User's
Manual

ADMAG TI Series
AXG, AXW Magnetic Flowmeter
FOUNDATION™ Fieldbus Communication Type

IM 01E21A02-03EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01E21A02-03EN
2nd Edition

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AXG, AXW Magnetic Flowmeter
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1. Introduction

This manual provides the basic guidelines for basic operation of ADMAG TI Series AXG, AXW magnetic flowmeters with FOUNDATION™ Fieldbus protocol.
For items which are not covered in this manual, read the applicable user's manuals listed in "Table 1.1 Manual and General Specifications List" in the ADMAG TI Series Installation Manual. These documents can be downloaded from the YOKOGAWA website. To ensure the correct use of the product, read these manuals thoroughly and fully understand how to operate the product before operating it. To confirm the model name and specifications of the product, refer to the general specifications.
Website address: http://www.yokogawa.com/fld/doc/

■ Precautions related to the protection, safety, and alteration of the product

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

WARNING

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

CAUTION

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

IMPORTANT

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

NOTE

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

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

Protective grounding terminal

⏚ Functional grounding terminal

(This terminal should not be used as a protective grounding terminal.)

∼ Alternating current

⎓ Direct current

⚠ Caution

This symbol indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the product.

For the protection and safe use of the product and the system in which this product is incorporated, be sure to follow the instructions and precautions on safety that are stated in user's manual whenever you handle the product. Take special note that if you handle the product in a manner that violates these instructions, the protection function of the product may be damaged or impaired, or may not be fully demonstrated. In such a case, YOKOGAWA does not guarantee the quality, performance, function, or safety of the product.

■ Regarding this user's manual

- This manual should be provided to the end user.
- The contents of this manual are subject to change without prior notice.
- 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 questions arise or errors are found, or if any information is missing from this manual, inform the nearest YOKOGAWA sales office or agent from which the customer has purchased this product.
- 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.
- Note that changes in the specifications, construction, or component parts of the product may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- This manual is intended for the following personnel:

  Engineers responsible for the installation and wiring of the product.

  Personnel responsible for the normal daily device operation after this product starts running (operator).
- To ensure correct use, read this manual and the applicable manuals thoroughly before starting operation. Read the general specifications for specifications of the product.

■ Trademarks

- All the brands or names of Yokogawa Electric's products used in this manual are either trademarks or registered trademarks of Yokogawa Electric Corporation.
- All other company and product names mentioned in this manual are trade names, trademarks or registered trademarks of their respective companies.
- In this manual, trademarks and registered trademarks are not marked with "™" or "®".
- "FOUNDATION" in "FOUNDATION Fieldbus" is a registered trademark of FieldComm Group.

1.1 For Safe Use of Product

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

■ General

WARNING

- Do not open the cover in wet weather or humid environment. When the cover is open, the stated enclosure protection is not applicable.
- When opening the cover, wait for more than 20 minutes after turning off the power. Only an expert engineer or skilled personnel is permitted to open the cover.

■ Operation

WARNING

Be sure to enable the write protection function to prevent parameters from being overwritten after finishing parameter setting.
In rare cases, the IR switches may respond unexpectedly to water drops or extraneous substances sticking on the surface of the display panel due to characteristics of the operating principles. The possibility of malfunction arises after rain or cleaning near the place where the flowmeter is installed. Repeatedly turning a flashlight, etc. on and off in the direction of the IR switch may also be a cause of malfunction.
Read the installation manual for the hardware write lock function, and Section 5.12 for the software write lock function.

■ Maintenance

WARNING

- If dirt, dust or other substances adhere to the glass of the display, wipe them clean with a soft dry cloth.
- Maintenance of this product should be implemented in a maintenance service shop where necessary devices and environment condition are provided. The required environmental condition is that the ambient temperature should be 5 to 40 °C (humidity of which maximum relative humidity is 80% for temperatures 5 to 31 °C, and of which relative humidity linearly decreases to 50% at a temperature of 40 °C when the temperature is over 31 °C).

■ microSD card

IMPORTANT

- Do not store or use the microSD card in places with static electricity near electrically charged objects or where electrical noise is present. Doing so can result in electric shock or damage to the microSD card.
- Do not disassemble or modify the microSD card.
- Do not physically shock, bend, or twist the microSD card.
- While reading/writing data, do not turn off the power, apply vibration or shock or pull out the card. Data can be corrupted or permanently lost.
- Use only the microSD cards specified by YOKOGAWA. The operation cannot be guaranteed when other cards are used.
- When inserting the microSD card into the product, make sure to orient the microSD card correctly (face up or down) and insert it securely. If not inserted correctly, the microSD card will not be recognized by the product.
- Do not touch the microSD card with wet hands.
- Do not use the microSD card if it is dusty or dirty.
- The microSD card comes formatted. If you would like to format the microSD card, use the product's Format function.
- YOKOGAWA provides no warranty for damage to, or loss of data recorded on the microSD card, regardless of the cause of such damage or loss. We recommend regularly making backup copies of your data.

1.2 Warranty

- The warranty shall cover the period described in the quotation presented to the purchaser at the time of purchase. Problems that may occur during the warranty period shall be repaired free of charge.
- In case of problems, the customer should contact the YOKOGAWA representative from which the product was purchased or the nearest YOKOGAWA office.
- If a problem arises with this product, please inform YOKOGAWA of the nature of the problem and the circumstances under which the problem developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
- Responsible part for repair costs of the problems shall be determined by YOKOGAWA based on our investigation.
- The purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:
  - Failure due to improper and/or inadequate maintenance by the purchaser.
  - Failure or damage due to improper handling, use, or storage which does not conform to design conditions.
  - Use of the product in question in a location not conforming to the standards specified by YOKOGAWA, or problems 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/lightning, or other natural disasters, as well as disturbances, riots, warfare, or radioactive contamination.

2. About Fieldbus

2.1 Overview

Fieldbus is a widely used bi-directional digital communication protocol for field devices that enable the simultaneous output to many types of data to the process control system.

The ADMAG TI Series Fieldbus communication type employs the specifications standardized by FieldComm Group, and provides interoperability between Yokogawa devices and those produced by other manufacturers. Fieldbus comes with software consisting of AI, DI, IT, AR, PID and MAO (only AXG) function blocks that enable the flexible implementation of systems.

For information on other features, engineering, design, construction work, startup and maintenance of Fieldbus, refer to “Fieldbus Technical Information” (TI 38K03A01-01E).

2.2 Internal Structure

This product contains two Virtual Field Devices (VFD) that share the following functions.

2.2.1 System/network Management VFD

- Sets node addresses and Physical Device tags (PD Tag) necessary for communication.
- Controls the execution of function blocks.
- Manages operation parameters and communication resources (Virtual Communication Relationship: VCR).

2.2.2 Function Block VFD

(1) Resource block (RB)

- Manages the status of hardware.
- Automatically informs the host of any detected faults or other problems.

(2) Sensor transducer block (STB)

- Calculates the flow velocity, volumetric flow rate, mass flow rate, calorie, and totalized value from a sensor output.
- Transfers the calculated process value to the AI and DI function blocks (totalized value only to the AI function block).
- Obtains a temperature value from the MAO function block.

(3) Diagnosis transducer block (DTB)

- Obtains transmits the adhesion resistance, electrode potential, flow noise and conductivity from the sensor output, and transfers them to the AI and DI function blocks.
- Has functions to set each of the adhesion, flow noise, conductivity, empty check and verification functions and to monitor them.

(4) Local Display transducer block (LTB)

- Controls the display.

(5) Maintenance transducer block (MTB)

- Is related to settings for detailed device information and manufacturing.
- Has functions to display device information (detailed version of the device, serial No. information, etc.), information related to event management (backup/restore, data logging function), application for service/factory/expert (for debugging, manufacturing), alarm/error log and software download results.

(6) AI function block (AIFB) (AXG: 4, AXW: 3)

- Outputs various flow rates (including flow velocity), calorie and totalized value.
- For AXG, outputs the adhesion resistance, electrode potential, flow noise and conductivity.
- Performs processing such as the SIMULATE function, damping (first-order lag filter), scaling, etc.

(7) DI function block (DIFB) (3)

- Performs discrete output for the process value, alarm and warning of STB and DTB.

(8) PID function block

- Performs the PID control computation based on the deviation of the measured value from the setpoint.

(9) MAO function block (only AXG)

- Inputs a temperature value from other device.

(10) IT function block (2)

- Adds two main inputs and integrates them for output.

(11) AR function block

- Switches two main inputs of different measurement ranges bumplessly and combines the result with three auxiliary inputs through the selected compensation function to calculate the output.

Indexes of each block are shown below:

Block	Start Index
Resource block	1000
Sensor transducer block	2000
Diagnosis transducer block	2500
Local Display transducer block	2700
Maintenance transducer block	2900
AI1 function block	4000
AI2 function block	4100
AI3 function block	4200
AI4 function block	4300
DI1 function block	6000
DI2 function block	6100

Block	Start Index
DI3 function block	6200
PID function Block	8000
MAO function block	10000
IT1 function block	16000
IT2 function block	16100
AR function block	17500

2.3 Logical Structure of Each Block

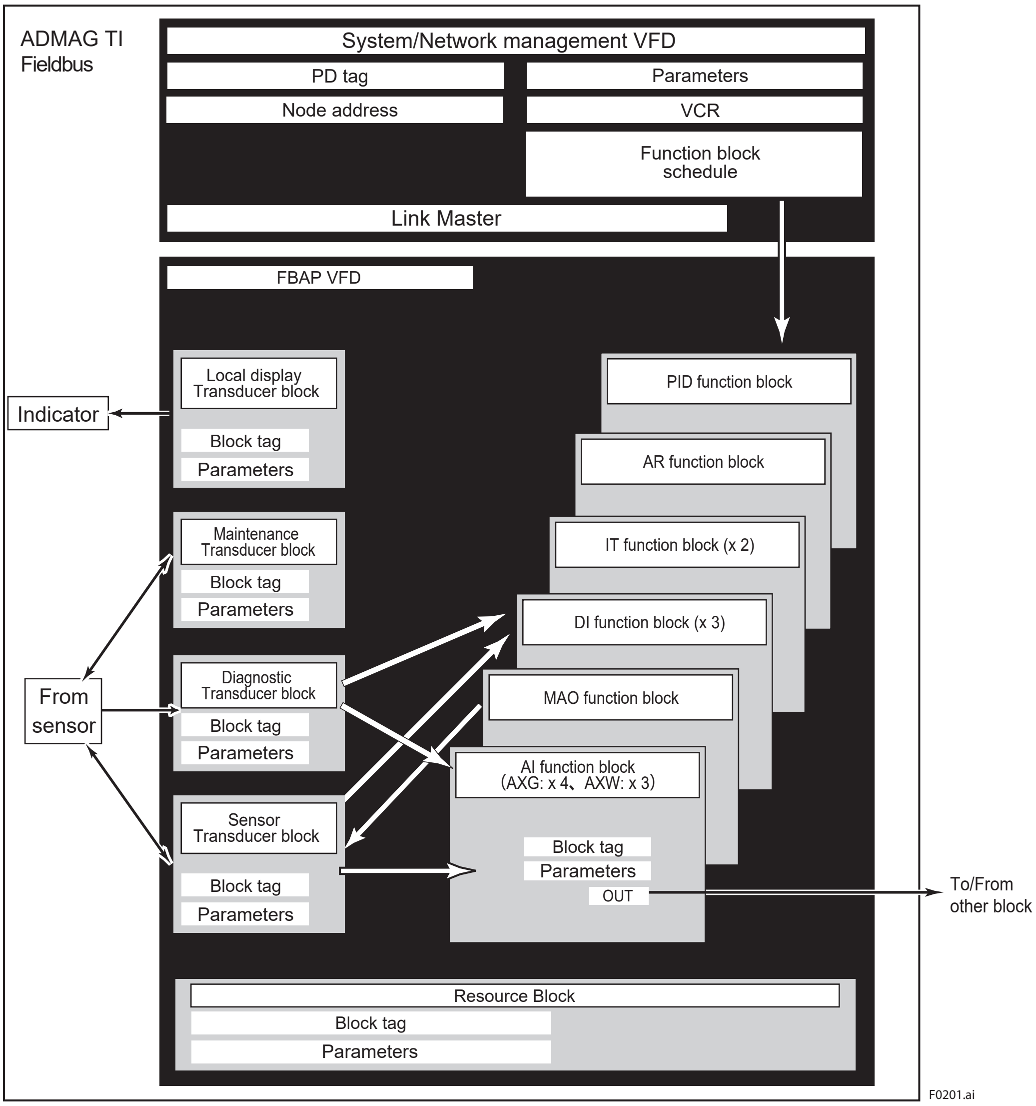


Figure 2.1 Logical Structure of Each Block

Setting of various parameters, node address, and PD Tag (Physical device tag) shown in Figure 2.1 is required before starting operation. For setting method, refer to “GETTING STARTED” in Chapter 3 and later.

3. Getting Started

Fieldbus fully adopts digital communication protocol and differs in operation from conventional 4 to 20 mA transmission protocol. It is recommended that those novice users who use field devices for the first time should use the device in accordance with the procedures described in this section. The procedures assume that field devices will be set up on a bench.

3.1 Connection of Devices

The following devices are required to use Fieldbus devices:

- **Power supply:**

  Fieldbus requires a dedicated power supply. It is recommended that current capacity be well over the total value of the maximum current consumed by all devices (including the host). The conventional 4 -20 mA DC current cannot be used as is.

- **Terminator:**

  Fieldbus requires two dedicated terminators. Refer to the supplier for details of terminators that are attached to the host.

- **Field device:**

  Connect the Fieldbus communication type product. This product or other devices can be connected.

  In order to smoothly start Fieldbus, please use the devices that has passed the interoperability test of the Fieldbus Foundation.

- **Host:**

  Used for accessing field devices. A dedicated host (such as DCS) is used for an instrumentation line while dedicated communication tools are used for experimental purposes. For the operation of the host, refer to the instruction manual for each host. No other details on the host are given in this manual. At least one device with the bus control function is necessary.

- **Cable:**

  Used for connecting devices. Refer to “Fieldbus Technical Information” (TI 38K03A01-01E) for details of instrumentation cabling. For laboratory or other experimental use, a twisted pair cable two to three meters in length (a cross section 0.9mm^2 (AXG #18) or more and a cycle period of within 5 cm (2 inches)) may be used. Termination processing depends on the type of device being deployed. For this product, use an M4 screw terminal claw. Some hosts require a connector.

Contact Yokogawa when making arrangements to purchase the recommended devices.

Connect devices as shown in Figure 3.1. Connect the terminators at both ends of the trunk, with the minimum length of the spur laid for connection. The polarity of signal and power must be maintained.

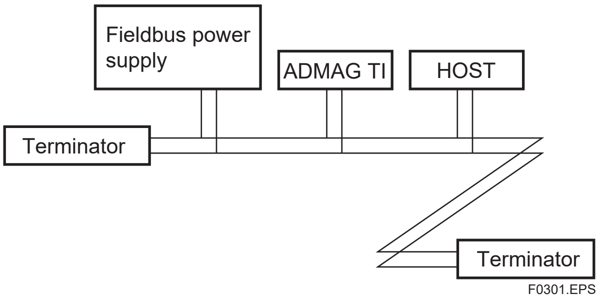


Figure 3.1 Connection of Devices

NOTE

No CHECK terminal is used for this product. Do not connect the field indicator and check meter.

IMPORTANT

If the flowmeter is connected with a parameter-setting tool, such as a PC, while being connected with the upper system, it may disturb the communication operation on the bus, and cause the operational failure of the system. Use the parameter-setting tool after taking preventive measures of setting the related loop offline in advance.

3.2 Host Setting

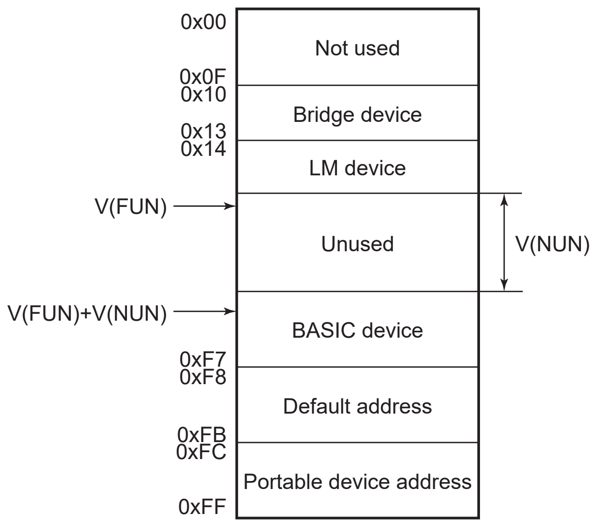
To activate Fieldbus, the following settings are required for the host. Particularly, pay attention so that the address range to use includes setting values of this product.

IMPORTANT

Do not turn off the power immediately after setting.
To improve the reliability of the device, processing to store data to EEPROM is duplexing.
If the power is turned off within 60 seconds after setting is made, the modified parameters are not saved, and the settings may return to the original values.

Table 3.1 Operation Parameters

Symbol	Parameter Name	Description and Setting
V(ST)	Slot-Time	Indicates the time necessary for the immediate reply of the device. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For this product, set a value of 4 or greater.
V(MID)	Minimum-Inter-PDU- Delay	Indicates the minimum value of communication data intervals to start reply. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For this product, set a value of 4 or greater.
V(MRD)	Maximum-Response-Delay	Indicates the worst-case time elapsed until a reply is received. Since the unit is Slot-time, set the value so that V (MRD) x V (ST) is the maximum value of the specifications for all devices. For this product, set V(MRD) x V(ST) to a value of 12 or greater.
V(FUN)	First-Unpolled-Node	Indicates the address next to the address range used by the host. Set 14 or more in hexadecimal notation.
V(NUN)	Number-of-consecutive-Unpolled-Node	Unused address range. If a large value is set, it reduces the communication load of the bus.



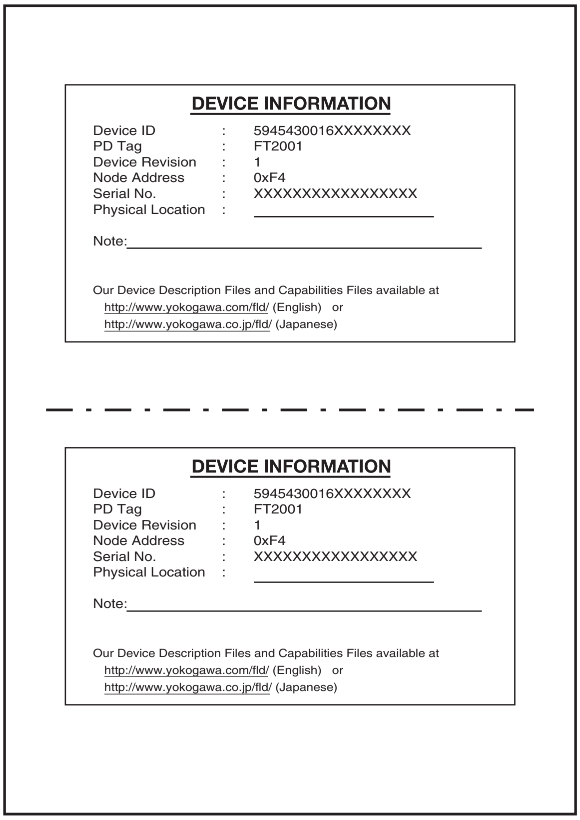
Note 1: Bridge device: A linking device which brings data from one or more H1 networks.
Note 2: LM device: with bus control function (Link Master function)
Note 3: BASIC device: without bus control function

F0302.EPS

Figure 3.2 Available Address Range

3.3 Bus Power ON

Turn on the power of the host, the bus, and this product. If this product is equipped with a display, first all segments are lit, and then the display begins to operate. If the display is not turned on, or abnormal current flows, check the polarity of power.
Using the host device display function, check that this product is in operation on the bus.
The device information, including the PD tag, Node address, and Device ID, is described on the sheet (see Figure 3.3) attached to the device. The same device information is given at two locations on this sheet.



DEVICE INFORMATION

Device ID : 5945430016XXXXXXXX
PD Tag : FT2001
Device Revision : 1
Node Address : 0xF4
Serial No. : XXXXXXXXXXXXXXXXX
Physical Location : ____________

Note: ____________

Our Device Description Files and Capabilities Files available at
http://www.yokogawa.com/fld/ (English) or
http://www.yokogawa.co.jp/fld/ (Japanese)

DEVICE INFORMATION

Device ID : 5945430016XXXXXXXX
PD Tag : FT2001
Device Revision : 1
Node Address : 0xF4
Serial No. : XXXXXXXXXXXXXXXXX
Physical Location : ____________

Note: ____________

Our Device Description Files and Capabilities Files available at
http://www.yokogawa.com/fld/ (English) or
http://www.yokogawa.co.jp/fld/ (Japanese)

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Figure 3.3 Device Information Attached to This Product.

If this product is not detected, check the address range in use and the polarity of power. If the node address and PD tag are not specified when ordering, the default value (0xF4) is factory set. If two or more devices with the same node address are connected at the same time, one device retains its factory-set address, while the other devices have default addresses of 0xF8 or later. In such a case, set an individual address.

3.4 Integration of DD

If the host supports DD (Device Description), the DD of this product needs to be specified. Check if the host has the following directory under the directory to specify DD.

594543¥0016 (AXG)
594543¥0017 (AXW)

(594543 is the manufacturer number of Yokogawa Electric Corporation, and 0016 is the device number of AXG, and 0017 is the device type for AXW.)

If the directory is not found, the DD of this product has not been included. Create the above directory and copy the DD file of this product (0m0n.ff5, 0m0n.sy5 (m, n is a numeral)) (separately supplied) into the directory.
Here, '0m' in the file name shows the device revision, and '0n' shows the DD revision.
Once the DD is installed in the directory, the name and attribute of all parameters of this product are displayed.
Also, off-line configuration is possible by using capabilities files (CFF).

If you do not have the DD or capabilities files, you can download them from Yokogawa's web page: Access the following web site, or contact your sales agent where you purchased this product.
http://www.yokogawa.com/fld/doc/

3.5 Reading the Parameters

Select the AI block of this product from the host screen, and read the OUT parameter. The measured value assigned to the present AI is displayed. Check that MODE_BLK of the function block and resource block is set to AUTO, change the input signal being measured, and read the parameter again. A new designated value will be displayed.

3.6 Continuous Record of Values

If the host has a function that continuously records the indications, use the function to record the indications (values). Depending on the host being used, it is necessary to set the schedule of Publish (function to transmit the indication to the bus on a periodic basis).

3.7 Generation of Alarm

The block alarm, out-of-range alarm of the output parameter (OUT) and update alarm at setting change can be generated from this product. When generating alarm, a Link Object and a VCR Static Entry need to be set. For details of Link Object and VCR Static Entry, refer to Subsection 4.6.1 Link object and Subsection 4.5.1 VCR Setting.

4. Configuration

This chapter describes how to adapt the function and performance of this product to suit specific applications. Because multiple devices are connected to Fieldbus, it is important to carefully consider the device requirements and settings when configuring the system. Specifically, the following steps must be taken.

(1) Network design

Determine the devices to be connected to Fieldbus and check the capacity of the power supply.

(2) Network definition

Determine the PD tag and node addresses for all devices.

(3) Definition of combining function blocks

Determine how function blocks are combined.

(4) Setting tags and addresses

Set the PD Tag and node addresses for each device.

(5) Communication setting

Set the link between communication parameters and function blocks.

(6) VFD parameter configuration

Set the parameter for function block VFD.

The following section describes each step of the procedures in this order. The use of a dedicated configuration tool significantly simplifies the procedures below. This chapter explains procedures that enable the user to configure even hosts that have relatively simple functions. Refer to Appendix 4 when the device is used as Link Master.

4.1 Network Design

- **Power supply:**

  Fieldbus requires a dedicated power supply. It is recommended that current capacity be well over the total value of the maximum current consumed by all devices (including the host). Conventional DC current of 4 - 20 mA cannot be used as is.

- **Terminator:**

  Fieldbus requires two dedicated terminators. Refer to the supplier for details of terminators that are attached to the host.

- **Field device:**

  Connects the field devices necessary for instrumentation. This product has passed the interoperability test conducted by the FieldComm Group. In order to smoothly start Fieldbus, it is recommended that the devices used satisfy the requirements of the above test.

- **Host:**

  Used for access to field devices and advanced control. At least one device with the bus control function is necessary.

● Cable:

Used for connecting devices. Refer to “Fieldbus Technical Information” (TI 38K03A01-01E) for details of instrumentation cabling. For field branch cabling, use terminal boards or a connection box as required.

First, check the capacity of the power supply. The power supply capacity must be greater than the sum of the maximum current consumed by all devices to be connected to Fieldbus. The maximum current consumed (power supply voltage 9V to 32V) for this product is 15 mA.
The cable used for the spur must be of the minimum possible length.

4.2 Network Definition

Before connecting devices with Fieldbus, define the Fieldbus network. Allocate the PD tag and node addresses to all devices (excluding such passive devices as terminators).
The PD tag is the same as the conventional one used for the device. Up to 32 alphanumeric characters may be used for definition. Use a hyphen as a delimiter as required.
The node address is used to specify devices for communication purposes. Because this data is too long for the PD Tag, the host uses the node address in place of the PD Tag for communication. The range of 20 to 247 (or from 14 to F7 in hexadecimal notation) can be set. The device (LM device) with bus control function (Link Master function) is allocated from a smaller address number (20) side, and other devices (BASIC device) without bus control function allocated from a larger address number (247) side respectively. Set the range of addresses to be used to the LM device. Set the following parameters.

Table 4.1 Parameters for Setting Address Range

Symbol	Parameter Name	Description
V(FUN)	First-Unpolled-Node	Sets the address next to the address range used for the host or other LM device.
V(NUN)	Number-of-consecutive-Unpolled-Node	Unused address range.

The devices within the address range written as “Unused” in Figure 4.1 cannot be used on Fieldbus. For other address ranges, the range is periodically checked to identify when a new device is mounted. Care must be taken to keep the unused device range as narrow as possible so as to lessen the load on Fieldbus.

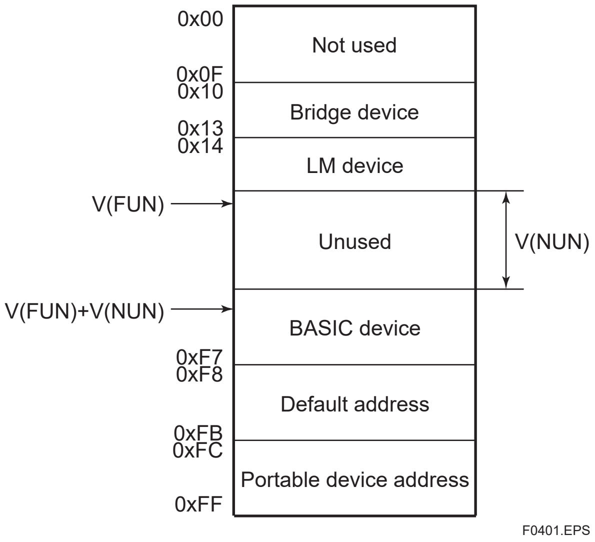


Figure 4.1 Available Range of Node Addresses

To ensure stable operation of Fieldbus, determine the operation parameters and set them to the LM devices. When the parameters in Table 4.2 are to be set, the worst-case value of all the devices to be connected to the same Fieldbus must be used. Refer to the specifications of each device for details. Table 4.2 lists specification values of this product.

Table 4.2 Operation Parameter Values of This Product to be Set to LM Devices

Symbol	Parameter Name	Description and Setting
V(ST)	Slot-Time	Indicates the time necessary for the immediate reply of the device. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For this product, set a value of 4 or greater.
V(MID)	Minimum-Inter-PDU-Delay	Indicates the minimum value of communication data intervals to start reply. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For this product, set a value of 4 or greater.
V(MRD)	Maximum-Response-Delay	Indicates the worst-case time elapsed until a reply is received. Since the unit is Slot-time, set the value so that V (MRD) x V (ST) is the maximum value of the specifications for all devices. For this product, set V(MRD) x V(ST) to a value of 12 or greater.

4.3 Definition of Combining Function Blocks

The input/output parameters for function blocks are combined. Specifically, see "VFD Parameter Configuration" in Section 4.6 for the details though the setting is written to the link object of this product. It is also possible to read values from the host at proper intervals instead of connecting the block output of this product to other blocks.

The combined blocks need to be executed synchronously with other blocks on the communications schedule. In this case, change the schedule of this product as shown in Table 4.3.

Table 4.3 Execution Schedule of the Function Blocks

Index	Parameter Name	Setting (Enclosed is factory-setting)
269(SM)	MACROCYCLE_ DURATION	Cycle (MACROCYCLE) period of control or measurement. Unit is 1/32 ms. (32000 = 1s)
351(SM)	FB_START_ENTRY.1	Function block startup time. Offset time from the start of MACROCYCLE specified in 1/32 ms. (0 = 0 s)
352~381(SM)	FB_START_ENTRY.2 to FB_START_ENTRY.31	No settings

The maximum of 10 ms is taken to execute the AI block. For scheduling of communications for combination with the next function block, arrange the schedule so that the execution starts after a lapse of longer than this time. Do not make settings so that function blocks of this product are executed at the same time (execution time is overlapped).
Figure 4.3 shows the execution schedule example of the function block like the loop shown in Figure 4.2.

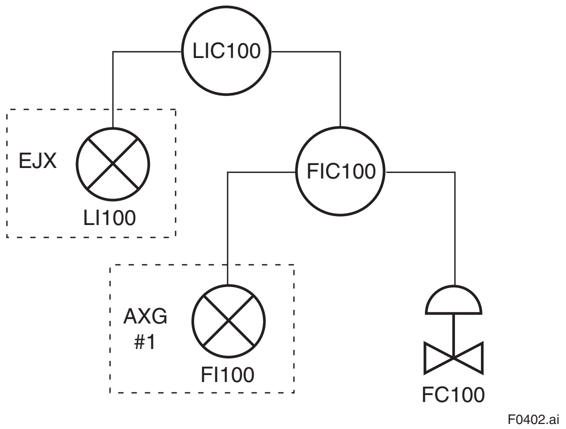


Figure 4.2 Example of Loop Connecting Function Block of This Product with Other Devices

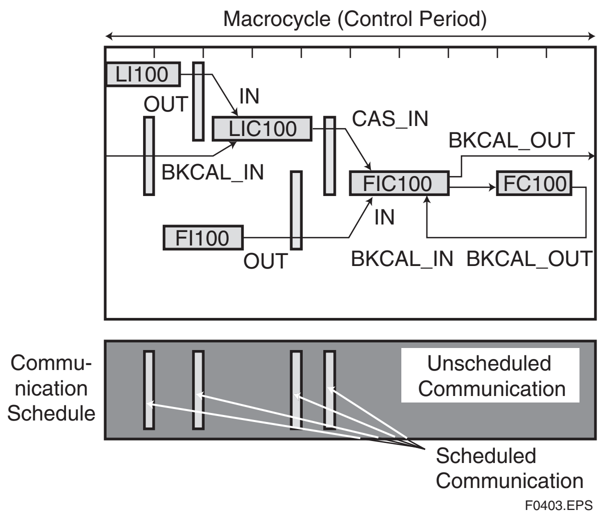


Figure 4.3 Function Block Schedule and Communication Schedule

When the control period (macro cycle) is set to more than 4 seconds, set the following intervals to be more than 1% of the control period.

- Interval between "end of block execution" and "start of sending CD from LAS"
- Interval between "end of the block execution" and "start of the next block execution"

4.4 Setting Tag and Address

This section describes the procedures to set PD Tag and node address in this product. There are three states of the Fieldbus devices as shown in Figure 4.4, and if the state is other than the lowest SM_OPERATIONAL state, no function block is executed. This product must be transferred to this state when a tag or address of this product is changed.

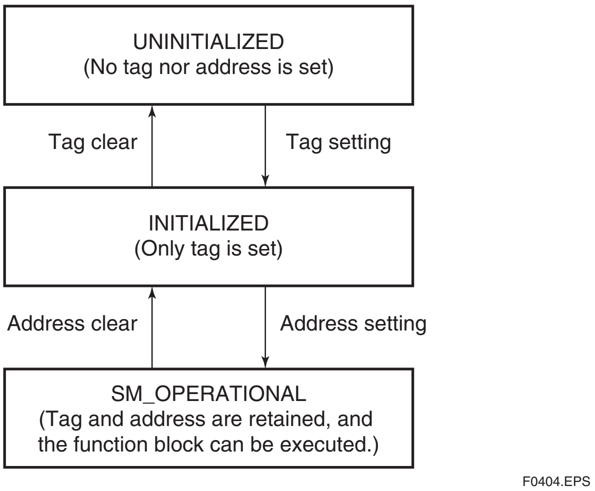


Figure 4.4 Status Transition by Setting PD Tag and Node Address

This product (unless otherwise specified) has the PD Tag (FT1002) and node address (244, or F4 in hexadecimal notation) that are set at shipment from the factory unless otherwise specified. To change only the node address, clear the address once and then set a new node address. To set the PD Tag, first clear the node address and clear the PD Tag. Then, reset the PD tag and node address.
Devices whose node addresses have been cleared will have the default address (randomly chosen from a range of 248 to 251, or from F8 to FB in hexadecimal notation). At the same time, it is necessary to specify the device ID in order to correctly specify the device. The device ID of AXG is 5945430016xxxxxxxx, and the device ID of AXW is 5945430017xxxxxxxx. (xxxxxxxx is a 8-digit alphanumeric characters.)

4.5 Communication Setting

To set the communication function, it is necessary to change the database residing in SM-VFD.

4.5.1 VCR Setting

Set VCR (Virtual Communication Relationship), which specifies the called party for communication and resources. This product has 38 VCRs whose application can be changed, except for the first VCR, which is used for management. This product has VCRs of four types:

Server (QUB) VCR

A Server responds to requests from a host. This communication needs data exchange. This type of communication is called QUB (Queued User- triggered Bidirectional) VCR.

Source (QUU) VCR

A Source multicasts alarms or trends to other devices. This type of communication is called QUU (Queued User-triggered Unidirectional) VCR.

Publisher (BNU) VCR

The output of the function block is sent to the function block of other device. This type of communication is called BNU (Buffered Network-triggered Unidirectional) VCR.

Subscriber (BNU) VCR

The output of the function block of other device is received by the function block of this product. This type of communication is called BNU (Buffered Network-triggered Unidirectional) VCR.

Each VCR has the parameters listed in Table 4.4. Parameters must be changed together for each VCR because modification of individual parameters may cause inconsistent operation.

Table 4.4 VCR Static Entry

Sub-index	Parameter Name	Description
1	FasArTypeAndRole	Indicates the type and role of communication (VCR). The following 4 types are used for this product. 0x32: Server Server (Responds to requests from host.) 0x44: Source Source (Transmits alarm or trend.) 0x66: Publisher (The output of the function block is sent to the function block of other device.) 0x76: Subscriber (The output of the function block of other device is received by the function block of this product.)
2	FasDllLocalAddr	Sets the address (DLSAP or DLCEP) to specify VCR in this product. The range from 20 to F7 in hexadecimal notation is used.
3	FasDllConfigured RemoteAddr	Sets the node address of the called party for communication and the address (DLSAP or DLCEP) used to specify VCR in that address. For DLSAP or DLCEP, a range from 20 to F7 in hexadecimal notation is used. Addresses in Subindex 2 and 3 need to be set to the same contents of the VCR as the called party (local and remote are reversed).
4	FasDllSDAP	Specifies the quality of communication. Usually, set one of the following four types. 0x2B: Server 0x01: Source (Alert) 0x03: Source (Trend) 0x91: Publisher/Subscriber
5	FasDllMaxConfirm DelayOnConnect	To establish connection for communication, set the maximum wait time for the called party's response in ms. Typical setting at factory shipping is 60 seconds (60,000).
6	FasDllMaxConfirm DelayOnData	For request of data, set the maximum wait time for the called party's response in ms. Typical setting at factory shipping is 60 seconds (60,000).

Sub-index	Parameter Name	Description
7	FasDllMaxDlsduSize	Specifies maximum DL Service Data unit Size (DLSDU). Set 256 for Server and Trend VCR, and 64 for other VCRs.
8	FasDllResidualActivity Supported	Specifies whether connection is monitored. Set TRUE (0xff) for Server. This parameter is not used for other communication.
9	FasDllTimelinessClass	Not used.
10	FasDllPublisherTime WindowSize	Not used.
11	FasDllPublisherSynchronizaing Dlcep	Not used.
12	FasDllSubsriberTime WindowSize	Not used.
13	FasDllSubscriberSynchronization Dlcep	Not used.
14	FmsVfdId	Indicates VFD of this product to be used. (0x1: System/ network management VFD, 0x1234: Function block VFD)
15	FmsMaxOutstanding ServiceCalling	Set 0 to Server. It is not used for other applications.
16	FmsMaxOutstanding ServiceCalled	Set 1 to Server. It is not used for other applications.
17	FmsFeaturesSupported	Indicates the type of services in the application layer. In this product, it is automatically set in accordance with specific applications.

4.5.2 Function Block Execution Control

In accordance with the instructions given in Section 4.3, set the execution cycle of the function blocks and schedule of execution.

4.5.3 Mode Transition

When the function block mode is changed to Out_Of_Service, the function block pauses and a block alarm is issued.
When the function block mode is changed to Manual, the function block suspends updating of output values. In this case alone, it is possible to write a value to the OUT parameter of the block for output. Note that no parameter status can be changed.

4.6 VFD Parameter Configuration

Set the parameter for function block VFD.

4.6.1 Link object

A link object combines the data voluntarily sent by the function block with the VCR. This product has 45 link objects. A single link object specifies one combination. Each link object has the parameters listed in Table 4.6. Parameters must be changed collectively for each VCR because the modifications made to each parameter may cause inconsistent operation.

Table 4.6 Link Object Parameters

Sub-index	Parameter Name	Description
1	LocalIndex	Sets the index of function block parameters to be combined. Set “0” for Trend and Alert.
2	VcrNumber	Sets the index of VCR to be combined. If set to “0”, this link object is not used.
3	RemoteIndex	Not used. Set to “0”.
4	ServiceOperation	Set one of the following. Set only one each for link object for Alert or Trend. 0: Undefined 2: Publisher 3: Subscriber 6: Alert 7: Trend
5	StaleCountLimit	If data is not updated at the time of Subscribe, this is the count value until the input status is made to Bad. To avoid the careless mode transition caused when the data is not correctly received by a subscriber, set this parameter to “2” or more.

Forty-five link objects are not set at factory shipping.

4.6.2 Alert Object

This product can report the following alarms or events.

Analog Alerts (Generated when a process value exceeds the threshold)

AI Block: Hi-Hi Alarm, Hi Alarm, Low Alarm, Low-Low Alarm

Discrete Alerts (Generated when an abnormal condition is detected)

Resource Block: Block Alarm, Write Alarm

Transducer block: Block alarm

AI, DI, IT, AR, PID and MAO Blocks: Block Alarm

Update Alerts (Generated when an important (restorable) parameter is updated)

Resource Block: Update Event

Transducer Block: Update Event

AI, DI, IT, AR, PID and MAO block: Update Event

Field diagnosis alert (Generated when an error is found in the device status.)

Resource block:
Check alarm, error detection alarm, maintenance alarm and out-of-specification alarm

The alert consists of elements listed in Table 4.7.

Table 4.7 Alert Object

Subindex				Parameter Name	Description
Analog Alert	Discrete Alert	Update Alert	Field Diagnosis Alert		
1	1	1	1	Block Index	Index of block from which alert is generated
2	2	2	2	Alert Key	ALERT_KEY copied from the block
3	3	3	3	Standard Type	Type of the alert
4	4	4	4	Mfr Type	Alert Name identified with manufacturer specific DD
5	5	5	5	Message Type	Reason of alert notification
6	6	6	6	Priority	Priority of the alarm. By sending with priority information being added in communication frame when the alert is issued, for example, the alert is used to apply a filter to ignore values below the specified priority on the host side.
7	7	7	7	Time Stamp	Time when this alert is first detected
8	8		8	Subcode	Subcode indicating cause of alert
9	9		9	Value	Value of referenced data
10	10		10	Relative Index	Relative index of referenced data
		8		Static Revision	Value of the static revision (ST_REV) of the block
11	11	9		Unit Index	Unit code of referenced data
			11	Source Block Index	Relative index of block causing alarm generation

4.6.3 Trend Object

It is possible to set the parameter so that the function block automatically transmits Trend. This product has ten Trend objects, eight of which are used for Trend in analog mode parameters and two is used for Trend in discrete mode parameter. A single Trend object specifies the trend of one parameter.
Each Trend object has the parameters listed in Table 4.8. The first four parameters are the items to be set. Before writing to a Trend object, it is necessary to release the WRITE_LOCK parameter.

Table 4.8 Parameters for Trend Objects

Sub-index	Parameter Name	Description
1	Block Index	Sets the leading index of the function block that takes a trend.
2	Parameter Relative Index	Sets the index of parameters taking a trend by a value relative to the beginning of the function block. For example, the following three types of trends are possible in the AI block of this product. 7: PV 8: OUT 19: FIELD_VAL
3	Sample Type	Specifies how trends are taken. Choose one of the following two types: 1: Sampled upon execution of a function block. 2: The average value is sampled.
4	Sample Interval	Specifies sampling intervals in units of 1/ 32msec. Set the integer multiple of the function block execution.
5	Last Update	The last sampling time.
6 to 21	List of Status	Status part of a sampled parameter.
21 to 37	List of Samples	Data part of a sampled parameter.

Ten trend objects are factory-set as shown Table 4.9.

Table 4.9 Factory Setting for Trend Objects

Index	Parameter Name	Factory Settings
32000 to 32007	TREND_FLT.1 to TREND_FLT.8	No setting
32008 to 32009	TREND_DIS.1 to TREND_DIS.2	No setting

4.6.4 View Object

This object forms a group of parameters in a block. One advantage brought by forming groups of parameters is the reduction of load for data transactions. For contents of View Object, refer to Tables 4.11 to 4.16. Roles of VIEW_1 to VIEW_4 are shown in Table 4.10.

Table 4.10 Purpose of Each View Object

Parameter Name	Description
VIEW_1	Set of dynamic parameters required by the operator for plant operation. (PV, SV, OUT, Mode, etc.)
VIEW_2	Set of static parameters which need to be collectively shown to the plant operator. (Range etc.)
VIEW_3	Set of all the dynamic parameters.
VIEW_4	Set of static parameters for configuration or maintenance.

Table 4.11 View Object for Resource Block

Relative Index	Parameter Name	View 1	View 2	View 3	View 4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	RS_STATE	1		1	
8	TEST_RW				
9	DD_RESOURCE				
10	MANUFAC_ID				4
11	DEV_TYPE				2
12	DEV_REV				1
13	DD_REV				1
14	GRANT_DENY		2		
15	HARD_TYPES				2
16	RESTART				
17	FEATURES				2
18	FEATURE_SEL		2		
19	CYCLE_TYPE				2
20	CYCLE_SEL		2		
21	MIN_CYCLE_T				4
22	MEMORY_SIZE				2
23	NV_CYCLE_T		4		
24	FREE_SPACE		4		
25	FREE_TIME	4		4	
26	SHED_RCAS		4		
27	SHED_ROUT		4		
28	FAULT_STATE	1		1	
29	SET_FSTATE				
30	CLR_FSTATE				
31	MAX_NOTIFY				1
32	LIM_NOTIFY		1		
33	CONFIRM_TIME		4		
34	WRITE_LOCK		1		
35	UPDATE_EVT				
36	BLOCK_ALM				
37	ALARM_SUM	8		8	
38	ACK_OPTION				2
39	WRITE_PRI				1
40	WRITE_ALM				
41	ITK_VER				2
42	COMPATIBILITY_REV				
43	CAPABILITY_LEV				
44	FD_VER				2
45	FD_FAIL_ACTIVE	4		4	
46	FD_OFFSPEC_ACTIVE	4		4	
47	FD_MAINT_ACTIVE	4		4	
48	FD_CHECK_ACTIVE	4		4	
49	FD_FAIL_MAP				4
50	FD_OFFSPEC_MAP				4
51	FD_MAINT_MAP				4
52	FD_CHECK_MAP				4
53	FD_FAIL_MASK				4
54	FD_OFFSPEC_MASK				4
55	FD_MAINT_MASK				4
56	FD_CHECK_MASK				4
57	FD_FAIL_ALM				
58	FD_OFFSPEC_ALM				
59	FD_MAINT_ALM				
60	FD_CHECK_ALM				
61	FD_FAIL_PRI				1
62	FD_OFFSPEC_PRI				1
63	FD_MAINT_PRI				1
64	FD_CHECK_PRI				1
65	FD_SIMULATE			9	
66	FD_RECOMMEN_ACT	2		2	
67	FD_EXTENDED_ACTIVE_1				
68	FD_EXTENDED_ACTIVE_2				
69	FD_EXTENDED_ACTIVE_3				
70	FD_EXTENDED_ACTIVE_4				
71	FD_EXTENDED_ACTIVE_5				
72	FD_EXTENDED_ACTIVE_6				
73	FD_EXTENDED_ACTIVE_7				
74	FD_EXTENDED_ACTIVE_8				
75	FD_EXTENDED_MAP_1				
76	FD_EXTENDED_MAP_2				
77	FD_EXTENDED_MAP_3				
78	FD_EXTENDED_MAP_4				
79	FD_EXTENDED_MAP_5				
80	FD_EXTENDED_MAP_6				
81	FD_EXTENDED_MAP_7				
82	FD_EXTENDED_MAP_8				
83	DEVICE_CONDITION_ACTIVE_1				
84	DEVICE_CONDITION_ACTIVE_2				
85	DEVICE_CONDITION_ACTIVE_3				
86	DEVICE_CONDITION_ACTIVE_4				
87	DEVICE_CONDITION_ACTIVE_5				
88	DEVICE_CONDITION_ACTIVE_6				
89	DEVICE_CONDITION_ACTIVE_7				
90	DEVICE_CONDITION_ACTIVE_8				
91	SOFTWARE_REV				
92	WRITE_LOCK_LEVEL				
	Total	40	30	49	69

Table 4.12 View Object for Transducer Block

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
1	ST_REV	2	2	2	2	2	2	2	2	2	2
2	TAG_DESC										
3	STRATEGY					2					
4	ALERT_KEY					1					
5	MODE_BLK	4		4							
6	BLOCK_ERR	2		2							
7	UPDATE_EVT										
8	BLOCK_ALM										
9	TRANSDUCER_DIRECTORY										
10	TRANSDUCER_TYPE	2	2	2		2					
11	TRANSDUCER_TYPE_VER					2					
12	XD_ERROR	1		1							
13	COLLECTION_DIRECTORY										
14	PRIMARY_VALUE_TYPE		2								
15	PRIMARY_VALUE	5		5							
16	PRIMARY_VALUE_RANGE		11								
17	SECONDARY_VALUE_TYPE		2								
18	SECONDARY_VALUE	5		5							
19	SECONDARY_VALUE_RANGE		11								
20	XD_OPTS		4								
21	SENSOR_TYPE					2					
22	SENSOR_RANGE					11					
23	SENSOR_SN						32				
24	SENSOR_CAL_METHOD						1				
25	SENSOR_CAL_LOC						32				
26	SENSOR_CAL_DATE						7				
27	SENSOR_CAL_WHO						32				
28	BLOCK_ERR_DESC_1	4		4							
29	VOLUME_FLOW_VALUE	5		5							
30	VOLUME_FLOW_UNIT		2								
31	VOLUME_FLOW_DAMPING					4					
32	VOLUME_FLOW_DAMPING_TOTAL					4					
33	MASS_FLOW_VALUE	5		5							
34	MASS_FLOW_UNIT		2								
35	MASS_FLOW_DAMPING					4					
36	MASS_FLOW_DAMPING_TOTAL					4					
37	VELOCITY_FLOW_VALUE	5		5							
38	VELOCITY_FLOW_UNIT		2								
39	VELOCITY_FLOW_DAMPING					4					
40	VELOCITY_FLOW_DAMPING_ TOTAL					4					
41	CALORIFIC_VALUE	5		5							
42	CALORIFIC_UNIT		2								
43	CALORIFIC_DAMPING					4					
44	CALORIFIC_DAMPING_TOTAL					4					
45	SELECTED_FLOW			1							
46	VELOCITY_CHECK			4							
47	TOTAL_1_VALUE	5		5							
48	TOTAL_1_UNIT		2								
49	TOTAL_2_VALUE	5		5							
50	TOTAL_2_UNIT		2								
51	LOW_MF					4					
52	HIGH_MF					4					
53	LOW_MF_EDF					4					

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
54	HIGH_MF_EDF					4					
55	SELECT_FLOW_SENSOR					1					
56	MEASURE_MODE					1					
57	NOMINAL_SIZE_UNIT					1					
58	NOMINAL_SIZE					4					
59	AUTOZERO_EXECUTE			1							
60	ZERO_VALUE					4					
61	SIGNAL_LOCK					1					
62	VELOCITY_FLOW_SPAN					4					
63	VOLUME_FLOW_SPAN					4					
64	MASS_FLOW_SPAN					4					
65	CALORIFIC_SPAN					4					
66	TOT1_CONV_FC							4			
67	TOT1_LOWCUT							4			
68	TOT1_LOWCUT_UNIT			2							
69	TOT1_F_OPTS							1			
70	TOT1_OPTS							1			
71	TOT1_EXEC			1							
72	TOT1_PRESET			1							
73	TOT1_PRE_VAL							4			
74	TOT1_SETPNT							4			
75	TOT2_CONV_FC							4			
76	TOT2_LOWCUT							4			
77	TOT2_LOWCUT_UNIT			2							
78	TOT2_F_OPTS							1			
79	TOT2_OPTS							1			
80	TOT2_EXEC			1							
81	TOT2_PRESET			1							
82	TOT2_PRE_VAL							4			
83	TOT2_SETPNT							4			
84	TEMPERATURE_FUNC							1			
85	TEMPERATURE_UNIT							1			
86	TEMPERATURE_URV							4			
87	TEMPERATURE_LRV							4			
88	FLOW_DIRECT								1		
89	RATE_LIMIT								4		
90	DEAD_TIM								4		
91	NOISE_FILTER								1		
92	PULSING_FLOW								1		
93	POWER_SYNCH								1		
94	SET_PWR_FREQ								4		
95	IEX_PWR_FREQ			4							
96	MES_PWR_FREQ			4							
97	DENSITY_SEL								1		
98	DENSITY_UNIT								1		
99	FIXED_DENS								4		
100	STD_DENSITY								4		
101	STD_TEMP								4		
102	TEMP_COEF_A1								4		
103	TEMP_COEF_A2								4		
104	MEAS_TEMP			5							
105	CORRCT_DENS			4							
106	SPEC_HEAT								4		
107	CALORIFIC_FIX_TEMP								4		
108	LIMIT_STS_VEL1_VALUE	2			2						

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
109	LIMIT_STS_VEL1_SETPOINT									4	
110	LIMIT_STS_VEL1_ACT_DIRECTION									1	
111	LIMIT_STS_VEL1_HYSTERESIS									4	
112	LIMIT_STS_VEL1_UNIT				2						
113	LIMIT_STS_VEL2_VALUE	2			2						
114	LIMIT_STS_VEL2_SETPOINT									4	
115	LIMIT_STS_VEL2_ACT_DIRECTION									1	
116	LIMIT_STS_VEL2_HYSTERESIS									4	
117	LIMIT_STS_VEL2_UNIT				2						
118	LIMIT_STS_VOL1_VALUE	2			2						
119	LIMIT_STS_VOL1_SETPOINT									4	
120	LIMIT_STS_VOL1_ACT_ DIRECTION									1	
121	LIMIT_STS_VOL1_HYSTERESIS									4	
122	LIMIT_STS_VOL1_UNIT				2						
123	LIMIT_STS_VOL2_VALUE	2			2						
124	LIMIT_STS_VOL2_SETPOINT									4	
125	LIMIT_STS_VOL2_ACT_ DIRECTION									1	
126	LIMIT_STS_VOL2_HYSTERESIS									4	
127	LIMIT_STS_VOL2_UNIT				2						
128	LIMIT_STS_MASS1_VALUE	2			2						
129	LIMIT_STS_MASS1_SETPOINT									4	
130	LIMIT_STS_MASS1_ACT_ DIRECTION									1	
131	LIMIT_STS_MASS1_HYSTERESIS									4	
132	LIMIT_STS_MASS1_UNIT				2						
133	LIMIT_STS_MASS2_VALUE	2			2						
134	LIMIT_STS_MASS2_SETPOINT									4	
135	LIMIT_STS_MASS2_ACT_ DIRECTION									1	
136	LIMIT_STS_MASS2_HYSTERESIS									4	
137	LIMIT_STS_MASS2_UNIT				2						
138	LIMIT_STS_CAL1_VALUE	2			2						
139	LIMIT_STS_CAL1_SETPOINT										4
140	LIMIT_STS_CAL1_ACT_ DIRECTION										1
141	LIMIT_STS_CAL1_HYSTERESIS										4
142	LIMIT_STS_CAL1_UNIT				2						
143	LIMIT_STS_CAL2_VALUE	2			2						
144	LIMIT_STS_CAL2_SETPOINT										4
145	LIMIT_STS_CAL2_ACT_ DIRECTION										1
146	LIMIT_STS_CAL2_HYSTERESIS										4
147	LIMIT_STS_CAL2_UNIT				2						
148	ALM_OUT_MASK1								4		
149	ALM_OUT_MASK2								4		
150	ALM_OUT_MASK3								4		
151	ALM_OUT_MASK4								4		
152	ALM_REC_MASK1								4		
153	ALM_REC_MASK2								4		
154	ALM_REC_MASK3								4		
155	ALM_RECORD1				1						
156	ALM_TIME1				16						
157	ALM_RECORD2				1						
158	ALM_TIME2				16						

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
159	ALM_RECORD3				1						
160	ALM_TIME3				16						
161	ALM_RECORD4				1						
162	ALM_TIME4				16						
163	STB_INFO1										
	Total	71	46	86	102	98	106	48	76	56	20

Table 4.13 View Object for Diagnosis Transducer Block

Relative Index	Parameter Name	View					
		1	2	3-1	3-2	4-1	4-2
1	ST_REV	2	2	2	2	2	2
2	TAG_DESC						
3	STRATEGY					2	
4	ALERT_KEY					1	
5	MODE_BLK	4		4			
6	BLOCK_ERR	2		2			
7	UPDATE_EVT						
8	BLOCK_ALM						
9	TRANSDUCER_DIRECTORY						
10	TRANSDUCER_TYPE	2	2	2		2	
11	TRANSDUCER_TYPE_VER					2	
12	XD_ERROR	1		1			
13	COLLECTION_DIRECTORY						
14	ADHESION_VALUE	5		5			
15	ADHESION_VALUE_UNIT		2				
16	ELECTRODE_A_VALUE	5		5			
17	ELECTRODE_A_VALUE_UNIT		2				
18	ELECTRODE_B_VALUE	5		5			
19	ELECTRODE_B_VALUE_UNIT		2				
20	FLOW_NOISE_VALUE	5		5			
21	FLOW_NOISE_VALUE_UNIT		2				
22	CONDUCTIVITY_VALUE	5		5			
23	CONDUCTIVITY_VALUE_UNIT		2				
24	ADHESION_CHECK					1	
25	ADHESION_LEVEL1					4	
26	ADHESION_LEVEL2					4	
27	ADHESION_LEVEL3					4	
28	ADHESION_LEVEL4					4	
29	ADHESION_STATUS			1			
30	ADHESION_CHECK_CYCLE					1	
31	FLOW_NOISE_CHECK					1	
32	FLOW_NOISE_LEVEL1					4	
33	FLOW_NOISE_LEVEL2					4	
34	FLOW_NOISE_LEVEL3					4	
35	FLOW_NOISE_LEVEL4					4	
36	FLOW_NOISE_STATUS			1			
37	FLOW_NOISE_DAMPING					4	
38	LOW_CONDUCT_CHECK					1	
39	CONDUCTIVITY_LIMIT					4	
40	DIAG_EXECUTION			1			
41	COIL_INSULATION_TH					4	
42	IEX_COMPARE			4			
43	PEAK_HOLD_VALUE			4			
44	IEX_COIL_RESISTANCE			4			
45	EMPTY_STS			1			
46	DIAG_OUTPUT					1	
47	VERIFICATION_TARGET					2	
48	VERIFICATION_MODE					1	
49	VERIFICATION_EXE			1			
50	VERIFICATION_NO					1	
51	VERIFICATION_CHECK_RESULT			1			
52	VERIFICATION_OPERATION_TIME			16			
53	MAGNETIC_CIRCUIT_RESULT			1			
54	EXCITING_CIRCUIT_RESULT			1			
55	CALCULATION_CIRCUIT_RESULT			1			
56	DEVICE_STATUS_RESULT			1			
57	CONNECTION_STATUS_RESULT			1			
58	LIMIT_STS_ADH1_VALUE				2		
59	LIMIT_STS_ADH1_SETPOINT						4
60	LIMIT_STS_ADH1_ACT_DIRECTION						1
61	LIMIT_STS_ADH1_HYSTERESIS						4
62	LIMIT_STS_ADH1_UNIT				2		
63	LIMIT_STS_ADH2_VALUE				2		
64	LIMIT_STS_ADH2_SETPOINT						4
65	LIMIT_STS_ADH2_ACT_DIRECTION						1
66	LIMIT_STS_ADH2_HYSTERESIS						4
67	LIMIT_STS_ADH2_UNIT				2		
68	LIMIT_STS_ELEC_A1_VALUE				2		
69	LIMIT_STS_ELEC_A1_SETPOINT						4
70	LIMIT_STS_ELEC_A1_ACT_DIRECTION						1

Relative Index	Parameter Name	View					
		1	2	3-1	3-2	4-1	4-2
71	LIMIT_STS_ELEC_A1_HYSTERESIS						4
72	LIMIT_STS_ELEC_A1_UNIT				2		
73	LIMIT_STS_ELEC_A2_VALUE				2		
74	LIMIT_STS_ELEC_A2_SETPOINT						4
75	LIMIT_STS_ELEC_A2_ACT_DIRECTION						1
76	LIMIT_STS_ELEC_A2_HYSTERESIS						4
77	LIMIT_STS_ELEC_A2_UNIT				2		
78	LIMIT_STS_ELEC_B1_VALUE				2		
79	LIMIT_STS_ELEC_B1_SETPOINT						4
80	LIMIT_STS_ELEC_B1_ACT_DIRECTION						1
81	LIMIT_STS_ELEC_B1_HYSTERESIS						4
82	LIMIT_STS_ELEC_B1_UNIT				2		
83	LIMIT_STS_ELEC_B2_VALUE				2		
84	LIMIT_STS_ELEC_B2_SETPOINT						4
85	LIMIT_STS_ELEC_B2_ACT_DIRECTION						1
86	LIMIT_STS_ELEC_B2_HYSTERESIS						4
87	LIMIT_STS_ELEC_B2_UNIT				2		
88	LIMIT_STS_FLN1_VALUE				2		
89	LIMIT_STS_FLN1_SETPOINT						4
90	LIMIT_STS_FLN1_ACT_DIRECTION						1
91	LIMIT_STS_FLN1_HYSTERESIS						4
92	LIMIT_STS_FLN1_UNIT				2		
93	LIMIT_STS_FLN2_VALUE				2		
94	LIMIT_STS_FLN2_SETPOINT						4
95	LIMIT_STS_FLN2_ACT_DIRECTION						1
96	LIMIT_STS_FLN2_HYSTERESIS						4
97	LIMIT_STS_FLN2_UNIT				2		
98	LIMIT_STS_CNDC1_VALUE				2		
99	LIMIT_STS_CNDC1_SETPOINT						4
100	LIMIT_STS_CNDC1_ACT_DIRECTION						1
101	LIMIT_STS_CNDC1_HYSTERESIS						4
102	LIMIT_STS_CNDC1_UNIT				2		
103	LIMIT_STS_CNDC2_VALUE				2		
104	LIMIT_STS_CNDC2_SETPOINT						4
105	LIMIT_STS_CNDC2_ACT_DIRECTION						1
106	LIMIT_STS_CNDC2_HYSTERESIS						4
107	LIMIT_STS_CNDC2_UNIT				2		
108	LIMIT_STS_ADH_WARNING				2		
109	LIMIT_STS_ADH_ALARM				2		
110	LIMIT_STS_FLN_WARNING				2		
111	LIMIT_STS_FLN_ALARM				2		
112	LIMIT_STS_LOW_CNDC_WARNING				2		
113	DIAG_INFORMATION_1						
114	DIAG_INFORMATION_2						
115	DIAG_INFORMATION_3						
116	DIAG_INFORMATION_4						
117	DIAG_INFORMATION_5						
118	DIAG_INFORMATION_6						
	Total	36	14	75	52	62	92

Table 4.14 View Object for Display Transducer Block

Relative Index	Parameter Name	View				
		1	2	3	4-1	4-2
1	ST_REV	2	2	2	2	2
2	TAG_DESC					
3	STRATEGY				2	
4	ALERT_KEY				1	
5	MODE_BLK	4		4		
6	BLOCK_ERR	2		2		
7	UPDATE_EVT					
8	BLOCK_ALM					
9	TRANSDUCER_DIRECTORY					
10	TRANSDUCER_TYPE	2	2	2	2	
11	TRANSDUCER_TYPE_VER	2	2	2	2	
12	XD_ERROR	1		1		
13	COLLECTION_DIRECTORY					
14	DISP_LINE1_SEL				1	
15	DISP_LINE2_SEL				1	
16	DISP_LINE3_SEL				1	
17	DISP_LINE4_SEL				1	
18	DISP_LINE5_SEL				1	
19	DISP_LINE6_SEL				1	
20	DISP_LINE7_SEL				1	
21	DISP_LINE8_SEL				1	
22	DISP_FORMAT_FR				1	
23	DISP_FORMAT_TTL1				1	
24	DISP_FORMAT_TTL2				1	
25	DISP_FORMAT_TTL3				1	
26	DISP_CONTRAST					1
27	DISP_LINE					1
28	DISP_PERIOD					1
29	DISP_NE107					1
30	DISP_ALARM					1
31	DISP_SCROLL					1
32	DISP_DAMPING					4
33	DISP_FORMAT_DATE					1
34	LANGUAGE					1
35	DISPLAY_MODE					1
36	TREND_OFFLINE_LRV					4
37	TREND_OFFLINE_URV					4
38	DISP_TREND_SEL1					1
39	DISP_TREND_SEL2					1
40	DISP_TREND_SEL3					1
41	DISP_TREND_SEL4					1
42	DISP_INVERSE					1
43	LCD_TEST			1		
44	SQUAWK			1		
45	LANGUAGE_PACKAGE			1		
46	DISP_INSTALL					1
47	DISP_LOWCUT					4
48	DISP_LOWCUT_UNIT					2
49	DISP_IRSW_OPERATE					1
50	I_PARAM1					2
51	I_PARAM2					2
52	I_PARAM3					2
53	I_PARAM4					32
	Total	13	6	16	21	68

Table 4.15 View Object for Maintenance Transducer Block

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
1	ST_REV	2	2	2	2	2	2	2	2	2	2
2	TAG_DESC										
3	STRATEGY					2					
4	ALERT_KEY					1					
5	MODE_BLK	4		4							
6	BLOCK_ERR	2		2							
7	UPDATE_EVT										
8	BLOCK_ALM										
9	TRANSDUCER_ DIRECTORY										
10	TRANSDUCER_TYPE	2	2	2		2					
11	TRANSDUCER_ TYPE_VER	2	2	2		2					
12	XD_ERROR	1		1							
13	COLLECTION_ DIRECTORY										
14	DEVICE_KEY										
15	DEVICE_SN					32					
16	SPECIAL_ORDER_ID					32					
17	MANUFAC_DATE					7					
18	MS_CODE1										
19	MS_CODE2										
20	MS_CODE3										
21	SOFTWARE_DESC										
22	SIM_ENABLE_MSG			32							
23	SOFTDL_PROTECT					1					
24	SOFTDL_ERROR			2							
25	SOFTDL_COUNT										
26	SOFTDL_ACT_AREA										
27	CAPABILITY_CONFIG										
28	SI_CONTROL_CODES					1					
29	COMSTACK_ STATISTICS_1										
30	COMSTACK_ STATISTICS_2										
31	EXEC_FB_CNT										
32	FB_TEMP_DEV_ID										
33	FD_EXTENDED_SIM										
34	FD_1										
35	FD_2										
36	FD_3										
37	FD_4										
38	FD_5										
39	FD_6										
40	FD_7										
41	FD_8										
42	EEPROM_STATE										
43	INITIALIZE_EEPROM										
44	READ_MEMORY										
45	WRITE_MEMORY										
46	OPERATE_TIME				16						
47	TRNS_TYPE								1		
48	EL_SIZE								1		
49	EX_PROTECTION								1		
50	MODEL_CODE						16				

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
51	SUFFIX_CONF1						16				
52	SUFFIX_CONF2						16				
53	OPTION1						16				
54	OPTION2						16				
55	OPTION3						16				
56	OPTION4						16				
57	RS_MDL_CD							16			
58	RS_SUF_CONF1							16			
59	RS_SUF_CONF2							16			
60	RS_OPT1							16			
61	RS_OPT2							16			
62	RS_OPT3							16			
63	RS_OPT4							16			
64	TRNS_SN								16		
65	FS_SN								16		
66	MEMO1								16		
67	MEMO2								16		
68	MEMO3								16		
69	MAIN_B_REV								8		
70	SENSOR_B_REV								8		
71	IND_B_REV								8		
72	F_BCKUP_NAME				16						
73	F_BCKUP_DATE				16						
74	SD_BCK_NAME									8	
75	BCK_NAME1									16	
76	BCK_DATE1									16	
77	BCK_NAME2									16	
78	BCK_DATE2									16	
79	BCK_NAME3									16	
80	BCK_DATE3									16	
81	BACKUP_EXEC				1						
82	BACKUP_RSLT				1						
83	RESTORE_EXEC				1						
84	RESTORE_RSLT				1						
85	LOGGING_FILE										8
86	LOG_INTR_TIM										1
87	L_START_DATE				16						
88	L_START_TIME				16						
89	LOG_END_TIME										1
90	LOG1_SELECT										1
91	LOG2_SELECT										1
92	LOG3_SELECT										1
93	LOG4_SELECT										1
94	LOGGING_EXEC				1						
95	TEST_AUTO_ RELEASE_TIM										1
96	TEST_MODE				1						
97	VELOCITY_TEST_ VALUE				4						
98	P1_TEST_VALUE				2						
99	SO1_TEST_VALUE				1						
100	TEST_2_MODE				1						
101	TEST_2_OUT				4						
102	P1_OUT_MODE										1
103	P1_ACT_MODE										1

Relative Index	Parameter Name	View									
		1	2	3-1	3-2	4-1	4-2	4-3	4-4	4-5	4-6
104	P1_WIDTH										1
105	P1_RATE_UNIT										1
106	P1_RATE_VAL										4
107	P1_LOW_CUT										4
108	P1_LOW_CUT_UNIT										2
109	P1_ALM_OUT										1
110	F1_AT_0										2
111	F1_AT_100										2
112	SO1_FUNC										1
113	P1_OPTS										1
	Total	13	6	47	100	82	114	114	109	106	38

Table 4.16 View Object for AI Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	OUT	5		5	
9	SIMULATE				
10	XD_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	IO_OPTS				2
14	STATUS_OPTS				2
15	CHANNEL				2
16	L_TYPE				1
17	LOW_CUT				4
18	PV_FTIME				4
19	FIELD_VAL	5		5	
20	UPDATE_EVT				
21	BLOCK_ALM				
22	ALARM_SUM	8		8	
23	ACK_OPTION				2
24	ALARM_HYS				4
25	HI_HI_PRI				1
26	HI_HI_LIM				4
27	HI_PRI				1
28	HI_LIM				4
29	LO_PRI				1
30	LO_LIM				4
31	LO_LO_PRI				1
32	LO_LO_LIM				4
33	HI_HI_ALM				
34	HI_ALM				
35	LO_ALM				
36	LO_LO_ALM				
37	BLOCK_ERR_DESC_1				
	Total	31	26	31	46

Table 4.17 View Object for DI Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV_D	2		2	
8	OUT_D	2		2	
9	SIMULATE_D				
10	XD_STATE		2		
11	OUT_STATE		2		
12	GRANT_DENY		2		
13	IO_OPTS				2
14	STATUS_OPTS				2
15	CHANNEL				2
16	PV_FTIME				4
17	FIELD_VAL_D	2		2	
18	UPDATE_EVT				
19	BLOCK_ALM				
20	ALARM_SUM|ALARM_SUM_DI	8		8	
21	ACK_OPTION				2
22	DISC_PRI				1
23	DISC_LIM				1
24	DISC_ALM				
	Total	22	8	22	19

Table 4.18 View Object for PID Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	SP	5		5	
9	OUT	5		5	
10	PV_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	CONTROL_OPTS				2
14	STATUS_OPTS				2
15	IN			5	
16	PV_FTIME				4
17	BYPASS		1		
18	CAS_IN	5		5	
19	SP_RATE_DN				4
20	SP_RATE_UP				4
21	SP_HI_LIM		4		
22	SP_LO_LIM		4		
23	GAIN				4
24	RESET				4
25	BAL_TIME				4
26	RATE				4
27	BKCAL_IN			5	
28	OUT_HI_LIM		4		
29	OUT_LO_LIM		4		
30	BKCAL_HYS				4
31	BKCAL_OUT			5	
32	RCAS_IN			5	
33	ROUT_IN			5	
34	SHED_OPT				1
35	RCAS_OUT			5	
36	ROUT_OUT			5	
37	TRK_SCALE				11
38	TRK_IN_D	2		2	
39	TRK_VAL	5		5	
40	FF_VAL			5	
41	FF_SCALE				11
42	FF_GAIN				4
43	UPDATE_EVT				
44	BLOCK_ALM				
45	ALARM_SUM	8		8	
46	ACK_OPTION				2
47	ALARM_HYS				4
48	HI_HI_PRI				1
49	HI_HI_LIM				4
50	HI_PRI				1
51	HI_LIM				4
52	LO_PRI				1
53	LO_LIM				4
54	LO_LO_PRI				1
55	LO_LO_LIM				4
56	DV_HI_PRI				1
57	DV_HI_LIM				4
58	DV_LO_PRI				1
59	DV_LO_LIM				4
60	HI_HI_ALM				
61	HI_ALM				
62	LO_ALM				
63	LO_LO_ALM				
64	DV_HI_ALM				
65	DV_LO_ALM				
	Total	43	43	83	104

Table 4.19 View Object for MAO Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	CHANNEL				2
8	IN_1	5		5	
9	IN_2	5		5	
10	IN_3	5		5	
11	IN_4	5		5	
12	IN_5	5		5	
13	IN_6	5		5	
14	IN_7	5		5	
15	IN_8	5		5	
16	MO_OPTS				2
17	FSTATE_TIME				4
18	FSTATE_VAL1				4
19	FSTATE_VAL2				4
20	FSTATE_VAL3				4
21	FSTATE_VAL4				4
22	FSTATE_VAL5				4
23	FSTATE_VAL6				4
24	FSTATE_VAL7				4
25	FSTATE_VAL8				4
26	FSTATE_STATUS	2		2	
27	UPDATE_EVT				
28	BLOCK_ALM				
	Total	50	2	50	45

Table 4.20 View Object for IT Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	TOTAL_SP	4		4	
8	OUT	5		5	
9	OUT_RANGE		11		
10	GRANT_DENY		2		
11	STATUS_OPTS				2
12	IN_1	5		5	
13	IN_2	5		5	
14	OUT_TRIP	2		2	
15	OUT_PTRIP	2		2	
16	TIME_UNIT1		1		
17	TIME_UNIT2		1		
18	UNIT_CONV				4
19	PULSE_VAL1				4
20	PULSE_VAL2				4
21	REV_FLOW1	2		2	
22	REV_FLOW2	2		2	
23	RESET_IN	2		2	
24	STOTAL			4	
25	RTOTAL	4		4	
26	SRTOTAL			4	
27	SSP			4	
28	INTEG_TYPE				1
29	INTEG_OPTS				2
30	CLOCK_PER				4
31	PRE_TRIP				4
32	N_RESET	4		4	
33	PCT_INCL	4		4	
34	GOOD_LIM				4
35	UNCERT_LIM				4
36	OP_CMD_INT	1		1	
37	OUTAGE_LIM				4
38	RESET_CONFIRM	2		2	
39	UPDATE_EVT				
40	BLOCK_ALM				
	Total	52	17	64	42

Table 4.21 View Object for AR Function Block

Relative Index	Parameter Name	View			
		1	2	3	4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	OUT	5		5	
9	PRE_OUT	5		5	
10	PV_SCALE		11		
11	OUT_RANGE		11		
12	GRANT_DENY		2		
13	INPUT_OPTS				2
14	IN			5	
15	IN_LO			5	
16	IN_1			5	
17	IN_2			5	
18	IN_3			5	
19	RANGE_HI				4
20	RANGE_LO				4
21	BIAS_IN_1				4
22	GAIN_IN_1				4
23	BIAS_IN_2				4
24	GAIN_IN_2				4
25	BIAS_IN_3				4
26	GAIN_IN_3				4
27	COMP_HI_LIM				4
28	COMP_LO_LIM				4
29	ARITH_TYPE				1
30	BAL_TIME				4
31	BIAS				4
32	GAIN				4
33	OUT_HI_LIM				4
34	OUT_LO_LIM				4
35	UPDATE_EVT				
36	BLOCK_ALM				
	Total	23	26	48	68

Table 4.22 Indexes of VIEW for Each Block

Block Name	VIEW			
	1	2	3	4
Resource block	40100	40101	40102	40103
Sensor transducer block	40200	40201	40202 to 40203	40204 to 40209
Diagnosis transducer block	40250	40251	40252 to 40253	40254 to 40255
Display transducer block	40270	40271	40272	40273 to 40274
Maintenance transducer block	40290	40291	40292 to 40299*	40300 to 40309*
AI1 function block	40400	40401	40402	40403
AI2 function block	40410	40411	40412	40413
AI3 function block	40420	40421	40422	40423
AI4 function block	40430	40431	40432	40433
DI1 function block	40600	40601	40602	40603
DI2 function block	40610	40611	40612	40613
DI3 function block	40620	40621	40622	40623
PID function block	40800	40801	40802	40803
MAO function block	41000	41001	41002	41003
IT1 function block	41600	41601	41602	41603
IT2 function block	41610	41611	41612	41613
AR function block	41750	41751	41752	41753

*: Includes the VIEW object for manufacturing.

4.6.5 Function Block Parameters

Function block parameters can be read or set from the host. For the list of the parameters of the Resource block, Transducer block, AI block, DI block and MAO block, refer to “PARAMETER LISTS” in Chapter 6. For details about function blocks other than the AI, DI and MAO blocks, the LM function, and the software download function, refer to Appendices 1 to 6.

5. Functions

This chapter describes each function of the product. The overview of each function is as follows.

NOTE

FOUNDATION Fieldbus items found in the following menu path tables indicate a case where FieldMate, Yokogawa Electric's adjusting and setting tool for field device/environmental device, is used.

NOTE

For various setting changes, there is a mode which allows each parameter to be written.
For details, refer to "A1.2 Setting and Change of Basic Parameters".
If the parameter cannot be rewritten, check for write mode columns in parameter lists in Chapter 6.

■ Basic settings

This product can measure process values of the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise at the same time. A damping time constant can also be specified for each process value.
For details about how to check measured results and the setting procedures, refer to Section 5.1.

■ Totalization function

Two totalizers are mounted to totalize selected process values. In addition to the totalized value display function, the product has a totalization counter function to scale totalized values with the conversion factor and to count a specific flow rate. The product also has the totalization switch function that compares a specified target value with a totalized value to output the result as the status output, and the totalization preset function that starts totalization with the value specified in advance.
For details about the totalization function and setting procedures, refer to Section 5.2.

■ Limit switch function

This is the function to transmit 0 and 1 as a parameter by judging whether the selected process value is above or below the threshold.
For details about each output and the setting procedures, refer to Section 5.3.

■ Inputting external temperature

As a temperature value for the temperature correction of the mass flow rate, a temperature value can be imported from an external device.
For details about inputting external temperature, refer to Section 5.4.

■ Auxiliary calculation function

This function is used to calculate the temperature correction for density or the calorie by inputting the temperature from an external device. The accuracy of mass flow rate measurement is improved with the temperature correction for density.
For details about the auxiliary calculation function, refer to Section 5.5.

■ Alarm

A detected error can be notified as an alarm or warning. This function can show the error status based on NAMUR NE107 by setting parameters. It is also possible to keep alarms that occurred in the past as a record and mask unnecessary alarms so that they are hidden on the display.
For details about the alarm contents and setting procedures, refer to Section 5.6.

■ Display

This display supports multiple languages, and the language to show on the display can be selected. This function can also show the time changes of the selected parameter in a trend graph.
For details about settings of the display, refer to Section 5.7.

NOTE

The language on the display is set to English at shipment from the manufacturing factory. If necessary, select the adequate language referring to Subsection 5.7.1.
The menu pass of the display on this manual is set to “English”.

■ Device information

The user can check parameters specified at the time of ordering, model name and suffix code of this product.
For details about how to check the device information, refer to Section 5.8.

■ Self check function

The self check function can be used to diagnose failures of the product or the process state. For example, this function is useful for diagnosing the health of the product by using the electrode adhesion detecting function, sensor empty check function, or verification function.
For details about the self check functions, refer to Section 5.9.

■ Test mode

It is possible to arbitrarily specify the flow velocity and the value to be output from the pulse/status terminal (IO2) and to test a response from the product.
For details about the test mode, refer to Section 5.10.

■ Event management function

The backup function can store parameter settings in the built-in memory of the display. If the optional code MC is selected, setting parameters can be stored in the microSD card supplied with this product in addition to the built-in memory in the display (display board).
The backup data can be used to restore settings of the product for which data is backed up or duplicate settings to another product.
Due to the data logging function, up to four process values can be stored in the microSD card.
For details about each function of the backup, restore, and duplicate, and the data logging function, refer to Section 5.11.

■ Write lock function

A write lock can be changed with two methods; the hardware write lock switch and the parameter settings (software write lock).
For details about the software write lock function, refer to Section 5.12.

■ Simulation function

The simulation function is to imitate function block input. This function makes it possible to test the function block and alarm-processing system on the downstream side.
For details about the simulation function, refer to Section 5.13.

■ Pulse output, frequency output, and status output

This product has terminals for outputting pulse or status for calibration. The pulse/status terminal should be always used offline. When the pulse output is used, the pulse width or pulse rate can be selected. When a frequency output is used, outputs at 0% and 100% can be specified for the span of the process value. When the status output is used, the product status can be output as the status output. For both pulse output and frequency output, the low-cut values can be set.
For details about each output and the setting procedures, refer to Section 5.14.

NOTE

The pulse output, frequency output and status output should be used only at calibrating, and not used when normally running.

5.1 Basic Settings

5.1.1 Overview

This product can measure the flow velocity, volumetric flow rate, mass flow rate, calorie, and various diagnostic values.
Refer to the table below for the specification codes for communication/input-output and connection terminals, and input and output for each terminal.

Communication and I/O code		Connection Terminal			
		I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-
F0	-F	FOUNDATION Fieldbus communication	P/Sout (Passive)	-	-

P/Sout: Pulse output or status output
The position of Communication and I/O code:
Integral Type: AXG□□□-□□□□□□□□□□□□□□□-□■■□□
AXW □□□ - □□□□□□□□□□□□□□□ - □■■□□
AXW □□□ G - ■□□□□□ - □□□□ - □□□
Remote transmitter: AXG4A-□□□□□□□■■□□
AXW4A-□□□□□□□■■□□

5.1.2 Connection of Process Value to AI Function

The process value calculated by STB and DTB are output to a specific channel, respectively. By selecting the channel used in the AI function block, a process value is obtained from STB and DTB.
The relation of the channel for each process value and the channel which can be selected from each AI function block is shown in the figure below.

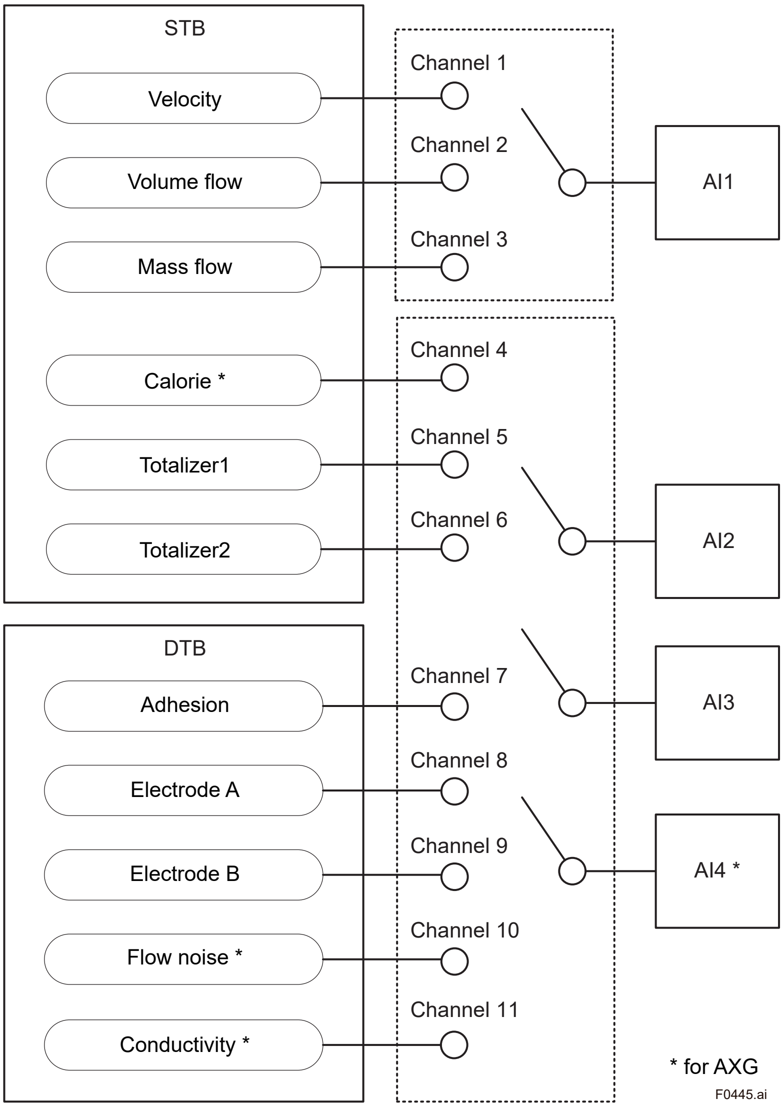


Figure 5.1.2.1 Relation of Process Value of STB and DTB and AI Function Block

The information of the figure above can be organized below.

Table 5.1.2.1 List of Relation of Process Value and AI Function Block

CHANNEL number	Selection		Model	Supported AI function block
	Display	FOUNDATION Fieldbus		
1	Velocity	Velocity	AXG / AXW	
2	Volume flow	Volume flow	AXG / AXW	AI1
3	Mass flow	Mass flow	AXG / AXW	
4	Calorie	Calorie	AXG	
5	Totalizer 1	Total1	AXG / AXW	
6	Totalizer 2	Total2	AXG / AXW	
7	Adhesion	Adhesion	AXG / AXW	AI2 AI3 AI4 (AI4 supports only AXG)
8	Electrode A	Electrode A	AXG / AXW	
9	Electrode B	Electrode B	AXG / AXW	
10	Flow noise	Flow Noise	AXG	
11	Conductivity	Conductivity	AXG	

A channel can be selected in each AI function block with the following parameters. Please note that it needs to change to the O/S mode to change the channel.

Display	Device setup ▶ Detailed setup ▶ Fieldbus info ▶ AI1FB* ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ AI1* ▶ Device Configuration ▶ Configuration ▶ Basic Setting ▶ (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4(AXG) AI1 - AI3(AXW)	15	Channel	CHANNEL	Selects CHANNEL number used in the AI function block. Refer to Table 5.1.2.1 for selection.

By selecting the channel selected in AI1, a process is displayed as PV (Primary Variable) in Selected Flow for STB.

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	45	PV flow select	Selected Flow	Displays the target process for PV.

Setting example: When the magnetic flowmeter is used by outputting the volumetric flow rate from AI1 and setting the volumetric flow rate span at 100 m^3/h, set the parameters as shown below.

AI1: CHANNEL=“Volume flow”
AI1: Transducer Scale.Units Index=“m^3/h”
AI1: Transducer Scale.EU at 100%=“100.000”
AI1: Transducer Scale.EU at 0%=“0.0”
STB: Volume Flow Span=“100.0”

Setting example: When the magnetic flowmeter is used by outputting the mass flow rate from AI1 and setting the mass flow rate span at 10000 kg/h and the density at 1000 kg/m^3, set the parameters as shown below.

STB: Density unit=“kg/m^3”
STB: Fixed Density=“1000.0”
AI1: CHANNEL=“Mass flow”
AI1: Transducer Scale.Units Index=“kg/h”
AI1: Transducer Scale.EU at 100%=“10000.0”
AI1: Transducer Scale.EU at 0%=“0.0”
STB: Mass Flow Span=“10000.0”

5.1.3 Display of the Process Value

The flow rate (PV), flow velocity, volumetric flow rate, mass flow rate, totalized value, calorie, flow noise, electrode adhesion, electrode potential, and conductivity can be checked with the following parameters. However, calorie, flow noise and conductivity are parameters which can be checked only with AXG, and they are hidden with AXW.

■ Flow rate (PV), flow velocity, volumetric flow rate, mass flow rate, totalized value, calorie

Menu path

Display	Device setup ► Process variables ► (see below)
FOUNDATION Fieldbus	Process Variables ► STB ► Process Variables ► Dynamic Variables ► Device Variables ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
-	-	Flow rate(%)	-	Displays the percentage to the range for the process value set to the Primary Value.
-	-	Flow rate	-	Displays the process value set to the Primary Value.
STB	37	-	Velocity Value ► Velocity Value.Status	Displays the status of the flow velocity.
		Velocity	Velocity Value ► Velocity Value.Value	Displays the value of the flow velocity.
STB	29	-	Volume Flow Value ► Volume Flow Value.Status	Displays the status of volumetric flow rate.
		Volume	Volume Flow Value ► Volume Flow Value.Value	Displays the value of the volumetric flow rate.
STB	33	-	Mass Flow Value ► Mass Flow Value.Status	Displays the status of the mass flow rate.
		Mass	Mass Flow Value ► Mass Flow Value.Value	Displays the value of the mass flow rate.
STB	41	-	Calorific Value ► Calorific Value.Status	Displays the status of calorie (only available for AXG, not for AXW).
		Calorie	Calorific Value ► Calorific Value.Value	Displays the value of calorie (only available for AXG, not for AXW).
STB	47	-	Total 1 Value ► Total 1 Value. Status	Displays the status of totalizer 1.
		Totalizer ► Totalizer 1	Total 1 Value ► Total 1 Value. Value	Displays the value of totalizer 1.
STB	49	-	Total 2 Value ► Total 2 Value. Status	Displays the status of totalizer 2.
		Totalizer ► Totalizer 2	Total 2 Value ► Total 2 Value. Value	Displays the value of totalizer 2.

Flow noise

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Flow noise ▶ Result ▶ (see below)
FOUNDATION Fieldbus	Process Variables ▶ DTB ▶ Process Variables ▶ Dynamic Variables ▶ Device Variables ▶ Flow Noise Value ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	20	-	Flow Noise Value.Status	Status of the flow noise value
		Value	Flow Noise Value.Value	Displays the flow noise value.

This parameter can be used only for AXG, not for AXW.

Electrode adhesion detection

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Adhesion ▶ Result ▶ (see below)
FOUNDATION Fieldbus	Process Variables ▶ DTB ▶ Process Variables ▶ Dynamic Variables ▶ Device Variables ▶ Adhesion Value ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	14	-	Adhesion Value.Status	Status of the resistance value of the electrode
		Value	Adhesion Value.Value	Displays the resistance value of the electrode.

Electrode potential

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Empty check ▶ (see below)
FOUNDATION Fieldbus	Process Variables ▶ DTB ▶ Process Variables ▶ Dynamic Variables ▶ Device Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	16	-	Electrode A Value ▶ Electrode A Value.Status	Status of voltage value between electrode A and electrode C
		Value	Electrode A Value ▶ Electrode A Value.Value	Displays the voltage value between electrode A and electrode C.
DTB	18	-	Electrode B Value ▶ Electrode B Value.Status	Status of voltage value between electrode B and electrode C
		Value	Electrode B Value ▶ Electrode B Value.Value	Displays the voltage value between electrode B and electrode C.

■ Conductivity

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Conductivity ▶ Result ▶ (see below)
FOUNDATION Fieldbus	Process Variables ▶ DTB ▶ Process Variables ▶ Dynamic Variables ▶ Device Variables ▶ Conductivity Value ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	22	-	Conductivity Value.Status	Displays the status of the calculated conductivity.
		Value	Conductivity Value.Value	Displays the calculated conductivity.

This parameter can be used only for AXG, not for AXW.

5.1.4 Engineering Unit Setting

The unit of the process value set for the AI channel (see 5.1.2) can be set with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Fieldbus info ▶ AI1FB* ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ AI1* ▶ Device Configuration ▶ Configuration ▶ Scale ▶ Transducer Scale ▶ (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	10	XD scale Units index	Transducer Scale.Units Index	Specifies the unit of the process value selected in the AI.

The settings for this parameter is also reflected to the following parameters for STB.
(Only the unit of the process value selected in the AI channel is reflected.)

■ Flow velocity, volumetric flow rate, mass flow rate, calorie

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	38	Velocity ▶ Unit	Velocity ▶ Velocity Unit	Displays the physical unit of the flow velocity.
STB	30	Volume ▶ Unit	Volume Flow ▶ Volume Flow Unit	Displays the physical unit of the volumetric flow rate.
STB	34	Mass ▶ Unit	Mass Flow ▶ Mass Flow Unit	Displays the physical unit of the mass flow rate.
STB	42	Calorie ▶ Unit	Calorie ▶ Calorific Unit	Displays the physical unit of the calorie (only available for AXG, not for AXW).

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	67	Totalizer 1 ▶ Unit	Totalizer 1 ▶ Total 1 Lowcut	Displays the unit of totalizer 1.
STB	76	Totalizer 2 ▶ Unit	Totalizer 2 ▶ Total 2 Lowcut	Displays the unit of totalizer 2.

NOTE

If there is inconsistency between the process value selected in the AI FB channel and the unit set with XD scale Units index, Bit1 in Block Error of the AI function block is set on.
Example:
AI Channel: 2 (volumetric flow rate), XD scale Units index (Transducer Scale.Units Index): 1328 (t/h)

5.1.5 Span Setting

The flow velocity, volumetric flow rate, mass flow rate, and calorie can be set from Sensor TB. However, the unit of the span is the unit set in Subsection 5.1.4.
If the flow rate unit is changed, the span value is converted in conjunction with the changed unit. The setting can be configured with the following parameters.

■ Flow velocity, volumetric flow rate, mass flow rate, calorie

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	62	Velocity ▶ Span	Velocity ▶ Velocity Span	Specifies the span of the flow velocity.
STB	63	Volume ▶ Span	Volume Flow ▶ Volume Flow Span	Specifies the span of volumetric flow rate.
STB	64	Mass ▶ Span	Mass Flow ▶ Mass Flow Span	Specifies the span of the mass flow rate.
STB	65	Calorie ▶ Span	Calorie ▶ Calorific Span	Specifies the span of the calorie. (Only available for AXG, not for AXW).

NOTE

Pay attention to the following points when setting the flow rate span.

- For a line with a significant flow rate change, set the flow rate span to the maximum flow rate. If the flow rate exceeds the flow rate span, the error of the flow rate% increases.
- For a line with a stable flow rate, set the flow rate span to approximately 1.5 to 2.0 times the normal flow rate.
- Set the flow rate for which the flow velocity is comparable to the range from 0.3 to 10 m/s. Check the flow velocity using the sizing data described in the general specifications. If the flow velocity is checked using the parameter, it displays the value obtained by converting the specified flow rate span to the flow velocity.

NOTE

Be sure to set the flow rate unit first when the flow rate unit and its span value are changed at the same time.

5.1.6 Damping Time Constant Setting

The flow rate-related process value (flow velocity, volumetric flow rate, mass flow rate and calorie), the damping time constant for flow noise (63.2% response) and the damping time constant for AIFB output can be specified. To reduce an output fluctuation or change the response speed, change the damping time constant (default value, 3.0 seconds).
For a piston pump, etc., the pulsing flow of up to 1 Hz can be measured with an output damping of 0.1 seconds.
The setting can be configured with the following parameters.

■ Flow rate-related process values/frequency

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	39	Velocity ▶ Damp AO/F	Velocity ▶ Velocity Damping	Specifies the damping time constant of the flow velocity value/frequency output.
STB	31	Volume ▶ Damp AO/F	Volume Flow ▶ Volume Flow Damping	Specifies the damping time constant of the volumetric flow rate value/frequency output.
STB	35	Mass ▶ Damp AO/F	Mass Flow ▶ Mass Flow Damping	Specifies the damping time constant of the mass flow rate value/ frequency output.
STB	43	Calorie ▶ Damp AO/F	Calorie ▶ Calorific Damping	Specifies the damping time constant of the calorie value/frequency output (only available for AXG, not for AXW).

■ Pulse output/totalization

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Density ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	40	Velocity ▶ Damp pls/ttl	Velocity ▶ Velocity Damping Ttl	Specifies the damping time constant of the flow velocity pulse/ totalized value.
STB	32	Volume ▶ Damp pls/ttl	Volume Flow ▶ Volume F Damping Total	Specifies the damping time constant of the volumetric flow rate pulse/totalized value.
STB	36	Mass ▶ Damp pls/ttl	Mass Flow ▶ Mass F Damping Total	Specifies the damping time constant of the mass flow rate pulse/ totalized value.
STB	44	Calorie ▶ Damp pls/ttl	Calorie ▶ Calorific Damping Ttl	Specifies the damping time constant of the calorie pulse/totalized value (only available for AXG, not for AXW).

■ Flow noise

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Flow noise ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ Flow Noise ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	37	Damp	Flow Noise Damping	Specifies the damping time constant of flow noise (only available for AXG, not for AXW).

■ AI FB output

Menu path

Display	Device setup ▶ Detailed setup ▶ Fieldbus info ▶ AI1FB* ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ AI1* ▶ Device Configuration ▶ Configuration ▶ Basic Settings ▶ (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	18	PV_FTIME	Process Value Filter Time	Specifies the damping time constant of the AI FB output.

NOTE

The output fluctuation increases if the damping time constant is set to a lower value.
Set the damping time constant to 5 seconds or longer for using the constant for control purpose.

5.1.7 Low-cut Function Setting

A low-cut value can be set for the frequency output, pulse output and totalizer.
If the low-cut function is used, the flow rate below setponts can be stopped from being output.
This function helps reduce erroneous output when the flow rate is “0”.
However, the unit of the low-cut value is the unit set in Subsection 5.1.4. If the unit is changed, the low-cut value is changed to the converted value in conjunction with the unit.
Set the low-cut value to “0” if the low-cut function is not used.
The setting can be configured with the following parameters.

■ AI FB output

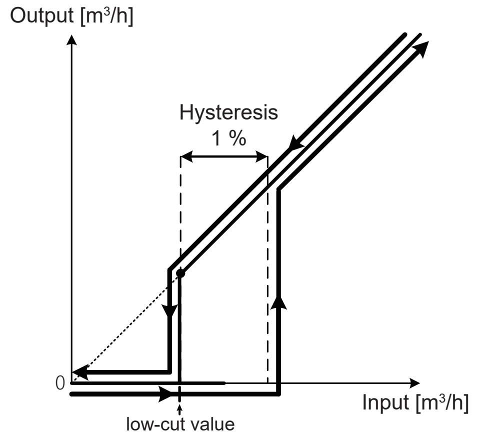
Menu path

Display	Device setup ► Detailed setup ► Fieldbus info ► AI1FB* ► (see below)
FOUNDATION Fieldbus	Device Configuration ► AI1* ► Device Configuration ► Configuration ► Options ► (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	17	LOW_CUT	Low Cutoff	Specifies the output low-cut value.

As for low-cut settings of the output signal (LOW_CUT), the output is made to 0 if the output goes below the low-cut setpoint.
To enable the low-cut function, the “Low cutoff” option should be enabled with IO_OPTS.
However, when the status returns from the low-cut state to the normal state, hysteresis is waited.
When the L_TYPE setting of the output mode is direct, the hysteresis width is 1% of XD_SCALE, and otherwise, the width is 1% of OUT_SCALE.



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■ Frequency output/pulse output

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	107	Low cut	Pulse 1 Low Cut	Specifies the low-cut value of the frequency output and pulse output.

■ Totalizer

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ► Totalizer► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	67	Totalizer 1 ► Low cut	Totalizer 1 ► Total 1 Lowcut	Specifies the low-cut value of totalizer 1.
STB	76	Totalizer 2 ► Low cut	Totalizer 2 ► Total 2 Lowcut	Specifies the low-cut value of totalizer 2.

An actual value which makes low cutting effective has ± 0.5% hysteresis from the set low-cut value. The hysteresis width on the negative side (going into the low cut when flow rate is decreasing) and the positive side (going out of low cut when flow rate is increasing) are as follows:

(1) Negative side

= Low-cut setpoint - (Minimum span set with multi range x 0.5%)

(2) Positive side

= Low-cut setpoint + (Minimum span set with multi range x 0.5%)

Example: When setting to span of volumetric flow rate = 10.0 m3/h,
Low-cut value = 1.0 m3/h

(1) Negative side

= 1.0 [m^3/h] – (10.0 [m^3/h] x 0.5 [%])

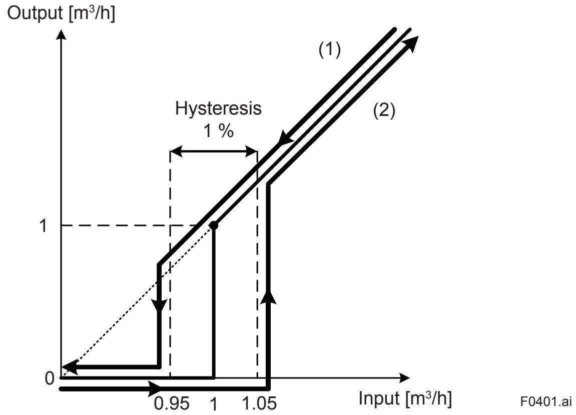
= 0.95 [m^3/h]

(2) Positive side

= 1.0 [m^3/h] + (10.0 [m^3/h] x 0.5 [%])

= 1.05 [m^3/h]

When a flow rate is decreasing and an actual flow rate goes below 0.95 [m³/h], the output flow rate is reduced to 0.0 [m³/h] with the low-cut function. On the other hand, when a flow rate is increasing and the actual flow rate goes over 1.05 [m³/h], a flow rate is output.



NOTE

Note that the totalization might be counted due to the influence of the output fluctuation near 0% output if a small low-cut value is set.
In particular, if the value of the flow rate span, damping time constant or conductivity is low, the totalization is easily counted when the flow rate is zero. In such a case, increase the flow rate span, damping time constant, or low-cut value.

NOTE

If the output process value to be output is changed, it is necessary to specify the low-cut value again.

5.1.8 Sensor's Nominal Size Setting

To combine the remote transmitter with other remote sensor, the nominal size of the remote sensor must be set.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Sensor ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ► Sensor ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	57	Nominal size unit	Nominal Size Unit	Specifies the unit of the nominal size.
STB	58	Nominal size	Nominal Size	Specifies the nominal size.

NOTE

For the integral type, do not change the nominal size and its unit since they are set at factory shipment.

5.1.9 Density Setting

The density must be set in order to measure the mass flow rate. The density can be selected from the fixed density or density corrected with temperature.
For details about how to measure the mass flow rate or correct the density by temperature, refer to Subsection 5.5.5.
If density is set to “0” while the mass flow rate is mapped to PV, a setting error will result.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ Density ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Density ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	97	Value select	Density Select	Selects one of the following temperature-based density corrections. • Fixed value : Uses the fixed density • Correction value : Uses the corrected density (Only available for AXG, not for AXW).
STB	98	Unit	Density Unit	Specifies the unit of the density.
STB	99	Fixed density	Fixed Density	Specifies the value of the fixed density.
STB	100	Std density	Standard Density	Specifies the reference standard density value to use the temperature-based density correction function (only available for AXG, not for AXW).
STB	105	Correct density	CORRCT Density	Displays the corrected density (only available for AXG, not for AXW).

5.1.10 Temperature Setting

The temperature setting is required when calculating the calorie based on the temperature difference from the temperature that is taken in via MAO FB.
For details about the calorie measurement, refer to Subsection 5.5.6.
This parameter can be used only for AXG, not for AXW.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ Temperature ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Temperature ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	101	Std temperature	Standard Temperature	Specifies the reference standard temperature for using the temperature-based density correction function.
STB	107	Fixed temperature	Calorific Fixed Temp	Specifies the reference temperature to use for the calorie calculation with temperature difference from the temperature which is input from the outside.

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ Temperature ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Query Device ▶ SnsrTB Original Parameters(Part2) ▶ Page 1 ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	104	Meas temperature	Measured Temperature	Displays the temperature that is input from the outside.

5.1.11 Zero Adjustment

The zero adjustment is to set the output for zero flow velocity to 0%. Although the adjustment to zero is performed at the manufacturing factory prior to shipment, this procedure must be carried out once again following the installation of piping to match the magnetic flowmeter to its operating conditions.
This subsection describes zero adjustment procedures using the display.

IMPORTANT

- The zero adjustment should be carried out before the actual operation. Note that other parameters cannot be set and changed during the zero adjustment (for approximately 30 seconds).
- The zero adjustment should be executed only after the sensor is filled with fluid to measure and the fluid velocity is reduced to zero by closing the valve.
- Each time the measuring fluid is changed, be sure to perform the zero adjustment for the changed fluid.

■ Execution of zero adjustment

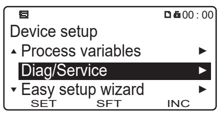
Zero adjustment using the display can be executed with the following parameter.

Menu path

Display	Device setup ► Diag/Service ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Maintenance ► Autozero ► (see below)

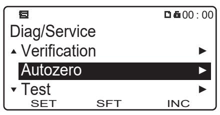
Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	59	Autozero	Autozero Execute	Executes zero adjustment.

When executing zero adjustment from the display, follow procedures below.



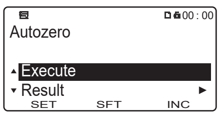
F0402.ai

Select “Diag/Service” in accordance with the menu path above.



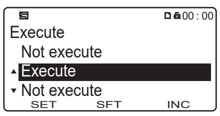
F0403.ai

Select “Autozero”.



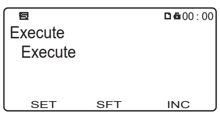
F0404.ai

Select “Execute”.



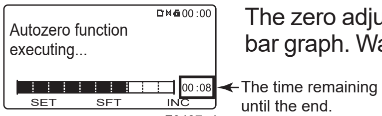
F0405.ai

Select “Execute”.



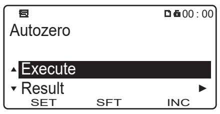
F0406.ai

When “Execute” blinks, touch [SET] to execute.



F0407.ai

The zero adjustment starts, and the progress is displayed with the remaining time and a bar graph. Wait for the zero adjustment to complete.



F0408.ai

After the zero adjustment is finished, the display returns to “Autozero” menu.

When executing zero adjustment from FOUNDATION Fieldbus, zero adjustment is set with the procedures of the interactive operation guide called DD Method. Follow procedures on the operation screen.

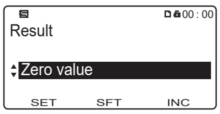
■ Confirmation of zero adjustment result

The zero adjustment result using the display can be confirmed with the following parameter.

Menu path

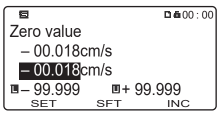
Display	Device setup ► Diag/Service ► Autozero ► Result ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Maintenance ► Autozero ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	60	Zero value	Zero Value	Refer to the following confirmation methods for results of zero adjustment and the display.



F0409.ai

For the result of the zero adjustment, select “Result” and then “Zero value”.



F0410.ai

The result of zero adjustment is displayed as on the left of the screen.

NOTE

When the zero adjustment result exceeds the defined value, the warning [092:AZ warn] is displayed.

5.2 Totalization Function

5.2.1 Totalized Value and Unit Setting

This product has two totalizers for TB in addition to IT FB. A process value which can be set for the totalizer on the TB side is a volumetric flow rate, mass flow rate, and calorie.
When Totalizer 1 and Totalizer 2 are selected as the channel of the AI function block, a unit can be set with following steps in 5.1.4 Engineering Unit Setting.
The set unit can be displayed with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	48	Totalizer 1 ▶ Unit	Total 1 Unit	Displays the unit of totalizer 1.
STB	50	Totalizer 2 ▶ Unit	Total 2 Unit	Displays the unit of totalizer 2.

5.2.2 Totalized Value Display and Totalization Counter Function

The totalization result can be displayed with a totalized value or a totalized value which is scaled with the conversion factor (totalized count value). When the totalized value is scaled with the conversion factor, a specific flow rate is totalized in 1-count increments, which can be used as a totalizer counter.
The totalized value can be displayed and configured with the following parameters.

■ Displaying totalized value

Menu path

Display	Device setup ▶ Process variables ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Process Variables ▶ STB ▶ Process Variables ▶ Dynamic Variables ▶ Device Variables ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	47	-	Total 1 Value ▶ Total 1 Value. Status	Status of totalizer 1.
		Totalizer 1	Total 1 Value ▶ Total 1 Value.Value	Displays the value of totalizer 1.
STB	49	-	Total 2 Value ▶ Total 2 Value. Status	Status of totalizer 2.
		Totalizer 2	Total 2 Value ▶ Total 2 Value.Value	Displays the value of totalizer 2.

■ Setting conversion factor for scaling

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	66	Totalizer 1 ▶ Conv factor	Totalizer1 ▶ Total 1 Conv Factor	Specifies the conversion factor of totalizer 1.
STB	75	Totalizer 2 ▶ Conv factor	Totalizer2 ▶ Total 2 Conv Factor	Specifies the conversion factor of totalizer 2.

■ Display of the totalized count value that is scaled with the conversion factor

Menu path

Display	Device setup ▶ Process variables ▶ Totalizer ▶(see below)
FOUNDATION Fieldbus	-

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
-	-	Totalizer 1 count	-	Displays the scaled totalized value of totalizer 1.
-	-	Totalizer 2 count	-	Displays the scaled totalized value of totalizer 2.

Example:
Set the unit of totalizer 2 to “m^3” and the conversion factor to “2”.
->If the totalized value of totalizer 2 is “10.123 m^3”, the totalized value is scaled to “10.123÷2 = 5”.

5.2.3 Totalization Switch Function

When a target value (threshold) to totalize is specified, it can be used as a totalization switch function. The totalization switch function can compare the specified target value with the totalized value and output the result in status output.
The status output is active while the totalized value exceeds the specified target value.
For details about the output, active direction, and status output function setting for each terminal, refer to Section 5.14. However, the status output function can be used only when disconnected offline from the control loop.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	74	Totalizer 1 ▶ Set point	Totalizer1 ▶ Total 1 Setpoint	Specifies the target value of totalizer 1.
STB	83	Totalizer 2 ▶ Set point	Totalizer2 ▶ Total 2 Setpoint	Specifies the target value of totalizer 2.

5.2.4 Operation of Totalizer Function at Alarm Occurrence

The operation of the totalizer can be specified when an alarm that affects the totalization function occurs.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	69	Totalizer 1 ▶ Failure opts	Totalizer1 ▶ Total 1 Failure Opts	Specifies the totalizer 1 operation to be performed when an alarm occurs.
STB	78	Totalizer 2 ▶ Failure opts	Totalizer2 ▶ Total 2 Failure Opts	Specifies the totalizer 2 operation to be performed when an alarm occurs.

From the table below, select the operation of the totalization function.

Selection		Description
Display	FOUNDATION Fieldbus	
Measured value	Measured value	Continues the totalization function with an instantaneous value at that time even while an alarm is occurring.
Stop	Stop	Displays the totalized value up to that point by immediately stopping the totalizer if an alarm occurs.
Last valid	Last valid	Continues the totalization function with the last instantaneous value right before an alarm occurs (monotonical increasing).

5.2.5 Start/Stop Setting for Totalization Function

The start/stop operation of the totalization function can be set.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	71	Totalizer 1 ▶ Start/Stop	Totalizer1 ▶ Total 1 Execution	Specifies Start/Stop to the totalization function of totalizer 1.
STB	80	Totalizer 2 ▶ Start/Stop	Totalizer2 ▶ Total 2 Execution	Specifies Start/Stop to the totalization function of totalizer 2.

NOTE

The totalization function is set to “Stop” at shipment from the manufacturing factory. To start the totalization function, be sure to set the function to “Start”.

5.2.6 Totalization Direction Setting

The totalization direction can be specified when using the totalization function.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	70	Totalizer 1 ▶ Options	Totalizer1 ▶ Total 1 Options	Specifies the totalization direction of totalizer 1.
STB	79	Totalizer 2 ▶ Options	Totalizer2 ▶ Total 2 Options	Specifies the totalization direction of totalizer 2.

From the table below, select the totalization direction.

Selection		Description
Display	FOUNDATION Fieldbus	
Balanced	Balanced	Totalizes the flow rate (difference) of the forward and reverse directions.
Absolute	Absolute	Totalizes the absolute value of the flow rate.
Only positive	OnlyPositive	Totalizes only the flow rate in the forward direction.
Only negative	OnlyNegative	Totalizes only the flow rate in the reverse direction.
Hold	Hold	Stops totalization processing (holding the current totalized value).

5.2.7 Totalized Value Reset/Preset Function

The reset/preset function can be specified for the totalized value. If the reset function is used, the function resets the totalized value to “0”. If the preset function is used, it sets the preset value specified in advance to the totalized value. The preset function is used when starting to count totalization from the specified value.
The setting can be configured with the following parameters.

■ Use of the reset/preset function

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	72	Totalizer 1 ▶ Reset/Preset	Totalizer1 ▶ Total 1 Preset	Uses the reset/preset function of totalizer 1.
STB	81	Totalizer 2 ▶ Reset/Preset	Totalizer2 ▶ Total 2 Preset	Uses the reset/preset function of totalizer 2.

From the table below, select the reset/preset function. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Not execute	Not execute	Does not use the reset/preset function of the totalized value.
Reset	Reset	Uses the reset function of the totalized value.
Preset	Preset	Uses the preset function for the totalized value.

■ Preset value setting

Menu path

Display	Device setup ▶ Detailed setup ▶ Totalizer ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Totalizer ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	73	Totalizer 1 ▶ Preset value	Totalizer1 ▶ Total 1 Preset Value	Specifies the preset value of totalizer 1.
STB	82	Totalizer 2 ▶ Preset value	Totalizer2 ▶ Total 2 Preset Value	Specifies the preset value of totalizer 2.

NOTE

The parameter returns to “Not execute” after the totalization value reset/preset function has been used.

5.3 Limit Switch Function

5.3.1 Limit Switch

The limit switch function is to transmit 0 and 1 as a parameter by judging whether the selected process value is above or below the threshold value. The function operates as the figure below.

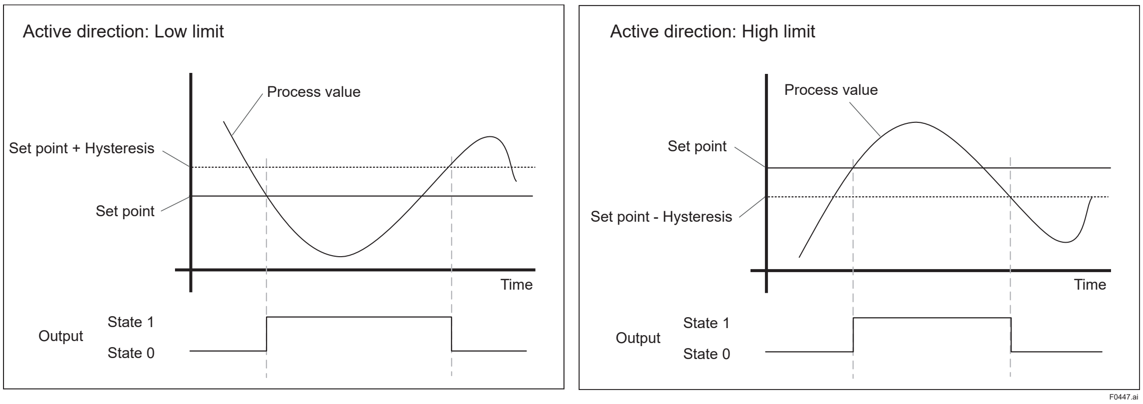


Figure 5.3.1 Limit Switch Operational Schematic Figure

Function item	Description of Parameter
Operation direction	Specifies the operation direction of the limit switch. 0 Low limit 1 High limit
Threshold	Specifies the threshold for judgment.
Hysteresis	Specifies the hysteresis (only a positive value can be specified).
Contact point output	0 (State 0) or 1 (State 1) is entered.

Figure 5.3.1 shows examples of the operation for a case where the operation direction is Low limit on the left side and a case where the operation direction is High limit on the right side.
When the operation direction is Low limit, a contact point output becomes 1 (State 1) if the process value goes below the threshold. When the process value goes over the value obtained by adding the hysteresis to the threshold (threshold + hysteresis) after that, the contact point output becomes 0.
When the operation direction is High limit, the operation is opposite to the operation for Low limit. When process value goes over the threshold, the contact point output becomes 1 (State 1). When the process value goes below the value obtained by deducting the threshold from the hysteresis (threshold - hysteresis), the contact point output becomes 0.
On this product, two units of the above parameter and process value unit are prepared for each process value. Meanwhile, the value of contact point output is updated only when selected by the channel of the DI function block.

■ Flow velocity limit switch

Display	--
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ►Limit Sts Velocity ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	108	--	Limit Sts Velocity1 Value ► Lmt Sts Velo1.Status	Displays the status of the contact point output of flow velocity limit switch 1.
STB		--	Limit Sts Velocity1 Value ► Lmt Sts Velo1.Value	Displays the contact point output of flow velocity limit switch 1.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	109	--	Lmt Sts Velo1 Sp	Specifies the threshold of flow velocity limit switch 1.
STB	110	--	Lmt Sts Velo1 Act Dir	Specifies the operation direction of flow velocity limit switch 1.
STB	111	--	Lmt Sts Velo1 Hys	Specifies the hysteresis of flow velocity limit switch 1.
STB	112	--	Lmt Sts Velo1 Unit	Displays the unit of the flow velocity.
STB	113	--	Limit Sts Velocity2 Value ► Lmt Sts Velo2.Status	Displays the status of the contact point output of flow velocity limit switch 2.
STB		--	Limit Sts Velocity2 Value ► Lmt Sts Velo2.Value	Displays the contact point output of flow velocity limit switch 2.
STB	114	--	Lmt Sts Velo2 Sp	Specifies the threshold of flow velocity limit switch 2.
STB	115	--	Lmt Sts Velo2 Act Dir	Specifies the operation direction of flow velocity limit switch 2.
STB	116	--	Lmt Sts Velo2 Hys	Specifies the hysteresis of flow velocity limit switch 2.
STB	117	--	Lmt Sts Velo2 Unit	Displays the unit of the flow velocity.

■ Volumetric flow rate limit switch

Display	--
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ►Limit Sts Volume ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	118	--	Limit Sts Volume1 Value ► Lmt Sts Vol1.Status	Displays the status of the contact point output of volumetric flow rate limit switch 1.
STB		--	Limit Sts Volume1 Value ► Lmt Sts Vol1.Value	Displays the contact point output of volumetric flow rate limit switch 1.
STB	119	--	Lmt Sts Vol1 Sp	Specifies the threshold of volumetric flow rate limit switch 1.
STB	120	--	Lmt Sts Vol1 Act Dir	Specifies the operation direction of volumetric flow rate limit switch 1.
STB	121	--	Lmt Sts Vol1 Hys	Specifies the hysteresis of volumetric flow rate limit switch 1.
STB	122	--	Lmt Sts Vol1 Unit	Displays the unit of the volumetric flow rate.
STB	123	--	Limit Sts Volume2 Value ► Lmt Sts Vol2.Status	Displays the status of the contact point output of volumetric flow rate limit switch 2.
STB		--	Limit Sts Volume2 Value ► Lmt Sts Vol2.Value	Displays the contact point output of volumetric flow rate limit switch 2.
STB	124	--	Lmt Sts Vol2 Sp	Specifies the threshold of volumetric flow rate limit switch 2.
STB	125	--	Lmt Sts Vol2 Act Dir	Specifies the operation direction of volumetric flow rate limit switch 2.
STB	126	--	Lmt Sts Vol2 Hys	Specifies the hysteresis of volumetric flow rate limit switch 2.
STB	127	--	Lmt Sts Vol2 Unit	Displays the unit of the volumetric flow rate.

Mass flow rate limit switch

Display	--
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ►Limit Sts Mass ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	128	--	Limit Sts Mass1 Value ► Lmt Sts Mass1.Status	Displays the status of the contact point output of mass flow rate limit switch 1.
STB		--	Limit Sts Mass1 Value ► Lmt Sts Mass1.Value	Displays the contact point output of mass flow rate limit switch 1.
STB	129	--	Lmt Sts Mass1 Sp	Specifies the threshold of mass flow rate limit switch 1.
STB	130	--	Lmt Sts Mass1 Act Dir	Specifies the operation direction of mass flow rate limit switch 1.
STB	131	--	Lmt Sts Mass1 Hys	Specifies the hysteresis of mass flow rate limit switch 1.
STB	132	--	Lmt Sts Mass1 Unit	Displays the unit of the mass flow rate.
STB	133	--	Limit Sts Mass2 Value ► Lmt Sts Mass2.Status	Displays the status of the contact point output of mass flow rate limit switch 2.
STB		--	Limit Sts Mass2 Value ► Lmt Sts Mass2.Value	Displays the contact point output of mass flow rate limit switch 2.
STB	134	--	Lmt Sts Mass2 Sp	Specifies the threshold of mass flow rate limit switch 2.
STB	135	--	Lmt Sts Mass2 Act Dir	Specifies the operation direction of mass flow rate limit switch 2.
STB	136	--	Lmt Sts Mass2 Hys	Specifies the hysteresis of mass flow rate limit switch 2.
STB	137	--	Lmt Sts Mass2 Unit	Displays the unit of the mass flow rate.

Calorie limit switch

Display	--
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ►Limit Sts Calorie ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	138	--	Limit Sts Calorie1 Value ► Lmt Sts Cal1.Status	Displays the status of the contact point output of calorie limit switch 1.
STB		--	Limit Sts Calorie1 Value ► Lmt Sts Cal1.Value	Displays the contact point output of calorie limit switch 1.
STB	139	--	Lmt Sts Cal1 Sp	Specifies the threshold of calorie limit switch 1.
STB	140	--	Lmt Sts Cal1 Act Dir	Specifies the operation direction of calorie limit switch 1.
STB	141	--	Lmt Sts Cal1 Hys	Specifies the hysteresis of calorie limit switch 1.
STB	142	--	Lmt Sts Cal1 Unit	Displays the unit of the calorie.
STB	143	--	Limit Sts Calorie2 Value ► Lmt Sts Cal2.Status	Displays the status of the contact point output of calorie limit switch 2.
STB		--	Limit Sts Calorie2 Value ► Lmt Sts Cal2.Value	Displays the contact point output of calorie limit switch 2.
STB	144	--	Lmt Sts Cal2 Sp	Specifies the threshold of calorie limit switch 2.
STB	145	--	Lmt Sts Cal2 Act Dir	Specifies the operation direction of calorie limit switch 2.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	146	--	Lmt Sts Cal2 Hys	Specifies the hysteresis of calorie limit switch 2.
STB	147	--	Lmt Sts Cal2 Unit	Displays the unit of the calorie.

■ Adhesion limit switch

Display	--
FOUNDATION Fieldbus	Device Configuration ▶ DTB ▶ Device Configuration ▶ Configuration ▶ Limit Switch Adhesion 1 ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	58	--	Lim.Sw. Adhesion1 Value ▶ Lmt Sts Adh1.Status	Displays the status of the contact point output of adhesion limit switch 1.
		--	Lim.Sw. Adhesion1 Value ▶ Lmt Sts Adh1.Value	Displays the contact point output of adhesion limit switch 1.
DTB	59	--	Lmt Sts Adh1 Sp	Specifies the threshold of adhesion limit switch 1.
DTB	60	--	Lmt Sts Adh1 Act Dir	Specifies the operation direction of adhesion limit switch 1.
DTB	61	--	Lmt Sts Adh1 Hys	Specifies the hysteresis of adhesion limit switch 1.
DTB	62	--	Lmt Sts Adh1 Unit	Displays the unit of the adhesion.

Display	--
FOUNDATION Fieldbus	Device Configuration ▶ DTB ▶ Device Configuration ▶ Configuration ▶ Limit Switch Adhesion 2 ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	63	--	Lim.Sw. Adhesion2 Value ▶ Lmt Sts Adh2.Status	Displays the status of the contact point output of adhesion limit switch 2.
		--	Lim.Sw. Adhesion2 Value ▶ Lmt Sts Adh2.Value	Displays the contact point output of adhesion limit switch 2.
DTB	64	--	Lmt Sts Adh2 Sp	Specifies the threshold of adhesion limit switch 2.
DTB	65	--	Lmt Sts Adh2 Act Dir	Specifies the operation direction of adhesion limit switch 2.
DTB	66	--	Lmt Sts Adh2 Hys	Specifies the hysteresis of adhesion limit switch 2.
DTB	67	--	Lmt Sts Adh2 Unit	Displays the unit of the adhesion.

■ Voltage limit switch between electrode A and electrode C

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Electrode A1 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	68	--	Lim.Sw. Electrode A1 Value ► Lmt Sts Elec A1.Status	Displays the status of the contact point output of voltage limit switch 1 between electrode A and electrode C.
		--	Lim.Sw. Electrode A1 Value ► Lmt Sts Elec A1.Value	Displays the contact point output of voltage limit switch 1 between electrode A and electrode C.
DTB	69	--	Lmt Sts Elec A1 Sp	Specifies the threshold of voltage limit switch 1 between electrode A and electrode C.
DTB	70	--	Lmt Sts Elec A1 Act Dir	Specifies the operation direction of voltage limit switch 1 between electrode A and electrode C.
DTB	71	--	Lmt Sts Elec A1 Hys	Specifies the hysteresis of voltage limit switch 1 between electrode A and electrode C.
DTB	72	--	Lmt Sts Elec A1 Unit	Displays the unit of the voltage between electrode A and electrode C.

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Electrode A2 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	73	--	Lim.Sw. Electrode A2 Value ► Lmt Sts Elec A2.Status	Displays the status of the contact point output of voltage limit switch 2 between electrode A and electrode C.
		--	Lim.Sw. Electrode A2 Value ► Lmt Sts Elec A2.Value	Displays the contact point output of voltage limit switch 2 between electrode A and electrode C.
DTB	74	--	Lmt Sts Elec A2 Sp	Specifies the threshold of voltage limit switch 2 between electrode A and electrode C.
DTB	75	--	Lmt Sts Elec A2 Act Dir	Specifies the operation direction of voltage limit switch 2 between electrode A and electrode C.
DTB	76	--	Lmt Sts Elec A2 Hys	Specifies the hysteresis of voltage limit switch 2 between electrode A and electrode C.
DTB	77	--	Lmt Sts Elec A2 Unit	Displays the unit of the voltage between electrode A and electrode C.

■ Voltage limit switch between electrode B and electrode C

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Electrode B1 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	78	--	Lim.Sw. Electrode B1 Value ► Lmt Sts Elec B1.Status	Displays the status of the contact point output of voltage limit switch 1 between electrode B and electrode C.
		--	Lim.Sw. Electrode B1 Value ► Lmt Sts Elec B1.Value	Displays the contact point output of voltage limit switch 1 between electrode B and electrode C.
DTB	79	--	Lmt Sts Elec B1 Sp	Specifies the threshold of voltage limit switch 1 between electrode B and electrode C.
DTB	80	--	Lmt Sts Elec B1 Act Dir	Specifies the operation direction of voltage limit switch 1 between electrode B and electrode C.
DTB	81	--	Lmt Sts Elec B1 Hys	Specifies the hysteresis of voltage limit switch 1 between electrode B and electrode C.
DTB	82	--	Lmt Sts Elec B1 Unit	Displays the unit of the voltage between electrode B and electrode C.

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Electrode B2 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	83	--	Lim.Sw. Electrode B2 Value ► Lmt Sts Elec B2.Status	Displays the status of the contact point output of voltage limit switch 2 between electrode B and electrode C.
		--	Lim.Sw. Electrode B2 Value ► Lmt Sts Elec B2.Value	Displays the contact point output of voltage limit switch 2 between electrode B and electrode C.
DTB	84	--	Lmt Sts Elec B2 Sp	Specifies the threshold of voltage limit switch 2 between electrode B and electrode C.
DTB	85	--	Lmt Sts Elec B2 Act Dir	Specifies the operation direction of voltage limit switch 2 between electrode B and electrode C.
DTB	86	--	Lmt Sts Elec B2 Hys	Specifies the hysteresis of voltage limit switch 2 between electrode B and electrode C.
DTB	87	--	Lmt Sts Elec B2 Unit	Displays the unit of the voltage between electrode B and electrode C.

■ Flow noise limit switch (only available for AXG, not for AXW)

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Flow Noise 1 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	88	--	Lim.Sw. Flow Noise 1 Value ► Lmt Sts FLN1.Status	Displays the status of the contact point output of flow noise limit switch 1.
		--	Lim.Sw. Flow Noise 1 Value ► Lmt Sts FLN1.Value	Displays the contact point output of flow noise limit switch 1.
DTB	89	--	Lmt Sts FLN1 Sp	Specifies the threshold of flow noise limit switch 1.
DTB	90	--	Lmt Sts FLN1 Act Dir	Specifies the operation direction of flow noise limit switch 1.
DTB	91	--	Lmt Sts FLN1 Hys	Specifies the hysteresis of flow noise limit switch 1.
DTB	92	--	Lmt Sts FLN1 Unit	Displays the unit of the flow noise.

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Flow Noise 2 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	93	--	Lim.Sw. Flow Noise 2 Value ► Lmt Sts FLN2.Status	Displays the status of the contact point output of flow noise limit switch 2.
		--	Lim.Sw. Flow Noise 2 Value ► Lmt Sts FLN2.Value	Displays the contact point output of flow noise limit switch 2.
DTB	94	--	Lmt Sts FLN2 Sp	Specifies the threshold of flow noise limit switch 2.
DTB	95	--	Lmt Sts FLN2 Act Dir	Specifies the operation direction of flow noise limit switch 2.
DTB	96	--	Lmt Sts FLN2 Hys	Specifies the hysteresis of flow noise limit switch 2.
DTB	97	--	Lmt Sts FLN2 Unit	Displays the unit of the flow noise.

■ Conductivity limit switch (only available for AXG, not for AXW)

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Conductivity 1 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	98	--	Lim.Sw. Conductivity 1 Value ► Lmt Sts Cndc1.Status	Displays the status of the contact point output of conductivity limit switch 1.
		--	Lim.Sw. Conductivity 1 Value ► Lmt Sts Cndc1.Value	Displays the contact point output of conductivity limit switch 1.
DTB	99	--	Lmt Sts Cndc1 Sp	Specifies the threshold of conductivity limit switch 1.
DTB	100	--	Lmt Sts Cndc1 Act Dir	Specifies the operation direction of conductivity limit switch 1.
DTB	101	--	Lmt Sts Cndc1 Hys	Specifies the hysteresis of conductivity limit switch 1.
DTB	102	--	Lmt Sts Cndc1 Unit	Displays the unit of the conductivity.

Display	--
FOUNDATION Fieldbus	Device Configuration ► DTB ► Device Configuration ► Configuration ► Limit Switch Conductivity 2 ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	103	--	Lim.Sw. Conductivity 2 Value ► Lmt Sts Cndc2.Status	Displays the status of the contact point output of conductivity limit switch 2.
		--	Lim.Sw. Conductivity 2 Value ► Lmt Sts Cndc2.Value	Displays the contact point output of conductivity limit switch 2.
DTB	104	--	Lmt Sts Cndc2 Sp	Specifies the threshold of conductivity limit switch 2.
DTB	105	--	Lmt Sts Cndc2 Act Dir	Specifies the operation direction of conductivity limit switch 2.
DTB	106	--	Lmt Sts Cndc2 Hys	Specifies the hysteresis of conductivity limit switch 2.
DTB	107	--	Lmt Sts Cndc2 Unit	Displays the unit of the conductivity.

The following selections are available as an operation method.

Selection		Description
Display	FOUNDATION Fieldbus	
--	state 0	Limit status is not activated (conditions are not met)
--	state 1	Limit status is activated (conditions are met)

The following selections are available as an operation direction.

Selection		Description
Display	FOUNDATION Fieldbus	
--	Low limit	Does not use the reset/preset function of the totalized value.
--	High limit	Uses the reset function of the totalized value.

5.3.2 Connection of Contact Point Output to DI Function

The contact point outputs at STB and DTB are output to specific channels, respectively. By selecting the channel to use in the DI function block, it is connected to the contact point.
The relation of the channel for each contact point output and the channel which can be selected from each DI function block is shown in the figure below.

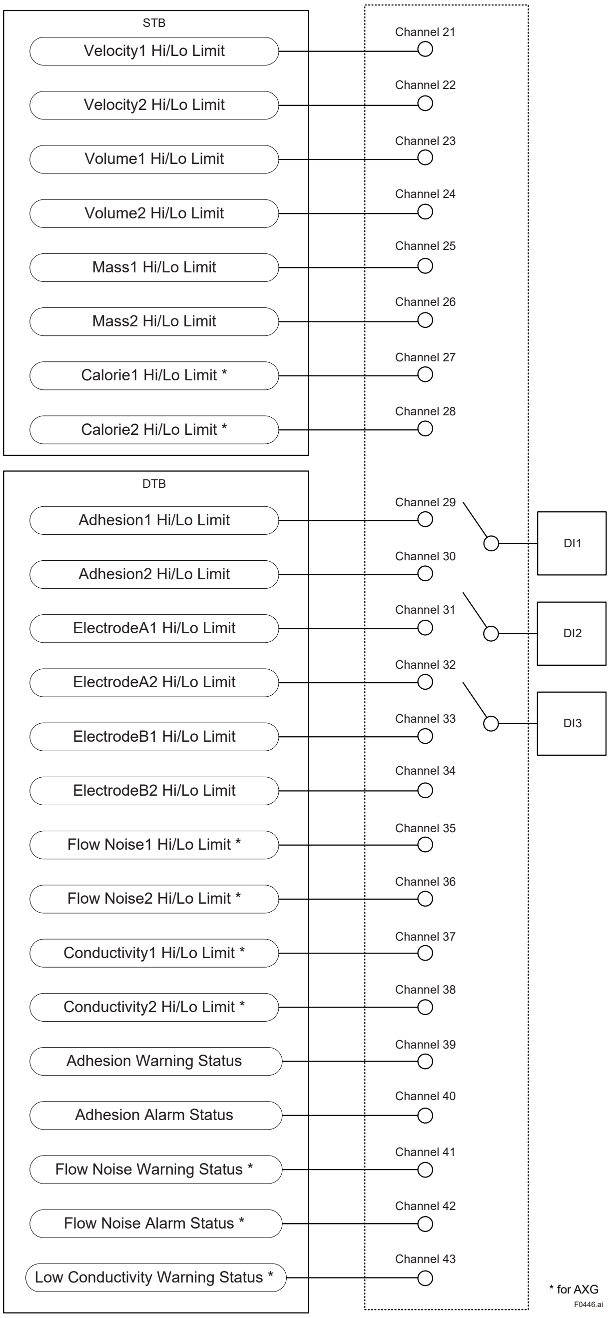


Figure 5.3.2 Relation of Process Value of STB and DTB and DI Function Block

The information of the figure above can be organized below.

Table 5.3.1 List of Relation of Contact Point Output and DI Function Block

CHANNEL number	Channel Selection		Model
	Display	FOUNDATION Fieldbus	
21	Velocity1 Hi/Lo Limit	Velo.1	AXG / AXW
22	Velocity2 Hi/Lo Limit	Velo.2	AXG / AXW
23	Volume1 Hi/Lo Limit	VolFlw.1	AXG / AXW
24	Volume2 Hi/Lo Limit	VolFlw.2	AXG / AXW

CHANNEL number	Channel Selection		Model
	Display	FOUNDATION Fieldbus	
25	Mass1 Hi/Lo Limit	MasFlw.1	AXG / AXW
26	Mass2 Hi/Lo Limit	MasFlw.2	AXG / AXW
27	Calorie1 Hi/Lo Limit	Calo.1	AXG
28	Calorie2 Hi/Lo Limit	Calo.2	AXG
29	Adhesion1 Hi/Lo Limit	Adh.1	AXG / AXW
30	Adhesion2 Hi/Lo Limit	Adh.2	AXG / AXW
31	Elec.A1 Hi/Lo Limit	Elec.A1	AXG / AXW
32	Elec.A2 Hi/Lo Limit	Elec.A2	AXG / AXW
33	Elec.B1 Hi/Lo Limit	Elec.B1	AXG / AXW
34	Elec.A2 Hi/Lo Limit	Elec.B2	AXG / AXW
35	Flow Noise1 Hi/Lo Limit	FLN.1	AXG
36	Flow Noise2 Hi/Lo Limit	FLN.2	AXG
37	Cond.1 Hi/Lo Limit	Cond.1	AXG
38	Cond.2 Hi/Lo Limit	Cond.2	AXG
39	Adhesion Warn Status	Adh.Warn	AXG / AXW
40	Adhesion Alarm Status	Adh.Alm	AXG / AXW
41	Flow Noise Warn Status	FLN.Warn	AXG
42	Flow Noise Alm Status	FLN.Alm	AXG
43	Low Conductivity Warn Status	LoCndc.Warn	AXG

A channel can be selected in each DI function block with the following parameter.

Display	Device setup ► Detailed setup ► Fieldbus info ► DIxFB* ► (see below)
FOUNDATION Fieldbus	Device Configuration ► DI1* ► Device Configuration ► Configuration ► (see below)

*One from DI1 to DI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DI1*	15	Channel	CHANNEL	Selects CHANNEL number used in the DI function block. Refer to Table 5.3.1 for Selection.

*One from DI1 to DI3.

5.4 Inputting External Temperature

By using the external temperature input, external temperature can be used for temperature-base density correction calculation and calorie calculation. For details about the temperature-input density correction calculation and calorie calculation, refer to Subsections 5.5.5 and 5.5.6.
This function can be used by making the minimum settings, such as scheduling and connecting the external input to IN_1 of the MAO function block.

External input temperature is set with the following parameters.

Display	Device setup ▶ Detailed setup ▶ Temperature ▶(see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Temperature ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	84	Function	Temp Function	Specifies as what value the device should handle the external temperature input internally.
STB	85	Unit	Temp Unit	Specifies the unit of the external temperature input.
STB	86	URV	Temp URV	Specifies the high limit of the range value of the external temperature input.
STB	87	LRV	Temp LRV	Specifies the low limit of the range value of the external temperature input.

NOTE

When the external input is connected to IN_2 - IN_8, it is not reflected.

From the table below, select the function.

Selection		Description
Display	FOUNDATION Fieldbus	
No function	No function	Disables the external input function.
Monitoring	Monitoring	Though the external input function is enabled, it does not influence flow rate calculation.
Diff temperature	Diff temperature	Uses the external input as temperature difference. Calorie calculation is enabled if selected.
Ext temperature	Ext temperature	Uses the external input as temperature. The density correction calculation and calorie calculation of mass flow rate are enabled if selected.

5.5 Auxiliary Calculation Function

5.5.1 Fluid Flow Direction Setting

The arrow indicated on the surface of the sensor indicates a fluid flow direction. At shipment from the manufacturing factory, a flow rate is measured assuming that the arrow direction is forward. By changing the parameter settings, this product can measure the flow rate, assuming that the reverse direction is forward against the arrow direction.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ► AUX Calculation ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	88	Flow direct	Flow Direction	Specifies the fluid flow direction.

From the table below, select the fluid flow direction.

Selection		Description
Display	FOUNDATION Fieldbus	
Forward	Forward	The arrow direction of the sensor is forward.
Reverse	Reverse	The reverse direction of the arrow of the sensor is forward.

5.5.2 Rate Limit Function Setting

If the rate limit function is used, it becomes possible to reduce noises that cannot be all cleared only by lengthening the damping time constant. When a step signal or a sudden signal due to a slurry fluid is input, this function judges whether the signal is a flow rate signal or a noise signal. This judgment is made based on the high/low limit value (rate limit value) and the rate limit function continuation time (dead time), causing the noise signal over the rate limit value to be cut off.
The rate limit value should be specified with the percentage (%) for the span of the process value PV-mapped in Subsection 5.1.2. If the rate limit function is not used, set "0" to the dead time.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Configuration ► AUX Calculation ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	89	Rate limit	Rate Limit	Specifies the rate limit value.
STB	90	Dead time	Dead Time	Specifies the dead time.
STB	91	Noise filter	Noise Filter	Specifies the noise filter (rate limit value and dead time).*1

*1: From the table below, select the noise filter (rate limit value and dead time).

Selection		Rate limit value	Dead time
Display	FOUNDATION Fieldbus		
Manual	Manual	The value is specified in the parameter “Rate limit”.	The value is specified in the parameter “Dead time”.
Level 1	Level 1	0.5%	0.5s
Level 2	Level 2	1.0%	1.0s
Level 3	Level 3	5.0%	3.0s

NOTE

If either the rate limit value or the dead time is specified, the noise filter is set to “Manual”.

NOTE

Determining the rate limit value and dead time

The Rage limit value:
Determine the level which should be cut the output fluctuation. For example, if its level is 2%, the noise of 2% or larger would be cut as shown in the following figure.

The Dead time (T_0):
Determine the value depending on the width of the output fluctuation. Choose the larger value when the noise which is over the dead time as shown in the following figure.

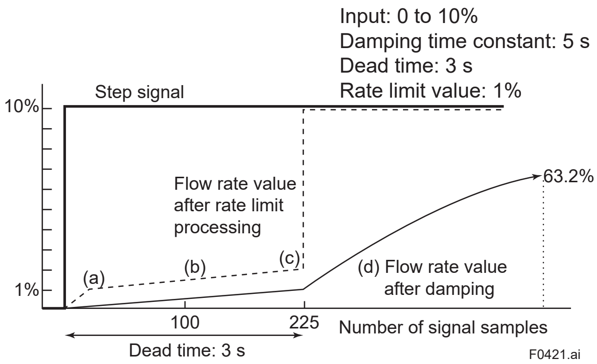
NOTE

For the rate limit function, the dead time is set to “0” at shipment from the manufacturing factory. Be sure to set the dead time when the rate limit function is used.

Signal processing for rate limit function
The product calculates to set the specific rate limit value to the primary delay response value of the previously sampled flow rate value. If the flow rate value sampled at this time exceeds the rate limit value above, its high or low limit is set to the flow rate value at this time. Furthermore, if the sampling count occurs within the dead time while the signal over the high/low limit is in the same direction, this signal is judged to be a flow rate signal.

Example:

(1) When input = 0 to 10%, Damping time constant = 5 seconds, Dead time = 3 seconds, and Rate limit value = 1%, the output for the step input is obtained as shown below.



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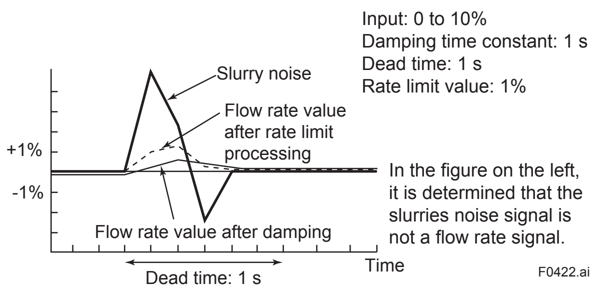
- In the condition above (1), the signal exceeds the rate limit value as compared with the previous value; therefore, the response is set to 1%.

  The actual output, which is damped, is processed as indicated with the solid line.
- Then, the flow rate value in the dead time is set to the “flow rate after damping calculation + signal of rate limit value (1%)”.
- The input signal does not return to the rate limit value or less within the dead time; therefore, it is judged to be a flow rate signal at the time of (3).
- The output signal starts following the step signal along the damping curve.

The figure below shows an output example when a slurry noise occurs.

(2) When input = 0 to 10%, Damping time constant = 1 second, Dead time = 1 seconds, and Rate limit value = 1%, the output for a slurry noise is obtained as shown below.



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5.5.3 Pulsing Flow Support Function Setting

If a pump, etc. is used, it may cause an error in the average of the flow rate due to the pulsing flow. If the pulsing flow support function is used, an error due to a pulsing flow can be reduced by following a flow rate change while controlling the flow rate calculation.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ AUX calculation ▶(see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ AUX Calculation ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	92	Pulsing flow	Pulsing Flow	Specifies the use of the pulsing flow support function.

From the table below, select the use of the pulsing flow support function.

Selection		Description
Display	FOUNDATION Fieldbus	
No	No	Do not use the pulsing flow support function.
Yes	Yes	Use the pulsing flow support function.

5.5.4 Power Frequency Synchronization Setting

This function can be specified whether the excitation frequency (internal signal processing frequency) and power frequency are synchronous or asynchronous.
When setting the excitation frequency and power frequency to asynchronous, the excitation frequency is determined with the setpoint of the power frequency.
The power frequency synchronous/asynchronous mode and the power frequency can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ AUX calculation ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ AUX Calculation ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	93	Power sync on/off	Power Synchronize	Sets the excitation frequency and power frequency to synchronous.*1
STB	94	Set power freq	Set Power Frequency	Specifies the power frequency when the excitation frequency and power frequency are asynchronous.

*1: Sets the synchronous/asynchronous mode of power frequency from the table below.

Selection		Description
Display	FOUNDATION Fieldbus	
Off	No	Sets the excitation frequency and power frequency asynchronous.
On	Yes	Sets the excitation frequency and power frequency synchronous.

IMPORTANT

When using the DC power as the transmitter power, set the commercially available power frequency of the place where the transmitter will be used.
Set "Power sync on/off" to Off and then set "Set power freq".

The excitation frequency and power frequency can be checked with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ AUX calculation ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ AUX Calculation

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	95	Iex power frequency	Iex Power Frequency	Displays the power frequency (synchronous with the excitation frequency).
STB	96	Meas power freq	Mes Power Frequency	Displays the measured power frequency.

5.5.5 Density Correction Calculation

When the temperature from other product (temperature transmitter, etc.) is obtained from MAO, the density correction calculation can be performed based on temperature. The measurement accuracy for the mass flow rate is improved by using this function.

The mass flow rate is calculated using the following formula.

$V_m=V_f \times \rho$

V_m: Mass flow rate [kg/s]
V_f: Volumetric flow rate [m^3/s]
ρ: Density [kg/m^3]

When the density correction calculation is performed based on temperature, the density is obtained using the following formula. The density compensating rates must be specified based on applications that use this product.

$\rho_r=\rho_n\times\{1+a_1\times(T_r-T_n)\times10^{-2}+a_2\times(T_r-T_n)^2\times10^{-6}\}$

ρ_r: Density corrected based on the measured temperature [kg/m^3]
ρ_n: Standard density [kg/m^3]
T_r: Measured temperature [°C]
T_n: Standard state temperature [°C]
a_1: Primary compensating rate
a_2: Secondary compensating rate

This function can be used only for AXG, not for AXW. The standard temperature and the compensating rates can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ Temperature ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Temperature ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	102	Coef A1	Temperature Coef A1	Specifies the primary compensating rate.
STB	103	Coef A2	Temperature Coef A2	Specifies the secondary compensating rate.

The density correction calculation can be set using the following procedure.

(1) Set to the use of the temperature-corrected density by referring to Subsection 5.1.9.

(2) Set the function of the external temperature input function to the temperature by referring to Section 5.4.

(3) Set the range high limit and low limit of the external temperature input by referring to Section 5.4.

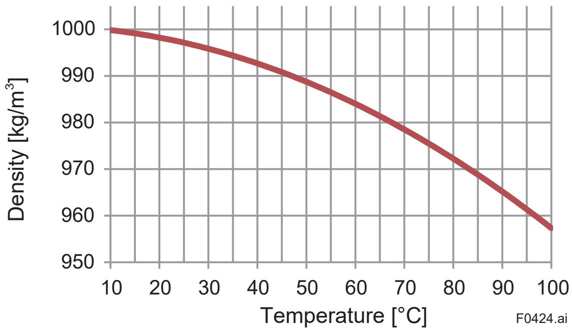
(4) Set the standard temperature and standard density by referring to Subsections 5.1.9 and 5.1.10.

(5) Set the primary and secondary compensating rates of the compensation formula.

NOTE

The density correction calculation is performed only when items (1) and (2) above are specified. If they are not specified, the density is assigned to the fixed value that is specified in Subsection 5.1.9.

Example:
If the water density is corrected based on the temperature in the following conditions, the result is obtained as shown below.
Ext temperature input range = 0.0 to 100.0°C,
Standard density = 1000 kg/m^3,
Standard temperature = 20°C,
Primary compensating rate = -0.02, Secondary compensating rate = -3.9



5.5.6 Calorie Calculation

By obtaining the absolute temperature or the temperature difference from other product (temperature transmitter, etc.) from MAO, the calorie calculation is executable.

The calorie is obtained using the following formula.

$Q = c \times V_m \times \Delta t$

Q: Calorie [J/s]
c: Specific heat [J/kg•K]
V_m: Mass flow rate [kg/s]
Δt: Temperature difference [K]

The temperature difference of Δt varies depending on the MAO function set in Section 5.4. If the temperature difference is selected, the temperature obtained in MAO is used. If the absolute temperature is selected, a difference between the temperature obtained in MAO and the reference temperature set in Subsection 5.1.10 is used.
[“Temperature acquired by MAO” – “Set reference temperature”]

This function can be used only for AXG, not for AXW. The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Pro var ▶ Calorie ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ STB ▶ Device Configuration ▶ Configuration ▶ Process Variables ▶ Calorie ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	106	Specific heat	Specific Heat	Specifies the specific heat.

The calorie calculation can be configured using the following procedures.

- **When the temperature is selected as the external temperature input function:**

(1) Set the function of the external temperature input function to the temperature by referring to Section 5.4.

(2) Set the range high limit and low limit of the external temperature input by referring to Section 5.4.

(3) Set the reference temperature by referring to Subsection 5.1.10.

(4) Set the specific heat.

- **When the temperature difference is selected as the external temperature input function:**

(1) Set the external temperature input function to the temperature difference by referring to Section 5.4.

(2) Set the range high limit and low limit of the external temperature input by referring to Section 5.4.

(3) Set the specific heat.

5.5.7 0% Signal Lock

If this function is enabled, the flow rate is fixed at 0. The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Maintenance ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	61	0% signal lock	Signal Lock	Specifies specifications for 0% signal lock.

From the table below, select the specifications of 0% signal lock.

Selection		Description
Display	FOUNDATION Fieldbus	
Off	Unlock	Does not use 0% Signal Lock
On	Lock	Uses 0% signal lock

5.6 Alarm

5.6.1 Alarm Display

If a failure of the device is detected with the self check function of this product, an alarm (device alarm) is notified from the resource block. If the error of each function block (block error) or the error of the process value (process alarm) is detected, an alarm is notified from each block. When the display is mounted, an error no. is displayed as AL.XX. When multiple alarms are notified, the error nos. of the multiple errors are alternatively displayed. Refer to Subsection 5.6.2 for alarm no. and alarm contents.

5.6.2 Errors and Countermeasures

Explanation of NE107 status:

NE107 status		Status of the device
F	Failure	Device malfunction, Parts malfunction
C	Function Check	The output signal is temporarily invalid for the local operation or manual operation input.
S	Out of specification	The device works in out of specifications. The output signal is uncertain for the process or the ambiance.
M	Maintenance required	The maintenance is required in the near future.
N	No Effect	State other than mentioned above

The following table shows contents and countermeasures of the error.
FD shown in the following table corresponds to FD_EXTENDED_ACTIVE_n in Section 6.1 and n in DEVICE_CONDITION_ACTIVE_n.
Bit shows bit assignment for each parameter.

■ System alarm

The device breaks down and causes abnormal measurement.
Device replacement is needed.

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
F	010:Main CPU FAIL	Main board CPU failure	CPU (main board) failure was detected.	Contact Yokogawa service center.	2	31
F	011:Rev calc FAIL	Reverse calculation failure	Failure of reverse calculation was detected.	Contact Yokogawa service center.	2	30
F	012:Main EEP FAIL	Main board EEPROM failure	Failure of EEPROM (main board) was detected.	Turn on the power again within the range of the temperature specifications. If the situation does not improve, contact Yokogawa service center.	2	29
F	013:Main EEP dflt	Main board EEPROM default	EEPROM (main board) was reset to default values.	Contact Yokogawa service center.	2	28
F	014:Snsr bd FAIL	Sensor board failure	Failure of sensor board was detected.	Contact Yokogawa service center.	2	23
F	015:Snsr comm ERR	Sensor communication error	Communication error of the sensor was detected.	Contact Yokogawa service center.	2	22
F	016:AD 1 FAIL[Sig]	A/D1 failure[Signal]	Failure of A/D transmitter 1 (flow velocity signal) was detected.	Contact Yokogawa service center.	2	21

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
F	017:AD 2 FAIL[Excit]	A/D2 failure[Exciter]	Failure of A/D transmitter 2 (exciting current) was detected.	Contact Yokogawa service center.	2	20
F	018:Coil open	Coil open	Coil of sensor was disconnected.	Turn off the power, check coil of sensor and excitation cable.	2	19
F	019:Coil short	Coil short	Coil of sensor was shorted.	Contact Yokogawa service center.	2	18
F	020:Exciter FAIL	Exciter failure	Failure of the excitation circuit was detected.	Contact Yokogawa service center.	2	17
F	027:Restore FAIL	Parameter restore incomplete	Restore of parameters was failed.	Retry parameter restoration.	2	7
F	028:Ind bd FAIL	Indicator board failure	Failure of display board was detected.	Check that the ambient temperature of display is within the range. If the situation does not improve, contact Yokogawa service center.	2	6
F	029:Ind bd EEP FAIL	Indicator board EEPROM failure	Failure of EEPROM (display board) was detected.	Turn on the power again within the range of the temperature specifications. If the situation does not improve, contact Yokogawa service center.	2	5
F	030:LCD drv FAIL	LCD driver failure	Failure of display driver was detected.	Contact Yokogawa service center.	2	4
F	031:Ind bd mismatch	Indicator board mismatch	Mismatch of display board was detected.	Contact Yokogawa service center.	2	3
F	032:Ind comm ERR	Indicator communication error	Communication error of display board was detected.	Check the connection of the display and main board.	2	2
F	033:microSD FAIL	microSD failure	Failure of the microSD card was detected.	Change the microSD card.	2	1
F	244:Amp EEP FAIL	Amp EEPROM Failure	Failure of amplifier EEPROM.	Replacement of amplifier or device	1	19
C	249:SoftDL Incmplt	SoftDL Incomplete	Software download incomplete.	Check cable and power.	1	24
C	250:SoftDL FAIL	SoftDL Failure	Software download failed.	Check cable and power.	1	25
F	251:Abnml Boot PRS	Abnormal Boot Process	Failure occurs while starting up the device.	Check cable and power.	1	26
F	335:IT1 ttl bkup ERR	IT1 Total Backup Err	IT1 totalized value saving error occurred.	Contact Yokogawa's sales office or service center.	6	8
F	339:IT2 ttl bkup ERR	IT2 Total Backup Err	IT2 totalized value saving error occurred.	Contact Yokogawa's sales office or service center.	6	4

■ Process alarm

The device works normally, but some issue of the process causes abnormal measurement. Maintenance work is needed.

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
S	050:Signal overflow	Signal overflow	Failure of input signal was detected.	Check whether signal cable is correct.	3	31
S	051:Empty detect	Empty pipe detection	Inside of sensor was detected to be empty. (Empty pipe detection)	Fill a sensor with fluid.	3	30
S	053:Adh over lv 4	Adhesion over level 4	The resistance value of the electrodes exceeded Level 4. (Adhesion detection of insulation to the electrode)	Clean electrodes.	3	28
N	364:AI1 HH Alarm	AI1 High High Alarm	HI_HI alarm occurred in the AI1 block.	Check AI1 Output Value and settings of AI1 HiHi Lim and AI1 Hi Hi Pri.	7	11
N	365:AI1 LL Alarm	AI1 Low Low Alarm	LO_LO alarm occurred in the AI1 block.	Check AI1 Output Value and settings of AI1 LoLo Lim and AI1 Lo Lo Pri.	7	10
N	366:AI1 Hi Alarm	AI1 High Alarm	High alarm occurred in the AI1 block.	Check AI1 Output Value and settings of AI1 Hi Lim and AI1 Hi Pri.	7	9
N	367:AI1 Lo Alarm	AI1 Low Alarm	Low alarm occurred in the AI1 block.	Check AI1 Output Value and settings of AI1 Lo Lim and AI1 Lo Pri.	7	8
N	368:AI2 HH Alarm	AI2 High High Alarm	HI_HI alarm occurred in the AI2 block.	Check AI2 Output Value and settings of AI2 HiHi Lim and AI2 Hi Hi Pri.	7	7
N	369:AI2 LL Alarm	AI2 Low Low Alarm	LO_LO alarm occurred in the AI2 block.	Check AI2 Output Value and settings of AI2 LoLo Lim and AI2 Lo Lo Pri.	7	6
N	370:AI2 Hi Alarm	AI2 High Alarm	High alarm occurred in the AI2 block.	Check AI2 Output Value and settings of AI2 Hi Lim and AI2 Hi Pri.	7	5
N	371:AI2 Lo Alarm	AI2 Low Alarm	Low alarm occurred in the AI2 block.	Check AI2 Output Value and settings of AI2 Lo Lim and AI2 Lo Pri.	7	4
N	372:AI3 HH Alarm	AI3 High High Alarm	HI_HI alarm occurred in the AI3 block.	Check AI3 Output Value and settings of AI3 HiHi Lim and AI3 Hi Hi Pri.	7	3
N	373:AI3 LL Alarm	AI3 Low Low Alarm	LO_LO alarm occurred in the AI3 block.	Check AI3 Output Value and settings of AI3 LoLo Lim and AI3 Lo Lo Pri.	7	2
N	374:AI3 Hi Alarm	AI3 High Alarm	High alarm occurred in the AI3 block.	Check AI3 Output Value and settings of AI3 Hi Lim and AI3 Hi Pri.	7	1

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
N	375:AI3 Lo Alarm	AI3 Low Alarm	Low alarm occurred in the AI3 block.	Check AI3 Output Value and settings of AI3 Lo Lim and AI3 Lo Pri.	7	0
N	376:AI4 HH Alarm	AI4 High High Alarm	HI_HI alarm occurred in the AI4 block.	Check AI4 Output Value and settings of AI4 HiHi Lim and AI4 Hi Hi Pri.	8	31
N	377:AI4 LL Alarm	AI4 Low Low Alarm	LO_LO alarm occurred in the AI4 block.	Check AI4 Output Value and settings of AI4 LoLo Lim and AI4 Lo Lo Pri.	8	30
N	378:AI4 Hi Alarm	AI4 High Alarm	High alarm occurred in the AI4 block.	Check AI4 Output Value and settings of AI4 Hi Lim and AI4 Hi Pri.	8	29
N	379:AI4 Lo Alarm	AI4 Low Alarm	Low alarm occurred in the AI4 block.	Check AI4 Output Value and settings of AI4 Lo Lim and AI4 Lo Pri.	8	28
N	392:PID HH Alarm	PID High High Alarm	HI_HI alarm occurred in the PID block.	Check PID Output Value and settings of PID HiHi Lim and PID Hi Hi Pri.	8	27
N	393:PID LL Alarm	PID Low Low Alarm	LO_LO alarm occurred the PID block.	Check PID Output Value and settings of PID LoLo Lim and PID Lo Lo Pri.	8	26
N	394:PID Hi Alarm	PID High Alarm	High alarm occurred in the PID block.	Check PID Output Value and settings of PID Hi Lim and PID Hi Pri.	8	25
N	395:PID Lo Alarm	PID Low Alarm	Low alarm occurred in the PID block.	Check PID Output Value and settings of PID Lo Lim and PID Lo Pri.	8	24

■ Setting alarm

The device works normally, but the parameter setting error occurs. Parameter setting is needed.

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
S	060:Span cfg ERR	Span configuration error	Setting error of span flow rate was detected. (fulfill “0.05 m/s < span flow rate < 16 m/s”)	Check or change span parameter settings.	3	23
S	066:Density cfg ERR	Density configuration error	The setting error of density value was detected when PV was set to mass flow rate.	Check the parameter settings related to density.	3	17
S	067:Pls 1 cfg ERR	Pulse output 1 configuration error	Setting error of pulse output 1 was detected.	Check Pulse1-related parameter settings.	3	15

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
C	069:Nomi size cfg	Nominal size configuration error	Configuration error of nominal size was detected. (fulfill "0.99 mm < nominal size of sensor < 3000.10 mm (0.01 inch < nominal size of sensor < 120.10 inch)")	Check the parameter settings related to nominal size.	3	13
C	070:Adh cfg ERR	Adhesion configuration error	Setting error of electrode adhesion detection function was detected. (fulfill "Level1 < Level2 < Level3 < Level4")	Check the parameter settings related to adhesion detection.	3	12
C	071:FLN cfg ERR	Flow noise configuration error	Setting error of flow noise verification function was detected. (fulfill "Level1 < Level2 < Level3 < Level4")	Change flow noise parameter settings.	3	11
C	072:Log not start	Data logging not started	Data logging failed to start.	Insert the microSD card.	3	10
C	247:RB O/S Mode	RB in O/S Mode	Resource block is in the O/S mode.	Change it to AUTO mode.	1	22
C	300:AI1 O/S Mode	AI1 in O/S Mode	The AI1 block is in the O/S mode.	Change the AI1 block mode.	6	31
C	301:AI1 Man Mode	AI1 in Man Mode	The AI1 block is in the Man mode.	Change the AI1 block mode.	6	30
C	302:AI1 Not Schedule	AI1 Not Scheduled	AI1 block is unscheduled.	Schedule the AI1 block.	6	29
C	303:AI1 Simulate Act	AI1 Simulation Active	AI1 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the AI1 block.	6	28
C	304:AI2 O/S Mode	AI2 in O/S Mode	The AI2 block is in the O/S mode.	Change the AI2 block mode.	6	27
C	305:AI2 Man Mode	AI2 in Man Mode	The AI2 block is in the Man mode.	Change the AI2 block mode.	6	26
C	306:AI2 Not Schedule	AI2 Not Scheduled	AI2 block is unscheduled.	Schedule the AI2 block.	6	25
C	307:AI2 Simulate Act	AI2 Simulation Active	AI2 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the AI2 block.	6	24
C	308:AI3 O/S Mode	AI3 in O/S Mode	The AI3 block is in the O/S mode.	Change the AI3 block mode.	6	23
C	309:AI3 Man Mode	AI3 in Man Mode	The AI3 block is in the Man mode.	Change the AI3 block mode.	6	22
C	310:AI3 Not Schedule	AI3 Not Scheduled	AI3 block is unscheduled.	Schedule the AI3 block.	6	21
C	311:AI3 Simulate Act	AI3 Simulation Active	AI3 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the AI3 block.	6	20
C	312:AI4 O/S Mode	AI4 in O/S Mode	The AI4 block is in the O/S mode.	Change the AI4 block mode.	6	19
C	313:AI4 Man Mode	AI4 in Man Mode	The AI4 block is in the Man mode.	Change the AI4 block mode.	6	18
C	314:AI4 Not Schedule	AI4 Not Scheduled	AI4 block is unscheduled.	Schedule the AI4 block.	6	17
C	315:AI4 Simulate Act	AI4 Simulation Active	AI4 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the AI4 block.	6	16
C	328:PID O/S Mode	PID in O/S Mode	The PID block is in the O/S mode.	Change the PID block mode.	6	15

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
C	329:PID Man Mode	PID in Man Mode	The PID block is in the Man mode.	Change the PID block mode.	6	14
C	330:PID Not Schedule	PID Not Scheduled	The PID block is unscheduled.	Schedule the PID block.	6	13
C	331:PID Bypass Mode	PID in Bypass Mode	2.ON is selected by BYPASS of PID.	Set BYPASS to 1.OFF.	6	12
C	332:IT1 O/S mode	IT1 in O/S Mode	The IT1 block is in the O/S mode.	Change the IT1 block mode.	6	11
C	333:IT1 Man mode	IT1 in Man Mode	The IT1 block is in the Man mode.	Change the IT1 block mode.	6	10
C	334:IT1 Not Schedule	IT1 Not Scheduled	IT1 block is unscheduled.	Schedule the IT1 block.	6	9
C	336:IT2 O/S Mode	IT2 in O/S Mode	The IT2 block is in the O/S mode.	Change the IT2 block mode.	6	7
C	337:IT2 Man Mode	IT2 in Man Mode	The IT2 block is in the Man mode.	Change the IT2 block mode.	6	6
C	338:IT2 Not Schedule	IT2 Not Scheduled	IT2 block is unscheduled.	Schedule the IT2 block.	6	5
C	340:DI1 O/S Mode	DI1 in O/S Mode	The DI1 block is in the O/S mode.	Change the DI1 block mode.	6	3
C	341:DI1 Man Mode	DI1 in Man Mode	The DI1 block is in the Man mode.	Change the DI1 block mode.	6	2
C	342:DI1 Not Schedule	DI1 Not Scheduled	DI1 block is unscheduled.	Schedule the DI1 block.	6	1
C	343:DI1 Simulate Act	DI1 Simulation Active	DI1 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the DI1 block.	6	0
C	344:DI2 O/S Mode	DI2 in O/S Mode	The DI2 block is in the O/S mode.	Change the DI2 block mode.	7	31
C	345:DI2 Man Mode	DI2 in Man Mode	The DI2 block is in the Man mode.	Change the DI2 block mode.	7	30
C	346:DI2 Not Schedule	DI2 Not Scheduled	DI2 block is unscheduled.	Schedule the DI2 block.	7	29
C	347:DI2 Simulate Act	DI2 Simulation Active	DI2 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the DI2 block.	7	28
C	348:DI3 O/S Mode	DI3 in O/S Mode	The DI3 block is in the O/S mode.	Change the DI3 block mode.	7	27
C	349:DI3 Man Mode	DI3 in Man Mode	The DI3 block is in the Man mode.	Change the DI3 block mode.	7	26
C	350:DI3 Not Schedule	DI3 Not Scheduled	DI3 block is unscheduled.	Schedule the DI3 block.	7	25
C	351:DI3 Simulate Act	DI3 Simulation Active	DI3 simulation function is running.	Disable SIMULATE. Simulate En/Disable of the DI3 block.	7	24
C	352:AR O/S Mode	AR in O/S Mode	The AR block is in the O/S mode.	Change the AR block mode.	7	23
C	353:AR Man Mode	AR in MAN Mode	The AR block is in the Man mode.	Change the AR block mode.	7	22
C	354:AR Not Scheduled	AR Not Scheduled	The AR block is unscheduled.	Schedule the AR block.	7	21
C	356:MAO O/S Mode	MAO in O/S Mode	The MAO block is in the O/S mode.	Change the MAO block mode.	7	19
C	357:MAO NotSchedule	MAO Not Scheduled	The MAO block is unscheduled.	Schedule the MAO block.	7	18
C	359:No FB Scheduled	No FB Scheduled	No function block is scheduled.	Check the schedule of LAS communication or function block.	7	16
C	360:SnsrTB O/S Mode	Sensor TB in O/S Mode	The STB block is in the O/S mode.	Change the STB block mode.	7	15

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
C	361:DiagTB O/S Mode	Diagnostic TB in O/S Mode	The DTB block is in the O/S mode.	Change the DTB block mode.	7	14
C	362:MaintTB O/SMode	Maintenance TB in O/S Mode	The MTB block is in the O/S mode.	Change the MTB block mode.	7	13
C	363:DispTB O/S Mode	Display TB in O/S Mode	The LTB block is in the O/S mode.	Change the LTB block mode.	7	12

■ Warning

The device works normally and measurement is also normal but warning occurs.

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
S	082:Pls 1 saturate	Pulse output 1 saturated	Saturation of pulse output 1 was detected.	Check process value and pulse output 1 parameter settings.	3	5
C	085:Cable miscon	Cable misconnect	Misconnection of cable was detected.	Check the signal cable and excitation cable connection.	3	2
C	086:Coil insulation	Coil insulation warning	Insulation deterioration of the coil was detected.	Contact Yokogawa service center.	3	1
M	087:Adhesion lv 3	Adhesion over level 3	The resistance value of the electrodes exceeded Level 3. (Adhesion detection of insulation to the electrode)	Recommend cleaning the electrode.	4	31
N	088:LC warn	Low conductivity warning	Decrease of conductivity was detected.	Check fluid conductivity.	4	30
M	089:Insu detect	Insulation detection	Insulation deterioration of electrode was detected.	Contact Yokogawa service center.	4	29
N	090:FLN over lv 3	Flow noise over level 3	Flow noise exceeded Level 3. (Detection of flow noise)	Check if the fluid has a problem (conductivity and bubble).	4	28
N	091:FLN over lv 4	Flow noise over level 4	Flow noise exceeded Level 4. (Detection of flow noise)	Check if the fluid has a problem (conductivity and bubble).	4	27
C	092:AZ warn	Autozero warning	Result of zero adjustment exceeded 10 cm/s.	Check fluid is stopped when executing zero adjustment.	4	26
C	093:Verif warn	Verification warning	Interruption of verification function was detected.	Execute the Verification function again.	4	25
C	094:Fact noise warn	Factory noise warning	The fluctuation of flow became larger.	Check the fluid.	4	24
C	095:Simulate active	Simulation active	The test mode for any of the flow velocity, volumetric flow rate, mass flow rate, calorie, pulse output, status input, or status output was executed.	Release simulation or test mode.	4	23
S	098:Pls 1 fix	Pulse output 1 fixed	It was detected that pulse output 1 is fixed.	Check whether pulse output 1 is in the test mode or not.	4	20

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
C	101:Param restore run	Parameter restore running	The restore function of the parameter was executed.	-	4	15
N	102:Disp over	Display over warning	The number of digits available for display exceeded the limit.	Check and change the display parameter.	4	14
N	103:SD size warn	microSD card size warning	Free space of the microSD card decreased to less than 10%.	microSD card may run out of memory space.	4	13
M	104:Bkup incmplt	Parameter backup incomplete	Parameter backup failed.	Retry parameter backup.	4	12
S	105:SD mismatch	microSD card mismatch	Mismatch of the microSD card was detected.	Change the microSD card.	4	11
M	106:SD removal ERR	microSD card removal procedure error	Removal of the microSD card failed.	Remove the microSD card in appropriate procedures.	4	10
N	131:Trans mismatch	Transmitter type mismatch	Mismatch of sensor and transmitter was detected.	Contact Yokogawa service center.	3	0

■ Information

The device works normally and measurement is also normal. These messages are just reference information.

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
N	120:Watchdog	Watchdog	Error of Watchdog timer was detected.	Contact Yokogawa service center.	4	7
N	121:Power off	Power off	Power-off was detected.	-	4	6
N	122:Inst power FAIL	Instant power failure	Instantaneous power failure was detected.	-	4	5
N	123:Param bkup run	Parameter backup running	Parameter backup function is running.	-	4	4
N	124:Data log run	Data logging running	Data-logging function is running.	-	4	3
N	133:G/A mismatch	G/A mismatch error	As a result of self-test, inconsistency of internal circuit was detected.	Contact Yokogawa service center.	5	21
N	-	Write Unlocked	Write lock function inoperative (Parameter can be written).	Make Write Lock of resource block Locked.	1	30
N	-	Hard Write Lock SW OFF	Hardware write protection switch is turned off (writing enabled).	Turn on the hardware write protection switch.	1	29
N	-	Write Locked	Write lock function operative (Parameter can not be written).	Make Write Lock of resource block Unlocked.	1	28
N	-	Hard Write Lock SW ON	Hardware write protection switch is turned on (writing disabled).	Turn off the hardware write protection switch.	1	27
N	248:Simulate SW ON	Simulation Switch ON	Simulation switch is turned on.	Turn off the simulation switch.	1	23

NE 107	Error Message		Error Description	Countermeasure	FD	bit
	Display	FOUNDATION Fieldbus				
N	246:Simulate SW OFF	Simulation Switch OFF	Simulation switch is turned off.	Turn on the simulation switch.	1	21

5.6.3 Operation at the Time of Error

The following table shows outputs at the time of error and actions of the outputs.

■ **System alarm**

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
10	Main CPU FAIL	20	--	--	--	Other	--	--	--	STOP	Totalizer stop	Undefined
11	Reverse calculation failure	20	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
12	Main board EEPROM failure	23	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
13	Main board EEPROM default	17	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
14	Sensor board failure	20	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
15	Sensor communication error	20	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
16	A/D1 failure[Signal]	20	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
17	A/D2 failure[Exciter]	20	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
18	Coil open	17	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
19	Coil short	20	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
20	Exciter failure	20	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
27	Parameter restore incomplete	--	--	17	--	--	--	Other	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
28	Indicator board failure	--	--	--	20	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
29	Indicator board EEPROM failure	--	--	--	23	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
30	LCD driver failure	--	--	--	20	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
31	Indicator board mismatch	--	--	--	20	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
32	Indicator communication error	--	--	--	20	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
33	microSD failure	--	--	--	20	--	--	--	Other	Normal calculation	Follows settings (see 4.2.4).	Alarm
244	Amp EEPROM Failure	--	--	--	--	--	--	--	--	--	--	Alarm
249	SoftDL Incomplete	--	--	17	--	--	--	Other	--	--	--	Alarm
250	SoftDL Failure	--	--	17	--	--	--	Other	--	--	--	Alarm

251	Abnormal Boot Process	--	--	--	--	--	--	--	--	--	--	Alarm
335	IT1 Total Backup Err	--	--	--	--	--	--	--	--	--	--	Normal
339	IT2 Total Backup Err	--	--	--	--	--	--	--	--	--	--	Normal

■ **Process alarm**

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
50	Signal overflow	17	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
51	Empty pipe detection	17	--	--	--	Other	--	--	--	Hold Prior setting	Follows settings (see 4.2.4).	Alarm
53	Adhesion over level 4	17	17	--	--	Other	Other	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
364	AI1 High High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
365	AI1 Low Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
366	AI1 High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
367	AI1 Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
368	AI2 High High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
369	AI2 Low Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
370	AI2 High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
371	AI2 Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
372	AI3 High High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
373	AI3 Low Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
374	AI3 High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
375	AI3 Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
376	AI4 High High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
377	AI4 Low Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
378	AI4 High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
379	AI4 Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
392	PID High High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
393	PID Low Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal
394	PID High Alarm	--	--	--	--	--	--	--	--	--	--	Normal
395	PID Low Alarm	--	--	--	--	--	--	--	--	--	--	Normal

■ **Setting alarm**

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
60	Span configuration error	19	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
66	Density configuration error	19	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
67	Pulse output 1 configuration error	--	--	19	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Alarm
69	Nominal size configuration error	19	--	--	--	Other	--	--	--	Normal calculation	Follows settings (see 4.2.4).	Alarm
70	Adhesion configuration error	--	19	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Alarm
71	Flow noise configuration error	--	19	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Alarm
72	Data logging not started	--	--	17	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Alarm
247	RB in O/S Mode	--	--	--	--	--	--	--	--	--	--	Alarm
300	AI1 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
301	AI1 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
302	AI1 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
303	AI1 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
304	AI2 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
305	AI2 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
306	AI2 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
307	AI2 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
308	AI3 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
309	AI3 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
310	AI3 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
311	AI3 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
312	AI4 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
313	AI4 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
314	AI4 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
315	AI4 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
328	PID in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
329	PID in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
330	PID Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
331	PID in Bypass Mode	--	--	--	--	--	--	--	--	--	--	Normal
332	IT1 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
333	IT1 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
334	IT1 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
336	IT2 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
337	IT2 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
338	IT2 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
340	DI1 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
341	DI1 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
342	DI1 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
343	DI1 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
344	DI2 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
345	DI2 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
346	DI2 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
347	DI2 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
348	DI3 in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
349	DI3 in Man Mode	--	--	--	--	--	--	--	--	--	--	Normal
350	DI3 Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
351	DI3 Simulation Active	--	--	--	--	--	--	--	--	--	--	Normal
352	AR in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
353	AR in MAN Mode	--	--	--	--	--	--	--	--	--	--	Normal
354	AR Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
356	MAO in O/S Mode	--	--	--	--	--	--	--	--	--	--	Normal
357	MAO Not Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
359	No FB Scheduled	--	--	--	--	--	--	--	--	--	--	Normal
360	Sensor TB in O/S Mode	--	--	--	--	O/S	--	--	--	--	--	Normal
361	Diagnostic TB in O/S Mode	--	--	--	--	--	O/S	--	--	--	--	Normal
362	Maintenance TB in O/S Mode	--	--	--	--	--	--	O/S	--	--	--	Normal
363	Display TB in O/S Mode	--	--	--	--	--	--	--	O/S	--	--	Normal

■ **Warning**

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
82	Pulse output 1 saturated	--	--	17	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Warning
85	Cable misconnect	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
86	Coil insulation warning	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
87	Adhesion over level 3	17	17	--	--	Other	Other	--	--	Normal calculation	Totalizer processing continue	Warning
88	Low conductivity Warning	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
89	Insulation detection	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
90	Flow noise over level 3	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
91	Flow noise over level 4	17	17	--	--	Other	Other	--	--	Normal calculation	Totalizer processing continue	Warning
92	Autozero warning	18	--	--	--	Other	--	--	--	Normal calculation	Totalizer processing continue	Warning
93	Verification warning	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Warning
94	Factory noise warning	--	17	--	--	--	Other	--	--	Normal calculation	Totalizer processing continue	Warning
95	Simulation active	--	--	17	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Warning
98	Pulse output 1 fixed	--	--	17	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Warning
101	Parameter restore running	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Warning
102	Display over warning	--	--	--	17	--	--	--	Other	Normal calculation	Totalizer processing continue	Warning
103	microSD card size warning	--	--	--	17	--	--	--	Other	Normal calculation	Totalizer processing continue	Warning
104	Parameter backup incomplete	--	--	17	--	--	--	Other	--	Normal calculation	Totalizer processing continue	Warning
105	microSD card mismatch	--	--	--	20	--	--	--	Other	Normal calculation	Totalizer processing continue	Warning
106	microSD card removal procedure error	--	--	--	20	--	--	--	Other	Normal calculation	Totalizer processing continue	Warning
131	Transmitter type mismatch	19	--	--	--	Other	--	--	--	Normal calculation	Totalizer processing continue	Warning

■ **Information**

Error		XD_ERROR				BLOCK_ERR				Process value*	Totalizer	Display
No	Message	STB	DTB	MTB	LTB	STB	DTB	MTB	LTB			
120	Watchdog	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Normal
121	Power off	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Normal
122	Instant power failure	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Normal
123	Parameter backup running	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Execute
124	Data logging running	--	--	--	--	--	--	--	--	Normal calculation	Totalizer processing continue	Icon
133	G/A mismatch error	17	--	--	--	Other	--	--	--	--	--	Alarm
246	Simulation Switch OFF	--	--	--	--	--	--	--	--	--	--	Normal
248	Simulation Switch ON	--	--	--	--	--	--	--	--	--	--	Normal
252	Hard Write Lock SW ON	--	--	--	--	--	--	--	--	--	--	Normal
253	Write Locked	--	--	--	--	--	--	--	--	--	--	Normal
254	Hard Write Lock SW OFF	--	--	--	--	--	--	--	--	--	--	Normal
255	Write Unlocked	--	--	--	--	--	--	--	--	--	--	Normal

* When a diagnosis-related process (adhesion resistance, electrode A potential, electrode B potential, flow noise and conductivity) is assigned to AI, a value may be updated even if set to “Hold Prior setting”.

5.6.4 Alarm Display Setting

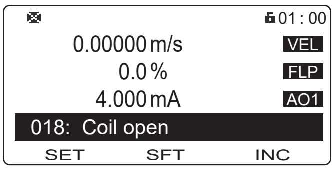
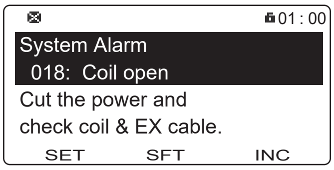
(1) Alarm display

If an error occurs on this product, an alarm appears on the display. The alarm display modes are classified into two types: one mode to display a process value and alarm name, and another mode to display an alarm name and action.
If multiple alarms occur on this product, they will be displayed in sequence on the display.
The setting can be configured with the following parameter.

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	30	Alarm display	Display Alarm	Specifies the alarm display.

From the table below, select the alarm display.

Selection		Description
Display	FOUNDATION Fieldbus	
Normal	Normal	Displays the process value and alarm name.  F0425.ai
Detail	Detail	Displays the alarm name and action.  F0426.ai

(2) Alarm display based on NAMUR NE107

A prefix can be assigned to the alarm name based on NAMUR NE107.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	29	NE107 display	Display NE107	Sets the alarm display based on NAMUR NE107.

From the table below, select the alarm display.

Selection		Description
Display	FOUNDATION Fieldbus	
Normal	Normal	Sets to the normal alarm display.
NE107	NE107	Sets the alarm display based on NAMUR NE107.

5.6.5 Alarm Record Function

The alarm record function can record an alarm that occurred in the past as history.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm record ► (see below)
FOUNDATION Fieldbus	Diagnostic ► STB ► Device Diagnostics ► Diagnostics/Alerts ► Alert ► Alarm Record ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	155	Record alarm 1	Alarm Record 1	Displays the name of the first new alarm.
STB	156	Record time 1	Alarm Time 1	Displays the operation time when the first new alarm occurs.
STB	157	Record alarm 2	Alarm Record 2	Displays the name of the second new alarm.
STB	158	Record time 2	Alarm Time 2	Displays the operation time when the second new alarm occurs.
STB	159	Record alarm 3	Alarm Record 3	Displays the name of the third new alarm.
STB	160	Record time 3	Alarm Time 3	Displays the operation time when the third new alarm occurs.
STB	161	Record alarm 4	Alarm Record 4	Displays the name of the fourth new alarm.
STB	162	Record time 4	Alarm Time 4	Displays the operation time when the fourth new alarm occurs.

The operation time when an alarm occurred is displayed in the format of “dddddD hh:mm”.
“dddddD” indicates the day, “hh” indicates the hour, and “mm” indicates the minute.
Example:
“00031D 12:34” is displayed.
This example shows that an alarm has occurred when the product has been operating for 31 days, 12 hours, and 34 minutes.

5.6.6 Alarm Mask Function

The alarm mask function can mask a specified alarm, hide an alarm notification, and record no alarm history. The mask function can be set for both the alarm notification and alarm record, respectively. This function is only for alarm whose FD is 2, 3, 4 or 5 in the Alarm List, 5.6.2 Errors and Countermeasures. Only this target alarm is described below.
The setting can be configured with the following parameters.

■ Alarm notification mask

If the alarm notification mask function is turned “On”, it disables alarm notification.
Setting example for alarm “Signal overflow”:

To disable the alarm notification, set “Signal overflow” of STB: Alarm Out Mask2 to “On”.
To enable the alarm notification, set “Signal overflow” of STB: Alarm Out Mask2 to “Off”.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm out mask ► (see below)
FOUNDATION Fieldbus	Diagnostic ► STB ► Device Diagnostics ► Diagnostics/Alerts ► Alert ► Alarm Out Mask ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	148	Mask 1-1	Alarm Out Mask1	Specifies the mask function for alarm notification 1-1.
		Mask 1-2		Specifies the mask function for alarm notification 1-2.
STB	149	Mask 2-1	Alarm Out Mask2	Specifies the mask function for alarm notification 2-1.
		Mask 2-2		Specifies the mask function for alarm notification 2-2.
STB	150	Mask 3-1	Alarm Out Mask3	Specifies the mask function for alarm notification 3-1.
		Mask 3-2		Specifies the mask function for alarm notification 3-2.
STB	151	Mask 4-1	Alarm Out Mask4	Specifies the mask function for alarm notification 4-1.

■ Alarm record mask

If the alarm record mask function is turned “On”, it disables the alarm record.
Setting example for alarm “Empty pipe detection”:
To disable the alarm record, set “Empty detect on” of STB: Alarm Record Mask2 to “On”.
To enable the alarm record, set “Empty detect on” of STB: Alarm Record Mask2 to “Off”.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm record mask ► (see below)
FOUNDATION Fieldbus	Device Configuration ► STB ► Device Configuration ► Query Device ► SnsrTB Original Parameters(Part2) ► Page 4 ► Alarm Record Mask ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
STB	152	Mask 1-1	Alarm Record Mask1	Specifies the mask function for alarm record 1-1.
		Mask 1-2		Specifies the mask function for alarm record 1-2.
STB	153	Mask 2-1	Alarm Record Mask2	Specifies the mask function for alarm record 2-1.
		Mask 2-2		Specifies the mask function for alarm record 2-2.
STB	154	Mask 3-1	Alarm Record Mask3	Specifies the mask function for alarm record 3-1.

NOTE

Note that an alarm masked with the alarm notification mask function is not recorded in the alarm record.

The alarm mask function setting is as follows.

Parameter Name	Indicates the name of the mask setting parameter.
Alarm Name	Indicates the alarm name.
Default Value	Indicates the default setting values (at shipment from the manufacturing factory). (✓: Masked, -: Not masked)
Attribute	Indicates whether the mask setting is enabled or disabled. (✓: Setting enabled, -: Setting disabled)

■ Alarm notification mask function

Display		FOUNDATION Fieldbus		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	010:Main CPU FAIL	-	Main board CPU failure	-	-
-	011:Rev calc FAIL	-	Reverse calculation failure	-	-
-	012:Main EEP FAIL	-	Main board EEPROM failure	-	-
Mask 1-1	013:Main EEP dflt	Alarm out mask 1	Main board EEPROM default	-	✓
-	014:Snsr bd FAIL	-	Sensor board failure	-	-
-	015:Snsr comm ERR	-	Sensor communication error	-	-
-	016:AD 1 FAIL[Sig]	-	A/D1 failure[Signal]	-	-
-	017:AD 2 FAIL[Excit]	-	A/D2 failure[Exciter]	-	-

Display		FOUNDATION Fieldbus		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	018:Coil open	-	Coil open	-	-
-	019:Coil short	-	Coil short	-	-
-	020:Exciter FAIL	-	Exciter failure	-	-
-	027:Restore FAIL	-	Parameter restore incomplete	-	-
Mask 1-2	028:Ind bd FAIL	Alarm out mask 1	Indicator board failure	✓	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm out mask 1	Indicator board EEPROM failure	-	✓
Mask 1-2	030:LCD drv FAIL	Alarm out mask 1	LCD driver failure	-	✓
Mask 1-2	031:Ind bd mismatch	Alarm out mask 1	Indicator board mismatch	-	✓
Mask 1-2	032:Ind comm ERR	Alarm out mask 1	Indicator communication error	-	✓
Mask 1-2	033:microSD FAIL	Alarm out mask 1	microSD failure	-	✓
Mask 2-1	050:Signal overflow	Alarm out mask 2	Signal overflow	-	✓
Mask 2-1	051:Empty detect	Alarm out mask 2	Empty pipe detection	-	✓
Mask 2-1	053:Adh over lv 4	Alarm out mask 2	Adhesion over level 4	✓	✓
Mask 2-1	060:Span cfg ERR	Alarm out mask 2	Span configuration error	-	✓
Mask 2-1	066:Density cfg ERR	Alarm out mask 2	Density configuration error	-	✓
Mask 2-2	067:Pls 1 cfg ERR	Alarm out mask 2	Pulse output 1 configuration error	-	✓
Mask 2-2	069:Nomi size cfg	Alarm out mask 2	Nominal size configuration error	-	✓
Mask 2-2	070:Adh cfg ERR	Alarm out mask 2	Adhesion configuration error	-	✓
Mask 2-2	071:FLN cfg ERR	Alarm out mask 2	Flow noise configuration error	-	✓
Mask 2-2	072:Log not start	Alarm out mask 2	Data logging not started	-	✓
Mask 2-2	082:Pls 1 saturate	Alarm out mask 2	Pulse output 1 saturated	✓	✓
Mask 2-2	085:Cable miscon	Alarm out mask 2	Cable misconnect	-	✓
Mask 2-2	086:Coil insulation	Alarm out mask 2	Coil insulation warning	✓	✓
Mask 2-2	131:Trans mismatch	Alarm out mask 2	Transmitter type mismatch	-	✓
Mask 3-1	087:Adhesion lv 3	Alarm out mask 3	Adhesion over level 3	✓	✓
Mask 3-1	088:LC warn	Alarm out mask 3	Low conductivity warning	✓	✓
Mask 3-1	089:Insu detect	Alarm out mask 3	Insulation detection	✓	✓
Mask 3-1	090:FLN over lv 3	Alarm out mask 3	Flow noise over level 3	✓	✓
Mask 3-1	091:FLN over lv 4	Alarm out mask 3	Flow noise over level 4	✓	✓
Mask 3-1	092:AZ warn	Alarm out mask 3	Autozero warning	✓	✓
Mask 3-1	093:Verif warn	Alarm out mask 3	Verification warning	✓	✓
Mask 3-1	094:Fact noise warn	Alarm out mask 3	Factory noise warning	✓	✓
Mask 3-1	095:Simulate active	Alarm out mask 3	Simulation active	-	✓
Mask 3-1	098:Pls 1 fix	Alarm out mask 3	Pulse output 1 fixed	-	✓
Mask 3-2	101:Param restore run	Alarm out mask 3	Parameter restore running	✓	✓
Mask 3-2	102:Disp over	Alarm out mask 3	Display over warning	✓	✓
Mask 3-2	103:SD size warn	Alarm out mask 3	microSD card size warning	✓	✓
Mask 3-2	104:Bkup incmplt	Alarm out mask 3	Parameter backup incomplete	-	✓
Mask 3-2	105:SD mismatch	Alarm out mask 3	microSD card mismatch	✓	✓

Display		FOUNDATION Fieldbus		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
Mask 3-2	106:SD removal ERR	Alarm out mask 3	microSD card removal procedure error	✓	✓
Mask 3-2	120:Watchdog*1	Alarm out mask 3	Watchdog*1	✓	✓
Mask 3-2	121:Power off*1	Alarm out mask 3	Power off*1	✓	✓
Mask 3-2	122:Inst power FAIL*1	Alarm out mask 3	Instant power failure*1	✓	✓
Mask 3-2	123:Param bkup run	Alarm out mask 3	Parameter backup running	✓	✓
Mask 3-2	124:Data log run	Alarm out mask 3	Data logging running	✓	✓
Mask 4-1	133:G/A mismatch	Alarm out mask 4	G/A mismatch error	✓	✓

*1: Recorded in the alarm record regardless of the settings of the alarm notification mask function.

■ Alarm record mask function

Display		FOUNDATION Fieldbus		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	010:Main CPU FAIL	-	Main board CPU failure	-	-
-	011:Rev calc FAIL	-	Reverse calculation failure	-	-
-	012:Main EEP FAIL	-	Main board EEPROM failure	-	-
Mask 1-1	013:Main EEP dflt	Alarm record mask 1	Main board EEPROM default	-	✓
-	014:Snsr bd FAIL	-	Sensor board failure	-	-
-	015:Snsr comm ERR	-	Sensor communication error	-	-
-	016:AD 1 FAIL[Sig]	-	A/D1 failure[Signal]	-	-
-	017:AD 2 FAIL[Excit]	-	A/D2 failure[Exciter]	-	-
-	018:Coil open	-	Coil open	-	-
-	019:Coil short	-	Coil short	-	-
-	020:Exciter FAIL	Alarm record mask 1	Exciter failure	-	-
-	027:Restore FAIL	-	Parameter restore incomplete	-	-
Mask 1-2	028:Ind bd FAIL	Alarm record mask 1	Indicator board failure	-	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm record mask 1	Indicator board EEPROM failure	-	✓
Mask 1-2	030:LCD drv FAIL	Alarm record mask 1	LCD driver failure	-	✓
Mask 1-2	031:Ind bd mismatch	Alarm record mask 1	Indicator board mismatch	-	✓
Mask 1-2	032:Ind comm ERR	Alarm record mask 1	Indicator communication error	-	✓
Mask 1-2	033:microSD FAIL	Alarm record mask 1	microSD failure	-	✓
Mask 2-1	050:Signal overflow	Alarm record mask 2	Signal overflow	-	✓
Mask 2-1	051:Empty detect	Alarm record mask 2	Empty pipe detection	-	✓
Mask 2-1	053:Adh over lv 4	Alarm record mask 2	Adhesion over level 4	-	✓
-	060:Span cfg ERR	-	Span configuration error	✓	-

Display		FOUNDATION Fieldbus		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	066:Density cfg ERR	-	Density configuration error	✓	-
-	067:Pls 1 cfg ERR	-	Pulse output 1 configuration error	✓	-
-	069:Nomi size cfg	-	Nominal size configuration error	✓	-
-	070:Adh cfg ERR	-	Adhesion configuration error	✓	-
-	071:FLN cfg ERR	-	Flow noise configuration error	✓	-
-	072:Log not start	-	Data logging not started	✓	-
-	082:Pls 1 saturate	-	Pulse output 1 saturated	✓	-
Mask 2-2	085:Cable miscon	Alarm record mask 2	Cable misconnect	-	✓
-	086:Coil insulation	-	Coil insulation warning	✓	-
-	131:Trans mismatch	-	Transmitter type mismatch	✓	-
-	087:Adhesion lv 3	-	Adhesion over level 3	✓	-
-	088:LC warn	-	Low conductivity warning	✓	-
-	089:Insu detect	-	Insulation detection	✓	-
-	090:FLN over lv 3	-	Flow noise over level 3	✓	-
-	091:FLN over lv 4	-	Flow noise over level 4	✓	-
-	092:AZ warn	-	Autozero warning	✓	-
-	093:Verif warn	-	Verification warning	✓	-
-	094:Fact noise warn	-	Factory noise warning	✓	-
-	095:Simulate active	-	Simulation active	✓	-
-	098:Pls 1 fix	-	Pulse output 1 fixed	✓	-
-	101:Param restore run	-	Parameter restore running	✓	-
-	102:Disp over	-	Display over warning	✓	-
-	103:SD size warn	-	microSD card size warning	✓	-
-	104:Bkup incmplt	-	Parameter backup incomplete	✓	-
-	105:SD mismatch	-	microSD card mismatch	✓	-
-	106:SD removal ERR	-	microSD card removal procedure error	✓	-
-	120:Watchdog*1	-	Watchdog*1	-	-
-	121:Power off*1	-	Power off*1	-	-
-	122:Inst power FAIL*1	-	Instant power failure*1	-	-
-	123:Param bkup run	-	Parameter backup running	✓	-
-	124:Data log run	-	Data logging running	✓	-
Mask 3-1	133:G/A mismatch	Alarm record mask 3	G/A mismatch error	✓	✓

*1: Recorded in the alarm record regardless of the settings of the alarm notification mask function.

5.7 Display

5.7.1 Language Setting

The language for the display can be selected from nine languages.
Set the desired display language from the languages that are included in the language package specified at the time of ordering.
The setting can be configured with the following parameter.

■ Selecting language

Menu path

Display	Device setup ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	34	Language	Language	Specifies the language to be shown on the display.

From the table below, select the language to be shown on the display.

Selection		Description
Display	FOUNDATION Fieldbus	
English	English	Package 1: Japanese, English, French, German, Italian, Spanish, Portuguese, Russian Package 2: English or Chinese
French	French	
German	German	
Italian	Italian	
Spanish	Spanish	
Portuguese	Portuguese	
Russian	Russian	
Chinese	Chinese	
Japanese	Japanese	

■ Display of language package

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	45	Language package	Language Package	Displays the language package for the display.

5.7.2 Display Item Setting

This product can show up to eight items on the display by scrolling it. Set each display item to the eight display line.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Line select ► (see below)
FOUNDATION Fieldbus	Device Configuration ► LTB ► Device Configuration ► Configuration ► Line Select ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	14	Line 1	Display Line Select 1	Specifies item 1 to be shown on the display.
LTB	15	Line 2	Display Line Select 2	Specifies item 2 to be shown on the display.
LTB	16	Line 3	Display Line Select 3	Specifies item 3 to be shown on the display.
LTB	17	Line 4	Display Line Select 4	Specifies item 4 to be shown on the display.
LTB	18	Line 5	Display Line Select 5	Specifies item 5 to be shown on the display.
LTB	19	Line 6	Display Line Select 6	Specifies item 6 to be shown on the display.
LTB	20	Line 7	Display Line Select 7	Specifies item 7 to be shown on the display.
LTB	21	Line 8	Display Line Select 8	Specifies item 8 to be shown on the display.

From the table below, select the items to be shown on the display.

Selection		Description
Display	FOUNDATION Fieldbus	
None	None	Does not display items (item 1 is not selectable).
Flow rate(%)	Flow rate(%)	Displays the flow rate for the span of the process value PV-mapped in Subsection 5.1.2.
PV	PV	Displays the PV-mapped process value in Subsection 5.1.2.
Velocity	Velocity	Displays the flow velocity.
Volume flow	Volume flow	Displays the volumetric flow rate.
Mass flow	Mass flow	Displays the mass flow rate.
Flow rate(%Bar)	Flow rate(%Bar)	Displays the flow rate for the span of the process value PV-mapped in Subsection 5.1.2 by using a bar graph.
Calorie	Calorie	Displays the calorie (only available for AXG, not for AXW).
Totalizer 1	Totalizer1	Displays the totalized value of totalizer 1.
Totalizer 2	Totalizer2	Displays the totalized value of totalizer 2.
PD tag	PD Tag	Displays PD Tag.
Commun protocol	Commun Protocol	Displays the communication protocol.
Adhesion	Adhesion	Displays the adhesion level of the electrode adhesion detecting function.
Flow noise level	flow noise level	Displays the flow noise level (only available for AXG, not for AXW).
Totalizer 1 count	Totalizer 1 count	Displays the count value of totalizer 1.
Totalizer 2 count	Totalizer 2 count	Displays the count value of totalizer 2.
AI1 Flow rate	AI1 Flow rate	Displays Simulate Value of AI1FB.
AI1 Flow rate(%)	AI1 Flow rate(%)	Displays FIELD_VAL of AI1FB.
AI1 Flow rate(%Bar)	AI1 Flow rate(%Bar)	Displays FIELD_VAL of AI1FB in a bar graph.
AI1.OUT	AI1.OUT	Displays OUT of AI1FB.
AI2.OUT	AI2.OUT	Displays OUT of AI2FB.
AI3.OUT	AI3.OUT	Displays OUT of AI3FB.
AI4.OUT	AI4.OUT	Displays OUT of AI4FB.

Selection		Description
Display	FOUNDATION Fieldbus	
IT1.OUT	IT1.OUT	Displays OUT of IT1FB.
IT2.OUT	IT2.OUT	Displays OUT of IT2FB.
AR.OUT	AR.OUT	Displays OUT of ARFB.

5.7.3 Decimal-Point Position Setting

The number of decimal places can be set to the automatic adjustment or fix mode for the totalized value or process value PV-mapped in Subsection 5.1.2.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Disp format ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Format ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	22	Format PV	Display Format Flow Rate	Specifies the decimal-point position for the process value PV-mapped in Subsection 5.1.2.
LTB	23	Format total 1	Display Format Total 1	Specifies the decimal-point position for the totalized value of totalizer 1.
LTB	24	Format total 2	Display Format Total 2	Specifies the decimal-point position for the totalized value of totalizer 2.

From the table below, select the position of the decimal point.
Process value

Selection		Description
Display	FOUNDATION Fieldbus	
Auto	Auto	Automatically adjusts the number of decimal places.
0 digit	0 digit	Fixes the number of decimal places to “0”.
1 digit	1 digit	Fixes the number of decimal places to “1”.
2 digit	2 digit	Fixes the number of decimal places to “2”.
3 digit	3 digit	Fixes the number of decimal places to “3”.
4 digit	4 digit	Fixes the number of decimal places to “4”.
5 digit	5 digit	Fixes the number of decimal places to “5”.
Auto 2	Auto 2	Automatically adjusts the number of decimal places in conjunction with the span.

Totalized value

Selection		Description
Display	FOUNDATION Fieldbus	
Auto	Auto	Automatically adjusts the number of decimal places.
0 digit	0 digit	Fixes the number of decimal places to “0”.
1 digit	1 digit	Fixes the number of decimal places to “1”.
2 digit	2 digit	Fixes the number of decimal places to “2”.
3 digit	3 digit	Fixes the number of decimal places to “3”.
4 digit	4 digit	Fixes the number of decimal places to “4”.
5 digit	5 digit	Fixes the number of decimal places to “5”.
6 digit	6 digit	Fixes the number of decimal places to “6”.

Selection		Description
Display	FOUNDATION Fieldbus	
7 digit	7 digit	Fixes the number of decimal places to “7”.

5.7.4 Display Line Count and Scroll Settings

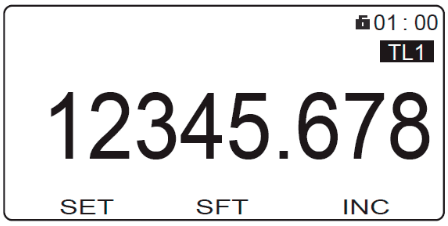
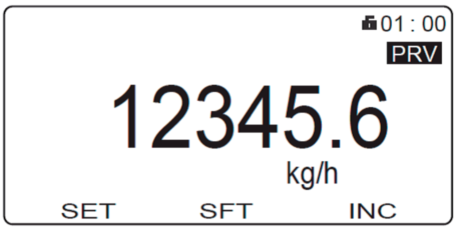
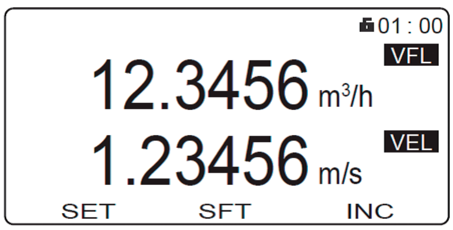
This product can show up to eight items on the display by scrolling, with four lines max. shown at a time. The scroll method can be selected from the automatic display switching or the display switching using the IR switch.
The setting can be configured with the following parameters.

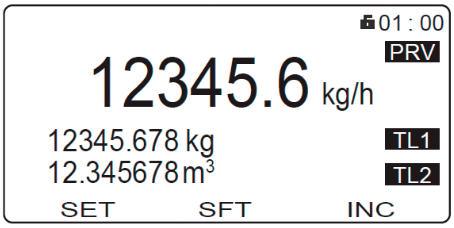
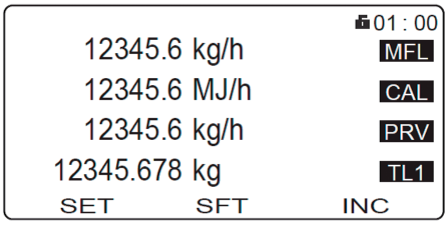
Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)
FOUNDATION Fieldbus	Device Configuration ► LTB ► Device Configuration ► Configuration ► Display Operation Configuration ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	27	Line mode	Display Line	Specifies the number of lines to be shown on the display.*1
LTB	31	Scroll mode	Display Scroll	Specifies the display scroll method.*2

*1: From the table below, select the number of display lines.
The font size is automatically adjusted based on the number of the displayed line.

Selection		Description
Display	FOUNDATION Fieldbus	
1 line(big)	1 Line(Big)	1-line display without unit. The numeric value is displayed in a large font.  F0427.ai
1 line	1 Line	1-line display with unit.  F0428.ai
2 line	2 Line	2-line display with units.  F0429.ai

Selection		Description
Display	FOUNDATION Fieldbus	
3 line	3 Line	3-line display with units.  F0430.ai
4 line	4 Line	4-line display with units.  F0431.ai

*2 Select the scroll method from the table below.

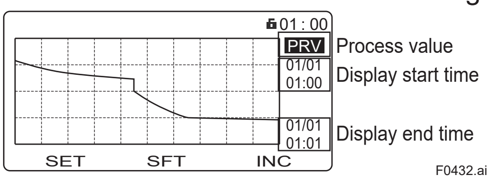
Selection		Description
Display	FOUNDATION Fieldbus	
Off	Off	Does not scroll.
Manual	Manual	Sets to the scroll using the IR switch.
Auto(2 s)	Auto(2 s)	Specifies to the automatic scroll at 2-second intervals.
Auto(4 s)	Auto(4 s)	Specifies to the automatic scroll at 4-second intervals.
Auto(8 s)	Auto(8 s)	Specifies to the automatic scroll at 8-second intervals.

NOTE

The default value of the scroll method (LTB: Display Scroll/Scroll mode) is “Off”.
If the value of the scroll method is set to “Off”, the 5th line and beyond cannot be checked on the display.
To display the 5th line and beyond, set an option other than “Off”.

5.7.5 Trend Graph Setting

The trend graph display function displays the time change of the selected item as a trend graph. Up to four items can be selected for the trend graph. The trend graph is scaled automatically, and the time axis flows from the left to the right.



F0432.ai

(1) Trend graph display setting

The process value and high/low limit that can be shown in the trend graph are as follows:

Process value	Display	Low limit	High limit
Flow rate (%)	FLP	0%	100%
PV	PRV	0	Span value specified in Subsection 5.1.5
Flow velocity	VEL		
Volumetric flow rate	VFL		
Mass flow rate	MFL		
Calorie*	CAL		
Totalizer 1	TL1	Preset value specified in Subsection 5.2.7	Target value of the totalizer specified in Subsection 5.2.3
Totalizer 2	TL2		

*Only available for AXG, not for AXW.

The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	35	Display mode	Display Measure Mode	Specifies the display of a trend graph.

From the table below, select the trend graph display.

Selection		Description
Display	FOUNDATION Fieldbus	
Normal	Normal	Does not display a trend graph (normal display).
Trend	Trend	Displays a trend graph.

(2) Trend graph display item setting

The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Trend select ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Trend Select ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	38	Trend 1	Display Trend Select 1	Specifies item 1 to be shown in a trend graph.
LTB	39	Trend 2	Display Trend Select 2	Specifies item 2 to be shown in a trend graph.
LTB	40	Trend 3	Display Trend Select 3	Specifies item 3 to be shown in a trend graph.
LTB	41	Trend 4	Display Trend Select 4	Specifies item 4 to be shown in a trend graph.

From the table below, select the display item of trend graph.

Selection		Description
Display	FOUNDATION Fieldbus	
None	None	Does not set any items (item 1 is not selectable).
Flow rate(%)	Flow rate(%)	Specifies the flow rate for the span of the process value that is mapped with PV in Subsection 5.1.2.
PV	PV	Specifies the process value PV-mapped in Subsection 5.1.2.
Velocity	Velocity	Sets the display item to the flow velocity.
Volume flow	Volume flow	Specifies the display item to the volumetric flow rate.
Mass flow	Mass flow	Specifies the display item to the mass flow rate.
Calorie	Calorie	Sets the display item to the calorie (only available for AXG, not for AXW).
Totalizer 1	Totalizer1	Specify the totalized value of totalizer 1.
Totalizer 2	Totalizer2	Specify the totalized value of totalizer 2.

(3) Update period setting

The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	28	Period	Display Period	Specifies the trend graph update period on the display.

From the table below, select the trend graph update period.

Selection		Description
Display	FOUNDATION Fieldbus	
0.2 s	0.2 s	Sets the update period to 0.2 sec.
0.4 s	0.4 s	Sets the update period to 0.4 sec.
1.0 s	1.0 s	Sets the update period to 1 sec.
2.0 s	2.0 s	Sets the update period to 2 sec.
4.0 s	4.0 s	Sets the update period to 4 sec.
8.0 s	8.0 s	Sets the update period to 8 sec.

5.7.6 Other Settings

(1) Display contrast (graduations) setting

The contrast of the display can be changed to 11 levels (+5 to -5).
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	26	Contrast	Display Contrast	Specifies the contrast of the display.

+5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5
High ◀──────────▶ Low

NOTE

How the contrast of the display looks changes a little depending on ambient temperature.
Set the contrast of the display by taking into account the ambient temperature of the environment where the display is used.

(2) Display damping time constant setting

This function can specify the damping time constant for the display independently of that specified in Subsection 5.1.6.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	32	Damp	Display Damping	Specifies the damping time constant of the display.

NOTE

The damping time constant of the display is effective only for the display. Refer to Subsection 5.1.6. to specify the damping time constant for the output of the physical quantity.

NOTE

The damping time constant of the display is not applied to the following display item.
AI1 Flow rate, AI1 Flow rate(%), AI1 Flow rate(%Bar), AI1.OUT, AI2.OUT, AI3.OUT, AI4.OUT, IT1.OUT, IT2.OUT, AR.OUT
For details about the display item, refer to Subsection 5.7.2.

(3) Date display format setting

The date display format can be set.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	33	Format date	Display Format Date	Specifies the date display format.

From the table below, set the date display format.

Selection		Description
Display	FOUNDATION Fieldbus	
MM/DD/YYYY	MM/DD/YYYY	Displays the date as "month/day/year".
DD/MM/YYYY	DD/MM/YYYY	Displays the date as "day/month/year".
YYYY/MM/DD	YYYY/MM/DD	Displays the date as "year/month/day".

(4) Display black/white inverse setting

The black/white inverse is available for the display.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	42	Inversion	Display Inversion	Specifies the display black/white inverse mode.

From the table below, select the display black/white inverse mode.

Selection		Description
Display	FOUNDATION Fieldbus	
Normal	Normal	Does not set the display to the black/white inverse mode. Character color: Black, Background color: White
Invert	Invert	Specifies the display to the black/white inverse mode. Character color: White, Background color: Black

(5) Display squawk setting (squawk)

The back light of the display can be blinked (squawked) at 4-second intervals to identify a communicating product if a number of the same instrument is installed.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Diag/Service ▶ Disp indicator ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Indication ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	44	Squawk	Squawk	Specifies the blinking operation of the display.

From the table below, select whether or not to blink the display. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedure of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Off	Off	Does not blink the display.
On	On	Blinks the display (continuously).
Squawk once	Squawk once	Blinks the display (only once).

(6) Low-cut value setting

The low-cut value can be set for the PV value displayed on the display.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Detailed setup ▶ Display set ▶ Optional config ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ LTB ▶ Device Configuration ▶ Configuration ▶ Display Operation Configuration ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
LTB	47	Low cut	Display Low Cut	Specifies the low-cut value to the PV value shown on the display.

NOTE

If the output process value to be output is changed, it is necessary to specify the low-cut value again.

(7) All block target mode

When setting a parameter, it is necessary to set a parameter by setting appropriate MODE_BLK. Target of RB/STB/DTB/LTB/MTB/FB (AIFB,DIFB) to O/S for each parameter. The parameter to simplify it on the display is “All block target mode”. This parameter makes it possible to set RB/STB/DTB/LTB/MTB/FB (AIFB, DIFB) to O/S at a time and to reset them to the original mode. Use this parameter to set a parameter in the following procedures.

1. Set “All block target mode” to O/S.
2. Set the required parameter from the display.
3. Set “All block target mode” to “Restore”.

The default value of “All block target mode” and the value right after “Restore” is “Not execute”.

Menu path (at the following five points on the menu tree of the display)

Display	Device setup ▶ Block mode ▶ (see below)
	Device setup ▶ Diag/Service ▶ (see below)
	Device setup ▶ Easy setup wizard ▶ (see below)
	Device setup ▶ Detailed setup ▶ (see below)
	Device setup ▶ Detailed setup ▶ Fieldbus info ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
-	-	All block target mode	-	Switch the target mode of RB/STB/DTB/LTB/MTB/FB (AIFB,DIFB) at once.

Select from the table below.

Selection		Description
Display	FOUNDATION Fieldbus	
O/S	-	Set the target mode of each block to O/S. If this value is written twice or more before [Restore], O/S mode is stored in the transmitter.
Restore		Restore each block to the target mode before executing this function.
Not Execute		Not execute

5.7.7 microSD Card Setting

If the optional code MC is selected, the backup parameters and logging data can be used by inserting the dedicated microSD card into the display.
For details about backing up parameters and logging data, refer to Section 5.11.

(1) Removing the microSD card

IMPORTANT

If “Unmount” is not executed on the software when removing the microSD card, it may cause data stored on the microSD card to be erased or the device to operate abnormally.

The microSD card can be removed with the following parameter.

Menu path

Display	Device setup ▶ microSD ▶ (see below)

Parameter	Description
Unmount	Specifies the removal of the microSD card.

From the table below, select whether to remove the microSD card.

Selection	Description
Cancel	Cancels the removal of the microSD card.
Execute	Makes it possible to remove the microSD card in safety.

(2) microSD card format

IMPORTANT

If the format function of this product is not used to format the microSD card, it may cause a device operation failure.

Formatting is possible with the following parameter.

Menu path

Display	Device setup ▶ microSD ▶ (see below)

Parameter	Description
Format	Specifies the format of the microSD card.

From the table below, select whether to format the microSD card.

Selection	Description
Cancel	Cancels formatting.
Execute	Executes formatting.

(3) Checking contents of the microSD card

Data on the microSD card can be checked with the following parameter.

Menu path

Display	Device setup ▶ microSD ▶ Contents

(4) Checking the property of the microSD card

The total space, available space and file system of the microSD card can be checked with the following parameter.

● Displaying total space

Menu path

Display	Device setup ▶ microSD ▶ Property ▶ Total space

● Displaying available space

Menu path

Display	Device setup ▶ microSD ▶ Property ▶ Available space

● Displaying file system

Menu path

Display	Device setup ▶ microSD ▶ Property ▶ File system

5.8 Device Information

5.8.1 Order Information

Order information can be specified for this product. If a particular parameter is specified at the time of ordering, this product is shipped with the parameter specified. If a parameter is not specified at the time of ordering, that parameter needs to be set by the customer.
The format of the model and suffix code is as shown below.

Sensor:

AXG□□□ - □□□□□□□□□□□□□□ - □□□□□ / □
(1) (2) (3)

AXW □□□ - □□□□□□□□□□□□□□ - □□□□□ / □
(1) (2) (3)

AXW □□□ G - □□□□□□ - □□□□ - □□□ / □
(1) (2) (3)

AXW □□□ W - □□□□□□ - □□□□ - □□□ / □
(1) (2) (3)

Transmitter:

AXG□A - □□□□□□□□□□□ / □
(1) (2) (3)

AXW □ A - □□□□□□□□□□□ / □
(1) (2) (3)

(1) Model code, (2) Suffix code, (3) Optional code

The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Device Information ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
-	-	PD Tag	-	Displays PD Tag. Max. 32 characters
MTB	50	MS code ► Model code	Basic Model Code	Specifies the model code of the integral flowmeter or remote transmitter.
MTB	51	MS code ► Suffix config 1	Suffix Config 1	Specifies the suffix code of the integral flowmeter or remote transmitter.
MTB	52	MS code ► Suffix config 2	Suffix Config 2	
MTB	53	MS code ► Option 1	Option 1	Specifies the optional code of the integral flowmeter or remote transmitter.
MTB	54	MS code ► Option 2	Option 2	
MTB	55	MS code ► Option 3	Option 3	
MTB	56	MS code ► Option 4	Option 4	
MTB	57	RS MS code ► Model code	Snsr Basic Model Code	Specifies the model code of the remote sensor.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	58	RS MS code ► Suffix config 1	Snsr Suffix Config 1	Specifies the suffix code of the remote sensor.
MTB	59	RS MS code► Suffix config 2	Snsr Suffix Config 2	
MTB	60	RS MS code ► Option 1	Sensor Option 1	Specifies the optional code of the remote sensor.
MTB	61	RS MS code ► Option 2	Sensor Option 2	
MTB	62	RS MS code ► Option 3	Sensor Option 3	
MTB	63	RS MS code ► Option 4	Sensor Option 4	

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Device Information ► Version/ Number Information ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	64	Trans serial No	Trans Serial No	Displays the serial number (device No.) of the transmitter.
MTB	65	Sensor serial No	Sensor Serial No	Displays the serial number (device No.) of the sensor.

NOTE

When any parameter related to the order information about the device is changed, the order information at shipment from the manufacturing factory cannot be referred to.
To store the order information defined at shipment from the manufacturing factory, it is recommended to refer to Section 5.11 to make a backup.

5.8.2 Device Revision

The revision of the software used for this product can be checked.
This information can be checked with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Device Information ► Version/ Number Information ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	47	Transmitter type	Transmitter Type	Displays the type of the transmitter.
MTB	69	Main soft rev	Main Board Rev	Displays the software revision of the main board.
MTB	70	Snsr soft rev	Sensor Board Rev	Displays the software revision of the sensor board.
MTB	71	Ind soft rev	Indicator Board Rev	Displays the software revision of the display board.

5.8.3 Memo Function

Three parameters can be used as a memo function. The memo function can be set to up to 16 characters.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Detailed setup ▶ Device info ▶ Memo ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ MTB ▶ Device Configuration ▶ Device Information ▶ Memo ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	66	Memo 1	Memo 1	Specifies memo 1.
MTB	67	Memo 2	Memo 2	Specifies memo 2.
MTB	68	Memo 3	Memo 3	Specifies memo 3.

5.9 Self-check Function

5.9.1 Types of Diagnosis Functions

This product has the self-check functions to diagnose device failures or process states.
The diagnosis functions of this instrument are as follows:

Diagnosis function	Description
High/low limit alarm notification	Displays an alarm when the specified value is exceeded and outputs it as the status output.
Electrode adhesion detection	Diagnoses an electrode adhesion from the resistance value of the electrode, and displays a warning or alarm if adhesion is detected.
Sensor empty check	Checks whether the sensor is in the empty pipe state, and displays an alarm if the empty pipe state is detected.
Misconnection detection	Checks whether the transmitter signal line and the excitation line are correctly connected, and displays a warning if a misconnection is detected.
Verification (device health diagnosis) function	Diagnoses the health of the product, and displays its result.
Electrode insulation deterioration diagnosis	Diagnose the deterioration of insulation from the resistance value of the electrode, and displays a warning if it is detected. (Only available for AXG, not for AXW).
Flow noise diagnosis	Measures a flow noise detected in the sensor, and displays a warning if the measured value exceeds the specified value. (Only available for AXG, not for AXW).
Diagnosing low conductivity	Obtains the conductivity from the resistance value and size of the electrode, and displays a warning if the conductivity falls below the specified value. (Only available for AXG, not for AXW).
Coil insulation diagnosis	By diagnosing the current value of exciting current, a warning is displayed when the insulation is deteriorated.

5.9.2 Alarm High/Low Limit Function

When the PV-mapped physical quantity of Subsection 5.1.2 exceeds the set value, the alarm can be displayed with the high/low limit function of the alarm. However, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side. This function also can output an alarm occurrence as a status output.
For details about the status output, refer to Section 5.14.
As a value to judge an alarm, the following four values can be set: high limit, high-high limit, low limit, and low-low limit.
The setting can be configured with the following parameters.

Menu path

Display	--
FOUNDATION Fieldbus	Diagnostic ► AI1* ► Device Diagnostics ► Diagnostics/Alerts ► Priority/Limits ► (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	26	-	High High Limit	Specifies the high-high limit to judge an alarm.
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	28	-	High Limit	Specifies the high limit to judge an alarm.
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	30	-	Low Limit	Specifies the low limit to judge an alarm.
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	32	-	Low Low Limit	Specifies the low-low limit to judge an alarm.

When the high and low limit alarms are reset, each has a hysteresis. The hysteresis width should be set with the percentage (%) for the span of the physical quantity PV-mapped in Subsection 5.1.2. The hysteresis in each case can be specified with the following parameter.

Menu path

Display	--
FOUNDATION Fieldbus	Diagnostic ► AI1* ► Device Diagnostics ► Diagnostics/Alerts ► Alert ► Alert Common ► (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	24	-	Alarm Hysteresis	Specifies the hysteresis width for the alarm occurrence and resetting.

(1) Hysteresis value = Span or max. range x Hysteresis width [%]

(2) Value that causes a high or high-high limit alarm to be reset

= Set high limit or high-high limit - Hysteresis value

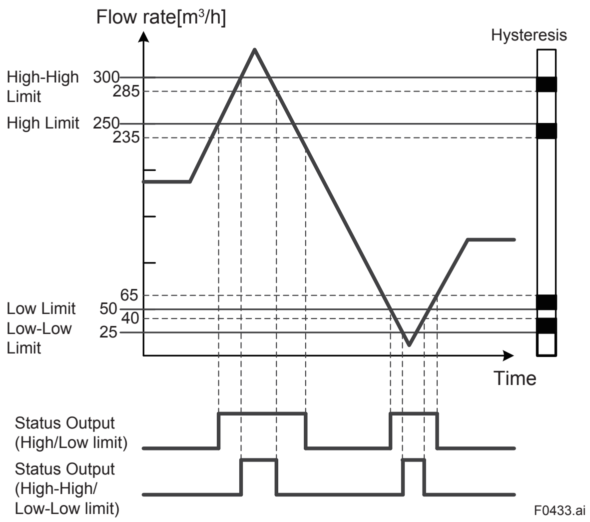
(3) Value that causes a low or low-low limit alarm to be reset

= Specified low limit or low-low limit value + Hysteresis value

Example:
Span of volumetric flow rate = 300 m^3/h,
High limit value = 250 m^3/h, Low limit value = 50 m^3/h,
High-high limit = 300 m^3/h, Low-low limit = 25 m^3/h,
If Hysteresis width is set to 5 %
In this case, each value is obtained as shown below.

(1) Hysteresis value = 300 [m^3/h] x 5 [%] = 15 [m^3/h]

(2-1) Value that causes a high-high limit alarm to be reset
= 300 [m^3/h] – 15 [m^3/h]
= 285 [m^3/h]
(2-2) Value that causes a high limit alarm to be reset
= 250 [m^3/h] – 15 [m^3/h]
= 235 [m^3/h]
(3-1) Value that causes a low limit alarm to be reset
= 50 [m^3/h] + 15 [m^3/h]
= 65 [m^3/h]
(3-2) Value that causes a low-low limit alarm to be reset
= 25 [m^3/h] + 15 [m^3/h]
= 40 [m^3/h]



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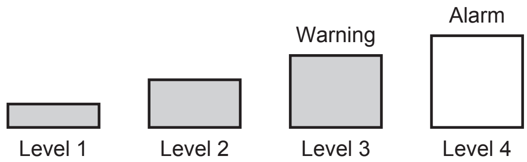
NOTE

When the physical quantity to be output is changed, set the high/low limits to judge an alarm again.

5.9.3 Electrode Adhesion Detection

The electrode adhesion detecting function diagnoses an electrode adhesion with the resistance value of the electrode, and displays a warning or alarm if an adhesion is detected.
The electrode adhesion detection is displayed on the display in four levels: level 1 to level 4.
A value to judge each level can be specified individually. Display a warning when adhesion exceeds level 3, and an alarm when adhesion exceeds level 4.
For details about the alarm and warning, refer to Subsection 5.6.1. Also, for the resistance value of the electrode, refer to Subsection 5.1.3.



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The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Adhesion ► (see below)
FOUNDATION Fieldbus	Diagnostic ► DTB ► Device Diagnostics ► Diagnostics/Alerts ► Diagnostics ► Adhesion ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	24	Function	Adhesion Check	Specifies the use of the electrode adhesion detecting function.*1
DTB	25	Threshold level 1	Adhesion Level1	Specifies the value to judge level 1.
DTB	26	Threshold level 2	Adhesion Level2	Specifies the value to judge level 2.
DTB	27	Threshold level 3	Adhesion Level3	Specifies the value to judge level 3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	28	Threshold level 4	Adhesion Level4	Specifies the value to judge level 4.
DTB	29	Result ▶ Status	Adhesion Status	Displays the electrode adhesion detection level.
DTB	30	Check cycle	Adhesion Check Cycle	Specifies the data update cycle for electrode adhesion detection.

*1: From the table below, select the use of the electrode adhesion detection function.

Selection		Description
Display	FOUNDATION Fieldbus	
Disable	Disable	Does not use the electrode adhesion detecting function.
Enable	Enable	Uses the electrode adhesion detecting function.

NOTE

If the electrode adhesion detecting function is not used, the electrode resistance value and level are cleared.

NOTE

Before using the electrode adhesion detecting function, be sure to make sure that the sensor is in the full pipe state. If the sensor is in the empty pipe state, the function to detect adhesion may not run normally.

NOTE

The electrode adhesion detecting function is restricted by the conductivity of fluid. The recommended conductivities are as follows.

Meter size	Conductivity
2.5 to 10 mm	30 µS/cm or larger
15 to 400 mm (0.5 to 16 in.)	10 µS/cm or larger
500 mm	20 µS/cm or larger

NOTE

If the data update cycle for the adhesion detection is shortened, the error of the electrode resistance value increases. Do not change the default value unless especially specified.

5.9.4 Sensor Empty Check

The sensor empty check function checks whether the sensor is in the empty pipe state, and displays an alarm if the empty pipe state is detected.
For details about the alarm and warning, refer to Subsection 5.6.1.
This information can be checked with the following parameter.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Empty check ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	45	Empty status	Empty Status	Displays the result of the sensor empty check function.

From the table below, check the result of the sensor empty check function.

Selection		Description
Display	FOUNDATION Fieldbus	
Full	Full	Indicates that the sensor is in the full pipe state.
Empty	Empty	Indicates that the sensor is in the empty pipe state.

IMPORTANT

- If the sensor is in the empty pipe state, output fluctuation or empty check alarm may occur. Be sure to use the magnetic flowmeter being filled with liquid fully.
- The empty check is determined by measuring the resistance between the electrode and the ground.For that reason, the empty pipe state may not be detected due to the piping condition, electrode condition, and environmental noise. In particular, note that the empty check function may not operate properly for high-viscosity fluids and adhesive fluids.
- It takes 10 to 15 minutes to diagnose the empty pipe state.Other process alarms may occur before the empty check alarm occurs after the pipe is in the empty pipe state.

5.9.5 Wiring Connection Diagnosis

The wiring connection diagnostic function diagnoses whether the signal line and the excitation line between the remote type sensor and transmitter are correctly connected, and displays a warning if a misconnection is detected.
For example, if there are two sets (A and B) of remote type sensors and transmitters, this function checks whether the signal line of transmitter A is misconnected to the signal terminal of sensor B, or the excitation line of transmitter A is misconnected to the excitation terminal of sensor B.
It takes approximately 10 seconds to diagnose the wiring connection.
For details about the alarm and warning, refer to Subsection 5.6.1.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	40	Diagnostic execute	Diagnostic Exe	Specifies the use of the wiring connection diagnostic function.*1
DTB	46	Diagnostic output	Diagnostic Output	Specifies the output to use the wiring connection diagnostic function.*2

*1: From the table below, select the use of the wiring connection diagnostic function. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Connect check exe	Conn Chk exe	Starts the wiring connection diagnostic function.

*2: From the table below, select the output while executing wiring connection diagnostic function.

Selection		Process value	Totalizer	Pulse output	Frequency output
Display	FOUNDATION Fieldbus				
Zero	Zero	0% output	Input 0 (Output fixed)	0 pps	0% output
Measured value	Measured value	Output of calculated value (Undefined)	Totalization of calculated value (Undefined)	Output of calculated value (Undefined)	Output of calculated value (Undefined)
Hold	Hold	Fixes the last valid value before the diagnosis starts.	Totalizes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.

IMPORTANT

- Before using the wiring connection diagnostic function, be sure to disconnect this product from the control loop.
- While the wiring connection diagnostic function is used, the pulse output is not output correctly.

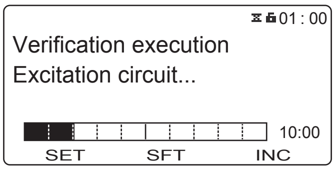
NOTE

When using the wiring connection diagnostic function, the following conditions must be satisfied. If the conditions are not satisfied, the magnetic flowmeter may not correctly diagnose the wiring connection state.

- The sensor is in the full pipe state.
- No influence of noise.
- The magnetic flowmeter transmitter and AM012 (calibrator) are not connected.

5.9.6 Verification (Device Health Diagnosis) Function

The verification function diagnoses the health of the product and displays the diagnosis result. It takes about 15 minutes to complete the verification function, and the progress of the verification function can be checked via the bar graph and the remaining time shown on the display.



This function can inspect each condition of the magnetic circuit, excitation circuit, and calculation circuit, and executes the device health diagnosis of the product based on their internal alarm record along with their wiring misconnection. This function evaluates the diagnosis result based on the conditions of the product and shows “Passed” if no problem is found or “Failed” if a problem is found on the display.
The following execution results are shown on the display.

- **Examples of “Passed” results**

VF check results	Passed
VF Operation time	00001D 10:01
Magnetic circuit result	Passed
Exciting circuit result	Passed
Calculation circuit result	Passed
Device status result	Passed
Connection status result	Passed

- **Examples of “Failed” results**

VF check results	Failed
VF Operation time	00001D 10:01
Magnetic circuit result	Passed
Exciting circuit result	Passed
Calculation circuit result	Failed
Device status result	Passed
Connection status result	Passed

Contact Yokogawa service center if the “Failed” message is displayed for items from “Magnetic circuit result” to “Device status result”.
If “Failed” is displayed for “Connection status result”, check for wiring misconnection between the sensor and transmitter (refer to Subsection 5.9.5 for detail) and damage on the cables.

The verification function can be used in two ways depending on the state of the fluid; one state where a fluid is flowing and another state where no fluid is flowing.
The two diagnosis results (current and previous) are stored in the device memory, and they can be checked later.
If the verification function is used, the following results can be displayed.

Total judgment result	Calculation circuit diagnosis result
Operation time of verification function	Device alarm diagnosis result
Magnetic circuit diagnosis result	Wiring connection diagnosis result
Excitation circuit diagnosis result	

The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
FOUNDATION Fieldbus	Diagnostic ► DTB ► Device Diagnostics ► Diagnostics/Alerts ► Diagnostics ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	46	Diagnostic output	Diagnostic Output	Specifies the output to execute the verification function.*1

Menu path

Display	Device setup ▶ Diag/Service ▶ Verification ▶(see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Maintenance ▶ Verification ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	48	Mode	Verification Mode	Specifies the fluid status to execute the verification function.*2
DTB	49	Execute	Verification Exe	Specifies the execution of the verification function.*3
DTB	50	VF No	Verification No	Specifies the diagnosis result display time.*4
DTB	47	VF target select	Verification Target	Specifies the target for diagnosis.*5

*1: From the table below, select the output to execute the verification function.

Selection		Process value	Totalizer	Pulse output	Frequency output
Display	FOUNDATION Fieldbus				
Zero	Zero	0% output	Input 0 (Output fixed)	0 pps	0% output
Measured value	Measured value	Output of calculated value (Undefined)	Totalization of calculated value (Undefined)	Output of calculated value (Undefined)	Output of calculated value (Undefined)
Hold	Hold	Fixes the last valid value before the diagnosis starts.	Totalizes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.

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

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

*3: From the table below, select whether or not to execute the verification function. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.

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

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

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

*5: Select the target for diagnosis from the table below (All of them are set to diagnosis target at the time of shipment).

Selection		Description
Display	FOUNDATION Fieldbus	
Magnetic circuit	Magnetic	Magnetic circuit diagnosis
Excitation circuit	Excitation	Excitation circuit diagnosis
Calculation circuit	Calculation	Calculation circuit diagnosis
Device status	Device status	Device alarm diagnosis
Connection status	Conn status	Wiring misconnection check

In the default state, all of the diagnosis results are reflected in the final results of the verification. Even if set with "VF target select" so as not to reflect the diagnosis results to the final results of the verification, execution time for the verification does not change because the diagnosis itself is executed. In addition, the diagnosis results selected to "0" with Verification Target are displayed as "Skip".
Note that verification itself cannot be executed if all diagnoses are unchecked in the check box of Verification Target (0x0000).
The diagnosis result is displayed as shown below.

Display	Device setup ► Diag/Service ► Verification ► Result ► (see below)
FOUNDATION Fieldbus	Diagnostic ► DTB ► Device Diagnostics ► Diagnostics/Alerts ► Maintenance ► Verification ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	51	Failed/Passed	VF Check Results	Execution result
DTB	52	VF operate time	VF Operation Time	Operation time of verification when started
DTB	53	Magnetic circuit	Magnetic Circuit Res	Magnetic circuit diagnosis result
DTB	54	Excite circuit	Exciting Circuit Res	Excitation circuit diagnosis result
DTB	55	Calc circuit	Calc Circuit Res	Calculation circuit diagnosis result
DTB	56	Device status	Device Status Res	Device alarm diagnosis result
DTB	57	Connect status	Connection Status Res	Wiring connection diagnosis result

The diagnosis result is judged as shown below.

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

IMPORTANT

- Before using the verification function, be sure to disconnect this product from the control loop.
- While the verification function is used, the pulse output is not output correctly.
- Note that parameters cannot be changed while the verification function is executed.

NOTE

- Be sure to use the verification function when the sensor is in the full pipe state. If the sensor is in the empty pipe state, the function to detect adhesion may not run normally.
- When using the verification function, correctly specify the fluid status with the parameter.
- If there is a problem with the result of the verification function, refer to the Maintenance Manual.

5.9.7 Electrode Insulation Deterioration Diagnosis (only available for AXG, not for AXW)

The electrode insulation deterioration diagnosis function diagnoses the deterioration of insulation with the resistance value of the electrode and displays a warning if the deterioration of insulation is detected. It takes approximately 5 minutes to complete this diagnosis.
For details about the alarm and warning, refer to Subsection 5.6.1.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	40	Diagnostic execute	Diagnostic Exe	Specifies the execution of the electrode insulation deterioration diagnostic function.*1
DTB	46	Diagnostic output	Diagnostic Output	Specifies the output to execute the electrode insulation deterioration diagnostic function.*2

*1: The electrode insulation deterioration diagnosis can be configured with the following parameters. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedure of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Electrode insul exe	Elec Ins exe	Starts the electrode insulation deterioration diagnosis function (only available for AXG, not for AXW).

*2: From the table below, select the output required to execute the diagnosis function.

Selection		Process value	Totalizer	Pulse output	Frequency output
Display	FOUNDATION Fieldbus				
Zero	Zero	0% output	Input 0 (Output fixed)	0 pps	0% output
Measured value	Measured value	Output of calculated value (Undefined)	Totalization of calculated value (Undefined)	Output of calculated value (Undefined)	Output of calculated value (Undefined)
Hold	Hold	Fixes the last valid value before the diagnosis starts.	Totalizes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.	Fixes the last valid value before the diagnosis starts.

IMPORTANT

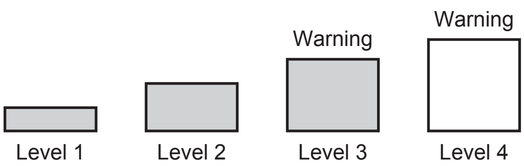
- Before using the electrode insulation deterioration diagnosis function, be sure to disconnect this product from the control loop.
- While the electrode insulation deterioration diagnosis function is used, the pulse output is not output correctly.

NOTE

Before using the electrode insulation deterioration diagnosis function, always make sure that the sensor is in the full pipe state. If the sensor is in the empty pipe state, the function to detect adhesion may not run normally.

5.9.8 Diagnosing Flow Noise (only available for AXG, not for AXW)

The flow noise diagnostic function measures a generated flow noise with the sensor, and displays a warning if the flow noise exceeds the specified value.
The flow noise diagnosis is shown on the display in four levels: level 1 to level 4. A value to judge each level can be specified individually. If an output exceeds the level 3 or level 4 value, a warning message is displayed.
For details about the alarm and warning, refer to Subsection 5.6.1. Also, for the flow noise value, refer to Subsection 5.1.3.
For details about the flow noise span and damping time constant, refer to Subsections 5.1.5 and 5.1.6.



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The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Flow noise ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ Flow Noise ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	31	Function	Flow Noise Check	Specifies the use of the flow noise diagnosis function.*1
DTB	32	Threshold level 1	Flow Noise Level1	Specifies the value to judge level 1.
DTB	33	Threshold level 2	Flow Noise Level2	Specifies the value to judge level 2.
DTB	34	Threshold level 3	Flow Noise Level3	Specifies the value to judge level 3.
DTB	35	Threshold level 4	Flow Noise Level4	Specifies the value to judge level 4.
DTB	36	Result ▶ Status	Flow Noise Status	Displays the flow noise level.

*1: From the table below, select the use of the flow noise function.

Selection		Description
Display	FOUNDATION Fieldbus	
Disable	Disable	Does not use the flow noise diagnosis function.
Enable	Enable	Uses the flow noise diagnosis function.

NOTE

If the flow noise diagnosis function is set to "Disable", the flow noise value and level are cleared.

5.9.9 Diagnosing Low Conductivity (only available for AXG, not for AXW)

The low conductivity diagnosis function calculates conductivity from the resistance value and size of the electrode and displays a warning if the conductivity falls below the specified value.
For details about the alarm and warning, refer to Subsection 5.6.1. Also, for the conductivity value, refer to Subsection 5.1.3.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Conductivity ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ Conductivity ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	38	Function	Low Conduct Check	Specifies the use of the low conductivity diagnosis function.*1
DTB	39	Low limit	Conductivity Limit	Specifies the value used to judge the low conductivity.

Menu path

Display	Device setup ▶ Detailed setup ▶ Device info ▶ Order info ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ MTB ▶ Device Configuration ▶ Device Information ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	48	Electrode size	Electrode Size	Displays the electrode size.

*1: From the table below, select the use of the low conductivity diagnosis function.

Selection		Description
Display	FOUNDATION Fieldbus	
Disable	Disable	Does not use the low conductivity diagnosis function.
Enable	Enable	Uses the low conductivity diagnosis function.

NOTE

The electrode size is specified at shipment from the manufacturing factory.
When any parameter related to the order information about the device is changed, the order information at shipment from the manufacturing factory cannot be referred to.
To store the order information defined at shipment from the manufacturing factory, it is recommended to refer to Section 5.11 to make a backup.

NOTE

Before using the low conductivity diagnosis function, always make sure that the sensor is in the full pipe state. If the sensor is in the empty pipe state or the transmitter is connected with AM012 (calibrator), the function to diagnose low conductivity may not run normally.

NOTE

If this function is set to “Disable”, the low conductivity value is cleared.

5.9.10 Coil Insulation Diagnosis

Coil insulation diagnosis is the function to display a warning when the insulation is deteriorated by diagnosing a current value of the exciting current. For details about the alarm and warning, refer to Subsection 5.6.1.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	42	IEX compare	IEX Compare	Displays the current value of Exciting current to judge coil insulation.
DTB	41	Coil insul threshold	Coil Insulation Th	Specifies the value to judge coil insulation.

5.9.11 Other Setting

In addition, the maximum voltage values of the flow rate signal and coil resistance value are displayed as diagnostic information.
This information can be checked with the following parameters.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ (see below)
FOUNDATION Fieldbus	Diagnostic ▶ DTB ▶ Device Diagnostics ▶ Diagnostics/Alerts ▶ Diagnostics ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DTB	42	V peak hold	Peak Hold Value	Displays the maximum voltage value of the flow rate signal (only available for AXG, not for AXW).
DTB	43	IEX resistance	Iex Coil Resistance	Displays the coil resistance value.

5.10 Test Mode

5.10.1 Test Mode Setting

If the test mode is executed, the flow velocity or the value to be output from a connection terminal can be arbitrarily set, and a response from the device can be tested.
A warning is displayed to indicate that the test mode is in use while this test mode is used.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ▶ Diag/Service ▶ Test ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ MTB ▶ Device Configuration ▶ Query Device ▶ MaintTB Original Parameters(Part2) ▶ Page 4 ▶ Test ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	96	Test mode	Test Mode	Selects the test item.

From the table below, select the test terminal and process value.

Display:

Selection		Description
Display	FOUNDATION Fieldbus	
Off	Off	Turns off the test mode
Velocity test	Velocity	Starts testing the flow velocity.
PO1 test	Pulse	Starts testing pulse output or frequency output 1 of the I/O2 terminal.
SO1 test	Status	Starts testing status output 1 of the I/O2 terminal.

If the flow velocity is set as a test value, the volumetric flow rate and calorie can be obtained from the test value.

NOTE

Set the output function of the pulse/status terminal (I/O2) in Subsection 5.14.1. If the set output function is different from the output function to perform testing, the test mode cannot be used.
For example, if the I/O2 terminal is set as the frequency output, and the test output function is set to the status output, the test cannot be started.

5.10.2 Test Value Setting

It is necessary to set a test value for the terminal output value (pulse/status) and the process value.
The setting can be configured with the following parameters.
However, the unit of the process value to test is the unit specified in Subsection 5.1.4. If the unit is changed, the process value is also changed in conjunction with the changed unit.

Menu path

Display	Device setup ▶ Diag/Service ▶ Test ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ MTB ▶ Device Configuration ▶ Query Device ▶ MaintTB Original Parameters(Part2) ▶ Page 4 ▶ Test ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	97	Velocity	Velocity Test Value	Sets the display item to the flow velocity.
MTB	98	PO1	P1 Test Value	Specifies the frequency of pulse output or frequency output 1 for the I/O2 terminal.
MTB	99	SO1	SO1 Test Value	Specifies the status of status output 1 for the I/O2 terminal.

5.10.3 Test 2 Mode

Test 2 Mode is the function to perform a test to the process value, analog output, totalized value and pulse at once.
The test value can be set in the range between -10.0% and 110.0%.
Input test values (%) are tested with a scale value in response to the span of each process value.

Menu path

Display	Device setup ▶ Diag/Service ▶ Test ▶ (see below)
FOUNDATION Fieldbus	Device Configuration ▶ MTB ▶ Device Configuration ▶ Query Device ▶ MaintTB Original Parameters(Part2) ▶ Page 4 ▶ Test ▶ (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	100	Test 2 mode	Test 2 Mode	Setting Test 2 mode
MTB	101	Test 2 value	Test 2 Output Value	Setting Test 2 mode value

From the table below, select the setting for Test 2 mode.

Selection	
Display	FOUNDATION Fieldbus
Normal	Normal
Test	Test

5.10.4 Test Mode Auto Reset

If the specified time lapses with no parameters changed while the test mode is enabled, the test mode is reset automatically. When any test mode parameter is changed, the test mode reset time is extended.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Diag/Service ► Test ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Query Device ► MaintTB Original Parameters(Part2) ► Page 4 ► Test

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	95	Release time	Test Auto Release Time	Specifies the time to automatically reset the test mode.

From the table below, select the test mode auto reset time.

Selection		Description
Display	FOUNDATION Fieldbus	
10 min	10min	Sets the reset time to 10 min.
30 min	30min	Sets the reset time to 30 min.
1 h	1h	Sets the reset time to 1 hour.
3 h	3h	Sets the reset time to 3 hours.
12 h	12h	Sets the reset time to 12 hours.

5.11 Event Management Function

5.11.1 Storing Parameter (Backup)

The backup function can store parameter settings in the display's built-in memory (display board) or microSD card (with the optional code MC selected). If the backup data is restored, the parameter settings can be duplicated to another product. The display's built-in memory can store data for three backups and the microSD card can store as much data as the capacity allows.
There are three backup methods available: Backup from the main board of this product to the memory on the display board, backup from the main board of the product to the microSD card, and backup from the memory on the display board to the microSD card. The file name, backup name, and date can be specified using the backup function.
The data backed up to the microSD card is stored in the "YOKOGAWA" folder as a ".PAR" file.

The setting can be configured with the following parameters.
For details about the backup parameters, refer to Subsection 5.11.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Parameter Backup/Restore ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	72	F backup name	Factory Backup Name	Displays the backup name defined at shipment from the manufacturing factory.
MTB	73	F backup date	Factory Backup Date	Displays the backup date at shipment from the manufacturing factory.
MTB	74	SD backup name	SD Backup Name	Specifies the name of the file to be backed up to the microSD card.
MTB	75	Backup name 1	Backup Name 1	Specifies backup name 1. Up to 16 characters
MTB	76	Backup date 1	Backup Date 1	Specifies date 1.
MTB	77	Backup name 2	Backup Name 2	Specifies backup name 2. Up to 16 characters
MTB	78	Backup date 2	Backup Date 2	Specifies date 2.
MTB	79	Backup name 3	Backup Name 3	Specifies backup name 3. Up to 16 characters
MTB	80	Backup date 3	Backup Date 3	Specifies date 3.
MTB	81	Backup execute	Backup Execute	Specifies the execution of the backup function.*1
MTB	82	Backup result	Backup Result	Displays the result of the backup function.*2

*1: From the table below, select the execution of the backup function. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Not execute	Not Execute	Does not back up data.
Store main to 1	Store Main to 1	Backs up parameter settings from the main board to memory 1 in the display's built-in memory.
Store main to 2	Store Main to 2	Backs up parameter settings from the main board to memory 2 in the display's built-in memory.
Store main to 3	Store Main to 3	Backs up parameter settings from the main board to memory 3 in the display's built-in memory.
Store main to SD	Store Main to SD	Backs up parameter settings from the main board to the microSD card.
Store EEP1 to SD	Store EEP1 to SD	Backs up parameter settings from memory 1 in the display's built-in memory to the microSD card.
Store EEP2 to SD	Store EEP2 to SD	Backs up parameter settings from memory 2 in the display's built-in memory to the microSD card.
Store EEP3 to SD	Store EEP3 to SD	Backs up parameter settings from memory 3 in the display's built-in memory to the microSD card.

*2: The result of the backup function is displayed as shown below.

Selection		Description
Display	FOUNDATION Fieldbus	
Unexecuted	Unexecuted	Backup not executed.
Success	Success	Backup successful.
Failure	Failure	Backup failed.
Running	Running	Parameter backup running.

The table below shows alarms whose parameters can be backed up when an alarm occurs.

✓: Executable when an alarm occurs.
-: Not executable when an alarm occurs.

Alarm name		Backup
Display	FOUNDATION Fieldbus	
010:Main CPU FAIL	10:Main board CPU failure	-
011:Rev calc FAIL	11:Reverse calculation failure	-
012:Main EEP FAIL	12:Main board EEPROM failure	-
013:Main EEP dflt	13:Main board EEPROM default	-
014:Snsr bd FAIL	14:Sensor board failure	✓
015:Snsr comm ERR	15:Sensor communication error	✓
016:AD 1 FAIL[Sig]	16:A/D1 failure[Signal]	✓
017:AD 2 FAIL[Excit]	17:A/D2 failure[Exciter]	✓
018:Coil open	18:Coil open	✓
019:Coil short	19:Coil short	✓
020:Exciter FAIL	20:Exciter failure	✓
027:Restore FAIL	27:Parameter restore incomplete	✓
028:Ind bd FAIL	28:Indicator board failure	-
029:Ind bd EEP FAIL	29:Indicator board EEP failure	-
030:LCD drv FAIL	30:LCD driver failure	-
031:Ind bd mismatch	31:Indicator board mismatch	-
032:Ind comm ERR	32:Indicator communication error	-
033:microSD FAIL	33:microSD failure	-
050:Signal overflow	50:Signal overflow	✓
051:Empty detect	51:Empty pipe detection	✓
053:Adh over lv 4	53:Adhension over level 4	✓
060:Span cfg ERR	60:Span configuration error	-
066:Density cfg ERR	66:Density configuration error	-
067:Pls 1 cfg ERR	67:Pulse output 1 cfg error	-
069:Nomi size cfg	69:Nominal size cfg error	-
070:Adh cfg ERR	70:Adhesion configuration error	-
071:FLN cfg ERR	71:Flow noise cfg error	-
072:Log not start	72:Data logging not started	-
082:Pls 1 saturate	82:Pulse output 1 saturated	✓
085:Cable miscon	85:Cable misconnect	✓
086:Coil insulation	86:Coil insulation warning	✓
087:Adhesion lv 3	87:Adhesion over level 3	✓
088:LC warn	88:Low conductivity Warning	✓
089:Insu detect	89:Insulation detection	✓
090:FLN over lv 3	90:Flow noise over level 3	✓
091:FLN over lv 4	91:Flow noise over level 4	✓
092:AZ warn	92:Autozero warning	✓
093:Verif warn	93:Verification warning	✓
094:Fact noise warn	94:Factory noise warning	✓
095:Simulate active	95:Simulation active	✓
098:Pls 1 fix	98:Pulse output 1 fixed	✓
101:Param restore run	101:Parameter restore running	-
102:Disp over	102:Display over warning	-
103:SD size warn	103:microSD card size warning	-
104:Bkup incmplt	104:Parameter backup incomplete	✓
105:SD mismatch	105:microSD card mismatch	-
106:SD removal ERR	106:microSD card removal error	-
120:Watchdog	120:Watchdog	✓
121:Power off	121:Power off	✓
122:Inst power FAIL	122:Instant power failure	✓
123:Param bkup run	123:Parameter backup running	-

Alarm name		Backup
Display	FOUNDATION Fieldbus	
124:Data log run	124:Data logging running	✓
131:Trans mismatch	131:Transmitter type mismatch	-
133:G/A mismatch	133:G/A mismatch error	-
225:Lnk.O16/32 N/O	225:Link Obj. 16/32 Not Open	✓
226:Lnk.O15/31 N/O	226:Link Obj. 15/31 Not Open	✓
227:Lnk.O14/30 N/O	227:Link Obj. 14/30 Not Open	✓
228:Lnk.O13/29/45 N/O	228:Link Obj. 13/29/45 Not Open	✓
229:Lnk.O12/28/44 N/O	229:Link Obj. 12/28/44 Not Open	✓
230:Lnk.O11/27/43 N/O	230:Link Obj. 11/27/43 Not Open	✓
231:Lnk.O10/26/42 N/O	231:Link Obj. 10/26/42 Not Open	✓
232:Lnk.O9/25/41 N/O	232:Link Obj. 9/25/41 Not Open	✓
233:Lnk.O8/24/40 N/O	233:Link Obj. 8/24/40 Not Open	✓
234:Lnk.O7/23/39 N/O	234:Link Obj. 7/23/39 Not Open	✓
235:Lnk.O6/22/38 N/O	235:Link Obj. 6/22/38 Not Open	✓
236:Lnk.O5/21/37 N/O	236:Link Obj. 5/21/37 Not Open	✓
237:Lnk.O4/20/36 N/O	237:Link Obj. 4/20/36 Not Open	✓
238:Lnk.O3/19/35 N/O	238:Link Obj. 3/19/35 Not Open	✓
239:Lnk.O2/18/34 N/O	239:Link Obj. 2/18/34 Not Open	✓
240:Lnk.O1/17/33 N/O	240:Link Obj. 1/17/33 Not Open	✓
244:Amp EEP FAIL	244:Amp EEPROM Failure	✓
246:Simulate SW OFF	246:Simulation Switch OFF	✓
247:RB O/S Mode	247:RB in O/S mode	✓
248:Simulate SW ON	248:Simulation Switch ON	✓
249:SoftDL Incmplt	249:SoftDL Incomplete	✓
250:SoftDL FAIL	250:SoftDL Failure	✓
251:Abnml Boot PRS	251:Abnormal Boot Process	✓
252:HWrite Lock SW ON	252:Hard Write Lock SW ON	✓
253:Write Locked	253:Write Locked	✓
254:HWrite Lock SW OFF	254:Hard Write Lock SW OFF	✓
255:Write Unlocked	255:Write Unlocked	✓
300:AI1 O/S Mode	300:AI1 in O/S Mode	✓
301:AI1 Man Mode	301:AI1 in Man Mode	✓
302:AI1 Not Schedule	302:AI1 Not Scheduled	✓
303:AI1 Simulate Act	303:AI1 Simulation Active	✓
304:AI2 O/S Mode	304:AI2 in O/S Mode	✓
305:AI2 Man Mode	305:AI2 in Man Mode	✓
306:AI2 Not Schedule	306:AI2 Not Scheduled	✓
307:AI2 Simulate Act	307:AI2 Simulation Active	✓
308:AI3 O/S Mode	308:AI3 in O/S Mode	✓
309:AI3 Man Mode	309:AI3 in Man Mode	✓
310:AI3 Not Schedule	310:AI3 Not Scheduled	✓
311:AI3 Simulate Act	311:AI3 Simulation Active	✓
312:AI4 O/S Mode	312:AI4 in O/S Mode	✓
313:AI4 Man Mode	313:AI4 in Man Mode	✓
314:AI4 Not Schedule	314:AI4 Not Scheduled	✓
315:AI4 Simulate Act	315:AI4 Simulation Active	✓
328:PID O/S Mode	328:PID in O/S Mode	✓
329:PID Man Mode	329:PID in Man Mode	✓
330:PID Not Schedule	330:PID Not Scheduled	✓
331:PID Bypass Mode	331:PID in Bypass Mode	✓
332:IT1 O/S mode	332:IT1 in O/S mode	✓
333:IT1 Man mode	333:IT1 in Man mode	✓
334:IT1 Not Schedule	334:IT2 Not Scheduled	✓

Alarm name		Backup
Display	FOUNDATION Fieldbus	
335:IT1 ttl bkup ERR	335:IT1 Total Backup Err	✓
336:IT2 O/S Mode	336:IT2 in O/S mode	✓
337:IT2 Man Mode	337:IT2 in Man mode	✓
338:IT2 Not Schedule	338:IT2 Not Scheduled	✓
339:IT2 ttl bkup ERR	339:IT2 Total Backup Err	✓
340:DI1 O/S Mode	340:DI1 in O/S mode	✓
341:DI1 Man Mode	341:DI1 in Man mode	✓
342:DI1 Not Schedule	342:DI1 Not Scheduled	✓
343:DI1 Simulate Act	343:DI1 Simulation Active	✓
344:DI2 O/S Mode	344:DI2 in O/S mode	✓
345:DI2 Man Mode	345:DI2 in Man mode	✓
346:DI2 Not Schedule	346:DI2 Not Scheduled	✓
347:DI2 Simulate Act	347:DI2 Simulation Active	✓
348:DI3 O/S Mode	348:DI2 in O/S mode	✓
349:DI3 Man Mode	349:DI2 in Man mode	✓
350:DI3 Not Schedule	350:DI2 Not Scheduled	✓
351:DI3 Simulate Act	351:DI2 Simulation Active	✓
352:AR O/S Mode	352:AR in O/S Mode	✓
353:AR Man Mode	353:AR in Man Mode	✓
354:AR Not Scheduled	354:AR Not Scheduled	✓
356:MAO O/S Mode	356:MAO in O/S Mode	✓
357:MAO Not Schedule	357:MAO Not Scheduled	✓
359:No FB Scheduled	359:No FB Scheduled	✓
360:SnsrTB O/S Mode	360:SensorTB in O/S mode	✓
361:DiagTB O/S Mode	361:DiagnosticTB in O/S Mode	✓
362:MaintTB O/S Mode	362:MaintenanceTB in O/S Mode	✓
363:DispTB O/S Mode	363:DisplayTB in O/S Mode	✓
364:AI1 HH Alarm	364:AI1 High High Alarm	✓
365:AI1 LL Alarm	365:AI1 Low Low Alarm	✓
366:AI1 Hi Alarm	366:AI1 High Alarm	✓
367:AI1 Lo Alarm	367:AI1 Low Alarm	✓
368:AI2 HH Alarm	368:AI2 High High Alarm	✓
369:AI2 LL Alarm	369:AI2 Low Low Alarm	✓
370:AI2 Hi Alarm	370:AI2 High Alarm	✓
371:AI2 Lo Alarm	371:AI2 Low Alarm	✓
372:AI3 HH Alarm	372:AI3 High High Alarm	✓
373:AI3 LL Alarm	373:AI3 Low Low Alarm	✓
374:AI3 Hi Alarm	374:AI3 High Alarm	✓
375:AI3 Lo Alarm	375:AI3 Low Alarm	✓
376:AI4 HH Alarm	376:AI4 High High Alarm	✓
377:AI4 LL Alarm	377:AI4 Low Low Alarm	✓
378:AI4 Hi Alarm	378:AI4 High Alarm	✓
379:AI4 Lo Alarm	379:AI4 Low Alarm	✓
392:PID HH Alarm	392:PID High High Alarm	✓
393:PID LL Alarm	393:PID Low Low Alarm	✓
394:PID Hi Alarm	394:PID High Alarm	✓
395:PID Lo Alarm	395:PID Low Alarm	✓

IMPORTANT

- When backing up the data in the microSD card, make sure that the preparation of the microSD card is completed. It takes approximately one minute until the product is ready to store data in the microSD card after it has been turned on.
- Note that parameters cannot be changed while the backup function is running. It takes approximately 20 seconds to complete backup processing.
- Take care not to duplicate the file name when backing up data to the microSD card.
- Note that if the microSD card runs out of free space, the subsequent data will not be stored.

NOTE

The backup name and date do not affect the backup function. Use this as the memo column when performing the backup function.

5.11.2 Restore/Duplicate Parameter

If the restore function is used, it becomes possible to restore parameter settings, which are backed up in the display's built-in memory or microSD card (with the optional code MC selected), to the product. Also, it is possible to return parameters to default values defined when shipped from the factory and to duplicate the backed-up parameters to other device based on the same specifications.

NOTE

When using the restore function, set STB, DTB, MTB, and LTB to the O/S mode.

IMPORTANT

For the remote type, it is necessary to set the device information of the remote sensor to the parameters of the remote transmitter.

The methods to restore or duplicate settings can be selected from the following four types.

Duplicate Data	Restores the target parameter (excluding the service parameters related to the transmitter adjustment) from the product in which the parameter is backed up. Restore is also executable for other products.
Restore Data	Restores the target parameter (including the service parameters related to the transmitter adjustment) from the product in which the parameter is backed up. Restore is not executable for other products.
Compulsion Data	Restores the target parameter (specified at shipment from the manufacturing factory) from the product for which the parameter is backed up. Forced restore is also executable for other products.
Restore Factory	Restores all the target parameters (parameters related to items specified at shipment from the manufacturing factory).

When using the restore function, always make sure that the backed-up device information matches the device information to be restored.
The table below shows the consistency of the device information.

✓: Match between devices is required

Device Information	Duplicate Data	Restore Data	Compulsion Data
Option Board ID	✓	✓	-
Transmitter Serial No	-	✓	-

Device Information	Duplicate Data	Restore Data	Compulsion Data
Sensor Serial No	-	✓	-
Main Board Software Rev.	✓	✓	-
Sensor Board Software Rev.	✓	✓	-
Display Board Software Rev.	✓	✓	-
Model (Note)	✓	✓	-
Communication and I/O Code	✓	✓	-

NOTE

Data can only be duplicated or restored between products of the same model code.

The setting can be configured with the following parameters.
For details about the restorable parameters, refer to Subsection 5.11.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Parameter Backup/Restore ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	83	Restore execute	Restore Execute	Specifies the execution of the restore function.*1
MTB	84	Restore result	Restore Result	Displays the result of the restore function.*2

*1: From the table below, select the execution of the restore function. In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.

Selection		Description
Display	FOUNDATION Fieldbus	
Not execute	Not execute	Does not restore data.
Duplicate data 1	Duplicate Data1	Restores the parameter (Duplicate Data) setting from memory 1 on the display board to the main board of the product.
Duplicate data 2	Duplicate Data2	Restores the parameter (Duplicate Data) setting from memory 2 on the display board to the main board of the product.
Duplicate data 3	Duplicate Data3	Restores the parameter (Duplicate Data) setting from memory 3 on the display board to the main board of the product.
Duplicate SD	Duplicate SD	Restores the parameter (Duplicate Data) setting from the microSD card to the main board of the product.
Restore data 1	Restore Data1	Restores the parameter (Restore Data) setting from memory 1 on the display board to the main board of the product.
Restore data 2	Restore Data2	Restores the parameter (Restore Data) setting from memory 2 on the display board to the main board of the product.
Restore data 3	Restore Data3	Restores the parameter (Restore Data) setting from memory 3 on the display board to the main board of the product.
Restore SD	Restore SD	Restores the parameter (Restore Data) setting from the microSD card to the main board of the product.
Compulsion data 1	Compulsion Data1	Restores the parameter (Compulsion Data) setting from memory 1 on the display board to the main board of the product.
Compulsion data 2	Compulsion Data2	Restores the parameter (Compulsion Data) setting from memory 2 on the display board to the main board of the product.
Compulsion data 3	Compulsion Data3	Restores the parameter (Compulsion Data) setting from memory 3 on the display board to the main board of the product.
Compulsion SD	Compulsion SD	Restores the parameter (Compulsion Data) setting from the microSD card to the main board of the product.
Restore factory	Restore Factory	Restores to the status that is set at shipment from the manufacturing factory.

*2: The result of the restore function is displayed as shown below.

Selection		Description
Display	FOUNDATION Fieldbus	
Unexecuted	Unexecuted	Does not restore data.
Success	Success	Succeeded in restoration.
Failure	Failure	Failed in restoration.
Running	Running	Restore running

The table below shows alarms whose parameters can be restored or duplicated when an alarm occurs.

✓: Executable when an alarm occurs.
-: Not executable when alarm occurs.

Alarm Name		Restore or Duplicate
Display	FOUNDATION Fieldbus	
010:Main CPU FAIL	10:Main board CPU failure	-
011:Rev calc FAIL	11:Reverse calculation failure	-
012:Main EEP FAIL	12:Main board EEPROM failure	-
013:Main EEP dflt	13:Main board EEPROM default	-
014:Snsr bd FAIL	14:Sensor board failure	✓
015:Snsr comm ERR	15:Sensor communication error	✓
016:AD 1 FAIL[Sig]	16:A/D1 failure[Signal]	✓
017:AD 2 FAIL[Excit]	17:A/D2 failure[Exciter]	✓
018:Coil open	18:Coil open	✓
019:Coil short	19:Coil short	✓
020:Exciter FAIL	20:Exciter failure	✓
027:Restore FAIL	27:Parameter restore incomplete	✓
028:Ind bd FAIL	28:Indicator board failure	-
029:Ind bd EEP FAIL	29:Indicator board EEP failure	-
030:LCD drv FAIL	30:LCD driver failure	-
031:Ind bd mismatch	31:Indicator board mismatch	-
032:Ind comm ERR	32:Indicator communication error	-
033:microSD FAIL	33:microSD failure	-
050:Signal overflow	50:Signal overflow	✓
051:Empty detect	51:Empty pipe detection	✓
053:Adh over lv 4	53:Adhension over level 4	✓
060:Span cfg ERR	60:Span configuration error	-
066:Density cfg ERR	66:Density configuration error	-
067:Pls 1 cfg ERR	67:Pulse output 1 cfg error	-
069:Nomi size cfg	69:Nominal size cfg error	-
070:Adh cfg ERR	70:Adhesion configuration error	-
071:FLN cfg ERR	71:Flow noise cfg error	-
072:Log not start	72:Data logging not started	-
082:Pls 1 saturate	82:Pulse output 1 saturated	✓
085:Cable miscon	85:Cable misconnect	✓
086:Coil insulation	86:Coil insulation warning	✓
087:Adhesion lv 3	87:Adhesion over level 3	✓
088:LC warn	88:Low conductivity Warning	✓
089:Insu detect	89:Insulation detection	✓
090:FLN over lv 3	90:Flow noise over level 3	✓
091:FLN over lv 4	91:Flow noise over level 4	✓
092:AZ warn	92:Autozero warning	✓
093:Verif warn	93:Verification warning	✓
094:Fact noise warn	94:Factory noise warning	✓
095:Simulate active	95:Simulation active	✓
098:Pls 1 fix	98:Pulse output 1 fixed	✓
101:Param restore run	101:Parameter restore running	-

Alarm Name		Restore or Duplicate
Display	FOUNDATION Fieldbus	
102:Disp over	102:Display over warning	-
103:SD size warn	103:microSD card size warning	-
104:Bkup incmplt	104:Parameter backup incomplete	✓
105:SD mismatch	105:microSD card mismatch	-
106:SD removal ERR	106:microSD card removal error	-
120:Watchdog	120:Watchdog	✓
121:Power off	121:Power off	✓
122:Inst power FAIL	122:Instant power failure	✓
123:Param bkup run	123:Parameter backup running	-
124:Data log run	124:Data logging running	-
131:Trans mismatch	131:Transmitter type mismatch	-
133:G/A mismatch	133:G/A mismatch error	-
225:Lnk.O16/32 N/O	225:Link Obj. 16/32 Not Open	✓
226:Lnk.O15/31 N/O	226:Link Obj. 15/31 Not Open	✓
227:Lnk.O14/30 N/O	227:Link Obj. 14/30 Not Open	✓
228:Lnk.O13/29/45 N/O	228:Link Obj. 13/29/45 Not Open	✓
229:Lnk.O12/28/44 N/O	229:Link Obj. 12/28/44 Not Open	✓
230:Lnk.O11/27/43 N/O	230:Link Obj. 11/27/43 Not Open	✓
231:Lnk.O10/26/42 N/O	231:Link Obj. 10/26/42 Not Open	✓
232:Lnk.O9/25/41 N/O	232:Link Obj. 9/25/41 Not Open	✓
233:Lnk.O8/24/40 N/O	233:Link Obj. 8/24/40 Not Open	✓
234:Lnk.O7/23/39 N/O	234:Link Obj. 7/23/39 Not Open	✓
235:Lnk.O6/22/38 N/O	235:Link Obj. 6/22/38 Not Open	✓
236:Lnk.O5/21/37 N/O	236:Link Obj. 5/21/37 Not Open	✓
237:Lnk.O4/20/36 N/O	237:Link Obj. 4/20/36 Not Open	✓
238:Lnk.O3/19/35 N/O	238:Link Obj. 3/19/35 Not Open	✓
239:Lnk.O2/18/34 N/O	239:Link Obj. 2/18/34 Not Open	✓
240:Lnk.O1/17/33 N/O	240:Link Obj. 1/17/33 Not Open	✓
244:Amp EEP FAIL	244:Amp EEPROM Failure	✓
246:Simulate SW OFF	246:Simulation Switch OFF	✓
247:RB O/S Mode	247:RB in O/S mode	✓
248:Simulate SW ON	248:Simulation Switch ON	✓
249:SoftDL Incmplt	249:SoftDL Incomplete	✓
250:SoftDL FAIL	250:SoftDL Failure	✓
251:Abnml Boot PRS	251:Abnormal Boot Process	✓
252:HWrite Lock SW ON	252:Hard Write Lock SW ON	✓
253:Write Locked	253:Write Locked	✓
254:HWrite Lock SW OFF	254:Hard Write Lock SW OFF	✓
255:Write Unlocked	255:Write Unlocked	✓
300:AI1 O/S Mode	300:AI1 in O/S Mode	✓
301:AI1 Man Mode	301:AI1 in Man Mode	✓
302:AI1 Not Schedule	302:AI1 Not Scheduled	✓
303:AI1 Simulate Act	303:AI1 Simulation Active	✓
304:AI2 O/S Mode	304:AI2 in O/S Mode	✓
305:AI2 Man Mode	305:AI2 in Man Mode	✓
306:AI2 Not Schedule	306:AI2 Not Scheduled	✓
307:AI2 Simulate Act	307:AI2 Simulation Active	✓
308:AI3 O/S Mode	308:AI3 in O/S Mode	✓
309:AI3 Man Mode	309:AI3 in Man Mode	✓
310:AI3 Not Schedule	310:AI3 Not Scheduled	✓
311:AI3 Simulate Act	311:AI3 Simulation Active	✓
312:AI4 O/S Mode	312:AI4 in O/S Mode	✓
313:AI4 Man Mode	313:AI4 in Man Mode	✓

Alarm Name		Restore or Duplicate
Display	FOUNDATION Fieldbus	
314:AI4 Not Schedule	314:AI4 Not Scheduled	✓
315:AI4 Simulate Act	315:AI4 Simulation Active	✓
328:PID O/S Mode	328:PID in O/S Mode	✓
329:PID Man Mode	329:PID in Man Mode	✓
330:PID Not Schedule	330:PID Not Scheduled	✓
331:PID Bypass Mode	331:PID in Bypass Mode	✓
332:IT1 O/S mode	332:IT1 in O/S mode	✓
333:IT1 Man mode	333:IT1 in Man mode	✓
334:IT1 Not Schedule	334:IT2 Not Scheduled	✓
335:IT1 ttl bkup ERR	335:IT1 Total Backup Err	✓
336:IT2 O/S Mode	336:IT2 in O/S mode	✓
337:IT2 Man Mode	337:IT2 in Man mode	✓
338:IT2 Not Schedule	338:IT2 Not Scheduled	✓
339:IT2 ttl bkup ERR	339:IT2 Total Backup Err	✓
340:DI1 O/S Mode	340:DI1 in O/S mode	✓
341:DI1 Man Mode	341:DI1 in Man mode	✓
342:DI1 Not Schedule	342:DI1 Not Scheduled	✓
343:DI1 Simulate Act	343:DI1 Simulation Active	✓
344:DI2 O/S Mode	344:DI2 in O/S mode	✓
345:DI2 Man Mode	345:DI2 in Man mode	✓
346:DI2 Not Schedule	346:DI2 Not Scheduled	✓
347:DI2 Simulate Act	347:DI2 Simulation Active	✓
348:DI3 O/S Mode	348:DI2 in O/S mode	✓
349:DI3 Man Mode	349:DI2 in Man mode	✓
350:DI3 Not Schedule	350:DI2 Not Scheduled	✓
351:DI3 Simulate Act	351:DI2 Simulation Active	✓
352:AR O/S Mode	352:AR in O/S Mode	✓
353:AR Man Mode	353:AR in Man Mode	✓
354:AR Not Scheduled	354:AR Not Scheduled	✓
356:MAO O/S Mode	356:MAO in O/S Mode	✓
357:MAO Not Schedule	357:MAO Not Scheduled	✓
359:No FB Scheduled	359:No FB Scheduled	✓
360:SnsrTB O/S Mode	360:SensorTB in O/S mode	✓
361:DiagTB O/S Mode	361:DiagnosticTB in O/S Mode	✓
362:MaintTB O/S Mode	362:MaintenanceTB in O/S Mode	✓
363:DispTB O/S Mode	363:DisplayTB in O/S Mode	✓
364:AI1 HH Alarm	364:AI1 High High Alarm	✓
365:AI1 LL Alarm	365:AI1 Low Low Alarm	✓
366:AI1 Hi Alarm	366:AI1 High Alarm	✓
367:AI1 Lo Alarm	367:AI1 Low Alarm	✓
368:AI2 HH Alarm	368:AI2 High High Alarm	✓
369:AI2 LL Alarm	369:AI2 Low Low Alarm	✓
370:AI2 Hi Alarm	370:AI2 High Alarm	✓
371:AI2 Lo Alarm	371:AI2 Low Alarm	✓
372:AI3 HH Alarm	372:AI3 High High Alarm	✓
373:AI3 LL Alarm	373:AI3 Low Low Alarm	✓
374:AI3 Hi Alarm	374:AI3 High Alarm	✓
375:AI3 Lo Alarm	375:AI3 Low Alarm	✓
376:AI4 HH Alarm	376:AI4 High High Alarm	✓
377:AI4 LL Alarm	377:AI4 Low Low Alarm	✓
378:AI4 Hi Alarm	378:AI4 High Alarm	✓
379:AI4 Lo Alarm	379:AI4 Low Alarm	✓
392:PID HH Alarm	392:PID High High Alarm	✓

Alarm Name		Restore or Duplicate
Display	FOUNDATION Fieldbus	
393:PID LL Alarm	393:PID Low Low Alarm	✓
394:PID Hi Alarm	394:PID High Alarm	✓
395:PID Lo Alarm	395:PID Low Alarm	✓
395:PID Lo Alarm	PID Low Alarm	✓

IMPORTANT

When using the restore function, be sure to prepare a backup file in the built-in memory or the microSD card. Note that the restore function is not executable if a backup file is not provided. When executing the restore function from the microSD card, make sure that the preparation of the microSD card is completed. Approximately one minute is required until the microSD card can be used after it has been turned on.

5.11.3 Backup and Restore Parameters

The list below shows the parameters that can be backed up or restored.

NOTE

Those parameters not listed in the following table are out of scope for both back up and restore. (Velocity Unit, Volume Flow Unit, Mass Flow Unit, Total1 Unit, etc.)
Those parameters which can be backed up have check marks in the check box in the column of “Duplicate data” in the following table.

Block Name	Parameter		Restore			
	Display	FOUNDATION Fieldbus	Duplicate data	Restore data	Compulsion data	Restore Factory
STB	Damp AO/F	Velocity Damping	✓	✓	-	✓
STB	Damp pls/ttl	Velocity Damping Ttl	✓	✓	-	✓
STB	Damp AO/F	Volume Flow Damping	✓	✓	-	✓
STB	Damp pls/ttl	Vol F Damping Total	✓	✓	-	✓
STB	Damp AO/F	Mass Flow Damping	✓	✓	-	✓
STB	Damp pls/ttl	Mass F Damping Total	✓	✓	-	✓
STB	Damp AO/F	Calorific Damping	✓	✓	-	✓
STB	Damp pls/ttl	Calorific Damping Ttl	✓	✓	-	✓
STB	Low MF	Low MF	✓	✓	✓	✓
STB	High MF	High MF	✓	✓	✓	✓
STB	Low MF EDF	Low MF EDF	✓	✓	-	✓
STB	High MF EDF	High MF EDF	✓	✓	-	✓
STB	Flow sensor sel	Select Flow Sensor	✓	✓	-	✓
STB	Measure mode	Measure Mode	✓	✓	-	✓
STB	Nominal size unit	Nominal Size Unit	✓	✓	✓	✓
STB	Nominal size	Nominal Size	✓	✓	✓	✓
STB	PV flow select	Selected Flow	✓	✓	✓	✓
STB	Span	Velocity Span	✓	✓	✓	✓
STB	Span	Volume Flow Span	✓	✓	✓	✓
STB	Span	Mass Flow Span	✓	✓	✓	✓
STB	Span	Calorie Span	✓	✓	-	✓
STB	Zero value	Zero Value	✓	✓	-	✓
STB	Low cut	Total1 Lowcut	✓	✓	-	✓
STB	Failure opts	Total1 Failure Option	✓	✓	-	✓
STB	Options	Total1 Options	✓	✓	-	✓

Block Name	Parameter		Restore			
	Display	FOUNDATION Fieldbus	Duplicate data	Restore data	Compulsion data	Restore Factory
STB	Start/Stop	Total1 Execution	✓	✓	-	✓
STB	Reset/Preset	Total1 Preset	✓	✓	-	✓
STB	Preset value	Total1 Preset Value	✓	✓	-	✓
STB	Set point	Total1 Setpoint	✓	✓	-	✓
STB	Low cut	Total2 Lowcut	✓	✓	-	✓
STB	Failure opts	Total2 Failure Option	✓	✓	-	✓
STB	Options	Total2 Option	✓	✓	-	✓
STB	Start/Stop	Total2 Execution	✓	✓	-	✓
STB	Reset/Preset	Total2 Preset	✓	✓	-	✓
STB	Preset value	Total2 Preset Value	✓	✓	-	✓
STB	Set point	Total2 Setpoint	✓	✓	-	✓
MTB	Output mode	Pulse 1 Output Mode	✓	✓	✓	✓
MTB	Active mode	Pulse 1 Active Mode	✓	✓	-	✓
MTB	Fix width	Pulse 1 Fix Width	✓	✓	-	✓
MTB	Rate unit	Pulse 1 Rate Unit	-	-	✓	✓
MTB	Rate value	Pulse 1 Rate Value	✓	✓	✓	✓
MTB	Low cut	Pulse output 1 Low Cut	✓	✓	-	✓
MTB	Alarm out	Pulse 1 Alarm Out	✓	✓	-	✓
MTB	Frequency at 0%	Frequency 1 at 0%	✓	✓	✓	✓
MTB	Frequency at 100%	Frequency 1 at 100%	✓	✓	✓	✓
MTB	SO1 function	SO1 Function	✓	✓	-	✓
STB	SO1 function	Temp Function	✓	✓	-	✓
STB	URV	Temp URV	✓	✓	-	✓
STB	LRV	Temp LRV	✓	✓	-	✓
STB	Flow direct	Flow Direction	✓	✓	-	✓
STB	Rate limit	Rate Limit	✓	✓	-	✓
STB	Dead time	Dead Time	✓	✓	-	✓
STB	Noise filter	Noise Filter	✓	✓	-	✓
STB	Pulsing flow	Pulsing Flow	✓	✓	-	✓
STB	Power sync on/off	Power Synchronize	✓	✓	✓	✓
STB	Set power freq	Power Frequency	✓	✓	✓	✓
STB	Value select	Density Select	✓	✓	-	✓
STB	Fixed density	Fixed Density	✓	✓	✓	✓
STB	Std density	Standard Density	✓	✓	-	✓
STB	Std temperature	Standard Temperature	✓	✓	-	✓
STB	Coef A1	Temperature Coef A1	✓	✓	-	✓
STB	Coef A2	Temperature Coef A2	✓	✓	-	✓
STB	Specific heat	Specific Heat	✓	✓	-	✓
STB	Fixed temperature	Calorific Fixed Temp	✓	✓	-	✓
STB	Mask 1-1	Alarm Out Mask1	✓	✓	-	✓
STB	Mask 1-2					
STB	Mask 2-1	Alarm Out Mask2	✓	✓	-	✓
STB	Mask 2-2					
STB	Mask 3-1	Alarm Out Mask3	✓	✓	-	✓
STB	Mask 3-2					
STB	Mask 4-1	Alarm Out Mask4	✓	✓	-	✓
STB	Mask 1-1	Alarm Record Mask1	✓	✓	-	✓
STB	Mask 1-2					
STB	Mask 2-1	Alarm Record Mask2	✓	✓	-	✓
STB	Mask 2-2					
STB	Mask 3-1	Alarm Record Mask3	✓	✓	-	✓
LTB	Line 1	Display Line Select 1	-	-	✓	✓

Block Name	Parameter		Restore			
	Display	FOUNDATION Fieldbus	Duplicate data	Restore data	Compulsion data	Restore Factory
LTB	Line 2	Display Line Select 2	-	-	✓	✓
LTB	Line 3	Display Line Select 3	-	-	✓	✓
LTB	Line 4	Display Line Select 4	-	-	✓	✓
LTB	Line 5	Display Line Select 5	-	-	✓	✓
LTB	Line 6	Display Line Select 6	-	-	✓	✓
LTB	Line 7	Display Line Select 7	-	-	✓	✓
LTB	Line 8	Display Line Select 8	-	-	✓	✓
LTB	Format PV	Display Format Flow Rate	-	-	✓	✓
LTB	Line mode	Display Line	-	-	✓	✓
LTB	Language	Language	-	-	✓	✓
LTB	Disp install	Display Install	-	-	✓	✓
LTB	-	IRSW operation	-	-	✓	✓
LTB	Low cut	Display Low Cut	✓	✓	-	✓
MTB	Electrode size	Electrode Size	✓	✓	-	✓
MTB	Model code	Basic Model Code	✓	✓	-	✓
MTB	Suffix config 1	Suffix Config 1	✓	✓	-	✓
MTB	Suffix config 2	Suffix Config 2	✓	✓	-	✓
MTB	Option 1	Option 1	✓	✓	-	✓
MTB	Option 2	Option 2	✓	✓	-	✓
MTB	Option 3	Option 3	✓	✓	-	✓
MTB	Option 4	Option 4	✓	✓	-	✓
MTB	Model code	Snsr Basic Model Code	✓	✓	-	✓
MTB	Suffix config 1	Snsr Suffix Config 1	✓	✓	-	✓
MTB	Suffix config 2	Snsr Suffix Config 2	✓	✓	-	✓
MTB	Option 1	Sensor Option 1	✓	✓	-	✓
MTB	Option 2	Sensor Option 2	✓	✓	-	✓
MTB	Option 3	Sensor Option 3	✓	✓	-	✓
MTB	Option 4	Sensor Option 4	✓	✓	-	✓
MTB	Trans serial No	Trans Serial No	✓	✓	-	✓
MTB	Sensor serial No	Sensor Serial No	✓	✓	-	✓
DTB	Function	Adhesion Check	✓	✓	✓	✓
DTB	Threshold level 1	Adhesion Level1	✓	✓	-	✓
DTB	Threshold level 2	Adhesion Level2	✓	✓	-	✓
DTB	Threshold level 3	Adhesion Level3	✓	✓	-	✓
DTB	Threshold level 4	Adhesion Level4	✓	✓	-	✓
DTB	Check cycle	Adhesion Check Cycle	✓	✓	-	✓
DTB	Function	Flow Noise Check	✓	✓	-	✓
DTB	Threshold level 1	Flow Noise Level1	✓	✓	-	✓
DTB	Threshold level 2	Flow Noise Level2	✓	✓	-	✓
DTB	Threshold level 3	Flow Noise Level3	✓	✓	-	✓
DTB	Threshold level 4	Flow Noise Level4	✓	✓	-	✓
DTB	Damp	Flow Noise Damping	✓	✓	-	✓
DTB	Function	Low Conduct Check	✓	✓	-	✓
DTB	Low limit	Conductivity Limit	✓	✓	-	✓
DTB	Coil insul threshold	Coil Insulation Th	✓	✓	-	✓
DTB	VF target select	Verification Target	✓	✓	-	✓
DTB	Diagnostic output	Diagnostic Output	✓	✓	-	✓
DTB	Mode	Verification Mode	✓	✓	-	✓
DTB	VF No	Verification No	✓	✓	-	✓
MTB	Release time	Test Auto Release Time	✓	✓	-	✓

5.11.4 Data Logging Function

When the optional code MC (microSD card) is selected, the data logging function can store up to four process values to the microSD card. To use this function, it is necessary to specify a file name, data storage interval,and ending time.
Stored data is saved in the "YOKOGAWA" folder as a ".TRD" file.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Data log ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Data Logging ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	85	File name	Logging File Name	Specifies the name of the file to be stored.
MTB	86	Interval time	Logging Interval Time	Specifies the data storage interval.*1
MTB	87	Start date	Logging Start Date	Displays the date to start the data logging function.
MTB	88	Start time	Logging Start Time	Displays the time to start the data logging function.
MTB	89	End time	Logging End Time	Specifies the time to end the data logging function.*2
MTB	90	Log 1	Log 1 Select	Specifies process value 1 to be stored.*3
MTB	91	Log 2	Log 2 Select	Specifies process value 2 to be stored.*3
MTB	92	Log 3	Log 3 Select	Specifies process value 3 to be stored.*3
MTB	93	Log 4	Log 4 Select	Specifies process value 4 to be stored.*3
MTB	94	Execute	Logging Execute	Specifies the execution of the data logging function.*4

*1: From the table below, select the data storage interval.

Selection		Description
Display	FOUNDATION Fieldbus	
1 s	1s	Sets the storage interval to 1 sec.
10 s	10s	Sets the storage interval to 10 sec.
30 s	30s	Sets the storage interval to 30 sec.
1 min	1min	Sets the storage interval to 1 min.
5 min	5min	Sets the storage interval to 5 min.
30 min	30min	Sets the storage interval to 30 min.
1 h	1h	Sets the storage interval to 1 hour.

*2: From the table below, select the ending time of the data logging function.

Selection		Description
Display	FOUNDATION Fieldbus	
10 min	10min	Sets the ending time to 10 minutes later.
30 min	30min	Sets the ending time to 30 minutes later.
1 h	1h	Sets the ending time to 1 hour later.
3 h	3h	Sets the ending time to 3 hours later.
12 h	12h	Sets the ending time to 12 hours later.
24 h	24h	Sets the ending time to 24 hours (1 day) later.
72 h	72h	Sets the ending time to 72 hours (3 days) later.
240 h	240h	Sets the ending time to 240 hours (10 days) later.
720 h	720h	Sets the ending time to 720 hours (30 days) later.
1440 h	1440h	Sets the ending time to 1440 hours (60 days) later.

*3: From the table below, select the process value to be stored.

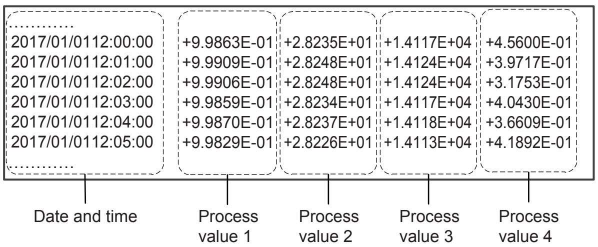
Selection		Description
Display	FOUNDATION Fieldbus	
PV	PV	Stores the process value PV-mapped in Subsection 5.1.2.
Velocity	Velocity	Stores the flow velocity.
Volume flow	Volume flow	Stores the volumetric flow rate.
Mass flow	Mass flow	Stores the mass flow rate.
Calorie	Calorie	Stores the calorie (only available for AXG, not for AXW).
Flow noise	Flow noise	Stores the flow noise value (only available for AXG, not for AXW).
Adhesion	Adhesion	Stores the resistance value of the electrode adhesion detection.
Electrode A	Electrode A	Stores the voltage of electrode A.
Electrode B	Electrode B	Stores the voltage of electrode B.
V peak	V peak	Stores the peak value of the flow rate signal (only available for AXG, not for AXW).

*4: From the table below, select the use of the data logging function.

Selection		Description
Display	FOUNDATION Fieldbus	
Not execute	Not Execute	Does not execute the data logging function.
Execute	Execute	Executes the data logging function.

Setting data is stored on the microSD card at a specified data storage interval during a period from the start of the data logging function to the end. The file stored with the data logging function can be opened as a text file.

Example: If the storage interval is set to “1 min”, data is stored as shown below.



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The access ongoing to the microSD card can be confirmed with the icon on the display. For example, the icons of the “microSD card ready” and “Access to microSD card” are displayed alternately and repeatedly because the product accesses to the microSD card periodically during its data logging.

When the microSD card cannot be accessed to remove, the icon of “Disable to access the microSD card” is displayed.
Insert the microSD card again when it is necessary to use this function again. The alarm of “microSD failure” occurs when the microSD card has any problems.

	Ready for the microSD card		Accessing the microSD card
	Disable to access the microSD card		

IMPORTANT

- Before using the data logging function, make sure that the microSD card is prepared. It takes approximately one minute until the product is ready to store data in the microSD card after it has been turned on.
- Note that if the microSD card runs out of free space, the subsequent data will not be stored.

NOTE

Do not remove the microSD card while the data logging function is running.

5.12 Write Lock Function

A write lock can be changed with two methods; the hardware write lock switch and parameter settings for software write lock. When the write lock is enabled with either method, data cannot be written. For details about the write lock switch, see the Installation Manual. This function can be configured with the following parameters.

Display	Device setup ► Detailed setup ► Fieldbus info ► RB ► (see below)
FOUNDATION Fieldbus	Device Configuration ► RS ► Device Configuration ► Configuration ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
RB	18	--	Feature Info ► Feature Selection	Sets the operation of the write lock switch (see below).
RB	34	Write Lock	Write Lock Info ► Write Lock	Specifies the use of the software write locking.
RB	92	--	Write Lock Info ► Write Lock Level	Sets the operation of the target range for the write locking (see below).

Write Lock Level

If the write lock function is enabled, the parameter of the block for Write Lock Level cannot be changed. Figure 5.12-1 shows correspondence between write lock level and target blocks for write lock. Furthermore, WRITE_LOCK_LEVEL is set to “A(ALL FBAP)” (resource block, all parameters of transducer block, and all parameters of the function block are write-protected) at shipping from factory.

Figure 5.12-1 Correspondence between Write Lock Level and Target Blocks for Write Lock.

Selection FOUNDATION Fieldbus	Target block for write lock function
Level:C (TB)	All parameters of transducer block, FEATURE_SEL and WRITE_LOCK_LEVEL of resource block
Level:B (TB+RB)	Transducer block, all parameters of resource block
Level:A (All FBAP)	In addition to WRITE_CLCK_LEVEL"B(TB+RB)”, all parameters of function block
Level:AA (MIB+All FBAP)	In addition to WRITE_LOCK_LEVEL"AA(MIB+ALL FBAP)”, MIB

Feature Selection

The user can choose to enable either the write lock function with the switch, or the software write lock function. (See the table below.)

Table 5.12-2 Relationship among Feature Selection, Write Lock Switch and WRITE_ LOCK Parameter

Feature Selection		Write lock switch	Write Lock
Hard W Lock (bit4)	**Soft W Lock (bit3)**		
0 (OFF)	0 (OFF)	OFF (Write lock disabled)	Setting unable (“1” (write lock disabled))
	1 (ON)		1 (Write lock disabled) (At factory shipping)
			2 (Write lock enabled)
1 (ON)	0 (OFF)	ON (Write lock enabled)	Setting disabled

* When both of “Hard W Lock” and “Soft W Lock” are set to 1(ON), the settings for “Hard W Lock” takes precedence, and “Soft W Lock” is automatically set to 0(OFF).

When the write lock function (hardware write lock) is enabled with the switch, be sure to set “Hard W Lock” (bit4) of Feature Selection for the resource block to “1”(ON). (“Hard W Lock” (bit4) is set to “0” (OFF) at factory shipping.)

Parameter: To enable the software write lock which is set with Write Lock, it is necessary to set Feature Selection to settings for factory shipping in advance. (“Hard W Lock” (bit4) is set to “0” (OFF), and “Soft W Lock” (bit3) to “1” (ON) at factory shipping.)

NOTE

The use status of the write lock function can be checked using the parameters or the icons shown on the display.
The following icons are displayed.

Icon	Description
	Write lock is not in use. (Parameters can be changed)
	Write lock is in use. (Parameter cannot be changed)

5.13 Simulation Function

The product has a function to simulate the input of the function block as if the data is received from the transducer block. This function makes it possible to test the function block and alarm-processing system on the downstream side.
To prevent this function from being mistakenly activated while running, a simulation switch is implemented as a “key” on the amplifier. If this switch (SW1-1) is moved to the ON side, the simulation is enabled. (See Figure 13.1.) If SIM_ENABLE_MSG of the maintenance transducer block (index 2922) and REMOTE LOOP TEST SWITCH are written in order to do the same thing from remote, it activates the same operation as when the above switch is turned ON. However, the value of this parameter is lost when the power is turned off. An alarm occurs from the resource block in a state where a simulation is possible. After use, swiftly prohibit simulation.
This function can be configured with the following parameters.

■ AIFB

Menu path

Display	--
FOUNDATION Fieldbus	Diagnostic ► AI1* ► Device Diagnostics ► Service ► (see below)

*For AXG, one from AI1 to AI4, and for AXW, one from AI1 to AI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
AI1 - AI4 (AXG) AI1 - AI3 (AXW)	9	--	Simulation Enable	In the communication access of FOUNDATION Fieldbus, the communication access is set with the procedures of the interactive operation guide called DD Method.
		--	Simulation Disable	

■ DIFB

Menu path

Display	--
FOUNDATION Fieldbus	Diagnostic ► DI1* ► Device Diagnostics ► Service ► (see below)

*One from DI1 to DI3.

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
DI1 - DI3	9	--	Simulate Status	Specifies the data status to simulate.
		--	Simulate Value	Specifies the data value to simulate.
		--	Transducer Status	Displays the data status from the transducer block. Unable to change.
		--	Transducer Value	Displays the data value from the transducer block. Unable to change.
		--	Simulate En/Disable	Controls the simulation function of this block. 1: Simulation prohibited (standard state) 2: Simulation starts

If “2” is set to Simulate En/Disable, the relevant function block starts using the simulation value which is set to this parameter instead of the data from the transducer block. It can be used for propagation of the status to the subsequent block, occurrence of the process alarm, and operation test of the subsequent block.

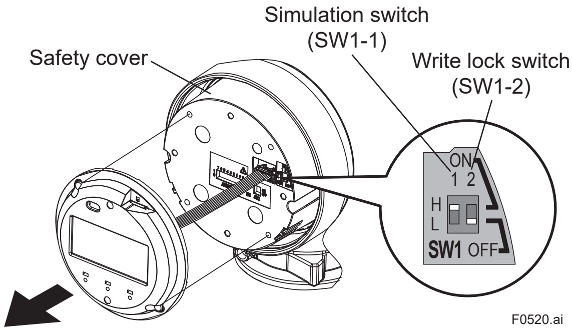


Figure 13.1 Settings of Simulation Switch

IMPORTANT

- To set the simulation switch, it needs to remove and install the cover on the display side. Refer to the procedures described on the ADMAG TI Installation Manual for implementation.
- To secure your safety, do not touch an electric circuit and cable other than the simulation switch.

5.14 Pulse Output, Frequency Output, and Status Output

NOTE

The pulse output, frequency output and status output should be used only at calibrating, and not used when normally running.

5.14.1 Outputs of I/O2 Terminals

Use the I/O2 terminal only when calibrating. The I/ O2 terminal can be used as the pulse output, frequency output, and status output.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	102	Output mode	Pulse 1 Output Mode	Specifies the output of the I/O2 terminal.

From the table below, select the output of I/O2 terminal.

Selection		Description
Display	FOUNDATION Fieldbus	
No function	No function	Does not use the terminal.
Fixed pulse output	Fixed Pulse Output	Sets to the fixed pulse output.
Frequency output	Frequency Output	Sets to the frequency output (Duty 50%).
Status output	Status Output	Sets to the status output. For details about the status output, refer to Subsection 5.14.6.

5.14.2 Alarm Output Function

The alarm output function can be used when using the frequency output or pulse output. This function can be set the output operation to be performed when an alarm has activated.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	109	Alarm out	Pulse 1 Alarm Out	Specifies the alarm output function for the frequency output or pulse output.

From the table below, select the use of the alarm output function.

Selection		Description
Display	FOUNDATION Fieldbus	
0 pps	0 pps	Pulse output stop
Measured value	Measured value	Outputs the frequency or fixed pulse with the measured value calculated while an alarm occurs.
Last valid	Last valid	Outputs the frequency or pulse with the last instantaneous value right before an alarm occurs (output is monotonic increase).
Max pps	Max pps	Outputs the frequency or pulse at 12500 pps.

5.14.3 Pulse Width Setting

The pulse width can be selected to use the pulse output.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	104	Fix width	Pulse 1 Fix Width	Specifies the pulse width.

From the table below, select the pulse width.

Selection		Max. output frequency [Hz]
Display	FOUNDATION Fieldbus	
0.05 ms	0.05ms	10000
0.1 ms	0.1ms	5000
0.5 ms	0.5ms	1000
1 ms	1ms	500
20 ms	20ms	25
33 ms	33ms	15
50 ms	50ms	10
100 ms	100ms	5
200 ms	200ms	2.5
330 ms	330ms	1.5
500 ms	500ms	1.0
1000 ms	1000ms	0.5
2000 ms	2000ms	0.25
Duty cycle 50% *	Duty cycle 50% *	-

*: The maximum pulse width is up to 300 seconds (5 minutes) when “Duty cycle 50%” is selected. When outputting the pulse whose period is over 10 minutes, the pulse width is fixed at 300s.

5.14.4 Active Direction Setting

The active direction of the pulse output or status output can be set.
The setting can be configured with the following parameter.

Menu path

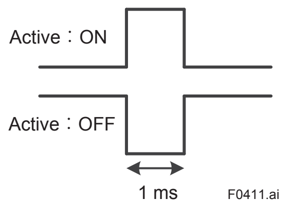
Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	103	Active mode	Pulse 1 Active Mode	Specifies an active direction for the pulse signal.

From the table below, select the active direction of the pulse signal.

Selection		Description
Display	FOUNDATION Fieldbus	
On active	On Active	Sets to Active when the pulse signal is set on.
Off active	Off Active	Sets to Active when the pulse signal is set off.

Example:
If the fixed pulse output is specified and the pulse width is set to “1 ms”, it is set to active as shown below.



5.14.5 Pulse Rate Setting

The weight of the fixed width pulse per pulse and the pulse rate scaling can be set.
The unit of the pulse rate is set to that of the process value which is assigned to PV in Subsection 5.1.2.
The setting can be configured with the following parameters. If the pulse rate scaling is changed, the pulse rate value is also changed conjunction with the changed unit.

■ Scaling pulse rate

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	105	Rate unit	Pulse 1 Rate Unit	Specifies the pulse rate value.

From the table below, select the pulse rate scaling.

Selection		Description
Display	FOUNDATION Fieldbus	
n unit/P	n unit/P	10^{-9} x units per pulse
u unit/P	u unit/P	10^{-6} x units per pulse
m unit/P	m unit/P	10^{-3} x units per pulse
Unit/P	Unit/P	1 unit per pulse
k unit/P	k unit/P	10^{3} x units per pulse
M unit/P	M unit/P	10^{6} x units per pulse
n P/unit	n P/unit	10^{-9} x pulses per unit
u P/unit	u P/unit	10^{-6} x pulses per unit
m P/unit	m P/unit	10^{-3} x pulses per unit
P/unit	P/unit	1 pulse per unit
k P/unit	k P/unit	10^{3} x pulses per unit
M P/unit	M P/unit	10^{6} x pulses per unit

Unit: The unit of the process value to be output as a pulse output

NOTE

The maximum pulse rate and pulse width must be specified so that the following conditions are satisfied.

Maximum pulse rate value [pps*]

= Flow rate span [Unit/s] x Pulse rate [P/Unit]

≤ 10 [k pps]

≤ 1 / (Pulse width x 2)

* pps:Pulse per sec

Example:
When the pulse width is set to “0.1 ms”, the maximum pulse rate value is set to “1 / (0.0001 x 2) = 5000 [pps]”. If the specified pulse rate exceeds this value, it causes a setting error, and an alarm is displayed.

Pulse rate value

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	106	Rate value	Pulse 1 Rate Value	Specifies the pulse rate value.

5.14.6 Frequency Output Range Setting

When the frequency output is used, the frequency at 0% and 100% can be specified for the span of the process value. The frequency output range can be set by specifying the frequency.
Set the output frequency for the span of the process value which is assigned to PV in Subsection 5.1.2.
The setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	110	Frequency at 0%	Frequency 1 at 0%	Specifies the output frequency when the process value is 0%.
MTB	111	Frequency at 100%	Frequency 1 at 100%	Specifies the output frequency when the process value is 100%.

5.14.7 Status Output Function Setting

When the status output is used, the device status can be output as a contact point.
The setting can be configured with the following parameter.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)
FOUNDATION Fieldbus	Device Configuration ► MTB ► Device Configuration ► Maintenance ► Pulse/Status Out ► (see below)

Block Name	Relative Index	Parameter		Description
		Display	FOUNDATION Fieldbus	
MTB	112	SO1 function	SO1 Function	Specifies the status output function.

From the table below, select the status output function.

Selection		Description
Display	FOUNDATION Fieldbus	
No function	No function	The status output is not available because the status output function is not enabled.
Alarm output	Alarm output	The status output is activated when the specific alarm occurs.
Warning output	Warning output	The status output is activated when the specific warning occurs.
Total limit 1	Total limit 1	The status output is activated while the totalized value of totalizer 1 is out of the set target value. For details about the totalization switch function, refer to Subsection 5.2.3.
Total limit 2	Total limit 2	The status output is activated while the totalized value of totalizer 2 is out of the set target value. For details about the totalization switch function, refer to Subsection 5.2.3.

6. Parameter Lists

Note: The Write Mode column contains the modes in which each parameter is write enabled.

O/S : Write enabled in the O/S mode.

MAN : Write enabled in the Man and O/S modes.

AUTO : Write enabled in the Auto, Man, and O/S modes.

- : Unable to write

6.1 Resource Block

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	1000	Block Header	“RB ”	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	1001	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	1002	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	1003	STRATEGY	0	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	1004	ALERT_KEY	0	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	1005	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	1006	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	1007	RS_STATE	1	-	Indicates the state of the resource block in the device.
8	1008	TEST_RW	0 0 0 0 0 0 0 0.0 All spaces All 0 0,0,0,0,0,0 0,0 0,0 0 0,0	AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO AUTO	Parameter used to perform a read/write test to the device.
9	1009	DD_RESOURCE	Space (32 characters)	-	Name of the Device Description, including information on this resource block.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
10	1010	MANUFAC_ID	0x594543	-	Manufacturer identification number (ID No.) used by an interface device to locate the DD for the resource. The manufacturer identification number of Yokogawa is 5850435 (0x594543).
11	1011	DEV_TYPE	0x16	-	ID number assigned to the device. The ID number for AXG is 0x0016, and for AXW 0x0017.
12	1012	DEV_REV	1	-	Device revision number.
13	1013	DD_REV	1	-	Revision number in the device description of the device.
14	1014	GRANT_DENY	0x00 0x00	AUTO AUTO	The parameter for checking if various operations have been executed. Set a bit corresponding to the GRANT parameter before various operations are executed. Check the DENY parameter after the operation. If the bit for the operation is not set, it indicates that the operation was executed. Bit assignment complies with the Communication standard specifications.
15	1015	HARD_TYPES	0x0007	-	Bit string indicating the types of hardware (device). Bit0: Scalar input analog input Bit1: Scalar output analog output Bit2: Discrete input digital input Bit3: Discrete output digital output
16	1016	RESTART	1	AUTO	Indicates how the device re-starts up. 1: Run: Running 2: Resource: Re-start 3:Defaults: Re-start with default value on FF specifications*1 4: Processor: Re-start of CPU
17	1017	FEATURES	0x041E	-	Determines option operations of the resource block. Bit assignment complies with the Communication standard specifications.
18	1018	FEATURE_SEL	0x000E	AUTO	Parameter to used to select resource block options. Options defined in FEATURES can be selected. Bit assignment complies with the Communication standard specifications.
19	1019	CYCLE_TYPE	0x0001	-	Bit string indicating the type of cycle which the resource can execute. Bit0: Scheduled: Used by scheduling Bit1:Event driven: Used by event-driven type Bit2:Manufacturer specified: Can be used with unique function
20	1020	CYCLE_SEL	0x0000	AUTO	Bit string to select the type of cycle.
21	1021	MIN_CYCLE_T	3200	-	Minimum value of period of execution.
22	1022	MEMORY_SIZE	0	-	Memory size available to configure the function block mounted in this device. To be checked before attempting a download.
23	1023	NV_CYCLE_T	0	-	Sets the interval between writing copies of nonvolatile parameters to EEPROM.
24	1024	FREE_SPACE	0.0	-	Percent of remaining memory available for further configuration. For this product, 0 is shown, which means a preconfigured resource.
25	1025	FREE_TIME	0.0	-	Percent of the block processing time that is free to process additional blocks. Not used for this product.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
26	1026	SHED_RCAS	640000	AUTO	Sets time for device's communication timeout set for Remote cascade. Used only with PID function.
27	1027	SHED_ROUT	640000	AUTO	Sets time for device's communication timeout set for remote out. Used only with PID function.
28	1028	FAULT_STATE	1	-	Indicates failsafe state. Not used for this product.
29	1029	SET_FSTATE	1	AUTO	Starts failsafe state. Not used for this product.
30	1030	CLR_FSTATE	1	AUTO	Resets failsafe state. Not used for this product.
31	1031	MAX_NOTIFY	128	-	Maximum number of alert information which can be held in the device.
32	1032	LIM_NOTIFY	128	AUTO	Maximum number of alert information which the device notifies at a time. By specifying this, the number of alert to notify the host is limited, and it can prevent the host from overflowing.
33	1033	CONFIRM_TIME	640000	AUTO	
34	1034	WRITE_LOCK	1	AUTO	Prohibits setpoints from being written from the outside. 1: Not Locked 2: Locked
35	1035	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
36	1036	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
37	1037	ALARM_SUM	0x0000 0x0000 0x0000 0x0000	- - - AUTO	Parameter to show the alarm status of the entire block. Bit assignment complies with the Communication standard specifications.
38	1038	ACK_OPTION	0xFFFF	AUTO	Sets operation to acknowledge (acknowledgment for the alarm) of various alarms. By setting a bit to the alarm, the device operates for the alarm as if it is acknowledged without the acknowledgment. Bit assignment complies with the Communication standard specifications.
39	1039	WRITE_PRI	0	AUTO	Sets the WRITE_ALM priority. It can be used not just to set the priority, but to disable alarm notification with settings. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
40	1040	WRITE_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0(State 0)	AUTO - - - -	The alarm is activated if the write lock condition is changed in the sequence like, "Lock -> Reset" or "Reset -> Lock".

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
41	1041	ITK_VER	6	-	Version number of the FF certification test (interoperability test) by Fieldbus Foundation applied to this product.
42	1042	COMPATIBILITY_REV	2	-	Indicates the lower revision compatible with the device DevRev.
43	1043	CAPABILITY_LEV	0	-	Indicates capability level inside the device.
44	1044	FD_VER	1	-	Indicates the major version value of diagnosis specification of the device.
45	1045	FD_FAIL_ACTIVE	0x00000000	-	Parameter assigned to “Failed” by the NAMUR NE-107 classification. For details about bit assignment, refer to ■ Field Diagnostic.
46	1046	FD_OFFSPEC_ACTIVE	0x00000000	-	Parameter assigned to “Off Specification” by the NAMUR NE-107 classification. For details about bit assignment, refer to ■ Field Diagnostic.
47	1047	FD_MAINT_ACTIVE	0x00000000	-	Parameter assigned to “Maintenance” by the NAMUR NE-107 classification. For details about bit assignment, refer to ■ Field Diagnostic.
48	1048	FD_CHECK_ACTIVE	0x00000000	-	Parameter assigned to “Check Function” by the NAMUR NE-107 classification. For details about bit assignment, refer to ■ Field Diagnostic.
49	1049	FD_FAIL_MAP	0xFC000000	AUTO	Specifies a bit to assign to FD_FAIL_ACTIVE, parameter indicating “Failed”, among 32-bit alarms appearing on FD_SIMULATE.DiagnosticValue. For details about bit assignment, refer to ■ Field Diagnostic.
50	1050	FD_OFFSPEC_MAP	0x00003800	AUTO	Specifies a bit to assign to FD_OFFSPEC_ACTIVE, parameter indicating “Off Specification” among 32-bit alarms appearing on FD_SIMULATE.DiagnosticValue. For details about bit assignment, refer to ■ Field Diagnostic.
51	1051	FD_MAINT_MAP	0x000003E0	AUTO	Specifies a bit to assign to FD_MAINT_ACTIVE, parameter indicating “Maintenance”, among 32-bit alarms appearing on FD_SIMULATE.DiagnosticValue. For details about bit assignment, refer to ■ Field Diagnostic.
52	1052	FD_CHECK_MAP	0x01FF8008	AUTO	Specifies a bit to assign to FD_CHECK_ACTIVE, parameter indicating “Check Function”, among 32-bit alarms appearing on FD_SIMULATE.DiagnosticValue. For details about bit assignment, refer to ■ Field Diagnostic.
53	1053	FD_FAIL_MASK	0x00000000	AUTO	Specifies a bit not to notify to the host among 32-bit “Failed” alarms appearing on FD_FAIL_ACTIVE. For details about bit assignment, refer to ■ Field Diagnostic.
54	1054	FD_OFFSPEC_MASK	0x00000000	AUTO	Specifies a bit not to notify to the host among 32-bit “Off Specification” alarms appearing on FD_OFFSPEC_ACTIVE. For details about bit assignment, refer to ■ Field Diagnostic.
55	1055	FD_MAINT_MASK	0x00000000	AUTO	Specifies a bit not to notify to the host among 32-bit “Maintenance” alarms appearing on FD_MAINT_ACTIVE. For details about bit assignment, refer to ■ Field Diagnostic.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
56	1056	FD_CHECK_ MASK	0x00000000	AUTO	Specifies a bit not to notify to the host among 32-bit "CheckFunction" alarms appearing on FD_CHECK_ACTIVE. For details about bit assignment, refer to ■ Field Diagnostic.
57	1057	FD_FAIL_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when the alarm classified into "Failed" occurs.
58	1058	FD_OFFSPEC_ ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when the alarm classified into "Off Specification" occurs. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
59	1059	FD_MAINT_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when the alarm classified into "Maintenance" occurs.
60	1060	FD_CHECK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when the alarm classified into "Check Function" occurs.
61	1061	FD_FAIL_PRI	0	AUTO	Indicates the FD_FAIL_ALM priority of the alarm. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
62	1062	FD_OFFSPEC_ PRI	0	AUTO	Indicates the FD_OFFSPEC_ALM priority of the alarm. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
63	1063	FD_MAINT_PRI	0	AUTO	Indicates the FD_MAINT_ALM priority of the alarm. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
64	1064	FD_CHECK_PRI	0	AUTO	Shows the FD_CHECK_ALM priority of the alarm. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
65	1065	FD_SIMULATE	0x00000000 0x00000000 1	AUTO - AUTO	Parameter to simulate an alarm.
66	1066	FD_RECOMMEN_ACT	0	-	Indicates countermeasure for the most important alarm.
67	1067	FD_EXTENDED_ACTIVE_1	0x00000000	-	Parameter to initiate an alarm. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
68	1068	FD_EXTENDED_ACTIVE_2	0x00000000	-	
69	1069	FD_EXTENDED_ACTIVE_3	0x00000000	-	
70	1070	FD_EXTENDED_ACTIVE_4	0x00000000	-	
71	1071	FD_EXTENDED_ACTIVE_5	0x00000000	-	
72	1072	FD_EXTENDED_ACTIVE_6	0x00000000	-	
73	1073	FD_EXTENDED_ACTIVE_7	0x00000000	-	
74	1074	FD_EXTENDED_ACTIVE_8	0x00000000	-	
75	1075	FD_EXTENDED_MAP_1	0x000010E0	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_1 to DEVICE CONDITION_ACTIVE_1.
76	1076	FD_EXTENDED_MAP_2	0x7F047F0F	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_2 to DEVICE CONDITION_ACTIVE_2. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
77	1077	FD_EXTENDED_MAP_3	0xE43D410B	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_3 to DEVICE CONDITION_ACTIVE_3. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
78	1078	FD_EXTENDED_MAP_4	0xDF3F09FF	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_4 to DEVICE CONDITION_ACTIVE_4. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
79	1079	FD_EXTENDED_MAP_5	0x00000400	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_5 to DEVICE CONDITION_ACTIVE_5. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
80	1080	FD_EXTENDED_MAP_6	0x00000000	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_6 to DEVICE CONDITION_ACTIVE_6. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
81	1081	FD_EXTENDED_MAP_7	0x00000000	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_7 to DEVICE CONDITION_ACTIVE_7. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
82	1082	FD_EXTENDED_MAP_8	0x00000000	AUTO	Parameter set by the user as the mask from FD_EXTENDED_ACTIVE_8 to DEVICE CONDITION_ACTIVE_8. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
83	1083	DEVICE_CONDITION_ACTIVE_1	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_1 for FD_EXTENDED_ACTIVE_1. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
84	1084	DEVICE_CONDITION_ACTIVE_2	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_2 for FD_EXTENDED_ACTIVE_2. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
85	1085	DEVICE_CONDITION_ACTIVE_3	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_3 for FD_EXTENDED_ACTIVE_3. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
86	1086	DEVICE_CONDITION_ACTIVE_4	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_4 for FD_EXTENDED_ACTIVE_4. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
87	1087	DEVICE_CONDITION_ACTIVE_5	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_5 for FD_EXTENDED_ACTIVE_5. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
88	1088	DEVICE_CONDITION_ACTIVE_6	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_6 for FD_EXTENDED_ACTIVE_6. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
89	1089	DEVICE_CONDITION_ACTIVE_7	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_7 for FD_EXTENDED_ACTIVE_7. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
90	1090	DEVICE_CONDITION_ACTIVE_8	0x00000000	-	Shows results reflecting the mask by FD_EXTENDED_MAP_8 for FD_EXTENDED_ACTIVE_8. For details about bit assignment, refer to FD and bit items in the table in Subsection 5.6.2.
91	1091	SOFTWARE_REV	-	-	Software revision
92	1092	WRITE_LOCK_LEVEL	2	AUTO	See 5.12.

■ Field diagnostic

Bit	Selection FOUNDATION Fieldbus
31	Electronics failure
30	Sensor/Actuator failure
29	Failure which requires investigation
28	Device specific failure
26	Operated at the backup side
24	Firmware update error
23	Communication configuration error
22	Non operating state
21	Calibration warning
20	Instrument configuration error
19	Function restricted
18	Simulation mode
17	Manual mode
16	Function Block notification
15	Device specific function check
13	Sensor-Actuator value out of specification
12	Environment out of specification
11	Device specific out of specification
9	Temporal decrease of value quality
8	Deteriorate estimation by counter
7	Deteriorate estimation by anomaly detection
6	Device specific maintenance request 2
5	Device specific maintenance request 1
3	Optional function configuration error
2	Alarm related information
1	Process alarm
0	CHECK

6.2 Sensor Transducer Block

■ List of sensor transducer block parameter

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	2000	Block Header	STB	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	2001	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	2002	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	2003	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	2004	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	2005	MODE_BLK	0x80(O/S) 0x80(O/S) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	2006	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	2007	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
8	2008	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
9	2009	TRANSDUCER_DIRECTORY	1 2010	- -	Parameter to store the index of the transducer included in the device.
10	2010	TRANSDUCER_TYPE	32872(Sensor TB)	-	Indicates the device type.
11	2011	TRANSDUCER_TYPE_VER	0x0001	-	Indicates the version of the device.
12	2012	XD_ERROR	0	-	Stores XD_ERROR which is occurring in the sensor transducer block.
13	2013	COLLECTION_DIRECTORY	0	-	Stores indexes of important parameters in the transducer block and the item ID of the corresponding DD.
14	2014	PRIMARY_VALUE_TYPE	101(volumetric)	-	Indicates a process type of Primary Value.
15	2015	PRIMARY_VALUE	0 0	- -	Indicates the volumetric flow rate.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
16	2016	PRIMARY_ VALUE_RANGE	28.2743 0 1349(m³/h) 4	- - - -	Indicates the range information and unit information for volumetric flow rate.
17	2017	SECONDARY_ VALUE_TYPE	0x8050	-	Indicates a process type of Secondary Value. This product is 0x8050 (totalizer 1).
18	2018	SECONDARY_ VALUE	0 0	- -	Indicates the value of totalizer 1.
19	2019	SECONDARY_ VALUE_RANGE	1 0 1034(m³) 4	- - - -	Indicates the unit information of totalizer 1.
20	2020	XD_OPTS	0x00000000	O/S	Bit assignment complies with the Communication standard specifications.
21	2021	SENSOR_TYPE	102(Electromagnetic)	-	Indicates a sensor input type. (102: Electromagnetic)
22	2022	SENSOR_ RANGE	1 0 1061(m/s) 4	- - - -	Indicates a sensor input range information.
23	2023	SENSOR_SN	Space (32 characters)	-	Indicates the serial No. of the sensor.
24	2024	SENSOR_CAL_ METHOD	101(static weigh)	AUTO	Specifies a calibration method for the sensor.
25	2025	SENSOR_CAL_ LOC	Yokogawa	AUTO	Specifies a location to calibrate the sensor.
26	2026	SENSOR_CAL_ DATE	0,0,0,1,1,15 (00:00:00 January 1, 2015)	AUTO	Specifies the calibration date of the sensor.
27	2027	SENSOR_CAL_ WHO	Yokogawa	AUTO	Specifies the calibrator of the sensor.
28	2028	BLOCK_ERR_ DESC_1	0x00000000	-	Indicates the detailed information of BLOCK_ERR. For details about bit assignment, refer to ■ List of sensor transducer block parameter bit.
29	2029	VOLUME_ FLOW_VALUE	0 0	- -	See 5.1.3.
30	2030	VOLUME_ FLOW_UNIT	m³/h	-	See 5.1.4.
31	2031	VOLUME_ FLOW_ DAMPING	3	AUTO	See 5.1.6.
32	2032	VOLUME_ FLOW_ DAMPING_ TOTAL	3	AUTO	See 5.1.6.
33	2033	MASS_FLOW_ VALUE	0 0	- -	See 5.1.3.
34	2034	MASS_FLOW_ UNIT	1324(kg/h)	-	See 5.1.4.
35	2035	MASS_FLOW_ DAMPING	3	AUTO	See 5.1.6.
36	2036	MASS_FLOW_ DAMPING_ TOTAL	3	AUTO	See 5.1.6.
37	2037	VELOCITY_ FLOW_VALUE	0 0	- -	See 5.1.3.
38	2038	VELOCITY_ FLOW_UNIT	1061(m/s)	-	See 5.1.4.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
39	2039	VELOCITY_ FLOW_ DAMPING	3	AUTO	See 5.1.6.
40	2040	VELOCITY_ FLOW_ DAMPING_ TOTAL	3	AUTO	See 5.1.6.
41	2041	CALORIFIC_ VALUE	0 0	- -	See 5.1.3.
42	2042	CALORIFIC_UNIT	50302(J/h)	-	See 5.1.4.
43	2043	CALORIFIC_ DAMPING	3	AUTO	See 5.1.6.
44	2044	CALORIFIC_ DAMPING_ TOTAL	3	AUTO	See 5.1.6.
45	2045	SELECTED_ FLOW	1(Volume)	-	Shows the flow rate process selected in AI FB.
46	2046	VELOCITY_ CHECK	0	-	Shows the flow rate process span shown on SELECTED_FLOW.
47	2047	TOTAL_1_VALUE	0 0	- -	See 5.2.2.
48	2048	TOTAL_1_UNIT	1034(m^3)	-	See 5.2.1. For a selection, see the STB selection supplement.
49	2049	TOTAL_2_VALUE	0 0	- -	See 5.2.2.
50	2050	TOTAL_2_UNIT	1034(m^3)	-	See 5.2.1. For a selection, see the STB selection supplement.
51	2051	LOW_MF	1.0	O/S	Specifies the meter factor of the low-frequency side.
52	2052	HIGH_MF	1.0	O/S	Specifies the meter factor of the high-frequency side.
53	2053	LOW_MF_EDF	1.0	O/S	Parameter for service
54	2054	HIGH_MF_EDF	1.0	O/S	Parameter for service
55	2055	SELECT_FLOW_ SENSOR	0	O/S	Sets the type of the remote sensor.
56	2056	MEASURE_ MODE	0	O/S	Parameter for service
57	2057	NOMINAL_SIZE_ UNIT	0(mm)	O/S	See 5.1.8.
58	2058	NOMINAL_SIZE	100	O/S	See 5.1.8.
59	2059	AUTOZERO_ EXECUTE	0(Not execute)	AUTO	See 5.1.11.
60	2060	ZERO_VALUE	0	O/S	See 5.1.11.
61	2061	SIGNAL_LOCK	0(Unlock)	AUTO	See 5.5.7.
62	2062	VELOCITY_ FLOW_SPAN	1.0	O/S	See 5.1.5.
63	2063	VOLUME_ FLOW_SPAN	28.2743	O/S	See 5.1.5.
64	2064	MASS_FLOW_ SPAN	1.0	O/S	See 5.1.5.
65	2065	CALORIFIC_ SPAN	1.0	O/S	See 5.1.5.
66	2066	TOT1_CONV_FC	1.0	O/S	See 5.2.2.
67	2067	TOT1_LOWCUT	0.0	O/S	See 5.1.7.
68	2068	TOT1_LOWCUT_ UNIT	1349(m^3/h)	-	See 5.2.1.
69	2069	TOT1_F_OPTS	1(Stop)	O/S	See 5.2.4.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
70	2070	TOT1_OPTS	2(OnlyPositive)	O/S	See 5.2.6.
71	2071	TOT1_EXEC	0(Stop)	O/S	See 5.2.5.
72	2072	TOT1_PRESET	0(Not execute)	O/S	See 5.2.7.
73	2073	TOT1_PRE_VAL	0.0	O/S	See 5.2.7.
74	2074	TOT1_SETPNT	0.0	O/S	See 5.2.3.
75	2075	TOT2_CONV_FC	1.0	O/S	See 5.2.2.
76	2076	TOT2_LOWCUT	0.0	O/S	See 5.1.7.
77	2077	TOT2_LOWCUT_UNIT	1349(m^3/h)	-	See 5.2.1.
78	2078	TOT2_F_OPTS	1(Stop)	O/S	See 5.2.4.
79	2079	TOT2_OPTS	2(OnlyPositive)	O/S	See 5.2.6.
80	2080	TOT2_EXEC	0(Stop)	O/S	See 5.2.5.
81	2081	TOT2_PRESET	0(Not execute)	O/S	See 5.2.7.
82	2082	TOT2_PRE_VAL	0.0	O/S	See 5.2.7.
83	2083	TOT2_SETPNT	0.0	O/S	See 5.2.3.
84	2084	TEMPERATURE_FUNC	0(No function)	O/S	See 5.4.
85	2085	TEMPERATURE_UNIT	0(°C)	O/S	See 5.4.
86	2086	TEMPERATURE_URV	120	O/S	See 5.4.
87	2087	TEMPERATURE_LRV	0	O/S	See 5.4.
88	2088	FLOW_DIRECT	0(Forward)	O/S	See 5.5.1.
89	2089	RATE_LIMIT	5	O/S	See 5.5.2.
90	2090	DEAD_TIM	0	O/S	See 5.5.2.
91	2091	NOISE_FILTER	0(Manual)	O/S	See 5.5.2.
92	2092	PULSING_FLOW	0(No)	O/S	See 5.5.3.
93	2093	POWER_SYNCH	0(No)	O/S	See 5.5.4.
94	2094	SET_PWR_FREQ	50	O/S	See 5.5.4.
95	2095	IEX_PWR_FREQ	0	-	See 5.5.4.
96	2096	MES_PWR_FREQ	0	-	See 5.5.4.
97	2097	DENSITY_SEL	0(Fixed value)	O/S	See 5.1.9.
98	2098	DENSITY_UNIT	0(kg/m^3)	O/S	See 5.1.9.
99	2099	FIXED_DENS	0	O/S	See 5.1.9.
100	2100	STD_DENSITY	0	O/S	See 5.1.9.
101	2101	STD_TEMP	20	O/S	See 5.1.10.
102	2102	TEMP_COEF_A1	0	O/S	See 5.5.5.
103	2103	TEMP_COEF_A2	0	O/S	See 5.5.5.
104	2104	MEAS_TEMP	0 0	- -	See 5.1.10.
105	2105	CORRCT_DENS	0	-	See 5.1.9.
106	2106	SPEC_HEAT	4184	O/S	See 5.5.6.
107	2107	CALORIFIC_FIX_TEMP	20	O/S	See 5.1.10.
108	2108	LIMIT_STS_VEL1_VALUE	0x1C 0	- -	See 5.3.1 ■ Flow velocity limit switch.
109	2109	LIMIT_STS_VEL1_SETPOINT	10	O/S	See 5.3.1 ■ Flow velocity limit switch.
110	2110	LIMIT_STS_VEL1_ACT_DIRECTION	1(High limit)	O/S	See 5.3.1 ■ Flow velocity limit switch.
111	2111	LIMIT_STS_VEL1_HYSTERESIS	0	O/S	See 5.3.1 ■ Flow velocity limit switch.
112	2112	LIMIT_STS_VEL1_UNIT	1061(m/s)	-	See 5.3.1 ■ Flow velocity limit switch.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
113	2113	LIMIT_STS_VEL2_VALUE	0x1C 0	- -	See 5.3.1 ■ Flow velocity limit switch.
114	2114	LIMIT_STS_VEL2_SETPOINT	-10	O/S	See 5.3.1 ■ Flow velocity limit switch.
115	2115	LIMIT_STS_VEL2_ACT_DIRECTION	0(Low limit)	O/S	See 5.3.1 ■ Flow velocity limit switch.
116	2116	LIMIT_STS_VEL2_HYSTERESIS	0	O/S	See 5.3.1 ■ Flow velocity limit switch.
117	2117	LIMIT_STS_VEL2_UNIT	1061(m/s)	-	See 5.3.1 ■ Flow velocity limit switch.
118	2118	LIMIT_STS_VOL1_VALUE	0x1C 0	- -	See 5.3.1 ■ Volumetric flow rate limit switch.
119	2119	LIMIT_STS_VOL1_SETPOINT	282.7433	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
120	2120	LIMIT_STS_VOL1_ACT_DIRECTION	1(High limit)	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
121	2121	LIMIT_STS_VOL1_HYSTERESIS	0	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
122	2122	LIMIT_STS_VOL1_UNIT	1349(m^3/h)	-	See 5.3.1 ■ Volumetric flow rate limit switch.
123	2123	LIMIT_STS_VOL2_VALUE	0x1C 0	- -	See 5.3.1 ■ Volumetric flow rate limit switch.
124	2124	LIMIT_STS_VOL2_SETPOINT	-282.7433	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
125	2125	LIMIT_STS_VOL2_ACT_DIRECTION	0(Low limit)	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
126	2126	LIMIT_STS_VOL2_HYSTERESIS	0	O/S	See 5.3.1 ■ Volumetric flow rate limit switch.
127	2127	LIMIT_STS_VOL2_UNIT	1349(m^3/h)	-	See 5.3.1 ■ Volumetric flow rate limit switch.
128	2128	LIMIT_STS_MASS1_VALUE	0x1C 0	- -	See 5.3.1 ■ Mass flow rate limit switch.
129	2129	LIMIT_STS_MASS1_SETPOINT	1	O/S	See 5.3.1 ■ Mass flow rate limit switch.
130	2130	LIMIT_STS_MASS1_ACT_DIRECTION	1(High limit)	O/S	See 5.3.1 ■ Mass flow rate limit switch.
131	2131	LIMIT_STS_MASS1_HYSTERESIS	0	O/S	See 5.3.1 ■ Mass flow rate limit switch.
132	2132	LIMIT_STS_MASS1_UNIT	1324(kg/h)	-	See 5.3.1 ■ Mass flow rate limit switch.
133	2133	LIMIT_STS_MASS2_VALUE	0x1C 0	- -	See 5.3.1 ■ Mass flow rate limit switch.
134	2134	LIMIT_STS_MASS2_SETPOINT	-1	O/S	See 5.3.1 ■ Mass flow rate limit switch.
135	2135	LIMIT_STS_MASS2_ACT_DIRECTION	0(Low limit)	O/S	See 5.3.1 ■ Mass flow rate limit switch.
136	2136	LIMIT_STS_MASS2_HYSTERESIS	0	O/S	See 5.3.1 ■ Mass flow rate limit switch.
137	2137	LIMIT_STS_MASS2_UNIT	1324(kg/h)	-	See 5.3.1 ■ Mass flow rate limit switch.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
138	2138	LIMIT_STS_ CAL1_VALUE	0x1C 0	- -	See 5.3.1 ■ Calorie limit switch.
139	2139	LIMIT_STS_ CAL1_SETPOINT	1	O/S	See 5.3.1 ■ Calorie limit switch.
140	2140	LIMIT_STS_ CAL1_ACT_ DIRECTION	1(High limit)	O/S	See 5.3.1 ■ Calorie limit switch.
141	2141	LIMIT_ STS_CAL1_ HYSTERESIS	0	O/S	See 5.3.1 ■ Calorie limit switch.
142	2142	LIMIT_STS_ CAL1_UNIT	50302(J/h)	-	See 5.3.1 ■ Calorie limit switch.
143	2143	LIMIT_STS_ CAL2_VALUE	0x1C 0	- -	See 5.3.1 ■ Calorie limit switch.
144	2144	LIMIT_STS_ CAL2_SETPOINT	-1	O/S	See 5.3.1 ■ Calorie limit switch.
145	2145	LIMIT_STS_ CAL2_ACT_ DIRECTION	0(Low limit)	O/S	See 5.3.1 ■ Calorie limit switch.
146	2146	LIMIT_ STS_CAL2_ HYSTERESIS	0	O/S	See 5.3.1 ■ Calorie limit switch.
147	2147	LIMIT_STS_ CAL2_UNIT	50302(J/h)	-	See 5.3.1 ■ Calorie limit switch.
148	2148	ALM_OUT_ MASK1	Ind bd FAIL on	O/S	See 5.6.6 ■ Alarm record mask.
149	2149	ALM_OUT_ MASK2	Adh over lv4 on Pls1 saturate on Coil insu on	O/S	See 5.6.6 ■ Alarm record mask.
150	2150	ALM_OUT_ MASK3	Adh over lv3 on LC warn on Insu detect on FLN over lv3 on FLN over lv4 on Verif warn on FC noise warn on Restore run on Disp over on SD size warn on SD mismatch on SD remov ERR on Watchdog on Power off on Inst PW Fail on Prm bkup run on Data log run on	O/S	See 5.6.6 ■ Alarm record mask.
151	2151	ALM_OUT_ MASK4	0x00000000	O/S	See 5.6.6 ■ Alarm record mask.
152	2152	ALM_REC_ MASK1	0x00000000	O/S	See 5.6.6 ■ Alarm record mask.
153	2153	ALM_REC_ MASK2	0x00000000	O/S	See 5.6.6 ■ Alarm record mask.
154	2154	ALM_REC_ MASK3	G/A mismatch on	O/S	See 5.6.6 ■ Alarm record mask.
155	2155	ALM_RECORD1	0(All Space)	-	See 5.6.5.
156	2156	ALM_TIME1	“ 00000D 00:00”	-	See 5.6.5.
157	2157	ALM_RECORD2	0(All Space)	-	See 5.6.5.
158	2158	ALM_TIME2	“ 00000D 00:00”	-	See 5.6.5.
159	2159	ALM_RECORD3	0(All Space)	-	See 5.6.5.
160	2160	ALM_TIME3	“ 00000D 00:00”	-	See 5.6.5.
161	2161	ALM_RECORD4	0(All Space)	-	See 5.6.5.
162	2162	ALM_TIME4	“ 00000D 00:00”	-	See 5.6.5.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
163	2163	STB_INFO1	0	-	Parameter for service

List of selection for sensor transducer block parameter

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
SENSOR_CAL_ METHOD		Sensor Calibration method	100 101 102 255		volumetric static weigh dynamic weigh other
SELECTED_FLOW	PV flow select	Selected Flow	0 1 2	Velocity Volume Mass	Velocity Volume Mass
SELECT_FLOW_ SENSOR	Flow sensor sel	Select Flow Sensor	0 1 2 4 7 8 9 10	ADMAG AXG ADMAG AXW ADMAG AXF ADMAG AE Calibrator Other 1 Other 2 Other 3	ADMAG AXG ADMAG AXW ADMAG AXF ADMAG AE Calibrator Other1 Other2 Other3
NOMINAL_SIZE_ UNIT	Nominal size unit	Nominal Size Unit	0 1	mm inch	mm inch
AUTOZERO_ EXECUTE	Autozero ▶ Execute	Autozero Execute	0 1	Not execute Execute	Not execute Execute
SIGNAL_LOCK	0% signal lock	Signal Lock	0 1	Off On	Unlock Lock
TOT1_F_OPTS TOT2_F_OPTS	Totalizer 1 ▶ Failure opts Totalizer 2 ▶ Failure opts	Total 1 Failure Opts Total 2 Failure Opts	0 1 2	Measuredvalue Stop Last valid	Measured value Stop Last valid
TOT1_OPTS TOT2_OPTS	Totalizer 1 ▶ Options Totalizer 2 ▶ Options	Total 1 Options Total 2 Options	0 1 2 3 4	Balanced Absolute Only positive Only negative Hold	Balanced Absolute OnlyPositive OnlyNegative Hold
TOT1_EXEC TOT2_EXEC	Totalizer 1 ▶ Start/Stop Totalizer 2 ▶ Start/Stop	Total 1 Execution Total 2 Execution	0 1	Stop Start	Stop Start
TOT1_PRESET TOT2_PRESET	Totalizer 1 ▶ Reset/Preset Totalizer 2 ▶ Reset/Preset	Total 1 Preset Total 2 Preset	0 1 2	Not execute Reset Preset	Not execute Reset Preset
TEMPERATURE_ FUNC	Temperature ▶ Function	Temp Function	0 1 2 3	No function Monitoring Difftemperature Temperature	No function Monitoring Diff temperture Ext temperature
TEMPERATURE_ UNIT	Temperature ▶ Unit	Temp Unit	0 1 2	°C °F K	°C °F K
FLOW_DIRECT	Flow direct	Flow Direction	0 1	Forward Reverse	Forward Reverse
NOISE_FILTER	Noise filter	Noise Filter	0 1 2 3	Manual Level 1 Level 2 Level 3	Manual Level 1 Level 2 Level 3

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
PULSING_FLOW	Pulsing flow	Pulsing Flow	0 1	No Yes	No Yes
POWER_SYNCH	Power sync on/off	Power Synchronize	0 1	Off On	No Yes
DENSITY_SEL	Value select	Density Select	0 1	Fixed value Correctionvalue	Fixed value Correction value
DENSITY_UNIT	Density ► Unit	Density Unit	0 1 2	kg/m^3 lb/gal lb/cf	kg/m^3 lb/gal lb/cf
LIMIT_STS_VEL1_ACT_DIRECTION	-	Lmt Sts Velo1 Act Dir	0	-	Low limit
LIMIT_STS_VEL2_ACT_DIRECTION	-	Lmt Sts Velo2 Act Dir	1	-	High limit
LIMIT_STS_VOL1_ACT_DIRECTION	-	Lmt Sts Vol1 Act Dir			
LIMIT_STS_VOL2_ACT_DIRECTION	-	Lmt Sts Vol2 Act Dir			
LIMIT_STS_MASS1_ACT_DIRECTION	-	Lmt Sts Mass1 Act Dir			
LIMIT_STS_MASS2_ACT_DIRECTION	-	Lmt Sts Mass2 Act Dir			
LIMIT_STS_CAL1_ACT_DIRECTION	-	Lmt Sts Cal1 Act Dir			
LIMIT_STS_CAL2_ACT_DIRECTION	-	Lmt Sts Cal2 Act Dir			

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
ALM_RECORD1	-	Alarm Record 1	0	-	All Space
ALM_RECORD2	-	Alarm Record 2	1	-	10:Main CPU FAIL
ALM_RECORD3	-	Alarm Record 3	2	-	11:Rev cal FAIL
ALM_RECORD4	-	Alarm Record 4	3	-	12:Main EEP FAIL
			4	-	13:Main EEP dflt
			5	-	14:Snsr bd FAIL
			6	-	15:Snsr comm ERR
			7	-	16:A/D1 FAIL
			8	-	17:A/D2 FAIL
			9	-	18:Coil open
			10	-	19:Coil short
			11	-	20:Exciter FAIL
			14	-	23:Opt mismatch
			18	-	27:Restore FAIL
			19	-	28:Ind bd FAIL
			20	-	29:Ind EEP FAIL
			21	-	30:LCD drv FAIL
			22	-	31:Ind mismatch
			23	-	32:Ind comm ERR
			24	-	33:microSD FAIL
			25	-	50:Sig overflow
			26	-	51:Empty detect
			28	-	53:Adh over lv4
			29	-	85:Cable miscon
			30	-	120:Watchdog
			31	-	121:Power off
			32	-	122:Inst PW FAIL
			33	-	130:ID not entr
			35	-	133:G/A mismatch

■ List of sensor transducer block parameter bit

Label			Bit	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
ALM_OUT_ MASK1	Mask 1-1 (bit28) Mask 1-2 (bit1 - 6)	Alarm Out Mask1	bit:28	013:Main EEP dflt	Main EEP dflt on
			bit:6	028:Ind bd FAIL	Ind bd FAIL on
			bit:5	029:Ind bd EEP FAIL	Ind EEP FAIL on
			bit:4	030:LCD drv FAIL	LCD drv FAIL on
			bit:3	031:Ind bd mismatch	Ind mismatch on
			bit:2	032:Ind comm ERR	Ind comm ERR on
			bit:1	033:microSD FAIL	SD FAIL on
ALM_OUT_ MASK2	Mask 2-1(bit31 - 17) Mask 2-2(bit15 - 0)	Alarm Out Mask2	bit:31	050:Signal overflow	Sig overflow on
			bit:30	051:Empty detect	Empty detect on
			bit:28	053:Adh over lv 4	Adh over lv4 on
			bit:23	060:Span cfg ERR	Span cfg ERR on
			bit:17	066:Density cfg ERR	Dens cfg ERR on
			bit:15	067:Pls 1 cfg ERR	Pls1 cfg ERR on
			bit:13	069:Nomi size cfg	Nomi size cfg on
			bit:12	070:Adh cfg ERR	Adh cfg ERR on
			bit:11	071:FLN cfg ERR	FLN cfg ERR on
			bit:10	072:Log not start	Log not start on
			bit:5	082:Pls 1 saturate	Pls1 saturte on
			bit:2	085:Cable miscon	Cable miscon on
			bit:1	086:Coil insulation	Coil insu on
			bit:0	131:Trans mismatch	Trn mismatch on
ALM_OUT_ MASK3	Mask 3-1(bit31 - 20) Mask 3-2(bit15 - 3)	Alarm Out Mask3	bit:31	087:Adhesion lv 3	Adh over lv3 on
			bit:30	088:LC warn	LC warn on
			bit:29	089:Insu detect	Insu detect on
			bit:28	090:FLN over lv 3	FLN over lv3 on
			bit:27	091:FLN over lv 4	FLN over lv4 on
			bit:26	092:AZ warn	AZ warn on
			bit:25	093:Verif warn	Verif warn on
			bit:24	094:Fact noise warn	FC noise warn on
			bit:23	095:Simulate active	Sim active on
			bit:20	098:Pls 1 fix	Pls1 fix on
			bit:15	101:Param restore run	Restore run on
			bit:14	102:Disp over	Disp over on
			bit:13	103:SD size warn	SD size warn on
			bit:12	104:Bkup incmplt	Bkup incmplt on
			bit:11	105:SD mismatch	SD mismatch on
			bit:10	106:SD removal ERR	SD remov ERR on
			bit:7	120:Watchdog	Watchdog on
			bit:6	121:Power off	Power off on
			bit:5	122:Inst power FAIL	Inst PW Fail on
			bit:4	123:Param bkup run	Prm bkup run on
			bit:3	124:Data log run	Data log run on
ALM_OUT_ MASK4	Mask 4-1	Alarm Out Mask4	bit: 21	133:G/A mismatch	G/A mismatch error

Label			Bit	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
ALM_REC_MASK1	Mask 1-1(bit31) Mask 1-2(bit28 - 1)	Alarm Record Mask1	bit:31 bit:6 bit:5 bit:4 bit:3 bit:2 bit:1	013:Main EEP dflt 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL	Main EEP dflt on Ind bd FAIL on Ind EEP FAIL on LCD drv FAIL on Ind mismatch on Ind comm ERR on SD FAIL on
ALM_REC_MASK2	Mask 2-1 Mask 2-2	Alarm Record Mask2	bit:31 bit:30 bit:28 bit:2	050:Signal overflow 051:Empty detect 053:Adh over lv 4 085:Cable miscon	Sig overflow on Empty detect on Adh over lv4 on Cable miscon on
ALM_REC_MASK3	Mask 4-1	Alarm Record Mask4	bit:21	133:G/A mismatch	G/A mismatch error
BLOCK_ERR_DESC_1	-	Block Err Desc	bit:31	-	10:Main board CPU failure
			bit:30	-	11:Reverse calculation failure
			bit:29	-	12:Main board EEPROM failure
			bit:28	-	13:Main board EEPROM default
			bit:27	-	14:Sensor board failure
			bit:26	-	15:Sensor communication error
			bit:25	-	16:A/D1 failure[Signal]
			bit:24	-	17:A/D2 failure[Exciter]
			bit:23	-	18:Coil open
			bit:22	-	19:Coil short
			bit:21	-	20:Exciter failure
			bit:18	-	50:Signal overflow
			bit:17	-	51:Empty pipe detection
			bit:16	-	60:Span configuration error
			bit:15	-	69:Nominal size configuration error
			bit:14	-	92:Autozero warning
			bit:13	-	131:Transmitter type mismatch
			bit:12	-	133:G/A mismatch error
			bit:11	-	53:Adhension over level 4
			bit:10	-	87:Adhesion over level 3
			bit:9	-	91:Flow noise over level 4
			bit:8	-	66:Density configuration error

6.3 Diagnosis Transducer Block

■ List of diagnosis transducer block parameter

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	2500	Block Header	DTB	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	2501	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	2502	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	2503	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	2504	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	2505	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	2506	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	2507	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
8	2508	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
9	2509	TRANSDUCER_DIRECTORY	1 2510	- -	Parameter to store the index of the transducer included in the device.
10	2510	TRANSDUCER_TYPE	32896(Diagnostic TB)	-	Indicates the device type.
11	2511	TRANSDUCER_TYPE_VER	0x0000	-	Indicates the version of the device.
12	2512	XD_ERROR	0	-	Stores the most important error among errors which are occurring in the sensor transducer block.
13	2513	COLLECTION_DIRECTORY	0	-	Stores indexes of important parameters in the transducer block and the item ID of the corresponding DD.
14	2514	ADHESION_VALUE	0 0	- -	See 5.1.3.
15	2515	ADHESION_VALUE_UNIT	1283(MOhm)	-	Shows the adhesion resistance unit.
16	2516	ELECTRODE_A_VALUE	0 0	- -	See 5.1.3.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
17	2517	ELECTRODE_A_VALUE_UNIT	1240(V)	-	Shows the electrode voltage unit (V).
18	2518	ELECTRODE_B_VALUE	0 0	- -	See 5.1.3.
19	2519	ELECTRODE_B_VALUE_UNIT	1240(V)	-	Shows the electrode voltage unit (V).
20	2520	FLOW_NOISE_VALUE	0 0	- -	See 5.1.3.
21	2521	FLOW_NOISE_VALUE_UNIT	50500(cm/s)	-	Shows the flow noise unit (cm/s).
22	2522	CONDUCTIVITY_VALUE	0 0	- -	See 5.1.3.
23	2523	CONDUCTIVITY_VALUE_UNIT	50501(mS/cm)	-	Shows the conductivity unit (mS/cm).
24	2524	ADHESION_CHECK	1(Enable)	AUTO	See 5.9.3.
25	2525	ADHESION_LEVEL1	0.1	AUTO	See 5.9.3.
26	2526	ADHESION_LEVEL2	0.5	AUTO	See 5.9.3.
27	2527	ADHESION_LEVEL3	4	AUTO	See 5.9.3.
28	2528	ADHESION_LEVEL4	12	AUTO	See 5.9.3.
29	2529	ADHESION_STATUS	0(Level0)	-	See 5.9.3.
30	2530	ADHESION_CHECK_CYCLE	2(2min)	AUTO	See 5.9.3.
31	2531	FLOW_NOISE_CHECK	0(Disable)	AUTO	See 5.9.8.
32	2532	FLOW_NOISE_LEVEL1	5	AUTO	See 5.9.8.
33	2533	FLOW_NOISE_LEVEL2	10	AUTO	See 5.9.8.
34	2534	FLOW_NOISE_LEVEL3	30	AUTO	See 5.9.8.
35	2535	FLOW_NOISE_LEVEL4	400	AUTO	See 5.9.8.
36	2536	FLOW_NOISE_STATUS	0(Level0)	-	See 5.9.8.
37	2537	FLOW_NOISE_DAMPING	3	AUTO	See 5.1.6.
38	2538	LOW_CONDUCT_CHECK	0(Disable)	AUTO	See 5.9.9.
39	2539	CONDUCTIVITY_LIMIT	0.001	AUTO	See 5.9.9.
40	2540	DIAG_EXECUTION	0(Not execute)	O/S	See 5.9.5 or 5.9.7.
41	2541	COIL_INSULATION_TH	25	AUTO	Specifies the value to judge coil insulation.
42	2542	IEX_COMPARE	0	-	Displays the standard exciting current value to judge coil insulation.
43	2543	PEAK_HOLD_VALUE	0	-	Displays the maximum amplitude of the electrode signal (voltage value).
44	2544	IEX_COIL_RESISTANCE	0	-	Displays the coil resistance value when exciting current is applied.
45	2545	EMPTY_STS	0(Full)	-	See 5.9.4.
46	2546	DIAG_OUTPUT	0(Zero)	AUTO	See 5.9.5, 5.9.6, or 5.9.7.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
47	2547	VERIFICATION_ TARGET	0xf800	AUTO	See 5.9.6. For details about bit assignment, refer to ■ List of diagnosis transducer block parameter selection bit.
48	2548	VERIFICATION_ MODE	0(No flow)	AUTO	See 5.9.6.
49	2549	VERIFICATION_ EXE	0(Not execute)	O/S	See 5.9.6.
50	2550	VERIFICATION_ NO	0(Factory)	AUTO	See 5.9.6.
51	2551	VERIFICATION_ CHECK_RESULT	3(No Data)	-	See 5.9.6.
52	2552	VERIFICATION_ OPERATION_ TIME	“ 00000D 00:00”	-	See 5.9.6.
53	2553	MAGNETIC_ CIRCUIT_ RESULT	3(No Data)	-	See 5.9.6.
54	2554	EXCITING_ CIRCUIT_ RESULT	3(No Data)	-	See 5.9.6.
55	2555	CALCULATION_ CIRCUIT_ RESULT	3(No Data)	-	See 5.9.6.
56	2556	DEVICE_ STATUS_RESULT	3(No Data)	-	See 5.9.6.
57	2557	CONNECTION_ STATUS_RESULT	3(No Data)	-	See 5.9.6.
58	2558	LIMIT_STS_ ADH1_VALUE	0 0	- -	See 5.3.1 ■ Adhesion diagnosis limit switch.
59	2559	LIMIT_STS_ ADH1_SETPOINT	0	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
60	2560	LIMIT_STS_ ADH1_ACT_ DIRECTION	1(High limit)	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
61	2561	LIMIT_STS_ ADH1_ HYSTERESIS	0	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
62	2562	LIMIT_STS_ ADH1_UNIT	1283(MOhm)	-	See 5.3.1 ■ Adhesion diagnosis limit switch.
63	2563	LIMIT_STS_ ADH2_VALUE	0 0	- -	See 5.3.1 ■ Adhesion diagnosis limit switch.
64	2564	LIMIT_STS_ ADH2_SETPOINT	0	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
65	2565	LIMIT_STS_ ADH2_ACT_ DIRECTION	0(Low limit)	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
66	2566	LIMIT_STS_ ADH2_ HYSTERESIS	0	O/S	See 5.3.1 ■ Adhesion diagnosis limit switch.
67	2567	LIMIT_STS_ ADH2_UNIT	1283(MOhm)	-	See 5.3.1 ■ Adhesion diagnosis limit switch.
68	2568	LIMIT_STS_ ELEC_A1_VALUE	0 0	- -	5.3.1 ■ Voltage limit switch between Electrode A to C
69	2569	LIMIT_STS_ ELEC_A1_ SETPOINT	0	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C
70	2570	LIMIT_STS_ ELEC_A1_ACT_ DIRECTION	1(High limit)	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
71	2571	LIMIT_STS_ ELEC_A1_ HYSTERESIS	0	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C
72	2572	LIMIT_STS_ ELEC_A1_UNIT	1240(V)	-	5.3.1 ■ Voltage limit switch between Electrode A to C
73	2573	LIMIT_STS_ ELEC_A2_VALUE	0 0	- -	5.3.1 ■ Voltage limit switch between Electrode A to C
74	2574	LIMIT_STS_ ELEC_A2_ SETPOINT	0	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C
75	2575	LIMIT_STS_ ELEC_A2_ACT_ DIRECTION	0(Low limit)	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C
76	2576	LIMIT_STS_ ELEC_A2_ HYSTERESIS	0	O/S	5.3.1 ■ Voltage limit switch between Electrode A to C
77	2577	LIMIT_STS_ ELEC_A2_UNIT	1240(V)	-	5.3.1 ■ Voltage limit switch between Electrode A to C
78	2578	LIMIT_STS_ ELEC_B1_VALUE	0 0	- -	5.3.1 ■ Voltage limit switch between Electrode B to C
79	2579	LIMIT_STS_ ELEC_B1_ SETPOINT	0	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
80	2580	LIMIT_STS_ ELEC_B1_ACT_ DIRECTION	1(High limit)	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
81	2581	LIMIT_STS_ ELEC_B1_ HYSTERESIS	0	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
82	2582	LIMIT_STS_ ELEC_B1_UNIT	1240(V)	-	5.3.1 ■ Voltage limit switch between Electrode B to C
83	2583	LIMIT_STS_ ELEC_B2_VALUE	0 0	- -	5.3.1 ■ Voltage limit switch between Electrode B to C
84	2584	LIMIT_STS_ ELEC_B2_ SETPOINT	0	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
85	2585	LIMIT_STS_ ELEC_B2_ACT_ DIRECTION	0(Low limit)	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
86	2586	LIMIT_STS_ ELEC_B2_ HYSTERESIS	0	O/S	5.3.1 ■ Voltage limit switch between Electrode B to C
87	2587	LIMIT_STS_ ELEC_B2_UNIT	1240(V)	-	5.3.1 ■ Voltage limit switch between Electrode B to C
88	2588	LIMIT_STS_ FLN1_VALUE	0 0	- -	5.3.1 ■ Flow noise limit switch
89	2589	LIMIT_STS_ FLN1_SETPOINT	0	O/S	5.3.1 ■ Flow noise limit switch
90	2590	LIMIT_STS_ FLN1_ACT_ DIRECTION	1(High limit)	O/S	5.3.1 ■ Flow noise limit switch
91	2591	LIMIT_ STS_FLN1_ HYSTERESIS	0	O/S	5.3.1 ■ Flow noise limit switch
92	2592	LIMIT_STS_ FLN1_UNIT	50500(cm/s)	-	5.3.1 ■ Flow noise limit switch
93	2593	LIMIT_STS_ FLN2_VALUE	0 0	- -	5.3.1 ■ Flow noise limit switch
94	2594	LIMIT_STS_ FLN2_SETPOINT	0	O/S	5.3.1 ■ Flow noise limit switch

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
95	2595	LIMIT_STS_ FLN2_ACT_ DIRECTION	0(Low limit)	O/S	5.3.1 ■ Flow noise limit switch
96	2596	LIMIT_ STS_FLN2_ HYSTERESIS	0	O/S	5.3.1 ■ Flow noise limit switch
97	2597	LIMIT_STS_ FLN2_UNIT	50500(cm/s)	-	5.3.1 ■ Flow noise limit switch
98	2598	LIMIT_STS_ CNDC1_VALUE	0 0	- -	5.3.1 ■ Conductivity limit switch
99	2599	LIMIT_STS_ CNDC1_ SETPOINT	0	O/S	5.3.1 ■ Conductivity limit switch
100	2600	LIMIT_STS_ CNDC1_ACT_ DIRECTION	1(High limit)	O/S	5.3.1 ■ Conductivity limit switch
101	2601	LIMIT_STS_ CNDC1_ HYSTERESIS	0	O/S	5.3.1 ■ Conductivity limit switch
102	2602	LIMIT_STS_ CNDC1_UNIT	50501(mS/cm)	-	5.3.1 ■ Conductivity limit switch
103	2603	LIMIT_STS_ CNDC2_VALUE	0 0	- -	5.3.1 ■ Conductivity limit switch
104	2604	LIMIT_STS_ CNDC2_ SETPOINT	0	O/S	5.3.1 ■ Conductivity limit switch
105	2605	LIMIT_STS_ CNDC2_ACT_ DIRECTION	0(Low limit)	O/S	5.3.1 ■ Conductivity limit switch
106	2606	LIMIT_STS_ CNDC2_ HYSTERESIS	0	O/S	5.3.1 ■ Conductivity limit switch
107	2607	LIMIT_STS_ CNDC2_UNIT	50501(mS/cm)	-	5.3.1 ■ Conductivity limit switch
108	2608	LIMIT_STS_ADH_ WARNING	0 0	- -	Judges ON/OFF operation concerning the adhesion warning.
109	2609	LIMIT_STS_ADH_ ALARM	0 0	- -	Judges ON/OFF operation concerning the adhesion alarm.
110	2610	LIMIT_STS_FLN_ WARNING	0 0	- -	Judges ON/ OFF operation concerning the flow noise warning.
111	2611	LIMIT_STS_FLN_ ALARM	0 0	- -	Judges ON/ OFF operation concerning the flow noise alarm.
112	2612	LIMIT_STS_ LOW_CNDC_ WARNING	0 0	- -	Judges ON/ OFF operation concerning the low conductivity warning.
113	2613	DIAG_ INFORMATION_1	0	-	Parameter for service
114	2614	DIAG_ INFORMATION_2	0	-	Parameter for service
115	2615	DIAG_ INFORMATION_3	0	-	Parameter for service
116	2616	DIAG_ INFORMATION_4	0	-	Parameter for service
117	2617	DIAG_ INFORMATION_5	0	-	Parameter for service
118	2618	DIAG_ INFORMATION_6	0	-	Parameter for service

■ List of diagnosis transducer block parameter selection

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
ADHESION_CHECK FLOW_NOISE_CHECK LOW_CONDUCT_CHECK	Adhesion ▶ Function Flow noise ▶ Function Conductivity ▶ Function	Adhesion Check Flow Noise Check Low Conduct Check	0 1	Disable Enable	Disable Enable
ADHESION_STATUS FLOW_NOISE_STATUS	Adhesion ▶ Result ▶ Status Flow noise ▶ Result ▶ Status	Adhesion Status Flow Noise Status	0 1 2 3 4	Level 0 Level 1 Level 2 Level 3 Level 4	Level0 Level1 Level2 Level3 Level4
ADHESION_CHECK_CYCLE	Check cycle	Adhesion Check Cycle	0 1 2 3	0.5 min 1 min 2 min 10 min	0.5min 1min 2min 10min
DIAG_EXECUTION	Diagnostic execute	Diagnostic Execution	0 1 2	Not execute Electrode insul exe Connect check exe	Not execute Elec Ins exe* Conn Chk exe
EMPTY_STS	Empty status	Empty Status	0 1	Full Empty	Full Empty
DIAG_OUTPUT	Diagnostic output	Diagnostic Output	0 1 2	Zero Measured value Hold	Zero Measured value Hold
VERIFICATION_MODE	Verification ▶ Mode	Verification Mode	0 1	No flow Flow	No flow Flow
VERIFICATION_EXE	Verification ▶ Execute	Verification Exe	0 1	Not execute Execute	Not execute Execute
VERIFICATION_NO	VF No	Verification No	0 1 2	Factory Previous Present	Factory Previous Present
VERIFICATION_CHECK_RESULT MAGNETIC_CIRCUIT_RESULT EXCITING_CIRCUIT_RESULT CALCULATION_CIRCUIT_RESULT DEVICE_STATUS_RESULT CONNECTION_STATUS_RESULT	Failed/Passed Magnetic circuit Excite circuit Calc circuit Device status Connect status	VF Check Results Magnetic Circuit Res Exciting Circuit Res Calc Circuit Res Device Status Res Connection Status Res	0 1 2 3 4 5	Passed Failed Canceled No data Unknown Skip	Passed Failed Canceled No Data Unknown Skip

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
LIMIT_STS_ADH1_ACT_DIRECTION	-	Lmt Sts Adh1 Act Dir	0	-	Low limit
LIMIT_STS_ADH2_ACT_DIRECTION	-	Lmt Sts Adh2 Act Dir	1	-	High limit
LIMIT_STS_ELEC_A1_ACT_DIRECTION	-	Lmt Sts Elec A1 Act Dir			
LIMIT_STS_ELEC_A2_ACT_DIRECTION	-	Lmt Sts Elec A2 Act Dir			
LIMIT_STS_ELEC_B1_ACT_DIRECTION	-	Lmt Sts Elec B1 Act Dir			
LIMIT_STS_ELEC_B2_ACT_DIRECTION	-	Lmt Sts Elec B2 Act Dir			
LIMIT_STS_FLN1_ACT_DIRECTION	-	Lmt Sts FLN1 Act Dir			
LIMIT_STS_FLN2_ACT_DIRECTION	-	Lmt Sts FLN2 Act Dir			
LIMIT_STS_CNDC1_ACT_DIRECTION	-	Lmt Sts Cndc1 Act Dir			
LIMIT_STS_CNDC2_ACT_DIRECTION	-	Lmt Sts Cndc2 Act Dir			

■ List of diagnosis transducer block parameter selection bit

Label			Bit	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
VERIFICATION_TARGET	VF target select	Verification Target	Bit31	Magneticcircuit	Magnetic
			Bit30	Excite circuit	Excitation
			Bit29	Calc circuit	Calculation
			Bit28	Device status	Device status
			Bit27	Connectstatus	Conn status

6.4 Display Transducer Block

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	2700	Block Header	LTB	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	2701	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	2702	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	2703	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	2704	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	2705	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	2706	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	2707	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
8	2708	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
9	2709	TRANSDUCER_DIRECTORY	1 2710	- -	Parameter to store the index of the transducer included in the device.
10	2710	TRANSDUCER_TYPE	32848(LCD TB)	-	Indicates the device type.
11	2711	TRANSDUCER_TYPE_VER	0x0000	-	Indicates the version of the device.
12	2712	XD_ERROR	0	-	Stores the most important error among errors which are occurring in the sensor transducer block.
13	2713	COLLECTION_DIRECTORY	0	-	Stores indexes of important parameters in the transducer block and the item ID of the corresponding DD.
14	2714	DISP_LINE1_SEL	1(PV)	AUTO	See 5.7.2.
15	2715	DISP_LINE2_SEL	1(Flow rate(%))	AUTO	See 5.7.2.
16	2716	DISP_LINE3_SEL	12(PD Tag)	AUTO	See 5.7.2.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
17	2717	DISP_LINE4_SEL	0(None)	AUTO	See 5.7.2.
18	2718	DISP_LINE5_SEL	0(None)	AUTO	See 5.7.2.
19	2719	DISP_LINE6_SEL	0(None)	AUTO	See 5.7.2.
20	2720	DISP_LINE7_SEL	0(None)	AUTO	See 5.7.2.
21	2721	DISP_LINE8_SEL	0(None)	AUTO	See 5.7.2.
22	2722	DISP_FORMAT_FR	7(Auto 2)	AUTO	See 5.7.3.
23	2723	DISP_FORMAT_TTL1	0(Auto)	AUTO	Not used
24	2724	DISP_FORMAT_TTL2	0(Auto)	AUTO	Specifies the decimal-point position for the totalized value of totalizer 1.
25	2725	DISP_FORMAT_TTL3	0(Auto)	AUTO	Specifies the decimal-point position for the totalized value of totalizer 2.
26	2726	DISP_CONTRAST	5(0)	AUTO	See 5.7.6.
27	2727	DISP_LINE	3(3 Line)	AUTO	See 5.7.4.
28	2728	DISP_PERIOD	1(0.4 s)	AUTO	See 5.7.5.
29	2729	DISP_NE107	0(Normal)	AUTO	See 5.6.4.
30	2730	DISP_ALARM	0(Normal)	AUTO	See 5.6.4.
31	2731	DISP_SCROLL	0(Off)	AUTO	See 5.7.4.
32	2732	DISP_DAMPING	0.0	AUTO	See 5.7.6.
33	2733	DISP_FORMAT_DATE	0(MM/DD/YYYY)	AUTO	See 5.7.6.
34	2734	LANGUAGE	0(English)	AUTO	See 5.7.1.
35	2735	DISPLAY_MODE	0(Normal)	AUTO	See 5.7.5.
36	2736	TREND_OFFLINE_LRV	0.0	AUTO	Specifies the low limit when displaying in a trend graph.
37	2737	TREND_OFFLINE_URV	10.0	AUTO	Specifies the high limit value when displaying in a trend graph.
38	2738	DISP_TREND_SEL1	0(Flow rate(%))	AUTO	See 5.7.5.
39	2739	DISP_TREND_SEL2	0(None)	AUTO	See 5.7.5.
40	2740	DISP_TREND_SEL3	0(None)	AUTO	See 5.7.5.
41	2741	DISP_TREND_SEL4	0(None)	AUTO	See 5.7.5.
42	2742	DISP_INVERSE	0(Normal)	AUTO	See 5.7.6.
43	2743	LCD_TEST	0(Not Execute)	AUTO	Specifies the test display function for the display.
44	2744	SQUAWK	0(Off)	AUTO	See 5.7.6.
45	2745	LANGUAGE_PACKAGE	0(Pack 1)	-	See 5.7.1.
46	2746	DISP_INSTALL	0(No disp)	AUTO	Specifies the presence or absence of the display.
47	2747	DISP_LOWCUT	0.0	AUTO	See 5.7.6.
48	2748	DISP_LOWCUT_UNIT	1349(m^3/h)		See 5.7.6.
49	2749	DISP_IRSW_OPERATE	1(Enable)	AUTO	Parameter to set the IR switch of the display enabled or disabled.
50	2750	I_PARAM1	-	-	Parameter for service

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
51	2751	I_PARAM2	-	-	Parameter for service
52	2752	I_PARAM3	-	-	Parameter for service
53	2753	I_PARAM4	-	-	Parameter for service

■ List of selection for display transducer block parameter

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
DISP_LINE1_SEL	Line 1	Display Line Select 1	0	Flow rate(%)	Flow rate(%)
			1	PV	PV
			2	Velocity	Velocity
			3	Volume	Volume flow
			4	Mass	Mass flow
			5	Flow rate(%Bar)	Flow rate(%Bar)
			6	Calorie	Calorie
			8	Totalizer 1	Totalizer1
			9	Totalizer 2	Totalizer2
			11	PD Tag	PD Tag
			12	Commun protocol	Commun Protocol
			13	Adhesion	Adhesion
			16	Flow noise level	Flow noise level
			18	Totalizer 1 count	Totalizer 1 count
			19	Totalizer 2 count	Totalizer 2 count
			21	AI1 Flow rate	AI1 Flow rate
			22	AI1 Flow rate(%)	AI1 Flow rate(%)
			23	AI1 Flow rate(%Bar)	AI1 Flow rate(%Bar)
			24	AI1.OUT	AI1.OUT
			25	AI2.OUT	AI2.OUT
			26	AI3.OUT	AI3.OUT
			27	AI4.OUT	AI4.OUT
			28	IT1.OUT	IT1.OUT
			29	IT2.OUT	IT2.OUT
			30	AR.OUT	AR.OUT

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
DISP_LINE2_SEL	Line 2	Display Line Select 2	0	None	None
DISP_LINE3_SEL	Line 3	Display Line Select 3	1	Flow rate(%)	Flow rate(%)
DISP_LINE4_SEL	Line 4	Display Line Select 4	2	PV	PV
DISP_LINE5_SEL	Line 5	Display Line Select 5	3	Velocity	Velocity
DISP_LINE6_SEL	Line 6	Display Line Select 6	4	Volume	Volume flow
DISP_LINE7_SEL	Line 7	Display Line Select 7	5	Mass	Mass flow
DISP_LINE8_SEL	Line 8	Display Line Select 8	6	Flow rate(%Bar)	Flow rate(%Bar)
			7	Calorie	Calorie
			9	Totalizer 1	Totalizer1
			10	Totalizer 2	Totalizer2
			12	PD Tag	PD Tag
			13	Commun protocol	Commun Protocol
			14	Adhesion	Adhesion
			17	Flow noise level	flow noise level
			19	Totalizer 1 count	Totalizer 1 count
			20	Totalizer 2 count	Totalizer 2 count
			22	AI1 Flow rate	AI1 Flow rate
			23	AI1 Flow rate(%)	AI1 Flow rate(%)
			24	AI1 Flow rate(%Bar)	AI1 Flow rate(%Bar)
			25	AI1.OUT	AI1.OUT
			26	AI2.OUT	AI2.OUT
			27	AI3.OUT	AI3.OUT
			28	AI4.OUT	AI4.OUT
			29	IT1.OUT	IT1.OUT
			30	IT2.OUT	IT2.OUT
			31	AR.OUT	AR.OUT
DISP_FORMAT_FR	Format PV	Display Format Flow Rate	0	Auto	Auto
			1	0 digit	0 digit
			2	1 digit	1 digit
			3	2 digit	2 digit
			4	3 digit	3 digit
			5	4 digit	4 digit
			6	5 digit	5 digit
			7	Auto 2	Auto 2
DISP_FORMAT_TTL1 DISP_FORMAT_TTL2	Format total 1 Format total 2	Display Format Total 1 Display Format Total 2	0	Auto	Auto
			1	0 digit	0 digit
			2	1 digit	1 digit
			3	2 digit	2 digit
			4	3 digit	3 digit
			5	4 digit	4 digit
			6	5 digit	5 digit
			7	6 digit	6 digit
			8	7 digit	7 digit

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
DISP_ CONTRAST	Contrast	Display Contrast	0	-5	-5
			1	-4	-4
			2	-3	-3
			3	-2	-2
			4	-1	-1
			5	0	0
			6	1	1
			7	2	2
			8	3	3
			9	4	4
			10	5	5
DISP_LINE	Line mode	Display Line	0	1 line(big)	1 Line(Big)
			1	1 line	1 Line
			2	2 line	2 Line
			3	3 line	3 Line
			4	4 line	4 Line
DISP_PERIOD	Period	Display Period	0	0.2 s	0.2 s
			1	0.4 s	0.4 s
			2	1.0 s	1.0 s
			3	2.0 s	2.0 s
			4	4.0 s	4.0 s
			5	8.0 s	8.0 s
DISP_NE107	NE107 display	Display NE107	0	Normal	Normal
			1	NE107	NE107
DISP_ALARM	Alarm display	Display Alarm	0	Normal	Normal
			1	Detail	Detail
DISP_SCROLL	Scroll mode	Display Scroll	0	Off	Off
			1	Manual	Manual
			2	Auto(2 s)	Auto(2 s)
			3	Auto(4 s)	Auto(4 s)
			4	Auto(8 s)	Auto(8 s)
DISP_FORMAT_ DATE	Format date	Display Format Date	0	MM/DD/YYYY	MM/DD/YYYY
			1	DD/MM/YYYY	DD/MM/YYYY
			2	YYYY/MM/DD	YYYY/MM/DD
LANGUAGE	Language	Language	0	English	English
			1	French	French
			2	German	German
			3	Italian	Italian
			4	Spanish	Spanish
			5	Portuguese	Portuguese
			6	Russian	Russian
			7	Chinese	Chinese
			8	Japanese	Japanese
DISPLAY_MODE	Display mode	Display Measure Mode	0	Normal	Normal
			1	Trend	Trend

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
DISP_TREND_SEL1	Trend 1	Display Trend Select 1	0	Flow rate(%)	Flow rate(%)
			1	PV	PV
			2	Velocity	Velocity
			3	Volume	Volume flow
			4	Mass	Mass flow
			5	Calorie	Calorie
			9	Totalizer 1	Totalizer1
			10	Totalizer 2	Totalizer2
DISP_TREND_SEL2 DISP_TREND_SEL3 DISP_TREND_SEL4	Trend 2 Trend 3 Trend 4	Display Trend Select 2 Display Trend Select 3 Display Trend Select 4	0	None	None
			1	Flow rate(%)	Flow rate(%)
			2	PV	PV
			3	Velocity	Velocity
			4	Volume flow	Volume flow
			5	Mass flow	Mass flow
			9	Calorie	Calorie
			10	Totalizer 1	Totalizer1
			11	Totalizer 2	Totalizer2
DISP_INVERSE	Inversion	Display Inversion	0	Normal	Normal
			1	Invert	Invert
LCD_TEST *	LCD test	LCD Test	0	Not execute	Not Execute
			1	Execute	Execute all
			2	Show pattern 1	Show Pattern1
			3	Show pattern 2	Show Pattern2
			4	Show pattern 3	Show Pattern3
			5	Show pattern 4	Show Pattern4
SQUAWK	Squawk	Squawk	0	Off	Off
			1	On	On
			2	Squawk once	Squawk once
LANGUAGE_PACKAGE	Language package	Language Package	0	Pack 1	Pack 1
			1	Pack 2	Pack 2
DISP_INSTALL	Disp install	Display Install	0	No disp	No disp
			1	With disp	With disp
DISP_IRSW_OPERATE	-	IRSW Operate	0	-	Disable
			1		Enable

*: LCD_TEST operates in the following ways based on selections.
Not Execute: Does not perform test display
Execute all : Test display (All lights on ► All lights off ► Houndstooth ► Houndstooth (inversion))
Show Pattern 1 : Test display (All lights on)
Show Pattern 2 : Test display (All lights off)
Show Pattern 3 : Test display (Houndstooth)
Show Pattern 4 : Test display (Houndstooth (inversion))

6.5 Maintenance Transducer Block

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	2900	Block Header	10	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	2901	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	2902	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	2903	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	2904	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	2905	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	2906	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	2907	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
8	2908	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
9	2909	TRANSDUCER_ DIRECTORY	1 2910	- -	Parameter to store the index of the transducer included in the device.
10	2910	TRANSDUCER_ TYPE	32864(Maintenance TB)	-	Indicates the device type.
11	2911	TRANSDUCER_ TYPE_VER	0x0003	-	Indicates the version of the device.
12	2912	XD_ERROR	0	-	Stores the most important error among errors which are occurring in the sensor transducer block.
13	2913	COLLECTION_ DIRECTORY	0	-	Stores indexes of important parameters in the transducer block and the item ID of the corresponding DD.
14	2914	DEVICE_KEY	0	AUTO	Parameter for service personnel

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
15	2915	DEVICE_SN	“0000000001 ”	-	Indicates the serial number of the device and transmitter. Displays Serial Number for Transmitter in the copied format.
16	2916	SPECIAL_ ORDER_ID	“0000000001 ”	AUTO	Identification number for special order
17	2917	MANUFAC_DATE	0,0,0,1,1,15 (00:00:00 January 1, 2015)	AUTO	Product completion date
18	2918	MS_CODE1	Space (32 characters)	-	MS code of device
19	2919	MS_CODE2	Space (32 characters)	-	MS code of device
20	2920	MS_CODE3	Space (32 characters)	-	MS code of device
21	2921	SOFTWARE_ DESC	“4.21 - 22 - 1.01 ”	-	Software description
22	2922	SIM_ENABLE_ MSG	Space (32 characters)	AUTO	Software switch for simulation function.
23	2923	SOFTDL_ PROTECT	1(Unprotected)	AUTO	Mask for software download function.
24	2924	SOFTDL_ERROR	0	-	Error at software download.
25	2925	SOFTDL_COUNT	0	AUTO	Number of times the software is downloaded.
26	2926	SOFTDL_ACT_ AREA	0(Area 0)	AUTO	Startup of flash ROM
27	2927	CAPABILITY_ CONFIG	0	AUTO	Setting of capability
28	2928	SI_CONTROL_ CODES	0(SI Units only)	AUTO	Switching parameter to support the SI unit on the device side.
29	2929	COMSTACK_ STATISTICS_1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- - - - - - - - - - - - - - - - -	Indicates the number of time of communication error and restarting.
30	2930	COMSTACK_ STATISTICS_2	“ ” “ ”	- -	Indicates the restarting information in the software and the DL layer communication.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
31	2931	EXEC_FB_CNT	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- -	Indicates the number of executed time of each scheduled function block.
32	2932	FB_TEMP_DEV_ID	“59454300160000000 0 ”	AUTO	Parameter utilized when changing DEVICE_ID. Only changing FB_TEMP_DEV_ID does not lead to the change of Device ID. If processing (180) only Main/B Normal is executed after setting Device ID which the user wish to change, the Device ID is valid in ADMAG TI after re-staring.
33	2933	FD_EXTENDED_SIM	0	AUTO	Parameter to simulate an alarm.
34	2934	FD_1	0	AUTO	See 5.6.2.
35	2935	FD_2	0	AUTO	
36	2936	FD_3	0	AUTO	
37	2937	FD_4	0	AUTO	
38	2938	FD_5	0	AUTO	
39	2939	FD_6	0	AUTO	
40	2940	FD_7	0	AUTO	
41	2941	FD_8	0	AUTO	
42	2942	EEPROM_STATE	Space (32 characters)	-	Parameter to indicate the EEPROM state. In which block EEP_FAILER occurs. Used to confirm initialization.
43	2943	INITIALIZE_EEPROM	0	AUTO	Parameter for service
44	2944	READ_MEMORY	Space (40 characters)	AUTO	Parameter for service
45	2945	WRITE_MEMORY	Space (40 characters)	AUTO	Parameter for service
46	2946	OPERATE_TIME	“ 00000D 00:00”	-	Operation time of the device.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
47	2947	TRNS_TYPE	2(4A Type)	-	See 5.8.2.
48	2948	EL_SIZE	1(3mm)	AUTO	See 5.9.9.
49	2949	EX_ PROTECTION	0(NO)	AUTO	Selects an explosion-protective product or standard product.
50	2950	MODEL_CODE	Space (16 characters)	AUTO	See 5.8.1.
51	2951	SUFFIX_CONF1	Space (16 characters)	AUTO	See 5.8.1.
52	2952	SUFFIX_CONF2	Space (16 characters)	AUTO	See 5.8.1.
53	2953	OPTION1	Space (16 characters)	AUTO	See 5.8.1.
54	2954	OPTION2	Space (16 characters)	AUTO	See 5.8.1.
55	2955	OPTION3	Space (16 characters)	AUTO	See 5.8.1.
56	2956	OPTION4	Space (16 characters)	AUTO	See 5.8.1.
57	2957	RS_MDL_CD	Space (16 characters)	AUTO	See 5.8.1.
58	2958	RS_SUF_CONF1	Space (16 characters)	AUTO	See 5.8.1.
59	2959	RS_SUF_CONF2	Space (16 characters)	AUTO	See 5.8.1.
60	2960	RS_OPT1	Space (16 characters)	AUTO	See 5.8.1.
61	2961	RS_OPT2	Space (16 characters)	AUTO	See 5.8.1.
62	2962	RS_OPT3	Space (16 characters)	AUTO	See 5.8.1.
63	2963	RS_OPT4	Space (16 characters)	AUTO	See 5.8.1.
64	2964	TRNS_SN	Space (16 characters)	AUTO	See 5.8.1.
65	2965	FS_SN	Space (16 characters)	AUTO	See 5.8.1.
66	2966	MEMO1	Space (16 characters)	AUTO	See 5.8.3.
67	2967	MEMO2	Space (16 characters)	AUTO	See 5.8.3.
68	2968	MEMO3	Space (16 characters)	AUTO	See 5.8.3.
69	2969	MAIN_B_REV	"R0.30.01"	-	See 5.8.2.
70	2970	SENSOR_B_REV	"R0.00.00"	-	See 5.8.2.
71	2971	IND_B_REV	"R0.00.00"	-	See 5.8.2.
72	2972	F_BCKUP_NAME	"Factory Delivery"	-	See 5.11.1.
73	2973	F_BCKUP_DATE	" 01/01/2019"	-	See 5.11.1.
74	2974	SD_BCK_NAME	"SD_FILE"	AUTO	See 5.11.1.
75	2975	BCK_NAME1	" Backup 1"	AUTO	See 5.11.1.
76	2976	BCK_DATE1	" 01/01/2019"	AUTO	See 5.11.1.
77	2977	BCK_NAME2	" Backup 2"	AUTO	See 5.11.1.
78	2978	BCK_DATE2	" 01/01/2019"	AUTO	See 5.11.1.
79	2979	BCK_NAME3	" Backup 3"	AUTO	See 5.11.1.
80	2980	BCK_DATE3	" 01/01/2019"	AUTO	See 5.11.1.
81	2981	BACKUP_EXEC	0(Not Execute)	AUTO	See 5.11.1.
82	2982	BACKUP_RSLT	0(Unexecuted)	-	See 5.11.1.
83	2983	RESTORE_EXEC	0(Not Execute)	AUTO	See 5.11.2.
84	2984	RESTORE_RSLT	0(Unexecuted)	-	See 5.11.2.
85	2985	LOGGING_FILE	"LOG_FILE"	AUTO	See 5.11.4.
86	2986	LOG_INTR_TIM	3(1min)	AUTO	See 5.11.4.
87	2987	L_START_DATE	" 01/01/2019"	-	See 5.11.4.
88	2988	L_START_TIME	" 00: 00: 00"	-	See 5.11.4.
89	2989	LOG_END_TIME	4(12h)	AUTO	See 5.11.4.
90	2990	LOG1_SELECT	4(PV)	AUTO	See 5.11.4.
91	2991	LOG2_SELECT	0(Velocity)	AUTO	See 5.11.4.
92	2992	LOG3_SELECT	1(Volume flow)	AUTO	See 5.11.4.
93	2993	LOG4_SELECT	1(Mass flow)	AUTO	See 5.11.4.
94	2994	LOGGING_EXEC	0(Not Execute)	AUTO	See 5.11.4.
95	2995	TEST_AUTO_ RELEASE_TIM	1(30min)	AUTO	See 5.10.3.
96	2996	TEST_MODE	0(Off)	AUTO	See 5.10.1.
97	2997	VELOCITY_ TEST_VALUE	0.0	AUTO	See 5.10.2.
98	2998	P1_TEST_VALUE	0	AUTO	See 5.10.2.

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
99	2999	SO1_TEST_VALUE	0(Open)	AUTO	See 5.10.2.
100	3000	TEST_2_MODE	0(Normal)	AUTO	See 5.10.2.
101	3001	TEST_2_OUT	0.0	AUTO	See 5.10.2.
102	3002	P1_OUT_MODE	1(Fixed Pulse Output)	AUTO	See 5.14.1.
103	3003	P1_ACT_MODE	0(On Active)	AUTO	See 5.14.4.
104	3004	P1_WIDTH	0(0.05ms)	AUTO	See 5.14.3.
105	3005	P1_RATE_UNIT	3(Unit/P)	AUTO	See 5.14.5.
106	3006	P1_RATE_VAL	1.0	AUTO	See 5.14.5.
107	3007	P1_LOW_CUT	0.0	AUTO	See 5.1.7.
108	3008	P1_LOW_CUT_UNIT	1349(m^3/h)	-	Indicates the unit of the physical quantity assigned to Pulse1. (Value for the unit of the physical quantity selected in Sensor TB.SELECTED_FLOW)
109	3009	P1_ALM_OUT	0(0 pps)	AUTO	See 5.14.2.
110	3010	F1_AT_0	0	AUTO	See 5.14.6.
111	3011	F1_AT_100	0	AUTO	See 5.14.6.
112	3012	SO1_FUNC	0(No function)	AUTO	See 5.14.7.
113	3013	P1_OPTS	2(Only positive)	AUTO	Selects the totalization mode for P1.

■ List of selection for maintenance transducer block parameter

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
SOFTDL_PROTECT	-	Soft DL Protect	1 2	-	Unprotected Protected
SOFTDL_ACT_AREA	-	Soft DL Act Area	0 1	-	Area 0 Area 1
SI_CONTROL_CODES	SI unit	SI Control Codes	0 1 2	SI All JP only	SI Units only All JP only

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
TRNS_TYPE	Transmitter type	Transmitter Type	0 1 2	None 1A type 4A type	Non 1A Type 4A Type
EL_SIZE	Electrode size	Electrode Size	0 1 2 3 4	1 mm 3 mm 8 mm 10 mm 6 mm	1mm 3mm 8mm 10mm 6mm
EX_PROTECTION	Explosionprotection	Explosion Proof	0 1	No Yes	NO YES
BACKUP_EXEC	Backup execute	Backup Execute	0 1 2 3 4 5 6 7	Not execute Store main to 1 Store main to 2 Store main to 3 Store main to SD Store EEP1 to SD Store EEP2 to SD Store EEP3 to SD	Not Execute Store Main to 1 Store Main to 2 Store Main to 3 Store Main to SD Store EEP1 to SD Store EEP2 to SD Store EEP3 to SD
BACKUP_RSLT RESTORE_RSLT	Backup result Restore result	Backup Result Restore Result	0 1 2 3	Unexecuted Success Failure Running	Unexecuted Success Failure Running
RESTORE_EXEC	Restore execute	Restore Execute	0 1 2 3 4 5 6 7 8 9 10 11 12 13	Not execute Duplicate data 1 Duplicate data 2 Duplicate data 3 Duplicate SD Restore data 1 Restore data 2 Restore data 3 Restore SD Compulsion data 1 Compulsion data 2 Compulsion data 3 Compulsion SD Restore factory	Not Execute Duplicate Data1 Duplicate Data2 Duplicate Data3 Duplicate SD Restore Data1 Restore Data2 Restore Data3 Restore SD Compulsion Data1 Compulsion Data2 Compulsion Data3 Compulsion SD Restore Factory
LOG_INTR_TIM	Interval time	Logging Interval Time	0 1 2 3 4 5 6	1 s 10 s 30 s 1 min 5 min 30 min 1 h	1s 10s 30s 1min 5min 30min 1h

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
LOG_END_TIME	End time	Logging End Time	0 1 2 3 4 5 6 7 8 9	10 min 30 min 1 h 3 h 12 h 24 h 72 h 240 h 720 h 1440 h	10min 30min 1h 3h 12h 24h 72h 240h 720h 1440h
LOG1_SELECT LOG2_SELECT LOG3_SELECT LOG4_SELECT	Log 1 Log 2 Log 3 Log 4	Log 1 Select Log 2 Select Log 3 Select Log 4 Select	0 1 2 3 4 5 6 7 8 9	Velocity Volume Mass Calorie PV Flow noise Adhesion Electrode A Electrode B V peak	Velocity Volume flow Mass flow Calorie PV Flow noise Adhesion Electrode A Electrode B V peak
LOGGING_EXEC	Data log ► Execute	Logging Execute	0 1	Not execute Execute	Not Execute Execute
TEST_AUTO_ RELEASE_TIM	Release time	Test Auto Release Time	0 1 2 3 4	10 min 30 min 1 h 3 h 12 h	10min 30min 1h 3h 12h
TEST_MODE	Test mode	Test Mode	0 1 2 3	Off Velocity test PO1 test SO1 test	Off Velocity Pulse Status
SO1_TEST_ VALUE	SO1	SO1 Test Value	0 1	Open Close	Open Close
TEST_2_MODE	Test 2 mode	Test 2 Mode	0 1	Normal Test	Normal Test
P1_OUT_MODE	Output mode	Pulse 1 Output Mode	0 1 2 3	No function Fixed pulse output Frequency output Status output	No function Fixed Pulse Output Frequency Output Status Output
P1_ACT_MODE	Active mode	Pulse 1 Active Mode	0 1	On active Off active	On Active Off Active

Label			Value	Selection	
Parameter Name	Display	FOUNDATION Fieldbus		Display	FOUNDATION Fieldbus
P1_WIDTH	Fix width	Pulse 1 Fix Width	0	0.05 ms	0.05ms
			1	0.1 ms	0.1ms
			2	0.5 ms	0.5ms
			3	1 ms	1ms
			4	20 ms	20ms
			5	33 ms	33ms
			6	50 ms	50ms
			7	100 ms	100ms
			8	200 ms	200ms
			9	330 ms	330ms
			10	500 ms	500ms
			11	1000 ms	1000ms
			12	2000 ms	2000ms
			13	Duty cycle 50%	Duty cycle 50%
P1_RATE_UNIT	Rate unit	Pulse 1 Rate Unit	0	n unit/P	n unit/P
			1	u unit/P	u unit/P
			2	m unit/P	m unit/P
			3	Unit/P	Unit/P
			4	k unit/P	k unit/P
			5	m unit/P	M unit/P
			6	n P/unit	n P/unit
			7	u P/unit	u P/unit
			8	m P/unit	m P/unit
			9	P/unit	P/unit
			10	k P/unit	k P/unit
			11	m P/unit	M P/unit
P1_ALM_OUT	Alarm out	Pulse 1 Alarm Out	0	0 pps	0 pps
			1	Measured value	Measured value
			2	Last valid	Last valid
			3	Max pps	Max pps
SO1_FUNC	P01/S01 ► Function	SO1 Function	0	No function	No function
			1	Alarm output	Alarm output
			2	Warning output	Warning output
			3	Total limit 1	Total limit 1
			4	Total limit 2	Total limit 2
			5	Total limit 3	Total limit 3
P1_OPTS	Options	Pulse 1 Options	0	Balanced	Balanced
			1	Absolute	Absolute
			2	Only positive	Only positive
			3	Only negative	Only negative

6.6 AI Function Block

Relative Index	Index				Parameter Name	Default Value	Write Mode	Description
	AI1	AI2	AI3	AI4 (only AXG)				
0	4000	4100	4200	4300	Block Header	AI1:“AI1 ” AI2:“AI2 ” AI3:“AI3 ” AI4:“AI4 ”	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	4001	4101	4201	4301	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	4002	4102	4202	4302	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	4003	4103	4203	4303	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	4004	4104	4204	4304	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	4005	4105	4205	4305	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	4006	4106	4206	4306	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	4007	4107	4207	4307	PV	0x1C 0.0	- -	Indicates the PV value (or the process value corresponding to the value) and status to be used for functional execution.
8	4008	4108	4208	4308	OUT	0x1C 0.0	- MAN	Indicates the value and status of analog output. Held when the block mode is MAN and O/S.
9	4009	4109	4209	4309	SIMULATE	0 0.0 0 0.0 1	AUTO AUTO - - AUTO	Parameter to simulate the AI block. The user can arbitrarily specify an input value and status from CHANNEL.
10	4010	4110	4210	4310	XD_SCALE	AI1 : 28.2743 AI2,AI3,AI4 : 1 0.0 AI1 : 1349(m^3/h) AI2, AI3, AI4 : 1034(m^3) 4	O/S O/S O/S O/S	Sets an input value (measured range) from the Transducer Block which corresponds to 0% and 100% points in calculation in the AI function block.
11	4011	4111	4211	4311	OUT_SCALE	AI1 : 28.2743 AI2,AI3,AI4 : 1 0.0 AI1 : 1349(m^3/h) AI2,AI3,AI4 : 1034(m^3) 4	O/S O/S O/S O/S	Parameter to scale output. Sets the output values for 0% and 100% points in calculation in the AI function block. Any unit stipulated in the FieldComm Group specifications can be defined.

Relative Index	Index				Parameter Name	Default Value	Write Mode	Description
	AI1	AI2	AI3	AI4 (only AXG)				
12	4012	4112	4212	4312	GRANT_DENY	0x00 0x00	AUTO AUTO	The parameter for checking if various operations have been executed. Set a bit corresponding to the GRANT parameter before various operations are executed. Check the DENY parameter after the operation. If the bit for the operation is not set, it indicates that the operation was executed. Bit assignment complies with the Communication standard specifications.
13	4013	4113	4213	4313	IO_OPTS	0x0000	O/S	Specifies the option settings and input/output functions of the IO block. Bit assignment complies with the Communication standard specifications.
14	4014	4114	4214	4314	STATUS_OPTS	0x0000	O/S	Option for the user to select in the status book processing. Bit assignment complies with the Communication standard specifications.
15	4015	4115	4215	4315	CHANNEL	AI1: 2(Volume flow) AI2, AI3, AI4: 5(Total1)	O/S	Parameter to select a channel for the transducer block to connect with.
16	4016	4116	4216	4316	L_TYPE	1(Direct)	Man	Parameter to select a totalization method for OUT. Refer to A1.3 for selection.
17	4017	4117	4217	4317	LOW_CUT	0.0	AUTO	Specifies a low-cut point. When the square root output is selected, and this function is set to valid with IO_OPTS, the output becomes 0 if the output goes below the setpoint for this parameter.
18	4018	4118	4218	4318	PV_FTIME	3.0	AUTO	Specifies the AI block filter (damping) in seconds.
19	4019	4119	4219	4319	FIELD_VAL	0x00 0.0	- -	Value obtained by scaling the input value with XD_SCALE and expressed in %. Raw value that is not influenced by the calculation or filter specified by L_TYPE.
20	4020	4120	4220	4320	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
21	4021	4121	4221	4321	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.
22	4022	4122	4222	4322	ALARM_SUM	0x0000 0x0000 0x0000 0x0000	- - - AUTO	Parameter to indicate the alarm status of the entire block.

Relative Index	Index				Parameter Name	Default Value	Write Mode	Description
	AI1	AI2	AI3	AI4 (only AXG)				
23	4023	4123	4223	4323	ACK_OPTION	0xFFFF	AUTO	Sets operation to acknowledge (acknowledgment for the alarm) of various alarms. By setting a bit to the alarm, the device operates for the alarm as if it is acknowledged without the acknowledgment. Bit assignment complies with the Communication standard specifications.
24	4024	4124	4224	4324	ALARM_HYS	0.5	AUTO	Threshold (hysteresis) against clearing each alarm of HI_HI, HI, LO and LO_LO. An active alarm is cleared if the setpoint goes into the normal value side by the amount of hysteresis from the limit value.
25	4025	4125	4225	4325	HI_HI_PRI	0	AUTO	Specifies the priority for the HI_HI alarm. It can be used not just to set the priority, but to disable alarm notification. Meanwhile, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
26	4026	4126	4226	4326	HI_HI_LIM	FLT_MAX	AUTO	Specifies a limit value for the HI_HI alarm.
27	4027	4127	4227	4327	HI_PRI	0	AUTO	Specifies the priority of the HI alarm. Meanwhile, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
28	4028	4128	4228	4328	HI_LIM	FLT_MAX	AUTO	Specifies a limit value for the HI alarm.

Relative Index	Index				Parameter Name	Default Value	Write Mode	Description
	AI1	AI2	AI3	AI4 (only AXG)				
29	4029	4129	4229	4329	LO_PRI	0	AUTO	Specifies the priority for the LO alarm. Meanwhile, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
30	4030	4130	4230	4330	LO_LIM	-FLT_MAX	AUTO	Specifies a limit value for the LO alarm.
31	4031	4131	4231	4331	LO_LO_PRI	0	AUTO	Specifies the priority of the LO_LO alarm. Meanwhile, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
32	4032	4132	4232	4332	LO_LO_LIM	-FLT_MAX	AUTO	Specifies a limit value for the LO_LO alarm.
33	4033	4133	4233	4333	HI_HI_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0.0	AUTO - - - -	Indicates information about the HI_HI alarm that occurred.
34	4034	4134	4234	4334	HI_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0.0	AUTO - - - -	Indicates information about the HI alarm that occurred.
35	4035	4135	4235	4335	LO_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0.0	AUTO - - - -	Indicates information about the LO alarm that occurred.
36	4036	4136	4236	4336	LO_LO_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0.0	AUTO - - - -	Indicates information about the LO_LO alarm that occurred.
37	4037	4137	4237	4337	BLOCK_ERR_ DESC_1	0x00000000	-	Bit assignment complies with the Communication standard specifications.

6.7 DI Function Block

Relative Index	Index			Parameter Name	Default Value	Write Mode	Description
	DI1	DI2	DI3				
0	6000	6100	6200	Block Header	DI1:“DI1 ” DI2:“DI2 ” DI3:“DI3 ”	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	6001	6101	6201	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	6002	6102	6202	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	6003	6103	6203	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	6004	6104	6204	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	6005	6105	6205	MODE_BLK	0x08(Auto) 0x08(Auto) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	6006	6106	6206	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	6007	6107	6207	PV_D	0x1C 0	- -	The primary discrete value (or process value) for execution of the block’s functions.
8	6008	6108	6208	OUT_D	0x1C 0	- MAN	Indicates the value and status of output value.
9	6009	6109	6209	SIMULATE_D	0(Bad:NonSpecific:NotLimited) 0(State 0) 0(Bad:NonSpecific:NotLimited) 0(State 0) 1(Disabled)	AUTO AUTO - - AUTO	Selects whether to use a limit switch input which is actually input from the transducer block, or to use a value specified by an operator. If the simulation is set to Disable, the actual value and status will be reflected.
10	6010	6110	6210	XD_STATE	0	AUTO	Not used for this product.
11	6011	6111	6211	OUT_STATE	0	AUTO	Not used for this product.

Relative Index	Index			Parameter Name	Default Value	Write Mode	Description
	DI1	DI2	DI3				
12	6012	6112	6212	GRANT_ DENY	0x00 0x00	AUTO AUTO	Parameter to check whether various operations are executed. Corresponds to the operation of the GRANT parameter before executing various operations. Set a bit and check the DENY parameter after the operation. If the bit corresponding to the operation is not set, it indicates that the operation was executed. Bit assignment complies with the Communication standard specifications.
13	6013	6113	6213	IO_OPTS	0x0000	O/S	Sets function settings for the block input/output options. Bit assignment complies with the Communication standard specifications.
14	6014	6114	6214	STATUS_ OPTS	0x0000	O/S	Parameter to select a block operation with status condition, etc. Bit assignment complies with the Communication standard specifications.
15	6015	6115	6215	CHANNEL	23(VolFlw.1)	O/S	Specifies a channel number for hardware to be connected to the transducer block. Bit assignment complies with the Communication standard specifications.
16	6016	6116	6216	PV_FTIME	0.0	AUTO	Specifies filter damp for PV_D.
17	6017	6117	6217	FIELD_VAL_D	0x00 0	- -	The status of the limit switch signal transferred from the transducer block.
18	6018	6118	6218	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0,0 0 0	AUTO - - - -	Shows the content of an update event (a change to the setpoint) upon occurrence.
19	6019	6119	6219	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0	AUTO - - - -	Indicates contents when a block alarm occurs.
20	6020	6120	6220	ALARM_ SUM|ALARM_ SUM_DI	0x0000 0x0000 0x0000 0x0000	- - - AUTO	Parameter to show alarm status in the block. Bit assignment complies with the Communication standard specifications.

Relative Index	Index			Parameter Name	Default Value	Write Mode	Description
	DI1	DI2	DI3				
21	6021	6121	6221	ACK_OPTION	0xFFFF	AUTO	Sets operation to acknowledge (acknowledgment for the alarm) of various alarms. By setting a bit to the alarm, the device operates for the alarm as if it is acknowledged without the acknowledgment. Bit assignment complies with the Communication standard specifications.
22	6022	6122	6222	DISC_PRI	0	AUTO	Specifies the alarm priority.
23	6023	6123	6223	DISC_LIM	0	AUTO	Indicates the input status for discrete alarm. Meanwhile, to activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
24	6024	6124	6224	DISC_ALM	0(Uninitialized) 0(Uninitialized) 0,0 0(Other) 0(State 0)	AUTO - - - -	Indicates the status related to discrete alarm.

6.8 MAO Function Block (only AXG)

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
0	10000	Block Header	"MAO"	O/S	Information on this block, such as Block Tag, DD Revision, Execution, etc.
1	10001	ST_REV	0	-	Represents the revision level of the setting parameter of the own block. This revision is updated if the setpoint is changed. Used to check for parameter change, etc.
2	10002	TAG_DESC	Space (32 characters)	AUTO	Universal parameter to store a comment explaining tag contents.
3	10003	STRATEGY	1	AUTO	Universal parameter intended to be used for the high-level system to separate function blocks.
4	10004	ALERT_KEY	1	AUTO	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	10005	MODE_BLK	0x80(O/S) 0x80(O/S) 0x88(Auto, O/S) 0x08(Auto)	AUTO - AUTO AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	10006	BLOCK_ERR	0x0000	-	Indicates the error statuses related to the own block.
7	10007	CHANNEL	20(Temperature)	O/S	Parameter to select a channel for the transducer block to connect with. For this product, 20 fixed.
8	10008	IN_1	0x0B 0	AUTO AUTO	See 5.4.
9	10009	IN_2	0x0B 0	AUTO AUTO	Not used for this product.
10	10010	IN_3	0x0B 0	AUTO AUTO	
11	10011	IN_4	0x0B 0	AUTO AUTO	
12	10012	IN_5	0x0B 0	AUTO AUTO	
13	10013	IN_6	0x0B 0	AUTO AUTO	
14	10014	IN_7	0x0B 0	AUTO AUTO	
15	10015	IN_8	0x0B 0	AUTO AUTO	
16	10016	MO_OPTS	0x0000	AUTO	Operational parameter to specify the output operation of MAO Function Block. Specifies a value to be transmitted to the sensor transducer block mainly at the fault state. Bit assignment complies with the Communication standard specifications.
17	10017	FSTATE_TIME	0	AUTO	Transits to the fault state when an input continues to be Bad for more than time set by FSTATE_TIME.
18	10018	FSTATE_VAL1	0	AUTO	Value to be transmitted to the sensor transducer block as input 1 at the fault state. (Option)
19	10019	FSTATE_VAL2	0	AUTO	Value to be transmitted to the sensor transducer block as input 2 at the fault state. (Option)

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
20	10020	FSTATE_VAL3	0	AUTO	Value to be transmitted to the sensor transducer block as input 3 at the fault state. (Option)
21	10021	FSTATE_VAL4	0	AUTO	Value to be transmitted to the sensor transducer block as input 4 at the fault state. (Option)
22	10022	FSTATE_VAL5	0	AUTO	Value to be transmitted to the sensor transducer block as input 5 at the fault state. (Option)
23	10023	FSTATE_VAL6	0	AUTO	Value to be transmitted to the sensor transducer block as input 6 at the fault state. (Option)
24	10024	FSTATE_VAL7	0	AUTO	Value to be transmitted to the sensor transducer block as input 7 at the fault state. (Option)
25	10025	FSTATE_VAL8	0	AUTO	Value to be transmitted to the sensor transducer block as input 8 at the fault state. (Option)
26	10026	FSTATE_STATUS	0x0000	-	Indicates the list of input items transited to the fault state. Bit assignment complies with the Communication standard specifications.
27	10027	UPDATE_EVT	0(Uninitialized) 0(Uninitialized) 0 0 0	AUTO - - - -	Indicates contents of the event when an update event (a change to the setpoint) occurs.
28	10028	BLOCK_ALM	0(Uninitialized) 0(Uninitialized) 0 0(Other) 0	AUTO - - - -	Indicates contents of the alarm when a block alarm occurs.

6.9 Unit and Code

Code	Unit
1034	m^3
1036	cm^3
1038	L
1043	CF
1048	gallon
1051	bbl
1061	m/s
1067	ft/s
1088	kg
1089	g
1092	t
1094	lb
1167	J
1172	MJ
1173	kJ
1180	cal
1181	kcal
1183	Btu
1196	MJ/h
1240	V
1283	Mohm
1318	g/s
1319	g/min
1320	g/h
1321	g/d
1322	kg/s
1323	kg/min
1324	kg/h
1325	kg/d
1326	t/s
1327	t/min
1328	t/h
1329	t/d
1330	lb/s
1331	lb/min
1332	lb/h
1333	lb/d
1347	m^3/s
1348	m^3/min
1349	m^3/h
1350	m^3/d
1351	L/s
1352	L/min
1353	L/h
1354	L/d
1355	ML/d
1356	CFS
1357	CFM
1358	CFH
1359	ft3/d
1362	gal/s
1363	GPM
1364	gal/h
1365	gal/d

Code	Unit
1366	Mgal/d
1371	bbl/s
1372	bbl/min
1373	bbl/h
1374	bbl/d
1431	kcal/s
1432	kcal/min
1433	kcal/h
1434	kcal/d
1438	kJ/s
1439	kJ/min
1440	kJ/h
1441	kJ/d
1442	MJ/s
1443	MJ/min
1444	MJ/d
1445	Btu/s
1446	Btu/min
1197	Btu/h
1447	Btu/day
1449	mgal/s
1450	kgal/s
1451	Mgal/s
1453	mgal/min
1454	kgal/min
1455	Mgal/min
1457	mgal/h
1458	kgal/h
1459	Mgal/h
1461	mgal/d
1462	kgal/d
1479	µbbl/s
1480	mbbl/s
1481	kbbl/s
1483	µbbl/min
1484	mbbl/min
1485	kbbl/min
1487	µbbl/h
1488	mbbl/h
1489	kbbl/h
1491	µbbl/d
1492	mbbl/d
1493	kbbl/d
1511	cm^3/s
1512	cm^3/min
1513	cm^3/h
1514	cm^3/d
1517	kL
1518	kL/min
1519	kL/h
1520	kL/d
1617	Ml/h
1618	Ml/min
1619	kL/s

Code	Unit
1620	kft3/d
1621	kCFH
1622	kCFM
1623	kCFS
1624	mft3/d
1625	mCFH
1626	mCFM
1627	mCFS
1628	kbbl(US Beer)/d
1629	kbbl(US Beer)/h
1630	kbbl(US Beer)/min
1631	bbl(US Beer)/d
1632	bbl(US Beer)/h
1633	bbl(US Beer)/min
1634	bbl(US Beer)/s
1635	mbbl(US Beer)/d
1636	mbbl(US Beer)/h
1637	mbbl(US Beer)/min
1638	mbbl(US Beer)/s
1639	ubbl(US Beer)/min
1640	ubbl(US Beer)/s
1641	klb(US)/d
1642	klb(US)/h
1643	klb(US)/min
1644	klb(US)/s
1645	Ml
1648	kgal
1667	Mgal
50100	Ml/s
50102	kbbl(US Beer)/s
50103	ubbl(US Beer)/h
50104	ubbl(US Beer)/d
50300	J/s
50301	J/min
50302	J/h
50303	J/d
50304	cal/s
50305	cal/min
50306	cal/h
50307	cal/d
50400	kCF
50402	mCF
50403	mgal(US)
50404	kbbl(US Oil)
50405	mbbl(US Oil)
50406	ubbl(US Oil)
50407	kbbl(US Beer)
50408	bbl(US Beer)
50409	mbbl(US Beer)
50410	ubbl(US Beer)
50411	klb
50500	cm/s
50501	mS/cm

7. Parameter Menu Tree

NOTE

The available menus and parameters vary depending on the connection terminal type and the optional codes selected at the time of ordering.

7.1 Display Menu Tree

The following table provides an overview of the display menu structure.
See the installation manual for general information regarding the operation via display unit.

NOTE

When writing parameters from a display, it is necessary to set all blocks to the O/S mode.

Operation level
- Exit
- Operator
- Maintenance
- Specialist

R	Read only
R/W1	Read and write possible
R/W2	Read always possible, Writing limited to the following operation levels (Operation level: Maintenance, Specialist)
R/W3	Read always possible, Writing limited to the following operation levels (Operation level: Specialist)

Device setup
- Block mode
- Current alarm -> Page 221
- Language R/W1
- Process variables -> Page 224
  - Flow rate(%)
  - Flow rate
  - Velocity
  - Volume
  - Mass
  - Calorie
  - Totalizer
- Diag/Service -> Page 225
  - All block target mode
  - Sts/Self test
  - Time stamp
  - Diagnosis
  - Verification
  - Autozero
  - Test
  - Param bkup/restore
  - Data log
  - Disp indicator
- Easy setup wizard -> Page 229
  - All block target mode
  - Volume
  - Pulse/Status out
  - Display set
  - Autozero exe
- Detailed setup -> Page 230
  - All block target mode
  - Pro var
  - Sensor
  - Totalizer
  - Pulse/Status out
  - Temperature
  - AUX calculation
  - Display set
  - Access cfg
  - Device info
  - Fieldbus info
  - Protection
- microSD -> Page 235
  - Contents
  - Unmount
  - Format
  - Property

■ Current alarm

Current alarm		
	Setting upload	
	ExtAct1-1	R
	ExtAct1-2	R
	ExtAct2-1	R
	ExtAct2-2	R
	ExtAct3-1	R
	ExtAct3-2	R
	ExtAct4-1	R
	ExtAct4-2	R
	ExtAct5-1	R
	ExtAct6-1	R
	ExtAct6-2	R
	ExtAct7-1	R
	ExtAct7-2	R
	ExtAct8-1	R
	Setting download	

ExtAct1-1	ExtAct1-2	ExtAct2-1	ExtAct2-2
244:Amp EEP FAIL	225:Lnk.O16/32 N/O	010:Main CPU FAIL	023:Opt bd mismatch
246:Simulate SW OFF	226:Lnk.O15/31 N/O	011:Rev calc FAIL	027:Restore FAIL
247:RB O/S Mode	227:Lnk.O14/30 N/O	012:Main EEP FAIL	028:Ind bd FAIL
248:Simulate SW ON	228:Lnk.O13/29/45 N/O	013:Main EEP dflt	029:Ind bd EEP FAIL
249:SoftDL Incmplt	229:Lnk.O12/28/44 N/O	014:Snsr bd FAIL	030:LCD drv FAIL
250:SoftDL FAIL	230:Lnk.O11/27/43 N/O	015:Snsr comm ERR	031:Ind bd mismatch
251:Abnml Boot PRS	231:Lnk.O10/26/42 N/O	016:AD 1 FAIL[Sig]	032:Ind comm ERR
	232:Lnk.O9/25/41 N/O	017:AD 2 FAIL[Excit]	033:microSD FAIL
	233:Lnk.O8/24/40 N/O	018:Coil open	
	234:Lnk.O7/23/39 N/O	019:Coil short	
	235:Lnk.O6/22/38 N/O	020:Exciter FAIL	
	236:Lnk.O5/21/37 N/O		
	237:Lnk.O4/20/36 N/O		
	238:Lnk.O3/19/35 N/O		
	239:Lnk.O2/18/34 N/O		
	240:Lnk.O1/17/33 N/O		

ExtAct3-1
050:Signal overflow
051:Empty detect
053:Adh over lv 4
060:Span cfg ERR
066:Density cfg ERR

ExtAct3-2
067:Pls 1 cfg ERR
069:Nomi size cfg
070:Adh cfg ERR
071:FLN cfg ERR
072:Log not start
082:Pls 1 saturate
085:Cable miscon
086:Coil insulation
131:Trans mismatch

ExtAct4-1
087:Adhesion lv 3
088:LC warn
089:Insu detect
090:FLN over lv 3
091:FLN over lv 4
092:AZ warn
093:Verif warn
094:Fact noise warn
095:Simulate active
098:Pls 1 fix

ExtAct4-2
101:Param restore run
102:Disp over
103:SD size warn
104:Bkup incmplt
105:SD mismatch
106:SD removal ERR
120:Watchdog
121:Power off
122:Inst power FAIL
123:Param bkup run
124:Data log run

ExtAct5-1
133:G/A mismatch

ExtAct6-1
300:AI1 O/S Mode
301:AI1 Man Mode
302:AI1 Not Schedule
303:AI1 Simulate Act
304:AI2 O/S Mode
305:AI2 Man Mode
306:AI2 Not Schedule
307:AI2 Simulate Act
308:AI3 O/S Mode
309:AI3 Man Mode
310:AI3 Not Schedule
311:AI3 Simulate Act
312:AI4 O/S Mode
313:AI4 Man Mode
314:AI4 Not Schedule
315:AI4 Simulate Act

ExtAct6-2
328:PID O/S Mode
329:PID Man Mode
330:PID Not Schedule
331:PID Bypass Mode
332:IT1 O/S mode
333:IT1 Man mode
334:IT1 Not Schedule
335:IT1 ttl bkup ERR
336:IT2 O/S Mode
337:IT2 Man Mode
338:IT2 Not Schedule
339:IT2 ttl bkup ERR
340:DI1 O/S Mode
341:DI1 Man Mode
342:DI1 Not Schedule
343:DI1 Simulate Act

ExtAct7-1
344:DI2 O/S Mode
345:DI2 Man Mode
346:DI2 Not Schedule
347:DI2 Simulate Act
348:DI3 O/S Mode
349:DI3 Man Mode
350:DI3 Not Schedule
351:DI3 Simulate Act
352:AR O/S Mode
353:AR Man Mode
354:AR Not Scheduled
356:MAO O/S Mode
357:MAO Not Schedule
359:No FB Scheduled

ExtAct7-2
360:STB O/S Mode
361:DTB O/S Mode
362:MTB O/S Mode
363:LTB O/S Mode
364:AI1 HH Alarm
365:AI1 LL Alarm
366:AI1 Hi Alarm
367:AI1 Lo Alarm
368:AI2 HH Alarm
369:AI2 LL Alarm
370:AI2 Hi Alarm
371:AI2 Lo Alarm
372:AI3 HH Alarm
373:AI3 LL Alarm
374:AI3 Hi Alarm
375:AI3 Lo Alarm

ExtAct8-1
376:AI4 HH Alarm
377:AI4 LL Alarm
378:AI4 Hi Alarm
379:AI4 Lo Alarm
392:PID HH Alarm
393:PID LL Alarm
394:PID Hi Alarm
395:PID Lo Alarm

NOTE

Only the status items that occur in the Fieldbus communication type are described above. Other items than the above status items are also shown on the display.

Process value

- Process variables
  - Flow rate(%) R
  - Flow rate R
  - Velocity R
  - Volume R
  - Mass R
  - Calorie R
  - Totalizer
    - Totalizer 1 R
    - Totalizer 2 R
    - Totalizer 1 count R
    - Totalizer 2 count R

■ Diagnosis/service

- **Diag/Service**
  - All block target mode
  - Sts/Self test -> Page 226
  - Time stamp
    - Date — R
    - Time — R
    - Op time — R
  - Diagnosis -> Page 227
  - Verification -> Page 228
  - Autozero
    - Execute — R/W2
    - Result
      - Zero value — R/W2
  - Test -> Page 228
  - Param bkup/restore
    - F backup name — R
    - F backup date — R
    - SD backup name — R/W3
    - Backup execute — R/W3
    - Backup result — R/W3
    - Restore execute — R/W3
    - Restore result — R/W3
    - Backup name 1 — R/W3
    - Backup date 1 — R/W3
    - Backup name 2 — R/W3
    - Backup date 2 — R/W3
    - Backup name 3 — R/W3
    - Backup date 3 — R/W3
  - Data log
    - File name — R/W3
    - Interval time — R/W3
    - Start date — R/W3
    - Start time — R/W3
    - End time — R/W3
    - Execute — R/W3
    - Log 1 — R/W3
    - Log 2 — R/W3
    - Log 3 — R/W3
    - Log 4 — R/W3
  - Disp indicator
    - LCD test — R/W1
    - Squawk — R/W1

● State/ Self test

- **Sts/Self test**
  - Current alarm
    - ExtAct1-1 R
    - ExtAct1-2 R
    - ExtAct2-1 R
    - ExtAct2-2 R
    - ExtAct3-1 R
    - ExtAct3-2 R
    - ExtAct4-1 R
    - ExtAct4-2 R
    - ExtAct5-1 R
    - ExtAct6-1 R
    - ExtAct6-2 R
    - ExtAct7-1 R
    - ExtAct7-2 R
    - ExtAct8-1 R
  - Alarm
    - Alarm record mask
      - Mask 1-1 R/W3
      - Mask 1-2 R/W3
      - Mask 2-1 R/W3
      - Mask 2-2 R/W3
      - Mask 3-1 R/W3
    - Alarm record
      - Record alarm 1 R
      - Record time 1 R
      - Record alarm 2 R
      - Record time 2 R
      - Record alarm 3 R
      - Record time 3 R
      - Record alarm 4 R
      - Record time 4 R
    - Alarm out mask
      - Mask 1-1 R/W3
      - Mask 1-2 R/W3
      - Mask 2-1 R/W3
      - Mask 2-2 R/W3
      - Mask 3-1 R/W3
      - Mask 3-2 R/W3
      - Mask 4-1 R/W3

Diagnosis

- **Diagnosis**
  - Adhesion
    - Function R/W3
    - Threshold level 1 R/W3
    - Threshold level 2 R/W3
    - Threshold level 3 R/W3
    - Threshold level 4 R/W3
    - Result
      - Value R
      - Status R
    - Check cycle R/W3
  - Flow noise
    - Function R/W3
    - Threshold level 1 R/W3
    - Threshold level 2 R/W3
    - Threshold level 3 R/W3
    - Threshold level 4 R/W3
    - Result
      - Value R
      - Status R
    - Damp R/W3
  - Conductivity
    - Function R/W3
    - Low limit R/W3
    - Result
      - Value R
  - Diagnostic execute R/W3
  - Coil insul threshold R/W3
  - IEX compare R
  - Diagnostic output R/W3
  - V peak hold R
  - IEX resistance R
  - Empty check
    - Electrode voltage A R
    - Electrode voltage B R
    - Empty status R

● Verification

Verification			
	Mode	R/W3	
	Execute	R/W3	
	VF No	R/W3	
	VF target select	R/W3	
	Result		
		Failed/Passed	R
		VF operate time	R
		Magnetic circuit	R
		Excite circuit	R
		Calc circuit	R
		Device status	R
		Connect status	R

● Test

Test		
	Release time	
	Test mode	R/W3
	Velocity	R/W3
	PO1	R/W3
	SO1	R/W3
	Test 2 mode	R/W3
	Test 2 value	R/W3

■ Easy setup wizard

- **Easy setup wizard**
  - All block target mode
  - Volume
    - Setting upload
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R
    - Time unit — R
    - Span — R/W3
    - Setting download
  - Pulse/Status out
    - Setting upload
    - P1 unit — R/W3
    - P1 val — R/W3
    - F1 at 0% — R/W3
    - F1 at 100% — R/W3
    - Setting download
  - Display set
    - Setting upload
    - Line 1 — R/W1
    - Line 2 — R/W1
    - Line 3 — R/W1
    - Setting download
  - Autozero exe — R/W2

Detailed setup

- **Detailed setup**
  - All block target mode
  - Pro var -> Page 231
  - Sensor
    - Low MF R/W3
    - High MF R/W3
    - Low MF EDF R/W3
    - High MF EDF R/W3
    - Flow sensor sel R/W3
    - Measure mode R/W3
    - Nominal size unit R/W3
    - Nominal size R/W3
  - Totalizer -> Page 232
  - Pulse/Status out
    - PO1/SO1
      - Output mode R/W3
      - Active mode R/W3
      - Fix width R/W3
      - Rate unit R/W3
      - Rate value R/W3
      - Low cut R/W3
      - Alarm out R/W3
      - Frequency at 0% R/W3
      - Frequency at 100% R/W3
      - SO1 function R/W3
      - Start/Stop R/W3
  - Temperature
    - Function R/W3
    - Unit R/W3
    - URV R/W3
    - LRV R/W3
  - AUX calculation
    - Flow direct R/W3
    - Rate limit R/W3
    - Dead time R/W3
    - Noise filter R/W3
    - Pulsing flow R/W3
    - 0% signal lock R/W3
    - Power sync on/off R/W3
    - Set power freq R/W3
    - Iex power frequency R
    - Meas power freq R
    - Set SIL R/W3

(Continued on next page)

- Display set -> Page 232
- Access cfg
  - User role R
  - Chg mainte R/W2
  - Chg special R/W3
- Device info -> Page 233
- Fieldbus info -> Page 234
  - All block target mode R/W3
  - STB target mode R/W3
  - DTB target mode R/W3
  - LTB target mode R/W3
  - MTB target mode R/W3
  - RB
  - AI1FB
  - AI2FB
  - AI3FB
  - AI4FB
  - DI1FB
  - DI2FB
  - DI3FB
- Protection
  - Key code R/W3
  - Write protect sts R

● Process variables

- **Pro var**
  - PV flow select R
  - Velocity
    - Damp AO/F R/W3
    - Damp pls/ttl R/W3
    - Unit R
    - Span R/W3
  - Volume
    - Damp AO/F R/W3
    - Damp pls/ttl R/W3
    - Unit R
    - Time unit R
    - Span R/W3
  - Mass
    - Damp AO/F R/W3
    - Damp pls/ttl R/W3
    - Unit R
    - Time unit R
    - Span R/W3
  - Calorie
    - Damp AO/F R/W3
    - Damp pls/ttl R/W3
    - Unit R
    - Time unit R
    - Span R/W3
    - Specific heat R/W3
  - Density
    - Value select R/W3
    - Unit R/W3
    - Fixed density R/W3
    - Std density R/W3
    - Correct density R
  - Temperature
    - Std temperature R/W3
    - Meas temperature R
    - Fixed temperature R/W3
    - Coef A1 R/W3
    - Coef A2 R/W3
  - Velocity check R

● Totalizer

- **Totalizer**
  - Totalizer 1
    - Unit — R
    - Conv factor — R/W3
    - Low cut — R/W3
    - Failure opts — R/W3
    - Options — R/W3
    - Start/Stop — R/W3
    - Reset/Preset — R/W3
    - Preset value — R/W3
    - Set point — R/W3
  - Totalizer 2
    - Unit — R
    - Conv factor — R/W3
    - Low cut — R/W3
    - Failure opts — R/W3
    - Options — R/W3
    - Start/Stop — R/W3
    - Reset/Preset — R/W3
    - Preset value — R/W3
    - Set point — R/W3

● Display

- **Display set**
  - Line select
    - Line 1 — R/W1
    - Line 2 — R/W1
    - Line 3 — R/W1
    - Line 4 — R/W1
    - Line 5 — R/W1
    - Line 6 — R/W1
    - Line 7 — R/W1
    - Line 8 — R/W1
  - Trend select
    - Trend 1 — R/W1
    - Trend 2 — R/W1
    - Trend 3 — R/W1
    - Trend 4 — R/W1
  - Disp format
    - Format PV — R/W1
    - Format total 1 — R/W1
    - Format total 2 — R/W1
    - Format total 3 — R/W1
  - Optional config
    - Contrast — R/W1
    - Line mode — R/W1
    - Period — R/W1
    - NE107 display — R/W1
    - Alarm display — R/W1
    - Scroll mode — R/W1
    - Damp — R/W1
    - Low cut — R/W1
    - Format date — R/W1
    - Inversion — R/W1
    - Language package — R
    - Display mode — R/W1
    - Trend offln LRV — R/W1
    - Trend offln URV — R/W1

● Device information

- **Device info**
  - Date/Time
    - Current date — R
    - Current time — R
    - Operation time — R
  - Order info
    - Long tag — R
    - Electrode size — R/W3
    - Explosion protection — R/W3
    - MS code
      - Model code — R/W3
      - Suffix config 1 — R/W3
      - Suffix config 2 — R/W3
      - Option 1 — R/W3
      - Option 2 — R/W3
      - Option 3 — R/W3
      - Option 4 — R/W3
    - RS MS code
      - Model code — R/W3
      - Suffix config 1 — R/W3
      - Suffix config 2 — R/W3
      - Option 1 — R/W3
      - Option 2 — R/W3
      - Option 3 — R/W3
      - Option 4 — R/W3
    - Disp install — R/W3
  - Ver/Num info
    - Transmitter type — R
    - Trans serial No — R/W3
    - Sensor serial No — R/W3
    - Main soft rev — R
    - Snsr soft rev — R
    - Ind soft rev — R
  - Memo
    - Memo 1 — R/W3
    - Memo 2 — R/W3
    - Memo 3 — R/W3

Fieldbus info

- Fieldbus info
  - All block target mode — R/W3
  - STB target mode — R/W3
  - DTB target mode — R/W3
  - LTB target mode — R/W3
  - MTB target mode — R/W3
  - RB
    - Target mode — R/W3
    - Write lock
  - AI1FB
    - Target mode — R/W3
    - XD scale EU at 100% — R/W3
    - XD scale EU at 0% — R/W3
    - XD scale Units index — R/W3
    - Channel — R/W3
    - L_TYPE — R/W3
    - LOW_CUT — R/W3
    - PV_FTIME — R/W3
  - AI2FB
    - Target mode — R/W3
    - XD scale EU at 100% — R/W3
    - XD scale EU at 0% — R/W3
    - XD scale Units index — R/W3
    - Channel — R/W3
    - L_TYPE — R/W3
    - LOW_CUT — R/W3
    - PV_FTIME — R/W3
  - AI3FB
    - Target mode — R/W3
    - XD scale EU at 100% — R/W3
    - XD scale EU at 0% — R/W3
    - XD scale Units index — R/W3
    - Channel — R/W3
    - L_TYPE — R/W3
    - LOW_CUT — R/W3
    - PV_FTIME — R/W3

(Continued on next page)

AI4FB		
	Target mode	R/W3
	XD scale EU at 100%	R/W3
	XD scale EU at 0%	R/W3
	XD scale Units index	R/W3
	Channel	R/W3
	L_TYPE	R/W3
	LOW_CUT	R/W3
	PV_FTIME	R/W3
DI1FB		
	Target mode	R/W3
	Channel	R/W3
	PV_FTIME	R/W3
DI2FB		
	Target mode	R/W3
	Channel	R/W3
	PV_FTIME	R/W3
DI3FB		
	Target mode	R/W3
	Channel	R/W3
	PV_FTIME	R/W3

■ microSD

microSD			
	Contents	R	
	Unmount	R/W1	
	Format	R/W1	
	Property		
		Total space	R
		Available space	R
		File system	R

Appendix 1. Application, Setting and Change of Basic Parameters

A1.1 Applications and Selection of Basic Parameters

Setting Item (applicable parameter)	Overview
Tag No. (PD_TAG) setup	Sets PD_TAG and each block tag. Up to 32 alphanumeric characters can be set for both.
Calibration range setup (XD_SCALE of AI block)	Sets the range of input from the transducer block corresponding to 0% point (always 0 for this product) and 100% points in operation within the AI function block. “Span flow rate”, item specified at ordering, is set at factory shipping. Sets the following four data; a range unit, input value of the 0% point (in case of this product, 0), input value of the 100% point (corresponding to flow rate span) and decimal-point position.
Output scale setup (OUT_SCALE of AI block)	The same value as XD_SCALE is set at shipment from the manufacturing factory.
Simulation setup (SIMULATE of AI/DI block)	Performs simulation of the AI/DI function block. The input value and status for the calibration range can also be set. Use this parameter for loop check and other purposes. Refer to “Simulation Function” in Section 5.13.
Damping time constant setup (PRIMARY_VALUE_FTIME of STB)	Sets the damping time constant in seconds. The setting of PRIMARY_VALUE_FTIME affects not only the flow rate, but also the totalization. In comparison, the setting of parameter PV_FTIME in an AI function block works as the damping time constant for the AI block’s OUT. As the damping function of the flowmeter itself, it is advisable to use PRIMARY_VALUE_FTIME.
Output signal low cut mode setup (PRIMARY_VALUE_LOWCUT of STB)	This setup is used for zeroing flow rate readings in a low flow rate area. Specifies the value of PRIMARY_VALUE_LOWCUT as a percent of PRIMARY_VALUE_RANGE. In comparison, the setting of parameter LOW_CUT in the AI function block works as a low cutoff level setting for the AI block’s OUT. As the low-cut function of the flowmeter itself, it is advisable to use PRIMARY_VALUE_LOWCUT.
LCD display setup (DISPLAY_SELECT1-3, DISPLAY_CYCLE of STB)	Sets the type of data, the unit to be displayed on the LCD and the display speed. Adjust display speed if a low temperature environment causes a poor LCD display quality.
Zero adjustment (AUTO_ZERO_EXE, MAGFLO_ZERO of STB)	Performs zero adjustment. Zero adjustment should be done only when the measurement fluid is filled in the sensor and the fluid velocity is completely zero.

A1.2 Setting and Change of Basic Parameters

This section describes procedures to set and change the parameters for each block. Obtaining access to each parameter differs depending on the configuration system used. For details, refer to the instruction manual for each configuration system.

(1) Access the block mode (MODE_BLK) of each block.

(2) Set the block mode (MODE_BLK) target(note 1) to Auto, Man or O/S(note 2) in accordance with the Write Mode of the parameter to be set or changed.

(3) Access the parameter to set or change.

(4) Make setting or change in accordance with each parameter.

(5) Set the Target of block mode (MODE_BLK) to Auto(note 2).

IMPORTANT

Do not turn the power OFF immediately after setting parameters. To improve the reliability of the device, processing to store data to EEPROM is duplexing. If the power is turned OFF within 30 seconds after setting of parameters, changed parameters are not saved and may return to their original values.

Note 1: Block mode consists of the following four modes that are controlled by the universal parameter that displays the operating condition of each block.
Target (target mode) : Sets the operating condition of the block.
Actual (actual mode) : Indicates the current block operating condition.
Permit (permit mode) : Indicates the operating condition that the block is allowed to take.
Normal (normal mode) : Indicate the operating condition that the block will usually take.

Note 2: The operating conditions which the individual blocks can take are as shown below for each block.

	AI Function Block	IT Function Block	DI Function Block	AR Function Block	PID Function Block	Transducer Block	Resource Block
Automatic (Auto)	◦	◦	◦	◦	◦	◦	◦
Manual (Man)	◦	◦	◦	◦	◦		
Out of Service (O/S)	◦	◦	◦	◦	◦	◦	◦

NOTE

For various setting changes, there is a mode which allows each parameter to be written.
If a parameter cannot be rewritten, check for write mode columns in parameter lists in Chapter 6.

A1.3 Setting the AI Function Block

The AI function block calculates the flow rate outputs.

■ Setting the flow range

Access the XD_SCALE parameter.
Set the required unit for the measurement range to Unit Index for XD_SCALE.
Set the upper range limit to EU at 100% of XD_SCALE.
Set the lower range limit to EU at 0% of XD_SCALE.
Set the decimal point position to Decimal Point of XD_SCALE.

Example: To measure 0 to 1003/h, set each item as follows:
Set 1349 to Unit Index of XD_SCALE*1
Set 100 to EU at 100% of XD_SCALE
Set 0 to EU at 0% of XD_SCALE
Set 0 to Decimal Point of XD_SCALE

■ Setting the output scale

Access the OUT_SCALE parameter.
Set the required unit of output to Units Index of OUT_SCALE.
Set the output value corresponding to the upper range limit to EU at 100% of OUT_SCALE.
Set an output value corresponding to the lower range limit to EU at 0% for OUT_SCALE.
Set the decimal point to Decimal Point.

For example: To set the output from 0.00 to 100.00 kg/h, set each item as follows:
Set 1324 to Units Index of OUT_SCALE*1
Set 100 to EU at 100% of OUT_SCALE
Set 0 to EU at 0% of OUT_SCALE
Set 2 to Decimal Point of OUT_SCALE

*1 For a description code about the unit, refer to “List of Unit Code” in Section 6.9.

■ Setting the output mode

Access the L_TYPE parameter. Set the output mode.
(In this product, the output mode is always 1:Direct.)
1 : Direct (Sensor output value)
2 : Indirect (Linear output value)
3 : IndirectSQRT (Square root extraction output value)

■ Simulation

Perform the simulation of the AI function block by setting the desired value and status of the input to the block.

(1) REMOTE LOOP TEST SWITCH is written to the SIM_ENABLE_MSG (index 2922) parameter of the MTB.

(2) Access the En/Disable element of the SIMULATE parameter to enable simulation. Set the simulation active or disable.

1 : Disable (invalid)
2 : Active (valid)

(3) Access the SIMULATE status parameter. Set the desired status code.

(4) Access the SIMULATE value parameter. Set the desired input value.

If simulation is enabled, AI block uses SIMULATE Status and SIMULATE Value as the input, and if disabled, the AI block uses Transducer Status and Transducer Value as input. Refer to “Simulation Function” in Section 5.13.

A1.4 Setting the Integrator (IT) Function Block

The IT function block outputs the flow rate totalization.

■ Setting the unit of flow rate totalization

(1) Access the TIME_UNIT1 parameter in IT block and set the RATE time unit corresponding IN_1. (If there exists input to IN_2, set the RATE time unit in TIME_UNIT2 in the same way.)

(2) Access the OUT_RANGE parameter of the IT block, and set the Flow rate unit to “Units Index”.

■ Setting the forward/reverse direction of the flow rate totalization

Access the INTEG_OPTS parameter in IT block, and set 0 or 1 to “Bit#2” or “Bit#3”.

(Example 1) Forward flow totalization
Bit#2=1
Bit#3=0

(Example 2) Reverse flow totalization
Bit#2=0
Bit#3=1

(Example 3) Differential flow rate totalization
Bit#2=1
Bit#3=1

■ Resetting or presetting totalized value

Reset totalization

Access the OP_CMD_INT parameter in IT block, and set Reset “1”.

Preset totalization

(1) Access the MODE_BLK parameter in the IT block and set Target (target mode) to O/S or Man in.

(2) Access the OUT parameter in the IT block, and set preset value to “Value”.

(3) Access the MODE_BLK parameter in the IT block and set Target (target mode) to Auto.

A1.5 Setting the DI Function Block

The DI function block receives and outputs limit switch signals from the transducer block.
Three DI blocks have independent parameters. Set up the parameters of each DI block you use, individually as necessary. The following shows setting examples of the DI1 function block.

■ Setting the channel

Specifies the limit switch number of the transducer block to be input to the DI block. For details, refer to Section 5.3.

■ Setting the damping time constant

Access the PV_FTIME parameter. Set a time to damp. (in units of seconds)

■ Simulation

Perform simulation of each DI function block by setting the desired value and status of the input to the block. Access the SIMULATE_D parameter and change the values of its elements as follows.

(1) REMOTE LOOP TEST SWITCH is written to the SIM_ENABLE_MSG (index 2922) parameter of the MTB.

(2) Access the SIMULATE_D En/Disable parameter. Set the simulation active or disable.

2 : Active

1 : Disable

(3) Access the SIMULATE_D Status parameter. Set the desired status code.

(4) Access the SIMULATE_D Value parameter. Set the desired input value.

When valid, the DI block uses SIMULATE_D Status and SIMULATE_D Value as an input, and when invalid, the DI block uses Transducer Status and Transducer Value as an input. Refer to “Simulation Function” in Section 5.13.

Appendix 2. Integrator (IT) Block

The IT block adds two main inputs and integrates them for output. The block compares the outputs with TOTAL_SP and PRE_TRIP and generates signals when the limits are reached (OUT_TRIP output, OUT_PTRIP output).
The output is as represented by the following equation (for counting UP and RATE conversion).

OUT = Integration start value + Total

Total = Total + Current Integral

Current Integral = (x + y) x Δt

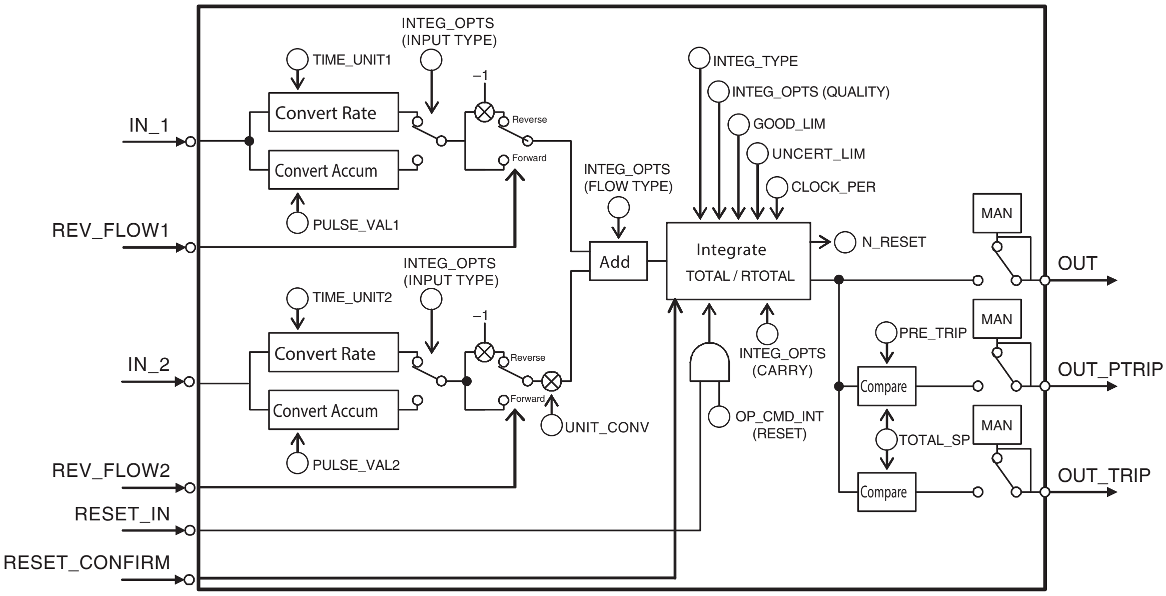
x : IN_1 value whose unit has been converted

y : IN_2 value whose unit has been converted

Δt : block execution period

A2.1 Schematic Function Diagram of Integrator Block

The functional block diagram of the IT block is shown below.



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IN_1 .... Block input 1 (value & status).
IN_2 .... Block input 2 (value & status).
REV_FLOW1.................. Indicates whether the sign of IN_1 is reversed. Discrete signal.
REV_FLOW2.................. Indicates whether the sign of IN_2 is reversed. Discrete signal.
RESET_IN .... RESET signal of the integrated values. Discrete signal.
RESET_CONFIRM......... RESET confirmation input. Discrete signal.
OUT .... Output (value & status).
OUT_PTRIP.................... Set if the target value PRE_TRIP is exceeded. Discrete signal.
OUT_TRIP .... Set when the target value exceeds TOTAL_SP (or 0). Discrete signal.

The IT block is classified into the following five sections for each function:

- Input process section........ Determines the input value status, converts RATE and ACCUM, and determines the input flow direction.
- Adder .... Adds the two inputs.
- Integrator .... Integrates the result of the adder into the integrated value.
- Output process section..... Determines the status and value of each output parameter.
- Reset process section ...... Resets the integrated value.

A2.2 Input Process Section

When executed, the IT block first performs input processing. The processing is executed in the following order: “Determining input status” => “Converting RATE or ACCUM” => “Determining the input flow direction”. Switching between Convert RATE and Convert ACCUM is made using bit 0 (for IN_1) or bit 1 (for IN_2) of INTEG_OPTS. INTEG_OPTS is one of the system parameters, and should be set by the user.
IN_1 and IN_2 are not be retained if the power is turned OFF.

A2.2.1 Determining Input Value Statuses

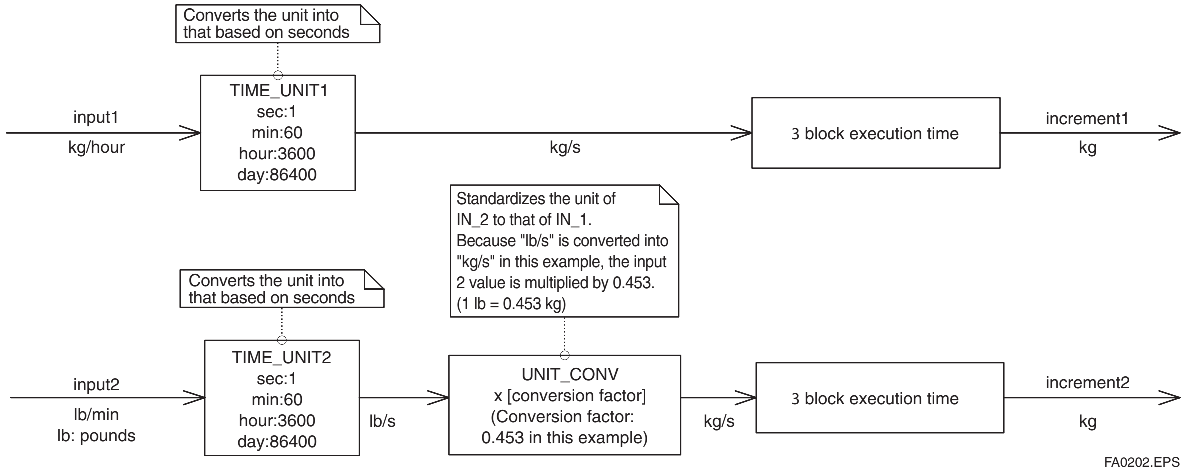
The following shows the correlation between the statuses of input parameters (IN_1, IN_2) and the statuses of input values used in the IT block.

Status of input parameter (IN_1, IN_2)	Bit4 of INTEG_OPTS (Use uncertain)	Bit5 of INTEG_OPTS* (Use Bad)	Status of input value handled in the IT block
Good	Irrelevant	Irrelevant	Good
Bad	Irrelevant	H (=1)	Good
Bad	Irrelevant	L (=0)	Bad
Uncertain	H (=1)	Irrelevant	Good
Uncertain	L (=0)	Irrelevant	Bad

For addition (see A2.3), if the status of an input value is “Bad”, the “Good” value just before the status changed to “Bad” is used.
* Even if the Use Bad option is applied and the internal status is “Good”, the value of “Good” just before the status changed to “Bad” is used.

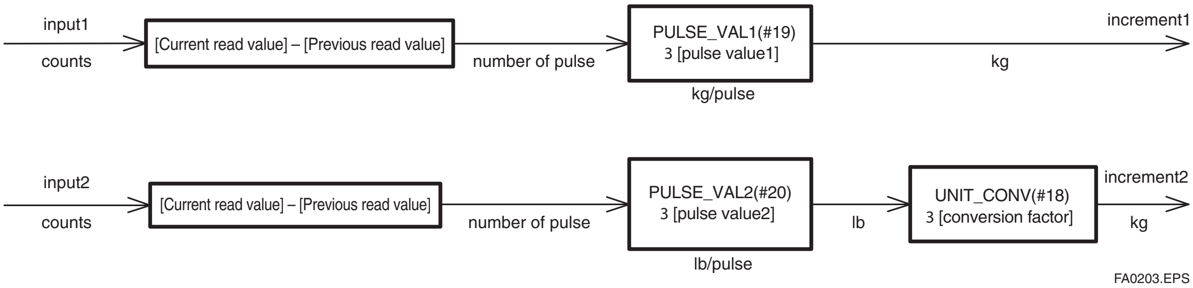
A2.2.2 Converting RATE

The following shows an example of RATE conversion.
In the RATE conversion, firstly convert the time system unit of two inputs to the unit of second. Next, convert the unit of the inputs to the same unit to be added together. The unit of IN_2 is standardized to that of IN_1.
Then, calculates a weight, volume, or energy by multiplying the block execution time by each of the two input values.
The unit information is not entered into the IT block as an input value. Because unit information is not input to the integrator block as an input value, the user must input tuned values to the TIME_UNIT1/2 and UNIT_CONV settings in advance.



A2.2.3 Converting ACCUM

The following shows an example of the ACCUM conversion.
In the ACCUM conversion, the difference between the value executed previously and the value executed this time is integrated or accumulated. This conversion applies when the output of a function block used as a counter is input to the input process of the IT block.
In order to convert the rate of change of an input to a value with an engineering unit, the user must configure the conversion factor to the appropriate engineering unit in the PULSE_VAL1 and PULSE_VAL2 parameters.
Moreover, the unit of IN_2 is standardized to that of IN_1 in the same way as the RATE conversion. Thus, the user must also set an appropriate value to UNIT_CONV.



A2.2.4 Determining the Input Flow Direction

The IT block also considers the input flow direction. Information about the input flow direction is contained in REV_FLOW1 and REV_FLOW2 (0: FORWARD, 1: REVERSE).
In input processing, the sign of the value after the RATE/ACCUM conversion is reversed if the REV_FLOW1 and REV_FLOW2 parameters are set to REVERSE. When determination of the flow direction of two input values is complete, these two inputs are passed to the adder. The settings in REV_FLOW will be retained even if the power is turned OFF.

A2.3 Adder

When input processing is complete, two arguments that have been RATE/ACCUM-converted will be passed to the adder.
The adder adds these two values in accordance with the option.

A2.3.1 Status of Value after Addition

If one of the statuses of the two arguments is “Bad” or if two of them are both “Bad”, the status of the value after addition becomes “Bad”. In this case, the value of “Good” just before the status changed to “Bad” is used as the addition value.
When the statuses of the two arguments are both “Good”, the status of the value after addition becomes “Good”. In this case, the status of the value after addition will be used for the status applied to integration.

A2.3.2 Addition

The following three options are available for addition:

- TOTAL.................... Adds two arguments values as is.
- FORWARD .... Adds two argument values, regarding a negative value as “0”.
- REVERSE .... Adds two argument values, regarding a positive value as “0”.

You can choose these options using bit 2 and bit 3 of INTEG_OPTS as follows:

Bit 2 of INTEG_OPTS (Flow forward)	Bit 3 of INTEG_OPTS (Flowr everse)	Adder Options
H	H	TOTAL
L	L	TOTAL
H	L	FORWARD
L	H	REVERSE

The result of the adder is passed to the integrator.
If only one of the inputs is connected, the value of a non-connected input will be ignored.

When bit 7 of INTEG_OPTS (Add zero if bad) has been set, if the status of a value after addition is “Bad”, the value after addition (increment) becomes “0”.

A2.4 Integrator

When addition is complete, its result will be passed to the integrator.
An integration method consists of combinations of a reset method and counting up/down. There are the following seven integration types, which can be set using INTEG_TYPE.

1. UP_AUTO: 0 to TOTAL_SP - auto reset at TOTAL_SP; Integrates from 0 to the setpoint (TOTAL_SP), and automatically resets when reaching the setpoint.
2. UP_DEM: 0 to TOTAL_SP - demand reset; Integrates from 0 to the setpoint, and is reset on demand.
3. DN_AUTO: TOTAL_SP to 0 - auto reset at TOTAL_SP; Integrates from 0 to the setpoint, and automatically reset when reaching zero.
4. DN_DEM: TOTAL_SP to 0 - demand reset; Integrates from 0 to the setpoint, and is reset on demand.
5. PERIODIC: 0 to ? - periodic reset; Integrates from 0, and reset periodically in accordance with CLOCK_PER.
6. DEMAND: 0 to ? - demand reset; Integrates from 0, and is reset on demand.
7. PER&DEM: 0 to ? - periodic & demand reset; Integrates from 0, and is reset periodically or on demand.

Each type of integration works independently as a function.
There are the following three types of integrated values:

1. Total .... Integrates the result of the adder as is.
2. ATotal .... Integrates the absolute value of the result of the adder.
3. RTotal........... Integrates the absolute value of the result of the adder only if the status of the result is “Bad”. This value is used for the RTOTAL value.

The table shows the details of INTEG_TYPE.

Name	Integration Method	Integration Range	Reset Trigger (Reset if one of the following conditions is established)	Trip Output
UP_AUTO(1)	CountUP Counting up from “0”	-INF< Total <TOTAL_SP 0< ATotal <+INF 0< RTotal <+INF	•OUT reaches TOTAL_SP. •RESET_IN = 1 •OP_CMD_INT = 1	◦
UP_DEM(2)	CountUP Counting up from “0”	-INF< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•RESET_IN = 1 •OP_CMD_INT = 1	◦
DN_AUTO(3)	CountDown Counting down from TOTAL_SP	0< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•OUT reaches 0 •RESET_IN = 1 •OP_CMD_INT = 1	◦
DN_DEM(4)	CountDown Counting down from TOTAL_SP	-INF< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•RESET_IN = 1 •OP_CMD_INT = 1	◦
PERI ODIC(5)	CountUP Counting up from “0”	-INF< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•Period defined by CLOCK_PER •OP_CMD_INT = 1	x
DEMAND(6)	CountUP Counting up from “0”	-INF< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•RESET_IN = 1 •OP_CMD_INT = 1	x
PER&DEM(7)	CountUP Counting up from “0”	-INF< Total <+INF 0< ATotal <+INF 0< RTotal <+INF	•Period defined by CLOCK_PER •RESET_IN = 1 •OP_CMD_INT = 1	x

A2.5 Output Process

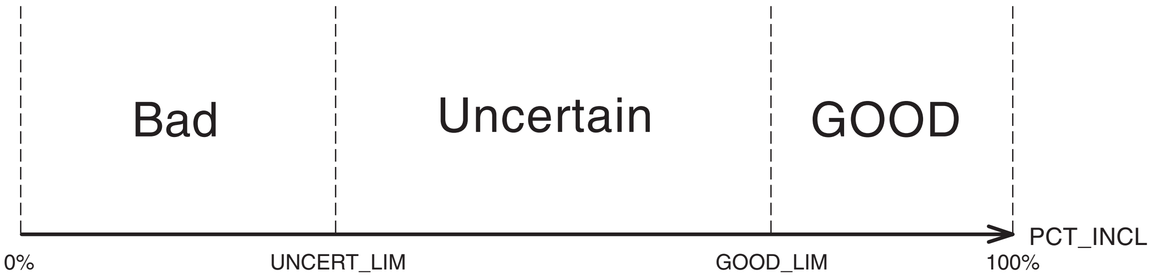
There are the following three output parameters:

1. OUT
2. OUT_TRIP
3. OUT_PTRIP

Parameters OUT_TRIP and OUT_PTRIP are used only when INTEG_TYPE is from 1 to 4.
In case that IT block related memory failed, the status of OUT, OUT_TRIP, OUT_PTRIP becomes "Bad-Device Failure".

A2.5.1 Status Determination

The same criteria for determining the status of the output of the IT block are used in common for the above three parameters.



PCT_INCL=1003(1 - (msp of RTotal)/(msp of ATotal))

msp of RTotal: RTotal value that is converted into a short floating-point number
msp of ATotal: ATotal value that is converted into a short floating-point number
RTotal: Integrated value of the absolute values of the increments whose status is bad
ATotal: Integrated value of the absolute values of the increments regardless of the output status

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OUT.Value, OUT_TRIP.Status, and OUT_PTRIP.Status are determined by the ratio of the "Good" integrated values to all integrated values, which is stored in PCT_INCL (0% to 100%). The user must set the threshold of each status to UNCERT_LIM and GOOD_LIM.
The IT block determines the status of the output using the three parameters: PCT_INCL, UNCERT_LIM, and GOOD_LIM.

- PCT_INCL ≥ GOOD_LIM

  =>Good

- UNCERT_LIM ≤ PCT_INCL < GOOD_LIM

  =>Uncertain

- PCT_INCL < UNCERT_LIM

  =>Bad

If INTEG_TYPE is 5, 6, or 7, the status of the trip output becomes "Good-NS-Constant".

A2.5.2 Determining the Output Value

The value of OUT.Value is determined as follows:

- For counting up

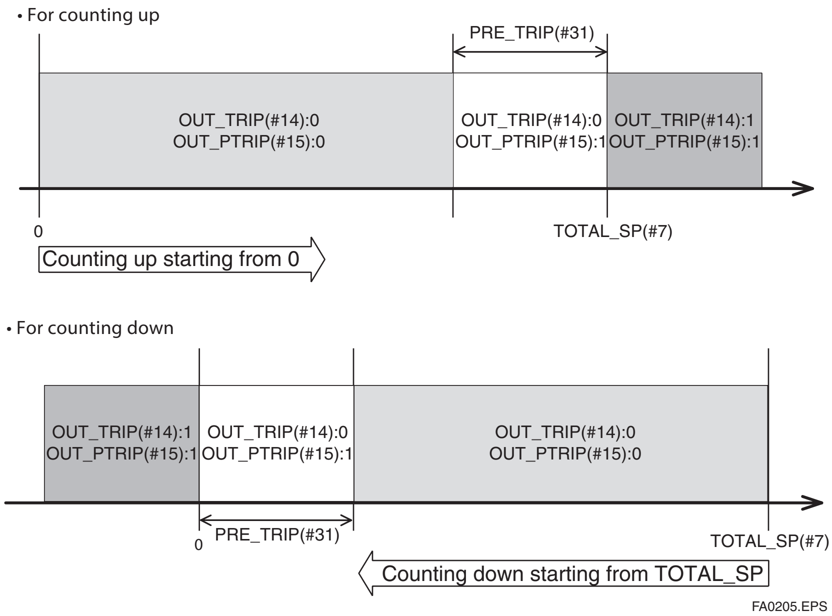
  OUT = Integration start value (0) + Total

- For counting down

  OUT = Integration start value (TOTAL_SP) - Total

Total...Total of integrated values. This value is retained even if INTEG_TYPE is changed during integration (in AUTO).

If OUT is rewritten in the MAN mode, integration starts with the value rewritten in the MAN mode after the mode was returned to AUTO.
The values in OUT_TRIP and OUT_PTRIP are determined in accordance with the correlation between OUT and TOTAL_SP/PRE_TRIP.



For counting up, the OUT value is as follows:

- OUT < TOTAL_SP - PRE_TRIP

  =>OUT_TRIP = 0, OUT_PTRIP = 0

- TOTAL_SP - PRE_TRIP <= OUT < TOTAL_SP

  =>OUT_TRIP = 0, OUT_PTRIP = 1

- TOTAL_SP <= OUT

  =>OUT_TRIP = 1, OUT_PTRIP = 1

For counting down, the OUT value is as follows:

- PRE_TRIP < OUT

  =>OUT_TRIP = 0, OUT_PTRIP = 0

- 0 < OUT <= PRE_TRIP

  =>OUT_TRIP = 0, OUT_PTRIP = 1

- OUT <= 0

  =>OUT_TRIP = 1, OUT_PTRIP = 1

Note that the given conditions do not apply to the following cases:

- If INTEG_TYPE is 5, 6, or 7, OUT_TRIP and OUT_PTRIP always output “0”.
- If INTEG_TYPE is 1 or 3, occurrence of AutoRESET (reset caused if the threshold is exceeded) causes OUT_TRIP to hold “1” for five seconds.

A2.5.3 Mode Handling

<table>
<tr><th>Mode</th><th>Action</th><th>Output</th></tr>
<tr><td>AUTO</td><td>Normal action</td><td>Normal output</td></tr>
<tr><td>MAN</td><td rowspan="2">Integration function is stopped. OUT will not be updated unless you set a value to it. No reset is accepted.</td><td rowspan="2">OUT rewritable. If no value is rewritten, the value with which the mode was running in AUTO immediately before is held. After returning to AUTO, integration starts with the written value or from the value just before running in AUTO.</td></tr>
<tr><td>O/S</td></tr>
</table>

When you rewrite the value in OUT and RTOTAL while at MAN or O/S, N_RESET is incremented.

A2.6 Reset Processing

A2.6.1 Reset Trigger

There are the following five types of reset triggers:

(1) An integrated value exceeds TOTAL_SP.

(2) An integrated value falls below “0”.

(3) RESET_IN is “H”.

(4) Every period specified in CLOCK_PER.

(5) OP_CMD_INT is 1.

The table shows the correlation between INTEG_TYPE and RESET triggers.

	(1)	(2)	(3)	(4)	(5)
1:UP_AUTO	◦	x	◦	x	◦
2:UP_DEM	x	x	◦	x	◦
3:DN_AUTO	x	◦	◦	x	◦
4:DN_DEMO	x	x	◦	x	◦
5:PERIODIC	x	x	x	◦	◦
6:DEMAND	x	x	◦	x	◦
7:PER&DEM	x	x	◦	◦	◦

When OP_CMD_INT has become “H” and a reset was executed, OP_CMD_INT automatically returns to “L”.
Even if RESER_IN becomes “H”, executing RESET, RESET_IN does not automatically return to “L”. The RESET_IN setting will not be retained if the power is turned OFF.

A2.6.2 Reset Timing

All items are reset during the execution of the function block. Therefore, the minimum period of a reset is the block execution period.

- **5-second rule**

If a reset is made, the next reset will not be accepted for 5 seconds after that.
Even if UP_AUTO (or DN_AUTO) is activated and TOTAL_SP (or 0) is reached within 5 seconds, the next reset will not be made for 5 seconds from the previous reset.

- **CLOCK_PER**

If INTEG_TYPE is PERIODIC (5) or PER&DEM (7), a reset is made at the period (sec) set to the CLOCK_PER parameter.
If the value in CLOCK_PER is smaller than the function block’s execution period, bit 1 of BLOCK_ERR “Block Configuration Error” is set.

A2.6.3 Reset Process

The basic reset process sequence is as follows:

1. Snapshot
2. Clearing the integrated values
3. Reset count increment
4. Judging OUT_TRIP and OUT_PTRIP (see A2.5)

1. Snapshot

Saves the following values in the specified parameters before clearing the integrated values. These values will be retained until the next reset is made.

STOTAL = Total
SRTOTAL = RTotal
SSP = TOTAL_SP

2. Clearing the integrated values

The reset process clears the Total, ATotal, and RTotal values in the internal registers.

Total = 0
ATotal = 0
RTotal = 0

3. Reset count increment

Each time a reset is executed, the N_RESET parameter will be incremented.
The high limit is 999,999, and if this limit is exceeded, the count returns to “0”.

4. Judging OUT_TRIP and OUT_PTRIP (see A2.5)

OUT_TRIP and OUT_PTRIP are judged again on the basis of the cleared integrated values.

There are three options relating to a reset:

- i Confirm reset (bit 8 of INTEG_OPTS)
- ii Carry (bit 6 of INTEG_OPTS)
- iii Generate reset event (bit 9 of INTEG_OPTS)

i Confirm reset (bit 8 of INTEG_OPTS)

If this option is enabled, the next reset is rejected until “1” is written to RESET_CONFIRM.

ii Carry (bit 6 of INTEG_OPTS)

If this option is enabled while INTEG_TYPE is UP_AUTO or DN_AUTO, the value exceeding the threshold at a reset will be carried into the next integration.
If INTEG_TYPE is any setting other than UP_AUTO or DN_AUTO, this option is irrelevant.

iii Generate reset event (bit 9 of INTEG_OPTS)

If this option is enabled, an alert event is generated if a reset occurs.

A2.7 List of Integrator Block Parameters

Index	Parameter Name	Default Value	Write Mode	View 1	View 2	View 3	View 4	Description
0	BLOCK_HEADER	TAG: “IT”	Block Tag=o/s					Information relating to this function block, such as block tag, DD revision, execution time
1	ST_REV	0	---	2	2	2	2	The revision level of the set parameters associated with the Integrator block
2	TAG_DESC	Nu11	---					Stores comments describing tag information.
3	STRATEGY	1					2	The strategy field is used by the high-level system to identify the function block.
4	ALERT_KEY	1					1	Key information used to identify the location at which an alert occurred
5	MODE_BLK			4		4		Integrator block mode. O/S, MAN, and AUTO are supported.
6	BLOCK_ERR		---	2		2		Indicates the active error conditions associated with the function block in bit strings.
7	TOTAL_SP	1000000.0		4		4		The target value of an integrated value or a start value for counting down
8	OUT		MAN	5		5		Output
9	OUT_RANGE	1000000.0 0.0 m3(1034) 0			11			Sets scaling for output display. Does not affect the block operation. For note.
10	GRANT_DENY	0			2			The parameter for checking if various operations have been executed
11	STATUS_OPTS	0	OS				2	Allows you to select a status-related option. The Integrator block uses “Uncertain if Man mode” only.
12	IN_1	0.0		5		5		Inputs flow rate (RATE, ACCUM) signals from the AI block or PI block.
13	IN_2	0.0		5		5		
14	OUT_TRIP	0		2		2		An output parameter informing the user that the integrated value has exceeded the target value
15	OUT_PTRIP	0		2		2		An output parameter informing the user that the integrated value is reaching the target value
16	TIME_UNIT1	sec(1)	MAN		1			Specifies the time unit of the RATE (kg/s, lb/min, kg/h...etc.) of the corresponding IN.
17	TIME_UNIT2	sec(1)	MAN		1			
18	UNIT_CONV	1.0					4	Specifies the unit conversion factor for standardizing the unit of IN_2 into that of IN_1.
19	PULSE_VAL1	1.0	MAN				4	Specifies the factor for converting the number of pulses for the corresponding IN into an appropriate engineering unit.
20	PULSE_VAL2	1.0	MAN				4	
21	REV_FLOW1	0		2		2		Selector switch used to specify the fluid flow direction (forward/reverse) with respect to the corresponding IN
22	REV_FLOW2	0		2		2		
23	RESET_IN	0		2		2		The parameter that receives a reset request from an external block to reset the integrated values
24	STOTAL	0.0				4		Indicates the snapshot of OUT just before a reset.
25	RTOTAL	0.0	MAN	4		4		Indicates the integrated value of the absolute values of the increments if the input status is “Bad”.
26	SRTOTAL	0.0				4		Indicates the snapshot of RTOTAL just before a reset.
27	SSP	0.0				4		Indicates the snapshot of TOTAL_SP just before a reset.

<table>
<tr><th rowspan="2">Index</th><th rowspan="2">Parameter Name</th><th rowspan="2">Default Value</th><th rowspan="2">Write Mode</th><th colspan="4">View</th><th rowspan="2">Description</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>28</td><td>INTEG_TYPE</td><td>UP_AUTO (1)</td><td></td><td></td><td></td><td></td><td>1</td><td>Integration Type Setting
<table>
<tr><th>Value</th><th>Name</th><th>Description</th></tr>
<tr><td>1</td><td>UP_AUTO</td><td>Counts up and is automatically reset when TOTAL_SP is reached.</td></tr>
<tr><td>2</td><td>UP_DEM</td><td>Counts up and is reset as demanded.</td></tr>
<tr><td>3</td><td>DN_AUTO</td><td>Counts down and is automatically reset when “0” is reached.</td></tr>
<tr><td>4</td><td>DN_DEM</td><td>Counts down and is reset as demanded.</td></tr>
<tr><td>5</td><td>PERIODIC</td><td>Counts up and is reset at periods specified in CLOCK_PER.</td></tr>
<tr><td>6</td><td>DEMAND</td><td>Counts up and is reset as demanded.</td></tr>
<tr><td>7</td><td>PER&DEM</td><td>Resets periodically or as demanded.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th rowspan="2">Index</th><th rowspan="2">Parameter Name</th><th rowspan="2">Default Value</th><th rowspan="2">Write Mode</th><th colspan="4">View</th><th rowspan="2">Description</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>29</td><td>INTEG_OPTS</td><td>030004</td><td></td><td></td><td></td><td></td><td>2</td><td>Specifies an integration optional function.
<table>
<tr><th>bit</th><th>Option Name</th><th>Description</th></tr>
<tr><td>0</td><td>Input 1 accumulate</td><td>Selects RATE or ACCUM input of IN_1.</td></tr>
<tr><td>1</td><td>Input 2 accumulate</td><td>Selects RATE or ACCUM input of IN_2.</td></tr>
<tr><td>2</td><td>Flow forward</td><td>Integrates forward flow (interprets reverse flow as zero).*</td></tr>
<tr><td>3</td><td>Flow reverse</td><td>Integrates reverse flow (interprets forward flow as zero).*</td></tr>
<tr><td>4</td><td>Use uncertain</td><td>Uses the input value of IN_1 or IN_2 whose status is “Uncertain” regarding it as a value of “Good”.</td></tr>
<tr><td>5</td><td>Use bad</td><td>Uses the input value of IN_1 or IN_2 whose status is “Bad” regarding it as a value of “Good”.</td></tr>
<tr><td>6</td><td>Carry</td><td>Carries over an excess exceeding the threshold at reset to the next integration.
(Note that this does not apply to UP_AUTO or DN_AUTO.)</td></tr>
<tr><td>7</td><td>Add zero if bad</td><td>Interprets an increment as zero if the status of the increment is “Bad”.</td></tr>
<tr><td>8</td><td>Confirm reset</td><td>After reset, rejects the next reset until “Confirm” is set to RESET_CONFIRM.</td></tr>
<tr><td>9</td><td>Generate reset event</td><td>Generates an alert event at reset.</td></tr>
<tr><td>10 to 15</td><td>Reserved</td><td></td></tr>
</table>
*If both forward and reverse flows are enabled or disabled, both forward and reverse flows are integrated.</td></tr>
<tr><td>30</td><td>CLOCK_PER</td><td>86400.0[sec]</td><td></td><td></td><td></td><td></td><td>4</td><td>Specifies the period at which a periodic reset is made.</td></tr>
<tr><td>31</td><td>PRE_TRIP</td><td>100000.0</td><td></td><td></td><td></td><td></td><td>4</td><td>Specifies an allowance applied before an integrated value exceeds the setpoint.</td></tr>
<tr><td>32</td><td>N_RESET</td><td>0.0</td><td></td><td>4</td><td></td><td>4</td><td></td><td>Indicates the number of resets in the range of 0 to 999999.</td></tr>
<tr><td>33</td><td>PCT_INCL</td><td>0.0[%]</td><td></td><td>4</td><td></td><td>4</td><td></td><td>The ratio of “the integrated values of the absolute values of the increments whose status is Good” to the “integrated values of the absolute values of the increments irrelevant to the status” PCT_INCL = 100 x (1−(msp of RTotal)/msp of ATotal))</td></tr>
<tr><td>34</td><td>GOOD_LIM</td><td>0.0[%]</td><td></td><td></td><td></td><td></td><td>4</td><td>The threshold of the ratio of “the integrated values of the increments whose status is Good” to all integrated values in which the status of OUT is “Good”</td></tr>
</table>

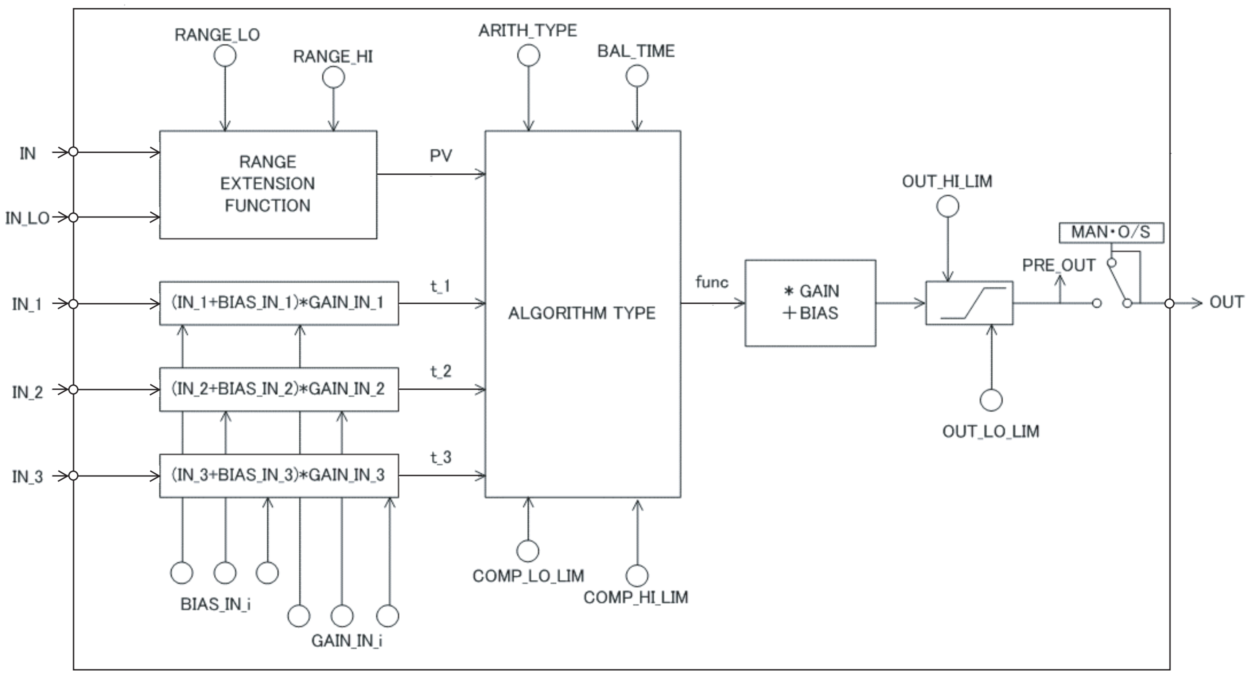
Index	Parameter Name	Default Value	Write Mode	View				Description
				1	2	3	4	
35	UNCERT_ LIM	0.0[%]					4	The threshold of the ratio of “the integrated values of the increments whose status is Good” to all the integrated values in which the status of OUT is “Uncertain”
36	OP_CMD_ INT	0		1		1		Operator command that resets integrated values
37	OUTAGE_ LIM	0.0					4	Maximum time for which values can be retained in the event of power failure. Does not affect the block operation.
38	RESET_ CONFIRM	0		2		2		Reset confirmation input Valid when the Confirm reset option of INTEG_OPTS is chosen
39	UPDATE_ EVT	1 1 0 0 0						Indicates event information if an update event occurs.
40	BLOCK_ALM	1 1 0 0 0						Indicates alarm information if a block alarm occurs.

Appendix 3. Arithmetic (AR) Block

The AR block switches two main inputs of different measurement ranges bumplessly and combines the result with three auxiliary inputs through the selected compensation function (10 types) to calculate the output.

A3.1 Functional Block Diagram

The diagram below shows the functional block diagram of the AR block.



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The AR block is divided into three sections to explain each function.

1. Input section...Makes a go/no-go decision on the use of an input value, switches the range, and determines the PV status.
2. Computation section...Makes calculations through ARITH_TYPE.
3. Output section...
   Applies GAIN multiplication and BIAS addition to the calculated result to perform limitation processing for output.

* The range extension function compensates the IN and IN_LO input values and realizes smooth input switching when two devices with different ranges are connected.

A3.2 Input Section

There are five inputs: IN and IN_LO main inputs and IN_1, IN_2, and IN_3 auxiliary inputs. IN and IN_LO are intended to connect devices with different measurement ranges and allow the use of switching a measurement range by selecting the measuring device. However, because there are slight differences between IN and IN_LO values even when the same item is measured, instantaneous switching causes abrupt changes in the output. To prevent this phenomenon, the Arithmetic block uses a function known as range extension to compensate the IN and IN_LO values between RANGE_HI and RANGE_LO. This enables the input to be switched smoothly. The result of the range extension function is substituted into PV to be used for calculations.

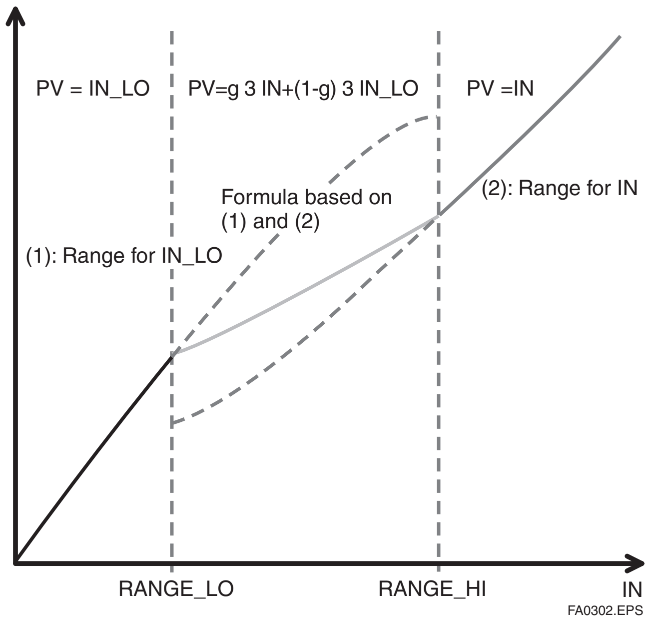
A3.2.1 Main Inputs

The range extension function determines the PV value in the following order:

1. If IN ≥ RANGE_HI => PV = IN
2. If IN ≤ RANGE_LO => PV = IN_LO
3. If RANGE_HI > IN > RANGE_LO => PV = g x IN + (1 - g) x IN_LO

g = (IN - RANGE_LO) / (RANGE_HI - RANGE_LO)

RANGE_HI and RANGE_LO are threshold values for switching two main inputs bumplessly.



PV is a parameter with status information, and PV status is determined with the value of “g”.

If “g” < 0.5 => The status of IN_LO is used
If “g” ≥ 0.5 => The status of IN is used

The determination of the status is made with a hysteresis of 10% provided for 0.5.

If RANGE_LO > RANGE_HI, the statuses of PV and OUT are “Bad.Configuration Error”. Then, “Configuration Error”. is output to BLOCK_ERR.

If the main input is one input, the input is reflected as is, RANGE_HI and RANGE_LO are not taken into account.

Example

RANGE_LO	20
RANGE_HI	300

In the above case, the followings are established:

IN = 310, IN_LO = 20 => PV = 310
IN = 230, IN_LO = 20 => g = (230−20) / (300−20) = 0.75
PV = 0.75 x 230 + (1−0.75) x 20 = 177.5
IN = 90, IN_LO = 20 => g = (90− 20) / (300−20) = 0.25
PV = 0.25 x 230 + (1-0.25) x 20 = 37.5
IN = 19, IN_LO = 10 => PV = 10

A3.2.2 Auxiliary Inputs

There are bias and gain parameters for the IN_1, IN_2, and IN_3 auxiliary inputs. The following shows the equation using them.

t_i = (IN_i + BIAS_IN_i) x GAIN_IN_i

The bias parameter is used for calculating absolute temperature or absolute pressure, while the gain parameter is used for normalization of square root extraction.

A3.2.3 INPUT_OPTS

INPUT_OPTS has an option that handles an input with “uncertain” or “bad” status as a “good” status input.

Bit	Function
0	Handles IN as a “good” status input if its status is “uncertain”.
1	Handles IN_LO as a “good” status input if its status is “uncertain”.
2	Handles IN_1 as a “good” status input if its status is “bad”.
3	Handles IN_1 as a “good” status input if its status is “uncertain”.
4	Handles IN_2 as a “good” status input if its status is “bad”.
5	Handles IN_2 as a “good” status input if its status is “uncertain”.
6	Handles IN_3 as a “good” status input if its status is “bad”.
7	Handles IN_3 as a “good” status input if its status is “uncertain”.
8 to 15	Reserved

There are options called “IN Use uncertain” and “IN_LO Use uncertain” for the IN and IN_LO inputs. When these options are valid, IN and IN_LO are internally interpreted as “good” IN and IN_LO even if their statuses are “uncertain”. (There is no option for “bad” status.)

For the IN_1, IN_2, and IN_3 auxiliary inputs, there are options known as “IN_i Use uncertain” and “IN_i Use bad”. If these options are valid, an IN_i with “uncertain” or “bad” status is internally interpreted as a “good” IN_i.

* The exception is that if each input status is “Bad.NotConnected”, INPUT_OPTS does not apply and the input remains bad.

A3.2.4 Relationship between the Main Inputs and PV

The value and PV status are determined with the statuses of two main inputs, INPUT_OPTS, and RANGE_LO and RANGE_HI.

- If the statuses of two main inputs are both “good”,

  or both statuses of two main inputs are other than “good”,

  See A3.2.1 Main Inputs.

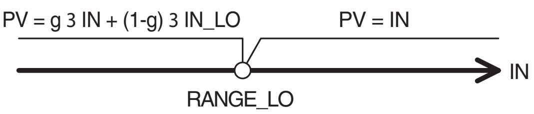
- If only one of the main inputs has “good” status after application of INPUT_OPTS,

  the PV value is determined as follows:

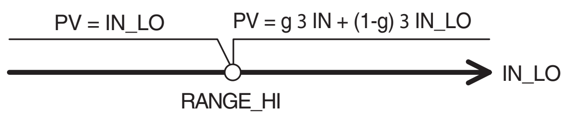
  − If the status of IN is “good” and the status of “IN_LO” is anything other than “good”,
  IN > RANGE_LO => PV = IN
  IN ≤ RANGE_LO => See A3.2.1.

  − When the status of IN is other than Good and the status of IN_LO is Good,
  IN_LO < RANGE_HI => PV = IN_LO
  IN_LO ≥ RANGE_HI => See A3.2.1.

If the status of IN is “good” and that of “IN_LO” is anything other than “good”



If the status of IN is anything other than “good” and that of “IN_LO” is “good”



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A3.3 Computation Section

A3.3.1 Computing Equations

This subsection shows computing equations used in the computation section:

1) Flow rate compensation (linear)

   func = PV x f

   f = (t_1/t_2)

2) Flow rate compensation (square root)

   func = PV x f

   f = sqrt(t_1/t_2/t_3)

3) Flow rate compensation (approximate formula)

   func = PV x f

   f = sqrt(t_1 x t_2 x t_3 x t_3)

4) Calorie calculation

   func = PV x f

   f = (t_1−t_2)

5) Multiplication and division

   func = PV x f

   f = ((t_1/t_2) + t_3)

6) Average calculation

   func = (PV + t_1 + t_2 + t_3)/N

   where N: number of inputs

7) Summation

   func = PV + t_1 + t_2 + t_3

8) Polynomial computation

   func = PV + t_1^2 + t_2^3 + t_3^4

9) HTG level compensation

   func = (PV−t_1)/(PV−t_2)

10) Polynomial computation

func = PV + t_1 x PV^2 + t_2 x PV^3 + t_3 x PV^4

* Precaution for computation

Division by 0 => If a value is divided by “0”, the calculation result is interpreted as $10^{37}$and, depending with core, a plus sign is added to it

Negative square root => The square root of an absolute value is extracted and a minus sign is added to it.

A3.3.2 Compensated Values

In computing equations 1) to 5) in A3.3.1, the value “f” is restricted by the COMP_HI_LIM or COMP_LO_LIM parameter. In this case, the value “f” is treated as follows:

If “f” > COMP_HI_LIM

f = COMP_HI_LIM

If “f” < COMP_LO_LIM

f = COMP_LO_LIM

A3.3.3 Average Calculation

In computing equation 6) in A3.3.1, the average of input value is calculated. Here, since it is necessary to obtain N, the number of inputs, determine to see if the sub-status of each input is “Not Connected”. Note that the main inputs may be accepted if IN or IN_LO is not in “Not Connected” sub-status. In this case, the number of inputs that are not in “Not Connected” sub-status is regarded as “N”.

A3.4 Output Section

After executing the computing equation, the block applies a gain to the calculated result and then adds a bias to it.
It then substitutes the result into PRE_OUT and if the mode is in AUTO, the value of PRE_OUT is taken as OUT.

PRE_OUT = func x GAIN + BIAS

Where func: result of computing equation execution

OUT = PRE_OUT (when the mode is in AUTO)

Next, the block performs limitation processing (OUT_HI_LIM, OUT_LO_LIM). This processing is described as follows with respect to the value of PRE_OUT.

If PRE_OUT > OUT_HI_LIM
PRE_OUT = OUT_HI_LIM

The “High Limited” processing is applied to the status of PRE_OUT.

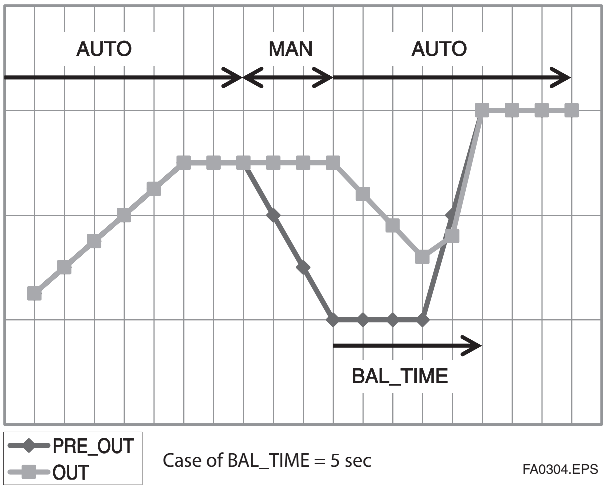
If PRE_OUT< OUT_LO_LIM
PRE_OUT = OUT_LO_LIM

The “Low Limited” processing is applied to the status of PRE_OUT.

A3.4.1 Mode Handling

Mode	Output
Auto	OUT=PRE_OUT
MAN	For output of OUT, the OUT value in the Auto mode just before change to MAN or O/S is retained.
O/S	

In the Manual mode (including O/S), the value of OUT in the Auto mode just before a change to the Manual mode is held, or the value written to OUT is output.
If the mode is switched from Manual to Auto, the output value of OUT that is linearly changed with respect to the value of PRE_OUT for time set by BAL_TIME is output. The PRE_OUT always indicates the results of calculation. After elapse of BAL_TIME, OUT = PRE_OUT is established.
Note that if the value of BAL_TIME is changed during the linear change of the OUT value, it is not reflected. The value of BAL_TIME will be reflected only after the mode is changed the next time.



The value of OUT is represented with the following equation.

$y^n = y^{n-1} + (x^n - y^{n-1}) / (\alpha - n)$

The value of $\alpha = (T / t^c) + 1$ *...The value of T/t^c truncates digits to the right of the decimal point.

where y : OUT
x : PRE_OUT
t^c : period of execution
T : BAL_TIME
n : period

A3.4.2 Status Handling

The setting of INPUT_OPTS is applied to the input status. When INPUT_OPTS is applied, there are cases where the PV status becomes “good” even if the status of main inputs is “uncertain”, or the status of auxiliary inputs is “uncertain” or “bad”.
The PV status is classified by the following:

- If the statuses of two main inputs are both “good”,

  Or if both statuses of two main inputs are other than “good”

  See A3.2.1 Main Inputs.

- If only one of the statuses of two main inputs is “good”

  - If the status of IN is “good” and the status of “IN_LO” is anything other than “good”

    IN > RANGE_LO => The status of IN applies.

    IN ≤ RANGE_LO => See A3.2.1 Main Inputs.

  - If the status of IN is anything other than “good” and the status of “IN_LO” is “good”

    IN_LO < RANGE_HI => The status of IN_LO applies

    IN_LO ≥ RANGE_HI => See A3.2.1 Main Inputs.

The exception is that if RANGE_LO > RANGE_HI, the PV status is made “Bad. ConfigurationError”.

The input status irrelevant to the computing equation selected by ARITH_TYPE will be ignored and does not affect other statuses. The statuses of outputs (OUT.Status and PRE_OUT.Status) are interpreted as the status of the worst input among the statuses of PV and auxiliary inputs (IN_1, IN_2, and IN_3) to which INPUT_OPTS has been applied.

Example)

<table>
<tr><th colspan="2"></th><th>Case 1</th><th>Case 2</th><th>Case 3</th></tr>
<tr><td colspan="2">PV</td><td colspan="3">Good</td></tr>
<tr><td colspan="2">IN_1</td><td colspan="3">Uncertain</td></tr>
<tr><td colspan="2">IN_2</td><td colspan="3">Bad</td></tr>
<tr><td colspan="2">IN_3</td><td colspan="3">Bad</td></tr>
<tr><td rowspan="3">INPUT_OPTS</td><td>IN_1</td><td>Handled as a “good” input if its status is “uncertain”.</td><td colspan="2">No option</td></tr>
<tr><td>IN_2</td><td colspan="2">Handled as a “good” input if its status is “bad”.</td><td>No option</td></tr>
<tr><td>IN_3</td><td colspan="3">No option</td></tr>
<tr><td colspan="2">ARITH_TYPE</td><td colspan="3">1) Flow rate compensation (linear) in A3.3.1, “Computing Equations”</td></tr>
<tr><td colspan="2">OUT.Status</td><td>Good</td><td>Uncertain</td><td>Bad</td></tr>
</table>

A3.5 List of the Arithmetic Block Parameters

Relative Index	Parameter Name	Write mode	Valid Range	Default Value	Description / Remarks
0	BLOCK_ HEADER	O/S		TAG="AR"	Information on this block such as block tag, DD revision, and execution time.
1	ST_REV			0	Indicates the revision level of the set parameters associated with the Arithmetic function block. This revision is updated if the setting value is changed. Used to check for parameter change, etc.
2	TAG_DESC			Null	Universal parameter to store a comment explaining tag contents.
3	STRATEGY			1	Universal parameter intended to be used for the high-level system to separate function blocks.
4	ALERT_KEY		1-255	1	Key information to identify where an alert takes place. Generally, this parameter is used by the high-level system to identify specific areas in a plant that are under the control of specific operators, to separate necessary alerts only. This is one of the universal parameters.
5	MODE_BLK			AUTO	Universal parameter to show a block operation state. Consists of Actual mode, Target mode, Permit mode and Normal mode.
6	BLOCK_ERR			0	Indicates the error statuses related to the own block. The bit used by the AR function block is as follows: bit1: Block Configuration Error bit15: O/S Mode
7	PV			0	The result of a range extension function is substituted into this. From the viewpoint of the computing equation, PV is the main input.
8	OUT	MAN		0	Output
9	PRE_OUT			0	Always indicates the calculation result. The value is substituted into OUT in the AUTO mode.
10	PV_SCALE	O/S			Indicates PV scaling. (for making a memo)
11	OUT_RANGE				Output scaling for the host (for making a memo)
12	GRANT_DENY			0	The parameter for checking if various operations have been executed. Set a bit corresponding to the GRANT parameter before various operations are executed. Check the DENY parameter after the operation. If the bit for the operation is not set, it indicates that the operation was executed.

<table>
<tr><th>Relative Index</th><th>Parameter Name</th><th>Write mode</th><th>Valid Range</th><th>Default Value</th><th>Description / Remarks</th></tr>
<tr><td>13</td><td>INPUT_OPTS</td><td></td><td></td><td>0</td><td>Determines whether an input is used as a “good” input when the input status is “bad” or “uncertain”.
<table>
<tr><th>Bit</th><th>Function</th></tr>
<tr><td>0</td><td>Handles IN as a “good” status input if its status is “uncertain”.</td></tr>
<tr><td>1</td><td>Handles IN_LO as a “good” status input if its status is “uncertain”.</td></tr>
<tr><td>2</td><td>Handles IN_1 as a “good” status input if its status is “uncertain”.</td></tr>
<tr><td>3</td><td>Handles IN_1 as a “good” status input if its status is “bad”.</td></tr>
<tr><td>4</td><td>Handles IN_2 as a “good” status input if its status is “uncertain”.</td></tr>
<tr><td>5</td><td>Handles IN_2 as a “good” status input if its status is “bad”.</td></tr>
<tr><td>6</td><td>Handles IN_3 as a “good” status input if its status is “uncertain”.</td></tr>
<tr><td>7</td><td>Handles IN_3 as a “good” status input if its status is “bad”.</td></tr>
<tr><td>8 to 15</td><td>Reserved</td></tr>
</table></td></tr>
<tr><td>14</td><td>IN</td><td></td><td></td><td>0</td><td>Input block</td></tr>
<tr><td>15</td><td>IN_LO</td><td></td><td></td><td>0</td><td>Input for a low-range process value.
This is used for the range extension function.</td></tr>
<tr><td>16</td><td>IN_1</td><td></td><td></td><td>0</td><td>Auxiliary input 1</td></tr>
<tr><td>17</td><td>IN_2</td><td></td><td></td><td>0</td><td>Auxiliary input 2</td></tr>
<tr><td>18</td><td>IN_3</td><td></td><td></td><td>0</td><td>Auxiliary input 3</td></tr>
<tr><td>19</td><td>RANGE_HI</td><td></td><td></td><td>0</td><td>High limit for switching to a high-range process value (IN) by the range extension function.</td></tr>
<tr><td>20</td><td>RANGE_LO</td><td></td><td></td><td>0</td><td>Low limit for switching to a low-range process value (LO_IN) by the range extension function.</td></tr>
<tr><td>21</td><td>BIAS_IN_1</td><td></td><td></td><td>0</td><td>IN_1 bias</td></tr>
<tr><td>22</td><td>GAIN_IN_1</td><td></td><td></td><td>0</td><td>IN_1 gain</td></tr>
<tr><td>23</td><td>BIAS_IN_2</td><td></td><td></td><td>0</td><td>IN_2 bias</td></tr>
<tr><td>24</td><td>GAIN_IN_2</td><td></td><td></td><td>0</td><td>IN_2 gain</td></tr>
<tr><td>25</td><td>BIAS_IN_3</td><td></td><td></td><td>0</td><td>IN_3 bias</td></tr>
<tr><td>26</td><td>GAIN_IN_3</td><td></td><td></td><td>0</td><td>IN_3 gain</td></tr>
<tr><td>27</td><td>COMP_HI_LIM</td><td></td><td></td><td>+INF</td><td>High limit of compensation factor f</td></tr>
<tr><td>28</td><td>COMP_LO_LIM</td><td></td><td></td><td>-INF</td><td>Low limit of compensation factor f</td></tr>
</table>

<table>
<tr><th>Relative Index</th><th>Parameter Name</th><th>Write mode</th><th>Valid Range</th><th>Default Value</th><th>Description / Remarks</th></tr>
<tr><td>29</td><td>AR IT H_TY PE</td><td>1 to 10</td><td></td><td>0x01</td><td>Computation algorithm identification no.
<table>
<tr><th>Value</th><th>Selection Name</th><th>Description</th></tr>
<tr><td>1</td><td>Flow compensation, linear</td><td>Flow rate compensation (linear)</td></tr>
<tr><td>2</td><td>Flow compensation, square root</td><td>Flow rate compensation (square root)</td></tr>
<tr><td>3</td><td>Flow compensation, approximate</td><td>Flow rate compensation (approximate formula)</td></tr>
<tr><td>4</td><td>BTU flow (*)</td><td>Calorie calculation</td></tr>
<tr><td>5</td><td>Traditional Multiply Divide</td><td>Multiplication and division</td></tr>
<tr><td>6</td><td>Average</td><td>Average calculation</td></tr>
<tr><td>7</td><td>Traditional summer</td><td>Summation</td></tr>
<tr><td>8</td><td>Fourth order Polynomial, Type1</td><td>4th-order (auxiliary input) polynomial</td></tr>
<tr><td>9</td><td>HTG level compensation (*)</td><td>HTG level compensation</td></tr>
<tr><td>10</td><td>Fourth order Polynomial, Type2</td><td>4th-order (main input) polynomial computation</td></tr>
</table>
* BTU stands for British thermal unit.
HTG stands for hydrostatic tank gauging.</td></tr>
<tr><td>30</td><td>BAL_TIME</td><td>More than 0</td><td></td><td>0</td><td>Time taken to return to the set value</td></tr>
<tr><td>31</td><td>BIAS</td><td></td><td></td><td>0</td><td>Bias value used to calculate the output</td></tr>
<tr><td>32</td><td>GAIN</td><td></td><td></td><td>1</td><td>Gain value used to calculate the output</td></tr>
<tr><td>33</td><td>OUT_HI_LIM</td><td></td><td></td><td>+INF</td><td>Maximum output value</td></tr>
<tr><td>34</td><td>OUT_LO_LIM</td><td></td><td></td><td>-INF</td><td>Minimum output value</td></tr>
<tr><td>35</td><td>UPDATE_EVT</td><td></td><td></td><td></td><td>Indicates contents of the event when an update event (a change to the setpoint) occurs.</td></tr>
<tr><td>36</td><td>BLOCK_ALM</td><td></td><td></td><td></td><td>Indicates contents of the alarm when a block alarm occurs.</td></tr>
</table>

Appendix 4. Link Master Functions

A4.1 Link Active Scheduler (LAS)

A link active scheduler (LAS) is a device to perform the network control function for Fieldbus. Fieldbus always needs one LAS on the link.
This product supports the following LAS functions.

1	PN transmission function	Identifies a fieldbus device newly connected to the bus.* PN (ProbeNode)
2	PT transmission function	Passes a token to a device on the link.* PT (PassToken)
3	CD transmission function	Starts up a scheduled transmission to a device on the link. *CD (CompleData)
4	Time synchronization function	Periodically transmits the time information to the link. Also, returns the time information in response to a request from a device.
5	Live list equalization function	Sends the live list information to the link master device on the link.
6	LAS transfer function	Function to transfer the right to be the LAS to another link master device.

A4.2 Link Master (LM)

Any devices having the function as LAS are called a link master (LM). Though there must be always one LAS on the link, there can be multiple LM devices. (Figure A4.1)
When the LAS stops working, another LM device on the link starts functioning as the LAS.

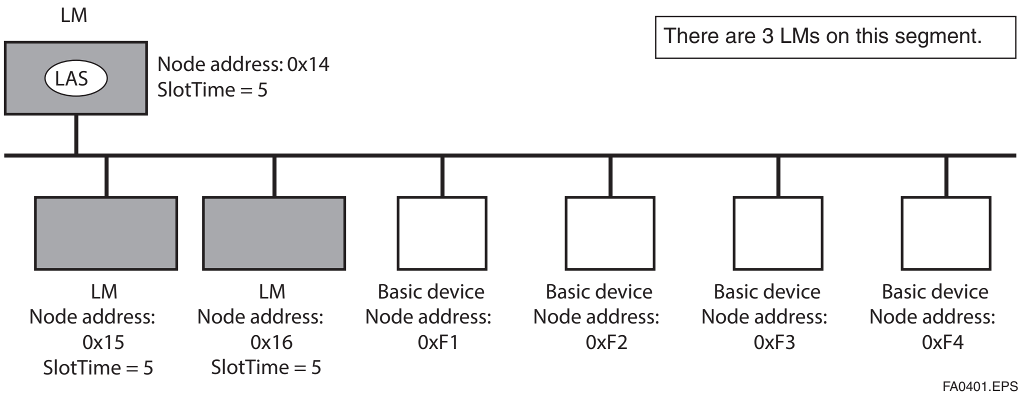


Figure A4.1 LM Device and Basic Device

A4.3 Transition of LM Function

There are the following procedures for an LM device to become the LAS:

(1) If the LM device judges that there is no LAS on the link, in such a case as when the link starts up or when the LAS fails*, the LM declares itself as the LAS, and then becomes the LAS.* Backup for LAS (Figure A4.2)

(2) The LM device requests the LAS on the link to transfer the right of being the LAS, and then becomes the LAS.

In either case, if there are multiple LM devices on the link, the LM device which has the smallest V(ST) x V(TN) value becomes the LAS.

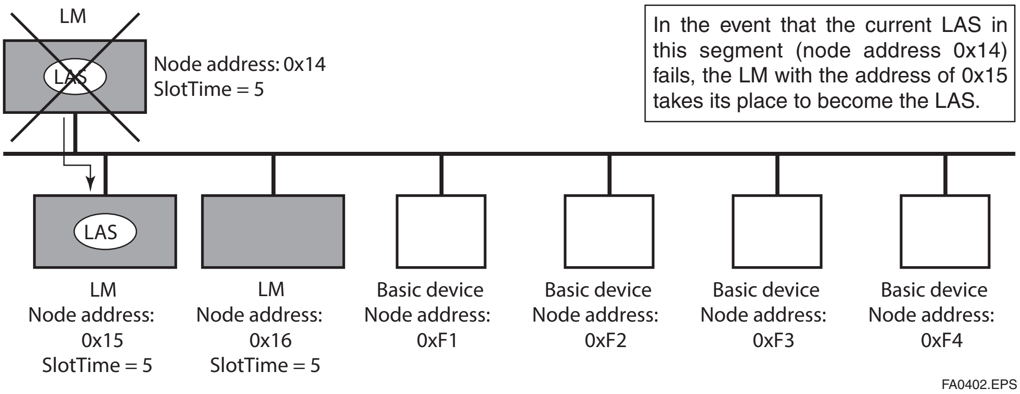


Figure A4.2 Backup of LM Function

To set up this product as a device that is capable of backing up the LAS, follow the procedures (1), (2) and (3) below.

Note: When changing the settings of this product, add this product to the link where an LAS is running. After making changes to the settings, do not turn off the power to this product for at least 30 seconds.

(1) Set the node address of this product. In general, set an address from 0x14 to [V(FUN) - 1] for the LM device.

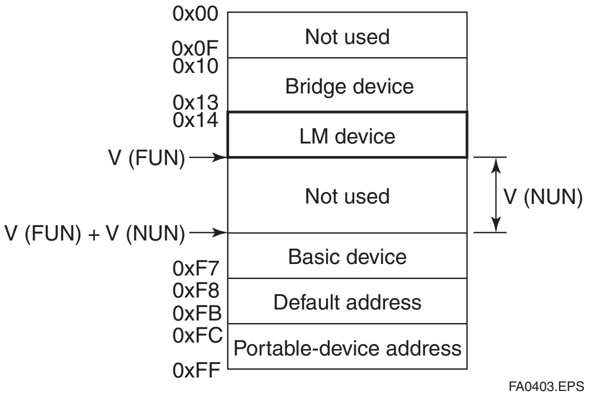


Figure A4.3 Node Address Ranges

(2) In the LAS settings of this product, set the values of V(ST), V(MRD), and V(MID) to the lowest capability values in all the devices on the link.

(Ex.) <Check of capacity value of each device>

DlmeBasicInfo (Index 374(SM))

Subindex	Element	This Device	Device 1	Device 2	Device 3	Description
1	SlotTime	4	8	10	20	Capability value for V (ST)
3	MaxResponse Delay	3	6	3	5	Capability value for V (MRD)
6	MinInterPdu Delay	4	8	12	10	Capability value for V (MID)

In the above case, the settings for this product should be as follows.

ConfiguredLinkSettingsRecord (Index 385(SM))

Subindex	Element	Setting Value (Default Value)	Description
1	SlotTime	20(4095)	V (ST)
3	MaxResponseDelay	6(5)	V (MRD)
6	MinInterPduDelay	12(12)	V (MID)

(3) Set the values of LAS setting V(FUN) and V(NUN) of this product so that they include the node addresses of all devices on the link. (See Figure A4.3.)

ConfiguredLinkSettingsRecord (Index 385(SM))

Subindex	Element	Default Value	Description
4	FirstUnpolledNodeId	0x25	V (FUN)
7	NumConsecUnpolledNodeId	0xBA	V (NUN)

A4.4 LM Functions

A4.4.1 LM Function List

No.	Function Name	Function
1	LM initialization function	Among LM devices, at startup, the device with the smallest [V(ST) x V(TN)] value becomes the LAS. At all times, each LM device is monitoring whether or not the BUS line is in a no-signal state.
2	StartUp of other nodes (PN and Node Activation SPDU transmissions)	Transmits a PN (Probe Node). Sends Node Activation SPDU to the device which returns a new PR (Probe Response) message.
3	PT transmission processing (including FinalBit processing)	Passes a PT (Pass Token) message to devices included in the live list sequentially. Monitors the RT (Return Token) and final bit returned in reply to the PT.
4	CD transmission function	Transmits a CD (Compel Data) message at the scheduled times.
5	Time synchronization function	Supports periodic TD (Time Distribution) transmissions and transmissions of a reply to a CT (Compel Time).
6	DomainDownload Server	Sets the schedule information. The schedule information can be equalized only when the Domain Download command is carried out from outside the LM in question. (The version information of the schedule is usually monitored, but no action is taken even when it is different.)
7	Live list equalization	Transmits SPDU messages to the LM device to equalize live lists.
8	LAS transfer function	Function to transfer the right of being the LAS to another LM device.
9	Reading/writing function of LM-related NMIB	See Section A4.5.
10	Round Trip Delay Reply (RR) DLPDU reply function	Not yet supported in the current version.
11	Long Address	Not yet supported in the current version.

A4.5 LM Parameters

A4.5.1 LM Parameter List

The tables below show the list of LM parameters.

Index(SM)	Parameter Name	Sub-parameter Name (Sub Index)	Default Value	Write mode	Description/ Remarks
283	PLME_BASIC_ CHARACTERISTICS	0		R	
		1 ChannelStatisticsSupported	0x00		
		2 MediumAndDataRatesSupported	0x4900000000000000		
		3 IecVersion	1 (0x1)		
		4 NumOfChannels	1 (0x1)		
		5 PowerMode	0 (0x0)		
284	CHANNEL_STATES	0		R	
		1 channel-1	0 (0x0)		
		2 channel-2	128 (0x80)		
		3 channel-3	128 (0x80)		
		4 channel-4	128 (0x80)		
		5 channel-5	128 (0x80)		
		6 channel-6	128 (0x80)		
		7 channel-7	128 (0x80)		
		8 channel-8	128 (0x80)		
285	PLME_BASIC_INFO	0		R	
		1 InterfaceMode	0 (0x0)		
		2 LoopBackMode	0 (0x0)		
		3 XmitEnabled	1 (0x1)		
		4 RcvEnabled	1 (0x1)		
		5 PreferredReceiveChannel	1 (0x1)		
		6 MediaTypeSelected	73 (0x49)		
		7 ReceiveSelect	1 (0x1)		
286	DLME_LINK_MASTER_CAPABILITIES_VARIABLE		0x04	RW	
287	DLME_LINK_ MASTER_ INFO_RECORD	0		RW	
		1 MaxSchedulingOverhead	0		
		2 DefMinTokenDelegTime	100		
		3 DefTokenHoldTime	300		
		4 TargetTokenRotTime	4096		
		5 LinkMaintTokHoldTime	400		
		6 TimeDistributionPeriod	5000		
		7 MaximumInactivityToClaimLasDelay	2		
		8 LasDatabaseStatusSpduDistributionPeriod	6000		
288	PRIMARY_LINK_MASTER_FLAG_VARIABLE		0	RW	LAS: True = 0xFF; Non-LAS: False = 0x00
289	LIVE_LIST_STATUS_ARRAY_VARIABLE		0	R	
290	MAX_TOKEN_ HOLD_ TIME_ARRAY	0		RW	
		1 Element1	0x0000(x16), 0x012C(x16)		
		2 Element2	0x012C(x5), 0x0000(x27)		
		3 Element3	0x0000(x32)		
		4 Element4	0x0000(x32)		
		5 Element5	0x0000(x32)		
		6 Element6	0x0000(x32)		
		7 Element7	0x0000(x31), 0x012C(x1)		
		8 Element8	0x012C(x32)		

Index(SM)	Parameter Name	Sub-parameter Name (Sub Index)	Default Value	Write mode	Description/ Remarks
291	BOOT_OPERAT_ FUNCTIONAL_ CLASS		Specified at the time of ordering	RW	0x01 (basic device); 0x02 (LM)
292	CURRENT_LINK_ SETTING_RECORD	0		R	Settings for LAS
		1 SlotTime	0		
		2 PerDlpduPhlOverhead	0		
		3 MaxResponseDelay	0		
		4 FirstUnpolledNodeId	0		
		5 ThisLink	0		
		6 MinInterPduDelay	0		
		7 NumConseeUnpolledNodeId	0		
		8 PreambleExtension	0		
		9 PostTransGapExtension	0		
		10 MaxInterChanSignalSkew	0		
		11 TimeSyncClass	0		
293	CONFIGURED_ LINK_ SETTING_RECORD	0		RW	
		1 SlotTime	4095		
		2 PerDlpduPhlOverhead	4		
		3 MaxResponseDelay	5		
		4 FirstUnpolledNodeId	37		
		5 ThisLink	0		
		6 MinInterPduDelay	12		
		7 NumConseeUnpolledNodeId	186		
		8 PreambleExtension	2		
		9 PostTransGapExtension	1		
		10 MaxInterChanSignalSkew	0		
		11 TimeSyncClass	4		
294	LINK_SCHEDULE_ACTIVATION_VARIABLE		0 (0x0)	RW	
295	LINK_ SCHEDULE_LIST_ CHARACTERISTICS_ RECORD	0		R	
		1 NumOfSchedules	2		
		2 NumOfSubSchedulesPerSchedule	5		
		3 ActiveScheduleVersion	0		
		4 ActiveSheduleOdIndex	0		
		5 ActiveScheduleStartingTime	0		
296	DLME_SCHEDULE_ DESCRIPTOR.1	0		R	
		1 Version	0		
		2 MacrocycleDuration	0		
		3 TimeResolution	0		
297	DLME_SCHEDULE_ DESCRIPTOR.2	0		R	
		1 Version	0		
		2 MacrocycleDuration	0		
		3 TimeResolution	0		
298	DOMAIN.1				Read/write impossible. Get-OD is possible.
299	DOMAIN.2				Read/write impossible. Get-OD is possible.

A4.5.2 Descriptions for LM Parameters

The following describes LM parameters of this product.
Do not turn off the power to this product for 60 seconds after making a change to parameter settings.

(1) DlmeLinkMasterCapabilitiesVariable

Bit Position	Meaning	Description	Value
B3: 0x04	LAS Schedule in Non-volatile Memory	Indicates whether the LAS schedule can (= 1) or cannot (= 0) be saved to the non-volatile memory	1
B2: 0x02	Last Values Record Supported	Indicates whether to support (= 1) or not to support (= 0) LastValuesRecord.	0
B1: 0x01	Link Master Statistics Record Supported	Indicates whether to support (= 1) or not to support (= 0) DlmeLinkMasterStatisticsRecord.	0

(2) DlmeLinkMasterInfoRecord

Sub-index	Element	Size [B]	Description
1	MaxSchedulingOverhead	1	V(MSO)
2	DefMinTokenDelegTime	2	V(DMDT)
3	DefTokenHoldTime	2	V(DTHT)
4	TargetTokenRotTime	2	V(TTRT)
5	LinkMaintTokHoldTime	2	V(LTHT)
6	TimeDistributionPeriod	4	V(TDP)
7	MaximumInactivityToClaimLasDelay	2	V(MICD)
8	LasDatabaseStatusSpduDistributionPeriod	2	V(LDDP)

(3) PrimaryLinkMasterFlagVariable

Variable which explicitly declares the LAS. Writing “TRUE” (0xFF) to this parameter in a device causes that device to attempt to become the LAS. The request of writing “TRUE” to this parameter in a device is rejected if the value of the same parameter in any other device that has a smaller node address is true.

(4) LiveListStatusArrayVariable

The parameter is a variable of 32[B] and each bit represents the status of whether a device is live (1) or not (0).
The leading bit corresponds to the device address 0x00, and the final bit to the device address 0xFF.
For example, if there are device addresses 0x10 and 0x15 on the bus, the value is as follows:

```
0x00 00 84 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
       00 00 00 00 00 00 00 00 00 00 00 00 00 00
    Bit corresponds    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 ...
                      0x00                     0x10    0x15
```

(5) MaxTokenHoldTimeArray

An 8 (64 byte array variable, in which each set of 2 bytes represents the delegation time (set as an octet time) assigned to a device. The delegation time denotes a time period that is given to a device by means of a PT message sent from the LAS within each token circulation cycle.
The unit is in octet time.
The leading 2 bytes correspond to the device address 0x00, and the final 2 bytes to the device address 0xFF.
Specify the subindex to access this parameter.

(6) BootOperatFunctionalClass

Writing 1 to this parameter in a device and restarting the device causes the device to start as a basic device.
On the contrary, writing 2 to this parameter and restarting the device causes the device to start as an LM.

(7) CurrentLinkSettingRecord/ConfiguredLinkSettingsRecord

CurrentLinkSettingRecord indicates the bus parameter currently used.
On the other hand, ConfiguredLinkSettingsRecord indicates the bus parameter to be used when the device becomes the LAS.
If the device is LAS, both parameters have the same value.

Sub-index	Element	Size [B]	Description
1	SlotTime	2	V(ST)
2	PerDlpduPhlOverhead	1	V(PhLO)
3	MaxResponseDelay	1	V(MRD)
4	FirstUnpolledNodeId	1	V(FUN)
5	ThisLink	2	V(TL)
6	MinInterPduDelay	1	V(MID)
7	NumConsecUnpolledNodeId	1	V(NUN)
8	PreambleExtension	1	V(PhPE)
9	PostTransGapExtension	1	V(PhGE)
10	MaxInterChanSignalSkew	1	V(PhIS)
11	TimeSyncClass	1	V(TSC)

(8) DlmeBasicInfo

Sub-index	Element	Size [B]	Description
1	SlotTime	2	Indicates the capability value for V(ST) of the device.
2	PerDlpduPhlOverhead	1	V(PhLO)
3	MaxResponseDelay	1	Indicates the capability value for V(MRD) of the device.
4	ThisNode	1	V(TN), Node Address
5	ThisLink	2	V(TL), link-id
6	MinInterPduDelay	1	Indicates the capability value for V(MID) of the device.
7	TimeSyncClass	1	Indicates the capability value for V(TSC) of the device.
8	PreambleExtension	1	V(PhPE)
9	PostTransGapExtension	1	V(PhGE)
10	MaxInterChanSignalSkew	1	V(PhIS)

(9) PlmeBasicCharacteristics

Sub-index	Element	Size [B]	Value	Description
1	Channel Statistics Supported	1	0	Statistics information are not supported.
2	Medium AndData Rates Supported	8	0x4900000000000000	Wire medium, voltage mode, and 31.25 kbps are supported.
3	IceVersion	2	1	Indicates the version for IEC Physical Layer Entity.
4	NumOf Channels	1	1	
5	Power Mode	1	1	0: Bus Powered 1: Self Powered

(10) ChannelStates

Sub-index	Element	Size [B]	Value	Description
1	Channel 1	1	0x00	In Use, No Bad since last read, No Silent since last read, No Jabber since last read, Tx Good, Rx Good
2	Channel 2	1	0x80	Unused
3	Channel 3	1	0x80	Unused
4	Channel 4	1	0x80	Unused
5	Channel 5	1	0x80	Unused
6	Channel 6	1	0x80	Unused
7	Channel 7	1	0x80	Unused
8	Channel 8	1	0x80	Unused

(11) PlmeBasicInfo

Sub-index	Element	Size [B]	Value	Description
1	InterfaceMode	1	0	0: Half Duplex 1: Full Duplex
2	LoopBackMode	1	0	0: Disabled 1: MAU 2: MDS
3	XmitEnabled	1	0x01	Channel 1 is enabled.
4	RcvEnebled	1	0x01	Channel 1 is enabled.
5	PreferredReceive Channel	1	0x01	Channel 1 is used for reception.
6	MediaType Selected	1	0x49	wire medium, voltage mode, 31.25 kbps are selected.
7	ReceiveSelect	1	0x01	Channel 1 is used for reception.

(12) LinkScheduleActivationVaribale

Writing the version number of an LAS schedule, which has already been downloaded to the domain, to this parameter causes the corresponding schedule to be executed.
On the other hand, writing 0 to this parameter stops the active schedule which is being executed.

(13) LinkScheduleListCharacteristicsRecord

Sub-index	Element	Size [B]	Description
1	NumOf Schedules	1	Indicates the total number of LAS schedules that have been downloaded to the domain.
2	NumOfSub SchedulesPer Schedule	1	Indicates the maximum number of sub-schedules an LAS schedule can contain.
3	ActiveSchedule Version	2	Indicates the version number of the schedule currently executed.
4	ActiveSchedule OdIndex	2	Indicates the index number of the domain that stores the schedule currently executed.
5	ActiveSchedule StaringTime	6	Indicates the time when the current schedule began being executed.

(14) DlmeScheduleDescriptor

This parameter exists for the same number as the total number of domains, and each describes the LAS schedule downloaded to the corresponding domain.
For the domain to which a schedule has not yet been downloaded, the values in this parameter are all zeros.

Sub- index	Element	S ize	Description
1	Version	2	Indicates the version number of the LAS schedule downloaded to the corresponding domain.
2	Macrocycle Duration	4	Indicates the macro cycle of the LAS schedule downloaded to the corresponding domain.
3	TimeResolution	2	Indicates the time accuracy that is required to execute the LAS schedule downloaded to the corresponding domain.

(15) Domain

This parameter is impossible to read/write. Get-OD is possible.
To this parameter, the LAS schedule can be downloaded with GenericDomainDownload.

NOTE

When downloading a LAS schedule to this product, the maximum allowable linkages between devices are 25.

A4.6 FAQs

Q1. When the LAS stops, this products does not back it up by becoming the LAS. Why?

A1-1. Is this product running as the LM device?
-> Check that the value of BootOperatFunctionalClass (index 367) is 2 (indicating that it is an LM).

A1-2. Check that the relation of V(ST) and V(TN) as LM device of this product is as follows:

This Device		Other LM devices
V(ST) x V(TN)	<	V(ST) x V(TN)

Q2. How can I make this product become the LAS while LAS is running?

A2-1. Check that the version numbers of the active schedules in the current LAS and this product are the same by reading:
-> LinkScheduleListCharacteristicsRecord (index 295 for this product)
- ActiveScheduleVersion(SubIndex-3)

A2-2. Make this product declare itself to become the LAS.
-> Set PrimaryLinkMasterFlagVariable in the current LAS to 0x00(FALSE).
Then, set PrimaryLinkMasterFlagVariable (index 288) in this product to 0xFF(TRUE).

Q3. On a link where this product works as the LAS, another device cannot be connected. How come?

A3-1. Check that the bus parameter as being the LAS for this product and the bus parameter indicating the capabilities of the device that cannot be connected are as follows:

This product		Problematic device
V(ST)	>	V(ST)
V(MID)	>	V(MID)
V(MRD)	>	V(MRD)

-> This product: ConfiguredLinkSettingsRecord (index385)   V(ST), V(MID), V(MRD)
-> Problematic device: DlmeBasicInfo   V(ST), V(MID), V(MRD)

A3-2. Check that the node address of the problematic device is not included in the V(FUN) + V(NUN) address of this product.

Q4. "AL.20" remains displayed on LCD.

The reason could be that LAS may not be on the bus, that communication with LAS is not established, and so on.
A4-1. Check that LAS is connected to the bus. (To use this product as LAS, perform the following operations in A4.3 (1), (2) and (3).)

A4-2. Set the LAS parameter to the operating parameter of this product. (Reference: 4.2 Network definition)

LAS		This product	
V(ST)	>	V(ST)	(4 or more)
V(MID)	>	V(MID)	(4 or more)
V(MRD)	>	V(MRD)	(3 or more)

A4-3. Check that the address of this product is correct. (Reference: 4.2 Network Definition)
The address of this product is;

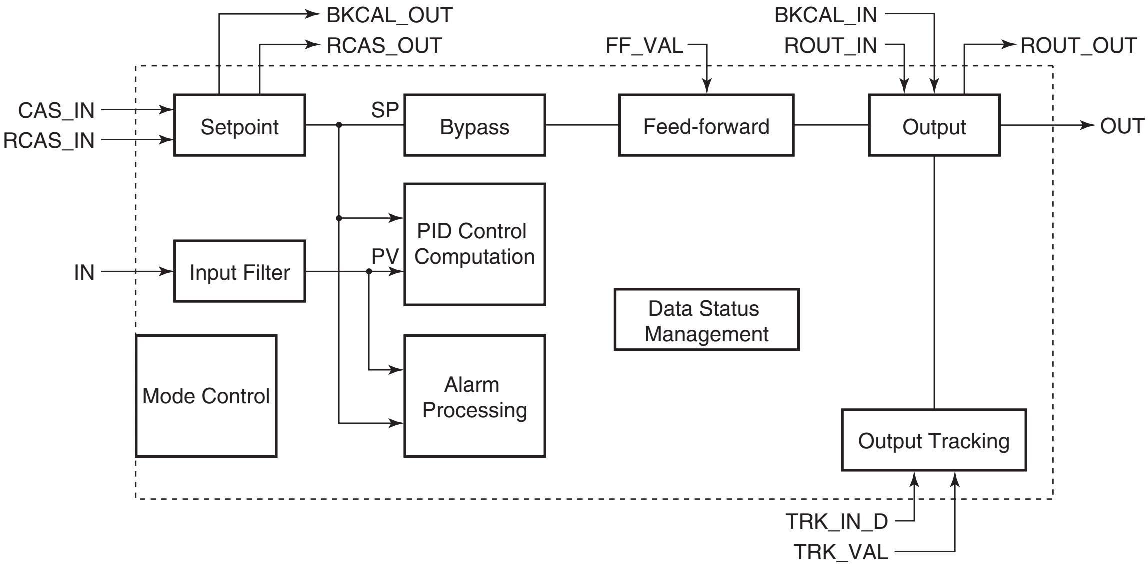
- Outside the LAS parameter V(FUN) to V(FUN) + V(NUN).
- Not the default address (0xF8 to 0xFB).

Appendix 5. PID Block

The PID block performs the PID calculation based on the deviation of the measured value (PV) from the setpoint (SP).
The PID block is generally used for constant-setpoint and tracking control.

A5.1 Functional Block Diagram

The functional block diagram of the PID block is shown below.



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A5.2 Functions of PID Block

The control calculation processing provided in the PID block has the following functions.

Control Calculation Processing	Description
PID control	Calculates the control output using the PID control algorithm.
Control output action	Converts the change in control output (ΔMV) for each control period to the manipulated value (MV) that is to be actually output. Supports “velocity type” as an operation of operational output.
Direction of control action	Switches the action direction of output between forward and reverse based on the changes in the deviation.
Control action bypass	When the bypass is set, the SP value is scaled to the OUT range and output as OUT.
Feed-forward	Adds the external compensation value FF_VAL to the output signal from the PID computation.
Measured-value tracking	Equalizes the setpoint (SP) to the measured value (PV).
Setpoint limiter	Limits the value of setpoint (SP) within the high/low limits.
External-output tracking	Converts TRK_VAL to the scale of OUT and outputs it.
Mode change	The PID block has the following eight modes: O/S, IMan, Lo, Man, Auto, Cas, RCas, and ROut.
Bumpless transfer	Switches the operational output value (OUT) without a sudden change at changing block modes and switching the operational output value (OUT) at the cascade downstream block.
Initialization and manual fallback	Changes MODE_BLK to IMan and temporarily suspends the control action. Operates when initialization and manual fallback conditions are met.
MAN fallback	Changes MODE_BLK to the Man mode and temporarily aborts the control action forcibly.
Auto fallback	Changes MODE_BLK to Auto when MODE_BLK is running in the Cas mode, and continues the control action using the setpoint set by the operator.
Mode shedding	Specifies the block mode with SHED_OPT after a failure.
Block alarm processing	Supports block alarms, process alarms, and event updates.

A5.3 Parameter List of PID Block

A blank in the Write Mode column indicates that the corresponding parameter can be written in all modes.

Index	Parameter Name	Default Value	Write mode	Valid Range	Description
0	Block Header	TAG: "PID"	Block Tag = O/S		Same as that for the AI block.
1	ST_REV		---		Same as that for the AI block.
2	TAG_DESC	Null			Same as that for the AI block.
3	STRATEGY	1			Same as that for the AI block.
4	ALERT_KEY	1		1 to 255	Same as that for the AI block.
5	MODE_BLK				
6	BLOCK_ERR		---		Same as that for the AI block.
7	PV		---		Measured value; Non-dimensional value that is converted from the input (IN) value based on the PV_SCALE values and filtered.
8	SP	0	AUTO	PV_SCALE ±10%	Setpoint
9	OUT		Man		Output value.
10	PV_SCALE	100 0 1133 1	O/S		Scale conversion value for the input (IN) value.
11	OUT_SCALE	100 0 1342 1	O/S		Scale values used for converting the control output (OUT) value to actual amount.
12	GRANT_DENY	0	AUTO		Same as that for the AI block.
13	CONTROL_ OPTS	0	O/S		Defines settings for control action. See Subsection A5.13.1 for details.
14	STATUS_OPTS	0	O/S		See Subsection A5.15.3 for details.
15	IN	0			Measurement input
16	PV_FTIME	2	AUTO	non negative	Time constant (in seconds) of the first-order lag filter applied to measurement input
17	BYPASS	1 (OFF)	Man	1, 2	Switch whether to set the BYPASS operation; set ON to bypass the control operation.
18	CAS_IN	0			Cascade setpoint
19	SP_RATE_DN	+INF		Positive	Rate-of-decrease limit for setpoint (SP)
20	SP_RATE_UP	-INF		Positive	Rate-of-increase limit for setpoint (SP)
21	SP_HI_LIM	100		PV_SCALE ±10%	Upper limit for setpoint (SP)
22	SP_LO_LIM	0		PV_SCALE ±10%	Lower limit for setpoint (SP)
23	GAIN	1			Proportional gain
24	RESET	10			Integration time (seconds)
25	BAL_TIME	0		Positive	Unused
26	RATE	0		Positive	Derivative time (seconds)
27	BKCAL_IN	0			Read-back of control output
28	OUT_HI_LIM	100		OUT_ SCALE ±10%	Upper limit for control output (OUT)
29	OUT_LO_LIM	0		OUT_ SCALE ±10%	Lower limit for control output (OUT)
30	BKCAL_HYS	0.5(%)		0 to 50%	Hysteresis for release from a limit for OUT. status
31	BKCAL_OUT	0	---		Read-back value to be sent to the BKCAL_ IN in the high-level block

Index	Parameter Name	Default Value	Write mode	Valid Range	Description
32	RCAS_IN	0			Remote setpoint set from a high-level computer, etc.
33	ROUT_IN	0			Remote control output value set from a high-level computer, etc.
34	SHED_OPT	0			Defines action of mode shedding. SHED_OPT defines the changes to be made to MODE.BLK.target and MODE.BLK.actual when the value of RCAS_IN.status or ROUT_IN.status becomes BAD if MODE_BLK.actual = RCas or ROut. See Subsection A5.17.1 for details.
35	RCAS_OUT	0	---		Remote setpoint sent to a high-level computer, etc.
36	ROUT_OUT	0	---		Remote control output value
37	TRK_SCALE	100 0 1342 1	Man		Scale value used to convert the external operation output value (TRK_VAL) to non-dimensional.
38	TRK_IN_D	0			Switch for output tracking. See Section A5.12 for details.
39	TRK_VAL	0			Output tracking value. When MODE_BLK.actual = LO, the value scaled from the TRK_VAL value is set in OUT.
40	FF_VAL	0			Input value for feed-forward control. The FF_VAL value is scaled to a value with the same scale as for OUT, multiplied with the FF_GAIN value, and then added to the output of the PID calculation.
41	FF_SCALE	100 0 1342 1			Scale value used for converting FF_VAL to a non-dimensional value.
42	FF_GAIN	0	Man		Gain for FF_VAL
43	UPDATE_EVT		---		Same as that for the AI block.
44	BLOCK_ALM		---		Same as that for the AI block.
45	ALARM_SUM	E nable			Same as that for the AI block.
46	ACK_OPTION	0xFFFF			Same as that for the AI block.
47	ALARM_HYS	0.5%		0 to 50%	Hysteresis set to prevent each alarm from hunting.
48	HI_HI_PRI	0		0 to 15	Defines the priority order of the HI_HI_ALM alarm.
49	HI_HI_LIM	+INF		PV_SCALE	Threshold for HI_HI_ALM alarm.
50	HI_PRI	0		0 to 15	Defines the priority order of the HI_ALM alarm.
51	HI_LIM	+INF			Threshold for HI_ALM alarm.
52	LO_PRI	0		0 to 15	Priority order of LO_ALM alarm.
53	LO_LIM	-INF		PV_SCALE	Threshold for LO_ALM alarm.
54	LO_LO_PRI	0		0 to 15	Priority order of LO_LO_ALM alarm.
55	LO_LO_LIM	-INF		PV_SCALE	Threshold for LO_LO_ALM alarm.
56	DV_HI_PRI	0		0 to 15	Priority order of DV_HI_ALM alarm.
57	DV_HI_LIM	+INF			Threshold for DV_HI_ALM alarm.
58	DV_LO_PRI	0		0 to 15	Priority order of DV_LO_ALM alarm.
59	DV_LO_LIM	-INF			Threshold for DV_LO_ALM alarm.
60	HI_HI_ALM	---	---		Alarm that is generated when the PV value has exceeded the HI_HI_LIM value. The priority of the alarm is determined by HI_HI_PRI (Only one alarm is generated at a time and alarm having the highest priority). When the PV value decreases below HI_HI_LIM - ALM_HYS, HI_HI_ALM is cleared.

Index	Parameter Name	Default Value	Write mode	Valid Range	Description
61	HI_ALM	---	---		Same as HI_HI_ALM.
62	LO_ALM	---	---		Same as HI_HI_ALM. Cleared when the PV value increases above LO_LIM + ALM_HYS.
63	LO_LO_ALM	---	---		Same as LO_ALM.
64	DV_HI_ALM	---	---		Alarm that is generated when the value of (PV - SP) has exceeded the DV_HI_LIM value. Other features are the same as HI_HI_ALM.
65	DV_LO_ALM	---	---		Alarm that is generated when the value of (PV - SP) decreases below the DV_LO_LIM value. Other features are the same as LO_LO_ALM.

A5.4 PID Computation Details

As the PID calculation method, the I-PD method (PI-D method for some modes) is employed.

A5.4.1 Proportional Derivative Leading Type PID Control Algorithm (I-PD)

The proportional derivative leading type PID control algorithm (I-PD) ensures control stability against sudden changes in the setpoint, such as when the user enters a new setpoint value. At the same time, the I-PD algorithm ensures excellent controllability by performing proportional, integral, and derivative control actions in response to changes of characteristics in the controlled process, changes in load, and occurrences of disturbances. If the mode of the PID block is Auto and RCas, calculation is done with this I-PD method. When the mode of the block is Cas, the proportional derivative leading type PID control algorithm is employed in order to obtain better performance against the changes in the setpoint. The control algorithm is automatically switched by the block in accordance with the mode.
The basic form of each algorithm is expressed in the equation below.

比例微分先行形PID（I-PD方式）

$$\Delta MVn = K\left\{\Delta PVn + \frac{\Delta T}{Ti}(PVn - SPn) + \frac{Td}{\Delta T}\Delta(\Delta PVn)\right\}$$

微分先行形PID（PI-D方式）

$$\Delta MVn = K\left\{\Delta(PVn - SPn) + \frac{\Delta T}{Ti}(PVn - SPn) + \frac{Td}{\Delta T}\Delta(\Delta PVn)\right\}$$

ΔMVn : change in control output

ΔPVn : change in measured (controlled) value ΔPVn=PVn- PVn-1

ΔT : control period (Block Header.period_of_execution)

K : proportional gain (GAIN)

Ti :i ntegral time (RESET)

Td : derivative time (RATE)

The subscripts, n and n-1, represent the time of sampling such that PVn and PVn-1 denote the PV value sampled most recently and the PV value sampled at the preceding control period, respectively.

A5.4.2 PID Control Algorithm Parameters

The table below shows setting parameters for the PID control algorithm.

Parameter	Description	Valid Range
GAIN	Proportional gain	0.05 to 20
RESET	Integral time	0.1 to 10000 (seconds)
RATE	Derivative time	0 to infinity (seconds)

A5.5 Control Output Action

The control output action is the function to convert the change in operation output (ΔMVn) at each control period to the actual operation output value (OUT).
The control output action for the PID block of EJX supports the velocity-type.

A5.5.1 Velocity Type

The PID block determines the value of the new control output (OUT) by adding the change in control output calculated in the current control period (ΔMVn) to the value read back from the output destination (BKCAL_IN).

The calculation expression for the control output action of speed type is shown below.

ΔMVn'= ΔMVn*(OUT_SCALE. EU100 - OUT_SCALE. EU_0) / (PV_SCALE.
EU_100 - PV_SCALE. EU_0)

(Direct Acting is False in CONTROL_OPTS)

OUT = BKCAL_IN - ΔMVn'

(Direct Acting is True in CONTROL_OPTS)

OUT = BKCAL_IN + ΔMVn'

A5.6 Direction of Control Action

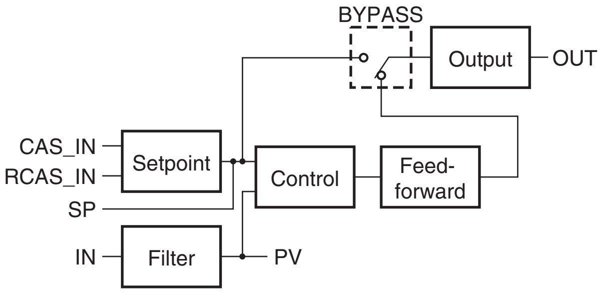
The operating direction of the output is switched for the increase or decrease of the deviation.

The direction is specified with Direct Acting of CONTROL_OPTS.

Value of Direct Acting	Description
True	The output increases when the measured value (PV) is greater than the setpoint (SP).
False	The output decreases when the measured value (PV) is greater than the setpoint (SP).

A5.7 Control Action Bypass

The PID calculation processing can be bypassed so as to set the SP value as the operation output (OUT).
The bypass setting is performed if the parameter BYPASS is set to “On”.
The block diagram is shown in the figure below.



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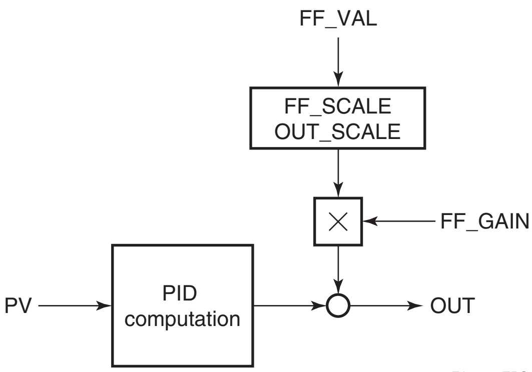
A5.8 Feed-forward

Feed-forward is a control action to add a compensation output value (FF_VAL) to the output signal of the PID calculation.
This is typically used for feed-forward control.
The figure below illustrates the action.



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A5.9 Block Modes

The block mode is defined with the parameter MODE_BLK.

MODE_ BLK	Target	Defines the target mode.
	Actual	Indicates the current block mode. Changes depending on the status of input data and target contents.
	Permitted	Defines constraints of the target mode. If constraints are not defined here, it becomes impossible to transition to the mode.
	Normal	Defines the normal mode.

There are eight modes for the PID block as shown below.

Block Mode	Description
ROut	Remote output mode. The mode outputs the value given by ROUT_IN.
RCas	By the remote cascade connection, the setpoint (SP) is received from the host computer, etc., and results of the PID control calculation processing are output.
Cas	By the cascade connection, the setpoint (SP) is received from other function block, and results of the PID control calculation processing are output.
Auto	The PID block carries out automatic control and outputs the result calculated by the PID control computation.
Man	The block goes into manual mode, and outputs OUT, the value set by the user manually.
LO	The PID block outputs the operation output value set in TRK_VAL.
IMan	Initialization and manual mode. This mode temporarily interrupts the control operation. The mode which operates when the initialization and manual fallback conditions shown in Section A5.14 are met.
O/S	Control calculation processing is carried out. The output of the previous value is kept.

A5.9.1 Mode Transitions

	Destination	Condition	Other Condition
(1)	O/S	If O/S is specified in MODE_BLK.target (or if O/S is set in target inside the resource block)	
(2)	IMan	If the Initialization and manual fallback conditions are met (Section A5.14)	NOT if condition (1) is met
(3)	LO	If Track Enable is specified in CONTROL_OPTS and the value of TRK_IN_D is true	NOT if either or both of conditions (1) and (2) are met
(4)	Man	If MAN is specified in MODE_BLK.target or if IN.status (input status) is BAD	NOT if any one or more of conditions (1) to (3) are met
(5)	Auto	If Auto is specified in MODE_BLK.target - AND - if IN.status (input status) is other than BAD	NOT if any one or more of conditions (1) to (3) are met
(6)	Cas	If Cas is specified in MODE_BLK.target - AND - if IN.Status (input status) and CAS_IN.Status are other than BAD	NOT if any one or more of conditions (1) to (3) are met
(7)	RCas	If RCas is specified in MODE_BLK.target - AND - if IN.Status (input status) and RCAS_IN.Status are other than BAD	NOT if any one or more of conditions (1) to (3) are met
(8)	ROut	If ROut is specified in MODE_BLK.target - AND - if ROUT_IN.status (input status) is other than BAD	NOT if any one or more of conditions (1) to (3) are met

Note 1: To activate mode transitions to Auto, Cas, RCas, and ROut, the respective target modes must be permitted beforehand with MODE_BLK.permitted.

Note 2: A transition to Cas, RCas, or ROut requires that initialization of the cascade connection has been completed.

Note 3: In case of the mode shedding (the data status of RCAS_IN, ROUT_IN is BAD), it transitions to the mode which has been specified with SHED_OPT. (For details, refer to A5.17.1.)

A5.10 Bumpless Switching

Bumpless switching is the function to allow the bumpless switch of MODE_BLK and of operation output values at the cascade downstream without a sudden change in the control output.
The action to perform a bumpless switching differs depending on the MODE_BLK values.

A5.11 Setpoint Limiter

The setpoint limiter function is to limit the settings of the setpoint (SP).
The operation of the setpoint limiter differs based on the block mode of the function block.

A5.11.1 When PID Block Is in Auto Mode

When the block mode (MODE_BLK) is Auto, the limiters of the setpoint (SP) in force are high/low limit and change-rate limit.

A5.11.1.1 High/Low Limit
A value exceeding the set high limit (SP_HI_LIM) cannot be set for SP.
A value smaller than the set low limit (SP_LO_LIM) cannot be set for SP.

A5.11.1.2 Change-rate Limit
The change-rate limits are used to restrict the magnitude of changes in the SP value so as to change the SP value gradually towards a new setpoint.

The increase of the SP value at each execution period of PID (period of execution in the Block Header) is limited to the value of SP_RATE_UP or less.

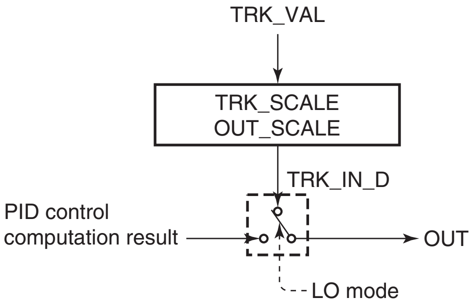
The decrease of the SP value at each execution period of PID (period of execution in the Block Header) is limited to the value of SP_RATE_DOWN or less.

A5.11.2 When PID Block Is in Cas or RCas Mode

By selecting Obey SP Limits if Cas or RCas in CONTROL_OPTS (see Subsection A5.13.1), the setpoint (SP) high/low limits can be put into force when the block mode (MODE_BLK) is Cas or RCas.

A5.12 External-output Tracking (LO)

External tracking is the action of outputting the set value of the operation output (TRK_VAL).
External tracking functions when the block mode is LO.
The flow of the processing is shown below.



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To change the block mode to LO:

Set Track Enable in CONTROL_OPTS.
If TRK_IN_D is set to true, the block mode becomes LO.

However, to change the block mode from Man to LO, both Track Enable and Track in Manual must also be specified in CONTROL_OPTS.

A5.13 Measured-value Tracking

Measured-value tracking is an action to equalize the setpoint (SP) to the measured value (PV) when the block mode (MODE_BLK) is running in Man in order to prevent a sudden change in control output from being caused by a mode change to Auto.
If the mode of the cascade secondary loop is changed from the Cas mode to the Auto mode while the cascade primary loop is controlling in the Auto or Cas mode, the cascade connection is opened and the control action of the primary loop stops. The setpoint (SP) of the secondary loop can also be equalized to its cascade input (CAS_IN) by tracing the measured value.

The settings for measured-value tracking are made in the parameter CONTROL_OPTS.

A5.13.1 CONTROL_OPTS

Setting contents of CONTROL_OPTS are shown.

Selection item for CONTROL_OPT	Operation Contents
Bypass Enable	This parameter allows BYPASS to be changed.
SP-PV Track in Man	Equalizes SP to PV when MODE_BLK.target is set to the Man mode.
SP-PV Track in ROut	Equalizes SP to PV when the ROut mode is specified with MODE_BLK.target.
SP-PV Track in LO or IMan	Equalizes SP to PV when Actual is the LO mode or the IMan mode.
SP Track retained Target	Equalizes SP to RCAS_IN when RCas bit is set in the target mode, and to CAS_IN when Cas bit is set when the actual mode is IMan, LO, Man and ROut.
Direct Acting	Set the PID block to a direct acting controller.
Track Enable	Transitions to LO if TRK_IN_D becomes 1 with this option being set.
Track in Manual	With the previously mentioned Track Enable alone, this is not valid when the target mode is Man. Sets this option even in Man when the user would like to transition to LO. Even if this option is set while Track Enable is not set, there is no effect.
Use PV for BKCAL_OUT	Sets the value of PV in BKCAL_OUT and RCAS_OUT, instead of the value of SP.
Obey SP limits if Cas or RCas	Puts the setpoint high/low limits in force in the Cas or RCas mode.
No OUT limits in Manual	Disables the high/low limits for OUT in the Man mode.

A5.14 Initialization and Manual Fallback (IMan)

Initialization and manual fallback denotes an abnormality processing function in which the PID block changes mode to IMan (initialization and manual) and suspends the control action. The function operates when the initialization and manual fallback conditions (IMan condition) are met.

A5.14.1 IMan condition

The IMan conditions are transition conditions of the mode to temporarily suspend control action by changing the block mode to the IMan mode.
Please note that the IMan mode is the mode to transition only when the IMan conditions are established.

A5.14.2 Establishment of IMan condition

The IMan conditions are established in the following cases.

- When quality=BAD in Data status of BKCAL_IN (Status).
- When substatus=Good(c)-FSA, LO, NI and IR in Data status of BKCAL_IN (Status).

A5.15 Manual Fallback

MAN fallback denotes an abnormality processing function in which the PID block changes a mode to Man and suspends the control action.

A5.15.1 Condition of MAN Fallback

The condition is established when the input data status (IN.Status) is BAD.
(Excluding when BYPASS)

A5.15.2 Specification of MAN Fallback

Specifies Target to Manual if BAD IN with STATUS_OPTS.

A5.15.3 STATUS_OPTS

The table below shows settings of STATUS_OPTS.

Options in STATUS_OPTS	Setting Contents
IFS if BAD IN	Sets the sub-status component of OUT.status to IFS if IN.status is Bad. Does not set while PID control bypass is on.
IFS if BAD CAS IN	When CAS_IN.Status is BAD, the substatus of OUT.Status is set to IFS.
Use Uncertain as Good	When IN.Status is Uncertain, tries not to handle as BAD. (When IN.Status is Uncertain, tries not to influence on mode transfer.)
Target to Manual if BAD IN	When IN becomes BAD, automatically changes MODE_BLK.Target to MAN.
Target to next permitted mode if BAD CAS IN	When CAS_IN becomes BAD, changes MODE_BLK.Target to Auto. (When Auto is not permitted as the destination of transition by Permitted, the destination of transition is changed to Man.)

A5.16 AUTO Fallback

AUTO fallback denotes a mode in which the PID block changes a mode from Cas to Auto and continues automatic PID control with the user-set setpoint.

A5.16.1 Condition of AUTO Fallback

The condition is established when the data status of the cascade setpoint (CAS_IN.Status) is BAD,
(Excluding when BYPASS)

A5.16.2 Specification of AUTO Fallback

Specifies “Target to next permitted mode if BAD CAS IN” with STATUS_OPTS.
(Also, specify the destination of transition to AUTO with MODE_BLK.Permitted.)

A5.17 Mode Shedding upon Computer Failure

When the data status of RCAS_IN or ROUT_IN falls to BAD while the PID block is running in the RCas or ROut mode, the mode shedding functions. If the RCAS_IN data is not renewed within the time specified by SHED_RCAS in the resource block, the data status of RCAS_IN falls to Bad.
At this time, change to the mode (Mode Shedding) specified in SHED_OPT.

A5.17.1 SHED_OPT

The SHED_OPT setting stipulates the specifications of mode shedding.

Available Setting for SHED_OPT	Operation Contents
Normal shed, normal return	Sets MODE_BLK.actual to Cas(*1), and leaves MODE_BLK.target unchanged.
Normal shed, no return	Sets both MODE_BLK.Actual and MODE_BLK.Target to Cas (*1).
Shed to Auto, normal return	Sets MODE_BLK.actual to Auto(*2), and leaves MODE_BLK.target unchanged.
Shed to Auto, no return	Sets both MODE_BLK.actual and MODE_BLK.target to Auto(*2).
Shed to Manual, normal return	Sets MODE_BLK.actual to Man, and leaves MODE_BLK.target unchanged.
Shed to Manual, no return	Sets both MODE_BLK.actual and MODE_BLK.target to Man.
Shed to retained target, normal return	1. If Cas is specified in MODE_BLK.target, sets MODE_BLK.actual to Cas(*1), and leaves MODE_BLK.target unchanged. 2. If Cas is not specified in MODE_BLK.target, sets MODE_BLK.actual to Auto(*2), and leaves MODE_BLK.target unchanged.
Shed to retained target, no return	1. If Cas is specified in MODE_BLK.target, sets both MODE_BLK.Actual and MODE_BLK.Target to Cas (*1). 2. If Cas is not specified in MODE_BLK.target, sets MODE_BLK.actual to Auto(*2), and MODE_BLK.target to Cas.

The modes to which a PID block can transfer are limited to those specified in MODE_BLK.permitted.
The priority of block modes is as shown below.
For this reason, in fact, (*1) transitions to Cas, Auto, or MAN, whichever is set permitted in MODE_BLK.Permitted and has the lowest priority level.

Lower priority level → Higher priority level

ROut RCas Cas Auto Man

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(*2) is only when Auto is set as permitted mode by MODE_BLK.Permitted.

Note: Due to initialization of the cascade connection, if the upstream is a control block, the transition to the Cas mode occurs in the following sequence:

RCas/ROut -> Auto -> Cas

A5.18 Alarm Processing of Block

There are two kinds of alarms generated by the PID block: Block and process alarms.

A5.18.1 Block Alarm (BLOCK_ALM)

The block alarm (BLOCK_ALM) is generated upon the occurrence of either of the following errors (values set in BLOCK_ERR) and notifies the content of BLOCK_ERR.

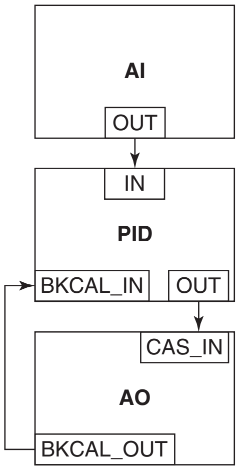
Name	Condition
Local Override	If MODE_BLK actual of PID block is LO.
Input Failure	If the PV status is Bad, that is, the IN status is Bad, or the IN status is Uncertain and when the “Use Uncertain as Good” bit of STATUS_OPTS is not set
Out of Service	If MODE_BLK.target of the PID block is the OS mode.

A5.18.2 Process Alarms

There are six types of process alarms. Only one process alarm can be generated at the same time, and the process alarm having the highest priority level from among those occurring at the same time is generated. To activate an alarm on communication, it is necessary to specify the priority for alarm activation in advance. To activate an alarm, set 3 or more. By sending with priority information being added in a communication frame when the alarm is activated, for example, the alarm is used to apply a filter to ignore values below the specified priority on the host side.
The priority level should be set for each process alarm type.

Parameter Name	Cause of Occurrence	Parameter Containing Priority Level Setting
HI_HI_ALM	Occurs when the PV increases above the HI_HI_LIM value.	HI_HI_PRI
HI_ALM	Occurs when the PV increases above HI_LIM value.	HI_PRI
LO_ALM	Occurs when the PV decreases below the LO_LIM value.	LO_PRI
LO_LO_ALM	Occurs when the PV decreases below the LO_LO_LIM value.	LO_LO_LIM
DV_HI_ALM	Occurs when the value of [PV - SP] increases above the DV_HI_LIM value.	DV_HI_PRI
DV_LO	Occurs when the value of PV - SP decreases below the DV_LO_LIM value.	DV_LO_PRI

A5.19 Example of Block Connections



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To use a simple PID control loop by combining a valve positioner (device with AO) with a sensor device, the setting procedures for each block are explained based on the basic connection example of PID.

(1) Connect the AI block and PID block of the sensor device, and the AO block of the valve positioner as shown above.

(2) Set GAIN, RESET, and RATE parameters by setting the MODE_BLK target of the PID block to O/S.

(3) Check that the value of MODE_BLK actual of the AI block is Auto.

(4) Set the MODE_BLK target of the AO block to Cas|Auto.

(5) Check that the value of BKCAL_IN status of the PID block is not BAD.

(6) Check that the value of IN status of the PID block is not BAD.

(7) Check that Auto is set to the permitted mode in MODE_BLK of the PID block.

(8) Set the MODE_BLK target of the PID block to Auto.

When finishing up to No. 8 with this setting, the PID block and AO block exchange the respective information and initialize the cascade connection.

By following the above steps, the actual of MODE_BLK of the PID block changes to Auto and the automatic PID control starts.

Appendix 6. Software Download Function

A6.1 Benefits of Software Download Function

The software download function is to update software used in field devices via FOUNDATION Fieldbus. Typical uses are to add new features such as function blocks and diagnostic function to the existing devices, and to optimize the existing field devices for your plant.

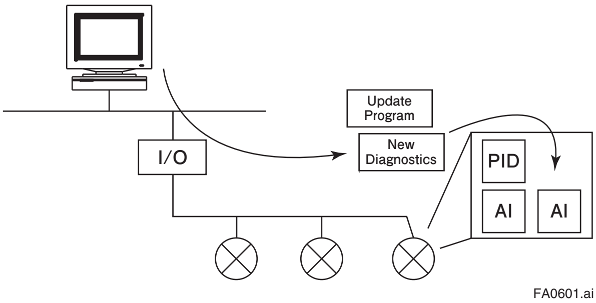

Figure A6.1 Concept of Software Downloading

A6.2 Specifications of Software Download Function

Power consumption: 15mA Max
Based on FOUNDATION Fieldbus Download Specifications FF-883 Download Class: Class 1

CAUTION

Class 1 devices can continue the specified measurement and/or control actions even while software is being downloaded to them. Upon completion of a download, however, the devices will be reset internally to activate the new, downloaded software. This will halt Fieldbus communication and function block executions for about one minute.

A6.3 Preparations for Software Downloading

For software downloading, you need to prepare the following:

- Software download tool
- Software for downloading file for each of the target field devices

  (Software)

For the software download tool, use only a program developed for that purpose. For details, see the software's User's Manual. For information about updates of software binary files for field devices and how to obtain them, visit the following web site.

http://www.yokogawa.co.jp/fld/top/fld-top-jp.htm

CAUTION

The communication may be disturbed if the software download tool is connected to a Fieldbus segment. Connect the software download tool to the Fieldbus segment before starting operation.

A6.4 Software Download Sequence

The flowchart below outlines the software download procedures. Although the time taken for the entire procedures varies depending on the size of the fieldbus device's software, it generally takes about 20 minutes where there is a one-to-one connection between the fieldbus device and the download tool. If multiple devices are connected to Fieldbus, it takes longer to download the software.

(1) Start the download tool

(2) Select file(s) (Select the software file(s) you want to download.)

(3) Select device(s) (Select the device(s) to which you want to download software.)

(4) Carry out download (Transmit the software to the field device(s).)

(5) Activate device(s) (Activate the device(s) to start with new software.)

CAUTION

If software download is executed, the PD tag, node address, and transducer block calibration parameters retained in the nonvolatile memory inside the target device are retained, but it may reset other parameters to their defaults (except a minor update that does not change the number of parameters). Hence, where necessary, save the parameters using an engineering tool, parameter setting utility, or the like before downloading the software, and then reconfigure the field device(s) after the download. For details, see Section A6.6.

CAUTION

The current dissipation of the target field device temporarily increases immediately after a download due to erasing of the FlashROM's contents. Use a Fieldbus power supply which has sufficient capacity to cover such increases in feed current.

CAUTION

Upon the completion of the activation(*1), the target fieldbus device performs resetting internally. The reset breaks communication with the field device and stops function block execution.

*1 Processing which automatically replaces the downloaded software in the software download processing

CAUTION

Do not turn off the power to a field device or disconnect the download tool during a download or activation. The device may fail as a result. Be careful about the noise on the Fieldbus link. If the fieldbus is noisy, the downloading may take a very long time or fail.

A6.5 Download Files

Download files have the following filenames (with the filename extension of ".ffd"). If a device type is AXG, "0016", and AXW, "0017". Take care to choose the correct download file for the target field device:

"594543" + "Device Family" + "_" + "Device Type" + "_"
+ "Domain Name" " + "_" +"Software Name" + "_"
+"Software Revision" + "." + "ffd"

(For example, the name of the download file for the AXG may have the following name:)

5945430016_0016_AXG4A_ORIGINAL_R101.ffd

The software name is "ORIGINAL" or "UPDATE". The former indicates an original file and the latter an update file. Whenever performing a download to update the device revision, be sure to obtain the original file. In general, device revision is updated when a parameter or block is added.

A6.6 Steps after Activating a Field Device

After the communication with a field device is recovered after activating the device, check that the software revision of the field device is updated accordingly by using the download tool. The software revision of the field device can be checked with the SOFT_REV parameter of the resource block.

The PD tag, node address, and transducer block calibration parameters that are retained in the nonvolatile memory inside the target device will remain unchanged after software download is executed. However, after a software update which causes an addition to the block parameters or blocks, or to the system/network management VFD parameters, some parameters may be reset to the defaults, thus requiring parameter setup and re-engineering. For details, see the table below.

Note that a change in the number of parameters or blocks requires the DD and capabilities files corresponding to the new software revision.

Table A6.1 Actions after Software Update

Contents of Software Update	Required Work
Software update without change in the number of parameters	Re-setup of parameters not needed.
Software update that adds a block parameter	Set up the added parameter.
Software update that adds a block	Carry out re-engineering. Set the parameters for the additional block.
Software update that changes the number of system/ network management VFD parameters	Carry out re-engineering.

A6.7 Troubleshooting

For information on the download tool’s error messages, see also the software’s User’s Manual.

Table A6.2 Problems after Software Update

Symptom	Cause	Remedy
An error occurs before starting a download, disabling the download.	The selected download file is not for the selected field device.	Check SOFTDL_ERROR in the maintenance transducer block and obtain the correct file.
An error occurs after starting a download, disabling the download.	You attempted to update the device revision by downloading a file which is not an original file.	Check SOFTDL_ERROR in the maintenance transducer block and obtain the original file.
	The voltage on the Fieldbus segment falls below the specified limit (9 volts).	Check the capacity of the Fieldbus power supply used and the voltage at the terminal.
	There was an error in a checksum or the number of transmission bytes.	Check SOFTDL_ERROR in the maintenance transducer block and obtain the correct file.
	The download tool does not allow download with same software revision.	Check the setting of the download tool.
The download takes far longer than expected or fails frequently.	The Fieldbus segment is noisy.	Check the noise level on the Fieldbus.
An error occurs after activation.	Transient error caused by the internal resetting of the field device	Check whether communication with the field device is recovered after a while.
The new software does not work after the activation.	The file of the current revision was downloaded.	Obtain the correct file.
	Failure of the memory in field device, etc.	Contact Yokogawa service center.

A6.8 Maintenance Block's Parameters Relating to Software Download

Table A6.3 Maintenance Transducer Block's Parameters Relating to Software Download

Relative Index	Index	Parameter Name	Default Value	Write Mode	Description
23	2923	SOFTDL_PROTECT	1	Auto	Mask for software download function. 0x01: No mask 0x02: With mask
24	2924	SOFTDL_ERROR	0	-	Indicates the error when downloading the software. See Table A6.4 Download Error Codes.
25	2925	SOFTDL_COUNT	0	-	Number of times the software is downloaded.
26	2926	SOFTDL_ACT_AREA	0	-	Indicates the the ROM number of the currently working FlashROM. 0: FlashROM #0 working 1: FlashROM #1 working

Table A6.4 Download Error Codes

Code	Description
0	No error.
32768	Version error of file header (other than 1).
32769	Size error of file header (other than 44).
32770	Manufacturer ID No. error (other than 0x594543)
32771	Device family error (other than RB.DEV_TYPE)
32772	Device revision error (less than RB.DEV_REV)
32773	File revision error (other than 3).
32774	File type error (other than 0, 1).
32775	Error of the number of modules (more than 9).
32776	Error of the number of EEPROM data adjustment (places not taken over) (more than 11)
32777	Size error of program module (less than 13 bytes or more than 655373 bytes)
32778	Size error of EEPROM data (less than 13 bytes or more than A area size + 13 bytes)
32779	Module type error (other than 0, 1).
32780	Module address error (less than 32768 (0x8000) or more than 786432 (0xC0000))
32781	Module CRC error.
32782	Block size error (The block size of the downloaded EEPROM data is less than the existing block size.)
32783	Block ID error (The existing block does not exist in the downloaded EEPRPM data.)
32784	ID error of the module which adjusts EEPRPM data (other than 1, 2).
32785	ID error of the EEPROM block which adjusts EEPROM data.
32786	Offset error of the data which adjusts EEPROM data from the beginning of the block (larger than block size).
32787	Size error of the data which adjusts EEPROM data.
32788	Type error of EEPROM data adjustment.
32789	File CRC error.
32790	File end code error (The first byte of the end code is other than 0X00).
32791	Write verify error of external Serial Flash ROM.
32792	Access error of external Serial Flash ROM.
32793	Timeout error when accessing to external Serial Flash ROM.
32794	Error of Generic Initiate Download Sequence.
32795	Error of Generic Download Segment.
32796	Error of Generic Terminate Download Sequence.
32797	State error at staring up (other than DWNLD_NOT_READY, DWNLD_READY, DWNLD_OK).
32798	Take-over processing error (built-in Flash ROM failure, EEPROM failure).

A6.9 System/Network Management VFD Parameter related to Software Download

Table A6.5 System/Network Management VFD Parameter Write Mode R/W: Read/Write, R: Read Only

Index (SM)	Parameter Name	(Sub-Index)	Sub-parameter Name	Default Value	Write Mode	Remarks
310	DWNLD_PROPERTY	0			R	
		1	Download Class	1	R	
		2	Write Rsp Returned For ACTIVATE	1	R	
		3	Write Rsp Returned For PREPARE	1	R	
		4	Reserved	0	-	
		5	ReadyForDwnld Delay Secs	60	R	
		6	Activation Delay Secs	120	R	
313	DOMAIN_ DESCRIPTOR	0			R/W	Read/write-permitted only for sub-index 1
		1	Command	3	R/W	
		2	State	1	R	
		3	Error Code	0	R	
		4	Download Domain Index	440	R	
		5	Download Domain Header Index	420	R	
		6	Activated Domain Header Index	430	R	
		7	Domain Name	AXG4A or AXW4A	R	
314	DOWNLOAD_ DOMAIN_HEADER	0				
		1	Header Version Number	1	R	
		2	Header Size	0	R	
		3	Manufacturer ID	0x594543	R	
		4	Device Family	(DEV_TYPE of RB)	R	
		5	Device Type	(DEV_TYPE of RB)	R	
		6	Device Revision	(DEV_REV of RB)	R	
		7	DD Revision	(DD_REV of RB)	R	
		8	Software Revision	(SOFTWARE_ REV of RB)	R	
		9	Software Name	ORIGINAL	R	
		10	Domain Name	AXG4A or AXW4A	R	
315	ACTIVATED_ DOMAIN_HEADER	0				
		1	Header Version Number	1	R	
		2	Header Size	44	R	
		3	Manufacturer ID	0x594543	R	
		4	Device Family	(DEV_TYPE of RB)	R	
		5	Device Type	(DEV_TYPE of RB)	R	
		6	Device Revision	(DEV_REV of RB)	R	
		7	DD Revision	(DD_REV of RB)	R	
		8	Software Revision	(SOFTWARE_ REV of RB)	R	
		9	Software Name	ORIGINAL	R	
		10	Domain Name	AXG4A or AXW4A		

Index (SM)	Parameter Name	(Sub-Index)	Sub-parameter Name	Default Value	Write Mode	Remarks
316	DOWNLOAD_DOMAIN					Read/write: prohibited, Get-OD: permitted

A6.10 Comments on System/Network Management VFD Parameters Relating to Software Download

IMPORTANT

Do not turn off the power to a field device immediately after changing parameter settings. To improve the reliability of the device, processing to store data to EEPROM is duplexing. If the power is turned off within 60 seconds after setup, the parameters may not be saved and revert to the previous settings.

(1) DWNLD_PROPERTY

Sub Index	Element	Size [B]	Description
1	Download Class	1	Indicates the download class. 1: Class 1
2	Write Rsp Returned For ACTIVATE	1	Indicates whether a write response is returned to the ACTIVATE command. 1: Write Response Returned
3	Write Rsp Returned For PREPARE	1	Indicates whether a write response is returned to the PREPARE command. 1: Write Response Returned
4	Reserved	1	(Reserved)
5	ReadyForDwnld Delay Secs	2	Indicates the maximum waiting time after receiving the PREPARE_FOR_DWNLD command to proceed to transition from DWNLD_NOT_READY to DWNLD_READY.
6	Activation Delay Secs	2	Indicates the maximum waiting time after receiving the ACTIVATE command to proceed to transition from DWNLD_OK to DWNLD_NOT_READY.

(2) DOMAIN_DESCRIPTOR

Sub Index	Element	Size [B]	Description
1	Command	1	Reads/writes software download commands. 1: PREPARE_FOR_DWNLD (instruction of download preparation) 2: ACTIVATE (activation instruction) 3: CANCEL_DWNLD (instruction of download cancellation)
2	State	1	Indicates the current download status. 1: DWNLD_NOT_READY (download not ready) 2: DWNLD_PREPARING (download under preparation) 3: DWNLD_READY (ready for download) 4: DWNLD_OK (download complete) 5: DOWNLOADING (download underway) 6: CHECKSUM_FAIL (not used in this product) 7: FMS_DOWNLOAD_FAIL (failure during download) 8: DWNLD_INCOMPLETE (download error detected at restart) 9: VCR_FAIL (not used in this product) 10: OTHER (download error other than 6 and 7 detected)
3	Error Code	2	Indicates the error during a download and activation. 0: success, configuration retained (download successfully completed) 32768 _ 65535: Download error (indicating error codes)
4	Download Domain Index	4	Indicates the index number of the domain for software downloading.
5	Download Domain Header Index	4	Indicates the index number of the domain header to which the download is performing.
6	Activated Domain Header Index	4	Indicates the index numbers of the domain header currently running.

Sub Index	Element	Size [B]	Description
7	Domain Name	8	Indicates the domain name. In this product, Domain Name indicates the field device name. (AXG4A or AXW4A)

(3) DOMAIN_HEADER

Sub Index	Element	Size [B]	Description
1	Header Version Number	2	Indicates the version number of the header.
2	Header Size	2	Indicates the header size.
3	Manufacturer ID	6	Indicates the value of resource block's MANUFAC_ID (manufacturer ID) as character string data.
4	Device Family	4	Indicates the device family. In this product, Device Family indicates the value of resource block's DEV_TYPE as character string data.
5	Device Type	4	Indicates the value of resource block's DEV_TYPE as character string data.
6	Device Revision	1	Indicates the value of resource block's DEV_REV.
7	DD Revision	1	Indicates the value of resource block's DD_REV.
8	Software Revision	8	Indicates the value of resource block's SOFT_REV.
9	Software Name	8	Indicates the attribute of the binary file. In this product, Software Name indicates either of the following: "ORGINAL _": followed by one space: Original file "UPDATE _ _": followed by two spaces: Update file
10	Domain Name	8	Indicates the domain name. In this product, Domain Name indicates the field device name. (AXG4A or AXW4A)

Revision Information

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