User's Manual

ADMAG TI Series
AXG1A Magnetic Flowmeter
Remote Transmitter
HART Communication Type

IM 01E22C02-02EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01E22C02-02EN
3rd Edition

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1. Introduction

This manual explains basic operations of ADMAG TI Series AXG1A Magnetic Flowmeter Remote Transmitter with HART Communication 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 an 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. 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.
- 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 operation of the product (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 "®".
- HART 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 environments. 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 protect 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 the cause of malfunction.
Refer to the installation manual for the hardware write protect function, and Section 4.14 for the software write protect function.

Maintenance

WARNING

- If dirt, dust, or other substances adheres 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 necessity tools and environment condition are provided. The required environmental condition is that the ambient temperature should be 5 to 40°C (the maximum relative humidity is 80 % for temperature 5 to 31°C, and decreasing linearly to 50 % relative humidity at 40°C).

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 shock or damage to the microSD card.
- Do not disassemble or modify the microSD card.
- Do not physically shock, bend, or pinch the microSD card.
- During reading/writing of 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 designated by YOKOGAWA. The operation of the device 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:
  - 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. Operation by Display unit

2.1 Basic Operating Procedures

The parameter settings can be changed by using three IR (infra-red) switches; [SET], [SHIFT] and [▼] switches on the display. The three IR switches enable the user to set parameters from the outside of the glass of the display cover.
This section provides descriptions of basic parameter configuration on the display and operation procedures of the IR switches. This product can be also operated by using the dedicated handheld terminal or the FieldMate (Versatile Device Management Wizard). For details about the setting procedure, refer to Chapter 4.

WARNING

Be sure to enable the write protect 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. Turning on and off the flashlight, etc. towards the IR switch may also be the cause of the malfunction.
Refer to the Installation Manual for the hardware write protect function, and Section 4.14 for the software write protect function.

IMPORTANT

Operate the display under conditions where direct sunlight, etc. do not shine to the IR switches directly when the parameter setting operation is carried out.

NOTE

- Always keep the display cover closed and operate the setting switches from the outside of the glass window.
- If dirt, dust, or other substances adheres to the glass of the display, wipe them clean with a soft dry cloth.
- Operation with dirty gloves may cause a switch response error.

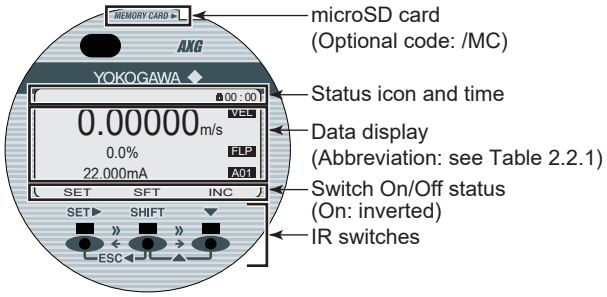
NOTE

The language on the display is set to “English” as default at factory shipment. Select the adequate language referring to Subsection 4.9.1.
The menu pass of the display on this manual is set to “English”.

2.2 Display and Basic Configuration

The display of the AXG1A remote transmitter has the various functions below.

2.2.1 Display Configuration



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(1) Basic operation of IR switches

The basic operations of the display panel are done by the three IR switches; [SET], [SHIFT], and [▼]. Combining two IR switches provides a different function, and the function of the switch is displayed on the display.

IR switch (Note 1)	Function of switch (Note 2)	Function
[SET ►]	SET	▪Apply parameter and data (Note 3) ▪Move to next menu
[SHIFT]	SFT	▪ Set/reset Multiple selectable options (Select type parameter) ▪ Move cursor right (Numeric type parameter)
[▼]	INC	▪ Move cursor down (Select type parameter) ▪ Increment value (Numeric type parameter) ▪ Change position of decimal point (Numeric type parameter)
[SHIFT] + [▼] (= [▲])	DEC	▪ Move cursor up (Select type parameter) ▪ Decrement value (Numeric type parameter)
[SHIFT] + [SET ►] (= [ESC ◄])	ESC	▪ Cancel ▪ Back to previous menu

Note 1: [A] + [B] (=[C]): The function is changed to switch [C] when switch [B] is pressed while pressing switch [A].
Note 2: [SET], [SFT], [INC], [DEC] and [ESC] indicate the assigned function in accordance with display mode at that time. All functions cannot be used simultaneously.
Note 3: “Apply” and “Enter” are executed by pressing [SET] twice. If the execution does not work properly, release your finger from the display glass completely after initially pressing [SET], and then, press that key again.

(2) Status icons

Icon	Description	Icon	Description
	Write protection function Disable		Write protection function Enable
	Device Busy		Device Fault
	microSD card Ready		microSD card Accessing
	microSD card Disable to access		Parameter Uploading
	Parameter Downloading		Trend graph function Running
	System Alarm Occurs		HART communication
	Process Alarm Occurs		Setting Alarm Occurs
	Warning Occurs		Information Occurs
	Display Damping Valid		Operation level: Operator
	Operation level: Maintenance		Operation level: Specialist

(3) Data indication part

Up to eight process values can be selected on the display. It is possible to display up to four items on the display at the same time, and the remaining four items can be displayed if scrolled.

Table 2.2.1 Abbreviation table of process values to be indicated on the display

Abbreviation	Description
FLP *1	Flow rate %
PRV *1	Process value
VEL *1	Flow velocity
VFL *1	Volumetric flow rate
MFL *1	Mass flow rate
FLB	Flow rate in % bar graph
CAL *1	Calorie
TL1 *1	Totalized value 1
TL2 *1	Totalized value 2
TL3 *1	Totalized value 3
TAG	Tag No.
LTG	Long tag
COM	Communication protocol
ADH	Adhesion diagnostic level (Alarm at Level 4)
AO1 *1	Analog output value 1
AO2 *1	Analog output value 2
FNL	Flow level of flow noise diagnosis (Alarm at Level 4)
TC1	Total 1 count
TC2	Total 2 count
TC3	Total 3 count

*1: A trend graph can be displayed online.

NOTE

The PRV (PV value) and FLP (flow rate%) operate in the same way as Analog output 1.
If the low cut function is enable for Analog output 1 (AO1 low cut / Low cut), the PRV and FLP are affected by the low cut function. Their value after low cut are displayed.
On the other hand, the VEL (flow velocity), VFL (volume flow), MFL (mass flow), and CAL (calorific value) are not affected by the low cut function. Their values are displayed as they are.

2.2.2 Operation Level

When setting a parameter from the display, configurable parameters differ depending on the three operation levels shown in Table 2.2.2. For maintenance and specialist levels, the pass code needs to be entered.

Table 2.2.2 Parameter Setting from Display and Operation Level

Operation Level	Parameter		Description
	Reading	Writing	
Operator	All parameters	Possible to set a display language on the display and parameters related to display items.	No pass code required
Maintenance	All parameters	Possible to set parameters allowed to set with the operator level and parameters related to zero adjustment.	Pass code required Default value: 0000
Specialist	All parameters	Possible to set all writable parameters	Pass code required Default value: 0000

A pass code can be configured only from the display.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Access cfg ► (see below)

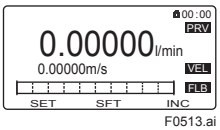
Parameter	Description
Chg mainte	Change of pass code (maintenance code) with maintenance operation level authority. To change the level, maintenance or specialist operation level authority is necessary.
Chg special	Change of pass code (special code) with specialist operation level authority. To change the level, specialist operation level authority is necessary.

2.3 Display Mode and Setting Mode

The device runs in Display Mode when the power is on. To check or change parameters, Setting Mode must be activated. The following procedure explains how to change to Setting Mode from Setting Mode. For the functions of the IR switches, refer to Subsection 2.2.1.

[Procedure]

1) Keep touching [SET] switch for few seconds.



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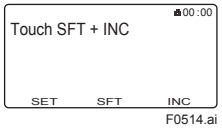
2) Touch [SFT] + [INC] switches.



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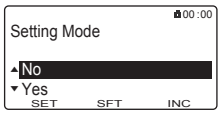
3) “No“ is selected.
Touch [INC] switch and select “Yes”.



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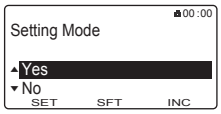
4) Touch [SET] switch.



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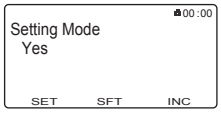
5) “Yes” is blinking.
Touch [SET] switch again.



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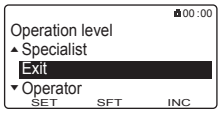
6) The screen moves to the menu of Operation Level.



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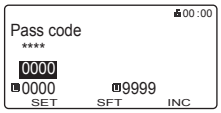
7) Select an appropreate operation level by moving the cursor with [INC] or [DEC] switch. Passcode is not necessary for “Operator”. For “Maintenance” and “Specialist”, passcode is necessary for each. For passcode setting, [SFT] is for position change, and [INC] is for number, then twice [SET] is for entry completion.
The default passcode at the factory shipment is set to “0000”.



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8) When the Operation Level is determined, the screen moves to “Device setup” as the Setting Mode where parameters can be configured.

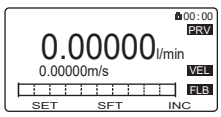
9) After completing parameter setting, push [ESC] switch. The screen returns to the Display Mode.

NOTE

Follow the procedure bellow when Ind soft rev (Indicator board revision / Ind soft rev) is R2.01.02 or earlier.

[Procedure]

1) Turn on the power and wait for several seconds to start Display Mode.



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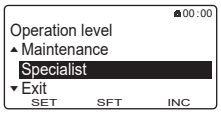
NOTE

2) Press and hold the [SET] switch for two seconds. The screen will switch to the "Operation level" menu.



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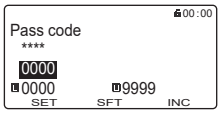
3) Select an appropriate operation level by moving the cursor with the [INC] or [DEC] switch. The "Operator" does not require a pass code, but for "Maintenance" and "Specialist", the pass code is necessary.
When setting the pass code, [SFT] is for position change, [INC] is for number change, and pressing [SET] twice is for entry completion.
The default pass code is set to "0000" when shipped from the factory.



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4) When the operation level is determined, the screen moves to "Device setup" and switches to Setting Mode. In Setting Mode, parameters can be configured.
5) After completing the parameter settings, press the [ESC] switch. The screen will return to Display Mode.

IMPORTANT

Menu path

Display	Device setup ► Easy setup wizard

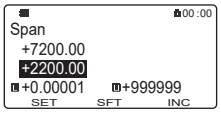
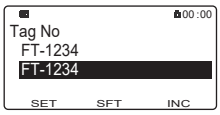
When parameters on the menu described above are set in the Wizard of Easy setup, be sure to execute "Setting download" in each menu after setting the parameters. If "Setting download" is not executed, any changed parameters will not be correctly applied to the device.

NOTE

If there is no operation for 10 minutes in Setting Mode, the screen goes back to Display Mode.

Parameter form

The following three parameter forms are available.

Type	Example of display	Description
Select type		Selects the adequate type of data from among the pre-determined alternatives.
Numeric type		Specifies the data with a combination of number and a decimal point for each digit.
Alphanumeric type		The data is configured with the combination of alphanumeric characters. (Tag No., Special unit, etc.)

The alphanumeric type displays the following alphanumeric characters in order.

0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz!"#$%&'()*+,-./:;<=>?@[\]^_`{|}~"space"

2.4 Parameter Setting from Display Panel

This section explains how to specify the parameters from the display panel. Refer to Section 2.3, and set the operation level to “Specialist”. Also select a parameter to be specified in the Setting Mode.

NOTE

The flow rate unit, span flow, and tag No. are explained as an example.
If a particular parameters 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.

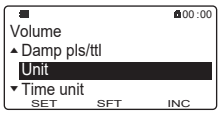
2.4.1 Setting Example of Select Type Parameter (Flow rate unit)

The following is the procedure of changing the flow rate unit for the Select type parameter.
The physical unit and time unit need to be specified individually for the flow rate unit. When setting the volumetric flow rate unit to l/min, set “l (liter)” to the physical unit and “/min” to the time unit.
This setting can be configured with the following parameters.

Menu path

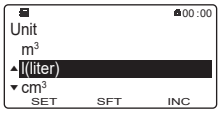
Display	Device setup ► Detailed setup ► Pro var ► Volume ► (see below)

Parameter	Description
Unit	Specifies the physical unit of the volumetric flow rate.
Time unit	Specifies the time unit of the volumetric flow rate.



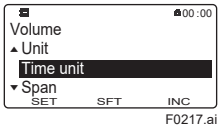
F0215.ai

Specify the physical unit for volumetric flow rate.
Move the cursor with [INC] and [DEC] according to the menu path described above, press [SET] to determine, and select the “Unit”.



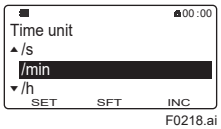
F0216.ai

Move the cursor with [INC] and [DEC], press [SET] to determine, and select the “l(liter)”. While the selected unit is blinking, press [SET] to determine the unit. The screen returns to the setting page after completing the setting.



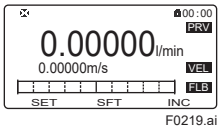
F0217.ai

Specify the time unit for volumetric flow rate.
Move the cursor with [INC] and [DEC] according to the menu path above, press [SET] to determine, and select the “Time unit”.



F0218.ai

Move the cursor with [INC] and [DEC], select “/min”, and then press [SET]. While the selected unit is blinking, press [SET] to determine the unit. The screen returns to the setting page after completing the setting.



F0219.ai

After completing the parameter setting, you can return the screen to Display Mode by pressing [ESC].

NOTE

Be sure to set the flow rate unit first when changing the flow rate unit and flow span value at the same time.
When the flow rate unit is changed, the span flow rate is converted in conjunction with the changed unit.

2.4.2 Setting Example of Numeric Type Parameter (Flow rate span)

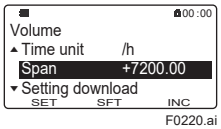
The following is the procedure of changing the flow rate span as numeric type parameter.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Volume ► Span

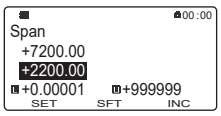
NOTE

Be sure to set the flow rate unit first when changing the flow rate unit and flow span value at the same time.
When the flow rate unit is changed, the span flow rate is converted in conjunction with the changed unit.



F0220.ai

Specify the flow rate span unit.
Move the cursor with [INC] and [DEC] according to the menu path above, press [SET] to determine, and select the “Span”.



F0221.ai

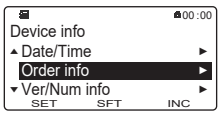
The switch's functionality for setting the span flow rate is as below:
Plus/minus and numeric change: [INC]
Movement of digits: [SFT]
Determination of parameter: [SET]
L: Minimum value
U: Maximum value
Press [SET] to determine the parameter while the setting value of the flow rate span is blinking. The screen returns to the setting page after completing the setting.

2.4.3 Setting Example of Alphanumeric Type Parameter (Tag No.)

The following is the procedure of changing the Tag No. of alphanumeric type parameter.
This setting can be configured with the following parameters.

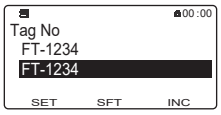
Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► Tag No



F0222.ai

Specify the Tag No..
Move the cursor with [INC] and [DEC] according to the menu path above, press [SET] to determine, and select the “Tag No”.



F0223.ai

The Tag No. can be set with up to eight characters from the display.
The switch's functionality for setting the Tag No. is as follows:
Number and character change: [INC]
Movement of digits: [SFT]
Determination of parameter: [SET]
Available characters: ASCII characters
Press [SET] to determine the parameter while the value of Tag No. is blinking. The screen returns to the setting page after completing the setting.

2.5 microSD Card Insertion/Removal

If the optional code MC is selected, the parameter setting can be stored into the dedicated microSD card inserted into the display unit. The stored data can be restored to the device. For detailed on the functions, refer to Chapter 4.

WARNING

Use only a microSD card designated by YOKOGAWA. The operation of the device cannot be guaranteed when other cards are used.

(1) Insertion of microSD Card

Carefully insert the dedicated microSD card into the slot on the display until the slot holds the card. (see Figure 2.5).

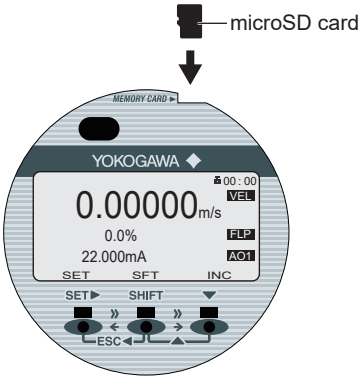


Figure 2.5 Insertion of microSD Card

(2) Removal of microSD Card

Remove the microSD from the slot shown in Figure 2.5.
When removing the microSD card, select “Execute” from the following parameters.

Menu path

Display	Device setup ► microSD ► Unmount

IMPORTANT

If the microSD card is removed without executing “Unmount” on the software, it may cause the stored data to be erased or the product to operate abnormally.

3. Operation with HART Configuration Tool

This chapter describes the connection of this instrument and HART configuration tool (FieldMate (Versatile Device Management Wizard)), and the operations using the HART configuration tool. Refer to the User's Manual of FieldMate (IM 01R01A01-01E) for details about FieldMate.

NOTE

- For more details regarding the operations of the HART configuration tool, refer to the manual of the HART configuration tool.
- When using FieldMate as the HART configuration tool, be sure that the revision is R3.02.00 or later.

NOTE

Parameters on the HART configuration tool are displayed in English only. Even if a language other than English is selected as "display language" on the display panel, parameters are displayed in English on the HART configuration tool.

3.1 Connecting HART Configuration Tool

The HART configuration tool can interface with this product from the control room, the device site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 230 Ω between the connection and the receiving instrument.
To communicate with the HART configuration tool, the HART configuration tool must be connected in parallel with this product. The connections must be non-polarized.
See Figure 3.1 for a connection example.

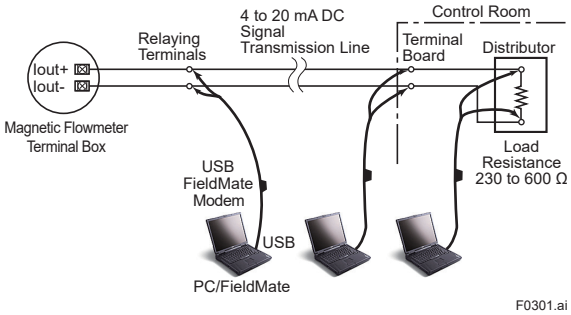


Figure 3.1 Connecting the HART Configuration Tool

IMPORTANT

The communication signal is superimposed on an analog output signal during communication. It is recommended to set a low-pass filter (approximately 0.1s) to the receiver in order to reduce the output effect from the communication signal. Before online-communication, confirm that the communication signal does not affect the upper system.

3.2 HART Configuration Tool and Device Revision

IMPORTANT

The protocol revision supported by the HART configuration tool must be the same as or later than the protocol revision of the product. If it is not, communication error will occur.

3.2.1 Device Description (DD) and Device Revision

Before using the HART configuration tool, confirm that the DD of this product is installed in the configuration tool. If the correct DD is not installed to the configuration tool, download the correct DD from the HART official site and install it, or contact the respective vendor of the configuration tool for its upgrade information.
The device revision is as follows.

DD Revision	1 or later
Device Type	AXG1A(0x371C)
Device Revision	2

• Confirmation of DD revision

(1) Turn on the power of this product with the configuration tool separated.
(2) Confirm the device revision from the installed DD file name according to the procedure provided for the configuration tool.

The DD file name is four digits: the first two digits indicate the device revision and the latter two digits indicate the DD revision.

NOTE

The device revision of the DD file is given in hexadecimal.

• Confirmation of Device revision

Connect the setting tool to this product and confirm the revision with the following parameter.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Fld dev rev

3.2.2 Device Type Manager (DTM) and Device Revision

When using FieldMate as the HART configuration tool, use the following DTM.

DTM Name	AXG HART 7 DTM
DTM Revision	5.6.4.0 or later *
Device Type	AXG4A (0x371A)
Device Revision	1

*: The DTM is included in Yokogawa DTM Library HART 7.9 or later.

NOTE

The DTM revision can be confirmed with “DTM setup”.
Device Files is a medium included in FieldMate.
The user registration site provides Device Files with the latest update programs.
(URL: https://partner.yokogawa.com/japan/fieldmate/)
When updating DTM, the following operations with “DTM setup” are required.

- Update DTM catalog
- Register DTM to the supported device.

For details, refer to the User’s Manual of FieldMate.

3.3 Basic Setup

If the dedicated parameters are specified at the time of ordering, this product is shipped with the Tag No. or device information configured.
The Tag No. and device information can be checked and set with the following parameters.

■ Tag No. (Tag, Long tag)

Menu path

HART	Device root menu ► Detailed setup ► Device information ► Order information ► (see below)

Parameter	Description
Tag	Up to 8 alphanumeric characters *1
Long tag	Up to 32 alphanumeric characters *2

■ Device information (Descriptor, Message, Date)

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► (see below)

Parameter	Description
Descriptor	Up to 16 alphanumeric characters *1
Message	Up to 32 alphanumeric characters *1
Date	Display format: mm/dd/yyyy mm = month (2 digits), dd = days (2 digits), yyyy = year (4 digits)

*1: Symbols, letters and numbers enclosed by the thick line in the following table are available.

*2: All symbols, letters and numbers in the following table are available.

SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	

* “SP” indicates a space.

3.4 Parameter Configuration

The parameter structure of the HART configuration tool is hierarchical and various settings are available. For details of the menu tree and parameter, refer to Chapters 4 and 5.
Note that some display parameters are different from those of the HART configuration tools.

CAUTION

Note that a parameter cannot be set with the display while communicating with the HART configuration tool.

3.5 Data Renewing and Upload/Download Function

(1) Data Renewing

The data is automatically updated at 0.5 to 2-second cycles.

(2) Upload/Download Function

The upload function is used for copying the parameters of the instrument to the HART configuration tool. The download function is used for setting the copied parameters in the HART configuration tool into another product. The applicable parameters are included in “Upload variables” as follows.

Menu path

HART	Upload variables ▶ (see below)

Tag	Total1 conv factor	Display select6
Descriptor	Total1 low cut*1	Display select7
Message	Total1 fail opts	Display select8
Write protect	Total1 options	Trend select 1
Dev id	Total1 Start/Stop	Trend select 2
Long tag	Total1 preset value	Trend select 3
Date	Total1 set point	Trend select 4
Final asmbly num	Total2 unit	Display format PV
Distributor	Total2 conv factor	Display format total 1
Model	Total2 low cut	Display format total 2
Poll addr	Total2 fail opts	Display format total 3
PV is	Total2 options	Display contrast
SV is	Total2 Start/Stop	Display line
TV is	Total2 preset value	Display period
QV is	Total2 set point	Display NE107
Alarm record mask 1	Total3 unit	Display alarm
Alarm record mask 2	Total3 conv factor	Display scroll
Alarm record mask 3	Total3 low cut	Display damping
Alarm out mask 1	Total3 fail opts	Display format date
Alarm out mask 2	Total3 options	Display inversion
Alarm out mask 3	Total3 Start/Stop	Language
Alarm out mask 4	Total3 preset value	Display measure mode
Low alarm*1	Total3 set point	Display installation
Low low alarm*1	Pulse1 output mode	IRSW operation
High alarm*1	Pulse1 active mode	Diagnostic output
High high alarm*1	Pulse1 fix width	VF mode
Hi/Lo alarm hysteresis	Pulse1 rate unit	VF No
PV flow select	Pulse1 rate value	Electrode size
Velocity check	Pulse1 low cut	Basic model code
Velocity unit	Pulse1 alarm out	Suffix config 1
Velocity span	Frequency1 at 0%	Suffix config 2
Velocity damping AO/frequency	Frequency1 at 100%	Option 1
Velocity damping pulse/total	Status output1 function	Option 2
Time unit	Pulse1 option	Option 3
Volume flow unit	Loop current mode	Option 4
Volume flow span	AO1 low cut*1	Remote sensor basic model code
Volume flow damping AO/frequency	AO1 high limit	Remote sensor suffix config 1
Volume flow damping pulse/total	AO1 low limit	Remote sensor suffix config 2
Mass flow unit	AO1 alarm out	Remote sensor option 1
Mass flow span	AO1 range mode	Remote sensor option 2
Mass flow damping AO/frequency	Forward span 2*1	Remote sensor option 3
Mass flow damping pulse/total	Reverse span 1*1	Remote sensor option 4
Density unit	Auto range hyst	Process applied to the primary variable is outside the operating limits of the field device
Density fixed value	Bi direction hyst	Process applied to the non-primary variable is outside the operating limits of the field device
Nominal size unit	Flow direction	PV Analog Channel Saturated
Nominal size	Display select1	PV Analog Channel Fixed
User span select AO1	Display select2	Field device has more status available
User unit AO1	Display select3	A reset or self test of the field device has occurred, or power has been removed and reapplied
User span AO1	Display select4	A modification has been made to the configuration of the field device
Total1 unit	Display select5	Field device has malfunctioned due to a hardware error or failure

*1: This parameter is not displayed with FDT2.0 DTM. It is displayed only with HART built-in DTM.

Menu path

HART	Upload variables ▶ (see below)

10:Main board CPU failure	Critical Power Failure	72:Data logging not started
11:Reverse calculation failure	Failure	80:Analog output 1 saturated
12:Main board EEPROM failure	Out of Specification	81:Analog output 2 saturated
13:Main board EEPROM default	Function Check	82:Pulse output 1 saturated
14:Sensor board failure	Simulation Active	83:Pulse output 2 saturated
15:Sensor communication error	Non-Volatile memory failure	84:Analog input saturated
16:A/D1 failure[Signal]	Volatile memory error	85:Cable misconnect
17:A/D2 failure[Exciter]	Watchdog reset executed	86:Coil insulation warning
18:Coil open	Voltage conditions out of range	131:Transmitter type mismatch
19:Coil short	Environmental conditions out of range	87:Adhesion over level 3
20:Exciter failure	Electronic failure	88:Low conductivity warning
21:PWM1 stop	Device Configuration Locked	89:Insulation detection
22:PWM2 stop	Status Simulation Active	90:Flow noise over level 3
23:Option board mismatch	Discrete Variable Simulation active	91:Flow noise over level 4
24:Option board EEPROM failure	Event Notification Overflow	92:Autozero warning
25:Option board A/D failure	Secondary Analog Channel Saturated	93:Verification warning
26:Option board SPI failure	Tertiary Analog Channel Saturated	94:Factory noise warning
27:Parameter restore incomplete	Quaternary Analog Channel Saturated	95:Simulation active
28:Indicator board failure	Quinary Analog Channel Saturated	96:Analog output 1 fixed
29:Indicator board EEPROM failure	Subdevice list changed	97:Analog output 2 fixed
30:LCD driver failure	Duplicate master detected	98:Pulse output 1 fixed
31:Indicator board mismatch	Subdevice mismatch	99:Pulse output 2 fixed
32:Indicator communication error	Subdevice with duplicate IDs found	100:Analog input fixed
33:microSD card failure	Stale data notice	101:Parameter restore running
50:Signal overflow	Capacity Denied	102:Display over warning
51:Empty pipe detection	Bandwidth allocation pending	103:microSD card size warning
52:H/L or HH/LL alarm	Block transfer pending	104:Parameter backup incomplete
53:Adhesion over level 4	Radio failure	105:microSD card mismatch
60:Span configuration error	Secondary Analog Channel Fixed	106:microSD card removal procedure error
61:PV flow select configuration error	Tertiary Analog Channel Fixed	120:Watchdog
62:Analog output 1 4-20mA limit error	Quaternary Analog Channel Fixed	121:Power off
63:Analog output 2 4-20mA limit error	Quinary Analog Channel Fixed	122:Instant power failure
64:Analog output 1 multi range error	67:Pulse output 1 configuration error	123:Parameter backup running
65:H/L HH/LL configuration error	68:Pulse output 2 configuration error	124:Data logging running
66:Density configuration error	69:Nominal size configuration error	130:Device ID not entered
Maintenance required	70:Adhesion configuration error	
Device variable alert	71:Flow noise configuration error	

3.6 Specific Functions of HART Configuration Tool

3.6.1 Burst Mode

(1) Applicable parameter of burst mode

When the burst mode is enabled, the instrument continuously sends up to three data via HART communication. Also, it is possible to continuously send an alarm signal when a change to the product settings or a change by the self diagnosis is detected.

NOTE

When changing the setting of the burst mode, set the Burst mode to “Off”.

Command Parameter	Burst Command	Burst Message Trigger Mode	Burst Trigger Source	Burst Trigger Units
PV	Cmd1: PV	Continuous	---	---
		Window	PV	Depends on the assigned variable to PV
		Rising		
		Falling		
		On-change		
Loop Current and Percent Range	Cmd2: % range/ current	Continuous	---	---
		Window	% range	%
		Rising		
		Falling		
		On-change		
PV, SV, TV, QV	Cmd3: Dyn vars/ current	Continuous	---	---
		Window	PV	Depends on the assigned variable to PV
		Rising		
		Falling		
		On-change		
Device Variable with status	Cmd9: Device vars w/ status	Continuous	---	---
		Window	Process variable assigned to the top of Burst Device Variables	Depends on the assigned variable to Burst Device Variables
		Rising		
		Falling		
		On-change		
Device Variable	Cmd33: Device variables	Continuous	---	---
		Window	Process variable assigned to the top of Burst Device Variables	Depends on the assigned variable to Burst Device Variables
		Rising		
		Falling		
		On-change		
Additional Device Status	Cmd48: Read Additional Device Status	Continuous	---	---
		On-change	All status	---

(2) Burst mode setting

Burst Mode can be specified in Easy Burst Mode or Detailed Burst Mode.

• Setting Easy Burst Mode

Easy Burst Mode can send one Burst Command continuously. Easy Burst Mode (BM0: Burst Message 0) can be configured with the following parameters.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Burst setup ► Easy burst setup ► set Easy Burst

NOTE

When Easy Burst Mode is used, Event Notification cannot be used.

• Setting Detailed Burst Mode

Detailed Burst Mode can send up to three Burst Commands continuously under various conditions. Detailed Burst Mode can be configured with the following parameters.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Burst setup ► Detailed burst setup ► (see below)

Parameter	Description
BM1 Setting ► set Detailed Burst	Detailed Burst Mode Settings (BM1: Burst Message 1)
BM2 Setting ► set Detailed Burst	Detailed Burst Mode Settings (BM2: Burst Message 2)
BM3 Setting ► set Detailed Burst	Detailed Burst Mode Settings (BM3: Burst Message 3)

In accordance with the method, specify the following.
• Burst Command
• Update Period/Max Update Period
• Burst Message Trigger Mode

(3) Burst Command Setting

Select the transmission data from the Burst Command.

Burst Command	Command Parameter
Cmd1:PV	PV
Cmd2:% range/current	Loop Current and Percent Range
Cmd3:Dyn vars/current	PV, SV, TV, QV
Cmd9: Device vars w/ status	Device Variable with status
Cmd33:Device Variables	Device Variable
Cmd48:Read Additional Device Status	Additional Device Status

(4) Burst Device Variables Setting

When “Cmd9: When Device vars w/ status” or “Cmd33:Device Variables” is selected as Burst Command, it is required to specify the Burst Device Variables, for which up to eight values can be specified.

Dev Var Code	Burst Device Variables	Dev Var Code	Burst Device Variables
0	Velocity	4	Totalizer 2
1	Volume flow	5	Totalizer 3
2	Mass flow	6	Flow noise
3	Totalizer1	7	Calorific value

(5) Update Period/Max Update Period Setting

Specify the Update Period/Max Update Period, which is the update period of Burst Message Trigger Mode. The Burst Trigger Source is checked with the period of the Update Period, and if it fulfills the conditions of Burst Message Trigger Mode, the data will be updated. When it does not fulfill the conditions of the Trigger Mode with the period of the Update Period and reaches the Max Update Period, the data will be updated forcibly.

The Update Period/Max Update Period needs to be selected from the following.

Update Period/Max Update Period	
0.5 s	8 s
1 s	16 s
2 s	32 s
4 s	60 s to 3600 s (any value)

NOTE

For the Update Period, specify a value smaller than the Max Update Period.

(6) Burst Message Trigger Mode Setting

Specify Burst Message Trigger Mode. When “Window”, “Rising”, or “Falling” is set, the Burst Trigger Level must be specified.

Burst Message Trigger Mode	Description
Continuous	Burst Messages are transmitted continuously.
Window	Burst Trigger Level is the amount of change. The device variable value detects and transmits the amount of change.
Rising	The setting value of the Burst Trigger Level is the high limit value. When the device variable value exceeds the high limit value, it is detected, and a message is transmitted.
Falling	The setting value of the Burst Trigger Level is the low limit value. The device variable value detects and transmits that the low limit value is surpassed.
On-change	When the device variable value is changed from the previous output, it is detected, and a message is transmitted.

3.6.2 Event Notification

Changes to the device settings and changes in the device status by self diagnosis can be detected as events, sending continuous alarm signals. Up to five events can be stored as the history. When Event Notification is used, the Detailed Burst Message must be specified and the Burst Message must be enabled.

NOTE

Note that events stored as the history are deleted if the power is turned off.

(1) Event Notification Setting

The Event Notification can be configured with the following parameters.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Event setup ► (see below)

Parameter	Description
set Event	Specifies Event Notification.
stop Event	Specifies stopping Event Notification.

Select an Event Notification configuration from the table below.

Selection	Description
Event Mask	Specifies device status to detect an event (Event Mask) (Cmd48: Read Additional Device Status)
Event Notification Retry Time	Specifies the period of Event Notification when an event occurs.
Max Update Time	Specifies the period of Event Notification when an event has not occurred.
Event Debounce Interval	Specifies the minimum time that an event continues.

(2) Event Acknowledgment

If an Event is occurring, it must be acknowledged.
Acknowledgment of an event can be configured with the following parameter.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Event setup ► acknowledge Event

NOTE

Only the event which occurs first can be acknowledged. When multiple events occur, they must all be acknowledged.

(3) Event Notification Flow

When Event Notification is enabled, a status change caused by the self diagnosis of the instrument will activate the alarm Event1. Event1 is continuously transmitted in the cycle of Event Notification Retry Time.
If Event2 occurs before Event1 is acknowledged, the information on Event2 is stored internally and continuously transmitted until Event1 is acknowledged. When Event1 is acknowledged, Event1 disappears and Event2 is continuously transmitted until it is acknowledged. When Event2 is acknowledged, all Events are acknowledged, and are continuously transmitted at the interval of the Max Update Time.

3.6.3 Multidrop Mode

When Multidrop is enabled, the product can refer to the connection of HART communication devices on one communication transmission line. This product can connect up to 63 devices.
To activate Multidrop Mode, a number from 1 to 63 must be assigned to the polling address.
When Multidrop Mode is activated, analog output signal settings of 4 to 20 mA must be changed because all the data is transmitted digitally.
Multidrop Mode can be configured with the following procedures.

(1) Polling Address Setting

Assign a number from 1 to 63 to the polling address. The polling address can be configured with the following parameter.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Poll addr

NOTE

When the same polling address is set for two or more devices in the Multidrop Mode, communication with these devices is disabled.

(2) Analog Output Setting

Usually, the analog output of Multidrop Mode should be fixed at 4 mA on the product side.
However, it becomes impossible to use a burnout output if the analog output is fixed at 4 mA.
In the case of applications which receive and operate the analog output signal, only one variable analog output signal can be set per loop.
The analog output of Multidrop Mode can be configured with the following parameter.

Menu path

HART	Device root menu ► Detailed setup ► Device information ► HART setup ► Loop current mode

Select the analog output of multi-drop mode from the table below.

Selection	Description
Disabled	Specifies analog output to 4mA (fixed).
Enabled	Specifies analog output to 4 to 20 mA (variable).

NOTE

The analog output signal which is fixed in Multidrop Mode is applied only to analog output 1.

(3) Enabling Multidrop Mode

Refer to the User's Manual of the HART configuration tool when configuring the settings of polling for the receiving instrument.

(4) Communication in Multidrop Mode

- When connection between the device and the HART configuration tool starts, the tool searches for the device set to Multidrop Mode, and the polling address and tag are displayed.
- After the desired device is selected, normal communication with the selected device becomes possible. However, communication in Multidrop Mode is slower.

(5) Release of Multidrop Mode

To reset the Multidrop Mode, the parameter needs to be configured as below.

- Specify the polling address of (1) to “0”.
- Specify the analog output of (2) to “Enabled”.

4. Functions

This chapter describes the functions of the product. Following is an overview of each function.

Basic settings

This product can measure the 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 be specified for each process value.
For details about how to check measured results and the setting procedure, refer to Section 4.1.

Totalization function

This product has three totalizers for totalizing 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 a totalization switch function that compares a specified target value with a totalized value to output the result in the form of the status output, and a totalization preset function that totalization starts from a value set in advance.
For details about the totalization function and setting procedures, refer to Section 4.2.

Pulse output, Frequency output, and Status output

A measurement result can be output as pulse output, frequency output, or status output. When a pulse output is used, the pulse width or pulse rate can be selected. When a frequency output is used, outputs at 0% and 100% for the span of the process value can be specified. When a status output is used, the product status can be output as a status output. For both pulse output and frequency output, the low-cut values can be set.
For details about each output and the setting procedure, refer to Section 4.3.

Status input

Since this product has a status input terminal, the totalizer preset function and zero adjustment function, etc. can be used in response to the status input from the outside. For details about the setting procedure of these functions, refer to Section 4.4.

Analog output/Analog input

Up to two analog outputs are available. The high/low limit function, forward/reverse flow rate function (reverse flow rate: 4 to 12 mA, forward flow rate: 12 to 20 mA), alarm output function, low-cut function and other functions are available.
Analog input is useful for inputting fluid temperature via an external temperature transmitter.
For details about setting procedures for the analog output and analog input, refer to Section 4.5.

Multi range function

The multi range function makes it possible to measure a flow rate while switching multiple ranges. A range can be switched in response to a flow rate, flow direction, and status input.
For details about the multi range function, refer to Section 4.6.

Auxiliary calculation function

This function is used to calculate the temperature correction for density or calorie by inputting the temperature from an external device in the form of an analog input. The accuracy of mass flow rate measurement is improved by setting the temperature correction for density.
For details about the auxiliary calculation function, refer to Section 4.7.

Alarm

A detected error can be notified as an alarm or warning. This function can show the error status based in accordance with NAMUR NE107 to suit parameter settings. It is also possible to record alarms that occurred in the past in the history and mask unnecessary so that they are hidden on the display.
For details about contents and setting procedures, refer to Section 4.8.

Display

This display supports multiple languages for use on the display. This function can also show the time changes of the selected parameter in a trend graph on the display.
For details about display settings, refer to Section 4.9.

NOTE

The language on the display is set to “English” as default at factory shipment. If necessary, refer to Subsection 4.9.1 to select the adequate language.
The menu pass of the display on this manual is set to “English”.

Device information

With this function, the parameters specified at the time of order, model code, and suffix code of this product can be checked on the display.
For details about how to check the device information, refer to Section 4.10.

Self-diagnostic function

The self-diagnostic 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 various self-diagnostic functions, refer to Section 4.11.

Test mode

With this mode, the process value and the value output from a connection terminal can be arbitrarily specified to test a response from the device.
For details about the test mode, refer to Section 4.12.

Backup, Restore, and Duplicate of Parameter

The backup function can store settings of the parameters into the built-in memory in the display. If the optional code MC is selected, setting parameters are 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.
For details about the backup, restore, and duplicate functions, refer to Section 4.13.

Software write protection function

A write protect can be changed using the hardware write protection switch and the parameter settings (software write protection).
For details about the hardware write protection switch, refer to the Installation Manual. For details about the software write protection function, refer to Section 4.14.

4.1 Basic Settings

4.1.1 Overview

This product can measure flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise at the same time. A measured result can be output as an analog output, frequency output, pulse output, and status output.
Refer to the table below for codes and connection terminals of communication/input-output and input and output for each terminal.

Communication and I/O Code	Connection Terminal					
HART	Iout1 +/-	P/Sout1 +/-	ALM +/-	So11 + So12 +	Si11 + Si12 +	MIO +/-
J0	Iout1 (Active)	P/Sout1 (Passive)	Alarm Output (Passive)	Sout1, 2 (Passive)	Sin1, 2 (No-voltage)	—
J2						Iin (Active)
J3						P/Sout2 (Passive)
J4						P/Sout2 (Active, without internal resistor)
J5						P/Sout2 (Active, with internal resistor)
J6						Iout2 (Active)

Iout1: Analog output 1 (HART communication signal superimposed)
Iout2: Analog output 2
Iin: Analog input
P/Sout1: Pulse/Status output 1
P/Sout2: Pulse/Status output 2
Sout1,2: Status output 1,2
Sin1,2: Status input 1,2
The position of Communication and I/O code: AXG1A-□□□□□□□■■□□

NOTE

Available functions vary depending on the connection terminal type specified at the time of order. Before using each function of this product, be sure to check the terminal of the product with the table above.

4.1.2 PV Mapping of Process Value

The flow velocity, volumetric flow rate, mass flow rate, and flow noise can be mapped to the primary variable (PV).
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► PV flow select
HART	Device root menu ► Detailed setup ► Process variables ► PV flow select

Selection		Description
Display	**HART**	
Velocity	Velocity	Specifies the flow velocity to the Primary Value.
Volume	Volume	Specifies the volumetric flow rate to the Primary Value.
Mass	Mass	Specifies the mass flow rate to the Primary Value.
Diag	Diag	Specifies the flow noise to the Primary Value.

Setting example: If the volumetric flow rate is set to PV, and the volumetric flow rate span is set to 100 m^3/h for use, set the parameters as follows.

PV flow select="Volume"
Volume flow unit="m^3"
Time unit="/h"
Volume flow span="100.000"

Setting example: If the mass flow rate is set to PV, with the mass flow rate span being set to 10,000 kg/h and the density to 1000 kg/m^3 for use, set the parameters as follows.

Density unit="kg/m^3"
Density fixed value="1000.000"
PV flow select="Mass"
Mass flow unit="kg"
Time unit="/h"
Mass flow span="10000.0"

4.1.3 Display of the Process Value

The flow velocity, volumetric flow rate, mass flow rate, totalized value, calorie, and flow noise can be checked with the following parameters.

■ Flow rate (PV)

Menu path

Display	Device setup ► Process variables ►(see below)
HART	Process variables root menu ► Dynamic variables ► (see below)

Parameter		Description
Display	**HART**	
Flow rate(%)	PV % rnge	Displays the percentage to the range for the process value set to the Primary Value.
Flow rate	PV	Displays the process value set to the Primary Value.

■ Flow velocity, Volumetric flow rate, Mass flow rate, Totalized value, Calorie

Menu path

Display	Device setup ► Process variables ►(see below)
HART	Process variables root menu ► Device variables ► (see below)

Parameter		Description
Display	**HART**	
Velocity	Velocity	Displays the flow velocity.
Volume	Volume flow	Displays the volumetric flow rate.
Mass	Mass flow	Displays the mass flow rate.
Totalizer ►Totalizer 1	Totalizer1	Displays the totalized value of totalizer 1.
Totalizer ►Totalizer 2	Totalizer2	Displays the totalized value of totalizer 2.
Totalizer ►Totalizer 3	Totalizer3	Displays the totalized value of totalizer 3.
Calorie	Calorific value	Displays the calorie.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Result ► Value
HART	Process variables root menu ► Device variables ► Flow noise

This parameter displays the flow noise.

4.1.4 Unit Setting

Units can be specified for the flow velocity, volumetric flow rate, mass flow rate, and calorie. Each flow rate unit can be specified with the physical unit and the time unit, individually. However, note that the time unit is common to all flow rates. Also, the unit of the flow velocity is fixed to “cm/s” and it cannot be changed.

Example) To set the volumetric flow rate unit to “m^3/h”
The volumetric unit can be set to “m^3/h” and the time unit to “/h”. At this time, the time unit for the mass flow rate and calorie are also set to “/h”.

This setting can be configured with the following parameters.

■ Physical unit

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► (see below)

Parameter		Description
Display	**HART**	
Velocity ► Unit	Velocity ► Velocity unit	Specifies the physical unit of the flow velocity.
Volume ► Unit	Volume flow ► Volume flow unit	Specifies the physical unit of the volumetric flow rate.
Mass ► Unit	Mass flow ► Mass flow unit	Specifies the physical unit of the mass flow rate.
Calorie ► Unit	Calorie ► Calorific unit	Specifies the physical unit of the calorie.

■ Time unit

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► (see below)

Parameter		Description
Display	**HART**	
Volume ► Time unit	Volume flow ► Time unit	Specifies the time unit of the volumetric flow rate.
Mass ► Time unit	Mass flow ► Time unit	Specifies the time unit of the mass flow rate.
Calorie ► Time unit	Calorie ► Time unit	Specifies the time unit of the calorie.

4.1.5 Span Setting

A span can be specified for the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise.
However, the unit for the span is the same as the unit specified in Subsection 4.1.4. If the unit is changed, the span value is converted to match the changed unit.
This 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)
HART	Device root menu ► Detailed setup ► Process variables ► (see below)

Parameter		Description
Display	**HART**	
Velocity ► Span	Velocity ► Velocity span	Specifies the span of the flow velocity.
Volume ► Span	Volume flow ► Volume flow span	Specifies the span of volumetric flow rate.
Mass ► Span	Mass flow ► Mass flow span	Specifies the span of the mass flow rate.
Calorie ► Span	Calorie ► Calorific flow span	Specify the span of the calorie.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Span
HART	Diagnostic root menu ► Diagnosis ► Flow noise ► Flow noise span

This parameter specifies the span of the flow noise.

NOTE

Be sure to note the following points when specifying the flow rate span.

- For a line with a significant flow 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. The flow velocity can be checked using the sizing data described in the general specifications. When 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 span value and its flow rate unit are changed at the same time.

4.1.6 Damping Time Constant Setting

The damping time constant (63.2% response) can be specified for the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise. To reduce an output fluctuation or change the response speed, change the damping time constant (default value is 3.0 seconds).
It is possible to measure a pulsing flow of up to 1 Hz with an output damping of 0.1 seconds for a piston pump, etc.
The damping time constant can be set for the output of each process value. The damping time constant is a common setting for the analog output, frequency output, pulse output, and totalized value. However, the damping setting for the flow noise is common to all outputs.
This setting can be configured with the following parameters.

■ Analog output/Frequency output

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► (see below)

Parameter		Description
Display	**HART**	
Velocity ► Damp AO/F	Velocity ► Velocity damping AO/frequency	Specifies the damping time constant of the flow velocity.
Volume ► Damp AO/F	Volume flow ► Volume flow damping AO/frequency	Specifies the damping time constant of the volumetric flow rate.
Mass ► Damp AO/F	Mass flow ► Mass flow damping AO/frequency	Specifies the damping time constant of the mass flow rate.
Calorie ► Damp AO/F	Calorie ► Calorific value damping AO/frequency	Specifies the damping time constant of the calorie.

■ Pulse output/Totalizer

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► (see below)

Parameter		Description
Display	**HART**	
Velocity ► Damp pls/ttl	Velocity ► Velocity damping pulse/total	Specifies the damping time constant of the flow velocity.
Volume ► Damp pls/ttl	Volume flow ► Volume flow damping pulse/total	Specifies the damping time constant of the volumetric flow rate.
Mass ► Damp pls/ttl	Mass flow ► Mass flow damping pulse/total	Specifies the damping time constant of the mass flow rate.
Calorie ► Damp pls/ttl	Calorie ► Calorific value damping pulse/total	Specifies the damping time constant of the calorie.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Damp
HART	Diagnostic root menu ► Diagnosis ► Flow noise ► Flow noise damping

This parameter specifies the damping time constant of the flow noise.

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 control processing application.

4.1.7 Low-cut Function Setting

A low-cut value can be specified for the analog output, frequency output, pulse output, and totalizer output value.
If the low-cut function is used, the flow rate below set values can be stopped from being output. This function helps reduce erroneous output when the flow is “0”.
However, the unit of the low-cut value is the same as the unit specified in Subsection 4.1.4. If the unit is changed, the low-cut value is changed to match the changed unit. The low-cut value is not synchronized with the span value. If the span value is changed, be sure to reset the low-cut value.
Set the low-cut value to “0” if the low-cut function is not used.
This setting can be configured with the following parameters.

Analog output

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ►(see below)
HART	Device root menu ► Detailed setup ► Analog output/input ► (see below)

Parameter		Description
Display	**HART**	
AO1 ► Low cut	Analog output 1 ► AO1 low cut	Specifies the low-cut value of analog output 1. If PV is set for the measurement screen on the display, a PV value which is low-cut with the value set here is displayed.
AO2 ► Low cut	Analog output 2 ► AO2 low cut	Specifies the low-cut value of analog output 2.

Frequency output/Pulse output

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Low cut	Pulse/Status output 1 ► Pulse1 low cut	Specifies the low-cut values of frequency output 1 and pulse output 1.
PO2/SO2 ► Low cut	Pulse/Status output 2 ► Pulse2 low cut	Specifies the low-cut values of frequency output 2 and pulse output 2.

Totalizer

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Low cut	Totalizer1 ► Total1 low cut	Specifies the low-cut value of totalizer 1.
Totalizer 2 ► Low cut	Totalizer2 ► Total2 low cut	Specifies the low-cut value of totalizer 2.
Totalizer 3 ► Low cut	Totalizer3 ► Total3 low cut	Specifies the low-cut value of totalizer 3.

The actual value for which the low-cut is effective has ±0.5% of the 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 set value – (Minimum span set with multi range × 0.5 %)

(2) Positive side

= Low-cut set value + (Minimum span set with multi range × 0.5 %)

Example: When setting to span of volumetric flow rate = 10.0 m^3/h, Low-cut value = 1.0 m^3/h

(1) Negative side

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

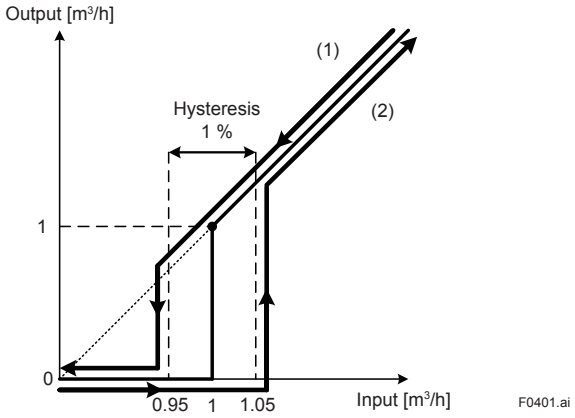
= 0.95 [m^3/h]

(2) Positive side

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

= 1.05 [m^3/h]

In this case, when the flow rate is decreasing, the output flow rate value becomes 0.0 [m^3/h] with the low-cut function if the actual flow rate goes below 0.95 [m^3/h]. On the other hand, when the flow rate is increasing, the flow rate value is output if the actual flow rate goes over 1.05 [m^3/h].



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 “0”. In such a case, increase the flow rate span, damping time constant, or low-cut value.

NOTE

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

4.1.8 Meter factor Setting

When ordering only AXG1A, or when changing the remote sensor to combine with, the meter factor of the remote sensor must be specified.
This setting can be configured with the following parameters.
When the customer orders AXG1A and the remote sensor at the same time as a combination, the meter factor of the remote sensor to combine with is set to AXG1A. So, the customer is not required to set the meter factor.

Menu path

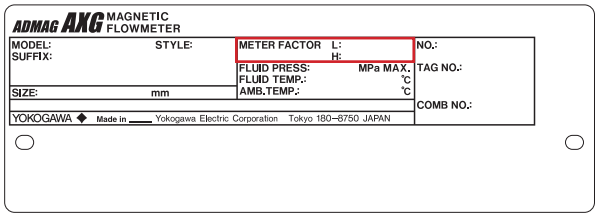
Display	Device setup ► Detailed setup ► Sensor ► (see below)
HART	Device root menu ► Basic setup ► Sensor ► (see below)

Parameter		Description
Display	**HART**	
Low MF	Low MF	Specifies the meter factor of the low-frequency side.
High MF	High MF	Specifies the meter factor of the high-frequency side.

NOTE

The meter factor is described in the METER FACTOR column on the remote sensor nameplate.

Example:



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4.1.9 Sensor Type Setting

When only AXG1A is ordered, or when the remote sensor to combine with, the type of the remote sensor must be specified.
This setting can be configured with the following parameters.
When the customer orders AXG1A and the remote sensor at the same time as a combination, the type of the remote sensor to combine with is set to AXG1A at the factory before shipment. So, the customer is not required to set the sensor type.

Menu path

Display	Device setup ► Detailed setup ► Sensor ► Flow sensor sel
HART	Device root menu ► Basic setup ► Sensor ► Flow sensor select

From the table below, select the sensor type.

Selection		Description
Display	**HART**	
ADMAG AXG	ADMAG AXG	Configure to use the ADMAG AXG Series remote sensor.
ADMAG AXW	ADMAG AXW	Configure to use the ADMAG AXW Series remote sensor.
ADMAG AXF	ADMAG AXF	Configure to use the ADMAG AXF Series remote sensor.
ADMAG	ADMAG	Configure to use the ADMAG Series remote sensor.
ADMAG AE	ADMAG AE	Configure to use the ADMAG AE Series remote sensor.
ADMAG SE	ADMAG SE	Configure to use the ADMAG SE Series remote sensor.
YEWMAG	YEWMAG	Configure to use the YEWMAG Series remote sensor.
Calibrator	Calibrator	Configure to use the AM012 (calibrator) .
Other 1	Other1	Configure to use another remote sensor.
Other 2	Other2	
Other 3	Other3	

IMPORTANT

When changing the combination of the sensors, the meter factor needs to be re-adjusted based on actual flow calibration to secure the accuracy. When using another remote sensor, such as other companies' products, contact a Yokogawa sales office or representative.

4.1.10 Sensor's Nominal Size Setting

When only AXG1A is ordered, or when changing the remote sensor to combine, the nominal size of the remote sensor must be specified.
This setting can be configured with the following parameters.
When the customer orders AXG1A and the remote sensor at the same time as a combination, the nominal size of the remote sensor to combine with is set to AXG1A at the factory before shipment. So, the customer is not required to set the nominal size.

Menu path

Display	Device setup ► Detailed setup ► Sensor ► (see below)
HART	Device root menu ► Detailed setup ► Sensor ► (see below)

Parameter		Description
Display	**HART**	
Nominal size unit	Nominal size unit	Specifies the unit of the nominal size.
Nominal size	Nominal size	Specifies nominal size.

4.1.11 Density Setting

The density must be set in order to measure the mass flow rate. The density can be selected from the density compensated with fixed density or density corrected by temperature.
For details about how to measure the mass flow rate or correct the density by temperature, refer to Subsection 4.7.5.
If density is set to "0" while the mass flow rate is mapped to PV, a setting error will result.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Density ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► Density ► (see below)

Parameter		Description
Display	**HART**	
Value select	Density value select	Selects one of the following temperature-based density corrections. • Fixed value: Uses the fixed density • Correction value: Uses the corrected density
Unit	Density unit	Specifies the unit of the density.
Fixed density	Density fixed value	Specifies the value of the fixed density.
Std density	Standard density	Specifies the reference density value of the standard condition to use the density compensated with temperature.
Correct density	Correct density	Displays the corrected density.

4.1.12 Temperature Setting

The temperature setting is required when calculating the calorie based on this value's difference from the temperature that is input via the analog input process.
For details about the calorie calculation, refer to Subsection 4.7.6.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Temperature ► (see below)
HART	Device root menu ► Detailed setup ► Process variables ► Temperature ► (see below)

Parameter		Description
Display	**HART**	
Std temperature	Standard temperature	Specifies the reference standard temperature for the temperature-based density correction function.
Meas temperature	Measured temperature	Displays the temperature that is input from analog input.
Fixed temperature	Calorific fix temp	Specifies the reference temperature for the calorie calculation with the temperature difference from the temperature which is input from analog input.

4.1.13 Span Flow Velocity Display

The span of the PV-mapped process value in Subsection 4.1.2 can be displayed in the flow velocity unit.
This information can be viewed with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Velocity check
HART	Device root menu ► Detailed setup ► Process variables ► Velocity check

4.1.14 User Span Function

The user span function can display a process value assigned to analog output 1 and analog output 2 with the customer's desired special unit. If the same process value is assigned to both analog outputs, the setting for analog output 1 takes precedence.
This setting can be configured with the following parameters.

■ Using user span

Menu path

Display	Device setup ► Detailed setup ► User Span ► (see below)
HART	Device root menu ► Basic setup ► User span ► (see below)

Parameter		Description
Display	**HART**	
User span AO1 ► Select	User span select AO1	Specifies the user span function to the process value allocated to analog output 1.
User span AO2 ► Select	User span select AO2	Specifies the user span function to the process value allocated to analog output 2.

From the table below, select the user span function.

Selection		Description
Display	**HART**	
No	No	Not using user span function.
Yes	Yes	Using user span function.

■ User unit setting

Menu path

Display	Device setup ► Detailed setup ► User Span ► (see below)
HART	Device root menu ► Basic setup ► User span ► (see below)

Parameter		Description
Display	**HART**	
User span AO1 ► Unit	User unit AO1	Specifies the desired unit of up to 8 characters to the process value assigned to analog output 1.
User span AO2 ► Unit	User unit AO2	Specifies the desired unit of up to 8 characters to the process value assigned to analog output 2.

User span setting

Menu path

Display	Device setup ► Detailed setup ► User Span ► (see below)
HART	Device root menu ► Basic setup ► User span ► (see below)

Parameter		Description
Display	**HART**	
User span AO1 ► Span	User span AO1	Specifies the desired span to the process value assigned to analog output 1.
User span AO2 ► Span	User span AO2	Specifies the desired span to the process value assigned to analog output 2.

IMPORTANT

The output in the user unit is displayed as follows:
Output in user unit = (Output in a physical unit of the process value / Span in a physical unit of the process value) × User span

Example:
To set the span setting for analog output 1 to 100 dl/s, set the parameters as follows due to 100 dl = 10 L. Displays 100 dl/s when outputting 100 %.
PV = “Volume flow”
Span of volumetric flow rate = “10 l/s”
Using user span for analog output 1 = “Yes”
User unit for analog output 1 = “dl/s”
User span for analog output 1 = “100”

4.1.15 Zero Adjustment

The zero adjustment is carried out to set the output for zero flow velocity to 0% (4 mA). 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 the zero adjustment procedure using the display.

IMPORTANT

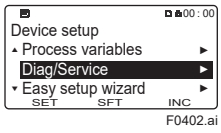
- The zero adjustment should be carried out before the actual operation. Note that setting and updating other parameters cannot be carried out during the zero adjustment (for approximately 30 seconds).
- The zero adjustment should be executed only after the sensor is filled with measuring fluid and the 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 that changed fluid.

Execution of zero adjustment

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

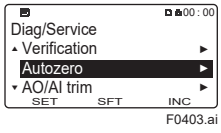
Menu path

Display	Device setup ▶ Diag/Service ▶ Autozero ▶ Execute ▶ Execute



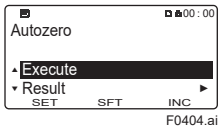
F0402.ai

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



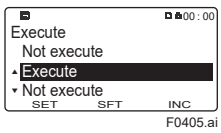
F0403.ai

Select “Autozero”.



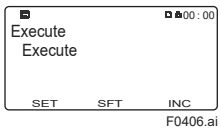
F0404.ai

Select “Execute”.



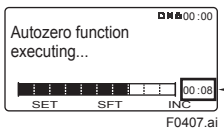
F0405.ai

Select “Execute”.



F0406.ai

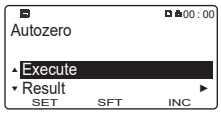
When “Execute” blinks, touch [SET] to execute.



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.

← The time remaining until the end.



F0408.ai

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

Zero adjustment by HART communication can be executed with the following parameters.

Menu path

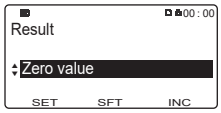
HART	Device root menu ► Basic setup ► Autozero ► Autozero Exe

■ Confirmation of zero adjustment result

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

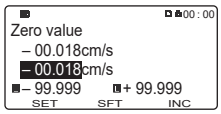
Menu path

Display	Device setup ► Diag/Service ► Autozero ► Result ► Zero value



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.

The zero adjustment result using HART communication can be confirmed with the following parameters.

Menu path

HART	Device root menu ► Basic setup ► Autozero ► Zero value

4.2 Totalization Function

4.2.1 Totalized Value and Unit Setting

This function can totalize the volumetric flow rate, mass flow rate, and calorie. This product has three totalizers and can totalize 3 process values at the same time.
Totalizer 1 totalizes the values in the unit of the PV-mapped process value in Subsection 4.1.2.
Totalizers 2 and 3 totalize the process value of the selected unit.
This setting can be displayed and configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Unit	Totalizer1 ► Total1 unit	Displays the unit of totalizer 1.
Totalizer 2 ► Unit	Totalizer2 ► Total2 unit	Specifies the unit of totalizer 2.
Totalizer 3 ► Unit	Totalizer3 ► Total3 unit	Specifies the unit of totalizer 3.

NOTE

The flow velocity and flow noise cannot be totalized. If flow velocity or flow noise is selected for the Primary Value, totalizer1 totalizes the volumetric flow rate and unit using “m^3”.

4.2.2 Totalized Value Display and Totalization 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. However, note that the conversion factor cannot be set to “0”.
If the totalized value on the display exceeds ±99999999, the maximum value of the displayed digits, the displayed value is reset to 0.
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)
HART	Process variables root menu ► Device variables ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1	Totalizer1	Displays the totalized value of totalizer 1.
Totalizer 2	Totalizer2	Displays the totalized value of totalizer 2.
Totalizer 3	Totalizer3	Displays the totalized value of totalizer 3.

NOTE

If Main soft rev (Main board revision/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (Indicator board revision/Ind soft rev) is R2.01.01 or earlier, the totalized value on the display is held at the upper limit if it exceeds ±99999999, the maximum value of the displayed digits.
For details about how to check the device revision (Main soft rev and Ind soft rev), refer to Subsection 4.10.2.

Setting conversion factor for scaling

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Conv factor	Totalizer1 ► Total1 conv factor	Specifies the conversion factor of totalizer 1.
Totalizer 2 ► Conv factor	Totalizer2 ► Total2 conv factor	Specifies the conversion factor of totalizer 2.
Totalizer 3 ► Conv factor	Totalizer3 ► Total3 conv factor	Specifies the conversion factor of totalizer 3.

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

Menu path

Display	Device setup ► Process variables ► Totalizer ► (see below)
HART	Process variables root menu ► Totalizer count ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 count	Totalizer1 count	Displays the scaled totalized value of totalizer 1.
Totalizer 2 count	Totalizer2 count	Displays the scaled totalized value of totalizer 2.
Totalizer 3 count	Totalizer3 count	Displays the scaled totalized value of totalizer 3.

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

NOTE

If Main soft rev (Main board revision/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (Indicator board revision/Ind soft rev) is R2.01.01 or earlier, the totalized value on the display is held at the upper limit if it exceeds ±99999999, the maximum value of the displayed digits.
For details about how to check the device revision (Main soft rev and Ind soft rev), refer to Subsection 4.10.2.

4.2.3 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. Even if the totalized value exceeds the displayed digit limit and is reset to 0 under that state, the status output remains active.
For details about the output, active direction, and status output function setting for each terminal, refer to Section 4.3.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Set point	Totalizer1 ► Total1 set point	Specifies the target value of totalizer 1.
Totalizer 2 ► Set point	Totalizer2 ► Total2 set point	Specifies the target value of totalizer 2.
Totalizer 3 ► Set point	Totalizer3 ► Total3 set point	Specifies the target value of totalizer 3.

Example: Setting procedure to use the totalization switch function with the pulse/status output 1.

Follow the steps below to set the status output of pulse/status output 1 to “On active” when the totalized value of totalizer 1 reaches the target value.

(1) Refer to Subsection 4.3.1 to specify the output of pulse/status output 1 to “Status output”.

(2) Refer to Subsection 4.3.5 to specify the active direction of pulse/status output 1 to “On active”.

(3) Refer to Subsection 4.3.9 to specify the status output function to “Total limit 1”.

(4) Refer to this subsection to specify the target value of totalizer 1.

4.2.4 Totalizer Operation at Alarm Occurrence

The totalizer operation can be specified to deal with an alarm that affects the totalization function.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Failure opts	Totalizer1 ► Total1 fail opts	Specifies totalizer 1 operation to be performed when an alarm occurs.
Totalizer 2 ► Failure opts	Totalizer2 ► Total2 fail opts	Specifies totalizer 2 operation to be performed when an alarm occurs.
Totalizer 3 ► Failure opts	Totalizer3 ► Total3 fail opts	Specifies totalizer 3 operation to be performed when an alarm occurs.

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

Selection		Description
Display	HART	
Measured value	Measured value	Continues the totalization function during an alarm.
Stop	Stop	Stops the totalization function during an alarm.
Last valid	Last valid	Continues the totalization function with the last valid value right before the alarm occurred during an alarm.

4.2.5 Start/Stop Setting for Totalization Function

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

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	HART	
Totalizer 1 ► Start/Stop	Totalizer1 ► Total1 Start/Stop	Specifies Start/Stop to the totalization function of totalizer 1.
Totalizer 2 ► Start/Stop	Totalizer2 ► Total2 Start/Stop	Specifies Start/Stop to the totalization function of totalizer 2.
Totalizer 3 ► Start/Stop	Totalizer3 ► Total3 Start/Stop	Specifies Start/Stop to the totalization function of totalizer 3.

NOTE

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

4.2.6 Totalization Direction Setting

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

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	HART	
Totalizer 1 ► Options	Totalizer1 ► Total1 options	Specifies the totalization direction of totalizer 1.
Totalizer 2 ► Options	Totalizer2 ► Total2 options	Specifies the totalization direction of totalizer 2.
Totalizer 3 ► Options	Totalizer3 ► Total3 options	Specifies the totalization direction of totalizer 3.

From the table below, select the totalization direction.

Selection		Description
Display	HART	
Balanced	Balanced	Totalizes the differential flow rate between the forward and reverse directions.
Absolute	Absolute	Totalizes the absolute value of the flow rate.
Only positive	Only positive	Totalizes only the flow rate in the forward direction.
Only negative	Only negative	Totalizes only the flow rate in the reverse direction.
Hold	Hold	Stops totalization processing (holds the current totalized value).

4.2.7 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.
This setting can be configured with the following parameters.

■ Use of the reset/preset function

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	HART	
Totalizer 1 ► Reset/Preset	Totalizer1 ► Total1 Reset/ Preset	Uses the reset/preset function of totalizer 1.
Totalizer 2 ► Reset/Preset	Totalizer2 ► Total2 Reset/ Preset	Uses the reset/preset function of totalizer 2.
Totalizer 3 ► Reset/Preset	Totalizer3 ► Total3 Reset/ Preset	Uses the reset/preset function of totalizer 3.

From the table below, select the reset/preset function.

Selection		Description
Display	HART	
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)
HART	Device root menu ► Detailed setup ► Totalizer ► (see below)

Parameter		Description
Display	**HART**	
Totalizer 1 ► Preset value	Totalizer1 ► Total1 preset value	Specifies the preset value of totalizer 1.
Totalizer 2 ► Preset value	Totalizer2 ► Total2 preset value	Specifies the preset value of totalizer 2.
Totalizer 3 ► Preset value	Totalizer3 ► Total3 preset value	Specifies the preset value of totalizer 3.

NOTE

The parameter returns to “Not execute” after the reset/preset function of the totalized value has been completed.

4.3 Pulse Output, Frequency Output, and Status Output

4.3.1 Pulse/Status Output Mode Setting

Select the output mode of the pulse/status.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Output mode	Pulse/Status output1 ► Pulse1 output mode	Specifies the output mode of pulse/status output 1.
PO2/SO2 ► Output mode	Pulse/Status output2 ► Pulse2 output mode	Specifies the output mode of pulse/status output 2.

From the table below, select the output mode.

Selection		Description
Display	**HART**	
No function	No function	Does not use the terminal.
Fixed pulse output	Fixed pulse output	Specifies the output to the fixed width pulse output.
Frequency output	Frequency output	Specifies the output to the frequency output (Duty 50%).
Status output	Status output	Specifies the output to the status output. For details about the status output, refer to Subsection 4.3.9.

4.3.2 Pulse Output/Frequency Output Mapping

When using as a pulse output or frequency output, the process value to be output needs to be selected.
For pulse/status output 1, a process value does not need to be set because the PV-mapped process value in Subsection 4.1.2 is an output target.
For pulse/status output 2, the process value to be output can be selected among the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO2/SO2 ► Pulse select
HART	Device root menu ► Detailed setup ► Pulse/Status ► Pulse/Status output2 ►Pulse2 select

This parameter specifies a process value output from pulse/status output 2.
From the table below, select the process value to be output.

Selection		Description
Display	**HART**	
No connect	Non-Connect	No output.
Velocity	Velocity	Specifies the flow velocity to the output.
Volume flow	Volume flow	Specifies the volumetric flow rate to the output.
Mass flow	Mass flow	Specifies the mass flow rate to the output.
Calorie	Calorie	Specifies the calorie to the output.
Diag	Diag	Specifies the flow noise to the output.

4.3.3 Alarm Output Function

It is possible to specify the output behavior for when an alarm occurs while being used as a pulse output or frequency output.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Alarm out	Pulse/Status output1 ► Pulse1 alarm out	Specifies the alarm output function of pulse output 1 and frequency output 1.
PO2/SO2 ► Alarm out	Pulse/Status output2 ► Pulse2 alarm out	Specifies the alarm output function of pulse output 2 and frequency output 2.

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

Selection		Description
Display	**HART**	
0 pps	0 pps	No output.
Measured value	Measured value	Outputs the frequency or pulse with the measured value.
Last valid	Last valid	Outputs the frequency or pulse with the last valid value before an alarm activates.
Max pps	Max pps	Outputs the frequency or pulse at 12500 pps.

4.3.4 Pulse Width Setting

The pulse width can be selected for use as a fixed width pulse.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Fix width	Pulse/Status output1 ► Pulse1 fix width	Specifies the pulse width of pulse output 1.
PO2/SO2 ► Fix width	Pulse/Status output2 ► Pulse2 fix width	Specifies the pulse width of pulse output 2.

From the table below, select the pulse width.

Pulse width [ms]	Max. output frequency [Hz]
0.05	10000
0.1	5000
0.5	1000
1	500
20	25
33	15
50	10
100	5
200	2.5
330	1.5
500	1.0
1000	0.5
2000	0.25
Duty cycle 50%	—

NOTE

The maximum pulse width when “Duty cycle 50%” is selected is up to 300 seconds (5 minutes).
To output pulse whose period exceeds 10 minutes, the pulse width is fixed to 300 seconds.

4.3.5 Active Direction Setting

When the pulse output or status output is used, either ON or OFF can be set to active for the pulse signal.
This setting can be configured with the following parameters.

Menu path

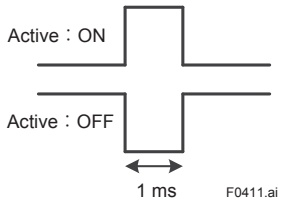
Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Active mode	Pulse/Status output1 ► Pulse1 active mode	Specifies the active direction of the pulse signal of pulse/status output 1.
PO2/SO2 ► Active mode	Pulse/Status output2 ► Pulse2 active mode	Specifies the active direction of the pulse signal of pulse/status output 2.
SO11 ►Active mode	Status output 11 ► Status output11 active mode	Specifies the active direction of the pulse signal of status output 11.
SO12 ►Active mode	Status output 12 ► Status output12 active mode	Specifies the active direction of the pulse signal of status output 12.

From the table below, select the active direction of the pulse signal.

Selection		Description
Display	**HART**	
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.



4.3.6 Active Pulse Setting

When communication and I/O code J4 is selected, the sensor will be set and shipped so that the sensor operates with pulse output 2 specified as a mechanical counter. This setting can be changed by the customer.
The mechanical counter specifications have the following limitations.

Maximum pulse rate	2pps
Pulse width	20ms, 33ms, 50ms, 100ms
Active direction	On active

Refer to the Installation Manual on how to connect with the mechanical counter.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO2/SO2 ► Active pulse
HART	Device root menu ► Detailed setup ► Pulse/Status ► Pulse/Status output2 ► Active pulse mode

Selection		**Description**
Display	**HART**	
Normal	Normal	Normal pulse
For magnetic counter	For magnetic counter	Mechanical counter specification pulse

4.3.7 Pulse Rate Setting

When the pulse output is used, the pulse rate value per pulse and pulse rate scaling can be specified.
The unit of the pulse rate is the same as the unit of the PV-mapped process value in Subsection 4.1.2.
This setting can be configured with the following parameters. If the pulse rate scaling is changed, the pulse rate value is also converted to match the changed unit.

■ Pulse rate value

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		**Description**
Display	**HART**	
PO1/SO1 ► Rate value	Pulse/Status output1 ► Pulse1 rate value	Specifies the pulse rate of pulse output 1.
PO2/SO2 ► Rate value	Pulse/Status output2 ► Pulse2 rate value	Specifies the pulse rate of pulse output 2.

Scaling pulse rate

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ►(see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Rate unit	Pulse/Status output1 ► Pulse1 rate unit	Specifies the scaling of the pulse rate of pulse output 1.
PO2/SO2 ► Rate unit	Pulse/Status output2 ► Pulse2 rate unit	Specifies the scaling of the pulse rate of pulse output 2.

From the table below, select the pulse rate scaling.

Selection	Description
n unit/P	10^{-9} × units per pulse
u unit/P	10^{-6} × units per pulse
m unit/P	10^{-3} × units per pulse
Unit/P	1 unit per pulse
k unit/P	10^{3} × units per pulse
M unit/P	10^{6} × units per pulse
n P/unit	10^{-9} × pulses per unit
u P/unit	10^{-6} × pulses per unit
m P/unit	10^{-3} × pulses per unit
P/unit	1 pulse per unit
k P/unit	10^{3} × pulses per unit
M P/unit	10^{6} × 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] × Pulse rate [P/Unit]

≤ 10 [k pps]

≤ 1 / (Pulse width × 2)

Example:
When the pulse width is set to “0.1 ms”, the maximum pulse rate value is set to “1 / (0.0001 × 2) = 5000 [pps]”. If the specified pulse rate exceeds this value, it causes a setting error, and an alarm is displayed.

4.3.8 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.
The output frequency is to be set for the span of the PV-mapped process value in Subsection 4.1.2.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Frequency at 0%	Pulse/Status output1 ► Frequency1 at 0%	Specifies the frequency when the process value to be output with frequency output 1 is set to 0%.
PO1/SO1 ► Frequency at 100%	Pulse/Status output1 ► Frequency1 at 100%	Specifies the frequency when the process value to be output with frequency output 1 is set to 100%.
PO2/SO2 ► Frequency at 0%	Pulse/Status output2 ► Frequency2 at 0%	Specifies the frequency when the process value to be output with frequency output 2 is set to 0%.
PO2/SO2 ► Frequency at 100%	Pulse/Status output2 ► Frequency2 at 100%	Specifies the frequency when the process value to be output with frequency output 2 is set to 100%.

4.3.9 Status Output Function Setting

The product state can be output as a contact point to use the status output.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► SO1 function	Pulse/Status output1 ► Status output1 function	Specifies status output 1 function.
PO2/SO2 ► SO2 function	Pulse/Status output2 ► Status output2 function	Specifies status output 2 function.
SO11 ► Function	Status output11 ► Status output11 function	Specifies status output 11 function.
SO12 ► Function	Status output12 ► Status output12 function	Specifies status output 12 function.

From the table below, select the status output function.

Selection		Description
Display	**HART**	
No function	No function	The status output is not available because the status output function is not enabled.
Warning output	Warning output	The status output is activated when a warning occurs.
Total limit 1	Total limit1	The status output is activated when the totalized value of totalizer 1 exceeds the specified target value. For details about the totalization switch function, refer to Subsection 4.2.3.
Total limit 2	Total limit2	The status output is activated when the totalized value of totalizer 2 exceeds the specified target value. For details about the totalization switch function, refer to Subsection 4.2.3.
Total limit 3	Total limit3	The status output is activated when the totalized value of totalizer 3 exceeds the specified target value. For details about the totalization switch function, refer to Subsection 4.2.3.
H/L alarm	H/L alarm	The status output is activated when the PV-mapped process value is equal to or lower than the specified low limit (L) or equal to or greater than the specified high limit (H). For details about the PV mapping for the process value and alarm information, refer to Subsection 4.1.2, Section 4.8, and Subsection 4.11.2.
HH/LL alarm	HH/LL alarm	The status output is active while the PV-mapped process value is equal to or lower than the specified low-low limit (LL) or equal to or greater than high-high limit (HH). For details about the PV mapping for the process value and alarm information, refer to Subsection 4.1.2, Section 4.8, and Subsection 4.11.2.
Fwd/Rev range	Fwd/Rev range	Used for forward/reverse range. A flow rate can be measured by switching analog output 1 between the forward range and reverse range in response to a flow direction. The status output is activated when the present range is the reverse range. For details, refer to Subsection 4.6.4.

Selection		Description
Display	HART	
Auto 2 range	Auto2 range	Used for the multi range. A flow rate can be measured while switching analog output 1 between range 1 and range 2 in response to the flow rate. The status output is activated when the present range is range 2. For details, refer to Subsection 4.6.3.
Auto 3 range	Auto3 range	Used for the multi range. A flow rate can be measured while switching analog output 1 between range 1 and range 3 in response to the flow rate. Displays the present range by combining the state of status outputs 11 and 12. Can be specified only with status outputs 11 and 12. For details, refer to Subsection 4.6.3.
Auto 4 range	Auto4 range	Used for the multi range. A flow rate can be measured while switching analog output 1 between range 1 and range 4 in response to the flow rate. Displays the present range by combining the state of status outputs 11 and 12. Can be specified only with status outputs 11 and 12. For details, refer to Subsection 4.6.3.
Ext 2 answer	Ext2 answer	The status output is active when the present range is range 2 while operating with Ext 2 range settings. For details, refer to Subsection 4.6.7.
Ext 3 answer	Ext3 answer	Displays the present range by combining the state of status outputs 11 and 12 while operating with Ext 3 range settings. Can be specified only with status outputs 11 and 12. For details, refer to Subsection 4.6.7.
Ext 4 answer	Ext4 answer	Displays the present range by combining the state of status outputs 11 and 12 while operating with Ext 4 range settings. Can be specified only with status outputs 11 and 12. For details, refer to Subsection 4.6.7.
System alarm	System alarm	The status output is activated when System alarm occurs. Can be specified only with status output 2.
Process alarm	Process alarm	The status output is activated when Process alarm occurs. Can be specified only with status output 2.
Setting alarm	Setting alarm	The status output is activated when Setting alarm occurs. Can be specified only with status output 2.
Signal overflow	50:Sig overflow	The status output is activated when Signal overflow occurs. Can be specified only with status output 2.
Empty detect	51:Empty detect	The status output is activated when Empty pipe detection occurs. Can be specified only with status output 2.
Adh over lv 4	53:Adh over lv4	The status output is activated when Adhesion over level 4 occurs. Can be specified only with status output 2.
Cable miscon	85:Cable miscon	The status output is activated when Cable misconnect occurs. Can be specified only with status output 2.
Coil insulation	86:Coil insulate	The status output is activated when Coil insulation occurs. Can be specified only with status output 2.
Adhesion lv 3	87:Adh over lv3	The status output is activated when Adhesion lv 3 occurs. Can be specified only with status output 2.
LC warn	88:LC warn	The status output is activated when Low conductivity Warning occurs. Can be specified only with status output 2.
Insu detect	89:Insu detect	The status output is activated when Insulation detection occurs. Can be specified only with status output 2.
FLN over lv 3	90:FLN over lv3	The status output is activated when Flow noise over level 3 occurs. Can be specified only with status output 2.

Selection		Description
Display	HART	
FLN over lv 4	91:FLN over lv4	The status output is activated when Flow noise over level 4 occurs. Can be specified only with status output 2.
Verif warn	93:Verif warn	The status output is activated when Verification warning occurs. Can be specified only with status output 2.
Fact noise warn	94:FC noise warn	The status output is activated when Factory noise warning occurs. Can be specified only with status output 2.
Low alarm	Lo alarm	The status output is activated when the PV-mapped process value is equal to or less than the low limit (L) and exceeds the low-low limit value (LL). Can be specified only with status output 2.
LL alarm	Lo Lo alarm	The status output is activated when the PV-mapped process value is equal to or less than the specified low-low limit value (LL). Can be specified only with status output 2.
High alarm	Hi alarm	The status output is activated when the PV-mapped process value is equal to or greater than the specified high limit (H) and no more than the high-high limit (HH). Can be specified only with status output 2.
HH alarm	Hi Hi alarm	The status output is activated when the PV-mapped process value is equal to or greater than the specified high-high limit (HH). Can be specified only with status output 2.

4.3.10 Pulse Option Setting

An instantaneous flow rate is totalized for the fixed width pulse output or frequency output and is output as a pulse when the totalized value exceeds 1. With the pulse option, the totalization method can be selected.

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
PO1/SO1 ► Options	Pulse/Status outpu1 ► Pulse1 option	Specifies pulse 1 option.
PO2/SO2 ► Options	Pulse/Status outpu2 ► Pulse2 option	Specifies pulse 2 option.

Selection		Description
Display	**HART**	
Balanced	Balanced	Totalizes a flow rate in the forward direction with a positive value and a flow rate in the reverse direction with a negative value, and outputs a value as a pulse if the forward and negative totalized values exceed 1.
Absolute	Absolute	Totalizes an absolute value of the flow rate and outputs it as a pulse if the totalized value exceeds 1.
Only positive	Only positive	Totalizes only a flow rate in the forward direction and outputs it as a pulse if the totalized value exceeds 1. (The negative flow rate is not totalized as 0)
Only negative	Only negative	Converts a negative flow rate to a positive value and totalizes it. Outputs the value as a pulse if the value exceeds 1. (The negative flow rate is not totalized in the forward direction as 0)

Use “Balanced” and “Absolute” in the following cases.

Balanced	When raising 0% point with frequency output Setting example) Pulse mode = Freq, Freq at 0% = 100Hz, Freq at 100% = 500Hz, Pulse option = Balanced Since 100Hz is output at 0% with the above settings, an instantaneous flow rate can be measured up to -25% in frequency output. (Possible to use in the same way as the analog output)
Absolute	When using in combination with forward/reverse range Setting example) Pulse mode = Fixed, Pulse option = Absolute, SO function = Fwd/Rev range Please set your desired value for pulse width / rate / rate unit, and reverse span1. With the above settings, the same pulse output can be reproduced as when the forward/reverse range setting is made with the old model AXF.

4.4 Status Input

4.4.1 Active Direction Setting for Status Input

When the status input is used, either ON or OFF can be set to active for the status input.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Status in ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
SI11 ► Active mode	Status input 11 ► Status input11 active mode	Specifies the active direction of status input 11.
SI12 ► Active mode	Status input 12 ► Status input12 active mode	Specifies the active direction of status input 12.

From the table below, select the active direction of the status input.

Selection		Description
Display	**HART**	
On active	Short(On) act	Specifies the status input to Active when it is shorted-circuited.
Off active	Open(Off) act	Specifies the status input to Active when it is open.

4.4.2 Status Input Function Setting

When the status input is used, the function of the status input can be set.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Status in ► (see below)
HART	Device root menu ► Detailed setup ► Pulse/Status ► (see below)

Parameter		Description
Display	**HART**	
SI11 ► Function	Status input 11 ► Status input11 function	Specifies status input 11 function.
SI12 ► Function	Status input 12 ► Status input12 function	Specifies status input 12 function.

From the table below, select the status input function.

Selection		Description
Display	**HART**	
No function	No function	The status input is not available because the status input function is not enabled.
0% signal lock	0% Signal Lock	Analog output 1 is fixed at 4 mA when the status input becomes active.
Ext auto zero	Ext auto zero	The zero adjustment function is automatically used when the status input is active. Note that zero adjustment cannot be stopped even if the status input is changed while the zero adjustment function is used.
Total preset 1	Total preset 1	The preset value specified in Subsection 4.2.7 is set as the value for totalizer 1 and totalization starts from the value when the status input is active.
Total preset 2	Total preset 2	The preset value specified in Subsection 4.2.7 is set as the value for totalizer 2 and totalization starts from the value when the status input becomes active.
Total preset 3	Total preset 3	The preset value specified in Subsection 4.2.7 is set as the value for totalizer 3 and totalization starts from the value when the status input becomes active.
Ext 2 ranges	Ext2 ranges	The range of analog output 1 is switched from range 1 to range 2 while the status input is active. Used for External Contact Range. For details on the external contact range, refer to Subsection 4.6.6.
Ext 3 ranges	Ext3 ranges	Used for External Contact Range. The range of analog output 1 is arbitrarily switched from range 1 to 3 by combining the state of status input 11 and 12. For details, refer to Subsection 4.6.6.
Ext 4 ranges	Ext4 ranges	Used for External Contact Range. The range of analog output 1 is arbitrarily switched from range 1 to 4 by combining the state of status input 11 and 12. For details, refer to Subsection 4.6.6.
0% signal lock 2	0% Signal Lock 2	A flow rate is fixed at 0 when the status input becomes active. Due to this, the analog output, pulse output and flow rate on the display become 0.

4.5 Analog Input and Analog Output

4.5.1 Analog Output Select

The process value to be assigned to analog output 2 is set.
In the case of analog output 1, the process value does not need to be set because the PV-mapped process value in Subsection 4.1.2 is an output target.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO2 ► AO2 select
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog output 2 ► AO2 select

From the table below, select the process value for the analog output.

Selection		Description
Display	**HART**	
No connect	Non-Connect	No output.
Velocity	Velocity	Specifies the flow velocity to the output.
Volume flow	Volume flow	Specifies the volumetric flow rate to the output.
Mass flow	Mass flow	Specifies the mass flow rate to the output.
Calorie	Calorie	Specifies the calorie to the output.
Diag	Diag	Specifies the flow noise to the output.

4.5.2 Display Analog Output

The current value of the analog output can be checked with the following parameters.

Menu path

Display	Device setup ► Process variables ► Analog out/in ► (see below)
HART	Process variables root menu ► View outputs ► (see below)

Parameter		Description
Display	**HART**	
AO1	AO1 current	Displays the current value of analog output 1.
AO2	AO2 current	Displays the current value of analog output 2.

4.5.3 Analog Output High/Low Limit Function

The high and low limits of the analog output can be set for each terminal.
The high limit can be limited between 4.0 mA and 21.6 mA, and the low limit to between 2.4 mA and 20.0 mA.
This setting can be configured with the following parameters.

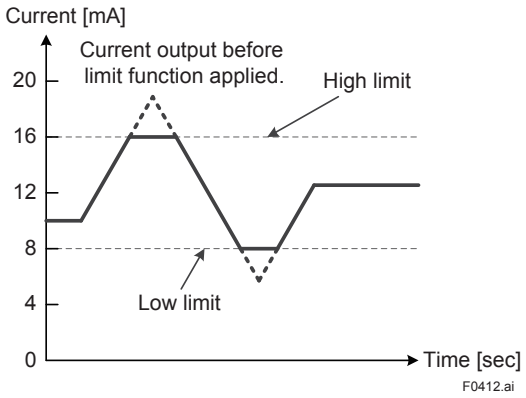
Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► (see below)
HART	Device root menu ► Detailed setup ► Analog output/input ► (see below)

Parameter		Description
Display	**HART**	
AO1 ► High limit	Analog output1 ► AO1 high limit	Specifies the high limit of analog output 1.
AO1 ► Low limit	Analog output1 ► AO1 low limit	Specifies the low limit of analog output 1.
AO2 ► High limit	Analog output2 ► AO2 high limit	Specifies the high limit of analog output 2.
AO2 ► Low limit	Analog output2 ► AO2 low limit	Specifies the low limit of analog output 2.

Example:

If the high limit is set to 16 mA and the low limit to 8 mA, the result is as shown below.



4.5.4 Absolute Range Function

The absolute range function is available for using analog output 1. If the absolute range function is used, the forward flow rate and reverse flow rate toward a span can be output to analog output at the same time. With 0% flow rate set at 12 mA, the reverse flow rate can be output to an analog output of 4 to 12 mA, and the forward flow rate to an analog output of 12 to 20 mA.
The absolute range function and low-cut function can be used at the same time. For details about the low-cut function, refer to Subsection 4.1.7.
This setting can be configured with the following parameters.

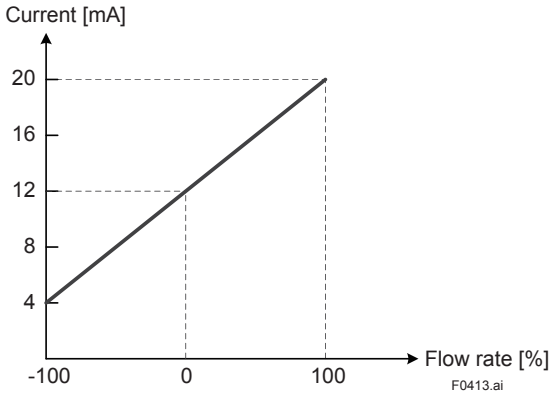
Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO1 ► Range mode
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog output1 ► AO1 range mode

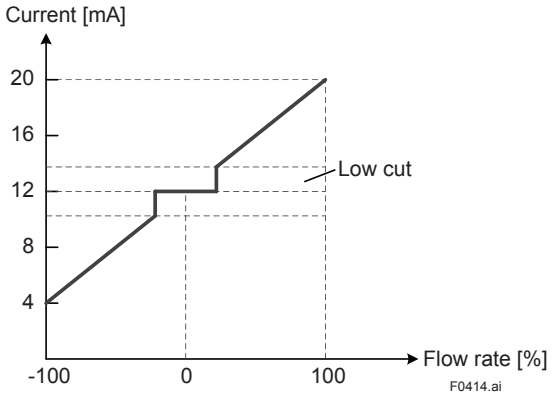
This parameter sets the use of the absolute range function for analog output 1.
From the table below, select the use of the absolute range function.

Selection		Description
Display	**HART**	
Normal range	Normal range	Does not use the absolute range function.
Abs range	Abs range	Uses the absolute range function.

Example:
(1) With absolute range and no low cut



(2) With absolute range and low cut



NOTE

The absolute range function and multi range function cannot be used at the same time.

4.5.5 Alarm Output Function

Behavior of the analog output when a target alarm occurs can be set with the alarm output function.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► (see below)
HART	Device root menu ► Detailed setup ► Analog output/input ► (see below)

Parameter		Description
Display	**HART**	
AO1 ► Alarm out	Analog output1 ► AO1 alarm out	Specifies the alarm output function of analog output 1.
AO2 ► Alarm out	Analog output2 ► AO2 alarm out	Specifies the alarm output function of analog output 2.

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

Selection		Description
Display	**HART**	
< 2.4 mA	< 2.4 mA	Outputs lower than 2.4 mA.
3.8 mA	3.8 mA	Outputs 3.8 mA.
4 mA	4 mA	Outputs 4 mA.
20.5 mA	20.5 mA	Outputs 20.5 mA.
> 21.6 mA	> 21.6 mA	Outputs higher than 21.6 mA.
Measured value	Measured value	Outputs measured current (the current value is undefined due to an error).
Hold	Hold	Outputs current that is applied when an alarm occurs.

4.5.6 Analog Output Priority

The function of the prioritized analog output varies depending on the settings of the product.

Priority level	Output mode
High ↑	HART multi-drop mode, fixed output of 4 mA (For details, refer to Subsection 3.6.3.)
	Test mode bit (For details, refer to Section 4.12.)
	Status input function Output of 0% signal lock (For details, refer to Subsection 4.4.2.)
	Alarm output function (For details, refer to Subsection 4.5.5.)
↓ Low	Verification function, Output during offline diagnosis (For details, refer to Subsection 4.11.6.)
	Normal output

4.5.7 Current Value Adjustment

After the sensor is installed to the customer's piping, an analog input value or analog output value can be adjusted in the customer's installation environment To adjust an analog output value, output currents of 4 mA and 20 mA from this product, connect an ammeter for calibration, and measure the current value.
Set the measured current value to the parameter and adjust the analog output value.
To adjust the analog input value, input currents of 4 mA and 20 mA from an external device, and display the analog input value on the display of this product. For details about settings of the display item, refer to Subsection 4.9.2.
Set the displayed analog value (adjusted value) to the parameter and adjust the analog input value.
This setting can be configured with the following parameters.

■ Analog input

Menu path

Display	Device setup ► Diag/Service ► AO/AI trim ► AI trim ► (see below)
HART	Maintenance root menu ► AO/AI trim ► AI trim ► (see below)

Parameter		Description
Display	**HART**	
Trim 4mA	AI trim	Specifies the adjustment value when inputting 4 mA of analog input.
Trim 20mA		Specifies the adjustment value when inputting 20 mA of analog input.
Trim clear	Clear AI trim	Clears the adjustment value for inputting analog input.

■ Analog output

Menu path

Display	Device setup ► Diag/Service ► AO/AI trim ► AO trim ► (see below)
HART	Maintenance root menu ► AO/AI trim ► AO trim ► (see below)

Parameter		Description
Display	**HART**	
AO1 trim 4mA	AO1 trim	Specifies the adjustment value of analog output 1 (4 mA).
AO1 trim 20mA		Specifies the adjustment value of analog output 1 (20 mA).
AO1 trim clear	Clear D/A trim 1	Clears the adjustment value of analog output 1.
AO2 trim 4mA	AO2 trim	Specifies the adjustment value of analog output 2 (4 mA).
AO2 trim 20mA		Specifies the adjustment value of analog output 2 (20 mA).
AO2 trim clear	Clear D/A trim 2	Clears the adjustment value of analog output 2.

IMPORTANT

If the input/output does not agree with the readings of the current value when the current value adjustment function is used, readjust the current value.

4.5.8 Analog Input Function Setting

A process value from an external device can be imported to the product as an analog input.
The analog input can be used for temperature-based density correction calculation and calorie calculation by using the analog input as a temperature input.
For details about the temperature-input density correction calculation and calorie calculation, refer to Subsections 4.7.5 and 4.7.6.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► Function
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog input ► AI function

This parameter specifies the analog input function.
From the table below, select the analog input function.

Selection		Description
Display	**HART**	
No function	No function	An analog input is not available because the analog input function is not enabled.
Monitoring	Monitoring	The analog input value can be monitored. However, this function does not give any influences on either the density correction calculation or the calorie calculation.
Diff temperature	Diff temperature	The analog input is used as the temperature difference. Calorie can be calculated.
Ext temperature	Ext temperature	The analog input is used as absolute temperature. Density correction and calorie can be calculated.

4.5.9 Display Analog Input

The current value of the analog input can be checked with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► Value
HART	Process variables root menu ► View inputs ► AI current

4.5.10 Analog Input Unit Setting

A unit can be set for when an analog input is used as an input for temperature.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► Unit
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog input ► AI unit

4.5.11 Analog Input Range Setting

A range can be set for the process value for the analog input by specifying 0% and 100% of the process value for the analog input. The unit for the range is the same as the unit specified in Subsection 4.5.10.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► (see below)
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog input ► (see below)

Parameter		Description
Display	**HART**	
URV	AI URV	Specifies the value that is at the 100% point of the process value for the analog input.
LRV	AI LRV	Specifies the value that is at the 0% point of the process value for the analog input.

4.5.12 Analog Input High/Low Limit Function

High and low limits can be set for the analog input.
The high limit can be set to between 4.0 mA and 21.6 mA, and the low limit to between 2.4 mA and 20.0 mA.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► (see below)
HART	Device root menu ► Detailed setup ► Analog output/input ► Analog input ► (see below)

Parameter		Description
Display	**HART**	
High limit	AI high limit	Specifies the high limit value of the analog input value.
Low limit	AI low limit	Specifies the low limit value of the analog input value.

4.6 Multi Range Function

4.6.1 Multi Range type

The multi range function can be used for analog output 1. The multi range function shows the present range with the status input or status output. The multi range function makes it possible to measure a span for the PV-mapped process value in Subsection 4.1.2 while switching multiple ranges.
The multi range function has three ranges; the multi range, the forward/reverse range, and the external contact range, and one of the ranges should be selected.
The contents of each range are as follows:

Multi range	The state of the range is output in the status output by measuring a flow while switching several ranges in response to flow rate.
Forward/Reverse range	The state of the range is output in the status output by measuring a flow while switching several ranges in response to the flow direction.
External Contact Range	Flow is measured while switching several ranges by using the status inputs.

NOTE

- The absolute range function and multi range function cannot be used at the same time.
- The multi range function is not available for analog output 2.

4.6.2 Multi Range Setting

When using the multi range function, each range needs to be configured. For unit setting, refer to Subsection 4.1.4.
This setting can be configured with the following parameters. Refer to Subsection 4.1.5. for the span setting (forward span 1) when the multi range function is not used.

Menu path

Display	Device setup ► Detailed setup ► Multi range ► (see below)
HART	Device root menu ► Detailed setup ► Multi range ► (see below)

Parameter		Description
Display	**HART**	
Forward span 2	Forward span 2	Specifies forward span 2.
Forward span 3	Forward span 3	Specifies forward span 3.
Forward span 4	Forward span 4	Specifies forward span 4.
Reverse span 1	Reverse span 1	Specifies reverse span 1.
Reverse span 2	Reverse span 2	Specifies reverse span 2.
Reverse span 3	Reverse span 3	Specifies reverse span 3.
Reverse span 4	Reverse span 4	Specifies reverse span 4.

The type of the range for the multi range function can be set with the status output and status input functions. For details, refer to Subsections 4.3.9. and 4.4.2.
It is necessary to set a span for each range in response to the range type of the multi range function. Set each span value so as to satisfy the relation of lower range ≤ upper range.
For example, if the forward/reverse range is to be used in combination with the multi range (range 1 and 2), spans of forward span 1, forward span 2, reverse span 1, and reverse span 2 need to be set, and the relations of forward span 1 ≤ forward span 2 and reverse span 1 ≤ reverse span 2 should be satisfied.
If these conditions are not met, “Analog output 1 multi range error” occurs and the multi range function does not operate.

4.6.3 Multi Range Operation

The multi range allows two ranges to be automatically switched for measurement in response to the flow rate. When a measured flow rate is larger than the lower range, the range is switched to the higher range. When a measured flow rate is smaller than the higher range, the range is switched to the lower range.
The range being used is shown with the state of the status output. When the multi range is used in range 1 and 2, the relation of the range and status output is as follows:

Range	State of status output (auto 2 range indicated)
Forward span 1	Not active
Forward span 2	Active

When the range is switched from the higher range to the lower range, it has hysteresis. The hysteresis sets a percentage for the lower range.
The hysteresis for multi range switching can be set with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Multi range ► Auto range hyst
HART	Device root menu ► Detailed setup ► Multi range ► Auto range hyst

When multi range is used in range1 and 2, the multi range can be set with the following procedures.

(1) Refer to Subsection 4.1.2 to specify the PV process value.

(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(3) Specify the multi range switching hysteresis.

(4) Refer to Subsection 4.3.1 to specify the output of the terminal to the status output.

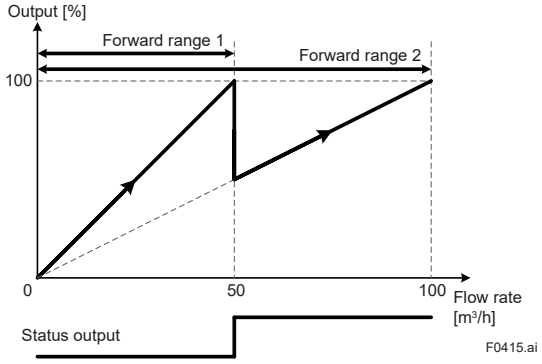
(5) Refer to Subsection 4.3.9 to specify the status output function to auto 2 range.

(6) Refer to Subsection 4.6.2 to specify forward span 2.

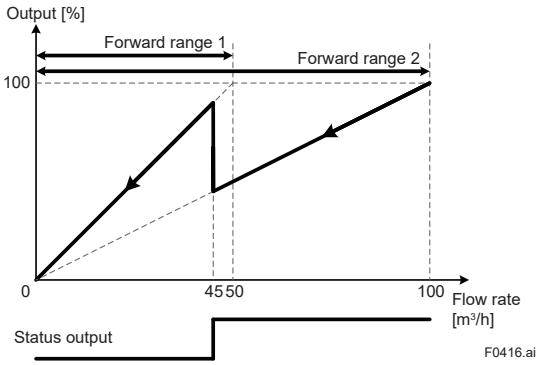
Specify a value greater than forward span 1.

Example:
PV = Volumetric flow rate,
Flow rate span (range 1) = 50 m^3/h,
Range 2 = 100 m^3/h,
When set to Hysteresis width = 10 %
->Hysteresis value = 50 [m^3/h] × 10 [%]
= 5 [m^3/h]

(1) When the range is switched from lower range 1 to higher range 2



(2) When the range is switched from higher range 2 to lower range 1 (waiting for hysteresis)



If status output 11 and 12 are combined, a flow rate can be measured by automatically switching analog output 1 to ranges 1 through 3 or to range 1 through 4 in response to the flow rate.
When using the multi range at ranges 1 through 3, set the functions of status output 11 and 12 to auto 3 range. Also, set span values at forward spans 1 through 3.
When using the multi range at ranges 1 through 4, set the functions of status output 11 and 12 to auto 4 range. Also, set span values at forward spans 1 through 4.
The relation between a range and the status output is as follows:

Range	State of status output 11 (Auto 3 (or 4) range)	State of status output 12 (Auto 3 (or 4) range)
Forward span 1	Not active	Not active
Forward span 2	Active	Not active
Forward span 3	Not active	Active
Forward span 4*	Active	Active

*: If set to use ranges 1 through 3, the range is in transition up to range 3.

NOTE

To change the PV process value set in Subsection 4.1.2, it is necessary to re-set the multi range.

4.6.4 Forward/Reverse Range

In the forward/reverse range, this product measures a flow by automatically switching the forward direction range (forward range) and reverse direction range (reverse range) in response to the flow direction. Both the forward range and reverse range can be set for the range, respectively. The range being used is shown with the state of the status output. When the forward/reverse range is used, the relation of the range and status output is as follows:

Flow direction	Range	State of the status output (Forward/Reverse range)
Forward	Forward span 1	Not active
Reverse	Reverse span 1	Active

When the range is switched from the forward range to the reverse range, it has hysteresis. The hysteresis sets a percentage for either the forward range or the reverse range, whichever is smaller.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Multi range ► Bi direction hyst
HART	Device root menu ► Detailed setup ► Multi range ► Bi direction hyst

The forward/reverse range can be configured with the following procedure.

(1) Refer to Subsection 4.1.2 to specify the PV process value.

(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(3) Specify the forward/reverse range switching hysteresis.

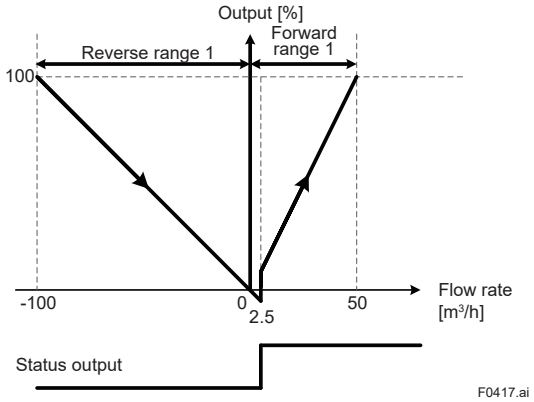
(4) Refer to Subsection 4.3.1 to specify the output of the terminal to the status output.

(5) Refer to Subsection 4.3.9 to specify the status output function to Fwd/Rev range.

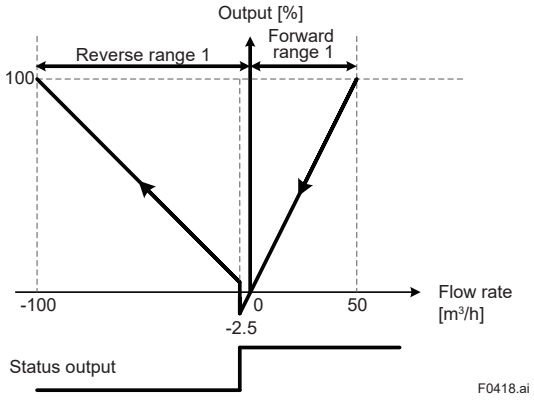
(6) Refer to Subsection 4.6.2 to specify reverse span 1.

Example:
PV = Volumetric flow rate,
Flow rate span (forward span 1) = 50 m^3/h,
Reverse span 1 = 100 m^3/h,
When set to Hysteresis = 5 %
-> Because of Forward range< Reverse range
Hysteresis value = 50 [m^3/h] × 5 [%]
= 2.5 [m^3/h]

(1) When the range is switched from the reverse range to the forward range (waiting for hysteresis)



(2) When the range is switched from the forward range to the reverse range (waiting for hysteresis)



NOTE

To change the PV process value set in Subsection 4.1.2, it is necessary to re-set the forward/ reverse range.

4.6.5 Combination of Multi Range and Forward/Reverse Range

The multi range can be used in combination with the forward/reverse range for this product. When the multi range (range 1 to 2) and the forward/reverse range are combined, the relation of the range and status output is as follows:

Flow direction	Range	State of the status output (Forward/Reverse range)	State of the status output (Auto 2 range)
Forward	**Forward span 2**	Not active	Active
	Forward span 1	Not active	Not active
Reverse	**Reverse span 1**	Active	Not active
	Reverse span 2	Active	Active

The multi range and the forward/reverse range each have a different hysteresis. For the hystereses of the multi range and the forward/reverse range, refer to Subsections 4.6.3 and 4.6.4.

The combination of the forward/reverse range and the multi range (ranges 1 through 2) can be set using the following procedures.

(1) Refer to Subsection 4.1.2 to specify the PV process value.

(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(3) Refer to Subsections 4.6.3 and 4.6.4 to specify the hystereses for the multi range and the forward/reverse range.

(4) Refer to Subsection 4.3.1 to specify the output of each terminal to the status output.

(5) Refer to Subsection 4.3.9 to specify the status output function to auto 2 range and forward/reverse range.

(6) Refer to Subsection 4.6.2 to specify forward span 2, reverse span 1, and reverse span 2.

By combining status output 11 and 12 with any status output (except for status output 11 and 12), a flow rate can be measured by automatically switching analog output 1 to forward/reverse ranges 1 through 3 or to forward/reverse ranges 1 through 4 in response to a flow rate.
When using the combination in the forward/reverse ranges 1 through 3, the functions of status output 11 and 12 should be set to auto 3 range and any status output (except for 11 and 12) should be set to the forward/reverse range. Also, set the span values for up to forward spans 1 through 3 and up to reverse spans 1 through 3.
When using the combination in the forward/reverse ranges 1 through 4, the functions of status output 11 and 12 should be set to the auto 4 range and any status output (except for 11 and 12) should be set to the forward/reverse range. Also, set the span values for forward spans 1 through 4 and reverse spans 1 through 4.
The relation between a range and the status output is as follows:

Flow direction	Range	State of the status output (Forward/Reverse range)	State of status output 11 (Auto 3 (or 4) range)	State of status output 12 (Auto 3 (or 4) range)
Forward	**Forward span 4***	Not active	Active	Active
	Forward span 3	Not active	Not active	Active
	Forward span 2	Not active	Active	Not active
	Forward span 1	Not active	Not active	Not active
Reverse	**Reverse span 1**	Active	Not active	Not active
	Reverse span 2	Active	Active	Not active
	Reverse span 3	Active	Not active	Active
	Reverse span 4*	Active	Active	Active

*: When forward/reverse ranges 1 through 3 are to be used, the range is in transition up to forward span 3 or reverse span 3.

4.6.6 External Contact Range

The external contact range can be used with this product. In the external contact range, a flow rate can be measured by arbitrarily switching two ranges in response to status input.
The relation between a range and the status input is as follows:

State of status input (Ext 2 ranges)	Range
Not active	Range 1
Active	Range 2

When using the external contact range in ranges 1 and 2, it can be set with the following procedures.

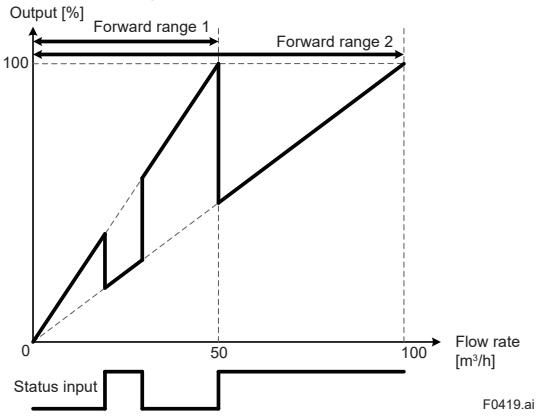
(1) Refer to Subsection 4.1.2 to specify the PV process value.

(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(3) Refer to Subsection 4.4.2 to specify the function of the status input to Ext 2 ranges.

(4) Refer to Subsection 4.6.2 to specify forward span 2.

Example:
PV = Volumetric flow rate,
Flow rate span (forward span 1) = 50 m^3/h,
When setting the forward span 2 = 100 m^3/h



If status input 11 and 12 are combined, a flow rate can be measured by arbitrarily switching the analog output 1 range to ranges 1 through 3 or to ranges 1 through 4.
When using the range in ranges 1 through 3, set the functions of status input 11 and 12 to Ext 3 ranges. Also, set the span value from forward spans 1 through 3.
When using the range in ranges 1 through 4, set the functions of status input 11 and 12 to Ext 4 ranges. Also, set the span value from forward spans 1 through 4.
The relation between a range and the status input is as follows:

State of status input 11 (Ext 3 (or 4) range)	State of status input 12 (Ext 3 (or 4) range)	Range
Not active	**Not active**	Range 1
Active	**Not active**	Range 2
Not active	**Active**	Range 3
Active	**Active**	Range 4*

*: For the setting to use ranges 1 through 3, the range is in transition up to range 3 (the range operates in range 3 even if the status input is set to range 4).

4.6.7 External Contact Range (with Answer)

This product can display the present range in the form of the state of status output while operating in the external contact range.

The relation between a range and the status output is as follows:

State of status input (Ext 2 ranges)	Range	State of the status output (Ext 2 answer)
Not active	Range 1	Not active
Active	Range 2	Active

The external contact range with answer can be configured using the following procedure.

(1) Refer to Subsection 4.1.2 to specify the PV process value.

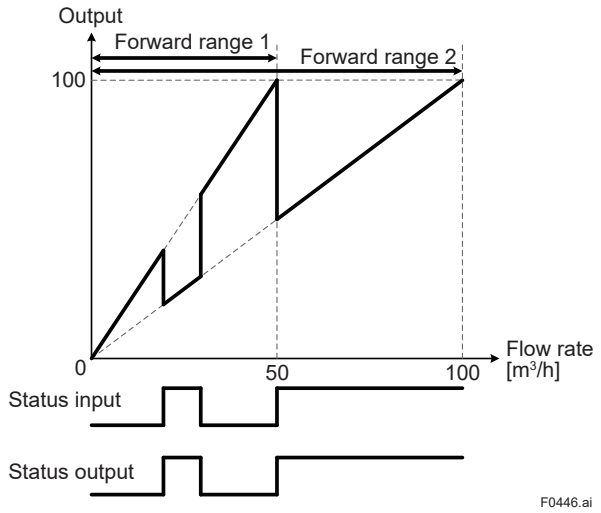
(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(3) Refer to Subsection 4.4.2 to specify the function of the status input to Ext 2 ranges.

(4) Refer to Subsection 4.3.9 to specify the function of the status output to Ext 2 answer.

(5) Refer to Subsection 4.6.2 to specify forward span 2.

Example:
PV = Volumetric flow rate,
Flow rate span (forward span 1) = 50 m^3/h,
When setting to forward span 2 = 100 m^3/h



While arbitrarily switching the analog output 1 range from ranges 1 through 3 or from ranges 1 through 4 by combining status input 11 and 12 with status output 11 and 12, the present range can be displayed by combining status output 11 and 12.
When using the range in ranges 1 through 3, status input 11 and 12 functions should be set to the Ext 3 ranges, and the status output 11 and 12 functions should be set to Ext 3 answer after the span values for forward spans 1 through 3 are also set.
When using the range in ranges 1 through 4, status input 11 and 12 functions should be set to the Ext 3 ranges, and the status output 11 and 12 functions should be set to the Ext 4 answer after the span values for forward spans 1 through 4 are also set.

State of status input 11 (Ext 3 (or 4) range)	State of status input 12 (Ext 3 (or 4) range)	Range	State of status output 11 (With Ext 3 (or 4) range answer)	State of status output 12 (With Ext 3 (or 4) range answer)
Not active	**Not active**	Range 1	Not active	Not active
Active	**Not active**	Range 2	Active	Not active
Not active	**Active**	Range 3	Not active	Active
Active	**Active**	Range 4*	Active	Active

*: For the setting to use ranges 1 through 3, the range is in transition up to range 3 (the range operates in range 3 even if the status input is set to range 4).

4.6.8 Combination of External Contact Range and Forward/ Reverse Range

The external contact range can be used in combination with the forward/reverse range for this product. The relation of the range and status output is as follows when the forward/reverse range and External Contact Range (range 1 and 2) are combined.

Condition		Operation		
Flow direction	**State of status input (Ext 2 ranges)**	Range	State of the status output (Forward/Reverse range)	State of the status output (Ext 2 answer)
Forward	**Active**	Forward span 2	Not active	Active
	Not active	Forward span 1	Not active	Not active
Reverse	**Not active**	Reverse span 1	Active	Not active
	Active	Reverse span 2	Active	Active

The combination of the forward/reverse range and the external contact range (range 1 and 2) can be set in the following procedures.

(1) Refer to Subsection 4.1.2 to specify the PV process value.

(2) Refer to Subsections 4.1.4 and 4.1.5 to specify span (forward span 1).

(3) Refer to Subsections 4.6.3 and 4.6.4 to specify the hystereses for the multi range and the forward/reverse range.

(4) Refer to Subsection 4.3.9 to specify the function of the status output to the forward/reverse range.

(5) Refer to Subsection 4.4.2 to specify the function of the status input to Ext 2 ranges.

(6) Refer to Subsection 4.6.2 to specify forward span 2, reverse span 1, and reverse span 2.

While arbitrarily switching the analog output 1 range from ranges 1 through 3 or from ranges 1 through 4 by combining status input 11 and 12 with status output 11 and 12, the present range can be displayed by combining status output 11 and 12.
When using the combination in ranges 1 through 3, the status input 11 and 12 functions should be set to the Ext 3 ranges, the status output (except for 11 and 12) should be set to the forward/ reverse range, and the status output 11 and 12 functions should be set to the Ext 3 answer after the span values for forward 1 through 3 ranges and reverse 1 through 3 ranges are also set.
When using the combination in ranges 1 through 4, the status input 11 and 12 functions should be set to the Ext 3 ranges, the status output (except for 11 and 12) should be set to the forward/ reverse range, and the status output 11 and 12 functions should be set to the Ext 4 answer after the span values for forward 1 through 4 ranges and reverse 1 through 4 ranges are also set.

Flow direction	State of status input 11 (Ext 3 (or 4) range)	State of status input 12 (Ext 3 (or 4) range)	Range	State of the status output (Forward/ Reverse range)	State of status output 11 (With Ext 3 (or 4) range answer)	State of status output 12 (With Ext 3 (or 4) range answer)
Forward	**Active**	**Active**	Forward span 4*	Not active	Active	Active
	Not active	**Active**	Forward span 3	Not active	Not active	Active
	Active	**Not active**	Forward span 2	Not active	Active	Not active
	Not active	**Not active**	Forward span 1	Not active	Not active	Not active
Reverse	**Not active**	**Not active**	Reverse span 1	Active	Not active	Not active
	Active	**Not active**	Reverse span 2	Active	Active	Not active
	Not active	**Active**	Reverse span 3	Active	Not active	Active
	Active	**Active**	Reverse span 4*	Active	Active	Active

*: For the setting to use ranges 1 through 3, the range is in transition up to range 3 (the range operates in range 3 even if the status input is set to range 4).

4.7 Auxiliary Calculation Function

4.7.1 Fluid Flow Direction Setting

The arrow on the surface of the sensor indicates the fluid flow direction. Upon shipment from the manufacturing factory, the 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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► Flow direct
HART	Device root menu ► Detailed setup ► AUX calculation ► Flow direction

This parameter specifies the fluid flow direction.
From the table below, select the fluid flow direction.

Selection		Description
Display	**HART**	
Forward	Forward	The arrow direction of the sensor is forward.
Reverse	Reverse	The reverse direction of the arrow of the sensor is forward.

4.7.2 Rate Limit Function Setting

If the rate limit function is used, it becomes possible to reduce noises that cannot all be 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 is specified with the percentage (%) for the span of the PV-mapped process value in Subsection 4.1.2. The dead time is set to “0” if the rate limit function is not used.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
HART	Device root menu ► Detailed setup ► AUX calculation ► (see below)

Parameter		Description
Display	**HART**	
Rate limit	Rate limit	Specifies the rate limit value.
Dead time	Dead time	Specifies the dead time.
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	HART		
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

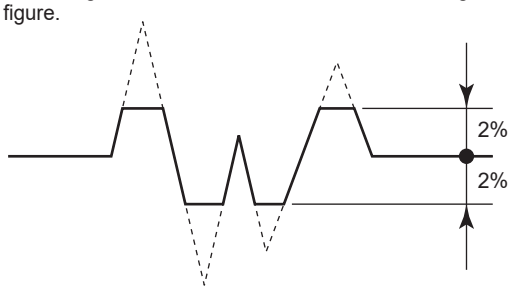
NOTE

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

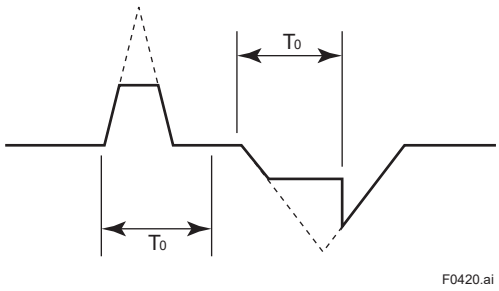
NOTE

Determining the rate limit value and dead time

The Rate 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.



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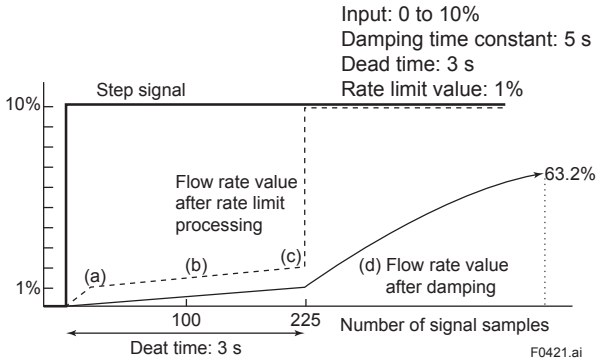
NOTE

For the rate limit function, the dead time is set to “0” upon 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.



- In condition (a), 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 by the solid line.

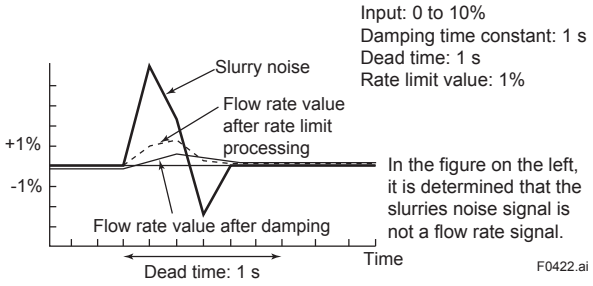
- Then, the flow rate value in the dead time is set to “flow rate after damping calculation + signal of rate limit value (1%)”.

- 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 (c).

- The output signal starts following the step signal along the damping curve.

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

(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.



4.7.3 Pulsing Flow Support Function Setting

If a plunger pump is used, it may cause an error in the average of the flow rate due to the influence of 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 change while controlling the flow rate calculation.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► Pulsing flow
HART	Device root menu ► Detailed setup ► AUX calculation ►Pulsing flow

This parameter 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	**HART**	
No	No	Do not use the pulsing flow support function.
Yes	Yes	Use the pulsing flow support function.

4.7.4 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 by the set value 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)
HART	Device root menu ► Detailed setup ► AUX calculation ► (see below)

Parameter		Description
Display	**HART**	
Power sync	Power synchronize	Sets the excitation frequency and power frequency to synchronous.*1
Set power freq	Set power frequency	Sets 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	**HART**	
No	No	Sets the excitation frequency and power frequency asynchronous.
Yes	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.
In this case, set “Power sync” to Off first before setting “Set power freq”.

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

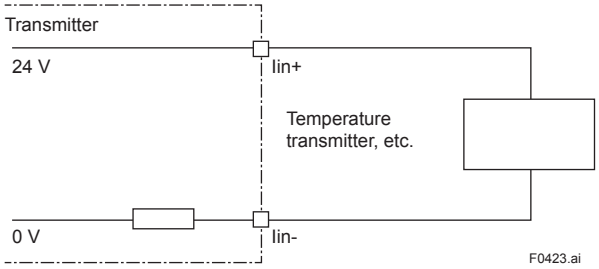
Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
HART	Device root menu ► Detailed setup ► AUX calculation ► (see below)

Parameter		Description
Display	**HART**	
Iex power frequency	IEX power frequency	Displays the power frequency (synchronous with the excitation frequency).
Meas power freq	Measured power frequency	Displays the measured power frequency.

4.7.5 Density Correction Calculation

When the temperature from another device (temperature transmitter, etc.) is used as an analog input, 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 obtained 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 depending 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 temperature [°C]
a_1: Primary compensating rate
a_2: Secondary compensating rate

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)
HART	Device root menu ► Detailed setup ► Process variables ► Temperature ► (see below)

Parameter		Description
Display	**HART**	
Coef A1	Temp coef A1	Specifies the primary compensating rate.
Coef A2	Temp coef A2	Specifies the secondary compensating rate.

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

(1) Refer to Subsection 4.11.1 to specify the use of the temperature corrected density.

(2) Refer to Subsection 4.5.8 to specify the function of the analog input to temperature.

(3) Refer to Subsection 4.5.11 to specify the range of the analog input.

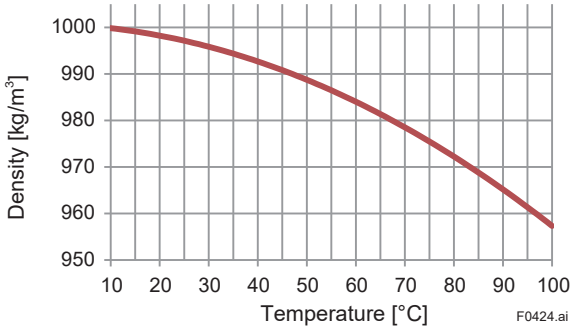
(4) Refer to Subsections 4.1.11 and 4.1.12 to specify the standard temperature and standard density.

(5) Specify the primary compensating rate and secondary compensating rate 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 4.1.11.

Example:
If a water density is corrected based on the temperature in the following conditions, the result is obtained as shown below.
analog 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



4.7.6 Calorie Calculation

When the absolute temperature or the temperature difference from another device (temperature transmitter, etc.) is used as the analog input, 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 analog input function specified in Subsection 4.5.8. If “Diff temperature” is selected in the analog input function, the temperature input in the form of analog input is used. If “Ext temperature” is selected, the difference between the temperature used as the analog input and the reference temperature specified in Subsection 4.1.12 is used.

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Calorie ► Specific heat
HART	Device root menu ► Basic setup ► Calorie ► Specific heat

This parameter specifies the specific heat.

The calorie calculation can be configured using the following procedure.

• When the absolute temperature is selected as the analog input:

(1) Refer to Subsection 4.5.8 to specify the function of the analog input to “Ext temperature”.

(2) Refer to Subsection 4.5.11 to specify the range of the analog input.

(3) Refer to Subsection 4.1.12 to specify the reference temperature.

(4) Specify the specific heat.

• When the temperature difference is selected as the analog input:

(1) Refer to Subsection 4.5.8 to specify the function of the analog input to “Diff temperature”.

(2) Refer to Subsection 4.5.11 to specify the range of the analog input.

(3) Specify the specific heat.

4.7.7 Limit of Alarm Output Function

The alarm output function of analog output 1 can be limited. For details about the alarm output function, refer to Subsection 4.5.5.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► Set SIL
HART	Device root menu ► Detailed setup ► AUX calculation ► Set SIL

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

Selection		Description
Display	**HART**	
No	No	Does not restrict the alarm output function of analog output 1.
Yes	Yes	Limits the alarm output function of analog output 1.

NOTE

If this function is set to “Yes”, the alarm output function for analog output 1 is to be limited to “< 2.4 mA” and “> 21.6 mA”. If another option is set, the alarm output function for analog output 1 is set to “> 21.6 mA”.

4.8 Alarm

4.8.1 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 specification. 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 possible countermeasures.

■ System alarm

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

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
F	010:Main CPU FAIL	10	Main board CPU failure	CPU (Main board) failure was detected.	Contact Yokogawa service center.
F	011:Rev calc FAIL	11	Reverse calculation failure	Failure of reverse calculation was detected.	Contact Yokogawa service center.
F	012:Main EEP FAIL	12	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.
F	013:Main EEP dflt	13	Main board EEPROM default	EEPROM (Main board) was reset to default values.	Contact Yokogawa service center.
F	014:Snsr bd FAIL	14	Sensor board failure	Failure of sensor board was detected.	Contact Yokogawa service center.
F	015:Snsr comm ERR	15	Sensor communication error	Communication error of the sensor was detected.	Contact Yokogawa service center.
F	016:AD 1 FAIL[Sig]	16	A/D1 failure[Signal]	Failure of A/D transmitter 1 [flow velocity signal] was detected.	Contact Yokogawa service center.
F	017:AD 2 FAIL[Excit]	17	A/D2 failure[Exciter]	Failure of A/D transmitter 2 [Exciting current] was detected.	Contact Yokogawa service center.
F	018:Coil open	18	Coil open	Coil of sensor was disconnected.	Turn off the power, check coil of sensor and excitation cable.
F	019:Coil short	19	Coil short	Coil of sensor was shorted.	Contact Yokogawa service center.
F	020:Exciter FAIL	20	Exciter failure	Failure of the excitation circuit was detected.	Contact Yokogawa service center.
F	021:PWM 1 stop	21	PWM1 stop	Error of pulse width modulation 1 was detected.	Contact Yokogawa service center.

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
F	022:PWM 2 stop	22	PWM2 stop	Error of pulse width modulation 2 was detected.	Contact Yokogawa service center.
F	023:Opt bd mismatch	23	Option board mismatch	Mismatch of option board was detected.	Contact Yokogawa service center.
F	024:Opt bd EEP FAIL	24	Option board EEPROM failure	Failure of EEPROM (option board) was detected.	Contact Yokogawa service center.
F	025:Opt bd A/D FAIL	25	Option board A/D failure	Failure of A/D (option board) was detected.	Contact Yokogawa service center.
F	026:Opt bd SPI FAIL	26	Option board SPI failure	Failure of SPI (option board) was detected.	Contact Yokogawa service center.
F	027:Restore FAIL	27	Parameter restore incomplete	Restore of parameters was failed.	Retry the restore function of the parameter.
F	028:Ind bd FAIL	28	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.
F	029:Ind bd EEP FAIL	29	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.
F	030:LCD drv FAIL	30	LCD driver failure	Failure of display driver was detected.	Contact Yokogawa service center.
F	031:Ind bd mismatch	31	Indicator board mismatch	Mismatch of display board was detected.	Contact Yokogawa service center.
F	032:Ind comm ERR	32	Indicator communication error	Communication error of display board was detected.	Check that the main and display boards are connected.
F	033:microSD FAIL	33	microSD card Failure	Failure of microSD card was detected.	Replace the microSD card.

Process alarm

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

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
S	050:Signal overflow	50	Signal overflow	Failure of input signal was detected.	Check the signal and grounding cables are connected.
S	051:Empty detect	51	Empty pipe detection	Inside of sensor was detected to be empty. (Empty check)	Fill the sensor with water.
N	052:H/L HH/LL alm	52	H/L or HH/LL alarm	A flow rate exceeds the high/low limits or high-high/low-low limits.	Check the parameter setting related to flow rate and alarm high/low limit function.
S	053:Adh over lv 4	53	Adhesion over level 4	The resistance value of the electrodes exceeded Level 4. (Adhesion detection of insulation to the electrode)	Recommend cleaning electrode.

Setting alarm

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

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
S	060:Span cfg ERR	60	Span configuration error	Setting error of flow span was detected. (fulfill “0.05 m/s < span flow rate < 16 m/s”)	Check the parameter setting related to span.
S	061:PV F cfg ERR	61	PV flow select configuration error	Flow noise was set to PV when flow noise could not be used.	Check or change the PV FLOW SEL parameter setting.
S	062:AO 1 4-20 lmt	62	Analog output 1 4-20mA limit error	Setting error of analog output 1 was detected. (fulfill “LRV < HRV”)	Check the parameter setting related to analog output 1.
S	063:AO 2 4-20 lmt	63	Analog output 2 4-20mA limit error	Setting error of analog output 2 was detected. (fulfill “LRV < HRV”)	Check the parameter setting related to analog output 2.
S	064:AO 1 mlt rng	64	Analog output 1 multi range error	Setting error of the multi range function was detected. (Span value settings of each range do not satisfy the relationship of lower range ≤ higher range, multi range settings for the status input and status output are erroneous, or the multi range and the absolute range are selected at the same time)	Check the parameter setting related to the multi range.
N	065:H/L cfg ERR	65	H/L HH/LL configuration error	Setting error of the alarm high/low limit function was detected. (fulfill “HRV - LRV > Hysteresis” and “HHRV - LLRV > Hysteresis”)	Check the parameter setting related to the alarm high/low limit function.

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
S	066:Density cfg ERR	66	Density configuration error	Setting error of density value was detected when PV was set to mass flow rate.	Check the parameter setting related to density.
S	067:Pls 1 cfg ERR	67	Pulse output 1 configuration error	Setting error of pulse output 1 was detected.	Check the parameter setting related to pulse output 1.
S	068:Pls 2 cfg ERR	68	Pulse output 2 configuration error	Setting error of pulse output 2 was detected.	Check the parameter setting related to pulse output 2.
C	069:Nomi size cfg	69	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 setting related to nominal size.
C	070:Adh cfg ERR	70	Adhesion configuration error	Setting error of electrode adhesion detection function was detected. (fulfill “Level1 < Level2 < Level3 < Level4”)	Check the parameter setting related to adhesion detection.
C	071:FLN cfg ERR	71	Flow noise configuration error	Setting error of flow noise verification function was detected. (fulfill “Level1 < Level2 < Level3 < Level4”)	Change the parameter settings related to flow noise.
C	072:Log not start	72	Data logging not started	Data logging failed to start.	Insert the microSD card.

Warning

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

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
S	080:AO 1 saturate	80	Analog output 1 saturated	Saturation of Analog output 1 was detected.	Check the parameter settings related to the process value and analog output 1.
S	081:AO 2 saturate	81	Analog output 2 saturated	Saturation of Analog output 2 was detected.	Check the parameter settings related to the process value and analog output 2.
S	082:Pls 1 saturate	82	Pulse output 1 saturated	Saturation of pulse output 1 was detected.	Check the parameter setting related to process value and pulse output 1.
S	083:Pls 2 saturate	83	Pulse output 2 saturated	Saturation of pulse output 2 was detected.	Check the parameter setting related to process value and pulse output 2.
S	084:AI saturate	84	Analog input saturated	Saturation of Analog input was detected.	Check analog input value and analog input parameter setting.
C	085:Cable miscon	85	Cable misconnect	Misconnection of cable was detected.	Check the signal cable and excitation cable connection.
C	086:Coil insulation	86	Coil insulation warning	Insulation deterioration of the coil was detected.	Contact Yokogawa service center.
M	087:Adhesion lv 3	87	Adhesion over level 3	The resistance value of the electrodes exceeded Level 3. (Adhesion detection of insulation to the electrode)	Recommend cleaning electrode.
N	088:LC warn	88	Low conductivity warning	Decrease of conductivity was detected.	Check fluid conductivity.
M	089:Insu detect	89	Insulation detection	Insulation deterioration of electrode was detected.	Contact Yokogawa service center.
N	090:FLN over lv 3	90	Flow noise over level 3	Flow noise exceeded Level 3. (Detection of flow noise)	Check if there is a problem with the fluid (conductivity, bubble, etc.).
N	091:FLN over lv 4	91	Flow noise over level 4	Flow noise exceeded Level 4. (Detection of flow noise)	Check if there is a problem with the fluid (conductivity, bubble, etc.).
C	092:AZ warn	92	Autozero warning	Result of zero adjustment exceeded 10 cm/s.	Check fluid is stopped when executing zero adjustment.
C	093:Verif warn	93	Verification warning	Interruption of verification function was detected.	Execute Verification again.
C	094:Fact noise warn	94	Factory noise warning	The fluctuation of flow became larger.	Check if there is a problem with the fluid.
C	095:Simulate active	95	Simulation active	A test mode for the flow velocity, volumetric flow rate, mass flow rate, calorie, analog output, pulse output, status input, or status output was executed.	Release simulation or test mode.

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
S	096:AO 1 fix	96	Analog output 1 fixed	It was detected that analog output 1 is fixed.	Check whether analog output 1 is in the test mode or not.
S	097:AO 2 fix	97	Analog output 2 fixed	It was detected that analog output 2 is fixed.	Check whether analog output 2 is in the test mode or not.
S	098:Pls 1 fix	98	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.
S	099:Pls 2 fix	99	Pulse output 2 fixed	It was detected that pulse output 2 is fixed.	Check whether pulse output 2 is in the test mode or not.
S	100:AI fix	100	Analog input fixed	It was detected that the analog input is fixed.	Check whether the analog input is in the test mode or not.
C	101:Param restore run	101	Parameter restore running	The restore function of the parameter was executed.	—
N	102:Disp over	102	Display over warning	The number of digits available for display exceeded the limit.	Check the parameter setting related to display.
N	103:SD size warn	103	microSD card size warning	Free space of microSD card decreased to less than 10%.	Increase the free space of the microSD card.
M	104:Bkup incmplt	104	Parameter backup incomplete	Parameter backup failed.	Retry the backup function of the parameter.
S	105:SD mismatch	105	microSD card mismatch	Mismatch of microSD card was detected.	Replace the microSD card.
M	106:SD removal ERR	106	microSD card removal procedure error	Removal of microSD card failed.	After executing the removal of the microSD card with parameter, remove the microSD card from the product.
N	131:Trans mismatch	107	Transmitter type mismatch	Mismatch of the sensor and transmitter was detected.	Contact Yokogawa service center.

Information

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

NE107 Status	Error Message			Error Description	Countermeasure
	Display	HART			
N	120:Watchdog	120	Watchdog	Error of Watchdog timer was detected.	Contact Yokogawa service center.
N	121:Power off	121	Power off	Power-off was detected.	—
N	122:Inst power FAIL	122	Instant power failure	Instantaneous power failure was detected.	—
N	123:Param bkup run	123	Parameter backup running	Parameter backup is running.	—
N	124:Data log run	124	Data logging running	Data log is running.	—
N	130:DevID not enter	130	Device ID not entered	No settings of Device ID was detected.	Contact Yokogawa service center.

4.8.2 Operation at the Time of Error

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

System alarm

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
F	010:Main CPU FAIL	Active	Non-Active	Burnout	Stop	Stop	Stop	Not defined
F	011:Rev calc FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	012:Main EEP FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	013:Main EEP dflt	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	014:Snsr bd FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	015:Snsr comm ERR	Active	Non-Active	Burnout	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	016:AD 1 FAIL[Sig]	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	017:AD 2 FAIL[Excit]	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	018:Coil open	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	019:Coil short	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Hold Prior setting	Alarm
F	020:Exciter FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	021:PWM 1 stop	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	022:PWM 2 stop	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	023:Opt bd mismatch	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	024:Opt bd EEP FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	025:Opt bd A/D FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	026:Opt bd SPI FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	027:Restore FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	028:Ind bd FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	029:Ind bd EEP FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	030:LCD drv FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	031:Ind bd mismatch	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	032:Ind comm ERR	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm
F	033:microSD FAIL	Active	Non-Active	Alarm Out	Alarm Out	Based on “FailOpts”	Normal Operation	Alarm

Process alarm

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
S	050:Signal overflow	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Hold Prior setting	Alarm
S	051:Empty detect	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Hold Prior setting	Alarm
N	052:H/L HH/LL alm	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm
S	053:Adh over lv 4	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Normal Operation	Alarm

Setting alarm

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
S	060:Span cfg ERR	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Normal Operation	Alarm
S	061:PV F cfg ERR	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Normal Operation	Alarm
S	062:AO 1 4-20 lmt	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm
S	063:AO 2 4-20 lmt	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm
N	065:H/L cfg ERR	Active	Non-Active	Alarm Out	Normal	Based on "FailOpts"	Normal Operation	Alarm
S	066:Density cfg ERR	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Normal Operation	Alarm
S	067:Pls 1 cfg ERR	Active	Non-Active	Alarm Out	Alarm Out	Continue	Normal Operation	Alarm
S	068:Pls 2 cfg ERR	Active	Non-Active	Alarm Out	Alarm Out	Continue	Normal Operation	Alarm
C	069:Nomi size cfg	Active	Non-Active	Alarm Out	Alarm Out	Based on "FailOpts"	Normal Operation	Alarm
C	070:Adh cfg ERR	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm
C	071:FLN cfg ERR	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm
C	072:Log not start	Active	Non-Active	Normal	Normal	Continue	Normal Operation	Alarm

Warning

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
S	080:AO 1 saturate	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	081:AO 2 saturate	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	082:Pls 1 saturate	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	083:Pls 2 saturate	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
S	084:AI saturate	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	085:Cable miscon	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	086:Coil insulation	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
M	087:Adhesion lv 3	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
N	088:LC warn	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
M	089:Insu detect	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
N	090:FLN over lv 3	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
N	091:FLN over lv 4	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	092:AZ warn	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	093:Verif warn	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	094:Fact noise warn	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	095:Simulate active	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	096:AO 1 fix	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	097:AO 2 fix	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	098:Pls 1 fix	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	099:Pls 2 fix	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	100:AI fix	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
C	101:Param restore run	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Execute
N	102:Disp over	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
N	103:SD size warn	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
M	104:Bkup incmplt	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
S	105:SD mismatch	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
M	106:SD removal ERR	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Warning
N	131:Trans mismatch	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal

Information

NE 107	Error Message	Output				Totalizer	Process Value	Display
		Alarm	Warning	Current	Pulse/ Status			
N	120:Watchdog	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	121:Power off	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	122:Inst power FAIL	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	123:Param bkup run	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Execute
N	124:Data log run	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Icon
N	130:DevID not enter	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal

4.8.3 Alarm Display Setting

(1) Alarm display

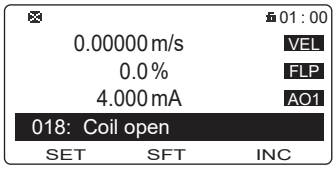
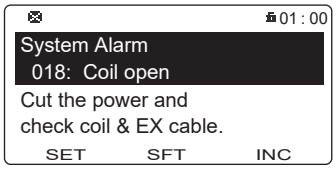
If an error occurs on this product, an alarm appears on the display. The alarm display modes are classified into two types: one mode to display a process value and alarm name, and another mode to display an alarm name and action.
If multiple alarms occur on this product, they will be displayed in sequence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

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Alarm display
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display alarm

This parameter sets the alarm display.

From the table below, select the alarm display.

Selection		Description
Display	**HART**	
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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► NE107 display
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display NE107

This parameter sets the alarm display based on NAMUR NE107.

From the table below, select the alarm display.

Selection		Description
Display	**HART**	
Normal	Normal	Sets to the normal alarm display.
NE107	NE107	Sets the alarm display based on NAMUR NE107.

4.8.4 Alarm History Function

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

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm record ► (see below)
HART	Diagnostic root menu ► Status/Self test ► Alarm ► Alarm record ► (see below)

Parameter		Description
Display	**HART**	
Record alarm 1	Alarm record 1	Displays the name of new alarm 1.
Record time 1	Alarm record time 1	Displays the operation time when the first new alarm occurs.
Record alarm 2	Alarm record 2	Displays the name of new alarm 2.
Record time 2	Alarm record time 2	Displays the operation time when the second new alarm occurs.
Record alarm 3	Alarm record 3	Displays the name of new alarm 3.
Record time 3	Alarm record time 3	Displays the operation time when the third new alarm occurs.
Record alarm 4	Alarm record 4	Displays the name of new alarm 4.
Record time 4	Alarm record 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 operated for 31 days, 12 hours, and 34 minutes.

4.8.5 Alarm Mask Function

The alarm mask function can be configured so that a set alarm is masked, alarm notifications are hidden, and the alarm history is not recorded. The mask function can be set for both the alarm notification and alarm record, respectively.
This 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 on” of Alarm out mask to “On”.
To enable the alarm notification, set “Signal overflow on” of Alarm out mask to “Off”.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm out mask ► (see below)
HART	Diagnostic root menu ► Status/Self test ► Alarm ► Alarm out mask ► (see below)

Parameter		Description
Display	**HART**	
Mask 1-1	Alarm out mask 1	Specifies the mask function for alarm notification 1-1.
Mask 1-2		Specifies the mask function for alarm notification 1-2.
Mask 2-1	Alarm out mask 2	Specifies the mask function for alarm notification 2-1.
Mask 2-2		Specifies the mask function for alarm notification 2-2.
Mask 3-1	Alarm out mask 3	Specifies the mask function for alarm notification 3-1.
Mask 3-2		Specifies the mask function for alarm notification 3-2.
Mask 4-1	Alarm out mask 4	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 pipe detection on” of Alarm out mask to “On”.
To enable the alarm record, set “Empty pipe detection on” of Alarm record mask to “Off”.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm record mask ► (see below)
HART	Diagnostic root menu ► Status/Self test ► Alarm ► Alarm record mask ► (see below)

Parameter		Description
Display	**HART**	
Mask 1-1	Alarm record mask 1	Specifies the mask function for alarm record 1-1.
Mask 1-2		Specifies the mask function for alarm record 1-2.
Mask 2-1	Alarm record mask 2	Specifies the mask function for alarm record 2-1.
Mask 2-2		Specifies the mask function for alarm record 2-2.
Mask 3-1	Alarm record mask 3	Specifies the mask function for alarm record 3-1.

NOTE

Note that an alarm masked by 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 value (upon 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		HART			Default value	Attribute
Parameter name	**Alarm name**	**Parameter name**	**Alarm name**			
—	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	—	—
Mask 1-1	013:Main EEP dflt	Alarm out mask 1	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	—	—
Mask 1-2	021:PWM 1 stop	Alarm out mask 1	21	PWM1 stop	—	✓
Mask 1-2	022:PWM 2 stop	Alarm out mask 1	22	PWM2 stop	—	✓
Mask 1-2	023:Opt bd mismatch	Alarm out mask 1	23	Option board mismatch	—	✓
Mask 1-2	024:Opt bd EEP FAIL	Alarm out mask 1	24	Option board EEPROM failure	—	✓
Mask 1-2	025:Opt bd A/D FAIL	Alarm out mask 1	25	Option board A/D failure	—	✓
Mask 1-2	026:Opt bd SPI FAIL	Alarm out mask 1	26	Option board SPI failure	—	✓
—	027:Restore FAIL	—	27	Parameter restore incomplete	—	—
Mask 1-2	028:Ind bd FAIL	Alarm out mask 1	28	Indicator board failure	✓	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm out mask 1	29	Indicator board EEPROM failure	—	✓
Mask 1-2	030:LCD drv FAIL	Alarm out mask 1	30	LCD driver failure	—	✓
Mask 1-2	031:Ind bd mismatch	Alarm out mask 1	31	Indicator board mismatch	—	✓
Mask 1-2	032:Ind comm ERR	Alarm out mask 1	32	Indicator communication error	—	✓
Mask 1-2	033:microSD FAIL	Alarm out mask 1	33	microSD failure	—	✓
Mask 2-1	050:Signal overflow	Alarm out mask 2	50	Signal overflow	—	✓
Mask 2-1	051:Empty detect	Alarm out mask 2	51	Empty pipe detection	—	✓

Display		HART			Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name			
Mask 2-1	052:H/L HH/LL alm	Alarm out mask 2	52	H/L or HH/LL alarm	✓	✓
Mask 2-1	053:Adh over lv 4	Alarm out mask 2	53	Adhesion over level 4	✓	✓
Mask 2-1	060:Span cfg ERR	Alarm out mask 2	60	Span configuration error	—	✓
Mask 2-1	061:PV F cfg ERR	Alarm out mask 2	61	PV flow select configuration error	—	✓
Mask 2-1	062:AO 1 4-20 lmt	Alarm out mask 2	62	Analog output 1 4-20mA limit error	—	✓
Mask 2-1	063:AO 2 4-20 lmt	Alarm out mask 2	63	Analog output 2 4-20 mA limit error	—	✓
Mask 2-1	064:AO 1 mlt rng	Alarm out mask 2	64	Analog output 1 multi range error	—	✓
Mask 2-1	065:H/L cfg ERR	Alarm out mask 2	65	H/L HH/LL configuration error	—	✓
Mask 2-1	066:Density cfg ERR	Alarm out mask 2	66	Density configuration error	—	✓
Mask 2-2	067:Pls 1 cfg ERR	Alarm out mask 2	67	Pulse output 1 configuration error	—	✓
Mask 2-2	068:Pls 2 cfg ERR	Alarm out mask 2	68	Pulse output 2 configuration error	—	✓
Mask 2-2	069:Nomi size cfg	Alarm out mask 2	69	Nominal size configuration error	—	✓
Mask 2-2	070:Adh cfg ERR	Alarm out mask 2	70	Adhesion configuration error	—	✓
Mask 2-2	071:FLN cfg ERR	Alarm out mask 2	71	Flow noise configuration error	—	✓
Mask 2-2	072:Log not start	Alarm out mask 2	72	Data logging not started	—	✓
Mask 2-2	080:AO 1 saturate	Alarm out mask 2	80	Analog output 1 saturated	—	✓
Mask 2-2	081:AO 2 saturate	Alarm out mask 2	81	Analog output 2 saturated	✓	✓
Mask 2-2	082:Pls 1 saturate	Alarm out mask 2	82	Pulse output 1 saturated	✓	✓
Mask 2-2	083:Pls 2 saturate	Alarm out mask 2	83	Pulse output 2 saturated	✓	✓
Mask 2-2	084:AI saturate	Alarm out mask 2	84	Analog input saturated	✓	✓
Mask 2-2	085:Cable miscon	Alarm out mask 2	85	Cable misconnect	—	✓
Mask 2-2	086:Coil insulation	Alarm out mask 2	86	Coil insulation warning	✓	✓
Mask 2-2	131:Trans mismatch	Alarm out mask 2	131	Transmitter type mismatch	—	✓
Mask 3-1	087:Adhesion lv 3	Alarm out mask 3	87	Adhesion over level 3	✓	✓
Mask 3-1	088:LC warn	Alarm out mask 3	88	Low conductivity warning	✓	✓
Mask 3-1	089:Insu detect	Alarm out mask 3	89	Insulation detection	✓	✓
Mask 3-1	090:FLN over lv 3	Alarm out mask 3	90	Flow noise over level 3	✓	✓
Mask 3-1	091:FLN over lv 4	Alarm out mask 3	91	Flow noise over level 4	✓	✓
Mask 3-1	092:AZ warn	Alarm out mask 3	92	Autozero warning	✓	✓
Mask 3-1	093:Verif warn	Alarm out mask 3	93	Verification warning	✓	✓
Mask 3-1	094:Fact noise warn	Alarm out mask 3	94	Factory noise warning	✓	✓
Mask 3-1	095:Simulate active	Alarm out mask 3	95	Simulation active	—	✓
Mask 3-1	096:AO 1 fix	Alarm out mask 3	96	Analog output 1 fixed	—	✓
Mask 3-1	097:AO 2 fix	Alarm out mask 3	97	Analog output 2 fixed	—	✓
Mask 3-1	098:Pls 1 fix	Alarm out mask 3	98	Pulse output 1 fixed	—	✓
Mask 3-1	099:Pls 2 fix	Alarm out mask 3	96	Pulse output 2 fixed	—	✓
Mask 3-1	100:AI fix	Alarm out mask 3	100	Analog input fixed	—	✓

Display		HART			Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name			
Mask 3-2	101:Param restore run	Alarm out mask 3	101	Parameter restore running	✓	✓
Mask 3-2	102:Disp over	Alarm out mask 3	102	Display over warning	✓	✓
Mask 3-2	103:SD size warn	Alarm out mask 3	103	microSD card size warning	✓	✓
Mask 3-2	104:Bkup incmplt	Alarm out mask 3	104	Parameter backup incomplete	—	✓
Mask 3-2	105:SD mismatch	Alarm out mask 3	105	microSD card mismatch	✓	✓
Mask 3-2	106:SD removal ERR	Alarm out mask 3	106	microSD card removal procedure error	✓	✓
Mask 3-2	120:Watchdog*1	Alarm out mask 3	120	Watchdog*1	✓	✓
Mask 3-2	121:Power off*1	Alarm out mask 3	121	Power off*1	✓	✓
Mask 3-2	122:Inst power FAIL*1	Alarm out mask 3	122	Instant power failure*1	✓	✓
Mask 3-2	123:Param bkup run	Alarm out mask 3	123	Parameter backup running	✓	✓
Mask 3-2	124:Data log run	Alarm out mask 3	124	Data logging running	✓	✓
Mask 4-1	130:DevID not enter	Alarm out mask 4	130	Device ID not entered	✓	✓

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

Alarm record mask function

Display		HART			Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name			
—	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	—	—
Mask 1-1	013:Main EEP dflt	Alarm record mask 1	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	—	—
Mask 1-2	021:PWM 1 stop	Alarm record mask 1	21	PWM1 stop	—	✓
Mask 1-2	022:PWM 2 stop	Alarm record mask 1	22	PWM2 stop	—	✓
Mask 1-2	023:Opt bd mismatch	Alarm record mask 1	23	Option board mismatch	—	✓
Mask 1-2	024:Opt bd EEP FAIL	Alarm record mask 1	24	Option board EEPROM failure	—	✓
Mask 1-2	025:Opt bd A/D FAIL	Alarm record mask 1	25	Option board A/D failure	—	✓
Mask 1-2	026:Opt bd SPI FAIL	Alarm record mask 1	26	Option board SPI failure	—	✓
—	027:Restore FAIL	—	27	Parameter restore incomplete	—	—
Mask 1-2	028:Ind bd FAIL	Alarm record mask 1	28	Indicator board failure	—	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm record mask 1	29	Indicator board EEPROM failure	—	✓
Mask 1-2	030:LCD drv FAIL	Alarm record mask 1	30	LCD driver failure	—	✓
Mask 1-2	031:Ind bd mismatch	Alarm record mask 1	31	Indicator board mismatch	—	✓
Mask 1-2	032:Ind comm ERR	Alarm record mask 1	32	Indicator communication error	—	✓
Mask 1-2	033:microSD FAIL	Alarm record mask 1	33	microSD failure	—	✓
Mask 2-1	050:Signal overflow	Alarm record mask 2	50	Signal overflow	—	✓
Mask 2-1	051:Empty detect	Alarm record mask 2	51	Empty pipe detection	—	✓
Mask 2-1	052:H/L HH/LL alm	Alarm record mask 2	52	H/L or HH/LL alarm	—	✓
Mask 2-1	053:Adh over lv 4	Alarm record mask 2	53	Adhesion over level 4	—	✓
—	060:Span cfg ERR	—	60	Span configuration error	✓	—
—	061:PV F cfg ERR	—	61	PV flow select configuration error	✓	—
—	062:AO 1 4-20 lmt	—	62	Analog output 1 4-20mA limit error	✓	—
—	063:AO 2 4-20 lmt	—	63	Analog output 2 4-20 mA limit error	✓	—

Display		HART			Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name			
—	064:AO 1 mlt rng	—	64	Analog output 1 multi range error	✓	—
—	065:H/L cfg ERR	—	65	H/L HH/LL configuration error	✓	—
—	066:Density cfg ERR	—	66	Density configuration error	✓	—
—	067:Pls 1 cfg ERR	—	67	Pulse output 1 configuration error	✓	—
—	068:Pls 2 cfg ERR	—	68	Pulse output 2 configuration error	✓	—
—	069:Nomi size cfg	—	69	Nominal size configuration error	✓	—
—	070:Adh cfg ERR	—	70	Adhesion configuration error	✓	—
—	071:FLN cfg ERR	—	71	Flow noise configuration error	✓	—
—	072:Log not start	—	72	Data logging not started	✓	—
—	080:AO 1 saturate	—	80	Analog output 1 saturated	✓	—
—	081:AO 2 saturate	—	81	Analog output 2 saturated	✓	—
—	082:Pls 1 saturate	—	82	Pulse output 1 saturated	✓	—
—	083:Pls 2 saturate	—	83	Pulse output 2 saturated	✓	—
—	084:AI saturate	—	84	Analog input saturated	✓	—
Mask 2-2	085:Cable miscon	Alarm record mask 2	85	Cable misconnect	—	✓
—	086:Coil insulation	—	86	Coil insulation warning	✓	—
—	131:Trans mismatch	—	131	Transmitter type mismatch	✓	—
—	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	✓	—
—	096:AO 1 fix	—	96	Analog output 1 fixed	✓	—
—	097:AO 2 fix	—	97	Analog output 2 fixed	✓	—
—	098:Pls 1 fix	—	98	Pulse output 1 fixed	✓	—
—	099:Pls 2 fix	—	99	Pulse output 2 fixed	✓	—
—	100:AI fix	—	100	Analog input 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 procedure error	✓	—

Display		HART			Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name			
—	120:Watchdog*1	—	120	Watchdog*1	—	—
—	121:Power off*1	—	121	Power off*1	—	—
—	122:Inst power FAIL*1	—	122	Instant power failure*1	—	—
—	123:Param bkup run	—	123	Parameter backup running	✓	—
—	124:Data log run	—	124	Data logging running	✓	—
Mask 3-1	130:DevID not enter	Alarm record mask 3	132	Device ID not entered	✓	✓

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

4.8.6 Burnout Direction Display

The burnout function sets an analog output direction when a CPU failure occurs. The analog output direction at burnout can be checked with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► H/L alarm cfg ► 4-20 burnout
HART	Diagnostic root menu ► Status/Self test ► Burn out

Displays burn out direction

Selection		Description
Display	**HART**	
High	High	Outputs 21.6 mA or more at burnout.
Low	Low	Outputs 2.4 mA or less at burnout.

NOTE

If the optional code C1 or C2 is selected, the burnout direction is set to “High”. Otherwise, the direction is set to “Low”.
Also, the burnout direction can be changed with the hardware burnout switch. For details about the hardware burnout switch, be sure to refer to the Installation Manual.

4.8.7 Alarm Terminal Active Direction Setting

The alarm terminal is active when a system alarm, process alarm, and/or setting alarm occurs.
The ON or OFF setting of the alarm terminal can be activated.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm output ► Active mode
HART	Diagnostic root menu ► Status/Self test ► Alarm ► Alarm output active mode

From the table below, select the active direction.

Selection		Description
Display	**HART**	
On active	On active	Specifies active when alarm terminal is on.
Off active	Off active	Specifies active when the alarm terminal is off.

4.9 Display

4.9.1 Language Setting

The language to be shown on the display can be selected from nine languages.
Select the desired display language from the languages that are included in the language package specified at the time of order.
This setting can be configured with the following parameters.

■ Selecting language

Menu path

Display	Device setup ► Language
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Language

This parameter specifies the language to be used on the display.
From the table below, select the language to be used on the display.

Selection		Description
Display	**HART**	
English	English	Package 1: Japanese, English, French, German, Italian, Spanish, Portuguese, Russian Package 2: English, 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 ► Language package
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Language package

This parameter indicates the language package for the display.

4.9.2 Display Item Setting

This product can show up to eight items on the display by scrolling it. Each display item is to be set to the eight-line mode.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Line select ► (see below)
HART	Device root menu ► Detailed setup ► Display ► Line select ► (see below)

Parameter		Description
Display	**HART**	
Line 1	Display select1	Specifies item 1 to be shown on the display.
Line 2	Display select2	Specifies item 2 to be shown on the display.
Line 3	Display select3	Specifies item 3 to be shown on the display.
Line 4	Display select4	Specifies item 4 to be shown on the display.
Line 5	Display select5	Specifies item 5 to be shown on the display.
Line 6	Display select6	Specifies item 6 to be shown on the display.
Line 7	Display select7	Specifies item 7 to be shown on the display.
Line 8	Display select8	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	**HART**	
None	None	Does not display items (item 1 is not selectable).
Flow rate(%)	Flow rate(%)	Displays the flow rate for the span of the PV-mapped process value of Subsection 4.1.2.
PV	PV	Displays the PV-mapped process value of Subsection 4.1.2.
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 PV-mapped process value of Subsection 4.1.2 by using a bar graph.
Calorie	Calorie	Displays the calorie.
Totalizer 1*1	Totalizer1	Displays the totalized value of totalizer 1.
Totalizer 2*1	Totalizer2	Displays the totalized value of totalizer 2.
Totalizer 3*1	Totalizer3	Displays the totalized value of totalizer 3.
Tag number	Tag number	Displays the tag number.
Long tag	Long tag	Displays the long tag.
Commun protocol	Commun Protocol	Displays the communication protocol.
Adhesion	Adhesion	Displays the adhesion level of the electrode adhesion detecting function.
Analog out 1	Analog out1	Displays the current value of analog output 1
Analog out 2	Analog out2	Displays the current value of analog output 2
Flow noise level	Flow noise level	Displays the noise level of the flow noise diagnosis function.
Totalizer 1 count*1	Totalizer1 count	Displays the count value of totalizer 1.
Totalizer 2 count*1	Totalizer2 count	Displays the count value of totalizer 2.
Totalizer 3 count*1	Totalizer3 count	Displays the count value of totalizer 3.

*1: The upper/lower limits on the display are limited by the number of digits that can be displayed according to the settings of the decimal point. For example, if the decimal point position of Totalizer 3 is set to decimal point 2, the upper and lower limits of Totalizer 3 are +999999.99 and -999999.99. If the totalized value exceeds the upper and lower limits, it is reset to 0.
For details about decimal-point position setting, refer to Subsection 4.9.3.
If the totalized value is reset to 0, the totalized value on the display may be different from the totalized value in Subsection 4.2.2. This is because the number of digits that can be displayed is different for both values. When re-totalizing, use the reset/preset function for the totalized value.
The upper and lower limits of the totalized count value are +99999999 and -99999999. If the totalized count value exceeds these upper and lower limits, the count value is reset to 0.

NOTE

When Main soft rev (Main board revision/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (Indicator board revision/Ind soft rev) is R2.01.01 or earlier, the upper/lower limits on the display are limited by the number of digits that can be displayed according to the settings of the decimal point. For example, if the decimal point position of Totalizer 3 is set to decimal point 2, the upper and lower limits of Totalizer 3 are +999999.99 and -999999.99. For details about decimal-point position setting, refer to Subsection 4.9.3.
The upper and lower limits of the totalized count value are +99999999 and -99999999. If the totalized value and totalized count value exceed these upper and lower limits, they are held at the upper limit or lower limit.
For details about how to check the device revision (Main soft rev and Ind soft rev), refer to Subsection 4.10.2.

4.9.3 Decimal-Point Position Setting

The number of decimal places can be set to the automatic adjustment or fix mode for the PV-mapped totalized value or process value of Subsection 4.1.2.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Disp format ► (see below)
HART	Device root menu ► Detailed setup ► Display ► Display format ► (see below)

Parameter		Description
Display	**HART**	
Format PV	Display format PV	Specifies the decimal-point position for the PV-mapped process value of Subsection 4.1.2.
Format total 1	Display format total 1	Specifies the decimal-point position for the totalized value of totalizer 1.
Format total 2	Display format total 2	Specifies the decimal-point position for the totalized value of totalizer 2.
Format total 3	Display format total 3	Specifies the decimal-point position for the totalized value of totalizer 3.

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

Selection		Description
Display	**HART**	
Auto	Auto	Automatically adjusts the number of digits after the decimal point with the PV-mapped process value.*1
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 digits after the decimal point with the span of the PV-mapped process value.*2

Totalized value

Selection		Description
Display	HART	
Auto	Auto	Automatically adjusts the number of digits after the decimal point with a totalized value.
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”.
7 digit	7 digit	Fixes the number of decimal places to “7”.

*1: When “Auto” is selected, the display format is automatically switched in response to the process value selected for PV. The table below shows details.

Judgment range			Supported display format
	|process value|≥	100000	0digit
100000	>|process value|≥	10000.0	1digit
10000.0	>|process value|≥	1000.00	2digit
1000.00	>|process value|≥	100.000	3digit
100.000	>|process value|≥	10.0000	4digit
10.0000	>|process value|≥	0.00000	5digit

Since the display format is switched in response to the process values, the display format may be switched when the product is used near the threshold listed in the above table.

*2: When “Auto 2” is selected, the display format is automatically switched in response to the span value of the process selected for PV.
The table below shows details.

Judgment range			Supported display format
	|span value|>	900	0digit
900	≥|span value|>	90	1digit
90	≥|span value|>	9	2digit
9	≥|span value|>	0	3digit

Since the display format is switched in response to span values of the process, the display format is not changed as long as the span is not changed.

4.9.4 Display Line Count and Scroll Settings

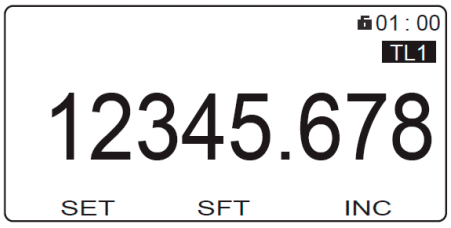
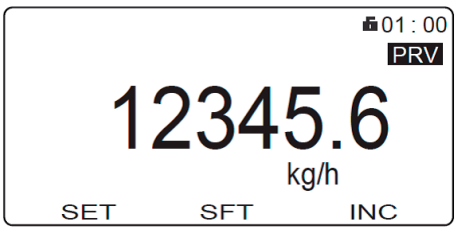
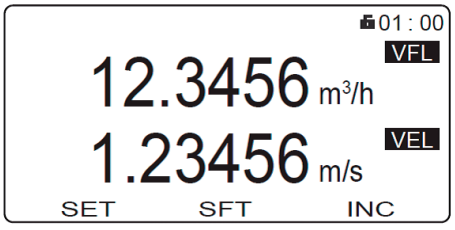
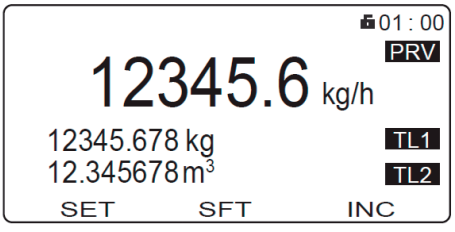
This product can show up to eight items on the display by scrolling, with four lines max. shown at a time. The scroll method can be selected from the automatic display switching or the display switching using the IR switch.
This setting can be configured with the following parameters.

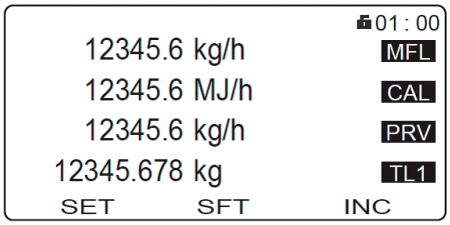
Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► (see below)

Parameter		Description
Display	**HART**	
Line mode	Display line	Specifies the number of lines to be shown on the display.*1
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 depending on the number of the displayed line.

Selection		Description
Display	**HART**	
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
3 line	3 Line	3-line display with units  F0430.ai

Selection		Description
Display	HART	
4 line	4 Line	4-line display with units.  F0431.ai

*2: From the table below, select the scroll method.

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

NOTE

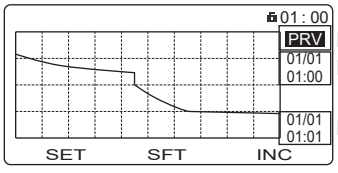
The default value of the scroll method (Display scroll/Scroll mode) is “Off”.
If the value of the scroll method is set to “Off”, the 5th line and beyond cannot be checked on the display.
To display the 5th line and beyond, set an option other than “Off”.

NOTE

When Main soft rev (Main board revision/Main soft rev) is R2.01.02 or earlier, the default value of the scroll method (Display scroll/Scroll mode) is “Manual”.
If the value of the scroll method is set to “Manual”, the display line is scrolled each time the infrared switch [INC] reacts.

4.9.5 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 a trend graph. A trend graph is scaled automatically, and the time axis flows from the left to the right.



Process value
Display start time
Display end time
F0432.ai

(1) Trend graph display setting

The process value and low limit value/high limit value that can be shown in a 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 4.1.5
Flow velocity	VEL		
Volumetric flow rate	VFL		
Mass flow rate	MFL		
Calorie	CAL		
Analog output 1	AO1	4 mA	20 mA
Analog output 2	AO2		
Totalizer 1	TL1	Preset value specified in Subsection 4.2.7	Target value of the totalizer specified in Subsection 4.2.3
Totalizer 2	TL2		
Totalizer 3	TL3		

A trend graph can be set with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Display mode
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display measure mode

From the table below, select the trend graph display.

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

NOTE

The trend graph display function is not synchronized with the multi range and the forward/reverse range.

(2) Trend graph display item setting

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Trend select ► (see below)
HART	Device root menu ► Detailed setup ► Display ► Trend select ► (see below)

Parameter		Description
Display	**HART**	
Trend 1	Trend select 1	Specifies item 1 to be shown in a trend graph.
Trend 2	Trend select 2	Specifies item 2 to be shown in a trend graph.
Trend 3	Trend select 3	Specifies item 3 to be shown in a trend graph.
Trend 4	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	**HART**	
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 PV-mapped process value of Subsection 4.1.2.
PV	PV	Specifies the PV-mapped process value of Subsection 4.1.2.

Selection		Description
Display	HART	
Velocity	Velocity	Specifies 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	Specifies the display item to calorie.
Analog out 1	Analog out1	Specifies to the low limit of analog output 1.
Analog out 2	Analog out2	Specifies to the low limit of analog output 2.
Totalizer 1	Totalizer1	Specifies the totalized value of totalizer 1.
Totalizer 2	Totalizer2	Specifies the totalized value of totalizer 2.
Totalizer 3	Totalizer3	Specifies the totalized value of totalizer 3.

(3) Update period setting

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Period
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display period

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

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

(4) Trend graph high/low limit setting

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► (see below)

Parameter		Description
Display	HART	
Trend offln URV	Trend offline urv	Specifies the high limit to display in a trend graph.
Trend offln LRV	Trend offline lrv	Specifies the low limit to display in a trend graph.

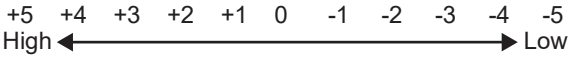
4.9.6 Other Settings

(1) Display contrast setting

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

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Contrast
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display contrast



(2) Display damping time constant setting

This function can specify the damping time constant for the display independently of that specified in Subsection 4.1.6.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Damp
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display damping

NOTE

The damping time constant of the display is effective only for the display. Refer to Subsection 4.1.6 to specify the damping time constant for the output of the physical quantity.

(3) Date display format setting

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

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Format date
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display format date

From the table below, specify the date display format.

Selection		Description
Display	**HART**	
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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Inversion
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► Display inversion

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

Selection		Description
Display	HART	
Normal	Normal	Does not set the display to the black/white inverse mode. (Character color: Black, Background color: White)
Invert	Invert	Sets 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 model is installed.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Disp indicator ► Squawk
HART	Maintenance root menu ► Display indication► Squawk

From the table below, select whether or not to blink the display.

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

(6) IR switch function

The IR switch function is a function to drive the IR switch for display operation. For the basic operations of the IR switch, refer to Subsection 2.2.1.
This setting can be configured with the following parameters.

Menu path

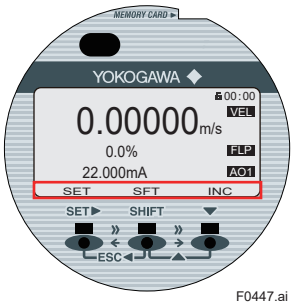
HART	Device root menu ► Detailed setup ► Display ► Display operation configuration ► IRSW operation

From the table below, select how the IR switch function is to be used.

Selection	Description
Disable	Disables the IR switch function.
Enable	Enables the IR switch function.

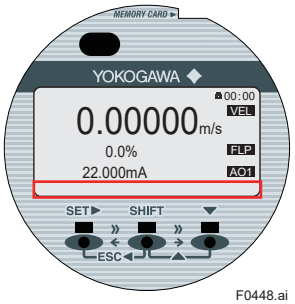
NOTE

If the IR switch function is set to “Disable”, the switch function is not displayed on the display, and the IR switch cannot be operated.



F0447.ai

If “Enable”



F0448.ai

If “Disable”

4.9.7 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 4.13.

(1) Removing the microSD card

IMPORTANT

If the microSD card is removed without executing “Unmount” on the software, 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 parameters.

Menu path

Display	Device setup ► microSD ► Unmount

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 a microSD card, it may cause a device operation failure.

Formatting is possible with the following parameters.

Menu path

Display	Device setup ► microSD ► Format

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

Selection	Description
Cancel	Cancels formatting.
Execute	Executes formatting.

(3) Checking microSD contents

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

Menu path

Display	Device setup ► microSD ► Contents

(4) Checking the property of microSD Card

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

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

4.10 Device Information

4.10.1 Order Information

Order information can be specified for this product. If a particular parameter is specified at the time of order, this product is shipped with the parameter specified. If a parameter is not specified at the time of order, that parameter needs to be set by the customer.
The model and suffix code are indicated in the following format.

Transmitter:
AXG1A - □□□□□□□□□□□□ /□
(1) (2) (3)

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

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► (see below)
HART	Device root menu ► Detailed setup ► Device information ► Order information ► (see below)

Parameter		Description
Display	**HART**	
Tag No	Tag	Specifies the Tag No. Max. 8 characters. (See P. 22.)
Long tag	Long tag	Specifies long tag. Max. 8 characters. (See P. 22.)
MS code ► Model code	Basic model code	Specifies the model code of the integral flowmeter or remote transmitter.
MS code ► Suffix config 1	Suffix config 1	Specifies the suffix code of the integral flowmeter or remote transmitter.
MS code ► Suffix config 2	Suffix config 2	
MS code ► Option 1	Option 1	Specifies the optional code of the integral flowmeter or remote transmitter.
MS code ► Option 2	Option 2	
MS code ► Option 3	Option 3	
MS code ► Option 4	Option 4	
RS MS code ► Model code	Remote sensor basic model code	Specifies the model code of the remote sensor.
RS MS code ► Suffix config 1	Remote sensor suffix config 1	Specifies the suffix code of the remote sensor.
RS MS code ► Suffix config 2	Remote sensor suffix config 2	
RS MS code ► Option 1	Remote sensor option 1	Specifies the optional code of the remote sensor.
RS MS code ► Option 2	Remote sensor option 2	
RS MS code ► Option 3	Remote sensor option 3	
RS MS code ► Option 4	Remote sensor option 4	

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)
HART	Device root menu ► Detailed setup ► Device information ► Version/Number information ► (see below)

Parameter		Description
Display	**HART**	
Trans serial No	Transmitter serial No	Displays the serial number (device No.) of the transmitter.
Sensor serial No	Sensor serial No	Displays the serial number (device No.) of the sensor.

NOTE

When any parameters related to the order information about the product are changed, the order information upon shipment from the manufacturing factory cannot be referred to.
To store the order information defined upon shipment from the manufacturing factory, it is recommended to refer to Section 4.13 to make a backup.

4.10.2 Device Revision

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

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)
HART	Device root menu ► Detailed setup ► Device information ► Version/Number information ► (see below)

Parameter		Description
Display	**HART**	
Transmitter type	Transmitter type	Displays the type of the transmitter.
Option board ID	Option board ID	Displays the type of the option board.
Main soft rev	Main board revision	Displays the software revision of the main board.
Snsr soft rev	Sensor board revision	Displays the software revision of the sensor board.
Ind soft rev	Indicator board revision	Displays the software revision of the display board.
Hard rev	Hardware rev	Displays the hardware revision of the HART device.
Dev id	Dev id	Displays the HART device ID.

4.10.3 Memo Function

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

Menu path

Display	Device setup ► Detailed setup ► Device info ► Memo ► (see below)
HART	Device root menu ► Detailed setup ► Device information ► Memo ► (see below)

Parameter		Description
Display	**HART**	
Memo 1	Memo 1	Specifies memo 1.
Memo 2	Memo 2	Specifies memo 2.
Memo 3	Memo 3	Specifies memo 3.

4.10.4 Date and Time Information

The present date and time can be set. The display format for date and time is the format set in Subsection 4.9.6.
This setting can be displayed and configured with the following parameters.

■ Displaying date and time

Menu path

Display	Device setup ► Detailed setup ► Device info ► Date/Time ► (see below)
HART	Maintenance root menu ► Time stamp ► (see below)

Parameter		Description
Display	**HART**	
Current date	Current Date	Displays current date.
Current time	Current Time	Displays current time.

■ Setting date and time

Menu path

Display	Device setup ► Detailed setup ► Device info ► Date/Time ► (see below)
HART	Maintenance root menu ► Time stamp ► (see below)

Parameter		Description
Display	**HART**	
Set date	-	Sets the current date.
Set time	-	Sets the current time.
-	Set Date/Time	Sets the current date/time.

4.10.5 Display Operation Time

Displays operation time. Operation time refers to the operation time up to the present from the time when the power was turned on for the first time. However, time is not counted when power is not turned on.
This information can be viewed with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Date/Time ► Operation time
HART	Maintenance root menu ► Time stamp ► Operation time

The operation time 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”
This example shows that the product has been operated for 31 days, 12 hours, and 34 minutes.

4.10.6 Explosion Protection Setting

Whether the product is a standard product or an explosion protection product can be set.
When using an explosion protection sensor, set the following parameter to “Yes”.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► Explosion protection
HART	HART Device root menu ► Detailed setup ► Device information ► Order information ► Explosion protection

From the table below, select explosion protection setting.

Selection		**Description**
Display	**HART**	
No	No	No explosion protection setting.
Yes	Yes	Explosion protection.

4.11 Self-diagnostic Function

4.11.1 Types of Diagnosis Functions

This product has a self-diagnostic function for diagnosing device failures or process states. Diagnostic functions of this product are as follows:

Diagnosis function	Description
Alarm high/low limit function	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	Diagnoses deterioration of insulation from a resistance value of the electrode, and displays a warning if it is detected.
Flow noise diagnosis	Measures a flow noise detected in the sensor, and displays a warning if the measured value exceeds the specified value.
Low conductivity diagnosis	Obtains the conductivity from the resistance value and size of the electrode, and displays a warning if the conductivity falls below the specified value.
Coil insulation diagnosis	Diagnoses the current value of exciting current, and displays warning if insulation is detected.

4.11.2 Alarm High/Low Limit Function

The high/low limit function of the alarm displays an alarm when the PV-mapped physical quantity of Subsection 4.1.2 exceeds the specified value. This function also can output an alarm occurrence as a status output.
For details about the status output, refer to Subsection 4.3.9.
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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► H/L alarm cfg ► (see below)
HART	Maintenance root menu ► High/Low alarm configuration ► (see below)

Parameter		Description
Display	**HART**	
High alarm	High alarm	Specifies the high limit to judge an alarm.
Low alarm	Low alarm	Specifies the low limit to judge an alarm.
HH alarm	High high alarm	Specifies the high-high limit to judge an alarm.
LL alarm	Low low alarm	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 PV-mapped physical quantity of Subsection 4.1.2. The hysteresis in each case can be specified with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► H/L alarm cfg ► H/L alarm hyst
HART	Maintenance root menu ► High/Low alarm configuration ► Hi/Lo alarm hysteresis

(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

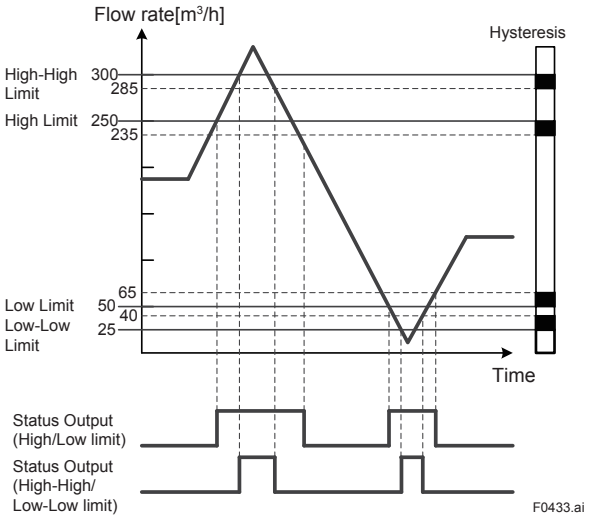
(3) Value that causes a low or low-low limit alarm to be reset

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

Example:
Span of volumetric flow rate = 300 m^3/h,
High-high limit = 300 m^3/h, Low-low limit = 25 m^3/h,
High limit value = 250 m^3/h, Low limit value = 50 m^3/h,
When set to Hysteresis width = 5 %

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

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

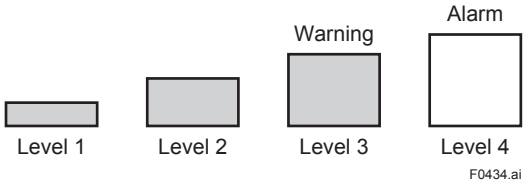


NOTE

When the physical quantity to be output is changed, specify the alarm judgment value again.

4.11.3 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 4.8.1.



This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Adhesion ► (see below)
HART	Diagnostic rootmenu ► Diagnosis ► Adhesion ► (see below)

Parameter		Description
Display	**HART**	
Function	Adhesion function	Specifies the use of the electrode adhesion detecting function.*1
Threshold level 1	Adhesion level 1	Specifies the value to judge level 1.
Threshold level 2	Adhesion level 2	Specifies the value to judge level 2.
Threshold level 3	Adhesion level 3	Specifies the value to judge level 3.
Threshold level 4	Adhesion level 4	Specifies the value to judge level 4.
Result ► Value	Result ► Adhesion value	Displays the resistance value of the electrode.
Result ► Status	Result ► Adhesion status	Displays the electrode adhesion detection level.
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	**HART**	
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

Be sure to use the electrode adhesion detecting 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.

NOTE

The electrode adhesion detecting function restricts fluid conductivity. 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.

4.11.4 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 4.8.1.
This information can be viewed with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Empty check ► (see below)
HART	Diagnostic root menu ► Diagnosis ► Empty ► (see below)

Parameter		Description
Display	**HART**	
Empty status	Result ► Empty status	Display the result of the sensor empty check function.*1
Electrode voltage A	Electrode voltage A	Displays the voltage of electrode A.
Electrode voltage B	Electrode voltage B	Displays the voltage of electrode B.

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

Selection		Description
Display	**HART**	
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.

4.11.5 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 sensors and remote 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 4.8.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
HART	Diagnostic root menu ► Diagnosis ► (see below)

Parameter		Description
Display	**HART**	
Diagnostic execute	Diagnostic Exe	Specifies the use of the wiring connection diagnostic function.*1
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.

Selection		Description
Display	**HART**	
Connect check exe	Connection check execute	Starts the wiring connection diagnostic function.

*2: From the table below, select the output for which the wiring connection diagnostic function is executed.

Selection		Analog output	Totalizer	Pulse output	Frequency output
Display	**HART**				
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.
- When the wiring misconnection diagnostic function is used, the analog output and pulse output are not output correctly.

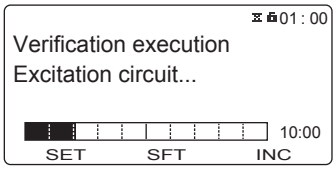
NOTE

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.

4.11.6 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 on the display.



This function can inspect conditions 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 4.11.5 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	

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
HART	Maintenance root menu ► Verification ► (see below)

Parameter		Description
Display	**HART**	
Diagnostic output	Diagnostic output	Specifies the output to execute the verification function.*1

Menu path

Display	Device setup ► Diag/Service ► Verification ► (see below)
HART	Maintenance root menu ► Verification ► (see below)

Parameter		Description
Display	**HART**	
Mode	VF mode	Specifies the fluid state when performing the verification function.*2
Execute	Verification Exe	Specifies the execution of the verification function.*3
VF No	VF No	Specifies the diagnosis result display time.*4
VF target select	VF target select	Specifies the target for diagnosis*5
Result	Result	Displays the diagnosis result of the time set by the VF number.*6

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

Selection		Analog output	Totalizer	Pulse output	Frequency output
Display	**HART**				
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 status required to execute the verification function.

Selection		Description
Display	**HART**	
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.

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

*5: From the table below, select the target for diagnosis.

Selection		Description
Display	HART	
Magnetic circuit	Magnetic	Magnetic circuit diagnosis
Excite circuit	Excitation	Excitation circuit diagnosis
Calc circuit	Calculation	Calculation circuit diagnosis
Device status	Device status	Device alarm diagnosis
Connect 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 an item is set on 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 VF target select are displayed as “Skip”.
Note that verification itself cannot be executed if all diagnoses are unchecked on VF target select (0x0000).

*6: From the table below, select the result.

Parameter		Description
Display	HART	
Failed/Passed	VF check result	Execution result *7
VF operate time	VF operation time	Operation time of verification when started
Magnetic circuit	Magnetic circuit result	Magnetic circuit diagnosis result *7
Excite circuit	Excitation circuit result	Excitation circuit diagnosis result *7
Calc circuit	Calculation circuit result	Calculation circuit diagnosis result *7
Device status	VF device status result	Device alarm diagnosis result *7
Connect status	Connection status result	Wiring misconnection check result *7

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

Result		Description
Display	HART	
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.
- When the electrode insulation deterioration diagnosis function is used, the analog output and pulse output are 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 verification result, refer to the Maintenance Manual.

4.11.7 Electrode Insulation Deterioration Diagnosis

The electrode insulation deterioration diagnosis function diagnoses a deterioration of insulation with a resistance value of the electrode and displays a warning if deterioration of insulation is detected. It takes approximately 5 minutes to complete this diagnosis.
For details about the alarm and warning, refer to Subsection 4.8.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
HART	Diagnostic root menu ► Diagnosis ► (see below)

Parameter		Description
Display	**HART**	
Diagnostic execute	Diagnostic Exe	Specifies the execution of the electrode insulation deterioration diagnostic function.*1
Diagnostic output	Diagnostic output	Specifies the output to execute the electrode insulation deterioration diagnostic function.*2

*1: From the table below, select the use of the electrode insulation deterioration diagnostic function.

Selection		Description
Display	**HART**	
Electrode insul exe	Electronics insulation execute	Starts the electrode insulation deterioration diagnosis function.

*2: From the table below, select the output while the electrode insulation deterioration diagnostic function is executed.

Selection		Analog output	Totalizer	Pulse output	Frequency output
Display	**HART**				
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

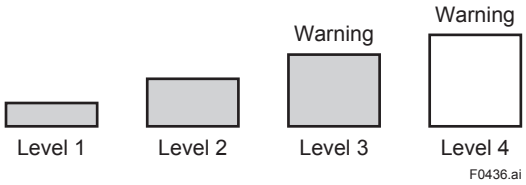
- Before using the electrode insulation deterioration diagnosis function, be sure to disconnect this product from the control loop.
- When the electrode insulation deterioration diagnosis function is used, the analog output and pulse output are not output correctly.

NOTE

Be sure to use the electrode insulation deterioration diagnostic function when the sensor is in the full pipe state. If the sensor is in the empty pipe state, the electrode insulation deterioration diagnosis function may not run normally.

4.11.8 Flow Noise Diagnosis

This function measures a flow noise detected in the sensor, and displays a warning if it 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 4.8.1.
For details about the flow noise span and damping time constant, refer to Subsections 4.1.5 and 4.1.6.



This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► (see below)
HART	Diagnostic root menu ► Diagnosis ► Flow noise ► (see below)

Parameter		Description
Display	**HART**	
Function	Flow noise function	Specifies the use of the flow noise diagnosis function.*1
Threshold level 1	Flow noise level 1	Specifies the value to judge level 1.
Threshold level 2	Flow noise level 2	Specifies the value to judge level 2.
Threshold level 3	Flow noise level 3	Specifies the value to judge level 3.
Threshold level 4	Flow noise level 4	Specifies the value to judge level 4.
Result ► Value	Result ► Flow noise	Displays the flow noise value.
Result ► Status	Result ► Flow noise status	Displays the flow noise level.

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

Selection		Description
Display	**HART**	
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.

4.11.9 Low Conductivity Diagnosis

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 4.8.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Conductivity ► (see below)
HART	Diagnostic root menu ► Diagnosis ► Conductivity ► (see below)

Parameter		Description
Display	**HART**	
Function	Low conductivity function	Specifies the use of the low conductivity diagnosis function.*1
Result ► Value	Result ► Conductivity value	Displays the calculated conductivity.
Low limit	Conductivity low limit	Specifies the value used to judge the low conductivity.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► (see below)
HART	Device root menu ► Detailed setup ► Device information ► Order information ► (see below)

Parameter		Description
Display	**HART**	
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	**HART**	
Disable	Disable	Does not use the low conductivity diagnosis function.
Enable	Enable	Uses the low conductivity diagnosis function.

NOTE

The electrode size is specified upon shipment from the manufacturing factory.
When any parameters related to the order information about the instrument are changed, the order information upon shipment from the manufacturing factory cannot be referred to.
To store the order information defined upon shipment from the manufacturing factory, it is recommended to refer to Section 4.13 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 conductivity may not run normally.

NOTE

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

4.11.10 Coil Insulation Diagnosis

Coil Insulation Diagnosis is the function to display a warning when the insulation is deteriorated by diagnosing the current value of the exciting current.
For details about the alarm and warning, refer to Subsection 4.8.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
HART	Diagnostic root menu ► Diagnosis ► (see below)

Parameter		Description
Display	**HART**	
IEX compare	IEX compare	Displays the current value of Exciting current to judge coil insulation.
Coil insul threshold	Coil insulation threshold	Sets the value to judge coil insulation.

4.11.11 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 viewed with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)
HART	Diagnostic root menu ► Diagnosis ► (see below)

Parameter		Description
Display	**HART**	
V peak hold	V peak hold value	Displays the maximum voltage of the flow signal.
IEX resistance	IEX coil resistance	Displays the coil resistance value.

4.12 Test Mode

4.12.1 Test Mode Setting

If the test mode is executed, a process value 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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Test ► (see below)
HART	Maintenance root menu ► Test ► (see below)

Parameter		Description
Display	**HART**	
Input test ► Test mode	Test mode	Specifies the use of the test mode (input).
Output test ► Test mode		Specifies the use of the test mode (output).

From the table below, select the input/output and process value to test.

Selection		Description
Display	**HART**	
Velocity test	Velocity test on	Starts testing the flow velocity.
Volume test	Volume flow test on	Starts testing the volumetric flow rate.
Mass test	Mass flow test on	Starts testing the mass flow rate.
Calorie test	Calorific value test on	Starts testing the calorie.
AI test	AI test on	Starts testing the analog input.
SI11 test	SI11 test on	Starts testing status input 11.
SI12 test	SI12 test on	Starts testing status input 12.
AO1 test	AO1 test on	Starts testing analog output 1.
PO1 test	Pulse1 test on	Starts testing pulse output/frequency output 1.
SO1 test	SO1 test on	Starts testing status output 1.
AO2 test	AO2 test on	Starts testing analog output 2.
PO2 test	Pulse2 test on	Starts testing pulse output/frequency output 2.
SO2 test	SO2 test on	Starts testing status output 2.
SO11 test	SO11 test on	Starts testing status output 11.
SO12 test	SO12 test on	Starts testing status output 12.
Alarm test	Alm test on	Starts testing alarm output.

A test mode value is transmitted in the order of the flow velocity, volumetric flow rate, mass flow rate, and calorie. For example, if the volumetric flow rate is set as a test value, the mass flow rate and calorie can be obtained from the test value. In this case, the test value of the flow velocity is executed with the normal measurement value.

NOTE

To specify each terminal output, refer to Subsection 4.3.1. If the specified output is different from the test starting output, the test mode cannot be used.
For example, if the pulse/status output is set as a frequency output to start the status output test, the test cannot be started.

4.12.2 Test Value Setting

It is necessary to set test values for the input and output and process value to test.
This setting can be configured with the following parameters.
However, the unit of the process value to test is the same as the unit specified in Subsection 4.1.4. If the unit is changed, the process value is also changed to match to the changed unit.

■ Input test

Menu path

Display	Device setup ► Diag/Service ► Test ► Input test ► (see below)
HART	Maintenance root menu ► Test ► Input test ► (see below)

Parameter		Description
Display	**HART**	
Velocity	Velocity	Specifies the flow velocity.
Volume	Volume flow	Specifies the volumetric flow rate.
Mass	Mass flow	Specifies the mass flow rate.
Calorie	Calorific value	Specifies the calorie.
AI	AI	Specifies to the current value of analog input.
SI11	SI11	Specifies the state of status input 11.
SI12	SI12	Specifies the state of status input 12.

■ Output test

Menu path

Display	Device setup ► Diag/Service ► Test ► Output test ► (see below)
HART	Maintenance root menu ► Test ► Output test ► (see below)

Parameter		Description
Display	**HART**	
AO1	AO1	Specifies to the current value of analog output 1.
PO1	Pulse1	Specifies the frequency of pulse output/frequency output 1.
SO1	SO1	Specifies the state of status output 1.
AO2	AO2	Specifies to the current value of analog output 2.
PO2	Pulse2	Specifies the frequency of pulse output/frequency output 2.
SO2	SO2	Specifies the state of status output 2.
SO11	SO11	Specifies the state of status output 11.
SO12	SO12	Specifies the state of status output 12.
Alarm	Alarm	Specifies the state of alarm output.

4.12.3 Test 2 Mode

The test 2 mode is the function to collectively test a process value, analog output, totalized value, and pulse.
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.

■ Test 2 mode setting

Menu path

Display	Device setup ► Diag/Service ► Test ► Test 2 mode
HART	Maintenance root menu ► Test ► Test 2 mode

Selects whether to enable test 2 mode.

Selection	
Display	**HART**
Normal	Normal
Test	Test

■ Test 2 mode value setting

Menu path

Display	Device setup ► Diag/Service ► Test ► Test 2 value
HART	Maintenance root menu ► Test ► Test 2 output value

Test 2 mode value is set with the percentage (%) for the span.

4.12.4 Test Mode Auto Reset

When a specific time lapses with no parameters changed after the test mode is enabled, the test mode will be reset automatically When any test mode parameter is changed, the test mode reset time is extended.
The time to automatically reset the test mode can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Test ► Release time
HART	Maintenance root menu ► Test ► Release time

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

Selection		Description
Display	**HART**	
10 min	10 min	Specifies the reset time to 10 min.
30 min	30 min	Specifies the reset time to 30 min.
1 h	1 h	Specifies the reset time to 1 hr.
3 h	3 h	Specifies the reset time to 3 hrs.
12 h	12 h	Specifies the reset time to 12 hrs.

4.13 Event Management Function

4.13.1 Backup Function

The backup function can back up 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 device. The display's built-in memory can store the 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 the 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.

This setting can be configured with the following parameters.
For details about the backup parameters, refer to Subsection 4.13.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)
HART	Maintenance root menu ► Param bkup/restore ► (see below)

Parameter		Description
Display	**HART**	
F backup name	Factory backup name	Displays the backup name defined upon shipment from the manufacturing factory.
F backup date	Factory backup date	Displays the backup date upon shipment from the manufacturing factory.
SD backup name	SD backup name	Specifies the name of the file to be backed up to the microSD card.
Backup name 1	Backup name 1	Specifies backup name 1. Up to 16 characters
Backup date 1	Backup date 1	Specifies date 1.
Backup name 2	Backup name 2	Specifies backup name 2. Up to 16 characters
Backup date 2	Backup date 2	Specifies date 2.
Backup name 3	Backup name 3	Specifies backup name 3. Up to 16 characters
Backup date 3	Backup date 3	Specifies date 3.
Backup execute	Backup Exe	Specifies the use of the backup function.*1
Backup result	—	Displays the backup result.*2 Displays results in the method for HART communication.

*1: From the table below, select how the backup function is to be used.

Selection		Description
Display	**HART**	
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.

Selection		Description
Display	HART	
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	HART	
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	HART		
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	✓
021:PWM 1 stop	21	PWM1 stop	—
022:PWM 2 stop	22	PWM2 stop	—
023:Opt bd mismatch	23	Option board mismatch	—
024:Opt bd EEP FAIL	24	Option board EEPROM failure	—
025:Opt bd A/D FAIL	25	Option board A/D failure	—
026:Opt bd SPI FAIL	26	Option board SPI failure	—
027:Restore FAIL	27	Parameter restore incomplete	✓
028:Ind bd FAIL	28	Indicator board failure	—
029:Ind bd EEP FAIL	29	Indicator board EEPROM 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	✓
052:H/L HH/LL alm	52	H/L or HH/LL alarm	✓
053:Adh over lv 4	53	Adhesion over level 4	✓
060:Span cfg ERR	60	Span configuration error	—
061:PV F cfg ERR	61	PV flow select configuration error	—
062:AO 1 4-20 lmt	62	Analog output 1 4-20mA limit error	—
063:AO 2 4-20 lmt	63	Analog output 2 4-20 mA limit error	—
064:AO 1 mlt rng	64	Analog output 1 multi range error	—
065:H/L cfg ERR	65	H/L HH/LL configuration error	—
066:Density cfg ERR	66	Density configuration error	—
067:Pls 1 cfg ERR	67	Pulse output 1 configuration error	—
068:Pls 2 cfg ERR	68	Pulse output 2 configuration error	—
069:Nomi size cfg	69	Nominal size configuration error	—

Alarm name			Backup
Display	HART		
070:Adh cfg ERR	70	Adhesion configuration error	—
071:FLN cfg ERR	71	Flow noise configuration error	—
072:Log not start	72	Data logging not started	—
080:AO 1 saturate	80	Analog output 1 saturated	✓
081:AO 2 saturate	81	Analog output 2 saturated	✓
082:Pls 1 saturate	82	Pulse output 1 saturated	✓
083:Pls 2 saturate	82	Pulse output 2 saturated	✓
084:AI saturate	84	Analog input saturated	✓
085:Cable miscon	85	Cable misconnect	✓
086:Coil insulation	86	Coil insulation warning	✓
131:Trans mismatch	131	Transmitter type mismatch	—
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	✓
096:AO 1 fix	96	Analog output 1 fixed	✓
097:AO 2 fix	97	Analog output 2 fixed	✓
098:Pls 1 fix	98	Pulse output 1 fixed	✓
099:Pls 2 fix	99	Pulse output 2 fixed	✓
100:AI fix	100	Analog input 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 procedure 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	✓
130:DevID not enter	130	Device ID not entered	✓

IMPORTANT

- Note that parameters cannot be changed when the backup function is executed. 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.

4.13.2 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. In addition, 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.

IMPORTANT

- For the remote type, it is necessary to set the device information of the remote sensor to the parameters of the remote transmitter.
- Before using the restore function, be sure to remove this product from piping line or stop the line.
- After executing the restore function, check that backup data is set for the target parameter.

The restore method can be selected from the following four types.

Duplicate Data	Restores the target parameter (excluding the factory adjusted value of the transmitter) from the product for which the parameter is backed up. Restore is also executable for other products.
Restore Data	Restores the target parameter (including the factory adjusted value of the transmitter) from the product for which the parameter is backed up. Restore is not executable for other products.
Compulsion Data	Restores the target parameter (specified at factory shipping) from the product for which the parameter is backed up. Restore is also executable for other products.
Restore factory	Restores all the parameters (specified upon 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.

✓: Items to be Matched.

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

This setting can be configured with the following parameters.
For details about the restorable parameters, refer to Subsection 4.13.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)
HART	Maintenance root menu ► Param bkup/restore ► (see below)

Parameter		Description
Display	**HART**	
Restore execute	Restore Exe	Specifies the execution of the restore function.*1
Restore result	—	Displays the restore result.*2

*1: From the table below, select the execution of the restore function.

Selection		Description
Display	**HART**	
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 upon shipment from the manufacturing factory.

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

Selection		Description
Display	**HART**	
Unexecuted	Unexecuted	Have not restored
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
Display	HART		
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	✓
021:PWM 1 stop	21	PWM1 stop	—
022:PWM 2 stop	22	PWM2 stop	—
023:Opt bd mismatch	23	Option board mismatch	—
024:Opt bd EEP FAIL	24	Option board EEPROM failure	—
025:Opt bd A/D FAIL	25	Option board A/D failure	—
026:Opt bd SPI FAIL	26	Option board SPI failure	—
027:Restore FAIL	27	Parameter restore incomplete	✓
028:Ind bd FAIL	28	Indicator board failure	—
029:Ind bd EEP FAIL	29	Indicator board EEPROM 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	✓
052:H/L HH/LL alm	52	H/L or HH/LL alarm	✓
053:Adh over lv 4	53	Adhesion over level 4	✓
060:Span cfg ERR	60	Span configuration error	—
061:PV F cfg ERR	61	PV flow select configuration error	—
062:AO 1 4-20 lmt	62	Analog output 1 4-20mA limit error	—
063:AO 2 4-20 lmt	63	Analog output 2 4-20 mA limit error	—
064:AO 1 mlt rng	64	Analog output 1 multi range error	—
065:H/L cfg ERR	65	H/L HH/LL configuration error	—
066:Density cfg ERR	66	Density configuration error	—
067:Pls 1 cfg ERR	67	Pulse output 1 configuration error	—
068:Pls 2 cfg ERR	68	Pulse output 2 configuration error	—
069:Nomi size cfg	69	Nominal size configuration error	—
070:Adh cfg ERR	70	Adhesion configuration error	—
071:FLN cfg ERR	71	Flow noise configuration error	—
072:Log not start	72	Data logging not started	—
080:AO 1 saturate	80	Analog output 1 saturated	✓
081:AO 2 saturate	81	Analog output 2 saturated	✓
082:Pls 1 saturate	82	Pulse output 1 saturated	✓
083:Pls 2 saturate	83	Pulse output 2 saturated	✓
084:AI saturate	84	Analog input saturated	✓
085:Cable miscon	85	Cable misconnect	✓
086:Coil insulation	86	Coil insulation warning	✓
131:Trans mismatch	131	Transmitter type mismatch	—
087:Adhesion lv 3	87	Adhesion over level 3	✓
088:LC warn	88	Low conductivity warning	✓

Alarm name			Restore
Display	HART		
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	✓
096:AO 1 fix	96	Analog output 1 fixed	✓
097:AO 2 fix	97	Analog output 2 fixed	✓
098:Pls 1 fix	98	Pulse output 1 fixed	✓
099:Pls 2 fix	99	Pulse output 2 fixed	✓
100:AI fix	100	Analog input 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 procedure 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	✓
130:DevID not enter	130	Device ID not entered	✓

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.

4.13.3 Backup and Restore Parameters

The list below shows the parameters that can be backed up or restored. However, the date to be restored with “Compulsion Data” is the value(s) specified by the customer upon shipment from the manufacturing factory. (Default value when not designated)

Parameter		Restore or Duplicate			
Display	HART	Duplicate Data	Restore Data	Compulsion Data	Restore factory
Damp AO/F	Velocity damping AO/frequency	✓	✓	—	✓
Damp pls/ttl	Velocity damping pulse/total	✓	✓	—	✓
Damp AO/F	Volume flow damping AO/frequency	✓	✓	—	✓
Damp pls/ttl	Volume flow damping pulse/total	✓	✓	—	✓
Damp AO/F	Mass flow damping AO/frequency	✓	✓	—	✓
Damp pls/ttl	Mass flow damping pulse/total	✓	✓	—	✓
Damp AO/F	Calorific value damping AO/ frequency	✓	✓	—	✓
Damp pls/ttl	Calorific value damping pulse/total	✓	✓	—	✓
Low MF	Low MF	✓	✓	✓	✓
High MF	High MF	✓	✓	✓	✓
Flow sensor sel	Flow sensor select	✓	✓	—	✓
Nominal size unit	Nominal size unit	✓	✓	✓	✓
Nominal size	Nominal size	✓	✓	✓	✓
PV flow select	PV flow select	✓	✓	✓	✓
Unit	Velocity unit	—	—	✓	✓
Unit	Volume flow unit	—	—	✓	✓
Unit	Mass flow unit	—	—	✓	✓
Time unit	Time unit	—	—	✓	✓
Span	Velocity span	✓	✓	✓	✓
Span	Volume flow span	✓	✓	✓	✓
Span	Mass flow span	✓	✓	✓	✓
Span	Calorific flow span	✓	✓	—	✓
Zero value	Zero value	✓	✓	—	✓
Conv factor	Total1 conv factor	—	—	✓	✓
Low cut	Total1 low cut	✓	✓	✓	✓
Failure opts	Total1 fail opts	✓	✓	—	✓
Options	Total1 options	✓	✓	—	✓
Start/Stop	Total1 Start/Stop	✓	✓	—	✓
Reset/Preset	Total1 Reset/Preset	✓	✓	—	✓
Preset value	Total1 preset value	✓	✓	—	✓
Set point	Total1 set point	✓	✓	—	✓
Low cut	Total2 low cut	✓	✓	—	✓
Failure opts	Total2 fail opts	✓	✓	—	✓
Options	Total2 options	✓	✓	—	✓
Start/Stop	Total2 Start/Stop	✓	✓	—	✓
Reset/Preset	Total2 Reset/Preset	✓	✓	—	✓
Preset value	Total2 preset value	✓	✓	—	✓
Set point	Total2 set point	✓	✓	—	✓
Low cut	Total3 low cut	✓	✓	—	✓
Failure opts	Total3 fail opts	✓	✓	—	✓
Options	Total3 options	✓	✓	—	✓
Start/Stop	Total3 Start/Stop	✓	✓	—	✓
Reset/Preset	Total3 Reset/Preset	✓	✓	—	✓
Preset value	Total3 preset value	✓	✓	—	✓
Set point	Total3 set point	✓	✓	—	✓
Output mode	Pulse1 output mode	✓	✓	✓	✓
Active mode	Pulse1 active mode	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	HART	Duplicate Data	Restore Data	Compulsion Data	Restore factory
Fix width	Pulse1 fix width	✓	✓	—	✓
Rate unit	Pulse1 rate unit	—	—	✓	✓
Rate value	Pulse1 rate value	✓	✓	✓	✓
Low cut	Pulse1 low cut	✓	✓	✓	✓
Alarm out	Pulse1 alarm out	✓	✓	—	✓
Frequency at 0%	Frequency1 at 0%	✓	✓	✓	✓
Frequency at 100%	Frequency1 at 100%	✓	✓	✓	✓
SO1 function	Status output1 function	✓	✓	—	✓
Options	Pulse1 option	✓	✓	—	✓
Active pulse	Pulse2 active pulse	✓	✓	—	✓
Output mode	Pulse2 output mode	✓	✓	—	✓
Pulse select	Pulse2 select	✓	✓	—	✓
Active mode	Pulse2 active mode	✓	✓	—	✓
Fix width	Pulse2 fix width	✓	✓	—	✓
Rate value	Pulse2 rate value	✓	✓	—	✓
Low cut	Pulse2 low cut	✓	✓	—	✓
Alarm out	Pulse2 alarm out	✓	✓	—	✓
Frequency at 0%	Frequency2 at 0%	✓	✓	—	✓
Frequency at 100%	Frequency2 at 100%	✓	✓	—	✓
SO2 function	Status output2 function	✓	✓	—	✓
Options	Pulse2 option	✓	✓	—	✓
Active mode	Status output11 active mode	✓	✓	—	✓
Function	Status output11 function	✓	✓	—	✓
Active mode	Status output12 active mode	✓	✓	—	✓
Function	Status output12 function	✓	✓	—	✓
Active mode	Status input11 active mode	✓	✓	—	✓
Function	Status input11 function	✓	✓	—	✓
Active mode	Status input12 active mode	✓	✓	—	✓
Function	Status input12 function	✓	✓	—	✓
Forward span 2	Forward span 2	✓	✓	—	✓
Forward span 3	Forward span 3	✓	✓	—	✓
Forward span 4	Forward span 4	✓	✓	—	✓
Reverse span 1	Reverse span 1	✓	✓	—	✓
Reverse span 2	Reverse span 2	✓	✓	—	✓
Reverse span 3	Reverse span 3	✓	✓	—	✓
Reverse span 4	Reverse span 4	✓	✓	—	✓
Auto range hyst	Auto range hyst	✓	✓	—	✓
Bi direction hyst	Bi direction hyst	✓	✓	—	✓
Low cut	AO1 low cut	✓	✓	—	✓
High limit	AO1 high limit	✓	✓	—	✓
Low limit	AO1 low limit	✓	✓	—	✓
Alarm out	AO1 alarm out	✓	✓	✓	✓
Range mode	AO1 range mode	✓	✓	—	✓
AO2 select	AO2 select	✓	✓	—	✓
Low cut	AO2 low cut	✓	✓	—	✓
High limit	AO2 high limit	✓	✓	—	✓
Low limit	AO2 low limit	✓	✓	—	✓
Alarm out	AO2 alarm out	✓	✓	—	✓
Function	AI function	✓	✓	—	✓
URV	AI URV	✓	✓	—	✓
LRV	AI LRV	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	HART	Duplicate Data	Restore Data	Compulsion Data	Restore factory
AO1 trim 4mA	AO1 Trim	✓	✓	—	✓
AO1 trim 20mA		✓	✓	—	✓
AO2 trim 4mA	AO2 Trim	✓	✓	—	✓
AO2 trim 20mA		✓	✓	—	✓
Flow direct	Flow direction	✓	✓	—	✓
Rate limit	Rate limit	✓	✓	—	✓
Dead time	Dead time	✓	✓	—	✓
Noise filter	Noise filter	✓	✓	—	✓
Pulsing flow	Pulsing flow	✓	✓	—	✓
Power sync	Power synchronize	✓	✓	✓	✓
Set power freq	Set power frequency	✓	✓	✓	✓
Value select	Density value select	✓	✓	—	✓
Fixed density	Density fixed value	✓	✓	✓	✓
Std density	Standard density	✓	✓	—	✓
Std temperature	Standard temperature	✓	✓	—	✓
Coef A1	Temp coef A1	✓	✓	—	✓
Coef A2	Temp coef A2	✓	✓	—	✓
Specific heat	Specific heat	✓	✓	—	✓
Fixed temperature	Calorific fix temp	✓	✓	—	✓
High alarm	High alarm	✓	✓	—	✓
Low alarm	Low alarm	✓	✓	—	✓
HH alarm	High high alarm	✓	✓	—	✓
LL alarm	Low low alarm	✓	✓	—	✓
H/L alarm hyst	Hi/Lo alarm hysteresis	✓	✓	—	✓
Line 1	Display select1	—	—	✓	✓
Line 2	Display select2	—	—	✓	✓
Line 3	Display select3	—	—	✓	✓
Line 4	Display select4	—	—	✓	✓
Line 5	Display select5	—	—	✓	✓
Line 6	Display select6	—	—	✓	✓
Line 7	Display select7	—	—	✓	✓
Line 8	Display select8	—	—	✓	✓
Format PV	Display format PV	—	—	✓	✓
Line mode	Display line	—	—	✓	✓
Disp install	Display installation	—	—	✓	✓
—	IRSW operation	—	—	✓	✓
Tag No	Tag	—	—	✓	✓
Long tag	Long tag	—	—	✓	✓
Electrode size	Electrode size	✓	✓	—	✓
Model code	Basic model code	✓	✓	—	✓
Suffix config 1	Suffix config 1	✓	✓	—	✓
Suffix config 2	Suffix config 2	✓	✓	—	✓
Option 1	Option 1	✓	✓	—	✓
Option 2	Option 2	✓	✓	—	✓
Option 3	Option 3	✓	✓	—	✓
Option 4	Option 4	✓	✓	—	✓
Model code	Remote sensor basic model code	✓	✓	—	✓
Suffix config 1	Remote sensor suffix config 1	✓	✓	—	✓
Suffix config 2	Remote sensor suffix config 2	✓	✓	—	✓
Option 1	Remote sensor option 1	✓	✓	—	✓
Option 2	Remote sensor option 2	✓	✓	—	✓
Option 3	Remote sensor option 3	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	HART	Duplicate Data	Restore Data	Compulsion Data	Restore factory
Option 4	Remote sensor option 4	✓	✓	—	✓
Trans serial No	Transmitter serial No	✓	✓	—	✓
Sensor serial No	Sensor serial No	✓	✓	—	✓
Function	Adhesion function	✓	✓	✓	✓
Threshold level 1	Adhesion level 1	✓	✓	—	✓
Threshold level 2	Adhesion level 2	✓	✓	—	✓
Threshold level 3	Adhesion level 3	✓	✓	—	✓
Threshold level 4	Adhesion level 4	✓	✓	—	✓
Check cycle	Adhesion check cycle	✓	✓	—	✓
Function	Flow noise function	✓	✓	—	✓
Threshold level 1	Flow noise level 1	✓	✓	—	✓
Threshold level 2	Flow noise level 2	✓	✓	—	✓
Threshold level 3	Flow noise level 3	✓	✓	—	✓
Threshold level 4	Flow noise level 4	✓	✓	—	✓
Damp	Flow noise damping	✓	✓	—	✓
Span	Flow noise span	✓	✓	✓	✓
Function	Low conductivity function	✓	✓	—	✓
Low limit	Conductivity low limit	✓	✓	—	✓
Coil insul threshold	Coil insulation threshold	✓	✓	—	✓
IEX compare	IEX compare	✓	✓	—	✓
Diagnostic output	Diagnostic output	✓	✓	—	✓
Mode	VF mode	✓	✓	—	✓
VF No	VF No	✓	✓	—	✓
Release time	Release time	✓	✓	—	✓

4.13.4 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.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Data log ► (see below)
HART	Maintenance root menu ► Data logging ► (see below)

Parameter		Description
Display	**HART**	
File name	File name	Specifies the name of the file to be stored.
Interval time	Interval time	Specifies the data storage interval.*1
Start date	Start date	Displays the date to start the data logging function.
Start time	Start time	Displays the time to start the data logging function.
End time	End time	Specifies the time to end the data logging function.*2
Log 1	Log1 select	Specifies process value 1 to be stored.*3
Log 2	Log2 select	Specifies process value 2 to be stored.*3
Log 3	Log3 select	Specifies process value 3 to be stored.*3
Log 4	Log4 select	Specifies process value 4 to be stored.*3
Execute	Logging Exe	Specifies the execution of the data logging function.*4

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

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

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

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

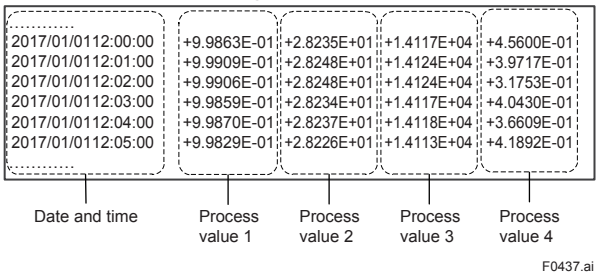
*3: From the table below, select the process value to be stored.

Selection		Description
Display	HART	
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.
PV	PV	Stores the PV-mapped process value of Subsection 4.1.2.
Adhesion	Adhesion	Stores the resistance value of the electrode adhesion detection.
Flow noise	Flow noise	Stores the flow noise value.
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.

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

Selection		Description
Display	HART	
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 storage interval during a period from the start of the data logging function to the end. The file stored by 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.



F0437.ai

The access ongoing to the microSD card can be confirmed by the icon on the display. For example, the icons of “microSD card ready” and “Access to microSD card” are displayed alternately and repeatedly because the product accesses the microSD card periodically during its data logging.
When the microSD card cannot be accessed to remove, the icon of “Error accessing microSD card” is displayed.
Insert the microSD card again when it is necessary to use this function again. An alarm of “microSD failure” occurs when the microSD card has any problems.

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

IMPORTANT

- When using the data logging function, be sure to set the date and time information.
- Before using the data logging function, make sure that the microSD card is prepared. It takes approximately 1 minute until the product is ready to store data on the microSD card after it has been turned on.
- Note that the date and time information are reset if this product is turned off.
- Note that if the microSD card runs out of free space, the subsequent data will not be stored.

4.14 Parameter Protection

4.14.1 Software Write Protection Function

Write protect can be specified by two methods; the hardware write protect switch and software write protect. When the write protect is set using one of these methods, data cannot be written to a parameter. For details about the hardware write protection switch, refer to the Installation Manual.
To enable the software write protection function, it is necessary to specify a “New password” (eight alphanumeric characters, excluding lowercase). By inputting the password in “Enable write”, it becomes possible to disable the write protection only for 10 minutes. The write protection function can be completely disabled by entering eight spaces in “New password” while the protection is disabled temporarily.
The write protection function can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Protection ► (see below)
HART	Device root menu ► Detailed setup ► Protection ► (see below)

Parameter		Description
Display	**HART**	
Write protect sts	Write protect	Indicates the use of the write protection function.*1
Enable write	Enable write 10 min	Cancels the write protection function only for 10 minutes.
New password	New password	Specifies a new pass word for the write protection function.

*1: Display of the use status of the write protection function

Value		Description
Display	**HART**	
No	No	The write protection function is not in use. (Parameter can be changed)
Yes	Yes	The write protection function is being used. (Parameter cannot be changed)

NOTE

The usage status of the write protect function can be checked by the icon displayed on the parameter or display.
The following icons are displayed.

Icon	Description
	Write protect Disable (Parameters can be changed)
	Write protect Enable (Parameter cannot be changed)

NOTE

When the write protection switch on the amplifier board is turned on, no parameters can be changed.
To change a parameter, cancel the write protection function with the pre-specified password and specify a new password.

If the password is forgotten, it is possible to temporarily disable the software write protection function by using the Joker password.
When the write protection function is disabled using the Joker password, “Break” is displayed as the software seal (because the write protection is not disabled with the regular route). To set the software seal back to “Keep”, it needs to set the write protection again. When the write protection is temporarily disabled using the formal password, the software seal is set back from “Break” to “Keep”.
The use of the Joker password seal can be checked by the following parameter.

Menu path

Display	Device setup ► Detailed setup ► Protection ► Soft seal status
HART	Device root menu ► Detailed setup ► Protection ► Software seal

Check the use of the Joker password depending on the following parameters.

Value		Description
Display	**HART**	
Keep	Keep	Normal
Break	Break	Disable the write protection function using the Joker password.

NOTE

If it is necessary to use the Joker password, contact Yokogawa sales office or representative.

4.14.2 Display Restriction Function

Access to the service mode is limited.

Menu path

Display	Device setup ► Detailed setup ► Protection ► Key code

5. Parameter Lists

This chapter shows parameter lists of the display and HART communication.

Each parameter is set as specified at the time of ordering. Since other parameters have default values set, be sure to refer to this chapter when changing them.

IMPORTANT

If this product is turned off before 30 seconds after setting the parameters, the settings will not be saved correctly. Please keep the product turned on for over 30 seconds after setting the parameters.

NOTE

To obtain correct flow signals, it is necessary to set the nominal size, flow rate span and meter factor of the flow sensor. The nominal size and meter factor of the flow sensor are set on this product when shipped from the manufacturing factory, and a customer is not required to set them.
If a particular parameters is specified at the time of order, this product is shipped with the parameter specified. If a parameter is not specified at the time of order, that parameter needs to be set by the customer.

NOTE

The available functions and parameters displayed vary depending on a type of the connection terminal specified at the time of ordering.

✓: Parameter displayed

Function of terminal	Description	Communication and I/O Code					
		J0	J2	J3	J4	J5	J6
Analog output 1	Regardless of the code selection, parameters related to analog output 1 are displayed.	✓	✓	✓	✓	✓	✓
Analog output 2	Depending on the code selection, parameters related to analog output 2 may not be displayed. No.7-6 to 7-10, 7-21 to 7-23, 13-9	-	-	-	-	-	✓
Alarm output	Regardless of the code selection, parameters related to the alarm output are displayed.	✓	✓	✓	✓	✓	✓
Pulse Status output 1	Regardless of the code selection, parameters related to pulse/ status output 1 are displayed.	✓	✓	✓	✓	✓	✓
Pulse Status output 2	Depending on the code selection, parameters related to pulse/ status output 2 may not be displayed. No.5-11 to 5-22, 13-10 to 13-11	-	-	✓	✓	✓	-
Status output	Depending on the code selection, parameters related to the status output may not be displayed.	✓	✓	✓	✓	✓	✓
Status input	Depending on the code selection, parameters related to the status input may not be displayed. No.6-3 to 6-5, 13-14	✓	✓	✓	✓	✓	✓
Analog input	Depending on the code selection, parameters related to the analog input may not be displayed. No.7-11 to 7-17, 7-24 to 7-26, 8-13 to 8-21, 13-5, 13-12	-	✓	-	-	-	-

The parameter list consists of the following items.

Parameter Name	Indicates a parameter name.
R/W	Indicates parameters which can be displayed and set. R: Displayed only, RW: Displayed and specified. However, when changing parameters on the display, a parameter which can be set depends on operation levels. Operator: Possible to set a display language on the display and parameters related to display items. Maintenance: Possible to set parameters allowed to set with the operator level and parameters related to zero adjustment. Specialist: Possible to set all writable parameters.
Data range	Indicates options for select type data. Indicates the setting range and the number of decimal places for numeric-type data. Indicates the limited number of characters for alphanumeric type data.
Default value	Indicates the default value upon shipment from the manufacturing factory.
Unit	Indicates the unit of the data range.
Reference	Reference page of parameter contents.

(1) Display parameters

These parameters are related to flow and totalizer display.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
1-1	PV % rnge	Flow rate(%)	-999.999 to +999.999 Number of decimal places: 3	-99999.9 to +99999.9 Number of decimal places: 1	R	-	%	P.39
1-2	PV	Flow rate	-999999 to +999999 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	R	-	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.39
1-3	AO1 current	Analog out 1	0.000 to +99.999 Number of decimal places: 3	0.000 to +99.999 Number of decimal places: 3	R	-	mA	P.73
1-4	Totalizer1	Totalizer 1	-999999 to +999999 Number of decimal places: 0 to 5	-99999999 to +99999999 Number of decimal places: 0 to 5	R	-	No.4-1	P.54
1-5	Totalizer2	Totalizer 2	-999999 to +999999 Number of decimal places: 0 to 5	-99999999 to +99999999 Number of decimal places: 0 to 5	R	-	No.4-10	P.54
1-6	Totalizer3	Totalizer 3	-999999 to +999999 Number of decimal places: 0 to 5	-99999999 to +99999999 Number of decimal places: 0 to 5	R	-	No.4-19	P.54
1-7	Totalizer1 count	Totalizer 1 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.55
1-8	Totalizer2 count	Totalizer 2 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.55
1-9	Totalizer3 count	Totalizer 3 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.55
1-10	Velocity	Velocity	-999999 to +999999 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	R	-	No.3-15	P.40
1-11	Volume flow	Volume	-999999 to +999999 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	R	-	No.3-16/ No.3-19	P.40
1-12	Mass flow	Mass	-999999 to +999999 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	R	-	No.3-17/ No.3-19	P.40
1-13	AO2 current	Analog out 2	0.000 to +99.999 Number of decimal places: 3	0.000 to +99.999 Number of decimal places: 3	R	-	mA	P.73

*2: The range of single precision float (IEEE 754).

(2) Easy configuration parameters

These parameters are frequently used general functions. Parameters for No.2-2 to 2-14 can be set by using the Easy setup wizard function.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
2-1	Language	Language	English French German Italian Spanish Portuguese Russian Chinese Japanese	English French German Italian Spanish Portuguese Russian Chinese Japanese	RW	English	-	P.119
2-2	Volume flow damping AO/frequency	Damp AO/F	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.42
2-3	Volume flow damping pulse/total	Damp pls/ttl	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.43
2-4	Volume flow unit	Unit	Ml(Megaliter) m^3 kl(Kiloliter) l(liter) cm^3	Ml(Megaliter) m^3 kl(kiloliter) l(liter) cm^3	RW	m^3 *1	-	P.40
2-5	Time unit	Time unit	/s /min /h	/s /min /h	RW	/h *1	-	P.41
2-6	Volume flow span	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.00 *1	No.3-16/ No.3-19	P.41
2-7	Pulse1 rate unit	P1 unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	RW	Unit/P *1	-	P.65
2-8	Pulse1 rate value	P1 val	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.5-4	P.64
2-9	Frequency1 at 0%	F1 at 0%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66
2-10	Frequency1 at 100%	F1 at 100%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66
2-11	Display select1	Line 1	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number Long tag Commun Protocol Adhesion Analog out1 Analog out2 Flow noise level Totalizer1 count Totalizer2 count Totalizer3 count	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	PV	-	P.120

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
2-12	Display select2	Line 2	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number Long tag Commun Protocol Adhesion Analog out1 Analog out2 Flow noise level Totalizer1 count Totalizer2 count Totalizer3 count	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	Flow rate(%)	-	P.120
2-13	Display select3	Line 3			RW	Analog out 1	-	P.120
2-14	Autozero Exe	Autozero exe	Not execute Execute	Not execute Execute	RW	Not execute	-	P.52

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

(3) Basic configuration parameters

These parameters are related to basic settings, such as a flow sensor.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
3-1	Velocity damping AO/ frequency	Damp AO/F	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.42
3-2	Velocity damping pulse/total	Damp pls/ttl	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.43
3-3	Volume flow damping AO/frequency	Damp AO/F	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.42
3-4	Volume flow damping pulse/total	Damp pls/ttl	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.43
3-5	Mass flow damping AO/frequency	Damp AO/F	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.42
3-6	Mass flow damping pulse/total	Damp pls/ttl	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.43
3-7	Calorific value damping AO/ frequency	Damp AO/F	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.42
3-8	Calorific value damping pulse/total	Damp pls/ttl	+0.1 to +200.0 Number of decimal places: 1	+0.1 to +200.0 Number of decimal places: 1	RW	3.0	s	P.43
3-9	Low MF	Low MF	+0.0100 to +3.0000 Number of decimal places: 4	+0.0100 to +3.0000 Number of decimal places: 4	RW	1.0000 *1	-	P.46
3-10	High MF	High MF	+0.0100 to +3.0000 Number of decimal places: 4	+0.0100 to +3.0000 Number of decimal places: 4	RW	1.0000 *1	-	P.46
3-11	Flow sensor select	Flow sensor sel	ADMAG AXG ADMAG AXW ADMAG AXF ADMAG ADMAG AE ADMAG SE YEWMAG Calibrator Other1 Other2 Other3	ADMAG AXG ADMAG AXW ADMAG AXF ADMAG ADMAG AE ADMAG SE YEWMAG Calibrator Other 1 Other 2 Other 3	RW	ADMAG AXG *1	-	P.47
3-12	Nominal size unit	Nominal size unit	mm inch	mm inch	RW	mm	-	P.48
3-13	Nominal size	Nominal size	+0.01000 to +3000.0 Number of decimal places: 0 to 5	+0.01000 to +3000.0 Number of decimal places: 0 to 5	RW	100 *1	No.3-12	P.48
3-14	PV flow select	PV flow select	Velocity Volume Mass Diag	Velocity Volume Mass Diag	RW	Volume *1	-	P.39
3-15	Velocity unit	Unit	m/s ft/s	m/s ft/s	RW	m/s *1	-	P.40
3-16	Volume flow unit	Unit	Ml(Megaliter) m^3 kl(Kiloliter) l(liter) cm^3 kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer)	Ml(Megaliter) m^3 kl(kiloliter) l(liter) cm^3 kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer)	RW	m^3 *1	-	P.40
3-17	Mass flow unit	Unit	t kg g klb lb	t kg g klb lb	RW	kg *1	-	P.40
3-18	Calorific unit	Unit	MJ kJ J kcal cal BTU	MJ kJ J kcal cal BTU	RW	J	-	P.40

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
3-19	Time unit	Time unit	/s /min /h /d	/s /min /h /d	RW	/h *1	-	P.41
3-20	Velocity span	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.00000 *1	No.3-15	P.41
3-21	Volume flow span	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.00000 *1	No.3-16/ No.3-19	P.41
3-22	Mass flow span	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.00000 *1	No.3-17/ No.3-19 [kg/h]	P.41
3-23	Calorific flow span	Span	+0.00000 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.00000	No.3-18/ No.3-19 [J/h]	P.41
3-24	Velocity check	Velocity check	-99.999 to +99.999 Number of decimal places: 3	-99.999 to +99.999 Number of decimal places: 3	R	-	m/s	P.49
3-25	User span select AO1	Select	No Yes	No Yes	RW	No	-	P.50
3-26	User unit AO1	Unit	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.50
3-27	User span AO1	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	100.000	-	P.51
3-28	User span select AO2	Select	No Yes	No Yes	RW	No	-	P.50
3-29	User unit AO2	Unit	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.50
3-30	User span AO2	Span	+0.00001 to +INF*2 Number of decimal places: 0 to 5	+0.00001 to +999999 Number of decimal places: 0 to 5	RW	100.000	-	P.51
3-31	Autozero Exe	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.52
3-32	Zero value	Zero value	-99.999 to +99.999 Number of decimal places: 3	-99.999 to +99.999 Number of decimal places: 3	RW	0.000	cm/s	P.53

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

(4) Totalization configuration parameters

These parameters are related to the totalization function.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
4-1	Total1 unit	Unit	Ml(Megaliter) m^3 kl(Kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US)	Ml(Megaliter) m^3 kl(kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US)	R	-	-	P.54
4-2	Total1 conv factor	Conv factor	-INF*2 to +INF*2 Unable to input 0 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	1.00000	No.4-1	P.55
4-3	Total1 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000 *1	Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Calorie: No.3-18/ No.3-19	P.44
4-4	Total1 fail opts	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.56
4-5	Total1 options	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Only positive	-	P.57
4-6	Total1 Start/Stop	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.57
4-7	Total1 Reset/Preset	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.58
4-8	Total1 preset value	Preset value	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.00000	Volumetric flow rate: No.3-16 Mass flow rate: No.3-17 Calorie: No.3-18	P.59
4-9	Total1 set point	Set point	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000	Volumetric flow rate: No.3-16 Mass flow rate: No.3-17 Calorie: No.3-18	P.56

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).
*3: Displayed only when analog input is valid.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
4-10	Total2 unit	Unit	Ml(Megaliter) m^3 kl(Kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US) MJ*3 kJ*3 J*3 kcal*3 cal*3 BTU*3	Ml(Megaliter) m^3 kl(kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US) MJ*3 kJ*3 J*3 kcal*3 cal*3 BTU*3	RW	m^3	-	P.54
4-11	Total2 conv factor	Conv factor	-INF*2 to +INF*2 Unable to input 0 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	1.00000	No.4-10	P.55
4-12	Total2 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-10/ No.3-19	P.44
4-13	Total2 fail opts	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.56
4-14	Total2 options	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Only negative	-	P.57
4-15	Total2 Start/Stop	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.57
4-16	Total2 Reset/Preset	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.58
4-17	Total2 preset value	Preset value	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-10	P.59
4-18	Total2 set point	Set point	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-10	P.56

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).
*3: Displayed only when analog input is valid.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
4-19	Total3 unit	Unit	Ml(Megaliter) m^3 kl(Kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US) MJ*3 kJ*3 J*3 kcal*3 cal*3 BTU*3	Ml(Megaliter) m^3 kl(kiloliter) l(liter) cm^3 t kg g kcf cf mcf Mgal(US) kgal(US) gal(US) mgal(US) kbbl(US Oil) bbl(US Oil) mbbl(US Oil) ubbl(US Oil) kbbl(US Beer) bbl(US Beer) mbbl(US Beer) ubbl(US Beer) klb(US) lb(US) MJ*3 kJ*3 J*3 kcal*3 cal*3 BTU*3	RW	m^3	-	P.54
4-20	Total3 conv factor	Conv factor	-INF*2 to +INF*2 Unable to input 0 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	1.00000	No.4-19	P.55
4-21	Total3 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-19/ No.3-19	P.44
4-22	Total3 fail opts	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.56
4-23	Total3 options	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Balanced	-	P.57
4-24	Total3 Start/Stop	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.57
4-25	Total3 Reset/Preset	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.58
4-26	Total3 preset value	Preset value	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-19	P.59
4-27	Total3 set point	Set point	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.00000	No.4-19	P.56

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).
*3: Displayed only when analog input is valid.

(5) Pulse output configuration parameters

These parameters are related to the pulse/status output 1/2.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
5-1	Pulse1 output mode	Output mode	No function Fixed pulse output Frequency output Status output	No function Fixed pulse output Frequency output Status output	RW	Fixedpulseoutput	-	P.60
5-2	Pulse1 active mode	Active mode	On active Off active	On active Off active	RW	On active	-	P.63
5-3	Pulse1 fix width	Fix width	0.05 ms 0.1 ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms 200 ms 330 ms 500 ms 1000 ms 2000 ms Duty cycle 50%	0.05 ms 0.1 ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms 200 ms 330 ms 500 ms 1000 ms 2000 ms Duty cycle 50%	RW	Duty cycle 50%	-	P.62
5-4	Pulse1 rate unit	Rate unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	RW	Unit/P *1	-	P.65
5-5	Pulse1 rate value	Rate value	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0 *1	No.5-4	P.64
5-6	Pulse1 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0 *1	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.44
5-7	Pulse1 alarm out	Alarm out	0 pps Measured value Last valid Max pps	0 pps Measured value Last valid Max pps	RW	0 pps	-	P.61
5-8	Frequency1 at 0%	Frequency at 0%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66
5-9	Frequency1 at 100%	Frequency at 100%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66
5-10	Status output1 function	SO1 function	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto2 range Ext2 answer	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto 2 range Ext 2 answer	RW	No function	-	P.67
5-11	Pulse1 option	Options	Balanced Absolute Only positive Only negative	Balanced Absolute Only positive Only negative	RW	Only positive	-	P.70
5-12	Pulse2 active pulse	Active pulse	Normal For magnetic counter	Normal For magnetic counter	RW	Normal	-	P.64
5-13	Pulse2 output mode	Output mode	No function Fixed pulse output Frequency output Status output	No function Fixed pulse output Frequency output Status output	RW	No function	-	P.60

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
5-14	Pulse2 select	Pulse select	Non-Connect Velocity Volume flow Mass flow Calorie Diag	No connect Velocity Volume flow Mass flow Calorie Diag	RW	No connect	-	P.61
5-15	Pulse2 active mode	Active mode	On active Off active	On active Off active	RW	On active	-	P.63
5-16	Pulse2 fix width	Fix width	0.05 ms 0.1 ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms 200 ms 330 ms 500 ms 1000 ms 2000 ms Duty cycle 50%	0.05 ms 0.1 ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms 200 ms 330 ms 500 ms 1000 ms 2000 ms Duty cycle 50%	RW	Duty cycle 50%	-	P.62
5-17	Pulse2 rate unit	Rate unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	n unit/P u unit/P m unit/P Unit/P k unit/P M unit/P n P/unit u P/unit m P/unit P/unit k P/unit M P/unit	RW	Unit/P	-	P.65
5-18	Pulse2 rate value	Rate value	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.5-16	P.64
5-19	Pulse2 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.44
5-20	Pulse2 alarm out	Alarm out	0 pps Measured value Last valid Max pps	0 pps Measured value Last valid Max pps	RW	0 pps	-	P.61
5-21	Frequency2 at 0%	Frequency at 0%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66
5-22	Frequency2 at 100%	Frequency at 100%	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	Hz	P.66

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
5-23	Status output2 function	SO2 function	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto2 range Ext2 answer System alarm Process alarm Setting alarm 50:Sig overflow 51:Empty detect 53:Adh over lv4 85:Cable miscon 86:Coil insulate 87:Adh over lv3 88:LC warn 89:Insu detect 90:FLN over lv3 91:FLN over lv4 93:Verif warn 94:FC noise warn Lo alarm Lo Lo alarm Hi alarm Hi Hi alarm	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto 2 range Ext 2 answer System alarm Process alarm Setting alarm Signal overflow Empty detect Adh over lv 4 Cable miscon Coil insulation Adhesion lv 3 LC warn Insu detect FLN over lv 3 FLN over lv 4 Verif warn Fact noise warn Low alarm LL alarm High alarm HH alarm	RW	No function	-	P.67
5-24	Pulse2 option	Options	Balanced Absolute Only positive Only negative	Balanced Absolute Only positive Only negative	RW	Only positive	-	P.70

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

(6) Status input and output configuration parameters

These parameters are related to the status input, status output and multi range.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
6-1	Status output11 active mode	Active mode	On active Off active	On active Off active	RW	On active	-	P.63
6-2	Status output11 function	Function	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto2 range Auto3 range Auto4 range Ext2 answer Ext3 answer Ext4 answer	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto 2 range Auto 3 range Auto 4 range Ext 2 answer Ext 3 answer Ext 4 answer	RW	No function	-	P.67
6-3	Status input11 active mode	Active mode	Short(On) active Open(Off) active	Short(On) act Open(Off) act	RW	Short(On) act	-	P.71
6-4	Status input11 function	Function	No function 0% Signal Lock Ext auto zero Total preset 1 Total preset 2 Total preset 3 Ext2 ranges Ext3 ranges Ext4 ranges 0% Signal Lock 2	No function 0% signal lock Ext auto zero Total preset 1 Total preset 2 Total preset 3 Ext 2 ranges Ext 3 ranges Ext 4 ranges 0% signal lock 2	RW		-	P.72
6-5	Status input11 State	State	Open Short	Open Close	R	-	-	-
6-6	Status output12 active mode	Active mode	On active Off active	On active Off active	RW	On active	-	P.63
6-7	Status output12 function	Function	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto2 range Auto3 range Auto4 range Ext2 answer Ext3 answer Ext4 answer	No function Warning output Total limit 1 Total limit 2 Total limit 3 H/L alarm HH/LL alarm Fwd/Rev range Auto 2 range Auto 3 range Auto 4 range Ext 2 answer Ext 3 answer Ext 4 answer	RW	No function	-	P.67
6-8	Status input12 active mode	Active mode	Short(On) active Open(Off) active	Short(On) act Open(Off) act	RW	Short(On) act	-	P.71
6-9	Status input12 function	Function	No function 0% Signal Lock Ext auto zero Total preset 1 Total preset 2 Total preset 3 Ext2 ranges Ext3 ranges Ext4 ranges 0% Signal Lock 2	No function 0% signal lock Ext auto zero Total preset 1 Total preset 2 Total preset 3 Ext 2 ranges Ext 3 ranges Ext 4 ranges 0% signal lock 2	RW		-	P.72
6-10	Status input12 State	State	Open Short	Open Close	R	-	-	-
6-11	Forward span 2	Forward span 2	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
6-12	Forward span 3	Forward span 3	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-13	Forward span 4	Forward span 4	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-14	Reverse span 1	Reverse span 1	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-15	Reverse span 2	Reverse span 2	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-16	Reverse span 3	Reverse span 3	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-17	Reverse span 4	Reverse span 4	0.00001 to +INF*2 Number of decimal places: 0 to 5	0.00001 to +999999 Number of decimal places: 0 to 5	RW	1.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.80
6-18	Auto range hyst	Auto range hyst	0 to 15 Number of decimal places: 0	0 to 15 Number of decimal places: 0	RW	10	%	P.81
6-19	Bi direction hyst	Bi direction hyst	0 to 8 Number of decimal places: 0	0 to 8 Number of decimal places: 0	RW	2	%	P.83

*2: The range of single precision float (IEEE 754).

(7) Analog output/input configuration parameters

These parameters are related to analog output 1/2 and analog input.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
7-1	AO1 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.44
7-2	AO1 high limit	High limit	+4.000 to +21.600 Number of decimal places: 3	+4.000 to +21.600 Number of decimal places: 3	RW	20.500	mA	P.74
7-3	AO1 low limit	Low limit	+2.400 to +20.000 Number of decimal places: 3	+2.400 to +20.000 Number of decimal places: 3	RW	3.800	mA	P.74
7-4	AO1 alarm out	Alarm out	< 2.4 mA 3.8 mA 4 mA 20.5 mA > 21.6 mA Measured value Hold	< 2.4 mA 3.8 mA 4 mA 20.5 mA > 21.6 mA Measured value Hold	RW	> 21.6 mA	-	P.76
7-5	AO1 range mode	Range mode	Normal range Abs range	Normal range Abs range	RW	Normal range	-	P.75
7-6	AO2 select	AO2 select	Non-Connect Velocity Volume flow Mass flow Calorie Diag	No connect Velocity Volume flow Mass flow Calorie Diag	RW	No connect	-	P.73
7-7	AO2 low cut	Low cut	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.7-6	P.44
7-8	AO2 high limit	High limit	+4.000 to +21.600 Number of decimal places: 3	+4.000 to +21.600 Number of decimal places: 3	RW	20.500	mA	P.74
7-9	AO2 low limit	Low limit	+2.400 to +20.000 Number of decimal places: 3	+2.400 to +20.000 Number of decimal places: 3	RW	3.800	mA	P.74
7-10	AO2 alarm out	Alarm out	< 2.4 mA 3.8 mA 4 mA 20.5 mA > 21.6 mA Measured value Hold	< 2.4 mA 3.8 mA 4 mA 20.5 mA > 21.6 mA Measured value Hold	RW	> 21.6 mA	-	P.76
7-11	AI function	Function	No function Monitoring Diff temperature Ext temperature	No function Monitoring Diff temperature Ext temperature	RW	No function	-	P.78
7-12	AI high limit	High limit	+4.000 to +21.600 Number of decimal places: 3	+4.000 to +21.600 Number of decimal places: 3	RW	20.500	mA	P.79
7-13	AI low limit	Low limit	+2.400 to +20.000 Number of decimal places: 3	+2.400 to +20.000 Number of decimal places: 3	RW	3.800	mA	P.79
7-14	AI current	Value	0.000 to +22.730 Number of decimal places: 3	0.000 to +22.730 Number of decimal places: 3	R	0.000	mA	P.78
7-15	AI unit	Unit	deg C deg F K	°C °F K	RW	deg C/°C	-	P.78
7-16	AI URV	URV	-999.9 to +999.9 Number of decimal places: 1	-999.9 to +999.9 Number of decimal places: 1	RW	120.0	No.7-15	P.79
7-17	AI LRV	LRV	-999.9 to +999.9 Number of decimal places: 1	-999.9 to +999.9 Number of decimal places: 1	RW	0.0	No.7-15	P.79
7-18	Clear D/A trim 1	AO1 trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.77
7-19	AO1 trim	AO1 trim 4mA	3.200 to 5.600 Number of decimal places: 3	3.200 to 5.600 Number of decimal places: 3	RW	4.000	mA	P.77
7-20		AO1 trim 20mA	18.400 to 21.600 Number of decimal places: 3	18.400 to 21.600 Number of decimal places: 3	RW	20.000	mA	P.77
7-21	Clear D/A trim 2	AO2 trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.77
7-22	AO2 trim	AO2 trim 4mA	3.200 to 5.600 Number of decimal places: 3	3.200 to 5.600 Number of decimal places: 3	RW	4.000	mA	P.77
7-23		AO2 trim 20mA	18.400 to 21.600 Number of decimal places: 3	18.400 to 21.600 Number of decimal places: 3	RW	20.000	mA	P.77

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
7-24	Clear AI trim	Trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.77
7-25	AI trim	Trim 4mA	3.200 to 5.600 Number of decimal places: 3	3.200 to 5.600 Number of decimal places: 3	RW	4.000	mA	P.77
7-26		Trim 20mA	18.400 to 21.600 Number of decimal places: 3	18.400 to 21.600 Number of decimal places: 3	RW	20.000	mA	P.77

*2: The range of single precision float (IEEE 754).

(8) Auxiliary function configuration parameters

These parameters are related to the flow direction, rate limit, low cut, temperature correction for density, or calorie calculation.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
8-1	Flow direction	Flow direct	Forward Reverse	Forward Reverse	RW	Forward	-	P.90
8-2	Rate limit	Rate limit	0.0 to 10.0 Number of decimal places: 1	0.0 to 10.0 Number of decimal places: 1	RW	5.0	%	P.90
8-3	Dead time	Dead time	0.0 to 15.0 Number of decimal places: 1	0.0 to 15.0 Number of decimal places: 1	RW	0.0	s	P.90
8-4	Noise filter	Noise filter	Manual Level1 Level2 Level3	Manual Level 1 Level 2 Level 3	RW	Manual	-	P.90
8-5	Pulsing flow	Pulsing flow	No Yes	No Yes	RW	No	-	P.93
8-6	Power synchronize	Power sync	No Yes	No Yes	RW	Yes	-	P.93
8-7	Set power frequency	Set power freq	47.00 to 63.00 Number of decimal places: 2	47.00 to 63.00 Number of decimal places: 2	RW	50.00	Hz	P.93
8-8	IEX power frequency	Iex power frequency	0.00 to 99.99 Number of decimal places: 2	0.00 to 99.99 Number of decimal places: 2	R	-	Hz	P.93
8-9	Mes power frequency	Meas power freq	0.00 to 99.99 Number of decimal places: 2	0.00 to 99.99 Number of decimal places: 2	R	-	Hz	P.93
8-10	Density value select	Value select	Fixed value Correction value	Fixed value Correction value	RW	Fixed value	-	P.48
8-11	Density unit	Unit	kg/m³ lb/gal lb/cf	kg/m³ lb/gal lb/cf	RW	kg/m³	-	P.48
8-12	Density fixed value	Fixed density	0.00000 to 999999 Number of decimal places: 0 to 5	0.00000 to 999999 Number of decimal places: 0 to 5	RW	0 *1	No.8-11	P.48
8-13	Standard density	Std density	0.00000 to +999999 Number of decimal places: 0 to 5	0.00000 to +999999 Number of decimal places: 0 to 5	RW	0	No.8-11	P.48
8-14	Standard temperature	Std temperature	-999.99 to +999.99 Number of decimal places: 2	-999.99 to +999.99 Number of decimal places: 2	RW	20.00	No.7-15	P.49
8-15	Temp coef A1	Coef A1	-INF*2 to +INF*2 Number of decimal places: 0 to 5 -32000.0 to +32000.0	-999999 to +999999 Number of decimal places: 0 to 5 -32000.0 to +32000.0	RW	0.0	-	P.94
8-16	Temp coef A2	Coef A2	-INF*2 to +INF*2 Number of decimal places: 0 to 5 -32000.0 to +32000.0	-999999 to +999999 Number of decimal places: 0 to 5 -32000.0 to +32000.0	RW	0.0	-	P.94
8-17	Measured temperature	Meas temperature	-999.99 to +999.99 Number of decimal places: 2	-999.99 to +999.99 Number of decimal places: 2	R	-	No.7-15	P.49
8-18	Correct density	Correct density	0.0 to 999999 Number of decimal places: 0 to 5	0.0 to 999999 Number of decimal places: 0 to 5	R	-	No.8-11	P.48
8-19	Specific heat	Specific heat	0.0 to +99999.9 Number of decimal places: 1	0.0 to +99999.9 Number of decimal places: 1	RW	4184.0	J/kg*K	P.96
8-20	Calorific fix temp	Fixed temperature	-999.99 to +999.99 Number of decimal places: 2	-999.99 to +999.99 Number of decimal places: 2	RW	20.00	No.7-15	P.49
8-21	Calorific value	Calorie	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	R	-	No.3-18/ No.3-19	P.40
8-22	Set SIL	Set SIL	No Yes	No Yes	RW	No	-	P.97

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

(9) Alarm configuration parameters

These parameters are related to the alarm output, burnout and history.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
9-1	High alarm	High alarm	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	300.000	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.135
9-2	Low alarm	Low alarm	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	-300.000	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.135
9-3	High high alarm	HH alarm	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	300.000	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.135
9-4	Low low alarm	LL alarm	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	-300.000	Flow velocity No.3-15 Volumetric flow rate: No.3-16/ No.3-19 Mass flow rate: No.3-17/ No.3-19 Flow noise cm/s	P.135
9-5	Hi/Lo alarm hysteresis	H/L alarm hyst	0 to 10 Number of decimal places: 0	0 to 10 Number of decimal places: 0	RW	5	%	P.135
9-6	Burn out	4-20 burnout	High Low	High Low	R	-	-	P.117
9-7	Alarm out mask 1	Mask 1-1	13: Main board EEPROM default on	013:Main EEP dflt	RW	All Off	-	P.110
		Mask 1-2	21: PWM1 stop on 22: PWM2 stop on 23: Option board mismatch on 24: Option EEPROM failure on 25: Option board A/D failure on 26: Option board SPI failure on 28: Indicator board failure on 29: Ind EEP FAIL on 30: LCD driver failure on 31: Indicator board mismatch on 32: Indicator communication error on 33: microSD failure on	021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL	RW	028:Ind bd FAIL	-	P.110

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
9-7	Alarm out mask 2	Mask 2-1	50: Signal overflow on 51: Empty pipe detection on 52: H/L HH/LL alarm on 53: Adhesion over level 4 on 60: Span configuration error on 61:PV flow configuration error on 62: Analog output 1 4-20 mA limit error on 63: Analog output 2 4-20 mA limit error on 64: Analog output 1 multi range error on 65: H/L HH/LL configuration error on 66: Density configuration error on	050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4 060:Span cfg ERR 061:PV F cfg ERR 062:AO 1 4-20 lmt 063:AO 2 4-20 lmt 064:AO 1 mlt rng 065:H/L cfg ERR 066:Density cfg ERR	RW	052:H/L HH/LL alm 053:Adh over lv 4	-	P.110
		Mask 2-2	67: Pulse output 1 configuration error on 68: Pulse output 2 configuration error on 69: Nominal size configuration error on 70: Adhesion configuration error on 71: Flow noise config error on 72: Data logging not started on 80: Analog output 1 saturated on 81: Analog output 2 saturated on 82: Pulse output 1 saturated on 83: Pulse output 2 saturated on 84: Analog input saturated on 85: Cable misconnect on 86: Coil insulation warning on 131: Transmitter type mismatch on	067:Pls 1 cfg ERR 068:Pls 2 cfg ERR 069:Nomi size cfg 070:Adh cfg ERR 071:FLN cfg ERR 072:Log not start 080:AO 1 saturate 081:AO 2 saturate 082:Pls 1 saturate 083:Pls 2 saturate 084:AI saturate 085:Cable miscon 086:Coil insulation 131:Trans mismatch	RW	081:AO 2 saturate 082:Pls 1 saturate 083:Pls 2 saturate 084:AI saturate 086:Coil insulation	-	P.110
	Alarm out mask 3	Mask 3-1	87: Adhesion over level 3 on 88: Low conductivity warning on 89: Insulation detection on 90: Flow noise over level 3 on 91: Flow noise over level 4 on 92: Autozero warning on 93: Verification warning on 94: Factory noise warning on 95: Simulation active on 96: Analog output 1 fixed on 97: Analog output 2 fixed on 98: Pulse output 1 fixed on 99: Pulse output 2 fixed on 100: Analog input fixed on	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 096:AO 1 fix 097:AO 2 fix 098:Pls 1 fix 099:Pls 2 fix 100:AI fix	RW	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	-	P.110
		Mask 3-2	101: Parameter restore running on 102: Display over warning on 103: microSD card size warning on 104: Parameter backup incomplete on 105: microSD card mismatch on 106: microSD card removal error on 120: Watchdog on 121: Power off on 122: Instant power failure on 123: Parameter backup running on 124: Data logging running on	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	RW	101:Param restore run 102:Disp over 103:SD size warn 105:SD mismatch 106:SD removal ERR 120:Watchdog 121:Power off 122:Inst power FAIL 123:Param bkup run 124:Data log run	-	P.110
	Alarm out mask 4	Mask 4-1	130: Device ID not entered on	130:DevID not enter	RW	All Space	-	P.110
9-8	Alarm record mask 1	Mask 1-1	13:Main board EEPROM default on	013:Main EEP dflt	RW	All Space	-	P.110
		Mask 1-2	21:PWM1 stop on 22:PWM1 stop on 23:Option board mismatch on 24:Option EEPROM failure on 25:Option board A/D failure on 26:Option board SPI failure on 28:Indicator board failure on 29:Ind EEP FAIL on 30:LCD driver failure on 31:Indicator board mismatch on 32:Indicator communication error on 33:microSD failure on	021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL	RW	All Space	-	P.110
	Alarm record mask 2	Mask 2-1	50: Signal overflow on 51: Empty pipe detection on 52: H/L HH/LL alarm on 53: Adhesion over level 4 on	050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4	RW	All Space	-	P.110
		Mask 2-2	85: Cable misconnect on	085:Cable miscon	RW	All Space	-	P.110
	Alarm record mask 3	Mask 3-1	130: Device ID not entered on	130:DevID not enter	RW	130:DevID not enter	-	P.110

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
9-9	Alarm record 1	Record alarm 1	All Space 10: Main board CPU failure 11: Reverse calculation failure 12: Main board EEPROM failure 13: Main board EEPROM default 14: Sensor board failure 15: Sensor communication error 16: A/D1 failure[Signal] 17: A/D2 failure[Exciter] 18: Coil open 19: Coil short 20: Exciter failure 21: PWM1 stop 22: PWM2 stop 23: Option board mismatch 24: Option board EEPROM failure 25: Option board A/D failure 26: Option board SPI failure 27: Parameter restore incomplete 28: Indicator board failure 29: Indicator board EEPROM failure 30: LCD driver failure 31: Indicator board mismatch 32: Indicator communication error 33: microSD failure 50: Signal overflow 51: Empty pipe detection 52: H/L or HH/LL alarm 53: Adhesion over level 4 85: Cable misconnect 120:Watchdog on 121:Power off on 122:Instant power failure on 130:Device ID not entered	All Space 010:Main CPU FAIL 011:Rev calc FAIL 012:Main EEP FAIL 013:Main EEP dflt 014:Snsr bd FAIL 015:Snsr comm ERR 016:AD 1 FAIL[Sig] 017:AD 2 FAIL[Excit] 018:Coil open 019:Coil short 020:Exciter FAIL 021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 027:Restore FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL 050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4 085:Cable miscon 120:Watchdog 121:Power off 122:Inst power FAIL 130:DevID not enter	R	All Space	-	P.109
9-10	Alarm record time 1	Record time 1	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.109
9-11	Alarm record 2	Record alarm 2	All Space 10: Main board CPU failure 11: Reverse calculation failure 12: Main board EEPROM failure 13: Main board EEPROM default 14: Sensor board failure 15: Sensor communication error 16: A/D1 failure[Signal] 17: A/D2 failure[Exciter] 18: Coil open 19: Coil short 20: Exciter failure 21: PWM1 stop 22: PWM2 stop 23: Option board mismatch 24: Option board EEPROM failure 25: Option board A/D failure 26: Option board SPI failure 27: Parameter restore incomplete 28: Indicator board failure 29: Indicator board EEPROM failure 30: LCD driver failure 31: Indicator board mismatch 32: Indicator communication error 33: microSD failure 50: Signal overflow 51: Empty pipe detection 52: H/L or HH/LL alarm 53: Adhesion over level 4 85: Cable misconnect 120:Watchdog on 121:Power off on 122:Instant power failure on 130:Device ID not entered	All Space 010:Main CPU FAIL 011:Rev calc FAIL 012:Main EEP FAIL 013:Main EEP dflt 014:Snsr bd FAIL 015:Snsr comm ERR 016:AD 1 FAIL[Sig] 017:AD 2 FAIL[Excit] 018:Coil open 019:Coil short 020:Exciter FAIL 021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 027:Restore FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL 050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4 085:Cable miscon 120:Watchdog 121:Power off 122:Inst power FAIL 130:DevID not enter	R	All Space	-	P.109
9-12	Alarm record time 2	Record time 2	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.109

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
9-13	Alarm record 3	Record alarm 3	All Space 10: Main board CPU failure 11: Reverse calculation failure 12: Main board EEPROM failure 13: Main board EEPROM default 14: Sensor board failure 15: Sensor communication error 16: A/D1 failure[Signal] 17: A/D2 failure[Exciter] 18: Coil open 19: Coil short 20: Exciter failure 21: PWM1 stop 22: PWM2 stop 23: Option board mismatch 24: Option board EEPROM failure 25: Option board A/D failure 26: Option board SPI failure 27: Parameter restore incomplete 28: Indicator board failure 29: Indicator board EEPROM failure 30: LCD driver failure 31: Indicator board mismatch 32: Indicator communication error 33: microSD failure 50: Signal overflow 51: Empty pipe detection 52: H/L or HH/LL alarm 53: Adhesion over level 4 85: Cable misconnect 120:Watchdog on 121:Power off on 122:Instant power failure on 130:Device ID not entered	All Space 010:Main CPU FAIL 011:Rev calc FAIL 012:Main EEP FAIL 013:Main EEP dflt 014:Snsr bd FAIL 015:Snsr comm ERR 016:AD 1 FAIL[Sig] 017:AD 2 FAIL[Excit] 018:Coil open 019:Coil short 020:Exciter FAIL 021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 027:Restore FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL 050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4 085:Cable miscon 120:Watchdog 121:Power off 122:Inst power FAIL 130:DevID not enter	R	All Space	-	P.109
9-14	Alarm record time 3	Record time 3	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.109
9-15	Alarm record 4	Record alarm 4	All Space 10: Main board CPU failure 11: Reverse calculation failure 12: Main board EEPROM failure 13: Main board EEPROM default 14: Sensor board failure 15: Sensor communication error 16: A/D1 failure[Signal] 17: A/D2 failure[Exciter] 18: Coil open 19: Coil short 20: Exciter failure 21: PWM1 stop 22: PWM2 stop 23: Option board mismatch 24: Option board EEPROM failure 25: Option board A/D failure 26: Option board SPI failure 27: Parameter restore incomplete 28: Indicator board failure 29: Indicator board EEPROM failure 30: LCD driver failure 31: Indicator board mismatch 32: Indicator communication error 33: microSD failure 50: Signal overflow 51: Empty pipe detection 52: H/L or HH/LL alarm 53: Adhesion over level 4 85: Cable misconnect 120:Watchdog on 121:Power off on 122:Instant power failure on 130:Device ID not entered	All Space 010:Main CPU FAIL 011:Rev calc FAIL 012:Main EEP FAIL 013:Main EEP dflt 014:Snsr bd FAIL 015:Snsr comm ERR 016:AD 1 FAIL[Sig] 017:AD 2 FAIL[Excit] 018:Coil open 019:Coil short 020:Exciter FAIL 021:PWM 1 stop 022:PWM 2 stop 023:Opt bd mismatch 024:Opt bd EEP FAIL 025:Opt bd A/D FAIL 026:Opt bd SPI FAIL 027:Restore FAIL 028:Ind bd FAIL 029:Ind bd EEP FAIL 030:LCD drv FAIL 031:Ind bd mismatch 032:Ind comm ERR 033:microSD FAIL 050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4 085:Cable miscon 120:Watchdog 121:Power off 122:Inst power FAIL 130:DevID not enter	R	All Space	-	P.109
9-16	Alarm record time 4	Record time 4	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.109
9-17	Alarm output active mode	Active mode	On active Off active	On active Off active	RW	On active	-	P.118

*2: The range of single precision float (IEEE 754).

(10) Display configuration parameters

These parameters are related to display settings.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
10-1	Display select1	Line 1	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number Long tag Commun protocol Adhesion Analog out1 Analog out2 Flow noise level Totalizer1 count Totalizer2 count Totalizer3 count	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	PV	-	P.120
10-2	Display select2	Line 2	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number Long tag Commun protocol Adhesion Analog out1 Analog out2 Flow noise level Totalizer1 count Totalizer2 count Totalizer3 count	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	Flow rate(%)	-	P.120
10-3	Display select3	Line 3			RW	Analog out 1	-	P.120
10-4	Display select4	Line 4			RW	None	-	P.120
10-5	Display select5	Line 5			RW	None	-	P.120
10-6	Display select6	Line 6			RW	None	-	P.120
10-7	Display select7	Line 7			RW	None	-	P.120
10-8	Display select8	Line 8			RW	None	-	P.120
10-9	Display format PV	Format PV	Auto 0 digit 1 digit 2 digit 3 digit 4 digit 5 digit Auto 2	Auto 0 digit 1 digit 2 digit 3 digit 4 digit 5 digit Auto 2	RW	Auto 2	-	P.121
10-10	Display format total 1	Format total 1	Auto 0 digit 1 digit 2 digit 3 digit 4 digit 5 digit 6 digit 7 digit	Auto 0 digit 1 digit 2 digit 3 digit 4 digit 5 digit 6 digit 7 digit	RW	Auto	-	P.121
10-11	Display format total 2	Format total 2			RW			
10-12	Display format total 3	Format total 3			RW			
10-13	Display contrast	Contrast	-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5	-5 -4 -3 -2 -1 0 1 2 3 4 5	RW	0	-	P.127
10-14	Display line	Line mode	1 Line(Big) 1 Line 2 Line 3 Line 4 Line	1 line(big) 1 line 2 line 3 line 4 line	RW	3 line	-	P.123

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
10-15	Display period	Period	0.2 s 0.4 s 1.0 s 2.0 s 4.0 s 8.0 s	0.2 s 0.4 s 1.0 s 2.0 s 4.0 s 8.0 s	RW	0.4 s	-	P.126
10-16	Display NE107	NE107 display	Normal NE107	Normal NE107	RW	Normal	-	P.108
10-17	Display alarm	Alarm display	Normal Detail	Normal Detail	RW	Normal	-	P.108
10-18	Display scroll	Scroll mode	Off Manual Auto(2 s) Auto(4 s) Auto(8 s)	Off Manual Auto(2 s) Auto(4 s) Auto(8 s)	RW	Off*3	-	P.123
10-19	Display damping	Damp	0.0 to 200.0 Number of decimal places: 1	0.0 to 200.0 Number of decimal places: 1	RW	0.0	s	P.127
10-20	Display format date	Format date	MM/DD/YYYY DD/MM/YYYY YYYY/MM/DD	MM/DD/YYYY DD/MM/YYYY YYYY/MM/DD	RW	MM/DD/YYYY	-	P.127
10-21	Language	Language	English French German Italian Spanish Portuguese Russian Chinese Japanese	English French German Italian Spanish Portuguese Russian Chinese Japanese	RW	English	-	P.119
10-22	Display measure mode	Display mode	Normal Trend	Normal Trend	RW	Normal	-	P.125
10-23	Trend offline lrv	Trend offln LRV	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.0	-	P.126
10-24	Trend offline urv	Trend offln URV	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	10.0	-	P.126
10-25	Trend select 1	Trend 1	Flow rate(%) PV Velocity Volume flow Mass flow Calorie Analog out1 Analog out2 Totalizer1 Totalizer2 Totalizer3	Flow rate(%) PV Velocity Volume flow Mass flow Calorie Analog out 1 Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	RW	PV	-	P.125
10-26	Trend select 2	Trend 2	None Flow rate(%) PV Velocity Volume flow Mass flow Calorie Analog out1 Analog out2 Totalizer1 Totalizer2 Totalizer3	None Flow rate(%) PV Velocity Volume flow Mass flow Calorie Analog out 1 Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	RW	None	-	P.125
10-27	Trend select 3	Trend 3			RW	None	-	P.125
10-28	Trend select 4	Trend 4			RW	None	-	P.125
10-29	Display inversion	Inversion	Normal Invert	Normal Invert	RW	Normal	-	P.127
10-30	LCD test	LCD test	Not execute Execute Show Pattern1 Show Pattern2 Show Pattern3 Show Pattern4	Not execute Execute Show pattern 1 Show pattern 2 Show pattern 3 Show pattern 4	RW	Not execute	-	-
10-31	Squawk	Squawk	Off On Squawk Once	Off On Squawk once	RW	Off	-	P.128
10-32	Language package	Language package	Package 1 Package 2	Pack 1 Pack 2	R	- *1	-	P.119
10-33	Display installation	Disp install	No disp With disp	No disp With disp	RW	With disp *1	-	-
10-34	IRSW operation	-	Disable Enable	-	RW	Enable	-	P.128

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*2: The range of single precision float (IEEE 754).
*3: When Main soft rev (Main board revision/Main soft rev) is R2.01.02 or earlier, the default value is Manual.

(11) Device information configuration parameters

These parameters are related to the device information.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
11-1	Tag	Tag No	ASCII 8 characters	ASCII 8 characters	RW	All Space *1	-	P.131
	Long tag	Long tag	ASCII 32 characters	ASCII 32 characters	RW	All Space *1	-	P.131
11-2	Operation time	Operation time	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.134
11-3	Current Date	Current date	01/01/1900 to 12/31/2155	01/01/1900 to 12/31/2155	R	1900/01/01	-	P.133
11-4	Current Time	Current time	00: 00: 00 to 23: 59: 59	00: 00: 00 to 23: 59: 59	R	00: 00: 00	-	P.133
11-5	-	Set date	-	01/01/1900 to 12/31/2155	RW	01/01/1900	-	P.133
	-	Set time	-	00: 00: 00 to 23: 59: 59	RW	00: 00: 00	-	P.133
	Set Date/Time	-	01/01/1900 00: 00: 00 to 12/31/2155 23: 59: 59	-	RW	01/01/1900 00: 00: 00	-	P.133
11-6	Transmitter type	Transmitter type	Non 1A Type	None 1A type	R	-	-	P.132
11-7	Option board ID	Option board ID	Non Multi	None Multi	R	-	-	P.132
11-8	Electrode size	Electrode size	1 mm 3 mm 8 mm 10 mm 6 mm	1 mm 3 mm 8 mm 10 mm 6 mm	RW	3 mm	-	P.146
11-9	Basic model code	Model code	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-10	Suffix config 1	Suffix config 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Suffix config 2	Suffix config 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-11	Option 1	Option 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Option 2	Option 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Option 3	Option 3	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Option 4	Option 4	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-12	Remote sensor basic model code	Model code	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-13	Remote sensor suffix config 1	Suffix config 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Remote sensor suffix config 2	Suffix config 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-14	Remote sensor option 1	Option 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Remote sensor option 2	Option 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Remote sensor option 3	Option 3	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
	Remote sensor option 4	Option 4	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.131
11-15	Transmitter serial No	Trans serial No	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.131
11-16	Sensor serial No	Sensor serial No	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.131
11-17	Memo 1	Memo 1	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.133
	Memo 2	Memo 2	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.133
	Memo 3	Memo 3	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.133
11-18	Main board revision	Main soft rev	R2.01.01*4	R2.01.01*4	R	-	-	P.132
11-19	Sensor board revision	Snsr soft rev	R1.01.01*4	R1.01.01*4	R	-	-	P.132
11-20	Indicator board revision	Ind soft rev	R2.01.01*4	R2.01.01*4	R	-	-	P.132
11-21	Explosion protection	Explosion protection	No/Yes	No/Yes	RW	No	-	P.134
11-22	MIO	Multi I/O	NAN AO2 Act AI Act PLS/SO2 Pas PLS/SO2 Act1 PLS/SO2 Act2/3	None AO2 Act AI Act PLS/SO2 Pas PLS/SO2 Act1 PLS/SO2 Act2/3	R	None	-	-

*1: Determined based on the information about specified items at the time of ordering and the sensor to be combined with.
*4: Set at the factory before shipment.

(12) Diagnosis function configuration parameters

These parameters are related to the electrode adhesion detection, flow noise diagnosis, and verification function settings.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
12-1	Adhesion function	Function	Disable Enable	Disable Enable	RW	Enable	-	P.137
12-2	Adhesion level 1	Threshold level 1	0.00 to +100.00 Number of decimal places: 2	0.00 to +100.00 Number of decimal places: 2	RW	0.10	M ohm	P.137
12-3	Adhesion level 2	Threshold level 2	0.00 to +100.00 Number of decimal places: 2	0.00 to +100.00 Number of decimal places: 2	RW	0.50	M ohm	P.137
12-4	Adhesion level 3	Threshold level 3	0.00 to +100.00 Number of decimal places: 2	0.00 to +100.00 Number of decimal places: 2	RW	4.00	M ohm	P.137
12-5	Adhesion level 4	Threshold level 4	0.00 to +100.00 Number of decimal places: 2	0.00 to +100.00 Number of decimal places: 2	RW	12.00	M ohm	P.137
12-6	Adhesion value	Value	0.00000 to +1000.0 Number of decimal places: 0 to 5	0.00000 to +1000.0 Number of decimal places: 0 to 5	R	-	M ohm	P.137
12-7	Adhesion status	Status	Level0 Level1 Level2 Level3 Level4	Level 0 Level 1 Level 2 Level 3 Level 4	R	-	-	P.137
12-8	Adhesion check cycle	Check cycle	0.5 min 1 min 2 min 10 min	0.5 min 1 min 2 min 10 min	RW	2 min	-	P.137
12-9	Flow noise function	Function	Disable Enable	Disable Enable	RW	Disable	-	P.145
12-10	Flow noise level 1	Threshold level 1	0.0 to +999.9 Number of decimal places: 1	0.0 to +999.9 Number of decimal places: 1	RW	5.0	cm/s	P.145
12-11	Flow noise level 2	Threshold level 2	0.0 to +999.9 Number of decimal places: 1	0.0 to +999.9 Number of decimal places: 1	RW	10.0	cm/s	P.145
12-12	Flow noise level 3	Threshold level 3	0.0 to +999.9 Number of decimal places: 1	0.0 to +999.9 Number of decimal places: 1	RW	30.0	cm/s	P.145
12-13	Flow noise level 4	Threshold level 4	0.0 to +999.9 Number of decimal places: 1	0.0 to +999.9 Number of decimal places: 1	RW	400.0	cm/s	P.145
12-14	Flow noise	Value	0.00000 to +100.00 Number of decimal places: 0 to 5	0.00000 to +100.00 Number of decimal places: 0 to 5	R	-	cm/s	P.145
12-15	Flow noise status	Status	Level0 Level1 Level2 Level3 Level4	Level 0 Level 1 Level 2 Level 3 Level 4	R	-	-	P.145
12-16	Flow noise damping	Damp	0.1 to 500.0 Number of decimal places: 1	0.1 to 500.0 Number of decimal places: 1	RW	3.0	s	P.43
12-17	Flow noise span	Span	0.1 to 999.9 Number of decimal places: 1	0.1 to 999.9 Number of decimal places: 1	RW	150.0	cm/s	P.41
12-18	Low conductivity function	Function	Disable Enable	Disable Enable	RW	Disable	-	P.146
12-19	Conductivity value	Value	0.00000 to +INF*2 Number of decimal places: 0 to 5	0.00000 to 999999 Number of decimal places: 0 to 5	R	-	mS/cm	P.146
12-20	Conductivity low limit	Low limit	0.0000 to 99.9999 Number of decimal places: 4	0.0000 to 99.9999 Number of decimal places: 4	RW	0.0010	mS/cm	P.146
12-21	Diagnostic Exe	Diagnostic execute	Not execute Elec ins exe Conn chk exe	Not execute Electrode insul exe Connect check exe	RW	Not execute	-	P.139 P.144
12-22	Coil insulation threshold	Coil insul threshold	0.0 to 100.0 Number of decimal places: 1	0.0 to 100.0 Number of decimal places: 1	RW	25.0	%	P.147
12-23	IEX compare	IEX compare	0.0 to 999.9 Number of decimal places: 1	0.0 to 999.9 Number of decimal places: 1	R	260.0	mA	P.147
12-24	V peak hold value	V peak hold	0.000 to 3.000 Number of decimal places: 3	0.000 to 3.000 Number of decimal places: 3	R	-	V	P.147
12-25	IEX coil resistance	IEX resistance	0 to +9999.9 Number of decimal places: 1	0 to +9999.9 Number of decimal places: 1	R	-	ohm	P.147
12-26	Electrode voltage A	Electrode voltage A	-3.00 to 3.00 Number of decimal places: 2	-3.00 to 3.00 Number of decimal places: 2	R	-	V	P.138
12-27	Electrode voltage B	Electrode voltage B	-3.00 to +3.00 Number of decimal places: 2	-3.00 to +3.00 Number of decimal places: 2	R	-	V	P.138
12-28	Empty status	Empty status	Full Empty	Full Empty	R	-	-	P.138
12-29	Diagnostic output	Diagnostic output	Zero Measured value Hold	Zero Measured value Hold	RW	Zero	-	P.139 P.140 P.144

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
12-30	VF target select	VF target select	Magnetic Excitation Calculation Device status Conn status	Magnetic circuit Excite circuit Calc circuit Device status Connect status	RW		-	P.140
12-31	VF mode	Mode	No flow Flow	No flow Flow	RW	No flow	-	P.140
12-32	Verification Exe	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.140
12-33	VF No	VF No	Factory Previous Present	Factory Previous Present	RW	Factory	-	P.140
12-34	VF check result	Failed/Passed	Passed Failed Canceled No Data Unknown	Passed Failed Canceled No data Unknown	R	No data	-	P.140
12-35	VF operation time	VF operate time	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.140
12-36	Magnetic circuit result	Magnetic circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.140
12-37	Excitation circuit result	Excite circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.140
12-38	Calculation circuit result	Calc circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.140
12-39	VF device status result	Device status	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.140
12-40	Connection status result	Connect status	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.140

*2: The range of single precision float (IEEE 754).

(13) Test mode configuration parameters

These parameters are related to test mode settings.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
13-1	Release time	Release time	10 min 30 min 1 h 3 h 12 h	10 min 30 min 1 h 3 h 12 h	RW	30 min	-	P.150
13-2	Test mode	-	Velocity test on Volume flow test on Mass flow test on Calorific value test on AO1 test on Pulse1 test on SO1 test on AO2 test on Pulse2 test on SO2 test on AI test on SO11 test on SI11 test on SO12 test on SI12 test on Alm test on SO3 test on (Unavailable) SI3 test on (Unavailable)	-	RW	All Space	-	P.148
	-	Input test ► Test mode	-	Velocity test Volume test Mass test Calorie test AI test SI11 test SI12 test	RW	-	-	P.148
	-	Output test ► Test mode	-	AO1 test PO1 test SO1 test AO2 test PO2 test SO2 test SO11 test SO12 test Alarm test	RW	-	-	P.148
13-3	Velocity	Velocity	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.3-15	P.149
13-3	Volume flow	Volume	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.3-16/ No.3-19	P.149
13-4	Mass flow	Mass	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.3-17/ No.3-19	P.149
13-5	Calorific value	Calorie	-INF*2 to +INF*2 Number of decimal places: 0 to 5	-999999 to +999999 Number of decimal places: 0 to 5	RW	0.0	No.3-18/ No.3-19	P.149
13-6	SI11	SI11	Open Close	Open Close	RW	Open	-	P.149
13-7	SI12	SI12	Open Close	Open Close	RW	Open	-	P.149
13-8	AO1	AO1	2.400 to 21.600 Number of decimal places: 3	2.400 to 21.600 Number of decimal places: 3	RW	4.000	mA	P.149
13-9	Pulse1	PO1	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0.0	pps (pulse/s)	P.149
13-10	SO1	SO1	Open Close	Open Close	RW	Open	-	P.149
13-11	AO2	AO2	2.400 to 21.600 Number of decimal places: 3	2.400 to 21.600 Number of decimal places: 3	RW	4.000	mA	P.149
13-12	Pulse2	PO2	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	pps (pulse/s)	P.149
13-13	SO2	SO2	Open Close	Open Close	RW	Open	-	P.149
13-14	SO11	SO11	Open Close	Open Close	RW	Open	-	P.149
13-15	SO12	SO12	Open Close	Open Close	RW	Open	-	P.149
13-16	AI	AI	0.000 to 21.600 Number of decimal places: 3	0.000 to 21.600 Number of decimal places: 3	RW	0.000	mA	P.149
13-17	Alarm	Alarm	Open Close	Open Close	RW	Open	-	P.149
13-18	Test 2 mode	Test 2 mode	Normal Test	Normal Test	RW	Normal	-	P.150
13-19	Test 2 output value	Test 2 value	-10.0 to 110.0	-10.0 to 110.0	RW	0.0	%	P.150

*2: The range of single precision float (IEEE 754).

(14) Backup/restore/data logging configuration parameters

These parameters are related to the backup function, restore function and data logging function of parameters.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
14-1	Factory backup name	F backup name	ASCII 16 characters	ASCII 16 characters	R	Factory Delivery	-	P.151
14-2	Factory backup date	F backup date	ASCII 16 characters	ASCII 16 characters	R	01/01/2019 *4	-	P.151
14-3	SD backup name	SD backup name	ASCII 8 characters	ASCII 8 characters	RW	SD_FILE	-	P.151
14-4	Backup name 1	Backup name 1	ASCII 16 characters	ASCII 16 characters	RW	Backup 1	-	P.151
14-5	Backup date 1	Backup date 1	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.151
14-6	Backup name 2	Backup name 2	ASCII 16 characters	ASCII 16 characters	RW	Backup 2	-	P.151
14-7	Backup date 2	Backup date 2	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.151
14-8	Backup name 3	Backup name 3	ASCII 16 characters	ASCII 16 characters	RW	Backup 3	-	P.151
14-9	Backup date 3	Backup date 3	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.151
14-10	Backup Exe	Backup execute	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	RW	Not execute	-	P.151
14-11		Backup result	Unexecuted Success Failure Running	Unexecuted Success Failure Running	R	Unexecuted	-	P.151
14-12	Restore Exe	Restore execute	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 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	RW	Not execute	-	P.154
14-13		Restore result	Unexecuted Success Failure Running	Unexecuted Success Failure Running	R	Unexecuted	-	P.154
14-14	File name	File name	ASCII 8 characters	ASCII 8 characters	RW	LOG_FILE	-	P.162
14-15	Interval time	Interval time	1 s 10 s 30 s 1 min 5 min 30 min 1 h	1 s 10 s 30 s 1 min 5 min 30 min 1 h	RW	1 min	-	P.162
14-16	Start date	Start date	01/01/1900 to 31/12/2155	01/01/1900 to 31/12/2155	R	01/01/2019	-	P.162
14-17	Start time	Start time	00: 00: 00 to 23: 59: 59	00: 00: 00 to 23: 59: 59	R	00:00:00	-	P.162
14-18	End time	End time	10 min 30 min 1 h 3 h 12 h 24 h 72 h 240 h 720 h 1440 h	10 min 30 min 1 h 3 h 12 h 24 h 72 h 240 h 720 h 1440 h	RW	12 h	-	P.162
14-19	Log1 select	Log 1	Velocity Volume flow Mass flow 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	RW	PV	-	P.162
14-20	Log2 select	Log 2			RW	Velocity	-	P.162
14-21	Log3 select	Log 3			RW	Volume flow	-	P.162
14-22	Log4 select	Log 4			RW	Mass flow	-	P.162
14-23	Logging Exe	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.162

*4: Set at the factory before shipment.

(15) Parameter protection parameters

These parameters are related to the write protect function.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	HART	Display	HART	Display				
15-1	-	Key code	0000 to 9999 Number of decimal places: 0	0000 to 9999 Number of decimal places: 0	RW	0000	-	P.165
15-2	Write protect	Write protect sts	No Yes	No Yes	R	No	-	P.164
15-3	Enable write 10 min	Enable write	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.164
15-4	New password	New password	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.164
15-5	Software seal	Soft seal status	Keep Break	Keep Break	R	Keep	-	P.164

6. Parameter Menu Tree

NOTE

The available menus and parameters vary depending on the connection terminal type and the optional codes specified at the time of ordering.

6.1 Display Menu Tree

The outline of the display menu structure is shown below.

- **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**
  - Current alarm → Page 197
  - Language R/W1
  - Process variables → Page 198
    - Flow rate(%)
    - Flow rate
    - Velocity
    - Volume
    - Mass
    - Calorie
    - Analog out 1
    - Analog out 2
    - Totalizer
  - Diag/Service → Page 199
    - Sts/Self test
    - Time stamp
    - Diagnosis
    - Verification
    - Autozero
    - AO/AI trim
    - H/L alarm cfg
    - Test
    - Param bkup/restore
    - Data log
    - Disp indicator
  - Easy setup wizard → Page 204
    - Volume
    - Pulse/Status out
    - Display set
    - Autozero exe
  - Detailed setup → Page 205
    - Pro var
    - Sensor
    - User Span
    - Totalizer
    - Pulse/Status out
    - Status in
    - Analog out/in
    - Multi range
    - AUX calculation
    - Display set
    - Access cfg
    - Device info
    - Protection
  - microSD → Page 212
    - Contents
    - Unmount
    - Format
    - Property

Current alarm

Current alarm	
Setting upload	
Status 0	R
Status 1	R
Status 2	R
Status 3	R
Status 4	R
Status 5	R
Status 14	R
Status 15	R
Status 16	R
Status 17	R
Status 18	R
Status 19	R
Status 20	R
Setting download	

Status 0
010:Main CPU FAIL
011:Rev calc FAIL
012:Main EEP FAIL
013:Main EEP dflt

Status 1
014:Snsr bd FAIL
015:Snsr comm ERR
016:AD 1 FAIL[Sig]
017:AD 2 FAIL[Excit]
018:Coil open
019:Coil short
020:Exciter FAIL

Status 2
021:PWM 1 stop
022:PWM 2 stop
023:Opt bd mismatch
024:Opt bd EEP FAIL
025:Opt bd A/D FAIL
026:Opt bd SPI FAIL

Status 3
027:Restore FAIL
028:Ind bd FAIL
029:Ind bd EEP FAIL
030:LCD drv FAIL
031:Ind bd mismatch
032:Ind comm ERR
033:microSD FAIL

Status 4
050:Signal overflow
051:Empty detect
052:H/L HH/LL alm
053:Adh over lv 4

Status 5
060:Span cfg ERR
061:PV F cfg ERR
062:AO 1 4-20 lmt
063:AO 2 4-20 lmt
064:AO 1 mlt rng
065:H/L cfg ERR
066:Density cfg ERR

Status 14
067:Pls 1 cfg ERR
068:Pls 2 cfg ERR
069:Nomi size cfg
070:Adh cfg ERR
071:FLN cfg ERR
072:Log not start

Status 15
080:AO 1 saturate
081:AO 2 saturate
082:Pls 1 saturate
083:Pls 2 saturate
084:AI saturate
085:Cable miscon
086:Coil insulation
131:Trans mismatch

Status 16
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

Status 17
095:Simulate active
096:AO 1 fix
097:AO 2 fix
098:Pls 1 fix
099:Pls 2 fix
100:AI fix

Status 18
101:Param restore run
102:Disp over
103:SD size warn
104:Bkup incmplt
105:SD mismatch
106:SD removal ERR

Status 19
120:Watchdog
121:Power off
122:Inst power FAIL
123:Param bkup run
124:Data log run

Status 20
130:DevID not enter

NOTE

Only the status items that occur in HART communication type are described above. Other than the above status items are also displayed on the display unit.

Process variables

Process variables			
	Flow rate(%)		R
	Flow rate		R
	Velocity		R
	Volume		R
	Mass		R
	Calorie		R
	Analog out 1		R
	Analog out 2		R
	Totalizer		
		Totalizer 1	R
		Totalizer 2	R
		Totalizer 3	R
		Totalizer 1 count	R
		Totalizer 2 count	R
		Totalizer 3 count	R

Diagnosis/Service

- **Diag/Service**
  - Sts/Self test → Page 200
  - Time stamp
    - Date R
    - Time R
    - Op time R
  - Diagnosis → Page 201
  - Verification → Page 202
  - Autozero
    - Execute R/W2
    - Result
      - Zero value R/W3
  - AO/AI trim → Page 202
  - H/L alarm cfg
    - High alarm R/W3
    - Low alarm R/W3
    - HH alarm R/W3
    - LL alarm R/W3
    - H/L alarm hyst R/W3
    - 4-20 burnout R
  - Test → Page 203
  - Param bkup/restore
    - F backup name R
    - F backup date R
    - SD backup name R/W3
    - Backup execute R/W3
    - Backup result R
    - Restore execute R/W3
    - Restore result R
    - 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
    - Start time R
    - 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

Status/Self test

- **Sts/Self test**
  - Current alarm
    - Status 0 — R
    - Status 1 — R
    - Status 2 — R
    - Status 3 — R
    - Status 4 — R
    - Status 5 — R
    - Status 14 — R
    - Status 15 — R
    - Status 16 — R
    - Status 17 — R
    - Status 18 — R
    - Status 19 — R
    - Status 20 — 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
    - Alarm output
      - Active mode — 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
    - Span 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

Analog output/input adjustment

AO/AI trim			
	AO trim		
		AO1 trim clear	R/W3
		AO1 trim 4mA	R/W3
		AO1 trim 20mA	R/W3
		AO2 trim clear	R/W3
		AO2 trim 4mA	R/W3
		AO2 trim 20mA	R/W3
	AI trim		
		Trim clear	R/W3
		Trim 4mA	R/W3
		Trim 20mA	R/W3

Test

Test			
	Release time		R/W3
	Input test		
		Test mode	R/W3
		Velocity	R/W3
		Volume	R/W3
		Mass	R/W3
		Calorie	R/W3
		AI	R/W3
		SI11	R/W3
		SI12	R/W3
	Output test		
		Test mode	R/W3
		AO1	R/W3
		PO1	R/W3
		SO1	R/W3
		AO2	R/W3
		PO2	R/W3
		SO2	R/W3
		SO11	R/W3
		SO12	R/W3
		Alarm	R/W3
	Test 2 mode		R/W3
	Test 2 value		R/W3

Easy setup wizard

Easy setup wizard			
	Volume		
		Setting upload	
		Damp AO/F	R/W2
		Damp pls/ttl	R/W2
		Unit	R/W2
		Time unit	R/W2
		Span	R/W2
		Setting download	
	Pulse/Status out		
		Setting upload	
		P1 unit	R/W2
		P1 val	R/W2
		F1 at 0%	R/W2
		F1 at 100%	R/W2
		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

- Pro var → Page 206
- Sensor
  - Low MF R/W3
  - High MF R/W3
  - Flow sensor sel R/W3
  - Nominal size unit R/W3
  - Nominal size R/W3
- User Span → Page 206
- Totalizer → Page 207
- Pulse/Status out → Page 208
- Status in → Page 209
- Analog out/in → Page 209
- Multi range
  - Forward span 2 R/W3
  - Forward span 3 R/W3
  - Forward span 4 R/W3
  - Reverse span 1 R/W3
  - Reverse span 2 R/W3
  - Reverse span 3 R/W3
  - Reverse span 4 R/W3
  - Auto range hyst R/W3
  - Bi direction hyst R/W3
- AUX calculation
  - Flow direct R/W3
  - Rate limit R/W3
  - Dead time R/W3
  - Noise filter R/W3
  - Pulsing flow R/W3
  - Power sync R/W3
  - Set power freq R/W3
  - Iex power frequency R
  - Meas power freq R
  - Set SIL R/W3
- Display set → Page 210
- Access cfg
  - User role R
  - Chg mainte R/W2
  - Chg special R/W3
- Device info → Page 211
- Protection
  - Key code R/W3
  - Write protect sts R
  - Enable write R/W3
  - New password R/W3
  - Soft seal status R

Process variables

- **Pro var**
  - PV flow select — R/W3
  - Velocity
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Span — R/W3
  - Volume
    - Damp AO/F — R/W2
    - Damp pls/ttl — R/W2
    - Unit — R/W2
    - Time unit — R/W2
    - Span — R/W2
  - Mass
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Time unit — R/W2
    - Span — R/W3
  - Calorie
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Time unit — R/W2
    - 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

User span

- **User Span**
  - User span AO1
    - Select — R/W3
    - Span — R/W3
    - Unit — R/W3
  - User span AO2
    - Select — R/W3
    - Span — R/W3
    - Unit — R/W3

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/W3
	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 3		
	Unit	R/W3
	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

Pulse/Status output

Pulse/Status out

PO1/SO1

Output mode	R/W3
Active mode	R/W3
Fix width	R/W3
Rate unit	R/W2
Rate value	R/W2
Low cut	R/W3
Alarm out	R/W3
Frequency at 0%	R/W2
Frequency at 100%	R/W2
SO1 function	R/W3
Options	R/W3

PO2/SO2

Active pulse	R/W3
Output mode	R/W3
Pulse select	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
SO2 function	R/W3
Options	R/W3

SO11

Active mode	R/W3
Function	R/W3

SO12

Active mode	R/W3
Function	R/W3

Status input

Status in			
	SI11		
		Active mode	R/W3
		Function	R/W3
		State	R
	SI12		
		Active mode	R/W3
		Function	R/W3
		State	R

Analog output/input

Analog out/in			
	AO1		
		Low cut	R/W3
		High limit	R/W3
		Low limit	R/W3
		Alarm out	R/W3
		Range mode	R/W3
	AO2		
		AO2 select	R/W3
		Low cut	R/W3
		High limit	R/W3
		Low limit	R/W3
		Alarm out	R/W3
	AI		
		Function	R/W3
		High limit	R/W3
		Low limit	R/W3
		Value	R
		Unit	R/W3
		URV	R/W3
		LRV	R/W3

Display set

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
		Format date	R/W1
		Inversion	R/W1
		Language package	R/W1
		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
    - Set date — R/W3
    - Set time — R/W3
  - Order info
    - Tag No — R/W3
    - Long tag — R/W3
    - 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
    - Option board ID — R
    - Trans serial No — R/W3
    - Sensor serial No — R/W3
    - Main soft rev — R
    - Snsr soft rev — R
    - Ind soft rev — R
    - Hard rev — R
    - Dev id — R
  - IO status
    - Multi I/O — R
  - Memo
    - Memo 1 — R/W3
    - Memo 2 — R/W3
    - Memo 3 — R/W3
  - HART info
    - Poll addr — R/W3
    - Loop curr mode — R/W3
    - Num req preams — R
    - Num resp preams — R/W3

microSD

microSD			
	Contents		R
	Unmount		R/W1
	Format		R/W1
	Property		
		Total space	R
		Available space	R
		File system	R

6.2 HART Communication Menu Tree

The outline of the HART communication menu structure is shown below.

R	Read only
R/W	Read and write possible

- **Online**
  - Process variables root menu →Page 214
    - Dynamic variables
    - Device variables
    - Device variables status
    - Totalizer count
    - View outputs
    - View inputs
  - Diagnostic root menu →Page 215
    - Status/Self test
    - Diagnosis
  - Maintenance root menu →Page 218
    - Time stamp
    - Test
    - Autozero
    - AO/AI trim
    - High/Low alarm configuration
    - Verification
    - Param bkup/restore
    - Data logging
    - Display indication
  - Device root menu →Page 220
    - Easy setup wizard
    - Basic setup
    - Detailed setup

Process variables root menu

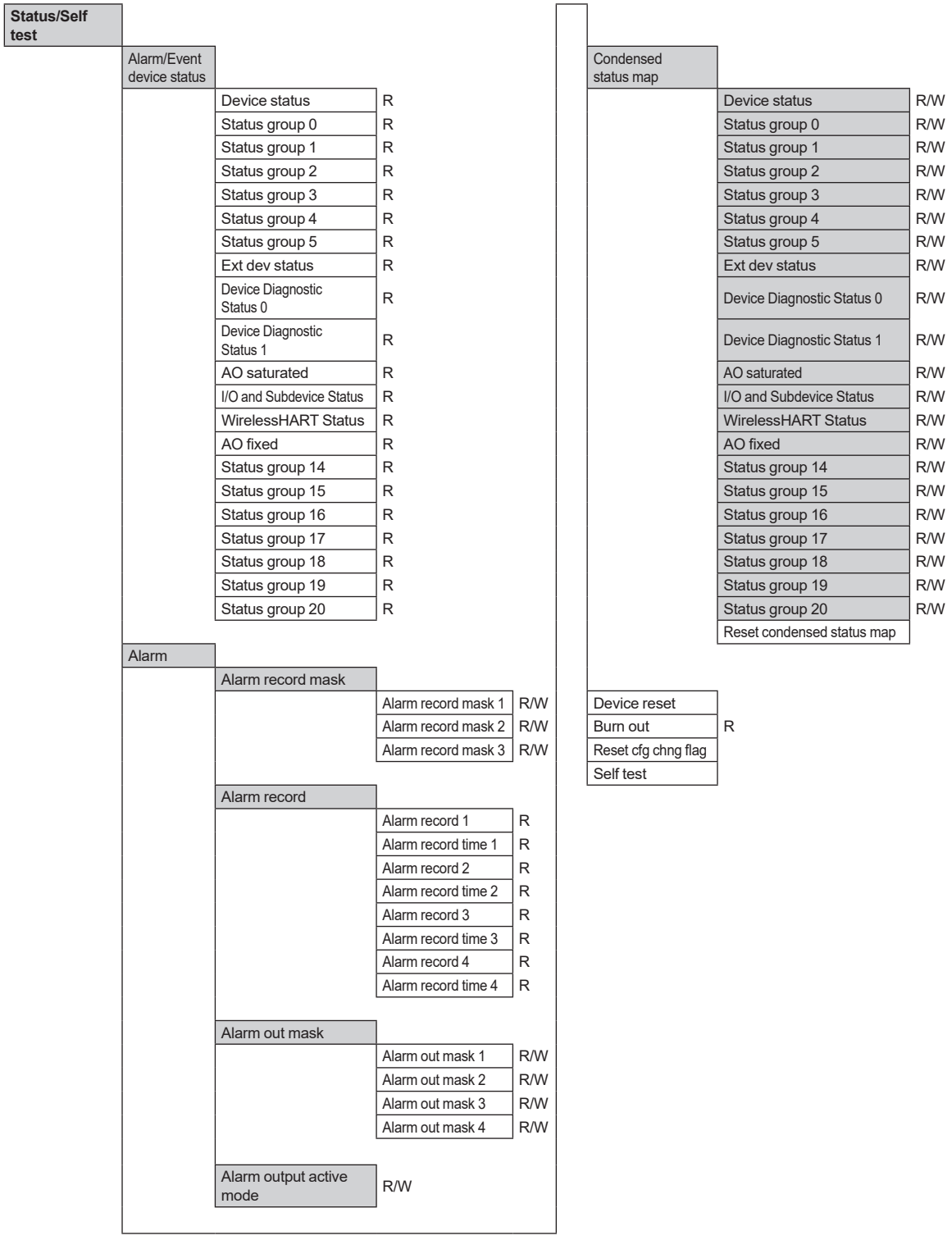
Process variables root menu

- Dynamic variables
  - [PV] R
  - [PV] data quality R
  - [PV] limit status R
  - PV % rnge R
  - Range information R
  - [SV] R
  - [SV] data quality R
  - [SV] limit status R
  - [TV] R
  - [TV] data quality R
  - [TV] limit status R
  - [QV] R
  - [QV] data quality R
  - [QV] limit status R
  - PV is R
  - SV is R
  - TV is R
  - QV is R
  - Change PV map
  - Change SV map
  - Change TV map
  - Change QV map
- Device variables
  - Velocity R
  - Volume flow R
  - Mass flow R
  - Totalizer1 R
  - Totalizer2 R
  - Totalizer3 R
  - Flow noise R
  - Calorific value R
- Device variables status
  - Velocity data quality R
  - Velocity limit status R
  - Volume flow data quality R
  - Volume flow limit status R
  - Mass flow data quality R
  - Mass flow limit status R
  - Totalizer1 data quality R
  - Totalizer1 limit status R
  - Totalizer2 data quality R
  - Totalizer2 limit status R
  - Totalizer3 data quality R
  - Totalizer3 limit status R
  - Flow noise data quality R
  - Flow noise limit status R
  - Calorific value data quality R
  - Calorific value limit status R
- Totalizer count
  - Totalizer1 count R
  - Totalizer2 count R
  - Totalizer3 count R
- View outputs
  - AO1 current R
  - Range information R
  - AO2 current R
- View inputs
  - AI current R

Diagnostic root menu

- **Diagnostic root menu**
  - Status/Self test → Page 216
  - Alarm/Event device status
  - Alarm
  - Condensed status map
  - Device reset
  - Burn out — R
  - Reset cfg chng flag
  - Self test
  - Diagnosis
    - Diagnostic output — R/W
    - Diagnostic Exe
    - Adhesion
      - Adhesion function — R/W
      - Adhesion level 1 — R/W
      - Adhesion level 2 — R/W
      - Adhesion level 3 — R/W
      - Adhesion level 4 — R/W
      - Result
        - Adhesion value — R
        - Adhesion status — R
      - Adhesion check cycle — R/W
    - Flow noise
      - Flow noise function — R/W
      - Flow noise level 1 — R/W
      - Flow noise level 2 — R/W
      - Flow noise level 3 — R/W
      - Flow noise level 4 — R/W
      - Result
        - Flow noise value — R
        - Flow noise status — R
      - Flow noise damping — R/W
      - Flow noise span — R/W
    - Conductivity
      - Low conductivity function — R/W
      - Conductivity low limit — R/W
      - Result
        - Conductivity value — R
    - Empty
      - Electrode voltage A — R
      - Electrode voltage B — R
      - Result
        - Empty status — R
    - Coil insulation threshold — R/W
    - IEX compare — R
    - V peak hold value — R
    - IEX coil resistance — R

Status/Self test



Device status
Process applied to the primary variable is outside the operating limits of the field device
Process applied to the non-primary variable is outside the operating limits of the field device
PV Analog Channel Saturated
PV Analog Channel Fixed
Field device has more status available
A reset or self test of the field device has occurred, or power has been removed and reapplied
A modification has been made to the configuration of the field device
Field device has malfunctioned due to a hardware error or failure

Status group 0
10:Main board CPU failure
11:Reverse calculation failure
12:Main board EEPROM failure
13:Main board EEPROM default

Status group 1
14:Sensor board failure
15:Sensor communication error
16:A/D1 failure[Signal]
17:A/D2 failure[Exciter]
18:Coil open
19:Coil short
20:Exciter failure

Status group 2
21:PWM1 stop
22:PWM2 stop
23:Option board mismatch
24:Option board EEPROM failure
25:Option board A/D failure
26:Option board SPI failure

Status group 3
27:Parameter restore incomplete
28:Indicator board failure
29:Indicator board EEPROM failure
30:LCD driver failure
31:Indicator board mismatch
32:Indicator communication error
33:microSD failure

Status group 4
50:Signal overflow
51:Empty pipe detection
52:H/L or HH/LL alarm
53:Adhesion over level 4

Status group 5
60:Span configuration error
61:PV flow select configuration error
62:Analog output 1 4-20mA limit error
63:Analog output 2 4-20mA limit error
64:Analog output 1 multi range error
65:H/L or HH/LL configuration error
66:Density configuration error

Ext dev status
Maintenance required.
Device variable alert
Critical Power Failure
Failure
Out of Specification
Function Check

Device Diagnostic Status 0
Simulation Active
Non-Volatile memory failure
Volatile memory error
Watchdog reset executed
Voltage conditions out of range
Environmental conditions out of range
Electronic failure
Device Configuration Locked.

Device Diagnostic Status 1
Status Simulation Active
Discrete Variables Simulation Active
Event Notification Overflow

AO saturated
Secondary Analog Channel Saturated
Tertiary Analog Channel Saturated
Quaternary Analog Channel Saturated
Quinary Analog Channel Saturated

I/O and Subdevice Status
Subdevice list changed
Duplicate master detected
Subdevice mismatch
Subdevices with duplicate IDs found
Stale data notice

WirelessHART Status
Capacity Denied.
Bandwidth allocation pending
Block Transfer Pending
Radio Failure

AO fixed
Secondary Analog Channel Fixed
Tertiary Analog Channel Fixed
Quaternary Analog Channel Fixed
Quinary Analog Channel Fixed

Status group 14
67:Pulse output 1 configuration error
68:Pulse output 2 configuration error
69:Nominal size configuration error
70:Adhesion configuration error
71:Flow noise configuration error
72:Data logging not started

Status group 15
80:Analog output 1 saturated
81:Analog output 2 saturated
82:Pulse output 1 saturated
83:Pulse output 2 saturated
84:Analog input saturated
85:Cable misconnect
86:Coil insulation warning
131:Transmitter type mismatch

Status group 16
87:Adhesion over level 3
88:Low conductivity warning
89:Insulation detection
90:Flow noise over level 3
91:Flow noise over level 4
92:Autozero warning
93:Verification warning
94:Factory noise warning

Status group 17
95:Simulation active
96:Analog output 1 fixed
97:Analog output 2 fixed
98:Pulse output 1 fixed
99:Pulse output 2 fixed
100:Analog input fixed

Status group 18
101:Parameter restore running
102:Display over warning
103:microSD card size warning
104:Parameter backup incomplete
105:microSD card mismatch
106:microSD card removal procedure error

Status group 19
120:Watchdog
121:Power off
122:Instant power failure
123:Parameter backup running
124:Data logging running

Status group 20
130:Device ID not entered

Maintenance root menu

- **Maintenance root menu**
  - Time stamp
    - Current Date — R/W
    - Current Time — R/W
    - Operation time — R
    - Set Date/Time
  - Test — →Page 219
  - Autozero
    - Autozero Exe
    - Result
      - Zero value — R/W
  - AO/AI trim
    - AO trim
      - AO1 Trim
      - AO2 Trim
      - Clear D/A trim 1
      - Clear D/A trim 2
    - AI trim
      - AI Trim
      - Clear AI trim
  - High/Low alarm configuration
    - Low alarm — R/W
    - Low low alarm — R/W
    - High alarm — R/W
    - High high alarm — R/W
    - Hi/Lo alarm hysteresis — R/W
  - Verification — →Page 219
  - Param bkup/restore
    - Factory backup name — R
    - Factory backup date — R
    - SD backup name — R/W
    - Backup Exe
    - Restore Exe
    - Backup name 1 — R/W
    - Backup date 1 — R/W
    - Backup name 2 — R/W
    - Backup date 2 — R/W
    - Backup name 3 — R/W
    - Backup date 3 — R/W
  - Data logging
    - File name — R/W
    - Interval time — R/W
    - Start date — R
    - Start time — R
    - End time — R/W
    - Logging Exe — R/W
    - Log1 select — R/W
    - Log2 select — R/W
    - Log3 select — R/W
    - Log4 select — R/W
  - Display indication
    - LCD test — R/W
    - Squawk

Test

Test			
	Release time		R/W
	Test mode		R/W
	Input test		
		Velocity	R/W
		Volume flow	R/W
		Mass flow	R/W
		Calorific value	R/W
		AI	R/W
		SI11	R/W
		SI12	R/W
	Output test		
		Loop test	
		AO1	R/W
		Pulse1	R/W
		SO1	R/W
		AO2	R/W
		Pulse2	R/W
		SO2	R/W
		SO11	R/W
		SO12	R/W
		Alarm	R/W
	Device variable simulation		
	Device status bit simulation		
	Test 2 mode		R/W
	Test 2 output value		R/W

Verification

Verification			
	VF target select		R/W
	Diagnostic output		R/W
	VF mode		R/W
	Verification Exe		
	VF No		R/W
	Result		
		VF check result	R
		VF operation time	R
		Magnetic circuit result	R
		Excitation circuit result	R
		Calculation circuit result	R
		VF device status result	R
		Connection status result	R

Device root menu

- Device root menu
  - Easy setup wizard
    - Volume flow
      - Volume flow damping AO/frequency R/W
      - Volume flow damping pulse/total R/W
      - Volume flow unit R/W
      - Time unit R/W
      - Volume flow span R/W
    - Pulse/Status out1
      - Pulse1 rate unit R/W
      - Pulse1 rate value R/W
      - Frequency1 at 0% R/W
      - Frequency1 at 100% R/W
    - Display setting
      - Display select1 R/W
      - Display select2 R/W
      - Display select3 R/W
    - Autozero Exe
  - Basic setup
    - PV flow select R/W
    - Velocity check R/W
    - Velocity
      - Velocity unit R/W
      - Velocity span R/W
      - Velocity damping AO/frequency R/W
      - Velocity damping pulse/total R/W
    - Volume flow
      - Volume flow unit R/W
      - Time unit R/W
      - Volume flow span R/W
      - Volume flow damping AO/frequency R/W
      - Volume flow damping pulse/total R/W
    - Mass flow
      - Mass flow unit R/W
      - Time unit R/W
      - Mass flow span R/W
      - Mass flow damping AO/frequency R/W
      - Mass flow damping pulse/total R/W
    - Calorie
      - Calorific unit R/W
      - Time unit R/W
      - Calorific flow span R/W
      - Calorific value damping AO/frequency R/W
      - Calorific value damping pulse/total R/W
      - Specific heat R/W
    - Sensor
      - Low MF R/W
      - High MF R/W
      - Flow sensor select R/W
      - Nominal size unit R/W
      - Nominal size R/W
    - User span
      - User span select AO1 R/W
      - User unit AO1 R/W
      - User span AO1 R/W
      - User span select AO2 R/W
      - User unit AO2 R/W
      - User span AO2 R/W
    - Autozero
      - Autozero Exe
      - Zero value R/W
  - Detailed setup →Page 221

Detailed setup

Detailed setup

- Process variables → Page 222
- Sensor
  - Low MF R/W
  - High MF R/W
  - Flow sensor select R/W
  - Nominal size unit R/W
  - Nominal size R/W
- User span
  - User span select AO1 R/W
  - User unit AO1 R/W
  - User span AO1 R/W
  - User span select AO2 R/W
  - User unit AO2 R/W
  - User span AO2 R/W
- Totalizer → Page 223
- Pulse/Status → Page 224
- Analog output/input → Page 225
- Multi range
  - Forward span 2 R/W
  - Forward span 3 R/W
  - Forward span 4 R/W
  - Reverse span 1 R/W
  - Reverse span 2 R/W
  - Reverse span 3 R/W
  - Reverse span 4 R/W
  - Auto range hyst R/W
  - Bi direction hyst R/W
- AUX calculation
  - Flow direction R/W
  - Rate limit R/W
  - Dead time R/W
  - Noise filter R/W
  - Pulsing flow R/W
  - Power synchronize R/W
  - Set power frequency R/W
  - IEX power frequency R
  - Measured power frequency R
  - Set SIL R/W
- Display → Page 225
- Device information → Page 226
- Protection
  - Write protect R
  - Enable write 10min
  - New password
  - Software seal R

Process variables

Process variables		
	PV flow select	R/W
	Velocity check	R/W
	Velocity	
		Velocity unit R/W
		Velocity span R/W
		Velocity damping AO/frequency R/W
		Velocity damping pulse/total R/W
	Volume flow	
		Volume flow unit R/W
		Time unit R/W
		Volume flow span R/W
		Volume flow damping AO/frequency R/W
		Volume flow damping pulse/total R/W
	Mass flow	
		Mass flow unit R/W
		Time unit R/W
		Mass flow span R/W
		Mass flow damping AO/frequency R/W
		Mass flow damping pulse/total R/W
	Calorie	
		Calorific unit R/W
		Time unit R/W
		Calorific flow span R/W
		Calorific value damping AO/frequency R/W
		Calorific value damping pulse/total R/W
		Specific heat R/W
	Density	
		Density value select R/W
		Density unit R/W
		Density fixed value R/W
		Standard density R/W
		Correct density R
	Temperature	
		Standard temperature R/W
		Measured temperature R
		Calorific fix temp R/W
		Temp coef A1 R/W
		Temp coef A2 R/W

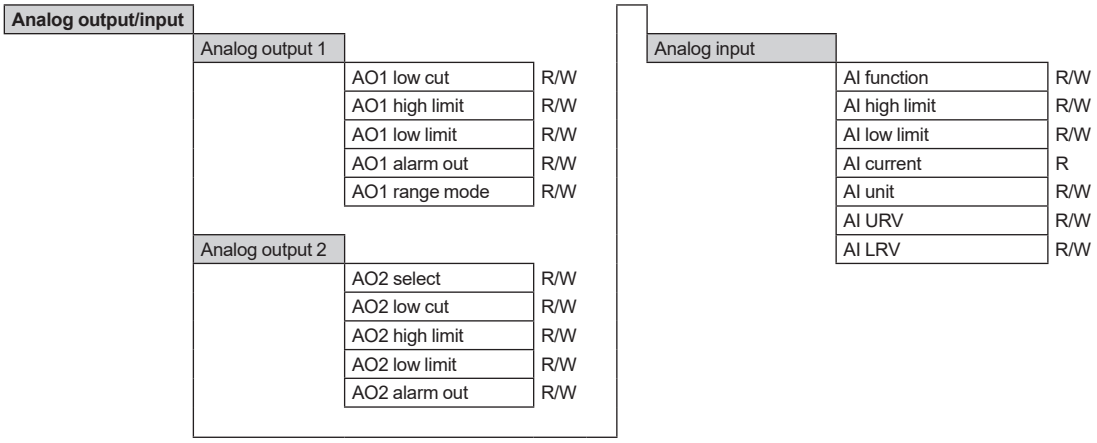
Totalizer

Totalizer			
	Totalizer1		
		Total1 unit	R/W
		Total1 conv factor	R/W
		Total1 low cut	R/W
		Total1 fail opts	R/W
		Total1 options	R/W
		Total1 Start/Stop	R/W
		Total1 Reset/Preset	
		Total1 preset value	R/W
		Total1 set point	R/W
	Totalizer2		
		Total2 unit	R/W
		Total2 conv factor	R/W
		Total2 low cut	R/W
		Total2 fail opts	R/W
		Total2 options	R/W
		Total2 Start/Stop	R/W
		Total2 Reset/Preset	
		Total2 preset value	R/W
		Total2 set point	R/W
	Totalizer3		
		Total3 unit	R/W
		Total3 conv factor	R/W
		Total3 low cut	R/W
		Total3 fail opts	R/W
		Total3 options	R/W
		Total3 Start/Stop	R/W
		Total3 Reset/Preset	
		Total3 preset value	R/W
		Total3 set point	R/W

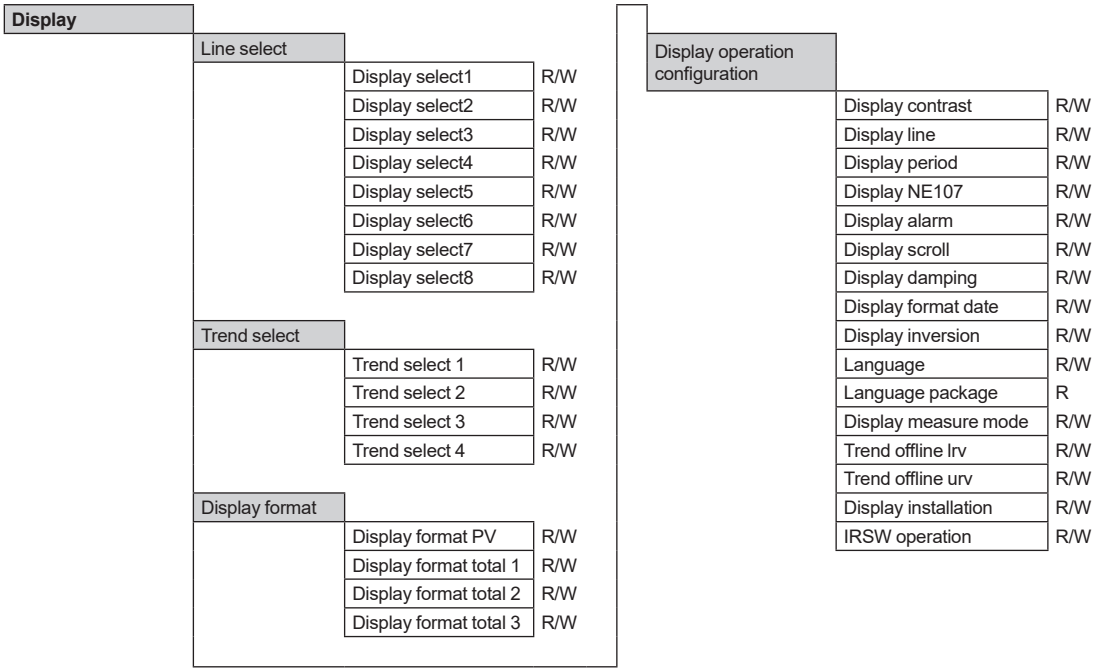
Pulse/Status

Pulse/Status			
	Pulse/Status output 1		
		Pulse1 output mode	R/W
		Pulse1 active mode	R/W
		Pulse1 fix width	R/W
		Pulse1 rate unit	R/W
		Pulse1 rate value	R/W
		Pulse1 low cut	R/W
		Pulse1 alarm out	R/W
		Frequency1 at 0%	R/W
		Frequency1 at 100%	R/W
		Status output1 function	R/W
		Pulse1 option	R/W
	Pulse/Status output 2		
		Pulse2 active pulse	R/W
		Pulse2 output mode	R/W
		Pulse2 select	R/W
		Pulse2 active mode	R/W
		Pulse2 fix width	R/W
		Pulse2 rate unit	R/W
		Pulse2 rate value	R/W
		Pulse2 low cut	R/W
		Pulse2 alarm out	R/W
		Frequency2 at 0%	R/W
		Frequency2 at 100%	R/W
		Status output2 function	R/W
		Pulse2 option	R/W
	Status output 11		
		Status output11 active mode	R/W
		Status output11 function	R/W
	Status output 12		
		Status output12 active mode	R/W
		Status output12 function	R/W
	Status input 11		
		Status input11 active mode	R/W
		Status input11 function	R/W
		Status input11 state	R/W
	Status input 12		
		Status input12 active mode	R/W
		Status input12 function	R/W
		Status input12 state	R/W

Analog output/input



Display



Device information

Device information			
	Order information		
		Tag	R/W
		Long tag	R/W
		Electrode size	R/W
		Explosion protection	R/W
		Basic model code	R/W
		Suffix config 1	R/W
		Suffix config 2	R/W
		Option 1	R/W
		Option 2	R/W
		Option 3	R/W
		Option 4	R/W
		Remote sensor basic model code	R/W
		Remote sensor suffix config 1	R/W
		Remote sensor suffix config 2	R/W
		Remote sensor option 1	R/W
		Remote sensor option 2	R/W
		Remote sensor option 3	R/W
		Remote sensor option 4	R/W
	Version/Number information		
		Transmitter type	R
		Option board ID	R
		Transmitter serial No	R/W
		Sensor serial No	R/W
		Main board revision	R
		Sensor board revision	R
		Indicator board revision	R
		Hardware rev	R
		Dev id	R
	IO Status		
		MIO	R
	Memo		
		Memo 1	R/W
		Memo 2	R/W
		Memo 3	R/W
	HART setup		
		Poll addr	R/W
		Loop current mode	R/W
		Num req preams	R
		Num resp preams	R/W
		Manufacturer	R
		Model	R
		Date	R/W
		Descriptor	R/W
		Message	R/W
		Distributor	R
		Final asmbly num	R/W
		Max dev vars	R
		Device profile	R
		Universal rev	R
		Fld dev rev	R
		Software rev	R
		Hardware rev	R
		Burst setup	→Page 227
		Event setup	→Page 228

Burst setup

- **Burst setup**
  - Stop burst
  - Easy burst setup
    - Set easy burst
    - Stop easy burst
    - Burst mode R
    - Burst Command R
    - slot0 R
    - slot1 R
    - slot2 R
    - slot3 R
  - Detailed burst setup
    - set Detailed Burst
    - stop Detailed Burst
    - BM1 Setting
      - Burst mode R
      - Burst Command R
      - slot0 R
      - slot1 R
      - slot2 R
      - slot3 R
      - slot4 R
      - slot5 R
      - slot6 R
      - slot7 R
      - Update Period R
      - Max Update Period R
      - Burst Msg Trigger Mode R
      - Burst Trigger Class R
      - Burst Trigger Units R
      - Burst Trigger Level R
    - BM2 Setting
      - Burst mode R
      - Burst Command R
      - slot0 R
      - slot1 R
      - slot2 R
      - slot3 R
      - slot4 R
      - slot5 R
      - slot6 R
      - slot7 R
      - UpdatePeriod R
      - Max Update Period R
      - Burst Msg Trigger Mode R
      - Burst Trigger Class R
      - Burst Trigger Units R
      - Burst Trigger Level R
    - BM3 Setting
      - Burst mode R
      - Burst Command R
      - slot0 R
      - slot1 R
      - slot2 R
      - slot3 R
      - slot4 R
      - slot5 R
      - slot6 R
      - slot7 R
      - UpdatePeriod R
      - Max Update Period R
      - Burst Msg Trigger Mode R
      - Burst Trigger Class R
      - Burst Trigger Units R
      - Burst Trigger Level R

Event setup

Event setup			
	set Event		
	stop Event		
	acknowledge Event		
	Event Setting		
		Event Notification Control	R
		Event Notification Retry Time	R
		Max Update Time	R
		Event Debounce Interval	R
		Event Status	R
		Time First unack Event Triggered	R
		Device Status Mask	R
		Ext dev status Mask	R
		Device Diagnostic Status 0 Mask	R
		Device Diagnostic Status 1 Mask	R
		Device Diagnostic Status 2 Mask	R
		Device Diagnostic Status 3 Mask	R
		AO fixed Mask	R
		AO saturated Mask	R
		Device Specific Status 0 Mask	R
		Device Specific Status 1 Mask	R
		Device Specific Status 2 Mask	R
		Device Specific Status 3 Mask	R
		Device Specific Status 4 Mask	R
		Device Specific Status 5 Mask	R
		Device Specific Status 14 Mask	R
		Device Specific Status 15 Mask	R
		Device Specific Status 16 Mask	R
		Device Specific Status 17 Mask	R
		Device Specific Status 18 Mask	R
		Device Specific Status 19 Mask	R
		Device Specific Status 20 Mask	R

Revision Information

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- Manual No. : IM 01E22C02-02EN

Edition	Date	Page	Revised Item
1st	Aug. 2019	—	New publication
2nd	Mar. 2020	— 13 37 108 122 136	Incorporate the manual change 19-0021-E. Correction of errors. 2.2.1 Add NOTE. 4.1.2 Add the setting example. 4.8.5 Add the setting example. 4.9.4 Add NOTE. 4.11.4 Add IMPORTANT.
3rd	Mar. 2020	14-16	2.3 Change the operation procedure by the display unit.