User's Manual

ADMAG TI Series
AXG1A Magnetic Flowmeter
Remote Transmitter
BRAIN Communication Type

IM 01E22C02-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01E22C02-01EN
3rd Edition

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1. Introduction

This manual explains basic operations of ADMAG TI Series AXG1A Magnetic Flowmeter Remote Transmitter with BRAIN 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 "®".

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.

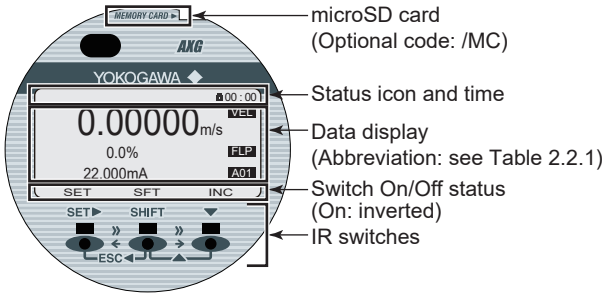
NOTE

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		BRAIN 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.
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 (G01: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)

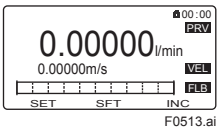
Parameter	Description
Chg mainte	Change of pass code (maintenance code) with maintenance operation level authority. To change the level, maintenance or specialist operation level authority is necessary.
Chg special	Change of pass code (special code) with specialist operation level authority. To change 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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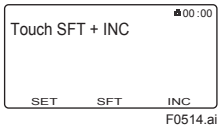
2) Touch [SFT] + [INC] switches.



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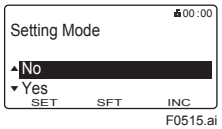
3) "No" is selected.
Touch [INC] switch and select "Yes".



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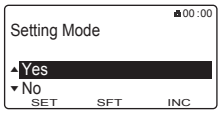
4) Touch [SET] switch.



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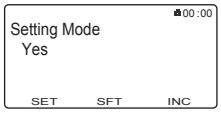
5) “Yes” is blinking.
Touch [SET] switch again.



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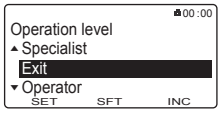
6) The screen moves to the menu of Operation Level.



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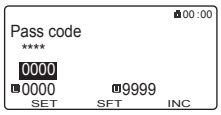
7) Select an appropreate operation level by moving the cursor with [INC] or [DEC] switch. Passcode is not necessary for “Operator”. For “Maintenance” and “Specialist”, passcode is necessary for each. For passcode setting, [SFT] is for position change, and [INC] is for number, then twice [SET] is for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



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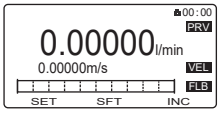
8) When the Operation Level is determined, the screen moves to “Device setup” as the Setting Mode where parameters can be configured.
9) After completing parameter setting, push [ESC] switch. The screen returns to the Display Mode.

NOTE

Follow the procedure bellow when Ind soft rev (K52:IND B REV / 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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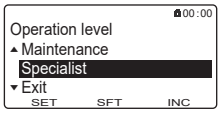
2) Press and hold the [SET] switch for two seconds. The screen will switch to the “Operation level” menu.



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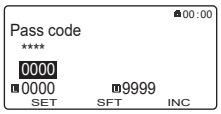
NOTE

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

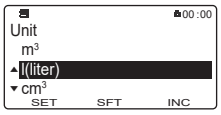
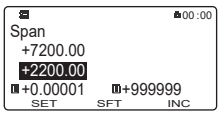
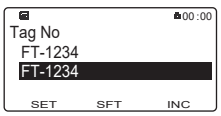
When parameters on the menu described above are set in the Wizard of Easy setup, be sure to execute “Setting download” in each menu after setting the parameters. If “Setting download” is not executed, any changed parameters will not be correctly applied to the device.

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.

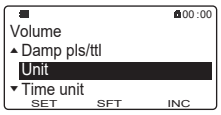
2.4.1 Setting Example of Select Type Parameter (Flow rate unit)

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

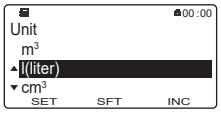
Display	Device setup ► Detailed setup ► Pro var ► Volume ► (see below)

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



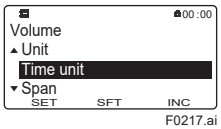
F0215.ai

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”.



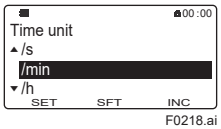
F0216.ai

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.



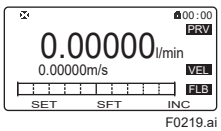
F0217.ai

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)

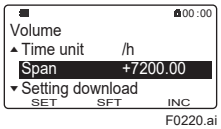
The following is the procedure of changing the flow rate span as numeric type parameter.
This setting can be configured with the following parameters.

Menu path

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

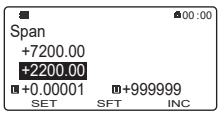
NOTE

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

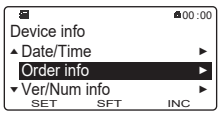
The switch's functionality for setting the span flow rate is as below:
Plus/minus and numeric change: [INC]
Movement of digits: [SFT]
Determination of parameter: [SET]
L: Minimum value
U: Maximum value
Press [SET] to determine the parameter while the setting value of the flow rate span is blinking. The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

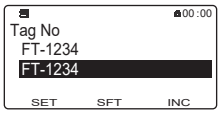
Menu path

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).

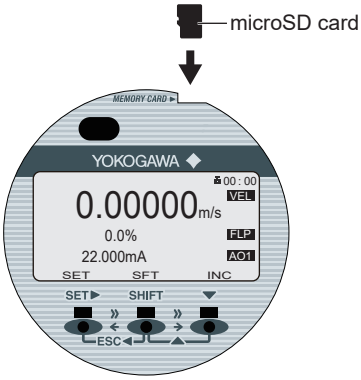


Figure 2.5 Insertion of microSD Card

(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 BRAIN Configuration Tool

This chapter describes the connection method of this product and BRAIN configuration tool (BRAIN TERMINAL (BT200) or FieldMate (Versatile Device Management Wizard)), and the operation method using BT200. Read the user's manual of BT200 (IM 01C00A11-01E) for details about the BT200. Read the user's manual of FieldMate (IM 01R01A01-01E) for details about the FieldMate.

NOTE

In this manual, the operation with the configuration tool is explained using the screen of BT200 for which language is set to English.

3.1 Connecting BRAIN Configuration Tool

In BRAIN communication, the communication signal is superimposed onto the 4 to 20 mA DC analog signal to be transmitted.
The BRAIN configuration tool can be connected to any relay terminal in the instrument room or transmission loop for communication, provided there is the minimum load resistance of 250 Ω between this product and the connection terminal of the BRAIN setting tool.
The BRAIN configuration tool must be connected in parallel with this product for communication, but the connection is not affected by the polarity.
See Figure 3.1 for a connection example.

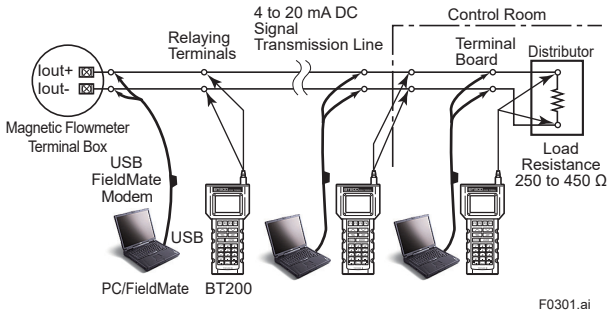


Figure 3.1 Connecting the BRAIN Configuration Tool

IMPORTANT

Communication signal is superimposed on output signal at communication. It is recommended to set a low-pass filter (approximately 0.1s) to the receiver in order to reduce the output effect from communication signal. Before online communication, confirm that communication signal does not give effect on the high-level system.

IMPORTANT

Restrictions exist with regard to the distance over which communication is possible. Read the general specifications.

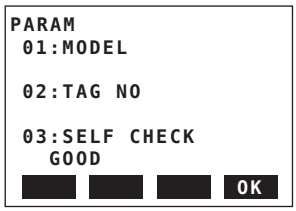
After connecting the BT200, check that it operates properly.

(1) When the BT200 is turned on, the message “Please wait..”. is displayed on the BT200 screen for several seconds. Then, press the Enter key.

(2) The initial data screen is displayed.

Press the function key “F4” [OK] or the Enter key.

Initial data screen



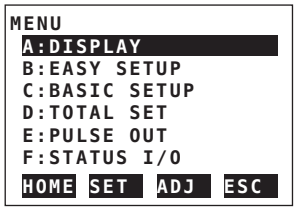
F0302.ai

[01:MODEL]: Product model name
[02:TAG NO]: Tag No. (if specified at ordering)
[03:SELF CHECK]: Abnormality check for this product GOOD or ERROR

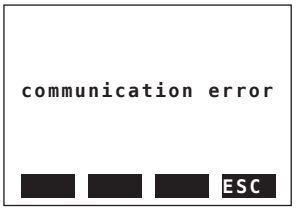
(3) When the menu screen is displayed, the parameters can be displayed and changed using the BT200.

If there is a problem in the wiring system with the BT200, “communication error” is displayed.

Menu screen



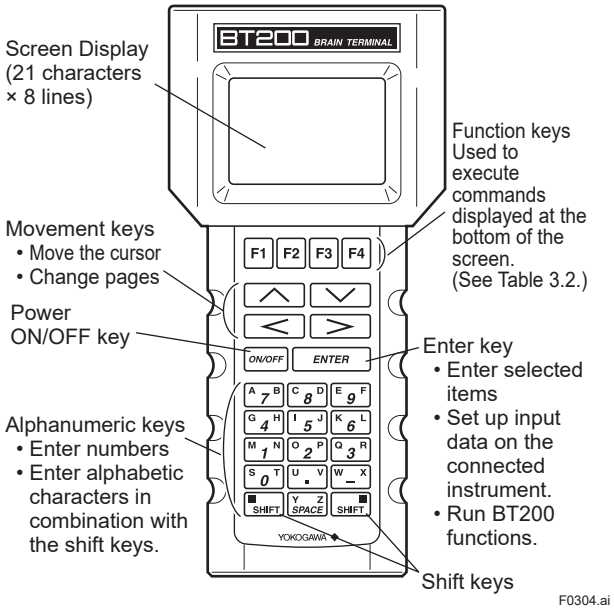
Communication error (Faulty wiring)



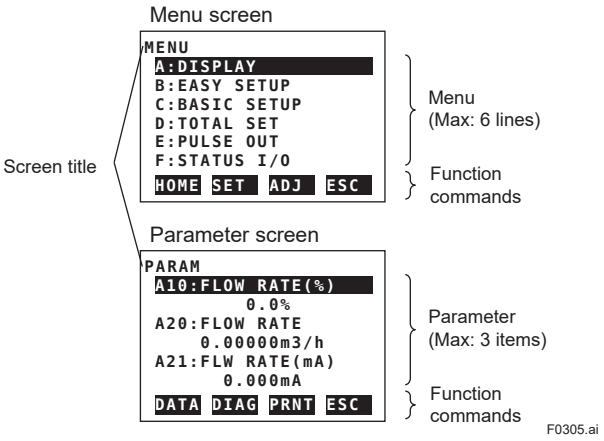
F0303.ai

3.2 BT200 Operating Procedures

3.2.1 Key Layout and Screen Display



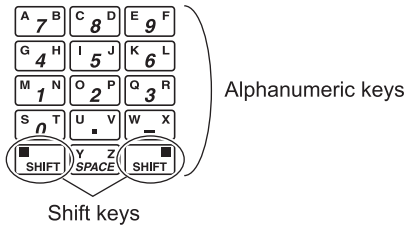
F0304.ai



F0305.ai

3.2.2 Key Descriptions

Use the alphanumeric keys in conjunction with the shift keys to enter numbers, symbols, and alphabetic characters.



F0306.ai

(1) Entering Numbers, Spaces and Hyphen

Simply press the alphanumeric keys to input keys.

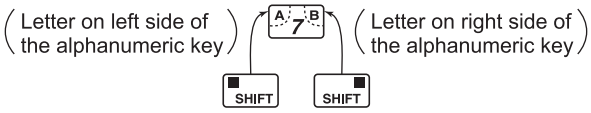
Entry	Key-in sequence
–4	[–] [4]
0.3	[0] [.] [3]
1 ␣ –9	[1] [SPACE] [–] [9]

F0307.ai

(2) Entering Alphabetic Characters

Press either the left or right shift key and then an alphanumeric key to enter the desired alphabetic character.

The shift key must be pressed each time an alphabetic character is entered.



Entry	Key-in sequence
W	[SHIFT] [–]
IC	[SHIFT] [5] [SHIFT] [8]
J. B	[SHIFT] [5] [.] [SHIFT] [7]

F0308.ai

(3) Entering Uppercase and Lowercase

The case toggles between uppercase and lowercase each time “F2” [CAPS] is pressed.

Entry	Key-in sequence
Boy	to lower case [SHIFT] [7] [F2] [SHIFT] [2] [SHIFT] [SPACE] (B) (o) (y)

F0309.ai

(4) Entering Symbols

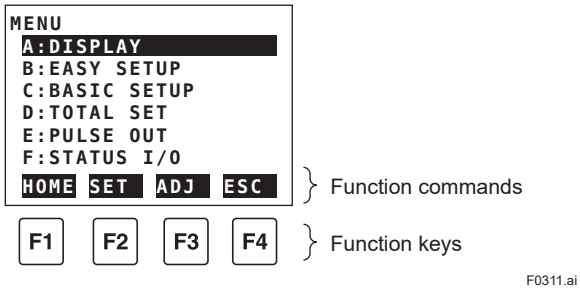
Press the function key “F1” [CODE] to select the following symbols.
The following symbols will appear in sequence, one at a time, at the cursor each time “F1” [CODE] is pressed:
/ . − , + *) (’ & % $ # " !
To enter characters next to these symbols, press the movement key to move the cursor.

Entry	Key-in Sequence
l/m	

F0310.ai

3.2.3 Function Keys

The functions of the function keys depend on function commands displayed on the screen.



F0311.ai

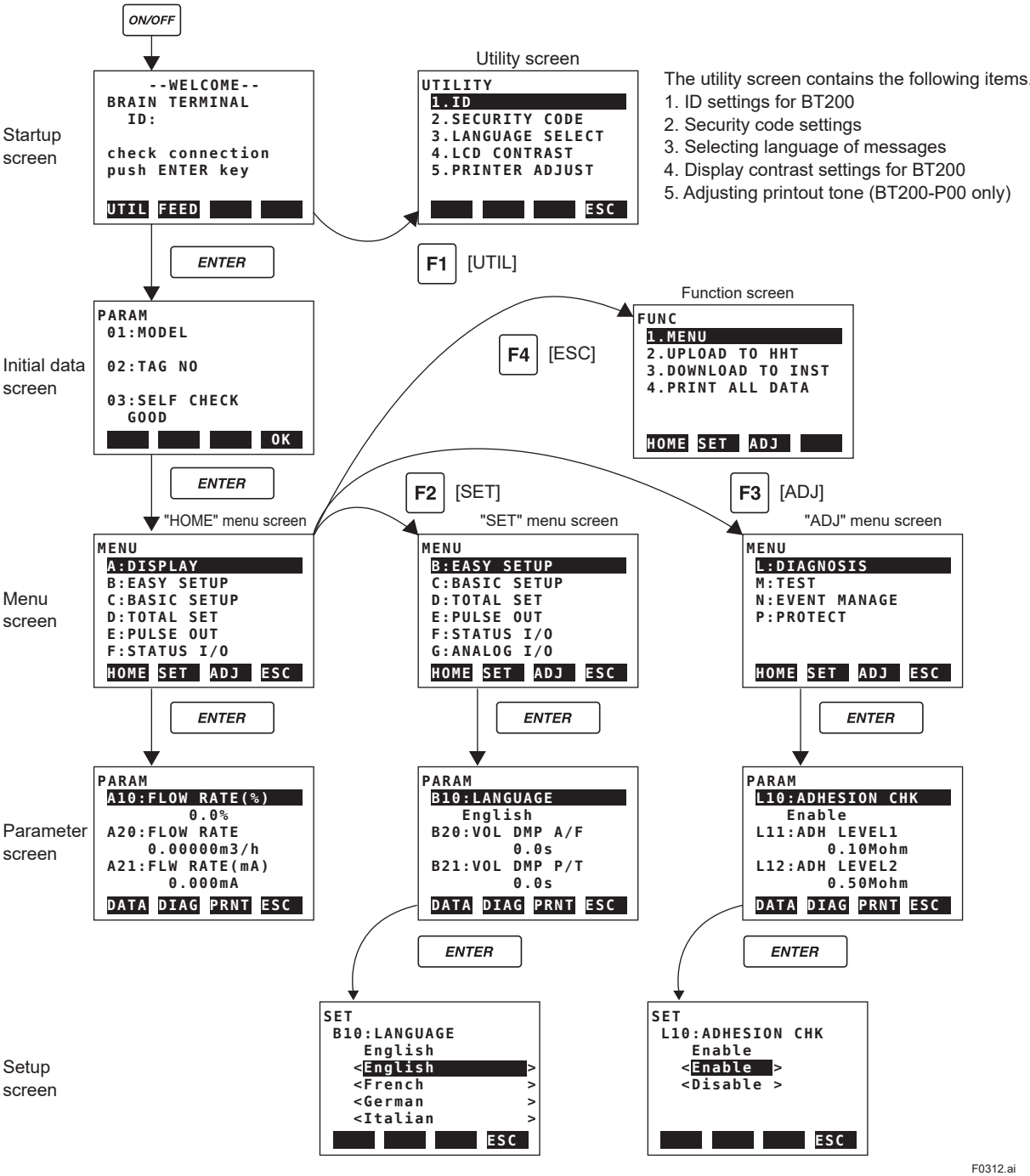
Table 3.2 Function Command

Command	Meaning
ADJ	Displays the ADJ menu
CAPS/caps	Changes the case mode
CODE	Selects symbol/sign
CLR	Erases input data or deletes all data
DATA	Updates parameter data
DEL	Deletes one character
DIAG	Calls the self-check panel
ESC	Returns to the most recent display
HOME	Displays the menu panel
NO	Resetting Return to setting screen
OK	Proceeds to the next panel
PRAM	Enters the parameter number setup mode
SET	Displays the SET menu
SLOT	Returns to the slot selection panel
UTIL	Calls the utility panel
*COPY	Prints out parameters on display
*FEED	Paper feed
*LIST	Lists all parameters in the menu
*PON/POFF	Automatic printout mode on or off for setting change data
*PRNT	Changes to the print mode
*GO	Starts printing
*STOP	Cancels printing

*: Available on BT200-P00 (with printer).

3.3 Calling Up Menu Addresses

Calling-up menu on the screen is as follows.
Press movement keys to move the cursor. By using the movement key left and right, an item can be moved by one screen.



F0312.ai

3.4 Parameter Update and Upload/ Download Function

(1) Updating Parameters

The display of the parameters is updated automatically every seven seconds. For the following parameters, refer to the following table.

Item	Name	Item	Name
A10	FLOW RATE(%)	I54	ALM RECORD3
A20	FLOW RATE	I55	ALM TIME3
A21	FLW RATE(mA)	I56	ALM RECORD4
A30	TOTAL1	I57	ALM TIME4
A31	TOTAL2	K02	OPERATE TIME
A32	TOTAL3	K03	CUR DATE
A33	TOTAL1 CNT	K04	CUR TIME
A34	TOTAL2 CNT	L16	ADH MEAS VAL
A35	TOTAL3 CNT	L17	ADH STATUS
C40	VELOCITY CHK	L25	FL NOISE VAL
F14	SI3 STATE	L26	FL NOISE STS
G23	AI VALUE	L31	CONDUCTIVITY
H22	IEX PWR FREQ	L40	V PEAK HOLD
H23	MES PWR FREQ	L41	IEX COIL R
H37	MEAS TEMP	L42	ELEC VOL A
H38	CORRCT DENS	L43	ELEC VOL B
H42	CAL VALUE	L44	EMPTY STS
I50	ALM RECORD1	N21	RESTORE RSLT
I51	ALM TIME1	P20	WRT PROTECT
I52	ALM RECORD2	P23	SOFT SEAL
I53	ALM TIME2		

(2) Upload/Download Function

The upload function is used for copying the parameters of this product to BT200. The download function is used for setting the copied parameters in the BT200 into other product. For the following parameters, refer to the following table.

Item	Name	Item	Name
B10/J32	LANGUAGE	B31/E14	P1 RATE VAL
B20/C12	VOL DMP A/F	B32/E17	F1 AT 0%
B21/C13	VOL DMP P/T	B33/E18	F1 AT 100%
B22/C32	VOL F UNIT	B40/J10	LINE1 SEL
B23/C35	TIME UNIT	B41/J11	LINE2 SEL
B24/C36	VOL F SPAN	B42/J12	LINE3 SEL
B30/E13	P1 RATE UNIT	B50/C51	AUTOZERO EXE

3.5 Parameter Configuration

This section describes procedures for setting parameters using the BT200.

IMPORTANT

Do not turn off the product right after changing parameter with the BT200.
If this product is turned off before 30 seconds after setting the parameters, the settings will not be stored correctly. Please keep the product turned on for over 30 seconds after setting the parameters.

IMPORTANT

Be sure to enable the write protect function to prevent parameters from being overwritten after finishing parameter setting.
Refer to the Installation Manual for the hardware write protect function, and Section 4.14 for the software write protect function.

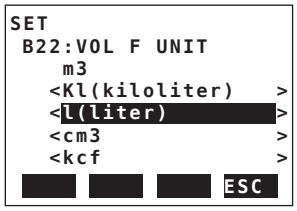
NOTE

Before updating any setting, refer to Chapter 5 and check the parameter content you want to change.

3.5.1 Setting Example of Select type Parameter (Flow Rate Unit)

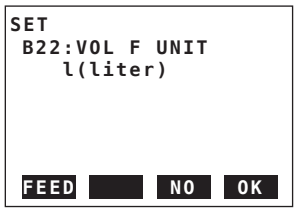
With [B22: VOL F UNIT] of the select type parameter, change the flow rate unit from m^3 to l (liter).

(1) Move from [B:EASY SETUP] to [B22:VOL F UNIT].
(2) Move to the setup screen, select the flow rate unit. Move the cursor to [l (liter)], and press the Enter key.
When the selected unit blinks, press the Enter key to determine.



F0313.ai

(3) The flow rate unit is now changed to “l (liter)”. Press the function key “F4” [OK], and then the screen is back to the parameter screen. Press the function key “F3” [NO], and then the screen is back to the setup screen.

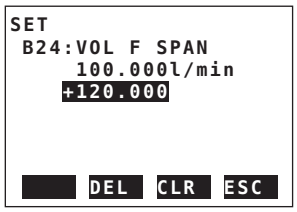


F0314.ai

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

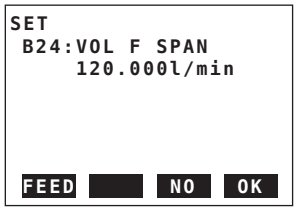
With [B24: VOL F SPAN] of the numeric-type parameter, change the flow rate span from “100.000 l/min” to “120.000 l/min”.

(1) Move from [B:EASY SETUP] to [B24:VOL F SPAN].
(2) Move to the setup screen, and enter the flow span value. Enter the value “120.000”, and press the Enter key. When the entered value blinks, press the Enter key to determine.



F0315.ai

(3) The flow span is now changed to “120.000 l/min”. Press the function key “F4” [OK], and then the screen is back to the parameter screen. Press the function key “F3” [NO], and then the screen is back to the setup screen.

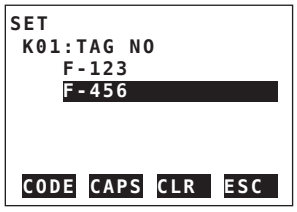


F0316.ai

3.5.3 Setting Example of Alphanumeric type Parameter (Tag No.)

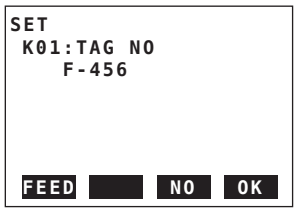
With [K01: TAG NO] of the alphanumeric type parameter, change Tag No. from “F-123” to “F-456”.

(1) Move to [K:DEVICE INFO] -> [K01:TAG NO].
(2) Move to the setup screen, and enter the Tag No. Enter the alphanumeric character “F-456”, and press the Enter key. When entered the alphanumeric character blinks, press the Enter key to determine.



F0317.ai

(3) The Tag No. is now changed to “F-456”. Press the function key “F4” [OK], and then the screen is back to the parameter screen. Press the function key “F3” [NO], and then the screen is back to the setup screen.



F0318.ai

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					
BRAIN	**Iout1 +/-**	**P/Sout1 +/-**	**ALM +/-**	**So11 + So12 +**	**Si11 + Si12 +**	**MIO +/-**
D0	Iout1 (Active)	P/Sout1 (Passive)	Alarm Output (Passive)	Sout1, 2 (Passive)	Sin1, 2 (No-voltage)	-
D2						Iin (Active)
D3						P/Sout2 (Passive)
D4						P/Sout2 (Active, without internal resistor)
D5						P/Sout2 (Active, with internal resistor)
D6						Iout2 (Active)

Iout1: Analog output 1 (BRAIN 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
BRAIN	C:BASIC SETUP ► C30:PV FLOW SEL

Selection		Description
Display	**BRAIN**	
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.

C30: PV FLOW SEL="Volume"
C32: VOL F UNIT="m^3"
C35: TIME UNIT="/h"
C37: VOL F SPAN="100"

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.

H31: DENSITY UNIT="kg/m^3"
H32: FIXED DENS="1000"
C30: PV FLOW SEL="Mass"
C33: MASS F UNIT="kg"
C35: TIME UNIT="/h"
C38: MASS F SPAN="10000"

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)
BRAIN	A:DISPLAY ► (see below)

Parameter		Description
Display	**BRAIN**	
Flow rate(%)	FLOW RATE(%)	Displays the percentage to the range for the process value set to the Primary Value.
Flow rate	FLOW RATE	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)
BRAIN	A:DISPLAY ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity	(*)	Displays the flow velocity.
Volume	(*)	Displays the volumetric flow rate.
Mass	(*)	Displays the mass flow rate.
Totalizer ►Totalizer 1	TOTAL1	Displays the totalized value of totalizer 1.
Totalizer ►Totalizer 2	TOTAL2	Displays the totalized value of totalizer 2.
Totalizer ►Totalizer 3	TOTAL3	Displays the totalized value of totalizer 3.
Calorie	(*)	Displays the calorie.

(*) Only the process value selected with C30:PV FLOW SEL can be checked from BRAIN communication.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Result ► Value
BRAIN	L:DIAGNOSIS ► L25:FL NOISE VAL

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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity ► Unit	C31:VELO F UNIT	Specifies the physical unit of the flow velocity.
Volume ► Unit	C32:VOL F UNIT	Specifies the physical unit of the volumetric flow rate.
Mass ► Unit	C33:MASS F UNIT	Specifies the physical unit of the mass flow rate.
Calorie ► Unit	C34:CAL UNIT	Specifies the physical unit of the calorie.

■ Time unit

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Volume ► Time unit	C35:TIME UNIT	Specifies the time unit of the volumetric flow rate.
Mass ► Time unit	C35:TIME UNIT	Specifies the time unit of the mass flow rate.
Calorie ► Time unit	C35: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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity ► Span	C36:VELO F SPAN	Specifies the span of the flow velocity.
Volume ► Span	C37:VOL F SPAN	Specifies the span of volumetric flow rate.
Mass ► Span	C38:MASS F SPAN	Specifies the span of the mass flow rate.
Calorie ► Span	C39:CAL F SPAN	Specifies the span of the calorie.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Span
BRAIN	L:DISGNOSIS ► L28:FL NOISE SPN

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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity ► Damp AO/F	C10:VELO DMP A/F	Specifies the damping time constant of the flow velocity.
Volume ► Damp AO/F	C12:VOL DMP A/F	Specifies the damping time constant of the volumetric flow rate.
Mass ► Damp AO/F	C14:MASS DMP A/F	Specifies the damping time constant of the mass flow rate.
Calorie ► Damp AO/F	C16:CAL DMP A/F	Specifies the damping time constant of the calorie.

■ Pulse output/Totalizer

Menu path

Display	Device setup ► Detailed setup ► Pro var ► (see below)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity ► Damp pls/ttl	C11:VELO DMP P/T	Specifies the damping time constant of the flow velocity.
Volume ► Damp pls/ttl	C13:VOL DMP P/T	Specifies the damping time constant of the volumetric flow rate.
Mass ► Damp pls/ttl	C15:MASS DMP P/T	Specifies the damping time constant of the mass flow rate.
Calorie ► Damp pls/ttl	C17:CAL DMP P/T	Specifies the damping time constant of the calorie.

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Damp
BRAIN	L:DIAGNOSIS ► L27:FL NOISE DMP

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)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
AO1 ► Low cut	G01: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	G11: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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Low cut	E15:P1 LOW CUT	Specifies the low-cut values of frequency output 1 and pulse output 1.
PO2/SO2 ► Low cut	E37:P2 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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Low cut	D12:TOT1 LOWCUT	Specifies the low-cut value of totalizer 1.
Totalizer 2 ► Low cut	D22:TOT2 LOWCUT	Specifies the low-cut value of totalizer 2.
Totalizer 3 ► Low cut	D32:TOT3 LOWCUT	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 [%])

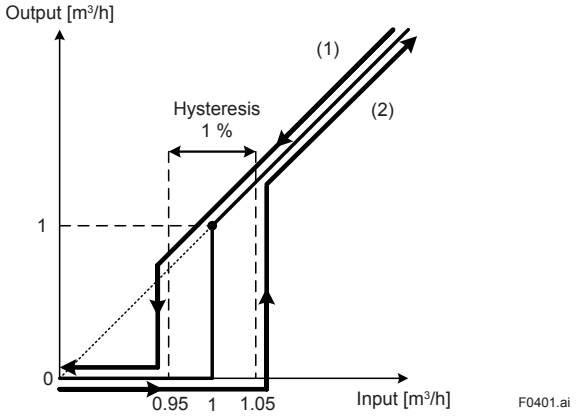
= 0.95 [m^3/h]

(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

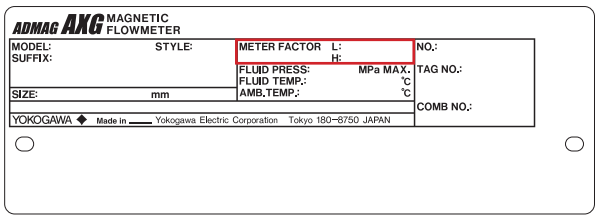
Display	Device setup ► Detailed setup ► Sensor ► (see below)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Low MF	C20:LOW MF	Specifies the meter factor of the low-frequency side.
High MF	C21: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
BRAIN	C:BASIC SETUP ► C24:FLOW SNSOR

From the table below, select the sensor type.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
Nominal size unit	C26:SIZE UNIT	Specifies the unit of the nominal size.
Nominal size	C27: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)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Value select	H30:DENSITY SEL	Selects one of the temperature-based density corrections from the following. • Fixed value : Uses the fixed density • Correction value : Uses the corrected density
Unit	H31:DENSITY UNIT	Specifies the unit of the density.
Fixed density	H32:FIXED DENS	Specifies the value of the fixed density.
Std density	H33:STD DENSITY	Specifies the reference density value of the standard condition when using the density compensated with temperature.
Correct density	H38:CORRCT DENS	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)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Std temperature	H34:STD TEMP	Specifies the reference standard temperature for using the temperature-based density correction function.
Meas temperature	H37:MEAS TEMP	Displays the temperature that is input from analog input.
Fixed temperature	H41:CAL FIX TEMP	Specifies the reference temperature to use 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
BRAIN	C:BASIC SETUP ► C40:VELOCITY CHK

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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
User span AO1 ► Select	C41:USR SPN SEL1	Specifies the user span function to the process value allocated to analog output 1.
User span AO2 ► Select	C44:USR SPN SEL2	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	**BRAIN**	
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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
User span AO1 ► Unit	C42:USR UNIT1	Specifies the desired unit of up to 8 characters to the process value assigned to analog output 1.
User span AO2 ► Unit	C45:USR UNIT2	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)
BRAIN	C:BASIC SETUP ► (see below)

Parameter		Description
Display	**BRAIN**	
User span AO1 ► Span	C43:USR SPAN1	Specifies the desired span to the process value assigned to analog output 1.
User span AO2 ► Span	C46:USR SPAN2	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

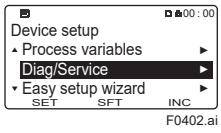
- The zero adjustment should be carried out before the actual operation. Note that setting and updating other parameters cannot be carried out during the zero adjustment (for approximately 30 seconds).
- The zero adjustment should be executed only after the sensor is filled with measuring fluid and the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

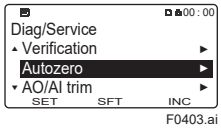
Menu path

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



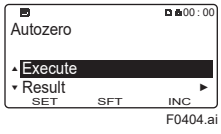
F0402.ai

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



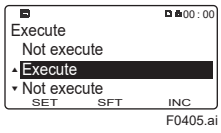
F0403.ai

Select “Autozero”.



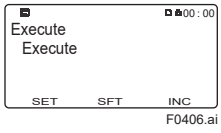
F0404.ai

Select “Execute”.



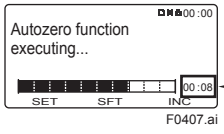
F0405.ai

Select “Execute”.



F0406.ai

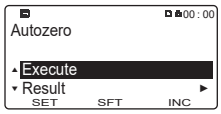
When “Execute” blinks, touch [SET] to execute.



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 BRAIN communication can be executed with the following parameters.

Menu path

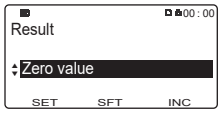
BRAIN	C:BASIC SETUP ► C51:AUTOZERO EXE

■ Confirmation of zero adjustment result

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

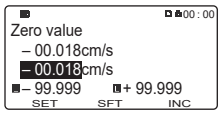
Menu path

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 BRAIN communication can be confirmed with the following parameters.

Menu path

BRAIN	C:BASIC SETUP ► C52:ZERO

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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Unit	D10:TOT1 UNIT	Displays the unit of totalizer 1.
Totalizer 2 ► Unit	D20:TOT2 UNIT	Specifies the unit of Totalizer2.
Totalizer 3 ► Unit	D30:TOT3 UNIT	Specifies the unit of Totalizer3.

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. In addition, if the values of A30-A35 exceed the limit of the displayed digits, they are reset to 0 in the same way as the value on the display.
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)
BRAIN	A:DISPLAY ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1	A30:TOTAL1	Displays the totalized value of totalizer 1.
Totalizer 2	A31:TOTAL2	Displays the totalized value of totalizer 2.
Totalizer 3	A32:TOTAL3	Displays the totalized value of totalizer 3.

NOTE

If Main soft rev (K50:MAIN B REV/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (K52:IND B REV/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. In addition, if the values of A30-A35 exceed the limit of the displayed digits, they are held at the upper limit in the same way as the value on the display.
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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Conv factor	D11:TOT1 CONV FC	Specifies the conversion factor of totalizer 1.
Totalizer 2 ► Conv factor	D21:TOT2 CONV FC	Specifies the conversion factor of totalizer 2.
Totalizer 3 ► Conv factor	D31:TOT3 CONV FC	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)
BRAIN	A:DISPLAY ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 count	A33:TOTAL1 CNT	Displays the scaled totalized value of totalizer 1.
Totalizer 2 count	A34:TOTAL2 CNT	Displays the scaled totalized value of totalizer 2.
Totalizer 3 count	A35:TOTAL3 CNT	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 (K50:MAIN B REV/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (K52:IND B REV/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. In addition, if the values of A30-A35 exceed the limit of the displayed digits, they are held at the upper limit in the same way as the value on the display.
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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Set point	D18:TOT1 SETPNT	Specifies the target value of totalizer 1.
Totalizer 2 ► Set point	D28:TOT2 SETPNT	Specifies the target value of totalizer 2.
Totalizer 3 ► Set point	D38:TOT3 SETPNT	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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Failure opts	D13:TOT1 F OPTS	Specifies the totalizer 1 operation to be performed when an alarm occurs.
Totalizer 2 ► Failure opts	D23:TOT2 F OPTS	Specifies the totalizer 2 operation to be performed when an alarm occurs.
Totalizer 3 ► Failure opts	D33:TOT3 F 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	**BRAIN**	
Measured value	Measured value	Continues the totalization function while an alarm is occurring.
Stop	Stop	Stops the totalization function while an alarm is occurring.
Last valid	Last valid	Continues the totalization function with the last valid value right before the alarm occurred while an alarm is occurring.

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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Start/Stop	D15:TOT1 EXEC	Specifies Start/Stop to the totalization function of totalizer 1.
Totalizer 2 ► Start/Stop	D25:TOT2 EXEC	Specifies Start/Stop to the totalization function of totalizer 2.
Totalizer 3 ► Start/Stop	D35:TOT3 EXEC	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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Options	D14:TOT1 OPTS	Specifies the totalization direction of totalizer 1.
Totalizer 2 ► Options	D24:TOT2 OPTS	Specifies the totalization direction of totalizer 2.
Totalizer 3 ► Options	D34:TOT3 OPTS	Specifies the totalization direction of totalizer 3.

From the table below, select the totalization direction.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Reset/Preset	D16:TOT1 PRESET	Uses the reset/preset function of totalizer 1.
Totalizer 2 ► Reset/Preset	D26:TOT2 PRESET	Uses the reset/preset function of totalizer 2.
Totalizer 3 ► Reset/Preset	D36:TOT3 PRESET	Uses the reset/preset function of totalizer 3.

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	D:TOTAL SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Totalizer 1 ► Preset value	D17:TOT1 PRE VAL	Specifies the preset value of totalizer 1.
Totalizer 2 ► Preset value	D27:TOT2 PRE VAL	Specifies the preset value of totalizer 2.
Totalizer 3 ► Preset value	D37:TOT3 PRE VAL	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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Output mode	E10:P1 OUT MODE	Specifies the output mode of pulse/status output 1.
PO2/SO2 ► Output mode	E31:P2 OUT MODE	Specifies the output mode of pulse/status output 2.

From the table below, select the output mode.

Selection		Description
Display	**BRAIN**	
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
BRAIN	E:PULSE SET ► E32:P2 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	**BRAIN**	
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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Alarm out	E16:P1 ALM OUT	Specifies the alarm output function of pulse output 1 and frequency output 1.
PO2/SO2 ► Alarm out	E33:P2 ALM 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	**BRAIN**	
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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Fix width	E12:P1 WIDTH	Specifies the pulse width of pulse output 1.
PO2/SO2 ► Fix width	E34:P2 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

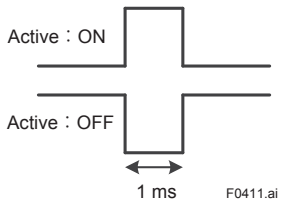
Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)

Parameter		Description
Display	BRAIN	
PO1/SO1 ► Active mode	E:PULSE OUT ► E11:P1 ACT MODE	Specifies the active direction of the pulse signal of pulse/status output 1.
PO2/SO2 ► Active mode	E:PULSE OUT ► E33:P2 ACT MODE	Specifies the active direction of the pulse signal of pulse/status output 2.
SO11 ►Active mode	F:STATUS I/O ► F20:SO11 ACTMODE	Specifies the active direction of the pulse signal of status output 11.
SO12 ►Active mode	F:STATUS I/O ► F30:SO12 ACTMODE	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	BRAIN	
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 D4 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
BRAIN	E:PULSE OUT ► E30:P2 ACT PULSE

Selection		Description
Display	**BRAIN**	
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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Rate value	E14:P1 RATE VAL	Specifies the pulse rate of pulse output 1.
PO2/SO2 ► Rate value	E36:P2 RATE VAL	Specifies the pulse rate of pulse output 2.

Scaling pulse rate

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► (see below)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Rate unit	E13:P1 RATE UNIT	Specifies the scaling of the pulse rate of pulse output 1.
PO2/SO2 ► Rate unit	E35:P2 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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Frequency at 0%	E17:F1 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%	E18:F1 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%	E39:F2 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%	E40:F2 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)

Parameter		Description
Display	BRAIN	
PO1/SO1 ► SO1 function	E:PULSE OUT ► E20:SO1 FUNCTION	Specifies status output 1 function.
PO2/SO2 ► SO2 function	E:PULSE OUT ► E41:SO2 FUNCTION	Specifies status output 2 function.
SO11 ► Function	F:STATUS I/O ► F21: SO11 FUNC	Specifies status output 11 function.
SO12 ► Function	F:STATUS I/O ► F31: SO12 FUNC	Specifies status output 12 function.

From the table below, select the status output function.

Selection		Description
Display	BRAIN	
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.
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.

Selection		Description
Display	BRAIN	
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.
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.

Selection		Description
Display	BRAIN	
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)
BRAIN	E:PULSE OUT ► (see below)

Parameter		Description
Display	**BRAIN**	
PO1/SO1 ► Options	E21:P1 OPTS	Specifies pulse 1 option.
PO2/SO2 ► Options	E42:P2 OPTS	Specifies pulse 2 option.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	F:STATUS I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
SI11 ► Active mode	F22:SI11 ACTMODE	Specifies the active direction of status input 11.
SI12 ► Active mode	F32:SI12 ACTMODE	Specifies the active direction of status input 12.

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	F:STATUS I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
SI11 ► Function	F23:SI11 FUNC	Specifies status input 11 function.
SI12 ► Function	F33:SI12 FUNC	Specifies status input 12 function.

From the table below, select the status input function.

Selection		Description
Display	**BRAIN**	
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
BRAIN	G:Analog I/O ► G10:AO2 SELECT

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

Selection		Description
Display	**BRAIN**	
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 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.

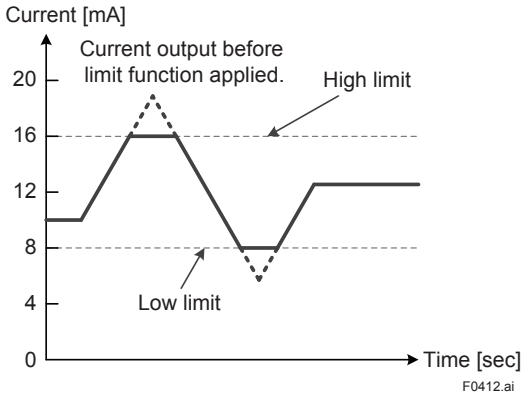
Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► (see below)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
AO1 ► High limit	G02:AO1 HI LIMIT	Specifies the high limit of analog output 1.
AO1 ► Low limit	G03:AO1 LO LIMIT	Specifies the low limit of analog output 1.
AO2 ► High limit	G12:AO2 HI LIMIT	Specifies the high limit of analog output 2.
AO2 ► Low limit	G13:AO2 LO 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.



4.5.3 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.

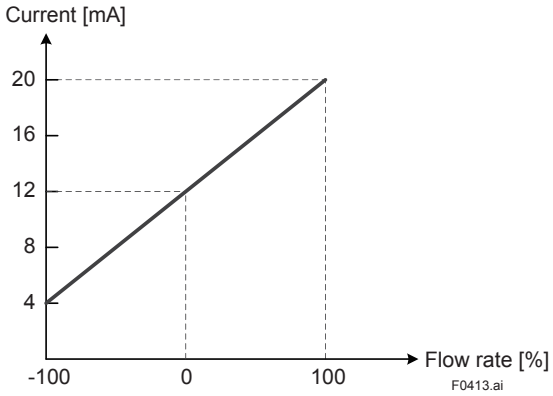
Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO1 ► Range mode
BRAIN	G:ANALOG I/O ► G05:AO1 RNG MODE

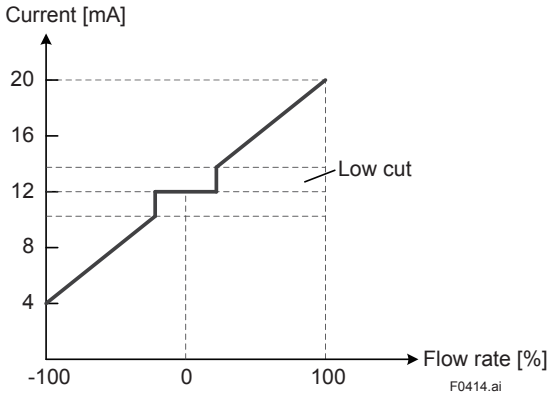
This parameter sets the use of the absolute range function for analog output 1.
From the table below, select the use of the absolute range function.

Selection		Description
Display	**BRAIN**	
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.

4.5.4 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)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
AO1 ► Alarm out	G04:AO1 ALM OUT	Specifies the alarm output function of analog output 1.
AO2 ► Alarm out	G14:AO2 ALM 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	**BRAIN**	
< 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.

4.5.5 Analog Output Priority

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

Priority level	Output mode
High ↑ ↓ Low	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 4.5.4.)
	Verification function, Output during offline diagnosis (For details, refer to Subsection 4.11.6.)
	Normal output

4.5.6 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)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
Trim 4mA	G51:AI at 4mA	Specifies the adjustment value when inputting 4 mA of analog input.
Trim 20mA	G52:AI at 20mA	Specifies the adjustment value when inputting 20 mA of analog input.
Trim clear	G50:AI TRIM CLR	Clears the adjustment value for inputting analog input.

■ Analog output

Menu path

Display	Device setup ► Diag/Service ► AO/AI trim ► AO trim ► (see below)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
AO1 trim 4mA	G31:AO1 at 4mA	Specifies the adjustment value of analog output 1 (4 mA).
AO1 trim 20mA	G32:AO1 at 20mA	Specifies the adjustment value of analog output 1 (20 mA).
AO1 trim clear	G30:AO1 TRIM CLR	Clears the adjustment value of analog output 1.
AO2 trim 4mA	G41:AO2 at 4mA	Specifies the adjustment value of analog output 2 (4 mA).
AO2 trim 20mA	G42:AO2 at 20mA	Specifies the adjustment value of analog output 2 (20 mA).
AO2 trim clear	G40:AO2 TRIM CLR	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.

4.5.7 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
BRAIN	G:ANALOG I/O ► G20:AI FUNCTION

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

Selection		Description
Display	**BRAIN**	
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.

4.5.8 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
BRAIN	G:ANALOG I/O ► G23:AI VALUE

4.5.9 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
BRAIN	G:ANALOG I/O ► G24:AI UNIT

4.5.10 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)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
URV	G25:AI URV	Specifies the value that is at the 100% point of the process value for the analog input.
LRV	G26:AI LRV	Specifies the value that is at the 0% point of the process value for the analog input.

4.5.11 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)
BRAIN	G:ANALOG I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
High limit	G21:AI HI LIMIT	Specifies the high limit value of the analog input value.
Low limit	G22:AI LO 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)
BRAIN	F:STATUS I/O ► (see below)

Parameter		Description
Display	**BRAIN**	
Forward span 2	F40:FWD SPAN2	Specifies forward span 2.
Forward span 3	F41:FWD SPAN3	Specifies forward span 3.
Forward span 4	F42:FWD SPAN4	Specifies forward span 4.
Reverse span 1	F43:REV SPAN1	Specifies reverse span 1.
Reverse span 2	F44:REV SPAN2	Specifies reverse span 2.
Reverse span 3	F45:REV SPAN3	Specifies reverse span 3.
Reverse span 4	F46:REV SPAN4	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
BRAIN	F:STATUS I/O ► F50:AUTO RNG HYS

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.

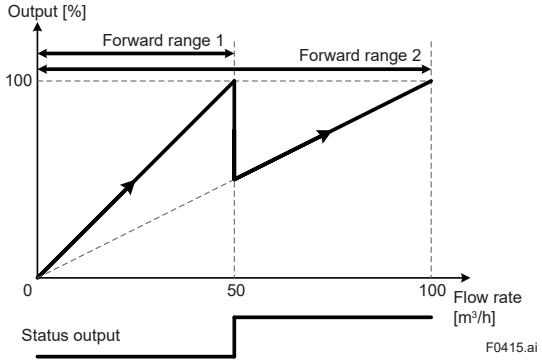
(5) Refer to Subsection 4.3.9 to specify the status output function to auto 2 range.

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

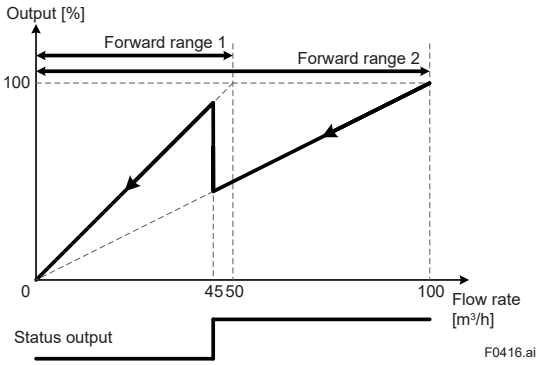
Specify a value greater than forward span 1.

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
BRAIN	F:STATUS I/O ► F51:BI DIREC HYS

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.

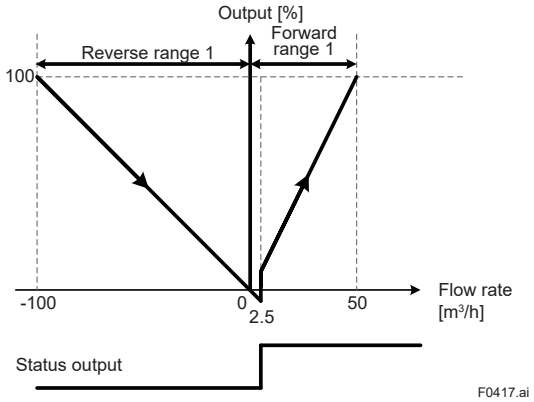
(4) Refer to Subsection 4.3.1 to specify the output of the terminal to the status output.

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

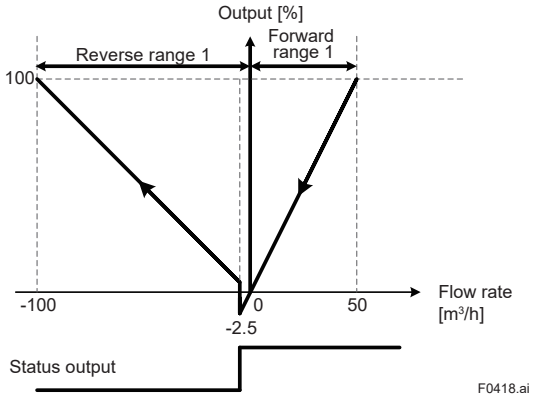
(6) Refer to Subsection 4.6.2 to specify reverse span 1.

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.

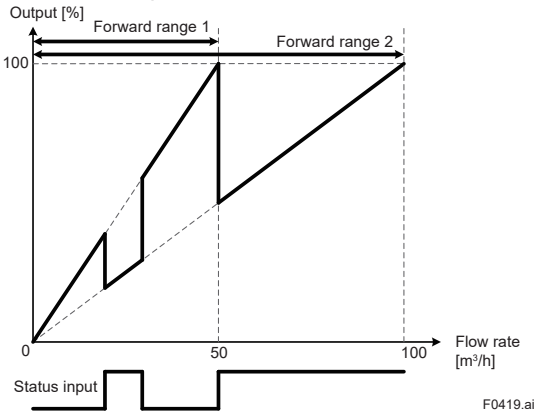
(1) Refer to Subsection 4.1.2 to specify the PV process value.

(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.

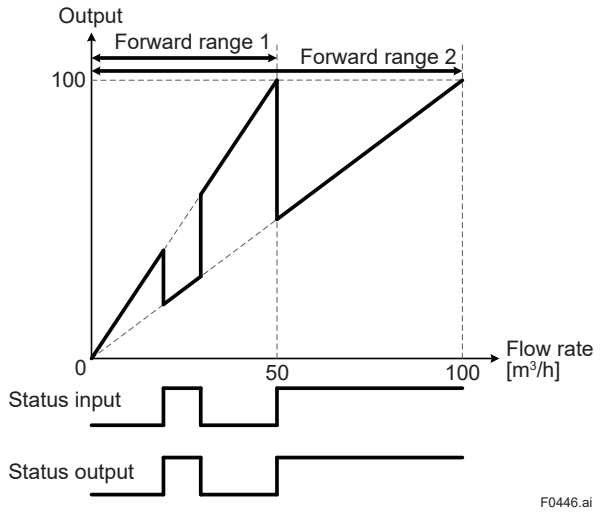
(2) Refer to Subsections 4.1.4 and 4.1.5 to specify the span (forward span 1).

(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
BRAIN	H:AUX CALC ► H10:FLOW DIRECT

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Rate limit	H11:RATE LIMIT	Specifies the rate limit value.
Dead time	H12:DEAD TIME	Specifies the dead time.
Noise filter	H13: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	BRAIN		
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

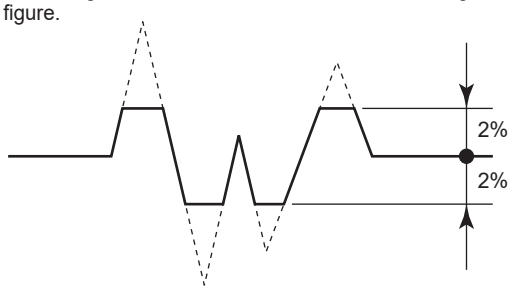
NOTE

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

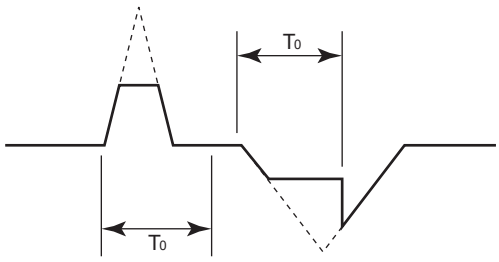
NOTE

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

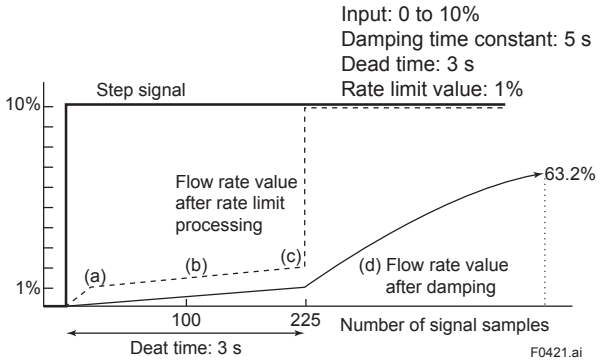
For the rate limit function, the dead time is set to “0” upon shipment from the manufacturing factory.
Be sure to set the dead time when the rate limit function is used.

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.

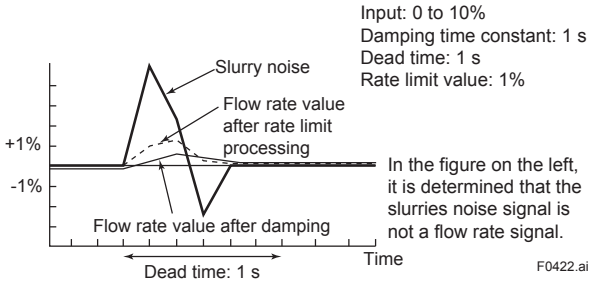
- Then, the flow rate value in the dead time is set to “flow rate after damping calculation + signal of rate limit value (1%)”.

- 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
BRAIN	H:AUX CALC ► H14: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	**BRAIN**	
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)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Power sync	H20:POWER SYNCH	Sets the excitation frequency and power frequency to synchronous.*1
Set power freq	H21:SET PWR FREQ	Specifies the power frequency when the excitation frequency and power frequency are asynchronous.

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

Selection		Description
Display	**BRAIN**	
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.

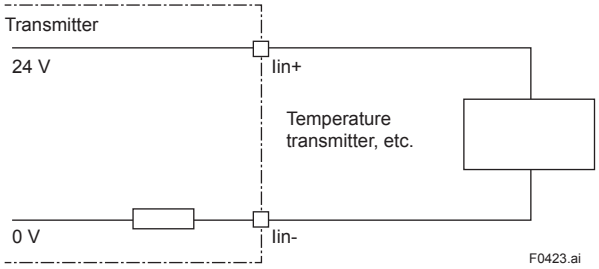
Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Iex power frequency	H22:IEX PWR FREQ	Displays the power frequency (synchronous with the excitation frequency).
Meas power freq	H23:MES PWR FREQ	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)
BRAIN	H:AUX CALC ► (see below)

Parameter		Description
Display	**BRAIN**	
Coef A1	H35:TEMP COEF A1	Specifies the primary compensating rate.
Coef A2	H36: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 4.5.7 to specify the function of the analog input to temperature.

(3) Refer to Subsection 4.5.10 to specify the range of the analog input.

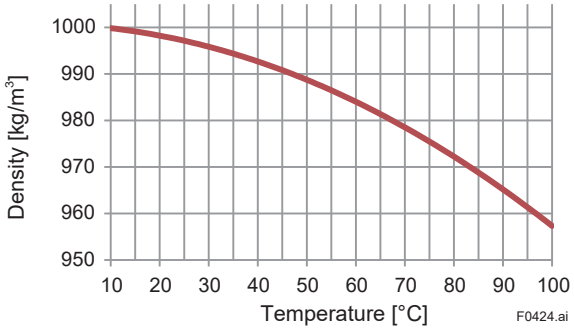
(4) Refer to Subsections 4.1.11 and 4.1.12 to specify the standard temperature and standard density.

(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
BRAIN	H:AUX CALC ► H40:SPEC 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 4.5.7 to specify the function of the analog input to “Ext temperature”.

(2) Refer to Subsection 4.5.10 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 4.5.7 to specify the function of the analog input to “Diff temperature”.

(2) Refer to Subsection 4.5.10 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
BRAIN	H:AUX CALC ► H50:SET SIL

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

Selection		Description
Display	**BRAIN**	
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	BRAIN		
F	010:Main CPU FAIL	10:Main CPU FAIL	CPU (Main board) failure was detected.	Contact Yokogawa service center.
F	011:Rev calc FAIL	11:Rev cal FAIL	Failure of reverse calculation was detected.	Contact Yokogawa service center.
F	012:Main EEP FAIL	12:Main EEP FAIL	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 EEP dflt	EEPROM (Main board) was reset to default values.	Contact Yokogawa service center.
F	014:Snsr bd FAIL	14:Snsr bd FAIL	Failure of sensor board was detected.	Contact Yokogawa service center.
F	015:Snsr comm ERR	15:Snsr comm ERR	Communication error of the sensor was detected.	Contact Yokogawa service center.
F	016:AD 1 FAIL[Sig]	16:A/D1 FAIL	Failure of A/D transmitter 1 (flow velocity signal) was detected.	Contact Yokogawa service center.
F	017:AD 2 FAIL[Excit]	17:A/D2 FAIL	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 FAIL	Failure of the excitation circuit was detected.	Contact Yokogawa service center.
F	021:PWM 1 stop	21-22:PWM stop	Error of pulse width modulation 1 was detected.	Contact Yokogawa service center.
F	022:PWM 2 stop		Error of pulse width modulation 2 was detected.	Contact Yokogawa service center.

NE107 Status	Error Message		Error Description	Countermeasure
	Display	BRAIN		
F	023:Opt bd mismatch	23:Opt mismatch	Mismatch of option board was detected.	Contact Yokogawa service center.
F	024:Opt bd EEP FAIL	24:Opt EEP FAIL	Failure of EEPROM (option board) was detected.	Contact Yokogawa service center.
F	025:Opt bd A/D FAIL	25:Opt A/D FAIL	Failure of A/D (option board) was detected.	Contact Yokogawa service center.
F	026:Opt bd SPI FAIL	26:Opt SPI FAIL	Failure of SPI (option board) was detected.	Contact Yokogawa service center.
F	027:Restore FAIL	27:Restore FAIL	Restore of parameters was failed.	Retry the restore function of the parameter.
F	028:Ind bd FAIL	28-32:Indct FAIL	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		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		Failure of display driver was detected.	Contact Yokogawa service center.
F	031:Ind bd mismatch		Mismatch of display board was detected.	Contact Yokogawa service center.
F	032:Ind comm ERR		Communication error of display board was detected.	Check that the main and display boards are connected.
F	033:microSD FAIL	33:microSD FAIL	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	BRAIN		
S	050:Signal overflow	50:Sig overflow	Failure of input signal was detected.	Check the signal and grounding cables are connected.
S	051:Empty detect	51:Empty detect	Inside of sensor was detected to be empty. (Empty pipe detection)	Fill the sensor with water.
N	052:H/L HH/LL alm	52:H/L HH/LL alm	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:Adh over lv4	The resistance value of the electrodes exceeded Level 4. (Adhesion detection of insulation to the electrode)	Recommend cleaning the 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	BRAIN		
S	060:Span cfg ERR	60:Span cfg ERR	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 F cfg ERR	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:AO1 4-20 lmt	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:AO2 4-20 lmt	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:AO1 mlt rng	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:AO H/L cfg	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	BRAIN		
S	066:Density cfg ERR	66:Dens cfg ERR	The setting error of density value was detected when PV was set to mass flow rate.	Check the parameter settings related to density.
S	067:Pls 1 cfg ERR	67:Pls1 cfg ERR	Setting error of pulse output 1 was detected.	Check the parameter setting related to pulse output 1.
S	068:Pls 2 cfg ERR	68:Pls2 cfg ERR	Setting error of pulse output 2 was detected.	Check the parameter setting related to pulse output 2.
C	069:Nomi size cfg	69:Nomi size cfg	Configuration error of nominal size was detected. (fulfill “0.99 mm < sensor nominal size < 3000.10 mm (0.01 inch < sensor nominal size < 120.10 inch)”)	Check the parameter settings related to nominal size.
C	070:Adh cfg ERR	70:Adh cfg ERR	Setting error of electrode adhesion detection function was detected. (fulfill “Level1 < Level2 < Level3 < Level4”)	Check the parameter settings related to adhesion detection.
C	071:FLN cfg ERR	71:FLN cfg ERR	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:Log not start	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	BRAIN		
S	080:AO 1 saturate	80-81:AO saturt	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		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	82-83:Pls saturt	Saturation of pulse output 1 was detected.	Check the parameter setting related to process value and pulse output 1.
S	083:Pls 2 saturate		Saturation of pulse output 2 was detected.	Check the parameter setting related to process value and pulse output 2.
S	084:AI saturate	84:AI saturate	Saturation of Analog input was detected.	Check analog input value and analog input parameter setting.
C	085:Cable miscon	85:Cable miscon	Misconnection of cable was detected.	Check the signal cable and excitation cable connection.
C	086:Coil insulation	86:Coil insulate	Insulation deterioration of the coil was detected.	Contact Yokogawa service center.
M	087:Adhesion lv 3	87:Adh over lv3	The resistance value of the electrodes exceeded Level 3. (Adhesion detection of insulation to the electrode)	Recommend cleaning the electrode.
N	088:LC warn	88:LC warn	Decrease of conductivity was detected.	Check fluid conductivity.
M	089:Insu detect	89:Insu detect	Insulation deterioration of electrode was detected.	Contact Yokogawa service center.
N	090:FLN over lv 3	90:FLN over lv3	Flow noise exceeded Level 3. (Detection of flow noise)	Check if the fluid has a problem (conductivity and bubble).
N	091:FLN over lv 4	91:FLN over lv4	Flow noise exceeded Level 4. (Detection of flow noise)	Check if the fluid has a problem (conductivity and bubble).
C	092:AZ warn	92:AZ warn	Result of zero adjustment exceeded 10 cm/s.	Check fluid is stopped when executing zero adjustment.
C	093:Verif warn	93:Verif warn	Interruption of verification function was detected.	Execute the Verification function again.
C	094:Fact noise warn	94:FC noise warn	The fluctuation of flow became larger.	Check if there is a problem with the fluid.
C	095:Simulate active	95:Sim 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	BRAIN		
S	096:AO 1 fix	96-97:AO 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		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	98-99:Pls 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		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:AI fix	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:Prm restore	The restore function of the parameter was executed.	-
N	102:Disp over	102:Disp over	The number of digits available for display exceeded the limit.	Check the parameter setting related to display.
N	103:SD size warn	103:SD size warn	Free space of microSD card decreased to less than 10%.	Increase the free space of the microSD card.
M	104:Bkup incmplt	104:Bkup incmplt	Parameter backup failed.	Retry the backup function of the parameter.
S	105:SD mismatch	105:SD mismatch	Mismatch of microSD card was detected.	Replace the microSD card.
M	106:SD removal ERR	106:SD remov ERR	Removal of microSD card failed.	After executing the removal of the microSD card with the parameter, remove the microSD card from the product.
N	131:Trans mismatch	131:Trn mismatch	Mismatch of 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	BRAIN		
N	120:Watchdog	(*)	Error of Watchdog timer was detected.	Contact Yokogawa service center.
N	121:Power off	(*)	Power-off was detected.	-
N	122:Inst power FAIL	(*)	Instantaneous power failure was detected.	-
N	123:Param bkup run	(*)	Parameter backup function is running.	-
N	124:Data log run	(*)	Data-logging function is running.	-

(*) Not displayed for Self check of BRAIN communication.

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

4.8.3 Alarm Display Setting

(1) Alarm display

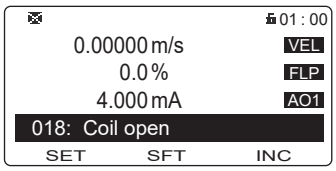
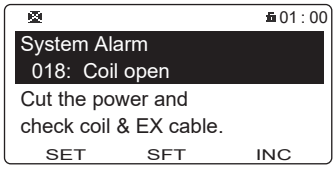
If an error occurs on this product, an alarm appears on the display. The alarm display modes are classified into two types: one mode to display a process value and alarm name, and another mode to display an alarm name and action.
If multiple alarms occur on this product, they will be displayed in sequence 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
BRAIN	J:DISPLAY SET ► J28:DISP ALARM

This parameter sets the alarm display.

From the table below, select the alarm display.

Selection		Description
Display	**BRAIN**	
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
BRAIN	J:DISPLAY SET ► J27:DISP NE107

This parameter sets the alarm display based on NAMUR NE107.

From the table below, select the alarm display.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	I:ALARM ► (see below)

Parameter		Description
Display	**BRAIN**	
Record alarm 1	I50:ALM RECORD1	Displays the name of the first new alarm.
Record time 1	I51:ALM TIME1	Displays the operation time when the first new alarm occurs.
Record alarm 2	I52:ALM RECORD2	Displays the name of the second new alarm.
Record time 2	I53:ALM TIME2	Displays the operation time when the second new alarm occurs.
Record alarm 3	I54:ALM RECORD3	Displays the name of the third new alarm.
Record time 3	I55:ALM TIME3	Displays the operation time when the third new alarm occurs.
Record alarm 4	I56:ALM RECORD4	Displays the name of the fourth new alarm.
Record time 4	I57:ALM TIME4	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 “50:Sig overflow”:
To disable the alarm notification, set “Sig overflow on” to I32: OUT MSK SET2.
To enable the alarm notification, set “Sig overflow off” to I32: OUT MSK SET2.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm out mask ► (see below)
BRAIN	I:ALARM ► (see below)

Parameter		Description
Display	**BRAIN**	
Mask 1-1	I30:OUT MSK SET1 (for setting)	Specifies the mask function for alarm notification 1-1.
Mask 1-2	I31:OUT MSK STS1 (for checking)	Specifies the mask function for alarm notification 1-2.
Mask 2-1	I32:OUT MSK SET2 (for setting)	Specifies the mask function for alarm notification 2-1.
Mask 2-2	I33:OUT MSK STS2 (for checking)	Specifies the mask function for alarm notification 2-2.
Mask 3-1	I34:OUT MSK SET3 (for setting)	Specifies the mask function for alarm notification 3-1.
Mask 3-2	I35:OUT MSK STS3 (for checking)	Specifies the mask function for alarm notification 3-2.

■ Alarm record mask

If the alarm record mask function is turned “On”, it disables the alarm record.
Setting example for alarm “51:Empty detect”:
To disable the alarm record, set “Empty detect on” to I42: REC MSK SET2.
To enable the alarm record, set “Empty detect off” to I42: REC MSK SET2.

Menu path

Display	Device setup ► Diag/Service ► Sts/Self test ► Alarm ► Alarm record mask ► (see below)
BRAIN	I:ALARM ► (see below)

Parameter		Description
Display	**BRAIN**	
Mask 1-1	I40:REC MSK SET1 (for setting)	Specifies the mask function for alarm record 1-1.
Mask 1-2	I41:REC MSK STS1 (for checking)	Specifies the mask function for alarm record 1-2.
Mask 2-1	I42:REC MSK SET2 (for setting)	Specifies the mask function for alarm record 2-1.
Mask 2-2	I43:REC MSK STS2 (for checking)	Specifies the mask function for alarm record 2-2.

Due to the characteristics of BRAIN communication, parameters for setting and checking are separate. Use the setting parameter when checking the present mask state and the setting parameter when changing the mask settings.

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		BRAIN		Default Value	Attribute
Parameter Name	**Alarm Name**	**Parameter Name**	**Alarm Name**		
-	010:Main CPU FAIL	-	10:Main CPU FAIL	-	-
-	011:Rev calc FAIL	-	11:Rev cal FAIL	-	-
-	012:Main EEP FAIL	-	12:Main EEP FAIL	-	-
Mask 1-1	013:Main EEP dflt	I30:OUT MSK SET1	13:Main EEP dflt	-	✓
-	014:Snsr bd FAIL	-	14:Snsr bd FAIL	-	-
-	015:Snsr comm ERR	-	15:Snsr comm ERR	-	-
-	016:AD 1 FAIL[Sig]	-	16:A/D1 FAIL	-	-
-	017:AD 2 FAIL[Excit]	-	17:A/D2 FAIL	-	-
-	018:Coil open	-	18:Coil open	-	-
-	019:Coil short	-	19:Coil short	-	-
-	020:Exciter FAIL	-	20:Exciter FAIL	-	-
Mask 1-2	021:PWM 1 stop	I30:OUT MSK SET1	21-22:PWM stop	-	✓
Mask 1-2	022:PWM 2 stop			-	✓
Mask 1-2	023:Opt bd mismatch	I30:OUT MSK SET1	23:Opt mismatch	-	✓
Mask 1-2	024:Opt bd EEP FAIL	I30:OUT MSK SET1	24:Opt EEP FAIL	-	✓
Mask 1-2	025:Opt bd A/D FAIL	I30:OUT MSK SET1	25:Opt A/D FAIL	-	✓
Mask 1-2	026:Opt bd SPI FAIL	I30:OUT MSK SET1	26:Opt SPI FAIL	-	✓
-	027:Restore FAIL	I30:OUT MSK SET1	27:Restore FAIL	-	-
Mask 1-2	028:Ind bd FAIL	I30:OUT MSK SET1	28-32:Indct FAIL	✓	✓
Mask 1-2	029:Ind bd EEP FAIL			-	✓
Mask 1-2	030:LCD drv FAIL			-	✓
Mask 1-2	031:Ind bd mismatch			-	✓
Mask 1-2	032:Ind comm ERR			-	✓
Mask 1-2	033:microSD FAIL	I30:OUT MSK SET1	33:microSD FAIL	-	✓
Mask 2-1	050:Signal overflow	I32:OUT MSK SET2	50:Sig overflow	-	✓
Mask 2-1	051:Empty detect	I32:OUT MSK SET2	51:Empty detect	-	✓
Mask 2-1	052:H/L HH/LL alm	I32:OUT MSK SET2	52:H/L HH/LL alm	✓	✓

Display		BRAIN		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
Mask 2-1	053:Adh over lv 4	I32:OUT MSK SET2	53:Adh over lv4	✓	✓
Mask 2-1	060:Span cfg ERR	I32:OUT MSK SET2	60:Span cfg ERR	-	✓
Mask 2-1	061:PV F cfg ERR	I32:OUT MSK SET2	61:PV F cfg ERR	-	✓
Mask 2-1	062:AO 1 4-20 lmt	I32:OUT MSK SET2	62:AO1 4-20 lmt	-	✓
Mask 2-1	063:AO 2 4-20 lmt	I32:OUT MSK SET2	63:AO2 4-20 lmt	-	✓
Mask 2-1	064:AO 1 mlt rng	I32:OUT MSK SET2	64:AO1 mlt rng	-	✓
Mask 2-1	065:H/L cfg ERR	I32:OUT MSK SET2	65:AO H/L cfg	-	✓
Mask 2-1	066:Density cfg ERR	I32:OUT MSK SET2	66:Dens cfg ERR	-	✓
Mask 2-2	067:Pls 1 cfg ERR	I32:OUT MSK SET2	67:Pls1 cfg ERR	-	✓
Mask 2-2	068:Pls 2 cfg ERR	I32:OUT MSK SET2	68:Pls2 cfg ERR	-	✓
Mask 2-2	069:Nomi size cfg	I32:OUT MSK SET2	69:Nomi size cfg	-	✓
Mask 2-2	070:Adh cfg ERR	I32:OUT MSK SET2	70:Adh cfg ERR	-	✓
Mask 2-2	071:FLN cfg ERR	I32:OUT MSK SET2	71:FLN cfg ERR	-	✓
Mask 2-2	072:Log not start	I32:OUT MSK SET2	72:Log not start	-	✓
Mask 2-2	080:AO 1 saturate	I32:OUT MSK SET2	80-81:AO saturt	-	✓
Mask 2-2	081:AO 2 saturate			✓	✓
Mask 2-2	082:Pls 1 saturate	I32:OUT MSK SET2	82-83:Pls saturt	✓	✓
Mask 2-2	083:Pls 2 saturate			✓	✓
Mask 2-2	084:AI saturate	I32:OUT MSK SET2	84:AI saturate	✓	✓
Mask 2-2	085:Cable miscon	I32:OUT MSK SET2	85:Cable miscon	-	✓
Mask 2-2	086:Coil insulation	I32:OUT MSK SET2	86:Coil insulate	✓	✓
Mask 2-2	131:Trans mismatch	I32:OUT MSK SET2	131:Trn mismatch	-	✓
Mask 3-1	087:Adhesion lv 3	I34:OUT MSK SET3	87:Adh over lv3	✓	✓
Mask 3-1	088:LC warn	I34:OUT MSK SET3	88:LC warn	✓	✓
Mask 3-1	089:Insu detect	I34:OUT MSK SET3	89:Insu detect	✓	✓
Mask 3-1	090:FLN over lv 3	I34:OUT MSK SET3	90:FLN over lv3	✓	✓
Mask 3-1	091:FLN over lv 4	I34:OUT MSK SET3	91:FLN over lv4	✓	✓
Mask 3-1	092:AZ warn	I34:OUT MSK SET3	92:AZ warn	✓	✓
Mask 3-1	093:Verif warn	I34:OUT MSK SET3	93:Verif warn	✓	✓
Mask 3-1	094:Fact noise warn	I34:OUT MSK SET3	94:FC noise warn	✓	✓
Mask 3-1	095:Simulate active	I34:OUT MSK SET3	95:Sim active	-	✓

Display		BRAIN		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
Mask 3-1	096:AO 1 fix	I34:OUT MSK SET3	96-97:AO fixed	-	✓
Mask 3-1	097:AO 2 fix			-	✓
Mask 3-1	098:Pls 1 fix	I34:OUT MSK SET3	98-99:Pls fixed	-	✓
Mask 3-1	099:Pls 2 fix			-	✓
Mask 3-1	100:AI fix	I34:OUT MSK SET3	100:AI fix	-	✓
Mask 3-2	101:Param restore run	I34:OUT MSK SET3	101:Prm restore	✓	✓
Mask 3-2	102:Disp over	I34:OUT MSK SET3	102:Disp over	✓	✓
Mask 3-2	103:SD size warn	I34:OUT MSK SET3	103:SD size warn	✓	✓
Mask 3-2	104:Bkup incmplt	I34:OUT MSK SET3	104:Bkup incmplt	-	✓
Mask 3-2	105:SD mismatch	I34:OUT MSK SET3	105:SD mismatch	✓	✓
Mask 3-2	106:SD removal ERR	I34:OUT MSK SET3	106:SD remov ERR	✓	✓
Mask 3-2	120:Watchdog*1	I34:OUT MSK SET3	120: Watchdog*1	✓	✓
Mask 3-2	121:Power off*1	I34:OUT MSK SET3	121: Power off*1	✓	✓
Mask 3-2	122:Inst power FAIL*1	I34:OUT MSK SET3	122: Inst PW FAIL*1	✓	✓
Mask 3-2	123:Param bkup run	I34:OUT MSK SET3	123: bkup run	✓	✓
Mask 3-2	124:Data log run	I34:OUT MSK SET3	124: Data log run	✓	✓

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

Alarm record mask function

Display		BRAIN		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	010:Main CPU FAIL	-	10:Main CPU FAIL	-	-
-	011:Rev calc FAIL	-	11:Rev cal FAIL	-	-
-	012:Main EEP FAIL	-	12:Main EEP FAIL	-	-
Mask 1-1	013:Main EEP dflt	I40:REC MSK SET1	13:Main EEP dflt	-	✓
-	014:Snsr bd FAIL	-	14:Snsr bd FAIL	-	-
-	015:Snsr comm ERR	-	15:Snsr comm ERR	-	-
-	016:AD 1 FAIL[Sig]	-	16:A/D1 FAIL	-	-
-	017:AD 2 FAIL[Excit]	-	17:A/D2 FAIL	-	-
-	018:Coil open	-	18:Coil open	-	-
-	019:Coil short	-	19:Coil short	-	-
Mask 1-2	021:PWM 1 stop	I40:REC MSK SET1	21-22:PWM stop	-	✓
Mask 1-2	022:PWM 2 stop			-	✓
Mask 1-2	023:Opt bd mismatch	I40:REC MSK SET1	23:Opt mismatch	-	✓
Mask 1-2	024:Opt bd EEP FAIL	I40:REC MSK SET1	24:Opt EEP FAIL	-	✓
Mask 1-2	025:Opt bd A/D FAIL	I40:REC MSK SET1	25:Opt A/D FAIL	-	✓
Mask 1-2	026:Opt bd SPI FAIL	I40:REC MSK SET1	26:Opt SPI FAIL	-	✓
-	027:Restore FAIL	-	27:Restore FAIL	-	-
Mask 1-2	028:Ind bd FAIL	I40:REC MSK SET1	28-32:Indct FAIL	-	✓
Mask 1-2	029:Ind bd EEP FAIL			-	✓
Mask 1-2	030:LCD drv FAIL			-	✓
Mask 1-2	031:Ind bd mismatch			-	✓
Mask 1-2	032:Ind comm ERR			-	✓
Mask 1-2	033:microSD FAIL	I40:REC MSK SET1	33:microSD FAIL	-	✓
Mask 2-1	050:Signal overflow	I42:REC MSK SET2	50:Sig overflow	-	✓
Mask 2-1	051:Empty detect	I42:REC MSK SET2	51:Empty detect	-	✓
Mask 2-1	052:H/L HH/LL alm	I42:REC MSK SET2	52:H/L HH/LL alm	-	✓
Mask 2-1	053:Adh over lv 4	I42:REC MSK SET2	53:Adh over lv4	-	✓
-	060:Span cfg ERR	-	60:Span cfg ERR	✓	-
-	061:PV F cfg ERR	-	61:PV F cfg ERR	✓	-
-	062:AO 1 4-20 lmt	-	62:AO1 4-20 lmt	✓	-
-	063:AO 2 4-20 lmt	-	63:AO2 4-20 lmt	✓	-
-	064:AO 1 mlt rng	-	64:AO1 mlt rng	✓	-
-	065:H/L cfg ERR	-	65:AO H/L cfg	✓	-
-	066:Density cfg ERR	-	66:Dens cfg ERR	✓	-
-	067:Pls 1 cfg ERR	-	67:Pls1 cfg ERR	✓	-
-	068:Pls 2 cfg ERR	-	68:Pls2 cfg ERR	✓	-
-	069:Nomi size cfg	-	69:Nomi size cfg	✓	-
-	070:Adh cfg ERR	-	70:Adh cfg ERR	✓	-
-	071:FLN cfg ERR	-	71:FLN cfg ERR	✓	-
-	072:Log not start	-	72:Log not start	✓	-
-	080:AO 1 saturate	-	80-81:AO saturt	✓	-
-	081:AO 2 saturate			✓	-
-	082:Pls 1 saturate	-	82-83:Pls saturt	✓	-
-	083:Pls 2 saturate			✓	-

Display		BRAIN		Default Value	Attribute
Parameter Name	Alarm Name	Parameter Name	Alarm Name		
-	084:AI saturate	-	84:AI saturate	✓	-
Mask 2-2	085:Cable miscon	I42:REC MSK SET2	85:Cable miscon	-	✓
-	086:Coil insulation	-	86:Coil insulate	✓	-
-	131:Trans mismatch	-	131:Trn mismatch	✓	-
-	087:Adhesion lv 3	-	87:Adh over lv3	✓	-
-	088:LC warn	-	88:LC warn	✓	-
-	089:Insu detect	-	89:Insu detect	✓	-
-	090:FLN over lv 3	-	90:FLN over lv3	✓	-
-	091:FLN over lv 4	-	91:FLN over lv4	✓	-
-	092:AZ warn	-	92:AZ warn	✓	-
-	093:Verif warn	-	93:Verif warn	✓	-
-	094:Fact noise warn	-	94:FC noise warn	✓	-
-	095:Simulate active	-	95:Sim active	✓	-
-	096:AO 1 fix	-	96-97:AO fixed	✓	-
-	097:AO 2 fix			✓	-
-	098:Pls 1 fix	-	98-99:Pls fixed	✓	-
-	099:Pls 2 fix			✓	-
-	100:AI fix	-	100:AI fix	✓	-
-	101:Param restore run	-	101:Prm restore	✓	-
-	102:Disp over	-	102:Disp over	✓	-
-	103:SD size warn	-	103:SD size warn	✓	-
-	104:Bkup incmplt	-	104:Bkup incmplt	✓	-
-	105:SD mismatch	-	105:SD mismatch	✓	-
-	106:SD removal ERR	-	106:SD remov ERR	✓	-
-	120:Watchdog*1	-	120: Watchdog*1	-	-
-	121:Power off*1	-	121: Power off*1	-	-
-	122:Inst power FAIL*1	-	122: Inst PW FAIL*1	-	-
-	123:Param bkup run	-	123: bkup run	✓	-
-	124:Data log run	-	124: Data log run	✓	-

*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
BRAIN	I:ALARM ► I20:4-20 BURNOUT

Displays burn out direction

Selection		Description
Display	**BRAIN**	
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
BRAIN	I:ALARM ► I15:ALM OUT ACT

From the table below, select the active direction.

Selection		Description
Display	**BRAIN**	
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
BRAIN	J:DISPLAY SET ► J32: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	**BRAIN**	
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
BRAIN	J:DISPLAY SET ► J52:LANG 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)
BRAIN	J:DISPLAY SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Line 1	J10:LINE1 SEL	Specifies item 1 to be shown on the display.
Line 2	J11:LINE2 SEL	Specifies item 2 to be shown on the display.
Line 3	J12:LINE3 SEL	Specifies item 3 to be shown on the display.
Line 4	J13:LINE4 SEL	Specifies item 4 to be shown on the display.
Line 5	J14:LINE5 SEL	Specifies item 5 to be shown on the display.
Line 6	J15:LINE6 SEL	Specifies item 6 to be shown on the display.
Line 7	J16:LINE7 SEL	Specifies item 7 to be shown on the display.
Line 8	J17:LINE8 SEL	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	**BRAIN**	
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.
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 (K50:MAIN B REV/Main soft rev) is R2.01.02 or earlier, or Ind soft rev (K52:IND B REV/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)
BRAIN	J:DISPLAY SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Format PV	J20:FORMAT FR	Specifies the decimal-point position for the process value PV-mapped in Subsection 4.1.2.
Format total 1	J21:FORMAT TOT1	Specifies the decimal-point position for the totalized value of totalizer 1.
Format total 2	J22:FORMAT TOT2	Specifies the decimal-point position for the totalized value of totalizer 2.
Format total 3	J23:FORMAT TOT3	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	**BRAIN**	
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	BRAIN	
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

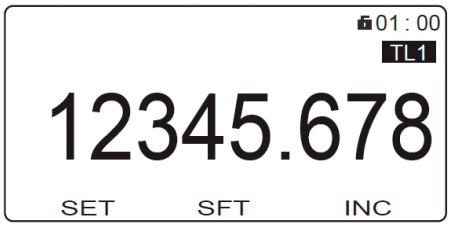
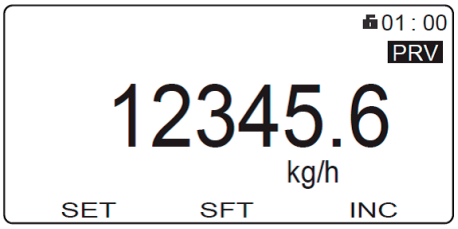
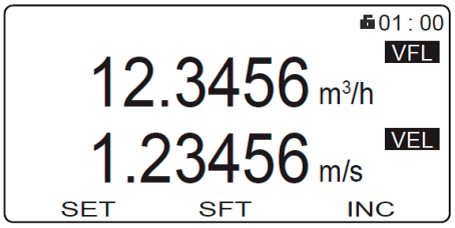
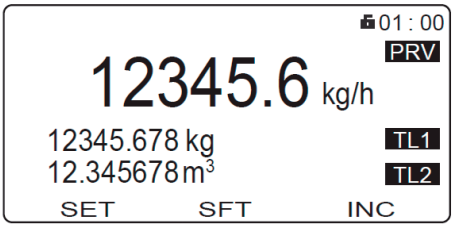
This product can show up to eight items on the display by scrolling, with four lines max. shown at a time. The scroll method can be selected from the automatic display switching or the display switching using the IR switch.
This setting can be configured with the following parameters.

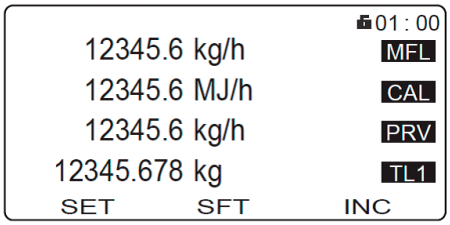
Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)
BRAIN	J:DISPLAY SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Line mode	J25:DISP LINE	Specifies the number of lines to be shown on the display.*1
Scroll mode	J29:DISP 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	**BRAIN**	
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	BRAIN	
4 line	4 Line	4-line display with units.  F0431.ai

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

Selection		Description
Display	BRAIN	
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

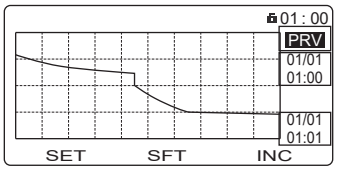
The default value of the scroll method (J29:DISP SCROLL/Scroll mode) is “Off”.
If the value of the scroll method is set to “Off”, the 5th line and beyond cannot be checked on the display.
To display the 5th line and beyond, set an option other than “Off”.

NOTE

When Main soft rev (K50:MAIN B REV/Main soft rev) is R2.01.02 or earlier, the default value of the scroll method (J29:DISP 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.



(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
BRAIN	J:DISPLAY SET ► J40:DISP MODE

From the table below, select the trend graph display.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	J:DISPLAY SET ► (see below)

Parameter		Description
Display	**BRAIN**	
Trend 1	J43:TREND1 SEL	Specifies item 1 to be shown in a trend graph.
Trend 2	J44:TREND2 SEL	Specifies item 2 to be shown in a trend graph.
Trend 3	J45:TREND3 SEL	Specifies item 3 to be shown in a trend graph.

Trend 4	J46:TREND4 SEL	Specifies item 4 to be shown in a trend graph.

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

Selection		Description
Display	BRAIN	
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.
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
BRAIN	J:DISPLAY SET ► J26:DISP PERIOD

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

Selection		Description
Display	BRAIN	
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)
BRAIN	J:DISPLAY SET ► (see below)

Parameter		Description
Display	BRAIN	
Trend offln URV	J42:OFFTREND URV	Specifies the high limit to display in a trend graph.
Trend offln LRV	J41:OFFTREND LRV	Specifies the low limit to display in a trend graph.

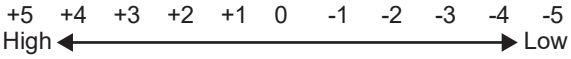
4.9.6 Other Settings

(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
BRAIN	J:DISPLAY SET ▶ J24:DISP CONTR



(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
BRAIN	J:DISPLAY SET ▶ J30:DISP 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
BRAIN	J:DISPLAY SET ▶ J31:FORMAT DATE

From the table below, specify the date display format.

Selection		Description
Display	**BRAIN**	
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
BRAIN	J:DISPLAY SET ▶ J47:DISP INVERSE

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

Selection		Description
Display	BRAIN	
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
BRAIN	J:DISPLAY SET ► J51:DISP SQUAWK

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

Selection		Description
Display	BRAIN	
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

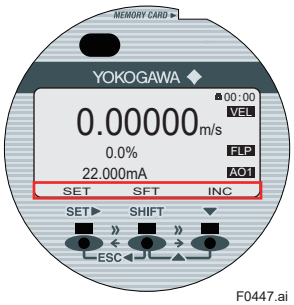
BRAIN	J:DISPLAY SET ► J54:IRSW OPERATE

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.

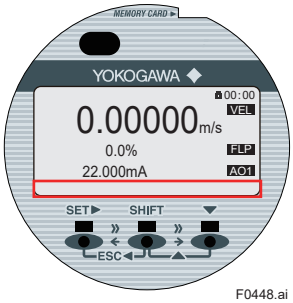
NOTE

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”



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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)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Tag No	K01:TAG NO	Specifies the Tag No. Max. 16 characters.
MS code ► Model code	K20:MODEL CODE	Specifies the model code of the integral flowmeter or remote transmitter.
MS code ► Suffix config 1	K21:SUFFIX CONF1	Specifies the suffix code of the integral flowmeter or remote transmitter.
MS code ► Suffix config 2	K22:SUFFIX CONF2	
MS code ► Option 1	K23:OPTION1	Specifies the optional code of the integral flowmeter or remote transmitter.
MS code ► Option 2	K24:OPTION2	
MS code ► Option 3	K25:OPTION3	
MS code ► Option 4	K26:OPTION4	
RS MS code ► Model code	K27:RS MDL CD	Specifies the model code of the remote sensor.
RS MS code ► Suffix config 1	K28:RS SUF CONF1	Specifies the suffix code of the remote sensor.
RS MS code ► Suffix config 2	K29:RS SUF CONF2	
RS MS code ► Option 1	K30:RS OPT1	Specifies the optional code of the remote sensor.
RS MS code ► Option 2	K31:RS OPT2	
RS MS code ► Option 3	K32:RS OPT3	
RS MS code ► Option 4	K33:RS OPT4	

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Trans serial No	K34:TRNS SR NO	Displays the serial number (device No.) of the transmitter.
Sensor serial No	K35:FT SR 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)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Transmitter type	K11:TRNS TYPE	Displays the type of the transmitter.
Option board ID	K12:OPT BOARD ID	Displays the type of the option board.
Main soft rev	K50:MAIN B REV	Displays the software revision of the main board.
Snsr soft rev	K51:SENSOR B REV	Displays the software revision of the sensor board.
Ind soft rev	K52:IND B REV	Displays the software revision of the display board.

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)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Memo 1	K40:MEMO1	Specifies memo 1.
Memo 2	K41:MEMO2	Specifies memo 2.
Memo 3	K42:MEMO3	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)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Current date	K03:CUR DATE	Displays current date.
Current time	K04:CUR TIME	Displays current time.

■ Setting date and time

Menu path

Display	Device setup ► Detailed setup ► Device info ► Date/Time ► (see below)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Set date	-	Specifies the current date.
Set time	-	Specifies the current time.
-	K05:SET CUR DAY	Set the current day (1-31).
-	K06:SETCUR MONTH	Set the current month (1-12).
-	K07:SET CUR YEAR	Set the current year (1900-2155).
-	K08:SET CUR HR	Set the current time (0-23).
-	K09:SET CUR MIN	Set the current minute (0-59).
-	K10:SET CUR SEC	Set the current second (0-59).

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
BRAIN	K:DEVICE INFO ► K02:OPERATE 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
BRAIN	K:DEVICE INFO ► K17:EX PROTECT

From the table below, select explosion protection setting.

Selection		Description
Display	**BRAIN**	
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)
BRAIN	I:ALARM ► (see below)

Parameter		Description
Display	**BRAIN**	
High alarm	I10:HIGH ALARM	Specifies the high limit to judge an alarm.
Low alarm	I11:LOW ALARM	Specifies the low limit to judge an alarm.
HH alarm	I12:HI HI ALARM	Specifies the high-high limit to judge an alarm.
LL alarm	I13:LO LO 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
BRAIN	I14:H/L ALM HYS

(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

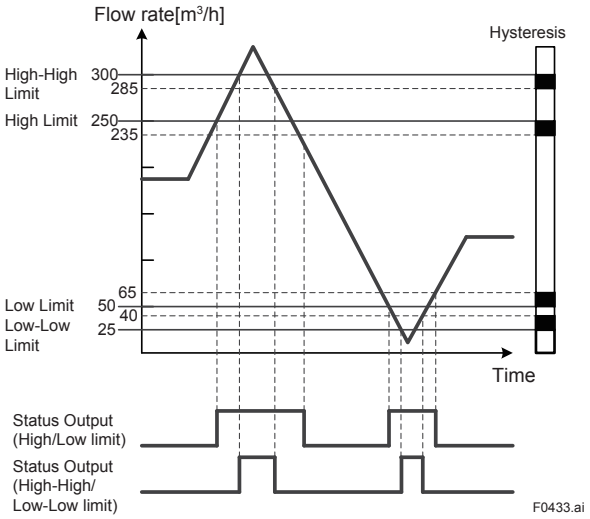
(3) Value that causes a low or low-low limit alarm to be reset

= 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]

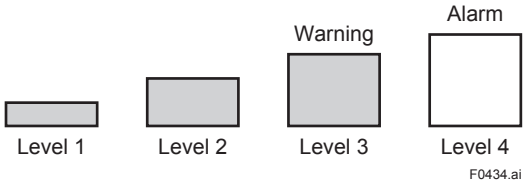


NOTE

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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Function	L10:ADHESION CHK	Specifies the use of the electrode adhesion detecting function.*1
Threshold level 1	L11:ADH LEVEL1	Specifies the value to judge level 1.
Threshold level 2	L12:ADH LEVEL2	Specifies the value to judge level 2.
Threshold level 3	L13:ADH LEVEL3	Specifies the value to judge level 3.
Threshold level 4	L14:ADH LEVEL4	Specifies the value to judge level 4.
Result ► Value	L16:ADH MEAS VAL	Displays the resistance value of the electrode.
Result ► Status	L17:ADH STATUS	Displays the electrode adhesion detection level.
Check cycle	L18:ADH CHK CYC	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	**BRAIN**	
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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Empty status	L44:EMPTY STS	Display the result of the sensor empty check function.*1
Electrode voltage A	L42:ELEC VOL A	Displays the voltage of electrode A.
Electrode voltage B	L43:ELEC VOL B	Displays the voltage of electrode B.

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Diagnostic execute	L33:DIAG EXE	Specifies the use of the wiring connection diagnostic function.*1
Diagnostic output	L49:DIAG 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	**BRAIN**	
Connect check exe	Conn Chk exe	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	**BRAIN**				
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.

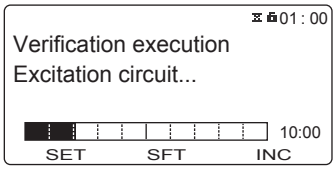
NOTE

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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Diagnostic output	L49:DIAG OUTPUT	Specifies the output to execute the verification function.*1

Menu path

Display	Device setup ► Diag/Service ► Verification ► (see below)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Mode	L50:VF MODE	Specifies the fluid state when performing the verification function.*2
Execute	L51:VF EXE	Specifies the execution of the verification function.*3
VF No	L52:VF NO	Specifies the diagnosis result display time.*4
VF target select	L47:VF TGT SET (for setting) L48:VF TGT STS (for checking)	Specifies the target for diagnosis.*5
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	**BRAIN**				
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	**BRAIN**	
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	BRAIN	
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	BRAIN	
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	BRAIN	
Magnetic circuit	-	Magnetic circuit diagnosis
Excite circuit	-	Excitation circuit diagnosis
Calc circuit	-	Calculation circuit diagnosis
Device status	-	Device alarm diagnosis
Connect status	-	Wiring misconnection check
-	All on	Set all diagnostics results valid.
-	All off	Set all diagnostics results invalid.
-	Magnetic on	Set the results of magnetic circuit diagnosis valid.
-	Magnetic off	Set the results of magnetic circuit diagnosis invalid.
-	Excitation on	Set the results of excitation circuit diagnosis valid.
-	Excitation off	Set the results of excitation circuit diagnosis invalid.
-	Calculation on	Set the results of calculation circuit diagnosis valid.
-	Calculation off	Set the results of calculation circuit diagnosis invalid.
-	Dev status on	Set the results of device alarm diagnosis valid.
-	Dev status off	Set the results of device alarm diagnosis invalid.
-	Conn status on	Set the results of misconnection diagnosis valid.
-	Conn status off	Set the results of misconnection diagnosis invalid.

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 L47:VF TGT SET 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 Disable with L47:VF TGT SET are displayed as “Skip”.
Note that verification itself cannot be executed if all diagnoses are unchecked on L47:VF TGT SET (All off).

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

Parameter		Description
Display	BRAIN	
Failed/Passed	L53:VF CHK RES	Execution result *7
VF operate time	L54:VF OPE TIME	Operation time at the start of verification
Magnetic circuit	L55:VF MAG RES	Magnetic circuit diagnosis result *7
Excite circuit	L56:VF EXCIT RES	Excitation circuit diagnosis result *7
Calc circuit	L57:VF CALC RES	Calculation circuit diagnosis result *7
Device status	L58:VF DEV RES	Device alarm diagnosis result *7
Connect status	L59:VF CONN RES	Wiring misconnection check result *7

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

Result		Description
Display	BRAIN	
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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Diagnostic execute	L33:DIAG EXE	Specifies the execution of the electrode insulation deterioration diagnostic function.*1
Diagnostic output	L49:DIAG 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	**BRAIN**	
Electrode insul exe	Elec ins exe	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	**BRAIN**				
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

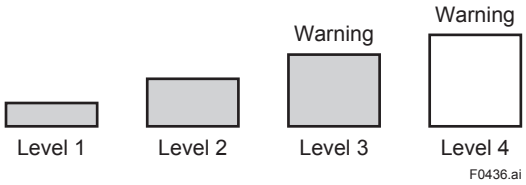
- Before using the electrode insulation deterioration diagnosis function, be sure to disconnect this product from the control loop.
- When the electrode insulation deterioration diagnosis function is used, the analog output and pulse output are not output correctly.

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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Function	L20:FL NOISE CHK	Specifies the use of the flow noise diagnosis function.*1
Threshold level 1	L21:FL NOISE LV1	Specifies the value to judge level 1.
Threshold level 2	L22:FL NOISE LV2	Specifies the value to judge level 2.
Threshold level 3	L23:FL NOISE LV3	Specifies the value to judge level 3.
Threshold level 4	L24:FL NOISE LV4	Specifies the value to judge level 4.
Result ► Value	L25:FL NOISE VAL	Displays the flow noise value.
Result ► Status	L26:FL NOISE STS	Displays the flow noise level.

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
Function	L30:LO COND FUNC	Specifies the use of the low conductivity diagnosis function.*1
Result ► Value	L31:CONDUCTIVITY	Displays the calculated conductivity.
Low limit	L32:CONDUCT LMT	Specifies the value used to judge the low conductivity.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► (see below)
BRAIN	K:DEVICE INFO ► (see below)

Parameter		Description
Display	**BRAIN**	
Electrode size	K15:EL SIZE	Displays the electrode size.

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
IEX compare	L38:IEX COMP	Displays the current value of Exciting current to judge coil insulation.
Coil insul threshold	L37:COIL INS TH	Specifies 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)
BRAIN	L:DIAGNOSIS ► (see below)

Parameter		Description
Display	**BRAIN**	
V peak hold	L40:V PEAK HOLD	Displays the maximum voltage of the flow signal.
IEX resistance	L41:IEX COIL R	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)
BRAIN	M:TEST ► (see below)

Parameter		Description
Display	**BRAIN**	
Input test ► Test mode	M02:TEST MODE (for setting) M03:TEST STATUS (for checking)	Selects the test item (input).
Output test ► Test mode		Selects the test item (output).

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

Selection		Description
Display	**BRAIN**	
-	Test all off	Ends all tests.
Velocity test	Velo test on	Starts testing the flow velocity.
Volume test	Vol F test on	Starts testing the volumetric flow rate.
Mass test	Mass F test on	Starts testing the mass flow rate.
Calorie test	Calorie test on	Starts testing the calorie.
AO1 test	AO1 test on	Starts testing analog output 1.
PO1 test	P1 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	P2 test on	Starts testing pulse output/frequency output 2.
SO2 test	SO2 test on	Starts testing status output 2.
AI test	AI test on	Starts testing the analog input.
SO11 test	SO11 test on	Starts testing status output 11.
SI11 test	SI11 test on	Starts testing status input 11.
SO12 test	SO12 test on	Starts testing status output 12.
SI12 test	SI12 test on	Starts testing status input 12.
-	Test all on	Starts all tests.
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)
BRAIN	M:TEST ► (see below)

Parameter		Description
Display	**BRAIN**	
Velocity	M10:VELO T VAL	Specifies the flow velocity.
Volume	M11:VOLUM T VAL	Specifies the volumetric flow rate.
Mass	M12:MASS T VAL	Specifies the mass flow rate.
Calorie	M13:CALO T VAL	Specifies the calorie.
AI	M30:AI TEST VAL	Specifies to the current value of analog input.
SI11	M41:SI11 T VAL	Specifies the state of status input 11.
SI12	M43:SI12 T VAL	Specifies the state of status input 12.

■ Output test

Menu path

Display	Device setup ► Diag/Service ► Test ► Output test ► (see below)
BRAIN	M:TEST ► (see below)

Parameter		Description
Display	**BRAIN**	
AO1	M14:AO1 TEST VAL	Specifies to the current value of analog output 1.
PO1	M15:P1 TEST VAL	Specifies the frequency of pulse output/frequency output 1.
SO1	M16:SO1 TEST VAL	Specifies the state of status output 1.
AO2	M20:AO2 TEST VAL	Specifies to the current value of analog output 2.
PO2	M21:P2 TEST VAL	Specifies the frequency of pulse output/frequency output 2.
SO2	M22:SO2 TEST VAL	Specifies the state of status output 2.
SO11	M40:SO11 T VAL	Specifies the state of status output 11.
SO12	M42:SO12 T VAL	Specifies the state of status output 12.
Alarm	M44:ALM TEST VAL	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
BRAIN	M:TEST ► M50:TEST 2 MODE

Selects whether to enable test 2 mode.

Selection	
Display	**BRAIN**
Normal	Normal
Test	Test

■ Test 2 mode value setting

Menu path

Display	Device setup ► Diag/Service ► Test ► Test 2 value
BRAIN	M:TEST ► M51:TEST 2 OUT

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
BRAIN	M:TEST ► M01:TEST REL TIM

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

Selection		Description
Display	**BRAIN**	
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)
BRAIN	N:EVENT MANAGE ► (see below)

Parameter		Description
Display	**BRAIN**	
F backup name	N10:F BCKUP NAME	Displays the backup name defined at shipment from the manufacturing plant.
F backup date	N11:F BCKUP DATE	Displays the backup date at shipment from the manufacturing plant.
SD backup name	N12:SD BCK NAME	Specifies the name of the file to be backed up to the microSD card.
Backup name 1	N13:BCK NAME1	Specifies backup name 1. Up to 16 characters
Backup date 1	N14:BCK DATE1	Specifies date 1.
Backup name 2	N15:BCK NAME2	Specifies backup name 2. Up to 16 characters
Backup date 2	N16:BCK DATE2	Specifies date 2.
Backup name 3	N17:BCK NAME3	Specifies backup name 3. Up to 16 characters
Backup date 3	N18:BCK DATE3	Specifies date 3.
Backup execute	N19:BACKUP EXEC	Specifies the use of the backup function.*1
Backup result	N22:BACKUP RSLT	Displays the result of the backup function.*2

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

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

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

Selection		Description
Display	BRAIN	
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	BRAIN	
010:Main CPU FAIL	10:Main CPU FAIL	—
011:Rev calc FAIL	11:Rev cal FAIL	—
012:Main EEP FAIL	12:Main EEP FAIL	—
013:Main EEP dflt	13:Main EEP dflt	—
014:Snsr bd FAIL	14:Snsr bd FAIL	✓
015:Snsr comm ERR	15:Snsr comm ERR	✓
016:AD 1 FAIL[Sig]	16:A/D1 FAIL	✓
017:AD 2 FAIL[Excit]	17:A/D2 FAIL	✓
018:Coil open	18:Coil open	✓
019:Coil short	19:Coil short	✓
020:Exciter FAIL	20:Exciter FAIL	✓
021:PWM 1 stop	21-22:PWM stop	—
022:PWM 2 stop		—
023:Opt bd mismatch	23:Opt mismatch	—
024:Opt bd EEP FAIL	24:Opt EEP FAIL	—
025:Opt bd A/D FAIL	25:Opt A/D FAIL	—
026:Opt bd SPI FAIL	26:Opt SPI FAIL	—
027:Restore FAIL	27:Restore FAIL	✓
028:Ind bd FAIL	28-32:Indct FAIL	—
029:Ind bd EEP FAIL		—
030:LCD drv FAIL		—
031:Ind bd mismatch		—
032:Ind comm ERR		—
033:microSD FAIL	33:microSD FAIL	—
050:Signal overflow	50:Sig overflow	✓
051:Empty detect	51:Empty detect	✓
052:H/L HH/LL alm	52:H/L HH/LL alm	✓
053:Adh over lv 4	53:Adh over lv4	✓
060:Span cfg ERR	60:Span cfg ERR	—
061:PV F cfg ERR	61:PV F cfg ERR	—
062:AO 1 4-20 lmt	62:AO1 4-20 lmt	—
063:AO 2 4-20 lmt	63:AO2 4-20 lmt	—
064:AO 1 mlt rng	64:AO1 mlt rng	—
065:H/L cfg ERR	65:AO H/L cfg	—
066:Density cfg ERR	66:Dens cfg ERR	—
067:Pls 1 cfg ERR	67:Pls1 cfg ERR	—
068:Pls 2 cfg ERR	68:Pls2 cfg ERR	—
069:Nomi size cfg	69:Nomi size cfg	—
070:Adh cfg ERR	70:Adh cfg ERR	—
071:FLN cfg ERR	71:FLN cfg ERR	—
072:Log not start	72:Log not start	—
080:AO 1 saturate	80-81:AO saturt	✓
081:AO 2 saturate		✓

Alarm name		Backup
Display	BRAIN	
082:Pls 1 saturate	82-83:Pls saturt	✓
083:Pls 2 saturate		✓
084:AI saturate	84:AI saturate	✓
085:Cable miscon	85:Cable miscon	✓
086:Coil insulation	86:Coil insulate	✓
131:Trans mismatch	131:Trn mismatch	—
087:Adhesion lv 3	87:Adh over lv3	✓
088:LC warn	88:LC warn	✓
089:Insu detect	89:Insu detect	✓
090:FLN over lv 3	90:FLN over lv3	✓
091:FLN over lv 4	91:FLN over lv4	✓
092:AZ warn	92:AZ warn	✓
093:Verif warn	93:Verif warn	✓
094:Fact noise warn	94:FC noise warn	✓
095:Simulate active	95:Sim active	✓
096:AO 1 fix	96-97:AO fixed	✓
097:AO 2 fix		✓
098:Pls 1 fix	98-99:Pls fixed	✓
099:Pls 2 fix		✓
100:AI fix	100:AI fix	✓
101:Param restore run	101:Prm restore	—
102:Disp over	102:Disp over	—
103:SD size warn	103:SD size warn	—
104:Bkup incmplt	104:Bkup incmplt	✓
105:SD mismatch	105:SD mismatch	—
106:SD removal ERR	106:SD remov ERR	—
120:Watchdog	120: Watchdog*1	✓
121:Power off	121: Power off*1	✓
122:Inst power FAIL	122: Inst PW FAIL*1	✓
123:Param bkup run	123: bkup run	—
124:Data log run	124: Data log run	✓

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)
BRAIN	N:EVENT MANAGE ► (see below)

Parameter		Description
Display	**BRAIN**	
Restore execute	N20:RESTORE EXEC	Specifies the execution of the restore function.*1
Restore result	N21:RESTORE RSLT	Displays the result of the restore function.*2

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

Selection		Description
Display	**BRAIN**	
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	**BRAIN**	
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	BRAIN	
010:Main CPU FAIL	10:Main CPU FAIL	—
011:Rev calc FAIL	11:Rev cal FAIL	—
012:Main EEP FAIL	12:Main EEP FAIL	—
013:Main EEP dflt	13:Main EEP dflt	—
014:Snsr bd FAIL	14:Snsr bd FAIL	✓
015:Snsr comm ERR	15:Snsr comm ERR	✓
016:AD 1 FAIL[Sig]	16:A/D1 FAIL	✓
017:AD 2 FAIL[Excit]	17:A/D2 FAIL	✓
018:Coil open	18:Coil open	✓
019:Coil short	19:Coil short	✓
020:Exciter FAIL	20:Exciter FAIL	✓
021:PWM 1 stop	21-22:PWM stop	—
022:PWM 2 stop		—
023:Opt bd mismatch	23:Opt mismatch	—
024:Opt bd EEP FAIL	24:Opt EEP FAIL	—
025:Opt bd A/D FAIL	25:Opt A/D FAIL	—
026:Opt bd SPI FAIL	26:Opt SPI FAIL	—
027:Restore FAIL	27:Restore FAIL	✓
028:Ind bd FAIL	28-32:Indct FAIL	—
029:Ind bd EEP FAIL		—
030:LCD drv FAIL		—
031:Ind bd mismatch		—
032:Ind comm ERR		—
033:microSD FAIL	33:microSD FAIL	—
050:Signal overflow	50:Sig overflow	✓
051:Empty detect	51:Empty detect	✓
052:H/L HH/LL alm	52:H/L HH/LL alm	✓
053:Adh over lv 4	53:Adh over lv4	✓
060:Span cfg ERR	60:Span cfg ERR	—
061:PV F cfg ERR	61:PV F cfg ERR	—
062:AO 1 4-20 lmt	62:AO1 4-20 lmt	—
063:AO 2 4-20 lmt	63:AO2 4-20 lmt	—
064:AO 1 mlt rng	64:AO1 mlt rng	—
065:H/L cfg ERR	65:AO H/L cfg	—
066:Density cfg ERR	66:Dens cfg ERR	—
067:Pls 1 cfg ERR	67:Pls1 cfg ERR	—
068:Pls 2 cfg ERR	68:Pls2 cfg ERR	—
069:Nomi size cfg	69:Nomi size cfg	—
070:Adh cfg ERR	70:Adh cfg ERR	—
071:FLN cfg ERR	71:FLN cfg ERR	—
072:Log not start	72:Log not start	—
080:AO 1 saturate	80-81:AO saturt	✓
081:AO 2 saturate		✓
082:Pls 1 saturate	82-83:Pls saturt	✓
083:Pls 2 saturate		✓
084:AI saturate	84:AI saturate	✓
085:Cable miscon	85:Cable miscon	✓
086:Coil insulation	86:Coil insulate	✓
131:Trans mismatch	131:Trn mismatch	—
087:Adhesion lv 3	87:Adh over lv3	✓
088:LC warn	88:LC warn	✓

Alarm name		Restore
Display	BRAIN	
089:Insu detect	89:Insu detect	✓
090:FLN over lv 3	90:FLN over lv3	✓
091:FLN over lv 4	91:FLN over lv4	✓
092:AZ warn	92:AZ warn	✓
093:Verif warn	93:Verif warn	✓
094:Fact noise warn	94:FC noise warn	✓
095:Simulate active	95:Sim active	✓
096:AO 1 fix	96-97:AO fixed	✓
097:AO 2 fix		✓
098:Pls 1 fix	98-99:Pls fixed	✓
099:Pls 2 fix		✓
100:AI fix	100:AI fix	✓
101:Param restore run	101:Prm restore	—
102:Disp over	102:Disp over	—
103:SD size warn	103:SD size warn	—
104:Bkup incmplt	104:Bkup incmplt	✓
105:SD mismatch	105:SD mismatch	—
106:SD removal ERR	106:SD remov ERR	—
120:Watchdog	120: Watchdog*1	✓
121:Power off	121: Power off*1	✓
122:Inst power FAIL	122: Inst PW FAIL*1	✓
123:Param bkup run	123: bkup run	—
124:Data log run	124: Data log run	✓

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	BRAIN	Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Damp AO/F	C10:VELO DMP A/F	✓	✓	—	✓
Damp pls/ttl	C11:VELO DMP P/T	✓	✓	—	✓
Damp AO/F	C12:VOL DMP A/F	✓	✓	—	✓
Damp pls/ttl	C13:VOL DMP P/T	✓	✓	—	✓
Damp AO/F	C14:MASS DMP A/F	✓	✓	—	✓
Damp pls/ttl	C15:MASS DMP P/T	✓	✓	—	✓
Damp AO/F	C16:CAL DMP A/F	✓	✓	—	✓
Damp pls/ttl	C17:CAL DMP P/T	✓	✓	—	✓
Low MF	C20:LOW MF	✓	✓	✓	✓
High MF	C21:HIGH MF	✓	✓	✓	✓
Flow sensor sel	C24:FLOW SENSOR	✓	✓	—	✓
Nominal size unit	C26:SIZE UNIT	✓	✓	✓	✓
Nominal size	C27:NOMINAL SIZE	✓	✓	✓	✓
PV flow select	C30:PV FLOW SEL	✓	✓	✓	✓
Unit	C31:VELO F UNIT	—	—	✓	✓
Unit	C32:VOL F UNIT	—	—	✓	✓
Unit	C33:MASS F UNIT	—	—	✓	✓
Time unit	C35:TIME UNIT	—	—	✓	✓
Span	C36:VELO F SPAN	✓	✓	✓	✓
Span	C37:VOL F SPAN	✓	✓	✓	✓
Span	C38:MASS F SPAN	✓	✓	✓	✓
Span	C39:CAL F SPAN	✓	✓	—	✓
Zero value	C52:ZERO	✓	✓	—	✓
Conv factor	D11:TOT1 CONV FC	—	—	✓	✓
Low cut	D12:TOT1 LOWCUT	✓	✓	✓	✓
Failure opts	D13:TOT1 F OPTS	✓	✓	—	✓
Options	D14:TOT1 OPTS	✓	✓	—	✓
Start/Stop	D15:TOT1 EXEC	✓	✓	—	✓
Reset/Preset	D16:TOT1 PRESET	✓	✓	—	✓
Preset value	D17:TOT1 PRE VAL	✓	✓	—	✓
Set point	D18:TOT1 SETPNT	✓	✓	—	✓
Low cut	D22:TOT2 LOWCUT	✓	✓	—	✓
Failure opts	D23:TOT2 F OPTS	✓	✓	—	✓
Options	D24:TOT2 OPTS	✓	✓	—	✓
Start/Stop	D25:TOT2 EXEC	✓	✓	—	✓
Reset/Preset	D26:TOT2 PRESET	✓	✓	—	✓
Preset value	D27:TOT2 PRE VAL	✓	✓	—	✓
Set point	D28:TOT2 SETPNT	✓	✓	—	✓
Low cut	D32:TOT3 LOWCUT	✓	✓	—	✓
Failure opts	D33:TOT3 F OPTS	✓	✓	—	✓
Options	D34:TOT3 OPTS	✓	✓	—	✓
Start/Stop	D35:TOT3 EXEC	✓	✓	—	✓
Reset/Preset	D36:TOT3 PRESET	✓	✓	—	✓
Preset value	D37:TOT3 PRE VAL	✓	✓	—	✓
Set point	D38:TOT3 SETPNT	✓	✓	—	✓
Output mode	E10:P1 OUT MODE	✓	✓	✓	✓
Active mode	E11:P1 ACT MODE	✓	✓	—	✓
Fix width	E12:P1 WIDTH	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	BRAIN	Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Rate unit	E13:P1 RATE UNIT	—	—	✓	✓
Rate value	E14:P1 RATE VAL	✓	✓	✓	✓
Low cut	E15:P1 LOW CUT	✓	✓	✓	✓
Alarm out	E16:P1 ALM OUT	✓	✓	—	✓
Frequency at 0%	E17:F1 AT 0%	✓	✓	✓	✓
Frequency at 100%	E18:F1 AT 100%	✓	✓	✓	✓
SO1 function	E20:SO1 FUNCTION	✓	✓	—	✓
Options	E21:P1 OPTS	✓	✓	—	✓
Active pulse	E30:P2 ACT PULSE	✓	✓	—	✓
Output mode	E31:P2 OUT MODE	✓	✓	—	✓
Pulse select	E32:P2 SELECT	✓	✓	—	✓
Active mode	E33:P2 ACT MODE	✓	✓	—	✓
Fix width	E34:P2 WIDTH	✓	✓	—	✓
Rate value	E36:P2 RATE VAL	✓	✓	—	✓
Low cut	E37:P2 LOW CUT	✓	✓	—	✓
Alarm out	E38:P2 ALM OUT	✓	✓	—	✓
Frequency at 0%	E39:F2 AT 0%	✓	✓	—	✓
Frequency at 100%	E40:F2 AT 100%	✓	✓	—	✓
SO2 function	E41:SO2 FUNCTION	✓	✓	—	✓
Options	E42:P2 OPTS	✓	✓	—	✓
Active mode	F20:SO11 ACTMODE	✓	✓	—	✓
Function	F21:SO11 FUNC	✓	✓	—	✓
Active mode	F30:SO12 ACTMODE	✓	✓	—	✓
Function	F31:SO12 FUNC	✓	✓	—	✓
Active mode	F22:SI11 ACTMODE	✓	✓	—	✓
Function	F23:SI11 FUNC	✓	✓	—	✓
Active mode	F32:SI12 ACTMODE	✓	✓	—	✓
Function	F33:SI12 FUNC	✓	✓	—	✓
Forward span 2	F40:FWD SPAN2	✓	✓	—	✓
Forward span 3	F41:FWD SPAN3	✓	✓	—	✓
Forward span 4	F42:FWD SPAN4	✓	✓	—	✓
Reverse span 1	F43:REV SPAN1	✓	✓	—	✓
Reverse span 2	F44:REV SPAN2	✓	✓	—	✓
Reverse span 3	F45:REV SPAN3	✓	✓	—	✓
Reverse span 4	F46:REV SPAN4	✓	✓	—	✓
Auto range hyst	F50:AUTO RNG HYS	✓	✓	—	✓
Bi direction hyst	F51:BI DIREC HYS	✓	✓	—	✓
Low cut	G01:AO1 LOW CUT	✓	✓	—	✓
High limit	G02:AO1 HI LIMIT	✓	✓	—	✓
Low limit	G03:AO1 LO LIMIT	✓	✓	—	✓
Alarm out	G04:AO1 ALM OUT	✓	✓	✓	✓
Range mode	G05:AO1 RNG MODE	✓	✓	—	✓
AO2 select	G10:AO2 SELECT	✓	✓	—	✓
Low cut	G11:AO2 LOW CUT	✓	✓	—	✓
High limit	G12:AO2 HI LIMIT	✓	✓	—	✓
Low limit	G13:AO2 LO LIMIT	✓	✓	—	✓
Alarm out	G14:AO2 ALM OUT	✓	✓	—	✓
Function	G20:AI FUNCTION	✓	✓	—	✓
URV	G25:AI URV	✓	✓	—	✓
LRV	G26:AI LRV	✓	✓	—	✓
AO1 trim 4mA	G31:AO1 at 4mA	✓	✓	—	✓
AO1 trim 20mA	G32:AO1 at 20mA	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	BRAIN	Duplicate Data	Restore Data	Compulsion Data	Restore Factory
AO2 trim 4mA	G41:AO2 at 4mA	✓	✓	—	✓
AO2 trim 20mA	G42:AO2 at 20mA	✓	✓	—	✓
Flow direct	H10:FLOW DIRECT	✓	✓	—	✓
Rate limit	H11:RATE LIMIT	✓	✓	—	✓
Dead time	H12:DEAD TIME	✓	✓	—	✓
Noise filter	H13:NOISE FILTER	✓	✓	—	✓
Pulsing flow	H14:PULSING FLOW	✓	✓	—	✓
Power sync	H20:POWER SYNCH	✓	✓	✓	✓
Set power freq	H21:SET PWR FREQ	✓	✓	✓	✓
Value select	H30:DENSITY SEL	✓	✓	—	✓
Fixed density	H32:FIXED DENS	✓	✓	✓	✓
Std density	H33:STD DENSITY	✓	✓	—	✓
Std temperature	H34:STD TEMP	✓	✓	—	✓
Coef A1	H35:TEMP COEF A1	✓	✓	—	✓
Coef A2	H36:TEMP COEF A2	✓	✓	—	✓
Specific heat	H40:SPEC HEAT	✓	✓	—	✓
Fixed temperature	H41:CAL FIX TEMP	✓	✓	—	✓
High alarm	I10:HIGH ALARM	✓	✓	—	✓
Low alarm	I11:LOW ALARM	✓	✓	—	✓
HH alarm	I12:HI HI ALARM	✓	✓	—	✓
LL alarm	I13:LO LO ALARM	✓	✓	—	✓
H/L alarm hyst	I14:H/L ALM HYS	✓	✓	—	✓
Line 1	J10:LINE1 SEL	—	—	✓	✓
Line 2	J11:LINE2 SEL	—	—	✓	✓
Line 3	J12:LINE3 SEL	—	—	✓	✓
Line 4	J13:LINE4 SEL	—	—	✓	✓
Line 5	J14:LINE5 SEL	—	—	✓	✓
Line 6	J15:LINE6 SEL	—	—	✓	✓
Line 7	J16:LINE7 SEL	—	—	✓	✓
Line 8	J17:LINE8 SEL	—	—	✓	✓
Format PV	J20:FORMAT FR	—	—	✓	✓
Line mode	J25:DISP LINE	—	—	✓	✓
Disp install	J53:DISP INSTALL	—	—	✓	✓
-	J54:IRSW OPERATE	—	—	✓	✓
Tag No	K01:TAG NO	—	—	✓	✓
Electrode size	K15:EL SIZE	✓	✓	—	✓
Model code	K20:MODEL CODE	✓	✓	—	✓
Suffix config 1	K21:SUFFIX CONF1	✓	✓	—	✓
Suffix config 2	K22:SUFFIX CONF2	✓	✓	—	✓
Option 1	K23:OPTION1	✓	✓	—	✓
Option 2	K24:OPTION2	✓	✓	—	✓
Option 3	K25:OPTION3	✓	✓	—	✓
Option 4	K26:OPTION4	✓	✓	—	✓
Model code	K27:RS MDL CD	✓	✓	—	✓
Suffix config 1	K28:RS SUF CONF1	✓	✓	—	✓
Suffix config 2	K29:RS SUF CONF2	✓	✓	—	✓
Option 1	K30:RS OPT1	✓	✓	—	✓
Option 2	K31:RS OPT2	✓	✓	—	✓
Option 3	K32:RS OPT3	✓	✓	—	✓
Option 4	K33:RS OPT4	✓	✓	—	✓
Trans serial No	K34:TRNS SR NO	✓	✓	—	✓
Sensor serial No	K35:FT SR NO	✓	✓	—	✓

Parameter		Restore or Duplicate			
Display	BRAIN	Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Function	L10:ADHESION CHK	✓	✓	✓	✓
Threshold level 1	L11:ADH LEVEL1	✓	✓	—	✓
Threshold level 2	L12:ADH LEVEL2	✓	✓	—	✓
Threshold level 3	L13:ADH LEVEL3	✓	✓	—	✓
Threshold level 4	L14:ADH LEVEL4	✓	✓	—	✓
Check cycle	L18:ADH CHK CYC	✓	✓	—	✓
Function	L20:FL NOISE CHK	✓	✓	—	✓
Threshold level 1	L21:FL NOISE LV1	✓	✓	—	✓
Threshold level 2	L22:FL NOISE LV2	✓	✓	—	✓
Threshold level 3	L23:FL NOISE LV3	✓	✓	—	✓
Threshold level 4	L24:FL NOISE LV4	✓	✓	—	✓
Damp	L27:FL NOISE DMP	✓	✓	—	✓
Span	L28:FL NOISE SPN	✓	✓	✓	✓
Function	L30:LO COND FUNC	✓	✓	—	✓
Low limit	L32:CONDUCT LMT	✓	✓	—	✓
Coil insul threshold	L37:COIL INS TH	✓	✓	—	✓
IEX compare	L38:IEX COMP	✓	✓	—	✓
Diagnostic output	L49:DIAG OUTPUT	✓	✓	—	✓
Mode	L50:VF MODE	✓	✓	—	✓
VF No	L52:VF NO	✓	✓	—	✓
Release time	M01:TEST REL TIM	✓	✓	—	✓

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)
BRAIN	N:EVENT MANAGE ► (see below)

Parameter		Description
Display	**BRAIN**	
File name	N30:LOGGING FILE	Specifies the name of the file to be stored.
Interval time	N31:LOG INTR TIM	Specifies the data storage interval.*1
Start date	N32:L START DATE	Displays the date to start the data logging function.
Start time	N33:L START TIME	Displays the time to start the data logging function.
End time	N34:LOG END TIME	Specifies the time to end the data logging function.*2
Log 1	N35:LOG1 SELECT	Specifies process value 1 to be stored.*3
Log 2	N36:LOG2 SELECT	Specifies process value 2 to be stored.*3
Log 3	N37:LOG3 SELECT	Specifies process value 3 to be stored.*3
Log 4	N38:LOG4 SELECT	Specifies process value 4 to be stored.*3
Execute	N39:LOGGING EXEC	Specifies the execution of the data logging function.*4

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

Selection		Description
Display	**BRAIN**	
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	**BRAIN**	
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.

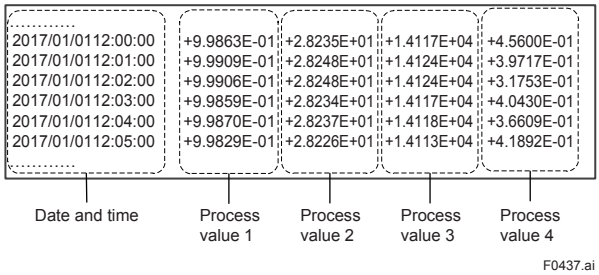
*3: From the table below, select the process value to be stored.

Selection		Description
Display	BRAIN	
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	BRAIN	
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.



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)
BRAIN	P:PROTECT ► (see below)

Parameter		Description
Display	**BRAIN**	
Write protect sts	P20:WRT PROTECT	Indicates the use of the write protection function.*1
Enable write	P21:ENABLE WRITE	Cancels the write protection function only for 10 minutes.
New password	P22: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	**BRAIN**	
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
BRAIN	P:PROTECT ► P23:SOFT SEAL

Check the use of the Joker password depending on the following parameters.

Value		Description
Display	**BRAIN**	
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 BRAIN 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					
		D0	D2	D3	D4	D5	D6
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

NOTE

When setting numeric data for BRAIN communication, the maximum value which can be set is “32000” and the minimum value is “-32000” regardless of the decimal point position.
Please note that when setting the value whose maximum value exceeds "32000”, the value is set to “32000”, and when setting the value whose minimum value exceeds “-32000”, the value is set to “-32000”.
Set data in the following range by taking into account the decimal point position.

Number of digits after the decimal point	Range
0	0 to 32000
1	0.0 to 3200.0
2	0.00 to 320.00
3	0.000 to 32.000
4	0.0000 to 3.2000
5	0.00000 to 0.32000

Example
When setting 333.33 to numeric type data, it cannot be set since "33333" of the number string excluding the decimal point goes over “32000”. It needs to set “333.3” by taking into account the decimal point position.

(1) Display parameters

These parameters are related to flow and totalizer display.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
1-1	A10:FLOW RATE(%)	Flow rate(%)	-999.999 to +999.999 Number of decimal places: 3	-99999.9 to +99999.9 Number of decimal places: 1	R	-	%	P.33
1-2	A20:FLOW RATE	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.33
1-3	A21:FLW RATE(mA)	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	-
1-4	A30:TOTAL1	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.47
1-5	A31:TOTAL2	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.47
1-6	A32:TOTAL3	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.47
1-7	A33:TOTAL1 CNT	Totalizer 1 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.48
1-8	A34:TOTAL2 CNT	Totalizer 2 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.48
1-9	A35:TOTAL3 CNT	Totalizer 3 count	-INF*2 to +INF*2 Number of decimal places: 0	-99999999 to +99999999 Number of decimal places: 0	R	-	-	P.48

*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
	BRAIN	Display	BRAIN	Display				
2-1	B10:LANGUAGE	Language	English French German Italian Spanish Portuguese Russian Chinese Japanese	English French German Italian Spanish Portuguese Russian Chinese Japanese	RW	English	-	P.110
2-2	B20:VOL DMP A/F	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.36
2-3	B21:VOL DMP P/T	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.36
2-4	B22:VOL F 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.34
2-5	B23:TIME UNIT	Time unit	/s /min /h	/s /min /h	RW	/h *1	-	P.35
2-6	B24:VOL F 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.35
2-7	B30:P1 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.58
2-8	B31:P1 RATE VAL	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.57
2-9	B32:F1 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.59
2-10	B33:F1 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.59
2-11	B40:LINE1 SEL	Line 1	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number 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 Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	PV	-	P.111

*1: Determined based on the information about specified items at the time and ordering or 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
	BRAIN	Display	BRAIN	Display				
2-12	B41:LINE2 SEL	Line 2	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number 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 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.111
2-13	B42:LINE3 SEL	Line 3			RW	Analog out 1	-	P.111
2-14	B50:AUTOZERO EXE	Autozero exe	Not execute Execute	Not execute Execute	RW	Not execute	-	P.45

*1: Determined based on the information about specified items at the time and ordering or 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
	BRAIN	Display	BRAIN	Display				
3-1	C10:VELO DMP A/F	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.36
3-2	C11:VELO DMP P/T	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.36
3-3	C12:VOL DMP A/F	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.36
3-4	C13:VOL DMP P/T	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.36
3-5	C14:MASS DMP A/F	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.36
3-6	C15:MASS DMP P/T	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.36
3-7	C16:CAL DMP A/F	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.36
3-8	C17:CAL DMP P/T	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.36
3-9	C20: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.39
3-10	C21: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.39
3-11	C24:FLOW SENSOR	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.40
3-12	C26:SIZE UNIT	Nominal size unit	mm inch	mm inch	RW	mm	-	P.41
3-13	C27: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.41
3-14	C30:PV FLOW SEL	PV flow select	Velocity Volume Mass Diag	Velocity Volume Mass Diag	RW	Volume *1	-	P.33
3-15	C31:VELO F UNIT	Unit	m/s ft/s	m/s ft/s	RW	m/s *1	-	P.34
3-16	C32:VOL F 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.34
3-17	C33:MASS F UNIT	Unit	t kg g klb lb	t kg g klb lb	RW	kg *1	-	P.34
3-18	C34:CAL UNIT	Unit	MJ kJ J kcal cal BTU	MJ kJ J kcal cal BTU	RW	J	-	P.34

*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
	BRAIN	Display	BRAIN	Display				
3-19	C35:TIME UNIT	Time unit	/s /min /h /d	/s /min /h /d	RW	/h *1	-	P.35
3-20	C36:VELO F 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.35
3-21	C37:VOL F 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.35
3-22	C38:MASS F 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.35
3-23	C39:CAL F 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.35
3-24	C40:VELOCITY CHK	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.42
3-25	C41:USR SPN SEL1	Select	No Yes	No Yes	RW	No	-	P.43
3-26	C42:USR UNIT1	Unit	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.43
3-27	C43:USR SPAN1	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.44
3-28	C44:USR SPN SEL2	Select	No Yes	No Yes	RW	No	-	P.43
3-29	C45:USR UNIT2	Unit	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.43
3-30	C46:USR SPAN2	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.44
3-31	C51:AUTOZERO EXE	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.45
3-32	C52:ZERO	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.46

*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
	BRAIN	Display	BRAIN	Display				
4-1	D10:TOT1 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.47
4-2	D11:TOT1 CONV FC	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.48
4-3	D12:TOT1 LOWCUT	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.38
4-4	D13:TOT1 F OPTS	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.50
4-5	D14:TOT1 OPTS	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Only positive	-	P.51
4-6	D15:TOT1 EXEC	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.50
4-7	D16:TOT1 PRESET	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.52
4-8	D17:TOT1 PRE VAL	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.52
4-9	D18:TOT1 SETPNT	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.49

*1: Determined based on the information about specified items at the time and ordering or 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
	BRAIN	Display	BRAIN	Display				
4-10	D20:TOT2 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.47
4-11	D21:TOT2 CONV FC	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.48
4-12	D22:TOT2 LOWCUT	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.38
4-13	D23:TOT2 F OPTS	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.50
4-14	D24:TOT2 OPTS	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Only negative	-	P.51
4-15	D25:TOT2 EXEC	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.50
4-16	D26:TOT2 PRESET	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.52
4-17	D27:TOT2 PRE VAL	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.52
4-18	D28:TOT2 SETPNT	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.49

*1: Determined based on the information about specified items at the time and ordering or 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
	BRAIN	Display	BRAIN	Display				
4-19	D30:TOT3 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.47
4-20	D31:TOT3 CONV FC	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.48
4-21	D32:TOT3 LOWCUT	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.38
4-22	D33:TOT3 F OPTS	Failure opts	Measured value Stop Last valid	Measured value Stop Last valid	RW	Stop	-	P.50
4-23	D34:TOT3 OPTS	Options	Balanced Absolute Only positive Only negative Hold	Balanced Absolute Only positive Only negative Hold	RW	Balanced	-	P.51
4-24	D35:TOT3 EXEC	Start/Stop	Stop Start	Stop Start	RW	Stop	-	P.50
4-25	D36:TOT3 PRESET	Reset/Preset	Not execute Reset Preset	Not execute Reset Preset	RW	Not execute	-	P.52
4-26	D37:TOT3 PRE VAL	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.52
4-27	D38:TOT3 SETPNT	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.49

*1: Determined based on the information about specified items at the time and ordering or 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
	BRAIN	Display	BRAIN	Display				
5-1	E10:P1 OUT MODE	Output mode	No function Fixed pulse Frequency output Status output	No function Fixed pulse output Frequency output Status output	RW	Fixedpulseoutput	-	P.53
5-2	E11:P1 ACT MODE	Active mode	On active Off active	On active Off active	RW	On active	-	P.56
5-3	E12:P1 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.55
5-4	E13:P1 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.58
5-5	E14:P1 RATE VAL	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.57
5-6	E15:P1 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.37
5-7	E16:P1 ALM OUT	Alarm out	0 pps Measured value Last valid Max pps	0 pps Measured value Last valid Max pps	RW	0 pps	-	P.54
5-8	E17:F1 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.59
5-9	E18:F1 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.59
5-10	E20:SO1 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.60
5-11	E21:P1 OPTS	Options	Balanced Absolute Only positive Only negative	Balanced Absolute Only positive Only negative	RW	Only positive	-	P.63
5-12	E30:P2 ACT PULSE	Active pulse	Normal For magnetic counter	Normal For magnetic counter	RW	Normal	-	P.57
5-13	E31:P2 OUT MODE	Output mode	No function Fixed pulse Frequency output Status output	No function Fixed pulse output Frequency output Status output	RW	No function	-	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).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
5-14	E32:P2 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.54
5-15	E33:P2 ACT MODE	Active mode	On active Off active	On active Off active	RW	On active	-	P.56
5-16	E34:P2 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.55
5-17	E35:P2 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.58
5-18	E36:P2 RATE VAL	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.57
5-19	E37:P2 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.37
5-20	E38:P2 ALM OUT	Alarm out	0 pps Measured value Last valid Max pps	0 pps Measured value Last valid Max pps	RW	0 pps	-	P.54
5-21	E39:F2 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.59
5-22	E40:F2 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.59

*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
	BRAIN	Display	BRAIN	Display				
5-23	E41:SO2 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.60
5-24	E42:P2 OPTS	Options	Balanced Absolute Only positive Only negative	Balanced Absolute Only positive Only negative	RW	Only positive	-	P.63

*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
	BRAIN	Display	BRAIN	Display				
6-1	F20:SO11 ACTMODE	Active mode	On active Off active	On active Off active	RW	On active	-	P.56
6-2	F21: SO11 FUNC	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.60
6-3	F22:SI11 ACTMODE	Active mode	Short(On) active Open(Off) active	Short(On) act Open(Off) act	RW	Short(On) act	-	P.64
6-4	F23:SI11 FUNC	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.65
6-5	F24:SI11 STATE	State	Open Short	Open Close	R	-	-	-
6-6	F30:SO12 ACTMODE	Active mode	On active Off active	On active Off active	RW	On active	-	P.56
6-7	F31: SO12 FUNC	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.60
6-8	F32:SI12 ACTMODE	Active mode	Short(On) active Open(Off) active	Short(On) act Open(Off) act	RW	Short(On) act	-	P.64
6-9	F33:SI12 FUNC	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.65
6-10	F34:SI12 STATE	State	Open Short	Open Close	R	-	-	-
6-11	F40:FWD SPAN2	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.73

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
6-12	F41:FWD SPAN3	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.73
6-13	F42:FWD SPAN4	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.73
6-14	F43:REV SPAN1	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.73
6-15	F44:REV SPAN2	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.73
6-16	F45:REV SPAN3	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.73
6-17	F46:REV SPAN4	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.73
6-18	F50:AUTO RNG HYS	Auto range hyst	0 to 15 Number of decimal places: 0	0 to 15 Number of decimal places: 0	RW	10	%	P.74
6-19	F51:BI DIREC HYS	Bi direction hyst	0 to 8 Number of decimal places: 0	0 to 8 Number of decimal places: 0	RW	2	%	P.76

*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
	BRAIN	Display	BRAIN	Display				
7-1	G01: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.37
7-2	G02:AO1 HI 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.67
7-3	G03:AO1 LO 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.67
7-4	G04:AO1 ALM 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.69
7-5	G05:AO1 RNG MODE	Range mode	Normal range Abs range	Normal range Abs range	RW	Normal range	-	P.68
7-6	G10: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.66
7-7	G11: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.37
7-8	G12:AO2 HI 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.67
7-9	G13:AO2 LO 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.67
7-10	G14:AO2 ALM 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.69
7-11	G20:AI FUNCTION	Function	No function Monitoring Diff temperature Ext temperature	No function Monitoring Diff temperature Ext temperature	RW	No function	-	P.71
7-12	G21:AI HI 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.72
7-13	G22:AI LO 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.72
7-14	G23:AI VALUE	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.71
7-15	G24:AI UNIT	Unit	deg C deg F K	°C °F K	RW	deg C/ °C	-	P.71
7-16	G25: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.72
7-17	G26: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.72
7-18	G30:AO1 TRIM CLR	AO1 trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.70
7-19	G31:AO1 at 4mA	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.70
7-20	G32:AO1 at 20mA	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.70
7-21	G40:AO2 TRIM CLR	AO2 trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.70
7-22	G41:AO2 at 4mA	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.70
7-23	G42:AO2 at 20mA	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.70

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
7-24	G50:AI TRIM CLR	Trim clear	Not execute Execute	Not execute Execute	RW	Not execute	-	P.70
7-25	G51:AI at 4mA	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.70
7-26	G52:AI at 20mA	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.70

*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
	BRAIN	Display	BRAIN	Display				
8-1	H10:FLOW DIRECT	Flow direct	Forward Reverse	Forward Reverse	RW	Forward	-	P.83
8-2	H11: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.83
8-3	H12: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.83
8-4	H13:NOISE FILTER	Noise filter	Manual Level1 Level2 Level3	Manual Level 1 Level 2 Level 3	RW	Manual	-	P.83
8-5	H14:PULSING FLOW	Pulsing flow	No Yes	No Yes	RW	No	-	P.86
8-6	H20:POWER SYNCH	Power sync	No Yes	No Yes	RW	Yes	-	P.86
8-7	H21:SET PWR FREQ	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.86
8-8	H22:IEX PWR FREQ	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.86
8-9	H23:MES PWR FREQ	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.86
8-10	H30:DENSITY SEL	Value select	Fixed value Correction value	Fixed value Correction value	RW	Fixed value	-	P.41
8-11	H31:DENSITY UNIT	Unit	kg/m³ lb/gal lb/cf	kg/m³ lb/gal lb/cf	RW	kg/m³	-	P.41
8-12	H32:FIXED DENS	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.41
8-13	H33:STD 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.41
8-14	H34:STD TEMP	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.42
8-15	H35: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.87
8-16	H36: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.87
8-17	H37:MEAS TEMP	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.42
8-18	H38:CORRCT DENS	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.41
8-19	H40:SPEC 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.89
8-20	H41:CAL 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.42
8-21	H42:CAL 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.34
8-22	H50:SET SIL	Set SIL	No Yes	No Yes	RW	No	-	P.90

*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 is related to the alarm output, burnout and history.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-1	I10: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.126
9-2	I11: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.126
9-3	I12:HI HI 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.126
9-4	I13:LO LO 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.126
9-5	I14:H/L ALM HYS	H/L alarm hyst	0 to 10 Number of decimal places: 0	0 to 10 Number of decimal places: 0	RW	5	%	P.126
9-6	I15:ALM OUT ACT	Active mode	On active Off active	On active Off active	RW	On active	-	P.109
9-7	I20:4-20 BURNOUT	4-20 burnout	High Low	High Low	R	-	-	P.109

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-7	I30:OUT MSK SET1	Mask 1-1	Mask all off	013:Main EEP dflt	RW	All Off	-	P.103
		Mask 1-2	Mask all on M/B EEP dflt off M/B EEP dflt on PWM1 stop off PWM1 stop on PWM2 stop off PWM2 stop on Opt mismatch off Opt mismatch on Opt EEP FAIL off Opt EEP FAIL on Opt A/D FAIL off Opt A/D FAIL on Opt SPI FAIL off Opt SPI FAIL on Ind bd FAIL off Ind bd FAIL on Ind EEP FAIL off Ind EEP FAIL on LCD drv FAIL off LCD drv FAIL on Ind mismatch off Ind mismatch on Ind comm ERR off Ind comm ERR on SD FAIL off SD FAIL 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	032:IndcommERR	-	P.103
	I31: OUT MSK STS1	-	Mask off Mask on Main EEP dflt on Opt SPI FAIL on Opt A/D FAIL on Opt EEP FAIL on Opt mismatch on PWM2 stop on PWM1 stop on SD FAIL on Ind comm ERR on Ind mismatch on LCD drv FAIL on Ind EEP FAIL on Ind bd FAIL on	-	R		-	P.103

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-7	I32:OUT MSK SET2	Mask 2-1	Mask all off Mask all on Sig overflow off Sig overflow on Empty detect off Empty detect on H/L alm off H/L alm on Adh over lv4 off Adh over lv4 on Span cfg ERR off Span cfg ERR on PV F cfg ERR off PV F cfg ERR on AO1 4-20 lmt off AO1 4-20 lmt on AO2 4-20 lmt off AO2 4-20 lmt on AO1 mlt rng off AO1 mlt rng on AO H/L cfg off AO H/L cfg on Dens cfg ERR off Dens cfg ERR 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/LHH/LLalm 053:Adh over lv 4	-	P.103
		Mask 2-2	Pls1 cfg ERR off Pls1 cfg ERR on Pls2 cfg ERR off Pls2 cfg ERR on Nom size cfg off Nom size cfg on Adh cfg ERR off Adh cfg ERR on FLN cfg ERR off FLN cfg ERR on Log not strt off Log not start on AO1 saturate off AO1 saturate on AO2 saturate off AO2 saturate on Pls1 saturat off Pls1 saturat on Pls2 saturat off Pls2 saturat on AI saturate off AI saturate on Cable miscon off Cable miscon on Coil insu off Coil insu on Trn mismatch off Trn 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:AO2saturate 082:Pls1saturate 083:Pls2saturate 084:AI saturate 086:Coil insulation	-	P.103
	I33:OUT MSK STS2	-	Mask off Mask on Adh over lv4 on H/L HH/LL alm on Empty detect on Sig overflow on Dens cfg ERR on AO H/L cfg on AO1 mlt rng on AO2 4-20 lmt on AO1 4-20 lmt on PV F cfg ERR on Span cfg ERR on Log not start on FLN cfg ERR on Adh cfg ERR on Nomi size cfg on Pls2 cfg ERR on Pls1 cfg ERR on Trn mismatch on Coil insu on Cable miscon on AI saturate on Pls2 saturte on Pls1 saturte on AO2 saturate on AO1 saturate on	-	R		-	P.103

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-7	I34:OUT MSK SET3	Mask 3-1	Mask all off Mask all on Adh over lv3 off Adh over lv3 on LC warn off LC warn on Insu detect off Insu detect on FLN over lv3 off FLN over lv3 on FLN over lv4 off FLN over lv4 on AZ warn off AZ warn on Verif warn off Verif warn on FCN warn off FCN warn on Sim active off Sim active on AO1 fix off AO1 fix on AO2 fix off AO2 fix on Pls1 fix off Pls1 fix on Pls2 fix off Pls2 fix on AI fix off AI fix 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 lv3 088:LC warn 089:Insu detect 090:FLN over lv3 091:FLN over lv4 092:AZ warn 093:Verif warn 094:Fact noise warn	-	P.103
		Mask 3-2	Restore run off Restore run on Disp over off Disp over on SD size wng off SD size wng on Bkup incmplt off Bkup incmplt on SD mismatch off SD mismatch on SD remov ERR off SD remov ERR on Watchdog off Watchdog on Power off off Power off on Inst PW Fail off Inst PW Fail on Prm bkup run off Prm bkup run on Data log run off Data log run 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		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		P.103
	I35:OUT MSK STS3	-	Mask off Mask on FC noise warn on Verif warn on AZ warn on FLN over lv4 on FLN over lv3 on Insu detect on LC warn on Adh over lv3 on AI fix on Pls2 fix on Pls1 fix on AO2 fix on AO1 fix on Sim active on SD remov ERR on SD mismatch on Bkup incmplt on SD size warn on Disp over on Restore run on Data log run on Prm bkup run on Inst PW Fail on Power off on Watchdog on	-	R		-	P.103

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-8	I40: REC MSK SET1	Mask 1-1	Mask all off Mask all on M/B EEP dflt off M/B EEP dflt on Exciter FAIL off Exciter FAIL on	013:Main EEP dflt	RW	All Space	-	P.103
		Mask 1-2	PWM1 stop off PWM1 stop on PWM2 stop off PWM2 stop on Opt mismatch off Opt mismatch on Opt EEP FAIL off Opt EEP FAIL on Opt A/D FAIL off Opt A/D FAIL on Opt SPI FAIL off Opt SPI FAIL on Ind bd FAIL off Ind bd FAIL on Ind EEP FAIL off Ind EEP FAIL on LCD drv FAIL off LCD drv FAIL on Ind mismatch off Ind mismatch on Ind comm ERR off Ind comm ERR on SD FAIL off SD FAIL 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		All Space		P.103
	I41: REC MSK STS1	-	Mask off Mask on Main EEP dflt on Exciter FAIL on Opt SPI FAIL on Opt A/D FAIL on Opt EEP FAIL on Opt mismatch on PWM2 stop on PWM1 stop on SD FAIL on Ind comm ERR on Ind mismatch on LCD drv FAIL on Ind EEP FAIL on Ind bd FAIL on	-	R		-	P.103
	I42: REC MSK SET2	Mask 2-1	Mask all off Mask all on Sig overflow off Sig overflow on Empty detect off Empty detect on H/L alm off H/L alm on Adh over lv4 off Adh over lv4 on	050:Signal overflow 051:Empty detect 052:H/L HH/LL alm 053:Adh over lv 4	RW	All Space	-	P.103
		Mask 2-2	Cable miscon off Cable miscon on	085:Cable miscon		All Space		P.103
	I43: REC MSK STS2	-	Mask off Mask on Adh over lv4 on H/L HH/LL alm on Empty detect on Sig overflow on Cable miscon on	-	R		-	P.103

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-9	I50:ALM RECORD1	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	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	R	All Space	-	P.102
9-10	I51:ALM TIME1	Record time 1	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.102
9-11	I52:ALM RECORD2	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	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	R	All Space	-	P.102

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-12	I53:ALM TIME2	Record time 2	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.102
9-13	I54:ALM RECORD3	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	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	R	All Space	-	P.102
9-14	I55:ALM RECORD3	Record time 3	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.102

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
9-15	I56:ALM RECORD4	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	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	R	All Space	-	P.102
9-16	I57:ALM TIME4	Record time 4	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.102

*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
	BRAIN	Display	BRAIN	Display				
10-1	J10:LINE1 SEL	Line 1	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number 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 Commun protocol Adhesion Analog out 1 Analog out 2 Flow noise level Totalizer 1 count Totalizer 2 count Totalizer 3 count	RW	PV	-	P.111
10-2	J11:LINE2 SEL	Line 2	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie Totalizer1 Totalizer2 Totalizer3 Tag number 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 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.111
10-3	J12:LINE3 SEL	Line 3			RW	Analog out 1	-	P.111
10-4	J13:LINE4 SEL	Line 4			RW	None	-	P.111
10-5	J14:LINE5 SEL	Line 5			RW	None	-	P.111
10-6	J15:LINE6 SEL	Line 6			RW	None	-	P.111
10-7	J16:LINE7 SEL	Line 7			RW	None	-	P.111
10-8	J17:LINE8 SEL	Line 8			RW	None	-	P.111
10-9	J20:FORMAT FR	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.112
10-10	J21:FORMAT TOT1	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.112
10-11	J22:FORMAT TOT2	Format total 2			RW			
10-12	J23:FORMAT TOT3	Format total 3			RW			
10-13	J24:DISP CONTR	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.118
10-14	J25:DISP 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.114

*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
	BRAIN	Display	BRAIN	Display				
10-15	J26:DISP 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.117
10-16	J27:DISP NE107	NE107 display	Normal NE107	Normal NE107	RW	Normal	-	P.101
10-17	J28:DISP ALARM	Alarm display	Normal Detail	Normal Detail	RW	Normal	-	P.101
10-18	J29:DISP 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.114
10-19	J30:DISP 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.118
10-20	J31: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.118
10-21	J32:LANGUAGE	Language	English French German Italian Spanish Portuguese Russian Chinese Japanese	English French German Italian Spanish Portuguese Russian Chinese Japanese	RW	English	-	P.110
10-22	J40:DISP MODE	Display mode	Normal Trend	Normal Trend	RW	Normal	-	P.116
10-23	J41:OFFTREND 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.117
10-24	J42:OFFTREND 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.117
10-25	J43:TREND1 SEL	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.116
10-26	J44:TREND2 SEL	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.116
10-27	J45:TREND3 SEL	Trend 3			RW	None	-	P.116
10-28	J46:TREND4 SEL	Trend 4			RW	None	-	P.116
10-29	J47:DISP INVERSE	Inversion	Normal Invert	Normal Invert	RW	Normal	-	P.118
10-30	J50: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	J51:DISP SQUAWK:	Squawk	Off On Squawk Once	Off On Squawk once	RW	Off	-	P.119
10-32	J52:LANG PACKAGE	Language package	Package 1 Package 2	Pack 1 Pack 2	R	- *1	-	P.110
10-33	J53:DISP INSTALL	Disp install	No disp With disp	No disp With disp	RW	With disp *1	-	-
10-34	J54:IRSW OPERATE	-	Disable Enable	-	RW	Enable	-	P.119

*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 (K50:MAIN B REV / 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
	BRAIN	Display	BRAIN	Display				
11-1	K01:TAG NO	Tag No	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-2	K02:OPERATE TIME	Operation time	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.124
11-3	K03:CUR DATE	Current date	01/01/1900 to 12/31/2155	01/01/1900 to 12/31/2155	R	2019/01/01	-	P.124
11-4	K04:CUR TIME	Current time	00: 00: 00 to 23: 59: 59	00: 00: 00 to 23: 59: 59	R	00: 00: 00	-	P.124
11-5	-	Set date	-	01/01/1900 to 12/31/2155	RW	01/01/2019	-	P.124
	-	Set time	-	00: 00: 00 to 23: 59: 59	RW	00: 00: 00	-	P.124
	K05: SET CUR DAY	-	1 to 31	-	RW	1	-	P.124
	K06: SETCUR MONTH	-	1 to 12	-	RW	1	-	P.124
	K07: SET CUR YEAR	-	1900 to 2155	-	RW	2019	-	P.124
	K08: SET CUR HR	-	0 to 23	-	RW	0	-	P.124
	K09: SET CUR MIN	-	0 to 59	-	RW	0	-	P.124
	K10: SET CUR SEC	-	0 to 59	-	RW	0	-	P.124
11-6	K11:TRNS TYPE	Transmitter type	Non 1A Type	None 1A type	R	-	-	P.123
11-7	K12:OPT BOARD ID	Option board ID	Non Multi	None Multi	R	-	-	P.123
11-8	K15:EL 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.137
11-9	K17:EX PROTECT	Explosion protection	No/Yes	No/Yes	RW	No	-	P.125
11-10	K20:MODEL CODE	Model code	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-11	K21:SUFFIX CONF1	Suffix config 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K22:SUFFIX CONF2	Suffix config 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-12	K23:OPTION1	Option 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K24:OPTION2	Option 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K25:OPTION3	Option 3	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K26:OPTION4	Option 4	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-13	K27:RS MDL CD	Model code	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-14	K28:RS SUF CONF1	Suffix config 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K29:RS SUF CONF2	Suffix config 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-15	K30:RS OPT1	Option 1	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K31:RS OPT2	Option 2	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K32:RS OPT3	Option 3	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
	K33:RS OPT4	Option 4	ASCII 16 characters	ASCII 16 characters	RW	All Space *1	-	P.122
11-16	K34:TRNS SR NO	Trans serial No	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.122
11-17	K35:FT SR NO	Sensor serial No	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.122
11-18	K40:MEMO1	Memo 1	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.123
	K41:MEMO2	Memo 2	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.123
	K42:MEMO3	Memo 3	ASCII 16 characters	ASCII 16 characters	RW	All Space	-	P.123
11-19	K50:MAIN B REV	Main soft rev	R2.01.01*4	R2.01.01*4	R	-	-	P.123
11-20	K51:SENSOR B REV	Snsr soft rev	R1.01.01*4	R1.01.01*4	R	-	-	P.123
11-21	K52:IND B REV	Ind soft rev	R2.01.01*4	R2.01.01*4	R	-	-	P.123
11-22	K57: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
	BRAIN	Display	BRAIN	Display				
12-1	L10:ADHESION CHK	Function	Disable Enable	Disable Enable	RW	Enable	-	P.128
12-2	L11:ADH LEVEL1	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.128
12-3	L12:ADH LEVEL2	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.128
12-4	L13:ADH LEVEL3	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.128
12-5	L14:ADH LEVEL4	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.128
12-6	L16:ADH MEAS VAL	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.128
12-7	L17:ADH STATUS	Status	Level0 Level1 Level2 Level3 Level4	Level 0 Level 1 Level 2 Level 3 Level 4	R	-	-	P.128
12-8	L18:ADH CHK CYC	Check cycle	0.5 min 1 min 2 min 10 min	0.5 min 1 min 2 min 10 min	RW	2 min	-	P.128
12-9	L20:FL NOISE CHK	Function	Disable Enable	Disable Enable	RW	Disable	-	P.136
12-10	L21:FL NOISE LV1	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.136
12-11	L22:FL NOISE LV2	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.136
12-12	L23:FL NOISE LV3	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.136
12-13	L24:FL NOISE LV4	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.136
12-14	L25:FL NOISE VAL	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.136
12-15	L26:FL NOISE STS	Status	Level0 Level1 Level2 Level3 Level4	Level 0 Level 1 Level 2 Level 3 Level 4	R	-	-	P.136
12-16	L27:FL NOISE DMP	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.37
12-17	L28:FL NOISE SPN	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.35
12-18	L30:LO COND FUNC	Function	Disable Enable	Disable Enable	RW	Disable	-	P.137
12-19	L31:CONDUCTIVITY	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.137
12-20	L32:CONDUCT LMT	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.137
12-21	L33:DIAG EXE	Diagnostic execute	Not execute Elec ins exe Conn chk exe	Not execute Electrode insul exe Connect check exe	RW	Not execute	-	P.130 P.135
12-22	L37:COIL INS TH	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.138
12-23	L38:IEX COMP	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.138
12-24	L40:V PEAK HOLD	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.138
12-25	L41:IEX COIL R	IEX resistance	0 to +9999.9 Number of decimal places: 1	0 to +9999.9 Number of decimal places: 1	R	-	ohm	P.138
12-26	L42:ELEC VOL 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.129
12-27	L43:ELEC VOL 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.129
12-28	L44:EMPTY STS	Empty status	Full Empty	Full Empty	R	-	-	P.129

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
12-29	L47: VF TGT SET	VF target select	All on All off Magnetic on Magnetic off Excitation on Excitation off Calculation on Calculation off Dev status on Dev status off Conn status on Conn status off	Magnetic circuit Excite circuit Calc circuit Device status Connect status	RW	All on	-	P.131
12-30	L48: VF TGT STS	-	Magnetic Excitation Calculation Device status Conn status	-	R		-	P.131
12-31	L49:DIAG OUTPUT	Diagnostic output	Zero Measured value Hold	Zero Measured value Hold	RW	Zero	-	P.130 P.131 P.135
12-32	L50:VF MODE	Mode	No flow Flow	No flow Flow	RW	No flow	-	P.131
12-33	L51:VF EXE	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.131
12-34	L52:VF NO	VF No	Factory Previous Present	Factory Previous Present	RW	Factory	-	P.131
12-35	L53:VF CHK RES	Failed/Passed	Passed Failed Canceled No Data Unknown	Passed Failed Canceled No data Unknown	R	No data	-	P.131
12-36	L54:VF OPE TIME	VF operate time	00000D 00: 00 to 99999D 23: 59	00000D 00: 00 to 99999D 23: 59	R	00000D 00: 00	-	P.131
12-37	L55:VF MAG RES	Magnetic circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.131
12-38	L56:VF EXCIT RES	Excite circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.131
12-39	L57:VF CALC RES	Calc circuit	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.131
12-40	L58:VF DEV RES	Device status	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.131
12-41	L59:VF CONN RES	Connect status	Passed Failed Canceled No Data Unknown Skip	Passed Failed Canceled No data Unknown Skip	R	No data	-	P.131

*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
	BRAIN	Display	BRAIN	Display				
13-1	M01:TEST REL TIM	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.141
13-2	M02: TEST MODE	-	Test all off Velo test on Vol F test on Mass F test on Calorie test on AO1 test on P1 test on SO1 test on AO2 test on P2 test on SO2 test on AI test on SO11 test on SI11 test on SO12 test on SI12 test on Test all on Alm test on	-	RW	Test all off	-	P.139
	M03: TEST STATUS	-	Test off Test on Calorie test on Mass F test on Vol F test on Velo test on AI test on SO2 test on P2 test on AO2 test on SO1 test on P1 test on AO1 test on Alm test on SI12 test on SO12 test on SI11 test on SO11 test on	-	R	-	-	P.139
	-	Input test ► Test mode	-	Velocity test Volume test Mass test Calorie test AI test SI11 test SI12 test	RW	-	-	P.139
	-	Output test ► Test mode	-	AO1 test PO1 test SO1 test AO2 test PO2 test SO2 test SO11 test SO12 test Alarm test	RW	-	-	P.139
13-3	M10:VELO T VAL	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.140
13-3	M11:VOLUM T VAL	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.140
13-4	M12:MASS T VAL	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.140
13-5	M13:CALO T VAL	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.140
13-6	M41:SI11 T VAL	SI11	Open Close	Open Close	RW	Open	-	P.140
13-7	M43:SI12 T VAL	SI12	Open Close	Open Close	RW	Open	-	P.140
13-8	M14:AO1 TEST VAL	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.140

*2: The range of single precision float (IEEE 754).

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
13-9	M15:P1 TEST VAL	PO1	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0.0	pps (pulse/s)	P.140
13-10	M16:SO1 TEST VAL	SO1	Open Close	Open Close	RW	Open	-	P.140
13-11	M20:AO2 TEST VAL	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.140
13-12	M21:P2 TEST VAL	PO2	0 to 12500 Number of decimal places: 0	0 to 12500 Number of decimal places: 0	RW	0	pps (pulse/s)	P.140
13-13	M22:SO2 TEST VAL	SO2	Open Close	Open Close	RW	Open	-	P.140
13-14	M40:SO11 T VAL	SO11	Open Close	Open Close	RW	Open	-	P.140
13-15	M42:SO12 T VAL	SO12	Open Close	Open Close	RW	Open	-	P.140
13-16	M30:AI TEST VAL	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.140
13-17	M44:ALM TEST VAL	Alarm	Open Close	Open Close	RW	Open	-	P.140
13-18	M50:TEST 2 MODE	Test 2 mode	Normal Test	Normal Test	RW	Normal	-	P.141
13-19	M51:TEST 2 OUT	Test 2 value	-10.0 to 110.0	-10.0 to 110.0	RW	0.0	%	P.141

*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
	BRAIN	Display	BRAIN	Display				
14-1	N10:F BCKUP NAME	F backup name	ASCII 16 characters	ASCII 16 characters	R	Factory Delivery	-	P.142
14-2	N11:F BCKUP DATE	F backup date	ASCII 16 characters	ASCII 16 characters	R	01/01/2019 *4	-	P.142
14-3	N12:SD BCK NAME	SD backup name	ASCII 8 characters	ASCII 8 characters	RW	SD_FILE	-	P.142
14-4	N13:BCK NAME1	Backup name 1	ASCII 16 characters	ASCII 16 characters	RW	Backup 1	-	P.142
14-5	N14:BCK DATE1	Backup date 1	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.142
14-6	N15:BCK NAME2	Backup name 2	ASCII 16 characters	ASCII 16 characters	RW	Backup 2	-	P.142
14-7	N16:BCK DATE2	Backup date 2	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.142
14-8	N17:BCK NAME3	Backup name 3	ASCII 16 characters	ASCII 16 characters	RW	Backup 3	-	P.142
14-9	N18:BCK DATE3	Backup date 3	ASCII 16 characters	ASCII 16 characters	RW	01/01/2019	-	P.142
14-10	N19:BACKUP EXEC	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.142
14-11	N20:RESTORE EXEC	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.145
14-12	N21:RESTORE RSLT	Restore result	Unexecuted Success Failure Running	Unexecuted Success Failure Running	R	Unexecuted	-	P.145
14-13	N22: BACKUP RSLT	Backup result	Unexecuted Success Failure Running	Unexecuted Success Failure Running	R	Unexecuted	-	P.142
14-14	N30:LOGGING FILE	File name	ASCII 8 characters	ASCII 8 characters	RW	LOG_FILE	-	P.153

*4: Set at the factory before shipment.

No.	Parameter Name		Data Range		R/W	Default Value	Unit	Reference
	BRAIN	Display	BRAIN	Display				
14-15	N31:LOG INTR TIM	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.153
14-16	N32:L START DATE	Start date	01/01/1900 to 31/12/2155	01/01/1900 to 31/12/2155	R	01/01/2019	-	P.153
14-17	N33:L START TIME	Start time	00: 00: 00 to 23: 59: 59	00: 00: 00 to 23: 59: 59	R	00:00:00	-	P.153
14-18	N34:LOG 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.153
14-19	N35: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.153
14-20	N36:LOG2 SELECT	Log 2			RW	Velocity	-	P.153
14-21	N37:LOG3 SELECT	Log 3			RW	Volume flow	-	P.153
14-22	N38:LOG4 SELECT	Log 4			RW	Mass flow	-	P.153
14-23	N39:LOGGING EXEC	Execute	Not execute Execute	Not execute Execute	RW	Not execute	-	P.153

*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
	BRAIN	Display	BRAIN	Display				
15-1	P10:KEY CODE	Key code	0000 to 9999 Number of decimal places: 0	0000 to 9999 Number of decimal places: 0	RW	0000	-	P.156
15-2	P20:WRT PROTECT	Write protect sts	No Yes	No Yes	R	No	-	P.155
15-3	P21:ENABLE WRITE	Enable write	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.155
15-4	P22:NEW PASSWORD	New password	ASCII 8 characters	ASCII 8 characters	RW	All Space	-	P.155
15-5	P23:SOFT SEAL	Soft seal status	Keep Break	Keep Break	R	Keep	-	P.155

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 192
  - Language R/W1
  - Process variables → Page 193
    - Flow rate(%)
    - Flow rate
    - Velocity
    - Volume
    - Mass
    - Calorie
    - Analog out 1
    - Analog out 2
    - Totalizer
  - Diag/Service → Page 194
    - 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 199
    - Volume
    - Pulse/Status out
    - Display set
    - Autozero exe
  - Detailed setup → Page 200
    - 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 207
    - 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

NOTE

Only the status items that occur in the BRAIN 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 195
  - Time stamp
    - Date R
    - Time R
    - Op time R
  - Diagnosis → Page 196
  - Verification → Page 197
  - Autozero
    - Execute R/W2
    - Result
      - Zero value R/W3
  - AO/AI trim → Page 197
  - 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 198
  - 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
    - 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
    - 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

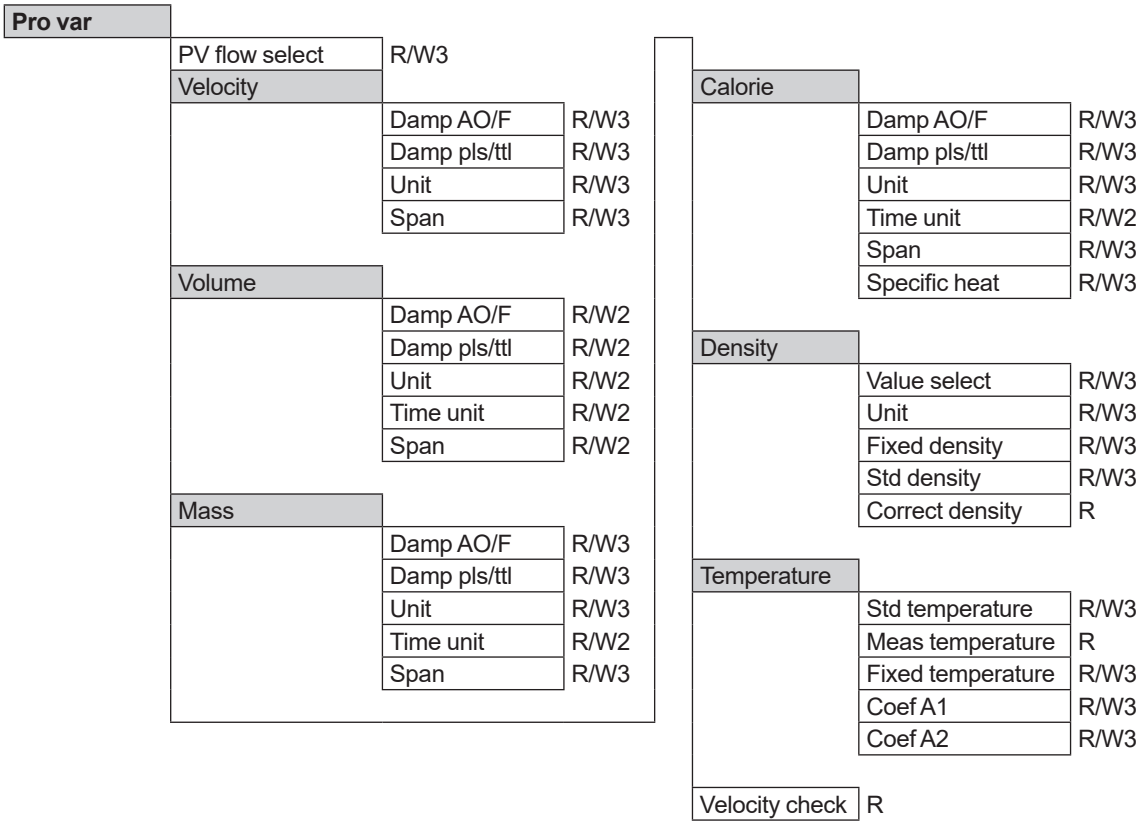
Easy setup wizard			
	Volume		
		Setting upload	
		Damp AO/F	R/W2
		Damp pls/ttl	R/W2
		Unit	R/W2
		Time unit	R/W2
		Span	R/W2
		Setting download	
	Pulse/Status out		
		Setting upload	
		P1 unit	R/W2
		P1 val	R/W2
		F1 at 0%	R/W2
		F1 at 100%	R/W2
		Setting download	
	Display set		
		Setting upload	
		Line 1	R/W1
		Line 2	R/W1
		Line 3	R/W1
		Setting download	
	Autozero exe		R/W2

Detailed setup

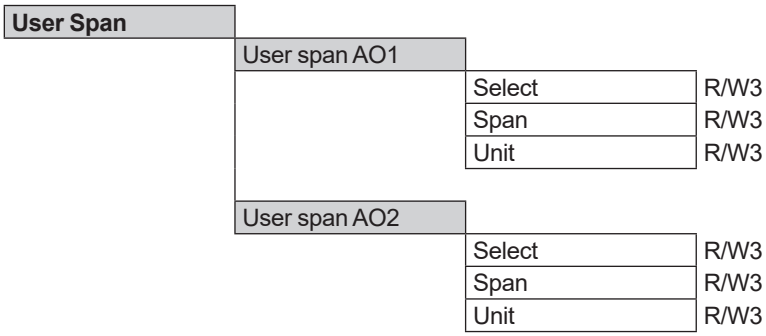
Detailed setup

- Pro var → Page 201
- 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 201
- Totalizer → Page 202
- Pulse/Status out → Page 203
- Status in → Page 204
- Analog out/in → Page 204
- 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 205
- Access cfg
  - User role R
  - Chg mainte R/W2
  - Chg special R/W3
- Device info → Page 206
- Protection
  - Key code R/W3
  - Write protect sts R
  - Enable write R/W3
  - New password R/W3
  - Soft seal status R

Process variables



User span



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
  - IO status
    - Multi I/O — R
  - Memo
    - Memo 1 — R/W3
    - Memo 2 — R/W3
    - Memo 3 — R/W3

microSD

microSD			
	Contents		R
	Unmount		R/W1
	Format		R/W1
	Property		
		Total space	R
		Available space	R
		File system	R

Revision Information

- Title : ADMAG TI Series AXG1A Magnetic Flowmeter Remote Transmitter BRAIN Communication Type
- Manual No. : IM 01E22C02-01EN

Edition	Date	Page	Revised Item
1st	Aug. 2019	—	New publication
2nd	Mar. 2020	— 13 32 102 114 128	Incorporate the manual change 19-0020-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.