wireless network. And it also stops the acquisition of process variables from the connected device.

(3) Remaining Battery Life

UAPMO block: Energy Left
The number of days of battery life remaining is indicated assuming ambient temperature condition as 23 °C. It takes several days for the value to be stabilized after the power on and initialization of the remaining battery life.
UAPMO block: Reset Energy Left
When changing batteries, the remaining battery life is initialized by Reset Energy Left parameter.

(4) LCD Display

TRANSDUCER block: LCD Intermittent Time
The integral indicator has three modes: Continuous, Intermittent, and Off. These modes are switched by LCD Intermittent Time parameter. The intermittent mode repeats on/off at defined seconds.
In any mode, current process value is displayed by magnet switch operation. After displaying current process value, returns to the configured mode.
Refer to subsection 8.6 “Switching LCD Display” for details.

NOTE

When the FN510 detects AL.01, AL.02 and AL.03 error, the LCD display does not dim regardless of the status in LCD mode. See Table 8.4 for details.

7.3.5 Tag and Device Information

You can specify the Device Tag when ordering the corresponding FN110 Field Wireless Communication Module.
Device Tag and device information can be checked as follows.

■ Procedure to Read the Device Tag and Device Information

- Device Tag (Software Tag)
  This is specified by writing characters (up to 16 characters) that differs from those specified in Tag No. to the module. For details how to confirm this, refer to subsection 6.3 “Connecting to the Field Wireless Network”.
- Tag Description
  This is a universal parameter to store the comment that describes the content of the tag located in the TRANSDUCER and AI1/AI2/AI3 blocks.

■ Limitation of Device Information

When changing the device information, input the information based on the following limitation on the number of characters.

- Message function (up to 32 characters)
  TRANSDUCER block: Tag Description
  AI1/AI2/AI3 block: Tag Description

7.3.6 Setup the Integral Indicator

TRANSDUCER block: LCD Exp Mode
Set the display method of the PV on the integral indicator. Index display or base display is selectable.

7.3.7 Sensor Type

Process values are assigned as shown in the table below depending on the Sensor Type.

Table 7.2 Block Assignment

Sensor Type	Assignment to Block
Vibration Sensor	AI1 block (Peak) AI2 block (RMS) AI3 block (Peak/RMS)
Not Used	AI1 block (Energy Left *1)

*: Valid if PV Energy Left Enable of AI1 block is set to Enable.

7.3.8 Sensor Input

The following parameters should be set to use the accelerometer. Before changing the following parameters, it is necessary to set the operational mode of block to O/S (Out of Service).

Transducer block: Sensing Mode
Select from either of the following:
Acceleration, Velocity, Velocity LPF 160 Hz Gain High or Velocity LPF 160 Hz Gain Low.
Set “Acceleration” to measure acceleration, “Velocity” to measure velocity, “Velocity LPF 160 Hz Gain High” and “Velocity LPF 160 Hz Low” to measure velocity around 160 Hz.

NOTE

The appropriate mode should be selected to accurately measure.
Measureable frequency and measureable frequency in each mode are described in subsection 7.3.11 and subsection 7.3.12.
Temperature characteristic with combination of FN510 and LN01 is described in Section 10.1.

Transducer block: Sampling Frequency
Sampling frequency should be more than twice the upper frequency limit of the vibration to be measured,. and is recommended to be more than two and a half times.

Transducer block: Sampling Points
Sampling Frequency per Sampling Points is recommended to be less than half the lower frequency limit of the vibration to be measured.

■Setting example
If the frequency range to be measured is from 10 Hz to 1000 Hz, more than 5 kHz should be selected as “Sampling Frequency”.

When 5 kHz is selected, 1024 is specified as “Sampling Points”. When 10 kHz is selected, 2048 is specified as “Sampling Points”.

7.3.9 Scaling

Before changing the following parameters, it is necessary to set the operational mode of block to O/S (Out of Service).

AI block: Transducer Value, Process Value Type, PV Range, Scale
To disable scaling function, set “Process Value Type” to “Direct”, then the Transducer Value is output as PV value.
To enable scaling function, set “Process Value Type “ to “Indirect”. and change the following parameters.

- Input range parameter
  AI block: PV Range
- Output range parameter
  AI block: Scale

A Transducer Value is converted to TV’ by the Input range parameter.TV’ is converted to PV by the Output range parameter.

NOTE

The scaling function effects to each Transducer Value individually. For example, if the scaling function is enabled on AI1 and AI2, there is no effect on PV of AI3.

■Setting example
Figure 7.3 shows a diagram of the case that is set up as follows:
Process Value Type = Indirect
PV Range.EU at 0% = 0
PV Range.EU at 100% = 100
Scale.EU at 0% = 30
Scale.EU at 100% = 180

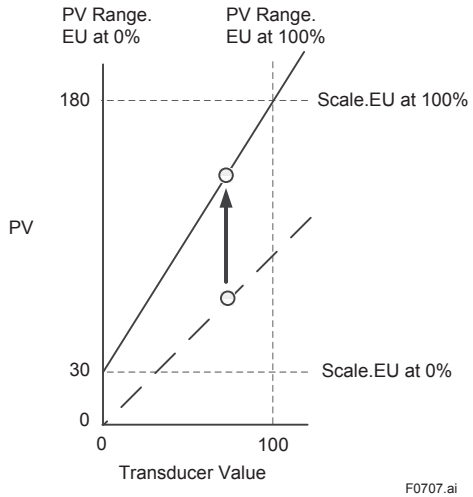


Figure 7.3 Example diagram of scaling function

7.3.10 Analog Alarm Function

Self-diagnostics function is used to inform that the process value has exceeded the threshold. For more information about self-diagnostics function, refer to 7.4"Self-Diagnostics"

Transducer block: HILO Alarm Limit Enable
To disable analog alarm function of each AI block, set "Disable" to "HILO Alarm Limit Enable".

AI block: High High Alarm, High Alarm, Low Alarm, Low Low Alarm.
Each AI reports Analog Alarm when PV exceeds Alarm Limit value.

AI block: Alarm Hysteresis.
The value of hysteresis of analog alarm. When "Process Value Type" is set to "Direct", hysteresis should be specified by the ratio [%] to the PV_Range. When "Process Value Type" is set to "Indirect", it should be specified by the ratio [%] to the scale.

■Setting example
Figure7.4 shows a diagram of the case that was set up as follows:
Process Value Type = Indirect
Scale.EU at 0% = 0
Scale.EU at 100% = 100
Scale.Unit = m/s^2
High High Alarm.Alarm limit = 90
High Alarm.Alarm limit = 85
Alarm Hysterisis = 5

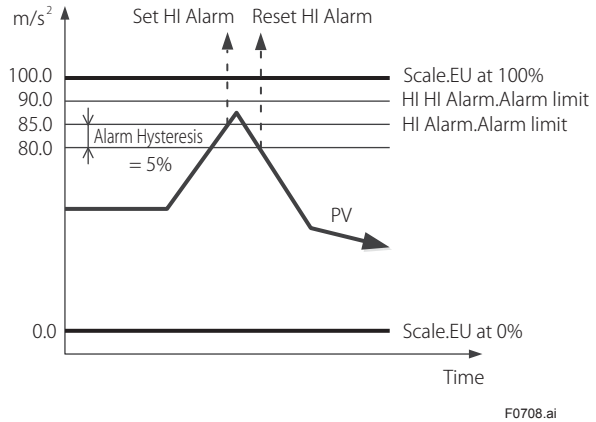
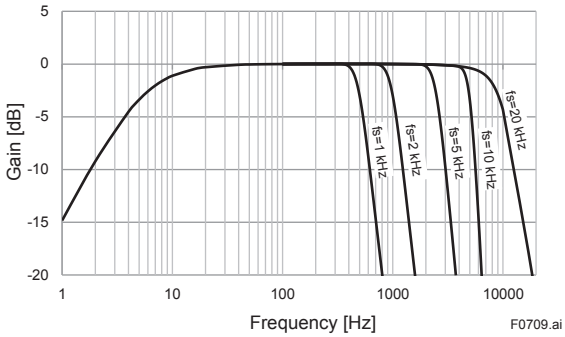


Figure 7.4 Operation example of Analog Alarm

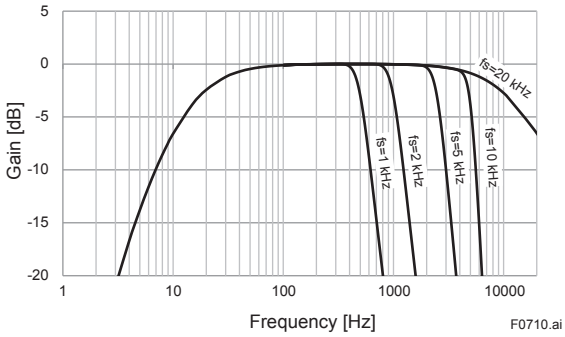
7.3.11 Frequency Characteristics

FN510 have frequency filters in accordance with the Sensing Mode and Sampling Frequency.
By switching the Sensing Mode, you can switch the frequency characteristic shown by the solid line in Figure 7.5 - 7.7.
In addition, in accordance with the Sampling Frequency, you can further select the frequency characteristics shown in dotted line.



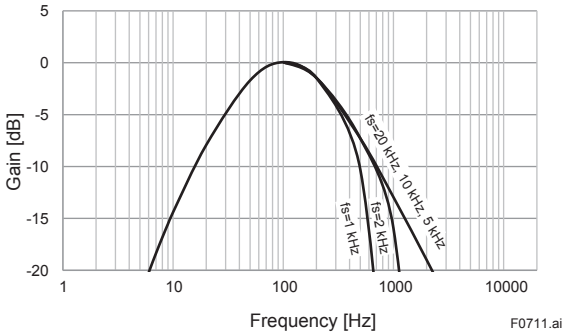
*fs: Sampling Frequency

Figure 7.5 Frequency characteristics (Acceleration)



*fs: Sampling Frequency

Figure 7.6 Frequency characteristics (Velocity)



*fs: Sampling Frequency

Figure 7.7 Frequency characteristics (Velocity LPF 160 Hz)

NOTE

If Velocity LPF 160 Hz mode is selected, frequency only around 160 Hz is extracted. Therefore, this mode should be used only when the vibration to be measured is around 160 Hz such as an electric motor.

7.3.12 Measurement Range

The measurement range depending on the Sensing Mode.
Measurement range in accordance with the Sensing Mode, is shown in Figure 7.8 and Figure 7.9.

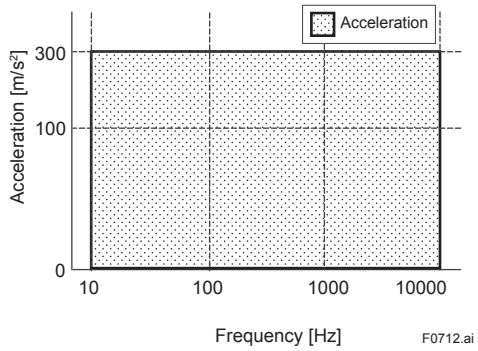


Figure 7.8 Measurement Range (Acceleration)

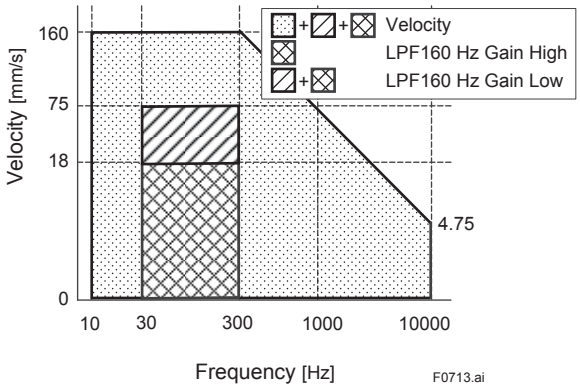


Figure 7.9 Measurement Range (Velocity)

7.3.13 Write Protect

Hardware write protection and software write protection functions are available for FN510.

■ Hardware Write Protection

Hardware Write Protection is set by slide switch on the front panel back.

■ Software Write Protection

Software Write Protection is set by the parameter of software write protect of UAP Option in UAPMO block.
For the relationship between hardware write protection and software write protection, refer to section 9 “Parameter Summary”.

7.3.14 Switching to the Deep Sleep Mode

When the FN510 will not be used for a long time, switch the FN510 to the deep sleep mode to conserve battery power. There are two methods of switching to the deep sleep mode. To switch to deep sleep mode, follow the procedure below.

■ Magnet Switch Operation

Procedures for switching to the deep sleep mode using a magnet switch are as follows.

1. Touch the magnet switch 1 for 5 seconds by a magnet (LCD displays “SLEEP” flashing).
2. Touch the magnet switch 1 for an additional 5 seconds by a magnet (LCD displays “SLEEP”).
3. Touch the magnet switch 2 within next 5 seconds by a magnet.

■ Write Parameter

TRANSDUCER block: Special Cmd
Set deep sleep mode to Special Cmd parameter.

There are three methods to start from the deep sleep mode.

■ **Restart**

Restart by re-connection of the battery pack.

■ **Infrared Communication**

Start by receiving infrared communication. Use the wireless field device configuration tool (for infrared) or device provisioning tool.

■ **Magnet Switch Operation**

Start by touching a magnet to magnet switch 1 for 10 seconds.

CAUTION

After setting the deep sleep mode by infrared device configuration tool, keep the infrared port of device away from any other infrared signals.

NOTE

- After switching to deep sleep mode, the FN510 stops any field wireless communication. For this reaon, there is the case that an error is display on field wireless configuraiton tool.
- To wake up from deep sleep mode by reconnection of battery pack, please pull battery pack and wait more than 30 seconds before attaching battery pack.

7.3.15 Switching to the Silence Mode

This is a function to pause the FN510 when it cannot join the field wireless network after a specified time has elapsed. This function is effective in conserving battery power when, for example, the installation of the Field Wireless Integrated Gateway is delayed compared to that of field wireless devices. When the FN510 fails to search the network for about 120 minutes, it switches to silence mode automatically. Thereafter, a cycle of 18 minutes pause and 36 seconds search is repeated until the FN510 can join the field wireless network. To minimize the consumption of the battery, the FN510 turns off the integral indicator and stops the measurement.
To start from the silence mode, either removes and inserts the battery pack, or receiving infrared communication. Use the device configuration tool (for infrared) or device provisioning tool.

7.4 Self-Diagnostics

7.4.1 Identify Problems by Using the Device Configuration Tool

The device configuration tool allows checking the self-diagnostic results and settings of the FN510. First, check Diagnostic Status of the self-diagnostic results.

■ **Procedure to Call Up the Self-Diagnostic Parameter**

UAPMO block: Diagnostic Status
Any of the four categories (Function check, Maintenance required, Failure, and Out of specification) according to NAMUR NE107 is supplied to Diagnostic Status of each diagnostic result.

Checking the Diagnostic Status category allows taking the proper action. The Diagnostic Status contents are common for all ISA devices, and the setting for the Diagnostic Status category can be changed. For further details, refer to Diagnostic Status Detail.
In Diagnostic Status Contents that can be diagnosed by the FN510, the alert category set in Out of Service can be changed to Function check. To do so, follow the procedures below.

1. UAPMO block: UAP Option Enable diagnostic status configuration select “enable”.
2. UAPMO block: Diagnostic Configuration change Out of Service from “Failure” to “Function check”.
3. UAPMO block: UAP Option Enable diagnostic status configuration select “disable”.

In Diagnostic Configuration setting, select one from the followings;

F: Failure Status
C: Function check status
O: Out of specification status
M: Maintenance required status

The contents of Diagnostic Status are defined either valid or invalid at Diagnostic Switch parameter. Follow the example below to change “Out of Service” to invalid.

1. UAPMO block: UAP Option Enable diagnostic status configuration select “enable”.
2. UAPMO block: Diagnostic Switch turn “Off” for Out of Service.
3. UAPMO block: UAP Option Enable diagnostic status configuration select “disable”.

NOTE

Be careful when changing the alert category and turning detection on and off as described above. Be sure to set UAP Option Enable diagnostic status configuration to disable again to prevent setting errors.

7.4.2 Alert Report

FN510 generates and alert information related to Diagnostic Status and Analog Alarm, automatically sends to a field wireless gateway. To use this function, the following alert setting is necessary. When “Out of Service” for Diagnostic Status alert is required, choose “FALSE” for [Out of Service. Alert Disable] in the UAPMO block. Refer to the field wireless gateway User’s Manual for the setting procedure to obtain the alert information from the gateway.
The alert report consists of the list of parameter name as shown Table 7.3.

Table 7.3 Contents of Alert Report

Parameter name	Description
DetectObjectTLPort	Alert detection port UAP (0xF0B2) fixed
DetectObject	Alert detection block UAPMO (1) AI1 (20) AI2 (21) AI3 (22)
DetectTime	Time stamp
AlertDirection	1: generated, 0: clear
AlertPriority	Alert priorities set by users
AlertType	Alert types, see Alert Type in Table 7.5
AlertValue	NAMUR107 category 0: Failure 1: Function Check 2: Out Of Specification 3: Maintenance Required

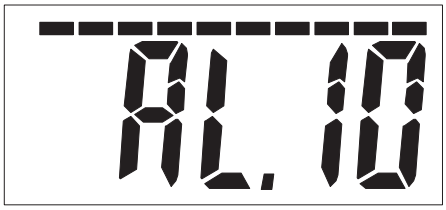
CAUTION

For a wireless gateway which does not support the alert report function, the alert setting in UAPMO block for this product must be set to “Disable”. Note that YFGW710 Field Wireless Integrated Gateway does not have the alert report function.

7.4.3 Checking with Integral Indicator

NOTE

If an error is detected by running self-diagnostics, an error number is displayed on the integral indicator. If there is more than one error, the error number changes at 2 seconds interval. See Table 8.4 regarding the alarm codes.



F0714.ai

Figure 7.10 Error Check with Integral Indicator

Table 7.4 Diagnostic Status

Bits	Contents	NAMUR NE107 Categorization*
Bit31(MSB)	F:Failure status	---
Bit30	C:Function check status	---
Bit29	O:Out of specification status	---
Bit28	M:Maintenance required status	---
Bit27	Faults in electronics	F
Bit26	Faults in sensor or actuator element	F
Bit25	Installation, calibration problem	C
Bit24	Out of service	C
Bit23	Outside sensor limits	O
Bit22	Environmental conditions out of device specification	O
Bit21	Fault prediction: Maintenance required	M
Bit20	Power is critical low: maintenance need short-term	M
Bit19	Power is low: maintenance need mid-term	M
Bit18	Software update incomplete	C
Bit17	Simulation is active	C
Bit16	Faults due to process influence	F
Bit15	Faults due to non-compliance with specified operating conditions	F
Bit14	Other faults	F
Bit13-Bit09	reserved by WCI	---
Bit08-Bit01	vendor specific area	---
Bit00	Detail information available 1: available 0: no available	---

* NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”

Table 7.5 Diagnostic Results Summary

Diagnostic Status Contents	Detect Object	Alert Type	NAMUR NE107 Category*	Diagnostic Status Detail	Description
Faults in electronics	UAPM O (1)	78	F	ADAPTER FAIL	FN510 failure
				ANTENNA FAIL	FN110 failure
				RS485 FAIL	Communication failure between FN110 and FN510
Faults in sensor or actuator element		77	F	SENSOR FAIL	Communication failure between FN510 and connected devices
Installation, calibration problem		76	C	DEVICE_CONNECTION_ ERR	Connection error between FN510 and connected devices
				DEVICE_PUBLISH_ INTERVAL_E	Publication interval is out of
Out of service		75	C	AI1 OUT OF SERVICE	AI1 O/S Mode
				AI2 OUT OF SERVICE	AI2 O/S Mode
				AI3 OUT OF SERVICE	AI3 O/S Mode
				TRANSDUCER OUT OF SERVICE	TRANSDUCER O/S Mode
Environmental conditions out of device specification		73	O	ADAPTER TEMP HI	FN510 temperature is above +85°C
				ADAPTER TEMP LO	FN510 temperature is below -40°C
				ANTENNA TEMP HI	FN110 temperature is above +85°C
				ANTENNA TEMP LO	FN110 temperature is below -40°C
Fault prediction: Maintenance required		72	M	AI1_HI_ALARM	AI1 High Alarm
				AI1_HI_HI_ALARM	AI1 High High Alarm
				AI1_LO_ALARM	AI1 Low Alarm
				AI1_LO_LO_ALARM	AI1 Low Low Alarm
				AI2_HI_ALARM	AI2 High Alarm
				AI2_HI_HI_ALARM	AI2 High High Alarm
				AI2_LO_ALARM	AI2 Low Alarm
				AI2_LO_LO_ALARM	AI2 Low Low Alarm
				AI3_HI_ALARM	AI3 High Alarm
				AI3_HI_HI_ALARM	AI3 High High Alarm
				AI3_LO_ALARM	AI3 Low Alarm
				AI3_LO_LO_ALARM	AI3 Low Low Alarm
Power is critical low: maintenance need short-term		71	M	CRITICAL LOWBAT	Low battery alert
Power is low: maintenance need mid-term		70	M	LOWBAT_ALM	Low battery
Simulation is active		68	C	AI1 SIMULATION ACTIVE	AI1 Simulation Mode
				BI1 SIMULATION ACTIVE	BI1 Simulation Mode
				BI2 SIMULATION ACTIVE	BI2 Simulation Mode
Faults due to process influence		67	F	BO_STALE_LIMIT_FAIL	Detect Stale Limit
Fault prediction: Maintenance required	AI1 (20)	1	M	AI1_HI_ALARM	Detect AI1 High Alarm
		2	M	AI1_HI_HI_ALARM	Detect AI1 High High Alarm
		3	M	AI1_LO_ALARM	Detect AI1 Low Alarm
		4	M	AI1_LO_LO_ALARM	Detect AI1 Low Low Alarm
	AI2 (21)	1	M	AI2_HI_ALARM	Detect AI2 High Alarm
		2	M	AI2_HI_HI_ALARM	Detect AI2 High High Alarm
		3	M	AI2_LO_ALARM	Detect AI2 Low Alarm
		4	M	AI2_LO_LO_ALARM	Detect AI2 Low Low Alarm
	AI3 (22)	1	M	AI3_HI_ALARM	Detect AI3 High Alarm
		2	M	AI3_HI_HI_ALARM	Detect AI3 High High Alarm
		3	M	AI3_LO_ALARM	Detect AI3 Low Alarm
		4	M	AI3_LO_LO_ALARM	Detect AI3 Low Low Alarm

* NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”

8. Maintenance

8.1 General

This chapter describes the procedures of replacing batteries and the status check method required for maintenance of FN510.
Please carefully and thoroughly read the following sections for information on how to properly handle this product while performing maintenance.

8.2 Recommended Products List

Table 8.1 lists the recommended products of our equipment needed to set up and use the FN510.

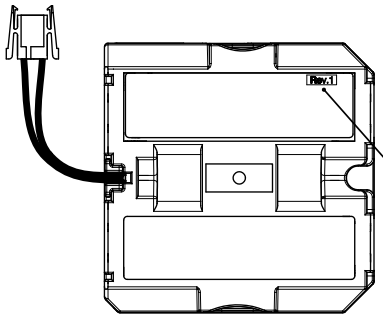
Table 8.1 Recommended Products List

Yokogawa-recommended Instrument
Provisioning Device Tool • FieldMate (R2.03 or later) • Provisioning Device Tool • Infrared Adapter certified by Yokogawa Supplier: ACTiSYS Product name: IrDA InfraRed USB Adaptor Product number: IR224UN-LN96 (9600bps)
Field Wireless Configuration Tool • Field Wireless Integrated Gateway attached Software Field Wireless Configurator Field Wireless Management Tool • Field Wireless Management Station attached Software Field Wireless Management Console
Device Configuration Tool • FieldMate (R3.02.00 or later) DeviceFile (R3.07.01 or later)
Field Wireless System related Product • Plant Resource Manager (PRM) (scheduled to be supported) DeviceFile (scheduled to be supported)

8.3 Replacing the Battery Pack

WARNING

- To ensure the installation minimizes the risk from electrostatic discharge.
  To prevent electrostatic discharge caused by static charge built up on the operator, ground the operator through conductive shoes and floors and by wearing anti-static work clothes to prevent charge build-up.
  Avoid any actions that cause the generation of electrostatic charge, such as rubbing surface of Battery Pack and product with a dry cloth.
  If static electricity cannot be suppressed, check that the surrounding atmosphere does not contain explosive gas or steam before replacing the Battery Pack.
- Be sure to use a battery pack that is indicated as “Rev.1” or higher for explosion protected instruments.



The battery pack in an intrinsically safe explosion protected product can be replaced in the installed condition in a hazardous area.

■ Preparation

Initialize the value of remaining battery life.
To initialize the battery life, set the Reset Energy Left parameter in UAPMO block. When the FN510 stop working because of low battery, initialize the remaining battery life immediately after replacing the battery pack. In the case of initialize the remaining battery life after replacing the battery pack, perform warm restart after initializing. For details on how to warm restart, refer to field wireless gateway User’s Manual (IM 01W02D01-01EN for YFGW410.

■ Removing

1. Loosen the four screws on the front panel.
2. Pull the lever in the direction of the arrow in Figure 8.1.
3. Pull out the battery connector from the front panel back.
4. Pull the battery pack.

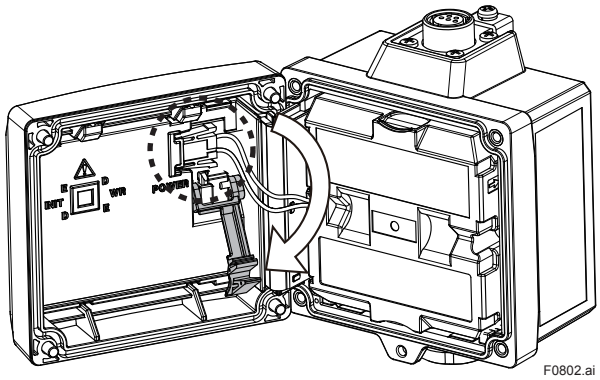


Figure 8.1 Removing the Battery Pack

CAUTION

After pulling out the battery connector, remove the battery pack.

■ Remounting

1. Insert the new battery pack. The orientation of the battery pack, “PART NO.” display is the front and connector cable is left side.
2. Plug the battery connector into the terminal on the front panel back. Connect facing down the white surface of the connector. Push the connector until it touches the back of the front panel then slide it to the left.
3. Push the lever in the direction of the arrow in Figure 8.2.
4. Close the front panel and tighten the four screws to a torque of 0.7 N • m.

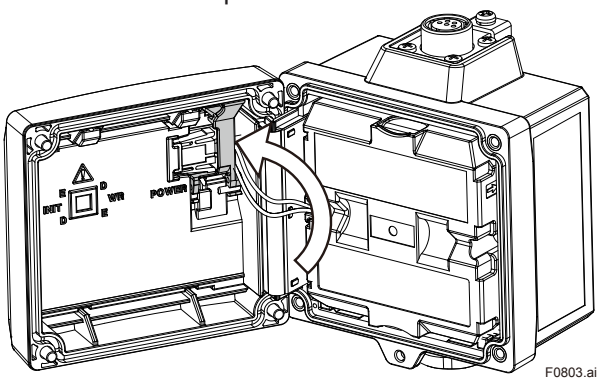


Figure 8.2 Remounting the Battery Pack

8.4 Replacing the Batteries

The batteries in the battery pack can be replaced. Batteries are not installed when shipped from the factory. Assemble the battery pack as follows.

WARNING

Be sure to replace the batteries or open and close the battery pack in a non-hazardous area. Doing so in a hazardous area could cause an explosion.

CAUTION

When replacing the batteries, be sure to replace the two batteries at the same time and do not use an old and a new battery together.

■ Disassembling

1. Loosen a battery case fixing screw.
2. Remove old batteries. Remove the battery by pushing up the negative side of the battery as shown in Figure 8.3.

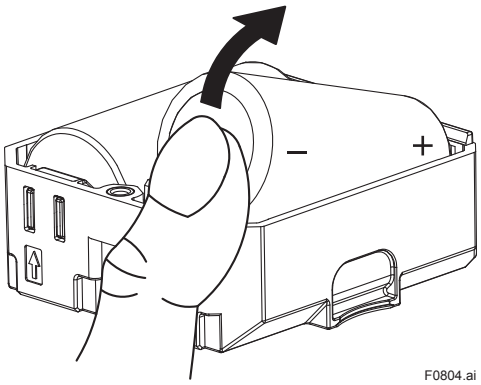


Figure 8.3 Remove Batteries

■ Assembling

1. Insert new batteries into the battery case. Check the orientation of the battery and push straight.
2. As shown in Figure 8.4, engage the hooks on the opposite side of the screw.
3. Tighten the screw to a torque of 0.7 N • m.

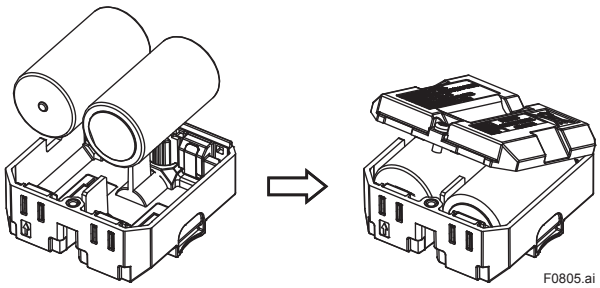


Figure 8.4 Assembling the Battery Pack

8.5 Handling Batteries

This battery pack uses two primary lithium-thionyl chloride batteries. Each battery contains approximately 5 grams of lithium, for a total of 10 grams in each pack. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage. Protect the electrode of the battery pack to avoid rapid electrical discharge. Discharged a battery may lead to fluid leakage and excessive heat. Batteries should be stored in a clean and dry area. For maximum battery life, storage temperature should not exceed 30°C.

WARNING

Handling the battery pack

The following precautions must be observed in order to safely and effectively use a battery pack. Improper use may lead to fluid leakage, excessive heat, ignition, or explosion.

- Never charge it.
- Do not short-circuit it.
- Do not disassemble, transform, or modify it.
- Do not heat it or throw it into a fire.
- Do not soak it in fresh water or seawater.

CAUTION

Observe the following precautions for the safe disposal of batteries.

- Do not incinerate the battery, and do not expose it to a high temperature of 100°C or more. This may lead to fluid leakage or explosion.
- Dispose of the battery according to laws and regulations.

Use the following dedicated parts for the battery pack and batteries.

■ Battery Pack

Part number: F9090FD*1 (with batteries)
Part number: F9090GD*2 (without batteries)
*1: If you need F9090FC, please purchase F9090FD. F9090FD is a set of F9090FC and instruction manual.
*2: If you need F9090GC, please purchase F9090GD. F9090GD is a set of F9090GC and instruction manual.

■ Batteries

Part number: F9915NR
Alternatively, following batteries may be purchased and used.

- Tadiran TL-5930/S or SL-2780/S
- VITZROCELL SB-D02

Transportation of products containing lithium batteries

Batteries used for this product contain lithium. Primary lithium batteries are regulated in transportation by the U.S. Department of Transportation, and are also covered by the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO), and the European Ground Transportation of Dangerous Goods (ARD). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping. When transporting this product with the battery pack inserted, keep it in deep sleep mode in order to conserve battery power. For details on how to switch to deep sleep mode, refer to subsection 7.3.14 “Switching to the Deep Sleep Mode”.

Procedure to replace and dispose of the batteries of the product

Below an explanation about the new EU Battery Directive (DIRECTIVE 2006/66/EC). This directive is only valid in the EU.
Batteries are used for this product. When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal.
Take a right action on waste batteries, because the collection systems in the EU on waste batteries are regulated.
Battery type: Primary lithium-thionyl chloride battery
Crossed-out dustbin symbol



NOTE

The symbol (see above), which is marked on the batteries, means they shall be sorted out and collected as ordained in ANNEXII in DIRECTIVE 2006/66/EC

Procedure to remove the batteries safely
Refer to subsection 8.3 “Replacing the Battery Pack” and subsection 8.4 “Replacing the Batteries”.

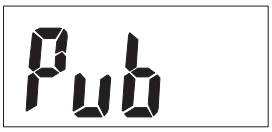
8.6 Switching LCD Display

The process value and the wireless communication status are displayed on the LCD by touching a magnet to the magnet switch1. The contents of the display changes as follows every two seconds.

1. Wireless Communication Status. See Table 8.2.
2. Object Name (AI1)
3. Process Value of AI1 block
4. Object Name (AI2)
5. Process Value of AI2 block
6. Object Name (AI3)
7. Process Value of AI3 block
8. Tag No. (If specified when ordering)

After display, return to normal display contents.

Table 8.2 Wireless Status

Integral Indicator	Description
 F0806.ai	Searching for Backbone Router or Router to connect. It is not connected to the field wireless network.
 F0807.ai	Discovering the connection destination, and is doing the Join process. It is not connected to the field wireless network.
 F0808.ai	Complete the Join process and is doing the Publish settings.
 F0809.ai	The publish setting is complete and has been sent the PV value to the field wireless network.
 F0810.ai	Silence Mode. For more information about silence mode, refer to subsection 7.3.15 “Switching to the Silence Mode”.

8.7 Replacing the FN110

This subsection describes the procedure for replacing the FN110. Replace the FN110 as follows.

1. Back up the configuration of the FN510.
2. Remove the battery pack.
3. Remove the FN110, and install a new FN110.
4. Remounting the battery pack.
5. Restore the backed up configuration of the FN510.
6. Performing provisioning work.
7. Update the configuration of field wireless gateway.

To back up the configuration, use the device configuration tool, such as FieldMate.
Performing provisioning work is necessary when replacing the FN110. Update the configuration information of the target device by using field wireless configuration tool. For details of provisioning, refer to subsection 6.3 “Connecting to the Field Wireless Network”.

8.8 Replacing the FN510

This subsection describes the procedure for replacing the FN510. Replace the FN510 as follows.

1. Back up the configuration of the FN510.
2. Remove the battery pack.
3. Remove the FN110 and the accelerometer, and install them to the new FN510.
4. Remounting the battery pack.
5. Restore the backed up configuration of the FN510.

8.9 Replacing the Accelerometer

This subsection describes the procedure for replacing the accelerometer.
Replace the accelerometer as follows.

1. Remove the battery pack.
2. Remove the accelerometer from the FN510
3. Install a new one.
4. Remounting the battery pack.

8.10 Troubleshooting

If any abnormality appears in the measured values, use the troubleshooting flow chart below to isolate and resolve the problem. Since some problems have complex causes, these flow charts may not identify all. If you have difficulty isolating or correcting a problem, contact Yokogawa service personnel.

8.10.1 Basic Troubleshooting Flow

First determine whether the process variable is actually abnormal or a problem exists in the measurement system. If the problem is in the measurement system, isolate the problem and decide what corrective action to take.
FN510 is equipped with a self-diagnostic function which will be useful in troubleshooting, and this product is equipped with an integral indicator and it will show an alarm code as a result of self-diagnosis.
See subsection 8.10.3 “Errors and Countermeasures” for the list of alarms.

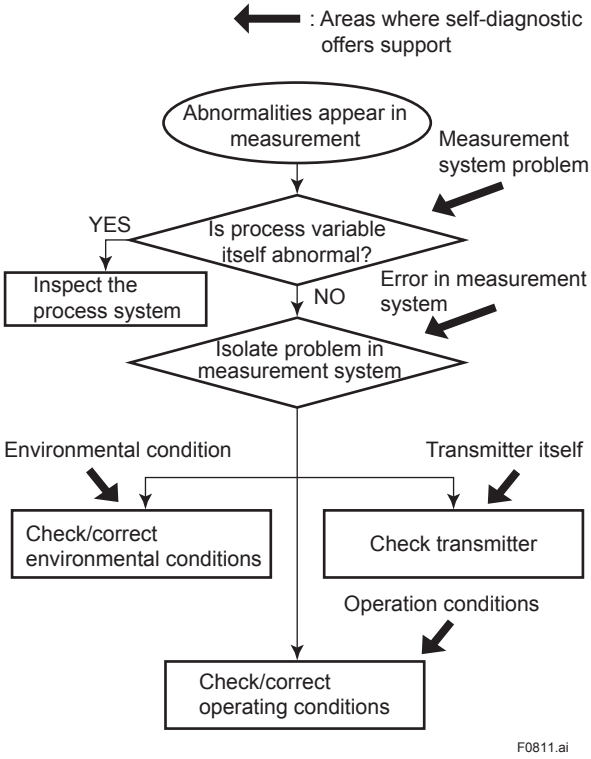


Figure 8.5 Basic Troubleshooting Flow

8.10.2 Example of Troubleshooting Flow

The following shows an example of the flow for troubleshooting.
Refer to this example and Table 8.3. Locate the problem and take the corresponding countermeasure.

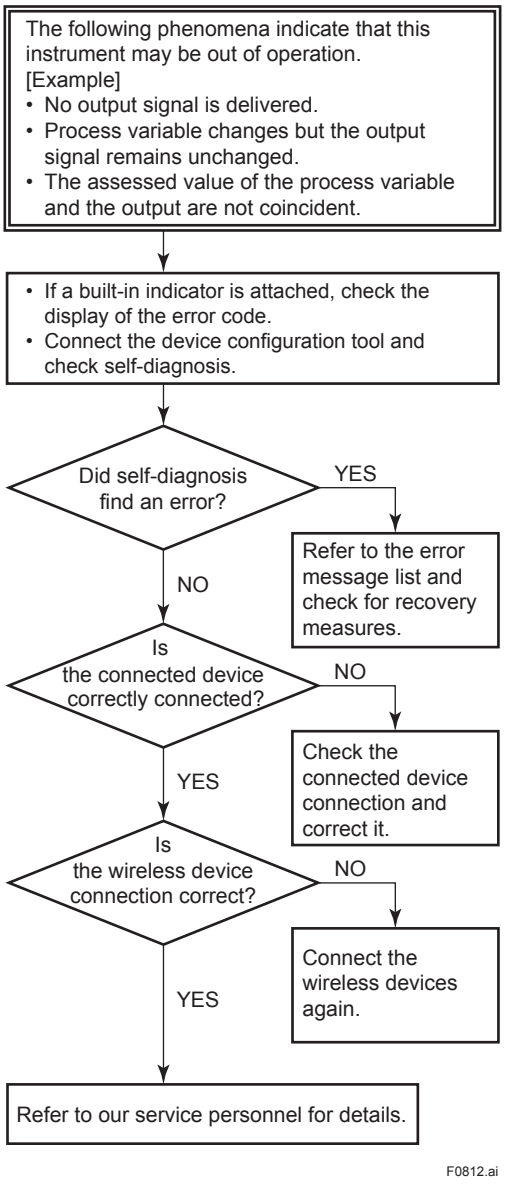


Figure 8.6 Example of Troubleshooting Flow

Table 8.3 Cause and Countermeasure

Observed Problems	Possible Cause	Countermeasure	Related Parameter
Outputs fixed current.	The simulation function is set to ON.	Set the simulation function to OFF.	• Simulate Switch
Parameters cannot be changed.	This product is in write protect status.	Release write protect.	• UAP Option • Hardware Write Protect
The status of the output is Out of Service even if the Mode.Targetis is set to Auto.	Sensor Type is not properly set.	Set the Sensor Type properly.	• Sensor Type
Energy Left value does not increase after replacing the battery pack.	Reset Energy Left function has not been executed.	Execute the Reset Energy Left function.	• Reset Energy Left

8.10.3 Errors and Countermeasures

Table 8.4 Error Message Summary

Integral indicator	NAMUR NE107 category *1	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart) *2	Output Operation	Action
AL.01 *3	F	27	Faults in electronics	ADAPTER FAIL	FN510 failure	None	Output value: Hold previous value Output status: BAD Device Failure	Contact Yokogawa service personnel.
AL.02 *3				ANTENNA FAIL	FN110failure			
AL.03 *3				RS485 FAIL	Communication failure between FN110 and FN510	Recovers communication between FN110 and FN510		Check the connection between FN110 and FN510
AL.10	F	26	Faults in sensor or actuator element	SENSOR FAIL	Disconnection or communication error, between the accerlerrometer and FN510	None	Output value: Hold previous value Output status: BAD Sensor Failure	Check if the accerlerrometer is properly connected to FN510. Replace the accerlerrometer if it is properly connected.
AL.20	M	20	Power is critical low: maintenance need short-term	CRITICAL LOWBAT	Low remaining battery voltage	None	Normal action	Replace the batteries.
		19	Power is low: maintenance need mid-term	LOWBAT ALM	Low remaining battery voltage			
AL.45	O	22	Environmental conditions out of device specification	ADAPTER TEMP HI	FN510 temperature is above +85°C	Recovers when the temperature returns to +85°C below	Normal action	Check the ambient temperature of the FN510
				ADAPTER TEMP LO	FN510 temperature is below -40°C	Recovers when the temperature returns to -40°C or more		
				ANTENNA TEMP HI	FN110 temperature is above +85°C	Recovers when the temperature returns to +85°C below		Check the ambient temperature of the FN110
				ANTENNA TEMP LO	FN110 temperature is below -40°C	Recovers when the temperature returns to -40°C or more		

Integral indicator	NAMUR NE107 category *1	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart) *2	Output Operation	Action
AL.50	C	25	Installation, calibration problem	DEVICE_CONNECTION_ERR	Connection error between FN510 and the connected device	None	Output value: Hold previous value Output status: BAD Configuration Err	Check if the connected device is properly connected to FN510. Replace the device if it is properly connected.
AL.52	C	25	Installation, calibration problem	DEVICE_PUBLISH_INTERVAL_ERR	Update time is out of specification	Change the update time.	Output value: Hold previous value Output status: BAD Configuration Err	Check the update time.
AL.60	C	24	Out of service	AI1 OUT OF SERVICE	AI1 block is O/S mode	Recover when the mode target of alert block is other than O/S	Output value: Hold previous value Output status: BAD Configuration Err	Check the AI1 block setting
				AI2 OUT OF SERVICE	AI2 block is O/S mode			Check the AI2 block setting
				AI3 OUT OF SERVICE	AI3 block is O/S mode			Check the AI3 block setting
				TRANSDUCER OUT OF SERVICE	BO1 block is O/S mode			Check the BO1 block setting
AL.61	C	17	Simulation is active	AI1 SIMULATION ACTIVE	Simulate Switch of AI1 block is enabled	Recover when the Simulate Switch of target block is set to disable	Output Simulate Value of AI1 block	Check the AI1 block setting
				AI2 SIMULATION ACTIVE	Simulate Switch of AI2 block is enabled		Output Simulate Value of AI2 block	Check the AI2 block setting
				AI3 SIMULATION ACTIVE	Simulate Switch of AI3 block is enabled		Output Simulate Value of AI3 block	Check the AI3 block setting
AL.62	C	24	Out of service	TRANSDUCER OUT OF SERVICE	TRANSDUCER block is O/S mode	Recover when the mode target of alert block is other than O/S	Output value of AI1,AI2 and AI3: Hold previous value Output status of AI1, AI2 and AI3: BAD Configuration Err	Check TRANSDUCER block setting

Integral indicator	NAMUR NE107 category *1	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart) *2	Output Operation	Action
AL.90	M	21	Fault prediction: Maintenance required	AI1_HI_HI_ ALARM	AI1 High High Alarm	None	Normal Action	Check AI1 block output value
				AI2_HI_HI_ ALARM	AI2 High High Alarm			Check AI2 block output value
				AI3_HI_HI_ ALARM	AI3 High High Alarm			Check AI3 block output value
AL.91	M	21	Fault prediction: Maintenance required	AI1_HI_ALARM	AI1 High Alarm	None	Normal Action	Check AI1 block output value
				AI2_HI_ALARM	AI2 High Alarm			Check AI2 block output value
				AI3_HI_ALARM	AI3 High Alarm			Check AI3 block output value
AL.92	M	21	Fault prediction: Maintenance required	AI1_LO_ ALARM	AI1 Low Alarm	None	Normal Action	Check AI1 block output value
				AI2_LO_ ALARM	AI2 Low Alarm			Check AI2 block output value
				AI3_LO_ ALARM	AI3 Low Alarm			Check AI3 block output value
AL.93	M	21	Fault prediction: Maintenance required	AI1_LO_LO_ ALARM	AI1 Low Low Alarm	None	Normal Action	Check AI1 block output value
				AI2_LO_LO_ ALARM	AI2 Low Low alarm			Check AI2 block output value
				AI3_LO_LO_ ALARM	AI3 Low Low alarm			Check AI3 block output value

*1: “NAMUR NE107 category” refers to the four categories (C: Function check, M: Maintenance required, F: Failure, and O: Out of specification) according to NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”.
*2: Except for the restart
*3: When the device detects “AL.01”, “AL.02”, and “AL.03”, integral indicator displays regardless of the LCD Mode.

9. Parameter Summary

Table 9.1 Parameter Summary

<table>
<tr><th>Object ID</th><th>Attribute ID</th><th>Label</th><th>Description</th><th>Default value</th><th>Handling *1</th></tr>
<tr><td rowspan="10">1. UAPMO block</td><td>1</td><td>Version Revision</td><td>Indicates the application revision of FN510. This revision changes when the application software is downloaded.</td><td>---</td><td>R</td></tr>
<tr><td>10</td><td>Static Revision</td><td>Indicates the revision level of the fixed parameters of UAP. Used, for example, to check whether parameters have been changed.</td><td>---</td><td>R</td></tr>
<tr><td>64</td><td>Identification Number</td><td>Indicates the vendor ID, model ID, and revision of the device.</td><td>---</td><td>R</td></tr>
<tr><td>65</td><td>CTS Version</td><td>Indicates the version of the communication stack test system (CTS).</td><td>0</td><td>R</td></tr>
<tr><td>66</td><td>ITS Version</td><td>Indicates the version of the interoperability test system (ITS).</td><td>0</td><td>R</td></tr>
<tr><td>67</td><td>Diagnostic Status</td><td>Indicates the diagnostic results of the device based on the NAMUR NE107 *2 model.
Setting Enable diagnostic status configuration in UAP Option to Enable allows turning OFF and ON the display of the diagnostic results for each summary, and changing Categorize.</td><td>---</td><td>R</td></tr>
<tr><td>68</td><td>UAP Option</td><td>Allows setting the Diagnostic Status and write protection of UAP.
1. Software write protect
1: On, 0: Off (default)
2. Enable hardware write protect
1: Enable, 0: Disable (default)
3. Enable diagnostic status configuration
1: Enable, 0: Disable (default)
The following table shows the relationship between the hardware write protection and software write protection.
<table>
<tr><th>Enable hardware write protect</th><th>Hardware write protect</th><th>Software Write protect</th><th>write protect</th></tr>
<tr><td>Disable</td><td>Off or On</td><td>Off</td><td>No</td></tr>
<tr><td>Disable</td><td>Off or On</td><td>On</td><td>Protected</td></tr>
<tr><td>Enable</td><td>Off</td><td>Off or On</td><td>No</td></tr>
<tr><td>Enable</td><td>On</td><td>Off or On</td><td>Protected</td></tr>
</table></td><td>1. Off
2. Disable
3. Disable</td><td>W(P)</td></tr>
<tr><td>69</td><td>Diagnostic Switch</td><td>Allows setting On/Off for each summary of Diagnostic Status when Enable diagnostic status configuration in UAP Option is set to Enable.
1: On (default), 0: Off</td><td>On</td><td>W(P)</td></tr>
<tr><td>70</td><td>Diagnostic Configuration</td><td>Allows Categorize for each summary of Diagnostic Status when Enable diagnostic status configuration in UAP Option is set to Enable.
0x08: F:Failure status
0x04: C:Function check status
0x02: O:Out of specification status
0x01: M:Maintenance required status</td><td>Refer to Table 9.2.</td><td>W(P)</td></tr>
<tr><td>71</td><td>Find Device</td><td>When set a value other than 0, FN510 displays “Squ.” on the LCD. The value means the display duration. After displaying, this value returns to 0.
Unit: second
Range: 0 to 60</td><td>0</td><td>W</td></tr>
</table>

Object ID	Attribute ID	Label	Description	Default value	Handling *1
1. UAPMO block (continued)	102	Diagnostic Status Detail	Detailed information on Diagnostic Status.	Refer to Table 9.2	W
	103	Energy Left	Indicates the number of days of remaining battery life assuming ambient temperature condition as 23 degrees Celsius. Unit: day	---	R
	104	Reset Energy Left	Resets the remaining battery power calculation to restore it to a remaining battery power calculation which is based on new batteries. 0: Continue 1: Reset	0 (reading value is always 0)	W(P)
	105	Power Supply Status	Indicates remaining battery life and power supply of device. 0: line powered 1: battery powered, greater than 75% remaining capacity 2: battery powered, between 25% and 75% remaining capacity 3: battery powered, less than 25% remaining capacity	---	R
	106	Energy Harvest Type	Available to write note into this parameter.	---	W(P)
	107	Power Supply Voltage	Indicates the measured power supply voltage (V).	---	R
	110	Hardware Write Protect	Indicates the status of the hardware write protection switch. 0: Off 1: On	---	R
	111	Antenna Temperature	Indicates the temperature of the FN110.	---	R
	112	Adapter Temperature	Indicates the temperature of the FN510.	---	R
	113	Temperature Unit	Selects the temperature unit to be indicated on Antenna Temperature and Adapter Temperature. 1000: K 1001: °C (default) 1002: °F 1003: °R	°C	W(P)
	135	Other Faults Alert	The On/Off or priority for Other Faults Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	136	Faults Non-compliance Alert	The On/Off or priority for Faults Non-compliance Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	137	Faults Process Influence Alert	The On/Off or priority for Faults Process Influence Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	138	Simulation Active Alert	The On/Off or priority for Simulation Active Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	139	Soft Update Incomplete Alert	The On/Off or priority for Soft Update Incomplete Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)

Object ID	Attribute ID	Label	Description	Default value	Handling *1
1. UAPMO block (continued)	140	Power Low Alert	The On/Off or priority for Power Low Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	141	Power Critical Low Alert	The On/Off or priority for Power Critical Low Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	142	Fault Prediction Alert	The On/Off or priority for Fault Prediction Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	143	Environmental Conditions Alert	The On/Off or priority for Environmental Conditions Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	144	Outside Sensor Limits Alert	The On/Off or priority for Outside Sensor Limits Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	145	Out of Service Alert	The On/Off or priority for Out of Service Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	146	Calibration Problem Alert	The On/Off or priority for Calibration Problem Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	147	Faults Sensor or Actuator Alert	The On/Off or priority for Faults Sensor or Actuator Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
	148	Faults Electronics Alert	The On/Off or priority for Faults Electronics Alert can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15)	1. Off 2. 15	W(P)
2. UDO block	2	DESCRIPTION	Indicates the version and model information of the downloaded data.	---	R
	3	STATE	Indicates the status of UDO block. 0: Idle 1: Downloading 3: Applying 4: DL Complete 6: DL Error	---	R
	5	MAX_BLOCK_SIZE	Maximum block size. This value is smaller than the maximum data size of APDU.	---	R
	14	LAST_BLOCK_DOWNLOADED	Indicates the last downloaded block number. 0 means that no block has been downloaded.	---	R
	16	ERROR_CODE	Indicates the error codes for DL Error. 0: no Error 1: Timeout 2: Client Abort 64: Apply failure	---	R

<table>
<tr><th>Object ID</th><th>Attribute ID</th><th>Label</th><th>Description</th><th>Default value</th><th>Handling *1</th></tr>
<tr><td rowspan="6">3.
CO
block</td><td>1</td><td>REVISION</td><td>Indicates the revision number such as COMM_ ENDPOINT, etc.</td><td>---</td><td>R</td></tr>
<tr><td>2</td><td>COMM_ ENDPOINT</td><td>Indicates the Endpoint information. The following shows the components.
1. Network address of remote endpoint
2. Transport layer port at remote endpoint
3. Object ID at remote endpoint
4. Stale data limit
5. Data publication period
6. Ideal publication phase
7. Publish Auto Retransmit
8. Configuration status</td><td>---</td><td>W</td></tr>
<tr><td>3</td><td>COMM_ CONTRACT</td><td>Indicates the Contract information. The following shows the components.
1. ContractID
2. Contract_Status
3. Actual_Phase</td><td>---</td><td>R</td></tr>
<tr><td>4</td><td>PUB_ITEM_ MAX</td><td>Maximum PUB_ITEM value.</td><td>9</td><td>R</td></tr>
<tr><td>5</td><td>PUB_ITEM_ NUM</td><td>PUB_ITEM number.</td><td>0</td><td>R</td></tr>
<tr><td>6</td><td>PUB_ITEM</td><td>Indicates the PUB_ITEM information. The following shows the components.
1. ObjectID
2. AttributeID
3. AttributeIndex
4. Size</td><td>---</td><td>W</td></tr>
<tr><td rowspan="5">4.
TRANSDUCER
block</td><td>1</td><td>Tag Description</td><td>Memo field available to write anything.</td><td>Transducer</td><td>W(P)</td></tr>
<tr><td>2</td><td>Model</td><td>Indicates the model name of the FN510.</td><td>---</td><td>R</td></tr>
<tr><td>3</td><td>Serial Number</td><td>Indicates the serial number of the FN510.</td><td>---</td><td>R</td></tr>
<tr><td>4</td><td>Display Selection</td><td>Select PV Value displaying on the integral indicator. Following value can be selected depending on the Sensor Type.
<table>
<tr><th>SensorType</th><th>Value</th></tr>
<tr><td>DIDO</td><td>32:BI1(Default)
33:BI2
64:BO1</td></tr>
<tr><td>DI Pulse Count</td><td>0:AI1(Default)</td></tr>
<tr><td>4-20 mA</td><td>0:AI1(Default)</td></tr>
<tr><td>Not Used</td><td>0:AI1(Default)</td></tr>
</table></td><td>BI1</td><td>W(P)</td></tr>
<tr><td>5</td><td>LCD Intermittent Time</td><td>Select the off time of the integral indicator.
0: Continuous mode
1: Intermittent mode
(off: 5 seconds, display: 2 seconds)
2: Intermittent mode
(off: 10 seconds, display: 2 seconds)
3: Intermittent mode
(off: 30 seconds, display: 2 seconds)
4: Intermittent mode (default)
(off: 60 seconds, display: 2 seconds)
5: Off mode</td><td>Intermittent mode (off: 60 seconds, display: 2 seconds)</td><td>W(P)</td></tr>
</table>

<table>
<tr><th>Object ID</th><th>Attribute ID</th><th>Label</th><th>Description</th><th>Default value</th><th>Handling *1</th></tr>
<tr><td rowspan="11">4. TRANSDUCER block (continued)</td><td>6</td><td>LCD Exp Mode</td><td>Select the notation of the integral indicator.
0: radix notation (default)
1: exponential notation</td><td>radix notation</td><td>W(P)</td></tr>
<tr><td>7</td><td>Wireless Status</td><td>Indicates the wireless communication status.
<table><tr><th>Bits</th><th>Contents</th><th>Value</th></tr><tr><td>Bit7-3</td><td>reserved</td><td>---</td></tr><tr><td>Bit2</td><td>Contract status (Client/Server)</td><td>0: Not established
1: Established</td></tr><tr><td>Bit1</td><td>Contract status (Publish)</td><td>0: Not established
1: Established</td></tr><tr><td>Bit0</td><td>Join status</td><td>0: Idle
1: Joined</td></tr></table></td><td>--</td><td>R</td></tr>
<tr><td>8</td><td>Measurement Rate</td><td>Indicates the publish period.
Unit: second</td><td>---</td><td>R</td></tr>
<tr><td>10</td><td>Special Cmd</td><td>Special function parameter.
0: Normal mode (default)
1: Deep-sleep mode</td><td>Normal mode</td><td>W</td></tr>
<tr><td>11</td><td>Sensor Type</td><td>Select the type of sensor to be connected to the FN510.
120: Vibration sensor (default)
139: Not Used</td><td>Vibration Sensor</td><td>W(P)</td></tr>
<tr><td>14</td><td>HILO Alarm Limit Enable</td><td>The Enable/Disable for Analog limits of AI blocks
0:Disable (Default)
1: Enable</td><td>Disable</td><td>W(P)</td></tr>
<tr><td>64</td><td>Sensing Mode</td><td>Select the sensing mode. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
0:Acceleration
1:Velocity(Default)
2:Velocity LPF160 Hz Gain High
3:Velocity LPF160 Hz Gain Low</td><td>Velocity</td><td>W(P)</td></tr>
<tr><td>65</td><td>Sampling Frequency</td><td>Select the sampling frequency. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
0:20 kHz(Default)
1:10 kHz
2:5 kHz
3:2 kHz
4:1 kHz</td><td>20 kHz</td><td>W(P)</td></tr>
<tr><td>66</td><td>Sampling Points</td><td>Select the sampling points. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
0:1024 points
1:2048 points
2:4096 points(Default)</td><td>4096 points</td><td>W(P)</td></tr>
<tr><td>102</td><td>Block Mode</td><td>Select the block's operation status. O/S and Auto can be selected.
1. Target: Specify object mode of the object.
2. Actual: Indicates current mode of the object.
3. Permitted: Indicates the mode selected by Target of the object.
4. Normal: Indicate normal status mode of the object.</td><td>1. Auto
2. Auto
3. O/S|Auto
4. Auto</td><td>W(P)</td></tr>
</table>

Object ID	Attribute ID	Label	Description	Default value	Handling *1
20. AI1 block 21. AI2 block 22. AI3 block	1	Process Value	Output object of AI1(DI Pulse Count or 4-20 mA). 1. Value: output value of the object. 2. Status: indicates the status of the object's output value.	1. --- 2. ---	R
	2	Block Mode	Select the block's operation status. O/S and Auto can be selected. 1. Target: Specify object mode of the object. 2. Actual: Indicates current mode of the object. 3. Permitted: Indicates the mode selected by Target of the object. 4. Normal: Indicate normal status mode of the object.	1. Auto 2. Auto 3. O/S|Auto 4. Auto	W(P)
	4	Scale	When Process Value Type is set to Indirect, this value is used as the upper or lower limit for the PV output scaling, unit code, etc. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service). 1. EU at 100%: Indicate the upper limit of the PV value 2. EU at 0%: Indicate the lower limit of the PV value 3. Units Index: Indicate the setting unit used for the PV value 4. Decimal: Indicate the digit number below the decimal point displayed in the integral indicator	1. 100 2. 0 3. % 4. 2	W(P)
	31	Alarm Hysteresis	Specifies the hysteresis value for Alarm limit. The unit is %. The value of Alarm Hysteresis will change regarding Process Value Type. If Process Value Type is Indirect, the value shall be expressed as the percent of Scale |EU 100% - EU 0%|.Otherwise, it shall be expressed as the percent of PV Range.	0	W(P)
	32	HI HI Alarm	The On/Off, priority or limit for High High alarm can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15) 3. Alarm limit (default: 1.#NF00)	1. Off 2. 15 3. 1.#INF00	W(P)
	33	HI Alarm	The On/Off, priority or limit for High alarm can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15) 3. Alarm limit (default: 1.#NF00)	1. Off 2. 15 3. 1.#INF00	W(P)
	34	LO Alarm	The On/Off, priority or limit for Low alarm can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15) 3. Alarm limit (default: -1.#NF00)	1. Off 2. 15 3. -1.#INF00	W(P)
	35	LO LO Alarm	The On/Off, priority or limit for Low Low alarm can be set. 1. On/Off setting 0: On, 255: Off (default) 2. Alert report priority: 0 to 15 (default: 15) 3. Alarm limit (default: -1.#NF00)	1. Off 2. 15 3. -1.#INF00	W(P)

Object ID	Attribute ID	Label	Description	Default value	Handling *1
20. AI1 block 21. AI2 block 22. AI3 block (continued)	102	Tag Description	A universal parameter to store the comment that describes the tag. Up to 32 characters can be used.	AI1	W(P)
	103	Simulate Switch	A simulation function switch for the object. 1: Disable (default) 2: Enable	Disable	W(P)
	104	Simulate Value	When Simulate Switch is set to Enable, this value is used as the input value for the object. The input value can be changed.	---	W(P)
	106	PV Energy Left Enable	Allows assign the Energy Left to AI1.PV.Value when Sensor Type in TRANSDUCER block is set to “Not Used”. 0: Disable (default) 1: Enable		W(P)
	107	Sensor Serial	Indicates the serial number of the sensor, which corresponds to its tag.	---	W(P)
	111	Transducer Value	When Simulate Switch is set to Disable, this value is used as the input value for the object.	---	W(P)
	112	Process Value Type	A scaling function switch for the object. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service). 1: Direct (default) 2: Indirect	Direct	W(P)
	113	PV Range	This value is used as the upper or lower limit for PV input scaling etc. When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service). 1. EU at 100%: Indicate the upper limit of the PV value 2. EU at 0%: Indicate the lower limit of the PV value 3. Units Index: Indicate the setting unit used for the PV value	1. 100 2. 0 3. -	W(P)

*1: R: Read only, W: Read and Write, (P): Target of the write protection
*2: NAMUR NE 107 “Self-Monitoring and Diagnosis of Field Devices”

■ TRANSDUCER Object (TRANSDUCER block)

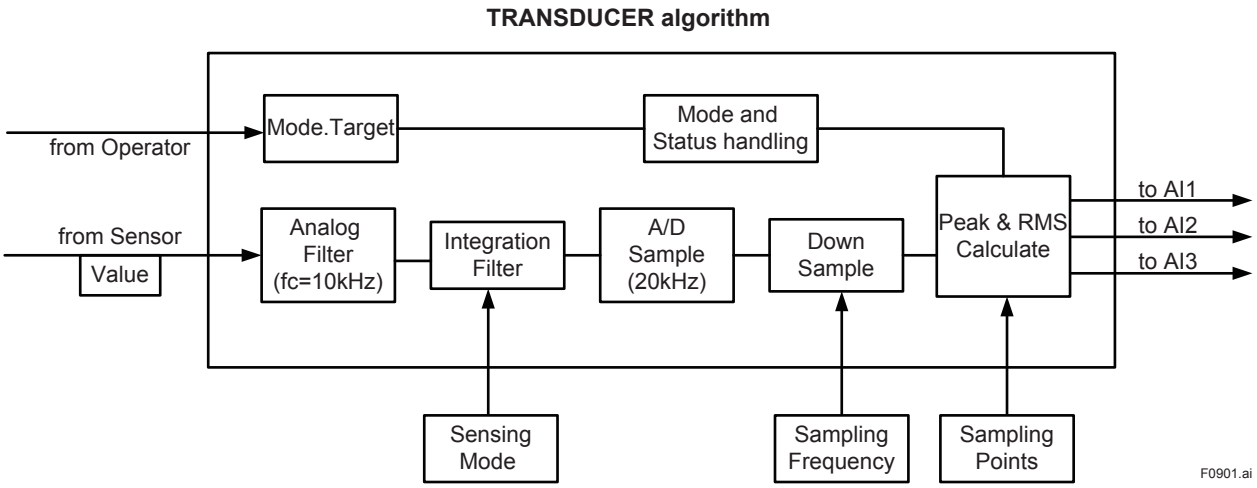


Figure 9.1 Example schema of TRANSDUCER Object

■ AI Object (AI1/AI2/AI3 block)

Scale function is enable when the Sensor Type in the TRANSDUCER block is set to Vibration Sensor.

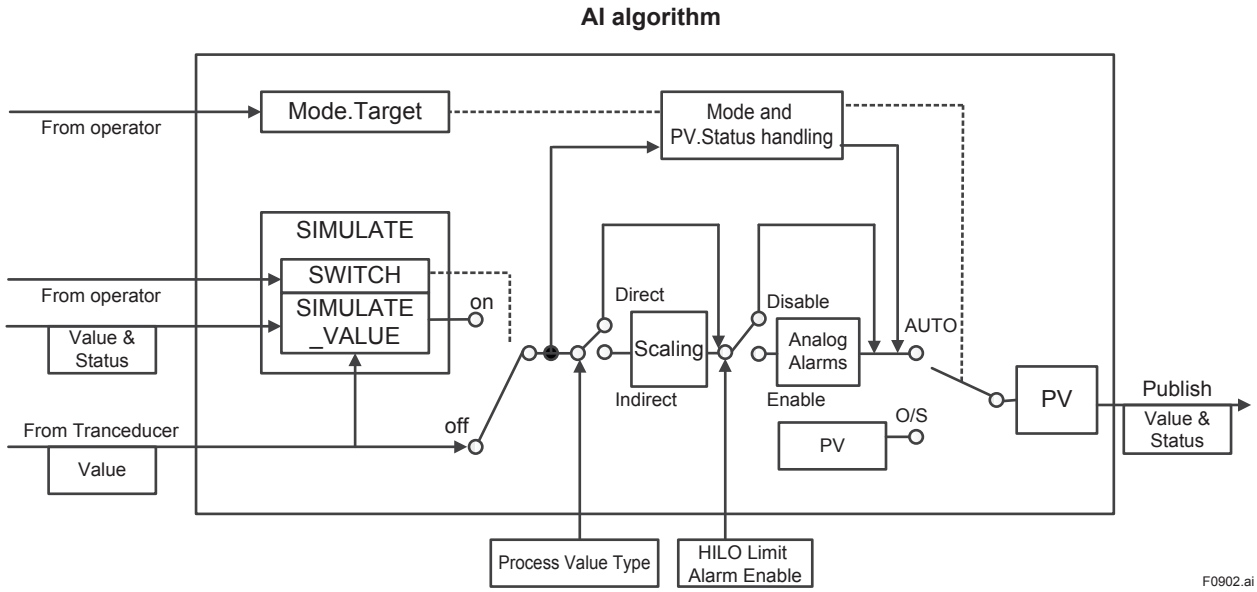


Figure 9.2 Example schema of Analog Input Object

Table 9.2 Diagnostic Status Detail

Bit	Diagnostic Status Detail	Description	Diagnostic status assignment bit	NAMUR NE107 Category *
Diagnostic Status Detail.1				
31	ADAPTER FAIL	FN510 failure	Bit27	F
30	ANTENNA FAIL	FN110 failure	Bit27	F
28	RS485 FAIL	Communication failure between FN110 and FN510	Bit27	F
27	SENSOR FAIL	Disconnection or communication error, between the connected device and FN510	Bit26	F
16	DEVICE_PUBLISH_INTERNAL_ERR	Update time is out of specification	Bit25	C
15	DEVICE_CONNECTION_ERR	Connection error between FN510 and the connected device	Bit25	C
9	LOWBAT_ALM	Low remaining battery voltage	Bit19	M
8	CRITICAL LOWBAT	Low remaining battery voltage	Bit20	M
7	ADAPTER TEMP HI	FN510 temperature is above +85°C	Bit22	O
6	ADAPTER TEMP LO	FN510 temperature is below -40°C	Bit22	O
5	ANTENNA TEMP HI	FN110 temperature is above +85°C	Bit22	O
4	ANTENNA TEMP LO	FN510 temperature is below -40°C	Bit22	O
Diagnostic Status Detail.2				
31	AI1 OUT OF SERVICE	AI1 O/S Mode	Bit24	C
30	AI2 OUT OF SERVICE	AI2 O/S Mode	Bit24	C
29	AI3 OUT OF SERVICE	AI3 O/S Mode	Bit24	C
22	TRANSDUCER OUT OF SERVICE	TRANSDUCER O/S Mode	Bit24	C
15	AI1 SIMULATION ACTIVE	AI1 Simulate Mode	Bit17	C
14	AI2 SIMULATION ACTIVE	AI2 Simulate Mode	Bit17	C
13	AI3 SIMULATION ACTIVE	AI3 Simulate Mode	Bit17	C
Diagnostic Status Detail.3				
31	AI1_HI_HI_ALARM	AI1 HI HI Alarm.limit	Bit21	M
30	AI1_HI_ALARM	AI1 HI Alarm.limit	Bit21	M
29	AI1_LO_ALARM	AI1 LO Alarm.limit	Bit21	M
28	AI1_LO_LO_ALARM	AI1 LO LO Alarm.limit	Bit21	M
27	AI2_HI_HI_ALARM	AI2 HI HI Alarm.limit	Bit21	M
26	AI2_HI_ALARM	AI2 HI Alarm.limit	Bit21	M
25	AI2_LO_ALARM	AI2 LO Alarm.limit	Bit21	M
24	AI2_LO_LO_ALARM	AI2 LO LO Alarm.limit	Bit21	M
23	AI3_HI_HI_ALARM	AI3 HI HI Alarm.limit	Bit21	M
22	AI3_HI_ALARM	AI3 HI Alarm.limit	Bit21	M
21	AI3_LO_ALARM	AI3 LO Alarm.limit	Bit21	M
20	AI3_LO_LO_ALARM	AI3 LO LO Alarm.limit	Bit21	M

* NAMUR NE 107 “Self-Monitoring and Diagnosis of Field Devices”

10. Connecting Sensor

10.1 LN01

The accuracy by combining FN510 and LN01 Piezoelectric Accelerometer (for FN Series) are shown in Table 10.1.

Table 10.1 Measurement accuracy with combination of LN01 Piezoelectric Accelerometer (reference value)

Conditions	Accuracy(100 Hz)
Ambient temperature -40 to 85ºC, the entire measurement range	Acceleration: -27 to 17% of reading ± 2 m/s^2 rms Velocity: -35% to 25% of reading ± 1 mm/s rms
Ambient temperature 25 ± 10ºC, the entire measurement range	Acceleration: ± (15% of reading + 0.8 m/s^2 rms) Velocity: ± (23% of reading + 0.2 mm/s rms)

For more information about the accuracy and temperature characteristics of LN01, refer to LN01 Piezoelectric Accelerometer (for FN series) (GS 01W03H01-01EN).

NOTE

An ambient temperature affects a sensitivity of accelerometer. If a high accuracy measurement is required, please install FN510 and LN01 to a location where a temperature change is small.

11. General Specifications

Please refer to the following General Specifications sheet for the specifications, model, suffix and option codes, and external dimensions of each product.
The General Specifications can be downloaded from the website of Yokogawa.
Website address: https://www.yokogawa.com/solutions/products-platforms/field-instruments/

■ General Specifications List

Model	Document Title	Document No.
YFGW410	Field Wireless Management Station	GS 01W02D01-01EN
YFGW610	Field Wireless Media Converter	GS 01W02D02-01EN
YFGW510	Field Wireless Access Point	GS 01W02E01-01EN
YFGW520	Field Wireless Access Point	GS 01W02E02-01EN
FN110	Field Wireless Communication Module	GS 01W03B01-01EN
FN310	Field Wireless Multi-Protocol Module	GS 01W03D01-01EN
FN510	Field Wireless Multi-Function Module	GS 01W03E01-01EN
LN01	Piezoelectric Accelerometer (for FN series)	GS 01W03H01-01EN
LN90	Interface Adapter	GS 01W03L01-01EN
YTMX580	Multi-Input Temperature Transmitter	GS 04R01B01-01EN

If you cannot find it on our website, please contact YOKOGAWA office.

Revision Information

Title : FN510 Field Wireless Multi-Function Module (Accelerometer input)
Manual No. : IM 01W03E03-01EN

Edition	Date	Page	Revised item
1st	Feb. 2017	—	New Publication
2nd	Apr. 2017	—	Add section 1.5 Update CE Conformity (RoHS)
3rd	July 2021	— 1-4 2-4 2-7 2-10 2-12 2-14 11-1	Delete ATEX documentation. 1.4 Add the description for EU RoHS and China RoHS. 2.6.1 Update the description for FM Approval (United States). 2.6.2 Update the description for FM Approval (Canada). 2.6.3 Update the description for ATEX Certification. 2.6.4 Update the description for IECEx Certification. Add 2.8. 11. Delete the description for general specifications and add the General Specifications list.