User's Manual

ADMAG TI Series
AXG, AXW Magnetic Flowmeter
Modbus Communication Type

IM 01E21A02-05EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01E21A02-05EN
2nd Edition

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Contents

1. Introduction

This manual provides the basic guidelines for basic operation of ADMAG TI Series AXG, AXW magnetic flowmeters with Modbus protocol.
For the items which are not covered in this manual, read the applicable user's manuals listed in "Table 1.1 Manual and General Specifications List" in ADMAG TI Series Installation Manual. These documents can be downloaded from the website of YOKOGAWA. To ensure correct use of the product, read these manuals thoroughly and fully understand how to operate the product before operating it. For method of checking the model and specifications, read 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 product.

WARNING

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

CAUTION

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

IMPORTANT

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

NOTE

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

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

Protective grounding terminal

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

Alternating current

Direct current

Caution
This symbol indicates that the operator must 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 is stated in user's manual whenever you handle the product. Take special note that if you handle the product in a manner that violated these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of product.

Regarding This User's Manual

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

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 or registered trademarks are not marked with ™ or ®.
- Modbus is a registered trademark of AEG Schneider.

1.1 For Safe Use of Product

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

General

WARNING

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

Operation

WARNING

Be sure to enable the write protect function to prevent the overwriting of parameters after finishing parameter setting.
In rare cases, the IR switches may respond unexpectedly to water drops or extraneous substances sticking on the surface of display panel, due to the operating principal. The possibility of malfunction arises after rain or cleaning operation near the place where the flowmeter is installed. Turning on and off the flashlight etc. towards the IR switch may also be a cause of malfunction.
Read the installation manual for the hardware write protect function, and Section 4.12 for the software write protect function.

Maintenance

WARNING

- If dirt, dust or other substances surfaces on the glass of display cover, wipe them clean with a soft dry cloth.
- Maintenance of this flowmeter should be implemented in a maintenance service shop where the necessity tools and environment condition are provided. The necessity of this environmental condition is that ambient temperature is 5 to 40°C (the maximum relative humidity is 80 % for temperature 5 to 31°C, and decreasing linearly to 50 % relative humidity at 40°C).

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.
- 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 corrupt or be permanently lost.
- Use only micro SD cards sold by YOKOGAWA. Operation cannot be guaranteed when other cards are used.
- When inserting the microSD card into the product, make sure to orient the microSD card correctly (face up or down) and insert it securely. If not inserted correctly, the microSD card will not be recognized by the product.
- Do not touch the microSD card with wet hands.
- Do not use the microSD card if it is dusty or dirty.
- The microSD card comes formatted. If you want 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 making backup copies of your data.

1.2 Warranty

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

2. Modbus Communication

Modbus interface of ADMAG TI is implemented in accordance with “MODBUS over serial line specification and implementation guide V1.02”. For details of instrumentation, see the website of Modbus organization (http://www.modbus.org/).

2.1 Communication Setting

The following table shows the related Modbus communication parameters. To reflect the setting, execute the “Modbus Restart” or send Function Code8 (Sub Code 01), or turn off/on the power of transmitter after setting.
See the following table for details of Modbus setting parameters:

Items	Description
Transmission media	RS-485
Baud rate	See the following parameter explanation: Subsection 2.1.1 to 2.1.11
Transmission Mode	
Parity	
Stop bit	
Device address	
Response delay time	
Data format for 4byte	
Data format for 2byte	
Data format for float	
Data format for string	

It is necessary to match Modbus communication settings of both this product and Master.

2.1.1 Modbus Restart

Menu path

Display	This parameter is only available via Modbus communication, not available via display unit.

Register Address: 40053

Parameters for related Modbus communication can be reflected by executing this parameter. Followings are the relevant Modbus communication parameters.

- Baud rate
- Transmission Mode
- Parity
- Stop bit
- Response delay time
- Device address
- Data format for 4byte
- Data format for 2byte
- Data format for float
- Data format for string

From the table below, select whether to execute the Modbus Restart.

Selection	Description
Not execute	Modbus Restart is not executed.
Execute	Modbus Restart is executed. After executing, this value is automatically set to “Not execute”.

2.1.2 Baud Rate

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set baud rate

Register Address: 40029

This parameter sets the baud rate for Modbus communication.
From the table below, select the baud rate.

Selection	Description
1200 bps	Default value : 19200 bps
2400 bps	
4800 bps	
9600 bps	
19200 bps	
38400 bps	
57600 bps	
115200 bps	

The baud rate can also be confirmed by the following parameter.
This parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur baud rate

Register Address: 30003

2.1.3 Transmission Mode

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set trans mode

Register Address: 40027

This parameter sets the transmission mode for Modbus communication.
From the table below, select the transmission mode.

Selection	Description
RTU	Default value : RTU
ASCII	

The transmission mode can be also confirmed by the following parameter.
This parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur trans mode

Register Address: 30002

2.1.4 Parity

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set parity

Register Address: 40030

This parameter sets the parity for Modbus communication.
From the table below, select the parity.

Selection	Description
None	Default value : Even
Odd	
Even	

The parity can be also confirmed by the following parameter.
This parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur parity

Register Address: 30004

2.1.5 Stop Bit

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set stop bit

Register Address: 40031

This parameter sets the stop bit for Modbus communication.
From the table below, select the stop bit.

Selection	Description
1 bit	Default value : 1 bit
2 bit	

The stop bit can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur stop bit

Register Address: 30005

2.1.6 Device Address

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set dev addr

Register Address: 40026

This parameter sets the device address for Modbus communication.
Setting range: 1 to 247 (software)
Default value : 1

Device address is can also be set by hardware switch.
Setting range: 1 to 127 (hardware)
See the installation manual for the device address setting by the hardware switch.

The device address can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur dev addr

Register Address: 30001

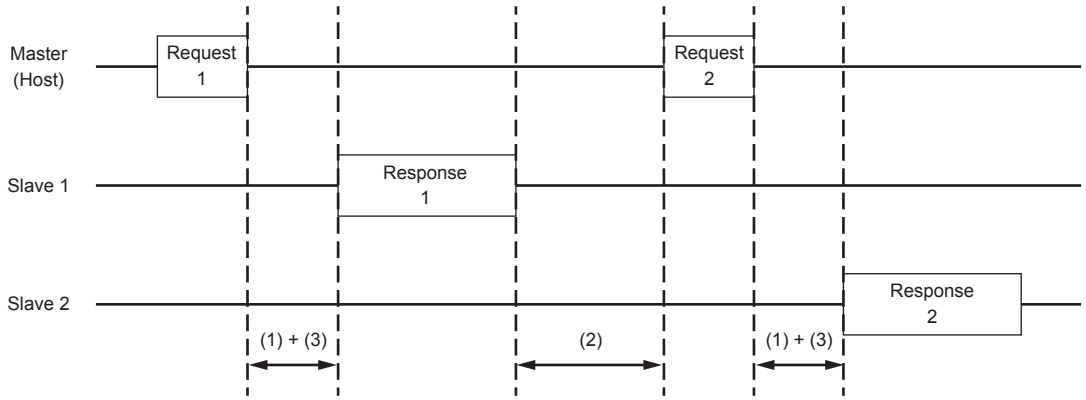
2.1.7 Response Delay Time

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set resp delay

Register Address: 40034

This parameter sets the response delay time for Modbus communication.
Setting range: 0 to 10000 ms
Default value : 0 ms.
The following figure shows the Modbus communication:



(1) Reaction time:

This time is the processing time to analyze received data and prepare transmission data for device. Received and Transmission processing time is not included.

(2) Host communication period:

This time is the period between the completion of slave transmission and the start of Master(Host) processing to receive data.
If Modbus is used as Multi-drop, this timeout period in host is recommended to be set to 100 ms or more.
When transmitted data size is big, this timeout period in host is recommended to be set to 3 sec or more.

(3) Response delay time:

This time is a device parameter to set delay time between the completion of data receiving from Master (Host) and the start of Slave processing to send data.
Response delay time includes Reaction time. If Response delay time is shorter than Reaction time, Reaction time equals Response delay time.

The response delay time can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur resp delay

Register Address: 30007

2.1.8 Data Format for 4byte

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set format integer32

Register Address: 40037

This parameter sets the data format (4byte) for Modbus communication.
From the table below, select the data format.

Selection	Byte Order			
	1 (MSB)	2	3	4 (LSB)
ABCD	Byte3	Byte2	Byte1	Byte0
CDAB	Byte1	Byte0	Byte3	Byte2
BADC	Byte2	Byte3	Byte0	Byte1
DCBA	Byte0	Byte1	Byte2	Byte3

MSB = Most significant byte, LSB = Least significant byte
Default value : ABCD

Example:
Integer (Data length = 4 bytes)
305419896 (0x12345678)

Selection	Byte Order			
	1 (MSB)	2	3	4 (LSB)
ABCD	0x12	0x34	0x56	0x78
CDAB	0x56	0x78	0x12	0x34
BADC	0x34	0x12	0x78	0x56
DCBA	0x78	0x 56	0x34	0x12

The data format for 4byte can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur format integer32

Register Address: 30009

2.1.9 Data Format for 2byte

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set format int8/16

Register Address: 40038

This parameter sets the data format (2byte) for Modbus communication.
From the table below, select the data format.

Selection	Byte Order	
	1 (MSB)	2 (LSB)
AB	Byte1	Byte0
BA	Byte0	Byte1

MSB = Most significant byte, LSB = Least significant byte
Default value : AB

Example:
Integer (Data length = 2 bytes)
4660 (0x1234)

Selection	Byte Order	
	1 (MSB)	2 (LSB)
AB	0x12	0x34
BA	0x34	0x12

The data format for 2byte can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur format int8/16

Register Address: 30010

2.1.10 Data Format for Float

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set format float

Register Address: 40036

This parameter sets the data format (float) for Modbus communication.
From the table below, select the data format.

Selection	Byte Order			
	1 (MSB)	2	3	4 (LSB)
ABCD	Byte3 SEEEEEEE	Byte2 EMMMMMMM	Byte1 MMMMMMMM	Byte0 MMMMMMMM
CDAB	Byte1 MMMMMMMM	Byte0 MMMMMMMM	Byte3 SEEEEEEE	Byte2 EMMMMMMM
BADC	Byte2 EMMMMMMM	Byte3 SEEEEEEE	Byte0 MMMMMMMM	Byte1 MMMMMMMM
DCBA	Byte0 MMMMMMMM	Byte1 MMMMMMMM	Byte2 EMMMMMMM	Byte3 SEEEEEEE

S = sign, E = exponent, M = mantissa
MSB = Most significant byte, LSB = Least significant byte
Default value : ABCD

Example:
Floating-point numbers (Data length = 4bytes)
123.456 (0x42F6E9D5)

Selection	Byte Order			
	1 (MSB)	2	3	4 (LSB)
ABCD	0x42	0xF6	0xE9	0xD5
CDAB	0xE9	0xD5	0x42	0xF6
BADC	0xF6	0x42	0xD5	0xE9
DCBA	0xD5	0xE9	0xF6	0x42

The data format for float can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur format float

Register Address: 30008

2.1.11 Data Format for String

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Set format string

Register Address: 40039

This parameter sets the data format (string) for Modbus communication.
From the table below, select the data format.

Selection	Byte Order							
	1 (MSB)	2	3	4	5	6	7	8 (LSB)
AB	Byte7	Byte6	Byte5	Byte4	Byte3	Byte2	Byte1	Byte0
BA	Byte6	Byte7	Byte4	Byte5	Byte2	Byte3	Byte0	Byte1

MSB = Most significant byte, LSB = Least significant byte
Default value : AB

Example:
String (Data length of 8, 16, 32 bytes)
YOKOGAWA

Selection	Byte Order							
	1 (MSB)	2	3	4	5	6	7	8 (LSB)
AB	Y	O	K	O	G	A	W	A
BA	O	Y	O	K	A	G	A	W

The data format for string can be also confirmed by the following parameter.
The following parameter is read only.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Modbus info ► Cur format string

Register Address: 30011

2.2 Flexible Register

The desired parameters can be set on the flexible register areas and read these parameters collectively from master which Modbus is supported.

Parameter	Relative Address	Register Address	Data Type	Read Write	Description
Set flexible register 01	3000	43001	Uint16	R/W	Specify the address of Input register. Setting range: 100 to 2999 Address of holding register can not be set. All “Input Register” in the range 100 to 2999 can be mapped to the flex input register. For details about the input register that can be set to flexible register, see Chapter 3. This parameter is only available via Modbus communication.
Set flexible register 02	3002	43003	Uint16	R/W	
Set flexible register 03	3004	43005	Uint16	R/W	
Set flexible register 04	3006	43007	Uint16	R/W	
Set flexible register 05	3008	43009	Uint16	R/W	
Set flexible register 06	3010	43011	Uint16	R/W	
Set flexible register 07	3012	43013	Uint16	R/W	
Set flexible register 08	3014	43015	Uint16	R/W	
Set flexible register 09	3016	43017	Uint16	R/W	
Set flexible register 10	3018	43019	Uint16	R/W	
Set flexible register 11	3020	43021	Uint16	R/W	
Set flexible register 12	3022	43023	Uint16	R/W	
Set flexible register 13	3024	43025	Uint16	R/W	
Set flexible register 14	3026	43027	Uint16	R/W	
Set flexible register 15	3028	43029	Uint16	R/W	
Set flexible register 16	3030	43031	Uint16	R/W	
Set flexible register 17	3032	43033	Uint16	R/W	
Set flexible register 18	3034	43035	Uint16	R/W	
Set flexible register 19	3036	43037	Uint16	R/W	
Set flexible register 20	3038	43039	Uint16	R/W	

The parameter of input register set in “Set flexible register” can be read via the following parameters.

Parameter	Relative Address	Register Address	Data Type	Read Write
Flexible register 01	3000	33001	Uint32	R
Flexible register 02	3002	33003	Uint32	R
Flexible register 03	3004	33005	Uint32	R
Flexible register 04	3006	33007	Uint32	R
Flexible register 05	3008	33009	Uint32	R
Flexible register 06	3010	33011	Uint32	R
Flexible register 07	3012	33013	Uint32	R
Flexible register 08	3014	33015	Uint32	R
Flexible register 09	3016	33017	Uint32	R
Flexible register 10	3018	33019	Uint32	R
Flexible register 11	3020	33021	Uint32	R
Flexible register 12	3022	33023	Uint32	R
Flexible register 13	3024	33025	Uint32	R
Flexible register 14	3026	33027	Uint32	R
Flexible register 15	3028	33029	Uint32	R
Flexible register 16	3030	33031	Uint32	R
Flexible register 17	3032	33033	Uint32	R
Flexible register 18	3034	33035	Uint32	R
Flexible register 19	3036	33037	Uint32	R
Flexible register 20	3038	33039	Uint32	R

2.3 Broadcast

Broadcast is a function receiving a command from all devices connected under multi drop mode.

- Broadcast is executed by setting 0x00 to device address.
- This message function is executed regardless of device address.
- This message is used only for write function.
- No response is returned from the slave device.

2.4 Message Construction

The message transmitted from host is constructed as below.

RTU

Device Address	Function code	Data	Error check (CRC)
1 byte	1 byte	N×2 bytes (N=1, 2, …)	2 bytes

ASCII

Delimiter	Device Address	Function code	Data	Error check (LRC)	End Delimiter
1 character (:)	2 characters	2 characters	N×2 characters (N=1, 2, …)	2 characters	2 characters (CR / LF)

2.4.1 Device Address

Specify the device address. Address range is 1 to 247.

2.4.2 Function Code

The function code specifies the function to be executed by the slave device.
See Section 2.5.

2.4.3 Data

The data field contains data required for executing the function defined by the function code.
The data structure varies with the function code.

2.4.4 Error Check

The error check code is used for detecting message errors, if any, introduced during signal transmission.

CRC (Cyclic Redundancy Check) is used in RTU serial transmission mode.
LRC (Longitudinal Redundancy Check) is used in ASCII serial transmission mode.

2.5 Supported Modbus Function Codes

ADMAG TI supports the following “Function Codes” to communicate with the host.

Function	Function Code		Broadcast
Read holding register	03	0x03	—
Read input register	04	0x04	—
Write single register	06	0x06	✓
Diagnostics	08	0x08	—
Write multiple register	16	0x10	✓

2.5.1 03 (0x03) Read Holding Registers

Specified quantity of Holding Registers contents is read from Specified Starting Address.

Example:
Read the following parameters (Holding Register) from a slave device with device address 5.

- Velocity damping for Freq (300)
- Velocity damping for PLS/TTL (302)

Request

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x05	0 5
Function code	0x03	0 3
Starting Address	0x012C	0 1 2 C
Quantity of Registers	0x0004	0 0 0 4
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

Response

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x05	0 5
Function code	0x03	0 3
Byte count	0x08	0 8
Data 1 (Velocity damping for Freq)	0x40400000 (3.0)	4 0 4 0 0 0 0 0 (3.0)
Data 2 (Velocity damping for PLS/TTL)	0x40400000 (3.0)	4 0 4 0 0 0 0 0 (3.0)
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

2.5.2 04 (0x04) Read Input Registers

Specified quantity of Input Registers contents is read from Specified Starting Address.

Example:
Read the following parameters (Input Register) from a slave device with device address 7.

- Flowrate% (100)
- Flowrate (102)

Request

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x07	0 7
Function code	0x04	0 4
Starting Address	0x0064	0 0 6 4
Quantity of Registers	0x0004	0 0 0 4
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

Response

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x07	0 7
Function code	0x04	0 4
Byte count	0x08	0 8
Data 1 (Flowrate%)	0x41458793 (12.3456)	4 1 4 5 8 7 9 3 (12.3456)
Data 2 (Flowrate)	0x436A9126 (234.567)	4 3 6 A 9 1 2 6 (234.567)
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

2.5.3 06 (0x06) Write Single Register

Write the data of the Holding Register.

Example:
Write the value 0x0001(Volume flow) to the parameter “PV flow select” (336) in a slave device with device address 9.

Request

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x09	0 9
Function code	0x06	0 6
Register Address	0x0150	0 1 5 0
Register value	0x0001	0 0 0 1
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

Response

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x09	0 9
Function code	0x06	0 6
Register Address	0x0150	0 1 5 0
Register value	0x0001	0 0 0 1
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

2.5.4 08 (0x08) Diagnostics

This function carries out the diagnosis specified by the Sub-function code and returns this information to the Master.

Example:
Perform the Sub-function code (0x0001 Restart Communications Option) in a slave device with device address 6.

Request

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x06	0 6
Function code	0x08	0 8
Sub-function	0x0001	0 0 0 1
Data	0x0000	0 0 0 0
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

Response

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x06	0 6
Function code	0x08	0 8
Sub-function	0x0001	0 0 0 1
Data	0x0000	0 0 0 0
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

ADMAG TI supports the following sub-function code.

Sub-function Code		Name
00	0x0000	Return Query Data
01	0x0001	Restart Communications Option

2.5.5 16 (0x10) Write Multiple Registers

Write data to Holding Registers from the specified Starting Address to the specified quantity of Registers.

Example:
Write the following parameters (Holding Register) in a slave device with device address 8.

- Velocity damping for Freq (300)
- Velocity damping for PLS/TTL (302)

Request

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x08	0 8
Function code	0x10	1 0
Starting Address	0x012C	0 1 2 C
Quantity of Registers	0x0004	0 0 0 4
Byte Count	0x08	0 8
Data 1 (Velocity damping for Freq)	0x40A00000	4 0 A 0 0 0 0 0
Data 2 (Velocity damping for PLS/TTL)	0x41200000	4 1 2 0 0 0 0 0
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

Response

Item	RTU	ASCII (String)
Delimiter	None	:
Device Address	0x08	0 8
Function code	0x10	1 0
Starting Address	0x012C	0 1 2 C
Quantity of Registers	0x0004	0 0 0 4
Error Check	CRC (16bits)	LRC (2 characters)
End Delimiter	None	CR / LF

2.6 Exception Code

ADMAG TI supports the following “Exception Codes” to indicate physical transmission errors.

Exception code	Name	Description
0x01	ILLEGAL FUNCTION	Function code does not exist
0x02	ILLEGAL DATA ADDRESS	Specified address is out of range
0x03	ILLEGAL DATA VALUE	Specified data is out of quantity
0x04	SLAVE DEVICE FAILURE	Failure during response process
0x06	SLAVE DEVICE BUSY	Cannot respond because of under processing

3. Modbus Registers

Used Modbus data types:

Data Type	Size	Description
Uint8	8 bit	Unsigned 8-bit integers in the range of 0 to 255.
Uint16	16 bit	Unsigned 16-bit integers in the range of 0 to 65535.
Uint32	32 bit	Unsigned 32-bit integers in the range of 0 to 4294967295. 2 consecutive registers used to store the value.
Int32	32 bit	Signed 32-bit integers in the range of -2147483648 to 2147483647. 2 consecutive registers used to store the value.
Float	32 bit	Float value in single precision in the IEEE-754 format. 2 consecutive registers used to store the value.
ASCII	n * 16 bit	One or more (n) consecutive registers. Each register contains 2 ASCII characters.

Each Register map in Section 3.1 and 3.2 consists of the following items:

<table>
<tr><td colspan="3">Parameter</td><td colspan="2">Parameter name
Symbol (G) = only AXG, not for AXW</td></tr>
<tr><td colspan="3">Relative Address</td><td colspan="2">Relative address number</td></tr>
<tr><td colspan="3" rowspan="2">Register Address</td><td colspan="2">Holding Register: Address offset of 40001 to holding register mapping</td></tr>
<tr><td colspan="2">Input Register: Address offset of 30001 to input register mapping</td></tr>
<tr><td rowspan="3">Communication and I/O code</td><td>M0</td><td>-M</td><td>Parameter available in I/O code M0, -M</td><td rowspan="3">✓: Enabled
— : Disabled</td></tr>
<tr><td colspan="2">M2</td><td>Parameter available in I/O code M2
Code M2 is supported by only AXG.</td></tr>
<tr><td>M6</td><td>-P</td><td>Parameter available in I/O code M6, -P</td></tr>
<tr><td colspan="3">Flex Input</td><td colspan="2">This register can be mapped to the “Flexible Input Register”</td></tr>
<tr><td colspan="3">Data Type</td><td colspan="2">Used data types</td></tr>
<tr><td colspan="3">Number of Register</td><td colspan="2">Number of registers used
When this value is “1” in Holding register, Register type mean “Single register”.</td></tr>
<tr><td colspan="3">Data range</td><td colspan="2">For selection-type data, the range indicates options.
For numeric-type data, the range indicates the setting range and the number of decimal places.
For alphanumeric-type data, the range indicates the limited number of characters.
Symbol (G) = only AXG, not for AXW
“INF” is the range of single precision floating point (IEEE 754).</td></tr>
<tr><td colspan="3">Default value</td><td colspan="2">Factory setting value</td></tr>
</table>

3.1 List of Modbus Register Address

3.1.1 Holding Register

Holding registers are available to be read and written.

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Set device address	25	40026	✓	✓	✓	Uint16	1
Set transmission mode	26	40027	✓	✓	✓	Uint8	1
Set baud rate	28	40029	✓	✓	✓	Uint8	1
Set parity	29	40030	✓	✓	✓	Uint8	1
Set stop bit	30	40031	✓	✓	✓	Uint8	1
Minimum response time	33	40034	✓	✓	✓	Uint16	1
Set data format for float	35	40036	✓	✓	✓	Uint8	1
Set data format for 4byte	36	40037	✓	✓	✓	Uint8	1
Set data format for 2byte	37	40038	✓	✓	✓	Uint8	1
Set data format for string	38	40039	✓	✓	✓	Uint8	1
System reset	50	40051	✓	✓	✓	Uint8	1
Modbus restart	52	40053	✓	✓	✓	Uint8	1
Velocity damping for Freq	300	40301	✓	✓	✓	Float	2
Velocity damping for PLS/TTL	302	40303	✓	✓	✓	Float	2
Volume flow damping for Freq	305	40306	✓	✓	✓	Float	2
Volume flow damping for PLS/TTL	307	40308	✓	✓	✓	Float	2
Mass flow damping for Freq	310	40311	✓	✓	✓	Float	2
Mass flow damping for PLS/TTL	312	40313	✓	✓	✓	Float	2
Calorific damping for Freq (G)	315	40316	—	✓	—	Float	2
Calorific damping for PLS/TTL (G)	317	40318	—	✓	—	Float	2
Low MF	320	40321	✓	✓	✓	Float	2
High MF	322	40323	✓	✓	✓	Float	2
Low MF(EDF)	324	40325	✓	✓	✓	Float	2
High MF(EDF)	326	40327	✓	✓	✓	Float	2
Select flow sensor	329	40330	✓	✓	✓	Uint8	1
Measure mode	330	40331	✓	✓	✓	Uint8	1
Nominal size unit	332	40333	✓	✓	✓	Uint8	1
Nominal size	333	40334	✓	✓	✓	Float	2
PV flow select	336	40337	✓	✓	✓	Uint8	1
Velocity unit	337	40338	✓	✓	✓	Uint8	1
Volume unit	338	40339	✓	✓	✓	Uint8	1
Mass unit	339	40340	✓	✓	✓	Uint8	1
Calorie unit (G)	340	40341	—	✓	—	Uint8	1
Time unit	341	40342	✓	✓	✓	Uint8	1
Velocity span	343	40344	✓	✓	✓	Float	2
Volume flow span	345	40346	✓	✓	✓	Float	2
Mass flow span	347	40348	✓	✓	✓	Float	2
Calorie span (G)	349	40350	—	✓	—	Float	2
Autozero exec	360	40361	✓	✓	✓	Uint8	1
Zero	361	40362	✓	✓	✓	Float	2
Total 1 conversion factor	502	40503	✓	✓	✓	Float	2
Total 1 lowcut	504	40505	✓	✓	✓	Float	2
Total 1 failure option	507	40508	✓	✓	✓	Uint8	1
Total 1 option	508	40509	✓	✓	✓	Uint8	1
Total 1 execution	510	40511	✓	✓	✓	Uint8	1
Total 1 reset/preset	512	40513	✓	✓	✓	Uint8	1

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Total 1 preset value	514	40515	✓	✓	✓	Float	2
Total 1 set point	516	40517	✓	✓	✓	Float	2
Total 2 unit	519	40520	✓	✓	✓	Uint8	1
Total 2 conversion factor	521	40522	✓	✓	✓	Float	2
Total 2 lowcut	523	40524	✓	✓	✓	Float	2
Total 2 failure option	526	40527	✓	✓	✓	Uint8	1
Total 2 option	527	40528	✓	✓	✓	Uint8	1
Total 2 execution	529	40530	✓	✓	✓	Uint8	1
Total 2 reset/preset	531	40532	✓	✓	✓	Uint8	1
Total 2 preset value	533	40534	✓	✓	✓	Float	2
Total 2 set point	535	40536	✓	✓	✓	Float	2
Total 3 unit	538	40539	✓	✓	✓	Uint8	1
Total 3 conversion factor	540	40541	✓	✓	✓	Float	2
Total 3 lowcut	542	40543	✓	✓	✓	Float	2
Total 3 failure option	545	40546	✓	✓	✓	Uint8	1
Total 3 option	546	40547	✓	✓	✓	Uint8	1
Total 3 execution	548	40549	✓	✓	✓	Uint8	1
Total 3 reset/preset	550	40551	✓	✓	✓	Uint8	1
Total 3 preset value	552	40553	✓	✓	✓	Float	2
Total 3 set point	554	40555	✓	✓	✓	Float	2
Pulse status output 1 mode	700	40701	✓	✓	✓	Uint8	1
Pulse output 1 active mode	701	40702	✓	✓	✓	Uint8	1
Pulse output 1 width	702	40703	✓	✓	✓	Uint8	1
Pulse output 1 rate unit	704	40705	✓	✓	✓	Uint8	1
Pulse output 1 rate value	705	40706	✓	✓	✓	Float	2
Pulse output 1 lowcut	707	40708	✓	✓	✓	Float	2
Pulse output 1 alarm out	710	40711	✓	✓	✓	Uint8	1
Frequency output 1 at 0%	712	40713	✓	✓	✓	Uint16	1
Frequency output 1 at 100%	714	40715	✓	✓	✓	Uint16	1
Status output 1 function	716	40717	✓	✓	✓	Uint8	1
Analog output 2 select	1100	41101	—	—	✓	Uint8	1
Analog output 2 lowcut	1102	41103	—	—	✓	Float	2
Analog output 2 high limit	1104	41105	—	—	✓	Float	2
Analog output 2 low limit	1106	41107	—	—	✓	Float	2
Analog output 2 alarm out	1109	41110	—	—	✓	Uint8	1
Analog input function (G)	1111	41112	—	✓	—	Uint8	1
Analog input high limit (G)	1113	41114	—	✓	—	Float	2
Analog input low limit (G)	1115	41116	—	✓	—	Float	2
Analog input unit (G)	1118	41119	—	✓	—	Uint8	1
Analog input URV (G)	1119	41120	—	✓	—	Float	2
Analog input LRV (G)	1121	41122	—	✓	—	Float	2
Analog output 2 trim clear	1124	41125	—	—	✓	Uint8	1
Analog output 2 at 4mA	1126	41127	—	—	✓	Float	2
Analog output 2 at 20mA	1128	41129	—	—	✓	Float	2
Analog input trim clear (G)	1131	41132	—	✓	—	Uint8	1
Analog input at 4mA (G)	1133	41134	—	✓	—	Float	2
Analog input at 20mA (G)	1135	41136	—	✓	—	Float	2
Flow direction	1300	41301	✓	✓	✓	Uint8	1
Rate limit	1302	41303	✓	✓	✓	Float	2
Dead time	1304	41305	✓	✓	✓	Float	2
Noise filter	1307	41308	✓	✓	✓	Uint8	1

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Pulsing flow	1308	41309	✓	✓	✓	Uint8	1
Power synchronize	1309	41310	✓	✓	✓	Uint8	1
Set power freq	1311	41312	✓	✓	✓	Float	2
Density select (G)	1314	41315	—	✓	—	Uint8	1
Density unit	1315	41316	✓	✓	✓	Uint8	1
Fixed density	1316	41317	✓	✓	✓	Float	2
Standard density (G)	1318	41319	—	✓	—	Float	2
Standard temperature (G)	1321	41322	—	✓	—	Float	2
Temperature coef A1 (G)	1324	41325	—	✓	—	Float	2
Temperature coef A2 (G)	1326	41327	—	✓	—	Float	2
Specific heat (G)	1329	41330	—	✓	—	Float	2
Fixed temperature (G)	1331	41332	—	✓	—	Float	2
High alarm	1500	41501	✓	✓	✓	Float	2
Low alarm	1502	41503	✓	✓	✓	Float	2
High high alarm	1504	41505	✓	✓	✓	Float	2
Low low alarm	1506	41507	✓	✓	✓	Float	2
High/Low alarm hysteresis	1509	41510	✓	✓	✓	Float	2
Alarm out mask 1	1512	41513	✓	✓	✓	Uint32	2
Alarm out mask 2	1514	41515	✓	✓	✓	Uint32	2
Alarm out mask 3	1516	41517	✓	✓	✓	Uint32	2
Alarm out mask 4	1518	41519	✓	✓	✓	Uint32	2
Alarm rec mask 1	1521	41522	✓	✓	✓	Uint32	2
Alarm rec mask 2	1523	41524	✓	✓	✓	Uint32	2
Alarm rec mask 3	1527	41528	✓	✓	✓	Uint32	2
Display line select 1	1700	41701	✓	✓	✓	Uint8	1
Display line select 2	1701	41702	✓	✓	✓	Uint8	1
Display line select 3	1702	41703	✓	✓	✓	Uint8	1
Display line select 4	1703	41704	✓	✓	✓	Uint8	1
Display line select 5	1704	41705	✓	✓	✓	Uint8	1
Display line select 6	1705	41706	✓	✓	✓	Uint8	1
Display line select 7	1706	41707	✓	✓	✓	Uint8	1
Display line select 8	1707	41708	✓	✓	✓	Uint8	1
Display format flowrate	1709	41710	✓	✓	✓	Uint8	1
Display format total 1	1710	41711	✓	✓	✓	Uint8	1
Display format total 2	1711	41712	✓	✓	✓	Uint8	1
Display format total 3	1712	41713	✓	✓	✓	Uint8	1
Display contrast	1714	41715	✓	✓	✓	Uint8	1
Display line	1715	41716	✓	✓	✓	Uint8	1
Display period	1716	41717	✓	✓	✓	Uint8	1
Display NE107	1718	41719	✓	✓	✓	Uint8	1
Display alarm	1719	41720	✓	✓	✓	Uint8	1
Display scroll	1721	41722	✓	✓	✓	Uint8	1
Display damping	1722	41723	✓	✓	✓	Float	2
Display format date	1725	41726	✓	✓	✓	Uint8	1
Display language	1726	41727	✓	✓	✓	Uint8	1
Display measure mode	1728	41729	✓	✓	✓	Uint8	1
Trend offline LRV	1729	41730	✓	✓	✓	Float	2
Trend offline URV	1731	41732	✓	✓	✓	Float	2
Display trend select 1	1734	41735	✓	✓	✓	Uint8	1
Display trend select 2	1735	41736	✓	✓	✓	Uint8	1
Display trend select 3	1736	41737	✓	✓	✓	Uint8	1

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Display trend select 4	1737	41738	✓	✓	✓	Uint8	1
Display inverse	1739	41740	✓	✓	✓	Uint8	1
LCD test	1741	41742	✓	✓	✓	Uint8	1
Display squawk	1743	41744	✓	✓	✓	Uint8	1
Display install	1745	41746	✓	✓	✓	Uint8	1
Display lowcut	1747	41748	✓	✓	✓	Float	2
Long tag	1833	41834	✓	✓	✓	ASCII	16
Tag number	1900	41901	✓	✓	✓	ASCII	8
Set current day	1909	41910	✓	✓	✓	Uint8	1
Set current month	1910	41911	✓	✓	✓	Uint8	1
Set current year	1911	41912	✓	✓	✓	Uint16	1
Set current hour	1913	41914	✓	✓	✓	Uint8	1
Set current minute	1914	41915	✓	✓	✓	Uint8	1
Set current sec	1915	41916	✓	✓	✓	Uint8	1
Electrode size	1917	41918	✓	✓	✓	Uint8	1
Basic model code	1919	41920	✓	✓	✓	ASCII	8
Suffix config 1	1928	41929	✓	✓	✓	ASCII	8
Suffix config 2	1936	41937	✓	✓	✓	ASCII	8
Option 1	1945	41946	✓	✓	✓	ASCII	8
Option 2	1953	41954	✓	✓	✓	ASCII	8
Option 3	1962	41963	✓	✓	✓	ASCII	8
Option 4	1970	41971	✓	✓	✓	ASCII	8
RS basic model code	1979	41980	✓	✓	✓	ASCII	8
RS suffix config 1	1988	41989	✓	✓	✓	ASCII	8
RS suffix config 2	1996	41997	✓	✓	✓	ASCII	8
RS option 1	2005	42006	✓	✓	✓	ASCII	8
RS option 2	2013	42014	✓	✓	✓	ASCII	8
RS option 3	2022	42023	✓	✓	✓	ASCII	8
RS option 4	2030	42031	✓	✓	✓	ASCII	8
Transmitter serial No	2039	42040	✓	✓	✓	ASCII	8
Flow sensor serial No	2047	42048	✓	✓	✓	ASCII	8
Memo1	2056	42057	✓	✓	✓	ASCII	8
Memo2	2065	42066	✓	✓	✓	ASCII	8
Memo3	2074	42075	✓	✓	✓	ASCII	8
Adhesion check	2200	42201	✓	✓	✓	Uint8	1
Adhesion level 1	2202	42203	✓	✓	✓	Float	2
Adhesion level 2	2204	42205	✓	✓	✓	Float	2
Adhesion level 3	2206	42207	✓	✓	✓	Float	2
Adhesion level 4	2208	42209	✓	✓	✓	Float	2
Adhesion check cycle	2210	42211	✓	✓	✓	Uint8	1
Flow noise check (G)	2212	42213	✓	✓	✓	Uint8	1
Flow noise level 1 (G)	2214	42215	✓	✓	✓	Float	2
Flow noise level 2 (G)	2216	42217	✓	✓	✓	Float	2
Flow noise level 3 (G)	2218	42219	✓	✓	✓	Float	2
Flow noise level 4 (G)	2220	42221	✓	✓	✓	Float	2
Flow noise damping (G)	2223	42224	✓	✓	✓	Float	2
Flow noise span (G)	2225	42226	✓	✓	✓	Float	2
Low conductivity function (G)	2228	42229	✓	✓	✓	Uint8	1
Conductivity limit (G)	2230	42231	✓	✓	✓	Float	2
Diagnosis execute	2233	42234	✓	✓	✓	Uint8	1
Coil insulation th	2235	42236	✓	✓	✓	Float	2

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Verification target select	2250	42251	✓	✓	✓	Uint16	1
Diagnostic output	2238	42239	✓	✓	✓	Uint8	1
Verification mode	2240	42241	✓	✓	✓	Uint8	1
Verification execute	2242	42243	✓	✓	✓	Uint8	1
Verification No	2244	42245	✓	✓	✓	Uint8	1
Test auto release time	2400	42401	✓	✓	✓	Uint8	1
Test mode bit	2402	42403	✓	✓	✓	Uint32	2
Velocity test value	2405	42406	✓	✓	✓	Float	2
Volume flow test value	2407	42408	✓	✓	✓	Float	2
Mass flow test value	2409	42410	✓	✓	✓	Float	2
Calorific test value (G)	2412	42413	—	✓	—	Float	2
Pulse output 1 test value	2415	42416	✓	✓	✓	Uint16	1
Status output 1 test value	2416	42417	✓	✓	✓	Uint8	1
Analog output 2 test value	2418	42419	—	—	✓	Float	2
Status output 2 test value	2422	42423	✓	✓	✓	Uint8	1
Analog input test value	2424	42425	—	✓	—	Float	2
Flow noise test value (G)	2433	42434	✓	✓	✓	Float	2
Total 1 test value	2436	42437	✓	✓	✓	Float	2
Total 2 test value	2438	42439	✓	✓	✓	Float	2
Total 3 test value	2440	42441	✓	✓	✓	Float	2
SD backup name	2600	42601	✓	✓	✓	ASCII	4
Backup name 1	2605	42606	✓	✓	✓	ASCII	8
Backup date 1	2613	42614	✓	✓	✓	ASCII	8
Backup name 2	2622	42623	✓	✓	✓	ASCII	8
Backup date 2	2630	42631	✓	✓	✓	ASCII	8
Backup name 3	2639	42640	✓	✓	✓	ASCII	8
Backup date 3	2647	42648	✓	✓	✓	ASCII	8
Backup exec	2656	42657	✓	✓	✓	Uint8	1
Restore exec	2658	42659	✓	✓	✓	Uint8	1
Logging file name	2660	42661	✓	✓	✓	ASCII	4
Logging interval time	2665	42666	✓	✓	✓	Uint8	1
Logging end time	2666	42667	✓	✓	✓	Uint8	1
Logging 1 select	2668	42669	✓	✓	✓	Uint8	1
Logging 2 select	2669	42670	✓	✓	✓	Uint8	1
Logging 3 select	2670	42671	✓	✓	✓	Uint8	1
Logging 4 select	2671	42672	✓	✓	✓	Uint8	1
Logging exec	2673	42674	✓	✓	✓	Uint8	1
Key code	2800	42801	✓	✓	✓	Uint16	1
Enable write protect	2802	42803	✓	✓	✓	ASCII	4
New password	2807	42808	✓	✓	✓	ASCII	4
Set flexible register 01	3000	43001	✓	✓	✓	Uint16	1
Set flexible register 02	3002	43003	✓	✓	✓	Uint16	1
Set flexible register 03	3004	43005	✓	✓	✓	Uint16	1
Set flexible register 04	3006	43007	✓	✓	✓	Uint16	1
Set flexible register 05	3008	43009	✓	✓	✓	Uint16	1
Set flexible register 06	3010	43011	✓	✓	✓	Uint16	1
Set flexible register 07	3012	43013	✓	✓	✓	Uint16	1
Set flexible register 08	3014	43015	✓	✓	✓	Uint16	1
Set flexible register 09	3016	43017	✓	✓	✓	Uint16	1
Set flexible register 10	3018	43019	✓	✓	✓	Uint16	1
Set flexible register 11	3020	43021	✓	✓	✓	Uint16	1

Parameter	Relative Address	Register Address	Communication and I/O code			Data Type	Number of Register
			M0 -M	M2	M6 -P		
Set flexible register 12	3022	43023	✓	✓	✓	Uint16	1
Set flexible register 13	3024	43025	✓	✓	✓	Uint16	1
Set flexible register 14	3026	43027	✓	✓	✓	Uint16	1
Set flexible register 15	3028	43029	✓	✓	✓	Uint16	1
Set flexible register 16	3030	43031	✓	✓	✓	Uint16	1
Set flexible register 17	3032	43033	✓	✓	✓	Uint16	1
Set flexible register 18	3034	43035	✓	✓	✓	Uint16	1
Set flexible register 19	3036	43037	✓	✓	✓	Uint16	1
Set flexible register 20	3038	43039	✓	✓	✓	Uint16	1

3.1.2 Input Register

Input registers are read-only.

Parameter	Relative Address	Register Address	Communication and I/O code			Flex input	Data Type	Number of Register
			M0 -M	M2	M6 -P			
Current device address	0	30001	✓	✓	✓	—	Uint16	1
Current transmission mode	1	30002	✓	✓	✓	—	Uint8	1
Current baud rate	2	30003	✓	✓	✓	—	Uint8	1
Current parity	3	30004	✓	✓	✓	—	Uint8	1
Current stop bit	4	30005	✓	✓	✓	—	Uint8	1
Minimum response time	6	30007	✓	✓	✓	—	Uint16	1
Current data format for float	7	30008	✓	✓	✓	—	Uint8	1
Current data format for 4byte	8	30009	✓	✓	✓	—	Uint8	1
Current data format for 2byte	9	30010	✓	✓	✓	—	Uint8	1
Current data format for string	10	30011	✓	✓	✓	—	Uint8	1
Modbus setting	12	30013	✓	✓	✓	—	ASCII	8
Flowrate%	100	30101	✓	✓	✓	✓	Float	2
Flowrate	102	30103	✓	✓	✓	✓	Float	2
Total 1	104	30105	✓	✓	✓	✓	Float	2
Total 2	106	30107	✓	✓	✓	✓	Float	2
Total 3	108	30109	✓	✓	✓	✓	Float	2
Total 1 count	110	30111	✓	✓	✓	✓	Int32	2
Total 2 count	112	30113	✓	✓	✓	✓	Int32	2
Total 3 count	114	30115	✓	✓	✓	✓	Int32	2
Velocity	116	30117	✓	✓	✓	✓	Float	2
Volume flow	118	30119	✓	✓	✓	✓	Float	2
Mass flow	120	30121	✓	✓	✓	✓	Float	2
AO2 mA	122	30123	—	—	✓	✓	Float	2
Velocity status	125	30126	✓	✓	✓	✓	Uint8	1
Volume flow status	126	30127	✓	✓	✓	✓	Uint8	1
Mass flow status	127	30128	✓	✓	✓	✓	Uint8	1
Calorie status (G)	128	30129	—	✓	—	✓	Uint8	1
Status group 0	200	30201	✓	✓	✓	✓	Uint32	2
Status group 1	202	30203	✓	✓	✓	✓	Uint32	2
Status group 2	204	30205	✓	✓	✓	✓	Uint32	2
Status group 3	206	30207	✓	✓	✓	✓	Uint32	2
Velocity check	300	30301	✓	✓	✓	✓	Float	2
Total 1 unit	500	30501	✓	✓	✓	✓	Uint8	1
Analog input value (G)	1100	31101	—	✓	—	✓	Float	2
IEX power freq	1300	31301	✓	✓	✓	✓	Float	2
Measured power freq	1302	31303	✓	✓	✓	✓	Float	2
Measured temperature (G)	1305	31306	—	✓	—	✓	Float	2
Corrected density (G)	1307	31308	—	✓	—	✓	Float	2
Calorie value (G)	1309	31310	—	✓	—	✓	Float	2
4-20mA Burnout	1500	31501	✓	✓	✓	✓	Uint8	1
Alarm record 1	1502	31503	✓	✓	✓	✓	Uint8	1
Alarm record time 1	1503	31504	✓	✓	✓	—	ASCII	8
Alarm record 2	1511	31512	✓	✓	✓	✓	Uint8	1
Alarm record time 2	1512	31513	✓	✓	✓	—	ASCII	8
Alarm record 3	1520	31521	✓	✓	✓	✓	Uint8	1
Alarm record time 3	1521	31522	✓	✓	✓	—	ASCII	8
Alarm record 4	1529	31530	✓	✓	✓	✓	Uint8	1
Alarm record time 4	1530	31531	✓	✓	✓	—	ASCII	8
Language package	1700	31701	✓	✓	✓	✓	Uint8	1

Parameter	Relative Address	Register Address	Communication and I/O code			Flex input	Data Type	Number of Register
			M0 -M	M2	M6 -P			
Operate time	1900	31901	✓	✓	✓	—	ASCII	8
Current date	1909	31910	✓	✓	✓	—	ASCII	8
Current time	1917	31918	✓	✓	✓	—	ASCII	8
Transmitter type	1926	31927	✓	✓	✓	✓	Uint8	1
Option board ID	1927	31928	✓	✓	✓	✓	Uint8	1
Main/B rev	1929	31930	✓	✓	✓	—	ASCII	4
Sensor/B rev	1933	31934	✓	✓	✓	—	ASCII	4
Indicator/B rev	1937	31938	✓	✓	✓	—	ASCII	4
IO1	1942	31943	✓	✓	✓	✓	Uint8	1
IO2	1943	31944	✓	✓	✓	✓	Uint8	1
IO3	1944	31945	✓	✓	✓	✓	Uint8	1
IO4	1945	31946	✓	✓	✓	✓	Uint8	1
Adhesion measure value	2200	32201	✓	✓	✓	✓	Float	2
Adhesion status	2203	32204	✓	✓	✓	✓	Uint8	1
Flow noise value (G)	2205	32206	✓	✓	✓	✓	Float	2
Flow noise status (G)	2208	32209	✓	✓	✓	✓	Uint8	1
Conductivity (G)	2210	32211	✓	✓	✓	✓	Float	2
IEX compare	2213	32214	✓	✓	✓	✓	Float	2
V peak hold value (G)	2216	32217	✓	✓	✓	✓	Float	2
IEX coil resistance	2219	32220	✓	✓	✓	✓	Float	2
Electrode voltage A	2221	32222	✓	✓	✓	✓	Float	2
Electrode voltage B	2223	32224	✓	✓	✓	✓	Float	2
Empty status	2225	32226	✓	✓	✓	✓	Uint8	1
Verification check result	2227	32228	✓	✓	✓	✓	Uint8	1
Verification operate time	2228	32229	✓	✓	✓	—	ASCII	8
Magnetic result	2236	32237	✓	✓	✓	✓	Uint8	1
Exciting circuit result	2237	32238	✓	✓	✓	✓	Uint8	1
Calculation circuit result	2238	32239	✓	✓	✓	✓	Uint8	1
Device status result	2239	32240	✓	✓	✓	✓	Uint8	1
Connection status result	2240	32241	✓	✓	✓	✓	Uint8	1
Factory backup name	2600	32601	✓	✓	✓	—	ASCII	8
Factory backup date	2608	32609	✓	✓	✓	—	ASCII	8
Restore result	2617	32618	✓	✓	✓	✓	Uint8	1
Backup result	2618	32619	✓	✓	✓	✓	Uint8	1
Logging start date	2620	32621	✓	✓	✓	—	ASCII	8
Logging start time	2629	32630	✓	✓	✓	—	ASCII	8
Write protect	2800	32801	✓	✓	✓	✓	Uint8	1
Software seal	2801	32802	✓	✓	✓	✓	Uint8	1
Flexible register 01	3000	33001	✓	✓	✓	—	Uint32	2
Flexible register 02	3002	33003	✓	✓	✓	—	Uint32	2
Flexible register 03	3004	33005	✓	✓	✓	—	Uint32	2
Flexible register 04	3006	33007	✓	✓	✓	—	Uint32	2
Flexible register 05	3008	33009	✓	✓	✓	—	Uint32	2
Flexible register 06	3010	33011	✓	✓	✓	—	Uint32	2
Flexible register 07	3012	33013	✓	✓	✓	—	Uint32	2
Flexible register 08	3014	33015	✓	✓	✓	—	Uint32	2
Flexible register 09	3016	33017	✓	✓	✓	—	Uint32	2
Flexible register 10	3018	33019	✓	✓	✓	—	Uint32	2
Flexible register 11	3020	33021	✓	✓	✓	—	Uint32	2
Flexible register 12	3022	33023	✓	✓	✓	—	Uint32	2
Flexible register 13	3024	33025	✓	✓	✓	—	Uint32	2

Parameter	Relative Address	Register Address	Communication and I/O code			Flex input	Data Type	Number of Register
			M0 -M	M2	M6 -P			
Flexible register 14	3026	33027	✓	✓	✓	—	Uint32	2
Flexible register 15	3028	33029	✓	✓	✓	—	Uint32	2
Flexible register 16	3030	33031	✓	✓	✓	—	Uint32	2
Flexible register 17	3032	33033	✓	✓	✓	—	Uint32	2
Flexible register 18	3034	33035	✓	✓	✓	—	Uint32	2
Flexible register 19	3036	33037	✓	✓	✓	—	Uint32	2
Flexible register 20	3038	33039	✓	✓	✓	—	Uint32	2

3.2 Modbus Register Information

3.2.1 Holding Register

Parameter	Relative Address	Register Address	Data range		Default value	Unit
Set device address	25	40026	1 to 247		1	—
Set transmission mode	26	40027	0 1	RTU ASCII	0 : RTU	—
Set baud rate	28	40029	0 1 2 3 4 5 6 7	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	4 : 19200 bps	—
Set parity	29	40030	0 1 2	None Odd Even	2 : Even	—
Set stop bit	30	40031	0 1	1 bit 2 bit	0 : 1 bit	—
Minimum response time	33	40034	0 to 10000		0	ms
Set data format for float	35	40036	0 1 2 3	ABCD CDAB BADC DCBA	0 : ABCD	—
Set data format for 4byte	36	40037	0 1 2 3	ABCD CDAB BADC DCBA	0 : ABCD	—
Set data format for 2byte	37	40038	0 1	AB BA	0 : AB	—
Set data format for string	38	40039	0 1	AB BA	0 : AB	—
System reset	50	40051	0 1	Not execute Execute	0 : Not execute	—
Modbus restart	52	40053	0 1	Not execute Execute	0 : Not execute	—
Velocity damping for Freq	300	40301	0.1 to 200.0		3.0	s
Velocity damping for PLS/TTL	302	40303	0.0 to 200.0		3.0	s
Volume flow damping for Freq	305	40306	0.1 to 200.0		3.0	s
Volume flow damping for PLS/TTL	307	40308	0.0 to 200.0		3.0	s
Mass flow damping for Freq	310	40311	0.1 to 200.0		3.0	s
Mass flow damping for PLS/TTL	312	40313	0.0 to 200.0		3.0	s

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Calorific damping for Freq (G)	315	40316	0.1 to 200.0	3.0	s
Calorific damping for PLS/TTL (G)	317	40318	0.0 to 200.0	3.0	s
Low MF	320	40321	0.01 to 3.0	1.0	—
High MF	322	40323	0.01 to 3.0	1.0	—
Low MF(EDF)	324	40325	0.01 to 3.0	1.0	—
High MF(EDF)	326	40327	0.01 to 3.0	1.0	—
Select flow sensor	329	40330	0 ADMAG AXG (G) 1 ADMAG AXW 2 ADMAG AXF (G) 4 ADMAG AE (G) 7 Calibrator 8 Other 1 9 Other 2 10 Other 3 (G)	In case of AXG 0 : ADMAG AXG In case of AXW 1 : ADMAG AXW	—
Measure mode	330	40331	0 Standard DF 1 Enhanced DF	0 : Standard DF	—
Nominal size unit	332	40333	0 mm 1 inch	0 : mm	—
Nominal size	333	40334	0.01 to 3000.0	100.0	Specified in "Nominal size unit"
PV flow select	336	40337	0 Velocity 1 Volume flow 2 Mass flow 3 Diag (G)	1 : Volume flow	—
Velocity unit	337	40338	0 m/s 1 ft/s	0 : m/s	—
Volume unit	338	40339	0 Ml(Megaliter) 1 m³ 2 kl(kiloliter) 3 l(liter) 4 cm³ 5 kcf 6 cf 7 mcf 8 Mgal(US) 9 kgal(US) 10 gal(US) 11 mgal(US) 12 kbbl(US Oil) 13 bbl(US Oil) 14 mbbl(US Oil) 15 ubbl(US Oil) 16 kbbl(US Beer) 17 bbl(US Beer) 18 mbbl(US Beer) 19 ubbl(US Beer)	1 : m³	—
Mass unit	339	40340	0 t 1 kg 2 g 3 klb 4 lb	1 : kg	—
Calorie unit (G)	340	40341	0 MJ 1 kJ 2 J 3 kcal 4 cal 5 BTU	2 : J	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Time unit	341	40342	0 /s 1 /min 2 /h 3 /d	2 : /h	—
Velocity span	343	40344	0.00001 to +INF	1.0	Specified in “Velocity unit”
Volume flow span	345	40346	0.00001 to +INF	28.7433	Specified in “Volume unit” and “Time unit”
Mass flow span	347	40348	0.00001 to +INF	1.0	Specified in “Mass unit” and “Time unit”
Calorie span (G)	349	40350	0.00001 to +INF	1.0	Specified in “Calorie unit” and “Time unit”
Autozero exec	360	40361	0 Not execute 1 Execute	0 : Not execute	—
Zero	361	40362	-99.999 to +99.999	0.0	—
Total 1 conversion factor	502	40503	-INF to +INF	1.0	—
Total 1 lowcut	504	40505	0.0 to +INF	0.0	—
Total 1 failure option	507	40508	0 Run 1 Hold 2 Last valid	1 : Hold	—
Total 1 option	508	40509	0 Balanced 1 Absolute 2 Only positive 3 Only negative 4 Hold	2 : Only positive	—
Total 1 execution	510	40511	0 Stop 1 Start	0 : Stop	—
Total 1 reset/preset	512	40513	0 Not execute 1 Reset 2 Preset	0 : Not execute	—
Total 1 preset value	514	40515	-INF to +INF	0.0	—
Total 1 set point	516	40517	0.0 to +INF	0.0	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Total 2 unit	519	40520	0 Ml(Megaliter) 1 m³ 2 kl(kiloliter) 3 l(liter) 4 cm³ 5 t 6 kg 7 g 8 kcf 9 cf 10 mcf 11 Mgal(US) 12 kgal(US) 13 gal(US) 14 mgal(US) 15 kbbl(US Oil) 16 bbl(US Oil) 17 mbbl(US Oil) 18 ubbl(US Oil) 19 kbbl(US Beer) 20 bbl(US Beer) 21 mbbl(US Beer) 22 ubbl(US Beer) 23 klb(US) 24 lb(US) 25 MJ (G) 26 kJ (G) 27 J (G) 28 kcal (G) 29 cal (G) 30 BTU (G)	1 : m³	—
Total 2 conversion factor	521	40522	-INF to +INF	1.0	—
Total 2 lowcut	523	40524	0.0 to +INF	0.0	—
Total 2 failure option	526	40527	0 Run 1 Hold 2 Last valid	1 : Hold	—
Total 2 option	527	40528	0 Balanced 1 Absolute 2 Only positive 3 Only negative 4 Hold	3 : Only negative	—
Total 2 execution	529	40530	0 Stop 1 Start	0 : Stop	—
Total 2 reset/preset	531	40532	0 Not execute 1 Reset 2 Preset	0 : Not execute	—
Total 2 preset value	533	40534	-INF to +INF	0.0	—
Total 2 set point	535	40536	0.0 to +INF	0.0	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Total 3 unit	538	40539	0 Ml(Megaliter) 1 m³ 2 kl(kiloliter) 3 l(liter) 4 cm³ 5 t 6 kg 7 g 8 kcf 9 cf 10 mcf 11 Mgal(US) 12 kgal(US) 13 gal(US) 14 mgal(US) 15 kbbl(US Oil) 16 bbl(US Oil) 17 mbbl(US Oil) 18 ubbl(US Oil) 19 kbbl(US Beer) 20 bbl(US Beer) 21 mbbl(US Beer) 22 ubbl(US Beer) 23 klb(US) 24 lb(US) 25 MJ (G) 26 kJ (G) 27 J (G) 28 kcal (G) 29 cal (G) 30 BTU (G)	1 : m³	—
Total 3 conversion factor	540	40541	-INF to +INF	1.0	—
Total 3 lowcut	542	40543	0.0 to +INF	0.0	—
Total 3 failure option	545	40546	0 Run 1 Hold 2 Last valid	1 : Hold	—
Total 3 option	546	40547	0 Balanced 1 Absolute 2 Only positive 3 Only negative 4 Hold	0 : Balanced	—
Total 3 execution	548	40549	0 Stop 1 Start	0 : Stop	—
Total 3 reset/preset	550	40551	0 Not execute 1 Reset 2 Preset	0 : Not execute	—
Total 3 preset value	552	40553	-INF to +INF	0.0	—
Total 3 set point	554	40555	0.0 to +INF	0.0	—
Pulse status output 1 mode	700	40701	0 No function 1 Fixed pulse output 2 Frequency output 3 Status output	1 : Fixed pulse output	—
Pulse output 1 active mode	701	40702	0 On active 1 Off active	0 : On active	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Pulse output 1 width	702	40703	0 0.05 ms 1 0.1 ms 2 0.5 ms 3 1 ms 4 20 ms 5 33 ms 6 50 ms 7 100 ms 8 200 ms 9 330 ms 10 500 ms 11 1000 ms 12 2000 ms 13 Duty cycle 50%	0 : 0.05 ms	—
Pulse output 1 rate unit	704	40705	0 n unit/P 1 u unit/P 2 m unit/P 3 Unit/P 4 k unit/P 5 M unit/P 6 n P/unit 7 u P/unit 8 m P/unit 9 P/unit 10 k P/unit 11 M P/unit	3 : Unit/P	—
Pulse output 1 rate value	705	40706	0.0 to +INF	0.0	—
Pulse output 1 lowcut	707	40708	0.0 to +INF	0.0	—
Pulse output 1 alarm out	710	40711	0 0 pps 1 Measured value 2 Hold 3 Max pps	0 : 0 pps	—
Frequency output 1 at 0%	712	40713	0 to 12500	0	Hz
Frequency output 1 at 100%	714	40715	0 to 12500	0	Hz
Status output 1 function	716	40717	0 No function 1 Alarm output 2 Warning output 3 Total limit 1 4 Total limit 2 5 Total limit 3 6 H/L alarm 7 HH/LL alarm	0 : No function	—
Analog output 2 select	1100	41101	0 No connect 1 Velocity 2 Volume flow 3 Mass flow 4 Calorie (G) 5 Diag (G)	0 : No connect	—
Analog output 2 lowcut	1102	41103	0.0 to +INF	0.0	—
Analog output 2 high limit	1104	41105	4.0 to 21.6	20.5	—
Analog output 2 low limit	1106	41107	2.4 to 20.0	3.8	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Analog output 2 alarm out	1109	41110	0 < 2.4 mA 1 3.8 mA 2 4 mA 3 20.5 mA 4 > 21.6 mA 5 Measured value 6 Hold	4 : > 21.6 mA	—
Analog input function (G)	1111	41112	0 No function 1 Monitoring 2 Diff temperature 3 Ext temperature	0 : No function	—
Analog input high limit (G)	1113	41114	4.0 to 21.6	20.5	mA
Analog input low limit (G)	1115	41116	2.4 to 20.0	3.8	mA
Analog input unit (G)	1118	41119	0 deg C 1 deg F 2 K	0 : deg C	—
Analog input URV (G)	1119	41120	-999.9 to +999.9	120.0	Specified in “Analog input unit”
Analog input LRV (G)	1121	41122	-999.9 to +999.9	0.0	Specified in “Analog input unit”
Analog output 2 trim clear	1124	41125	0 Not execute 1 Execute	0 : Not execute	—
Analog output 2 at 4mA	1126	41127	3.2 to 5.6	4.0	mA
Analog output 2 at 20mA	1128	41129	18.4 to 21.6	20.0	mA
Analog input trim clear (G)	1131	41132	0 Not execute 1 Execute	0 : Not execute	—
Analog input at 4mA (G)	1133	41134	3.2 to 5.6	4.0	mA
Analog input at 20mA (G)	1135	41136	18.4 to 21.6	20.0	mA
Flow direction	1300	41301	0 Forward 1 Reverse	0 : Forward	—
Rate limit	1302	41303	0.0 to 10.0	5.0	—
Dead time	1304	41305	0.0 to 15.0	0.0	—
Noise filter	1307	41308	0 Manual 1 Level 1 2 Level 2 3 Level 3	0 : Manual	—
Pulsing flow	1308	41309	0 No 1 Yes	0 : No	—
Power synchronize	1309	41310	0 No 1 Yes	1 : Yes	—
Set power freq	1311	41312	47.0 to 63.0	50.0	Hz
Density select (G)	1314	41315	0 Fixed value 1 Correction value	0 : Fixed value	—
Density unit	1315	41316	0 kg/m³ 1 lb/gal 2 lb/cf	0 : kg/m³	—
Fixed density	1316	41317	0.0 to 999999.0	0.0	Specified in “Density unit”

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Standard density (G)	1318	41319	0.0 to 999999.0	0.0	Specified in “Density unit”
Standard temperature (G)	1321	41322	-INF to +INF	20.0	Specified in “Analog input unit”
Temperature coef A1 (G)	1324	41325	-INF to +INF	0.0	—
Temperature coef A2 (G)	1326	41327	-INF to +INF	0.0	—
Specific heat (G)	1329	41330	0 to 4184.0	4184.0	—
Fixed temperature (G)	1331	41332	-INF to +INF	20.0	Specified in “Analog input unit”
High alarm	1500	41501	-INF to +INF	300.0	Specified in unit of process value selected in “PV flow select”
Low alarm	1502	41503	-INF to +INF	-300.0	Specified in unit of process value selected in “PV flow select”
High high alarm	1504	41505	-INF to +INF	300.0	Specified in unit of process value selected in “PV flow select”
Low low alarm	1506	41507	-INF to +INF	-300.0	Specified in unit of process value selected in “PV flow select”
High/Low alarm hysteresis	1509	41510	0 to 10	5	%
Alarm out mask 1	1512	41513	0x00000008 Main board EEPROM default 0x00020000 PWM2 stop 0x00040000 Option board mismatch 0x00080000 Option board EEPROM failure 0x00100000 Option board A/D failure 0x00200000 Option board SPI failure 0x02000000 Indicator board failure 0x04000000 Indicator board EEPROM failure 0x08000000 LCD driver failure 0x10000000 Indicator board mismatch 0x20000000 Indicator communication error 0x40000000 microSD failure	0x02000000	—

Parameter	Relative Address	Register Address	Data range		Default value	Unit
Alarm out mask 2	1514	41515	0x00000001 0x00000002 0x00000004 0x00000008 0x00000100 0x00000200 0x00000800 0x00002000 0x00004000 0x00010000 0x00040000 0x00080000 0x00100000 0x00200000 0x02000000 0x04000000 0x10000000 0x20000000 0x40000000 0x80000000	Signal overflow Empty pipe detection H/L or HH/LL alarm Adhesion over level 4 Span configuration error PV flow select configuration error (G) Analog output 2 4-20mA limit error (G) H/L HH/LL configuration error Density configuration error Pulse output 1 configuration error Nominal size configuration error Adhesion configuration error Flow noise configuration error (G) Data logging not started Analog output 2 saturated (G) Pulse output 1 saturated Analog input saturated (G) Cable misconnect Coil insulation warning Transmitter type mismatch	0x5F00000C	—
Alarm out mask 3	1516	41517	0x00000001 0x00000002 0x00000004 0x00000008 0x00000010 0x00000020 0x00000040 0x00000080 0x00000100 0x00000400 0x00000800 0x00002000 0x00010000 0x00020000 0x00040000 0x00080000 0x00100000 0x00200000 0x01000000 0x02000000 0x04000000 0x08000000 0x10000000	Adhesion over level 3 Low conductivity Warning (G) Insulation detection (G) Flow noise over level 3 (G) Flow noise over level 4 (G) Autozero warning Verification warning Factory noise warning (G) Simulation active Analog output 2 fixed (G) Pulse output 1 fixed Analog input fixed (G) Parameter restore running Display over warning microSD card size warning Parameter backup incomplete microSD card mismatch microSD card removal procedure error Watchdog Power off Instant power failure Parameter backup running Data logging running	0x1F3700DF	—
Alarm out mask 4	1518	41519	0x00000200 0x00000400	Modbus config update warning G/A mismatch error	0x00000000	—
Alarm rec mask 1	1521	41522	0x00000008 0x00020000 0x00040000 0x00080000 0x00100000 0x00200000 0x02000000 0x04000000 0x08000000 0x10000000 0x20000000 0x40000000	Main board EEPROM default PWM2 stop Option board mismatch Option board EEPROM failure Option board A/D failure Option board SPI failure Indicator board failure Indicator board EEPROM failure LCD driver failure Indicator board mismatch Indicator communication error microSD failure	0x00000000	—
Alarm rec mask 2	1523	41524	0x00000001 0x00000002 0x00000004 0x00000008 0x20000000	Signal overflow Empty pipe detection H/L or HH/LL alarm Adhesion over level 4 Cable misconnect	0x00000000	—
Alarm rec mask 3	1527	41528	0x00000200 0x00000400	Modbus config update warning G/A mismatch error	0x00000700	—

Parameter	Relative Address	Register Address	Data range		Default value	Unit
Display line select 1	1700	41701	0 1 2 3 4 5 6 7 8 9 10 11 12 13 15 16 17 18 19 20	Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie (G) Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 2 Flow noise level (G) Totalizer 1 count Totalizer 2 count Totalizer 3 count Modbus info	1 : PV	—
Display line select 2	1701	41702	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 20 21	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie (G) Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 2 Flow noise level (G) Totalizer 1 count Totalizer 2 count Totalizer 3 count Modbus info	1 : Flow rate(%)	—
Display line select 3	1702	41703	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 17 18 19 20 21	None Flow rate(%) PV Velocity Volume flow Mass flow Flow rate(%Bar) Calorie (G) Totalizer 1 Totalizer 2 Totalizer 3 Tag number Long tag Commun protocol Adhesion Analog out 2 Flow noise level (G) Totalizer 1 count Totalizer 2 count Totalizer 3 count Modbus info	21 : Modbus info	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Display line select 4	1703	41704	0 None 1 Flow rate(%) 2 PV 3 Velocity 4 Volume flow 5 Mass flow 6 Flow rate(%Bar) 7 Calorie (G) 8 Totalizer 1 9 Totalizer 2 10 Totalizer 3 11 Tag number 12 Long tag 13 Commun protocol 14 Adhesion 16 Analog out 2 17 Flow noise level (G) 18 Totalizer 1 count 19 Totalizer 2 count 20 Totalizer 3 count 21 Modbus info	0 : None	—
Display line select 5	1704	41705	0 None 1 Flow rate(%) 2 PV 3 Velocity 4 Volume flow 5 Mass flow 6 Flow rate(%Bar) 7 Calorie (G) 8 Totalizer 1 9 Totalizer 2 10 Totalizer 3 11 Tag number 12 Long tag 13 Commun protocol 14 Adhesion 16 Analog out 2 17 Flow noise level (G) 18 Totalizer 1 count 19 Totalizer 2 count 20 Totalizer 3 count 21 Modbus info	0 : None	—
Display line select 6	1705	41706	0 None 1 Flow rate(%) 2 PV 3 Velocity 4 Volume flow 5 Mass flow 6 Flow rate(%Bar) 7 Calorie (G) 8 Totalizer 1 9 Totalizer 2 10 Totalizer 3 11 Tag number 12 Long tag 13 Commun protocol 14 Adhesion 16 Analog out 2 17 Flow noise level (G) 18 Totalizer 1 count 19 Totalizer 2 count 20 Totalizer 3 count 21 Modbus info	0 : None	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Display line select 7	1706	41707	0 None 1 Flow rate(%) 2 PV 3 Velocity 4 Volume flow 5 Mass flow 6 Flow rate(%Bar) 7 Calorie (G) 8 Totalizer 1 9 Totalizer 2 10 Totalizer 3 11 Tag number 12 Long tag 13 Commun protocol 14 Adhesion 16 Analog out 2 17 Flow noise level (G) 18 Totalizer 1 count 19 Totalizer 2 count 20 Totalizer 3 count 21 Modbus info	0 : None	—
Display line select 8	1707	41708	0 None 1 Flow rate(%) 2 PV 3 Velocity 4 Volume flow 5 Mass flow 6 Flow rate(%Bar) 7 Calorie (G) 8 Totalizer 1 9 Totalizer 2 10 Totalizer 3 11 Tag number 12 Long tag 13 Commun protocol 14 Adhesion 16 Analog out 2 17 Flow noise level (G) 18 Totalizer 1 count 19 Totalizer 2 count 20 Totalizer 3 count 21 Modbus info	0 : None	—
Display format flowrate	1709	41710	0 Auto 1 0 digit 2 1 digit 3 2 digit 4 3 digit 5 4 digit 6 5 digit	0 : Auto	—
Display format total 1	1710	41711	0 Auto 1 0 digit 2 1 digit 3 2 digit 4 3 digit 5 4 digit 6 5 digit 7 6 digit 8 7 digit	0 : Auto	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Display format total 2	1711	41712	0 Auto 1 0 digit 2 1 digit 3 2 digit 4 3 digit 5 4 digit 6 5 digit 7 6 digit 8 7 digit	0 : Auto	—
Display format total 3	1712	41713	0 Auto 1 0 digit 2 1 digit 3 2 digit 4 3 digit 5 4 digit 6 5 digit 7 6 digit 8 7 digit	0 : Auto	—
Display contrast	1714	41715	0 -5 1 -4 2 -3 3 -2 4 -1 5 0 6 +1 7 +2 8 +3 9 +4 10 +5	5 : 0	—
Display line	1715	41716	0 1 line(big) 1 1 line 2 2 line 3 3 line 4 4 line	3 : 3 line	—
Display period	1716	41717	0 0.2 s 1 0.4 s 2 1.0 s 3 2.0 s 4 4.0 s 5 8.0 s	1 : 0.4 s	—
Display NE107	1718	41719	0 Normal 1 NE107	0 : Normal	—
Display alarm	1719	41720	0 Normal 1 Detail	0 : Normal	—
Display scroll	1721	41722	0 Off 1 Manual 2 Auto(2 s) 3 Auto(4 s) 4 Auto(8 s)	0 : Off*	—
Display damping	1722	41723	0.0 to 200.0	0.0	s
Display format date	1725	41726	0 MM/DD/YYYY 1 DD/MM/YYYY 2 YYYY/MM/DD	0 : MM/DD/YYYY	—
Display language	1726	41727	0 English 1 French 2 German 3 Italian 4 Spanish 5 Portuguese 6 Russian 7 Chinese 8 Japanese	0 : English	—

*: When Main soft rev (31930) is R1.01.03 or earlier, the default value is Manual.

Parameter	Relative Address	Register Address	Data range		Default value	Unit
Display measure mode	1728	41729	0 1	Normal Trend	0 : Normal	—
Trend offline LRV	1729	41730	-INF to +INF		0.0	—
Trend offline URV	1731	41732	-INF to +INF		10.0	—
Display trend select 1	1734	41735	0 1 2 3 4 5 7 8 9 10	Flow rate(%) PV Velocity Volume flow Mass flow Calorie (G) Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	1 : PV	—
Display trend select 2	1735	41736	0 1 2 3 4 5 6 8 9 10 11	None Flow rate(%) PV Velocity Volume flow Mass flow Calorie (G) Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	0 : None	—
Display trend select 3	1736	41737	0 1 2 3 4 5 6 8 9 10 11	None Flow rate(%) PV Velocity Volume flow Mass flow Calorie (G) Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	0 : None	—
Display trend select 4	1737	41738	0 1 2 3 4 5 6 8 9 10 11	None Flow rate(%) PV Velocity Volume flow Mass flow Calorie (G) Analog out 2 Totalizer 1 Totalizer 2 Totalizer 3	0 : None	—
Display inverse	1739	41740	0 1	Normal Invert	0 : Normal	—
LCD test	1741	41742	0 1 2 3 4 5	Not execute Execute Show pattern 1 Show pattern 2 Show pattern 3 Show pattern 4	0 : Not execute	—
Display squawk	1743	41744	0 1 2	Off On Squawk once	0 : Off	—
Display install	1745	41746	0 1	No disp With disp	1 : With disp	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Display lowcut	1747	41748	0.0 to +INF	0.0	Specified in unit of process value selected in "PV flow select"
Long tag	1833	41834	ASCII 32 characters	All Space	—
Tag number	1900	41901	ASCII 8 characters	All Space	—
Set current day	1909	41910	1 to 31	1	—
Set current month	1910	41911	1 to 12	1	—
Set current year	1911	41912	1900 to 2155	2018	—
Set current hour	1913	41914	0 to 23	0	—
Set current minute	1914	41915	0 to 59	0	—
Set current sec	1915	41916	0 to 59	0	—
Electrode size	1917	41918	0 | 1 mm 1 | 3 mm 2 | 8 mm 3 | 10 mm 4 | 6 mm	1 : 3 mm	—
Basic model code	1919	41920	ASCII 16 characters	All Space	—
Suffix config 1	1928	41929	ASCII 16 characters	All Space	—
Suffix config 2	1936	41937	ASCII 16 characters	All Space	—
Option 1	1945	41946	ASCII 16 characters	All Space	—
Option 2	1953	41954	ASCII 16 characters	All Space	—
Option 3	1962	41963	ASCII 16 characters	All Space	—
Option 4	1970	41971	ASCII 16 characters	All Space	—
RS basic model code	1979	41980	ASCII 16 characters	All Space	—
RS suffix config 1	1988	41989	ASCII 16 characters	All Space	—
RS suffix config 2	1996	41997	ASCII 16 characters	All Space	—
RS option 1	2005	42006	ASCII 16 characters	All Space	—
RS option 2	2013	42014	ASCII 16 characters	All Space	—
RS option 3	2022	42023	ASCII 16 characters	All Space	—
RS option 4	2030	42031	ASCII 16 characters	All Space	—
Transmitter serial No	2039	42040	ASCII 16 characters	All Space	—
Flow sensor serial No	2047	42048	ASCII 16 characters	All Space	—
Memo1	2056	42057	ASCII 16 characters	All Space	—
Memo2	2065	42066	ASCII 16 characters	All Space	—
Memo3	2074	42075	ASCII 16 characters	All Space	—
Adhesion check	2200	42201	0 | Disable 1 | Enable	1 : Enable	—
Adhesion level 1	2202	42203	0.0 to 100.0	0.1	M ohm
Adhesion level 2	2204	42205	0.0 to 100.0	0.5	M ohm
Adhesion level 3	2206	42207	0.0 to 100.0	4.0	M ohm

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Adhesion level 4	2208	42209	0.0 to 100.0	12.0	M ohm
Adhesion check cycle	2210	42211	0 0.5 min 1 1 min 2 2 min 3 10 min	2 : 2 min	—
Flow noise check (G)	2212	42213	0 Disable 1 Enable	0 : Disable	—
Flow noise level 1 (G)	2214	42215	0.0 to 999.9	5.0	cm/s
Flow noise level 2 (G)	2216	42217	0.0 to 999.9	10.0	cm/s
Flow noise level 3 (G)	2218	42219	0.0 to 999.9	30.0	cm/s
Flow noise level 4 (G)	2220	42221	0.0 to 999.9	400.0	cm/s
Flow noise damping (G)	2223	42224	0.1 to 500.0	3.0	s
Flow noise span (G)	2225	42226	0.1 to 999.9	1.5	cm/s
Low conductivity function (G)	2228	42229	0 Disable 1 Enable	0 : Disable	—
Conductivity limit (G)	2230	42231	0.0 to 99.999	0.001	mS/cm
Diagnosis execute	2233	42234	0 Not execute 1 Electrode insul exe (G) 2 Connect check exe	0 : Not execute	—
Coil insulation th	2235	42236	0.0 to 100.0	25.0	%
Verification target select	2250	42251	0x0001 Magnetic 0x0002 Excitation 0x0004 Calculation 0x0008 Device status 0x0010 Conn status	0x001F	—
Diagnostic output	2238	42239	0 Zero 1 Measured value 2 Hold	0 : Zero	—
Verification mode	2240	42241	0 No flow 1 Flow	0 : No flow	—
Verification execute	2242	42243	0 Not execute 1 Execute	0 : Not execute	—
Verification No	2244	42245	0 Factory 1 Previous 2 Present	0 : Factory	—
Test auto release time	2400	42401	0 10 min 1 30 min 2 1 h 3 3 h 4 12 h	0 : 10 min	—
Test mode bit	2402	42403	0x00000001 Velo test on 0x00000002 Vol F test on 0x00000004 Mass F test on 0x00000008 Calorie test on (G) 0x00000010 Flow noise test on (G) 0x00000020 Total 1 test on 0x00000040 Total 2 test on 0x00000080 Total 3 test on 0x00020000 P1 test on 0x00040000 SO1 test on 0x00080000 AO2 test on 0x00400000 AI test on (G)	0x00000000	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Velocity test value	2405	42406	-INF to +INF	0.0	Specified in “Velocity unit”
Volume flow test value	2407	42408	-INF to +INF	0.0	Specified in “Volume unit” and “Time unit”
Mass flow test value	2409	42410	-INF to +INF	0.0	Specified in “Mass unit” and “Time unit”
Calorific test value (G)	2412	42413	-INF to +INF	0.0	Specified in “Calorie unit” and “Time unit”
Pulse output 1 test value	2415	42416	0 to 12500	0	Hz
Status output 1 test value	2416	42417	0 Open 1 Close	0 : Open	—
Analog output 2 test value	2418	42419	2.4 to 21.6	4	mA
Analog input test value	2424	42425	0.0 to 21.6	0.0	mA
Alarm output test value	2431	42432	0 Open 1 Close	0 : Open	—
Flow noise test value (G)	2433	42434	-INF to +INF	0.0	—
Total 1 test value	2436	42437	-INF to +INF	0.0	m^3, kg or J (depends on the process variable to be totalized.)
Total 2 test value	2438	42439	-INF to +INF	0.0	m^3, kg or J (depends on the process variable to be totalized.)
Total 3 test value	2440	42441	-INF to +INF	0.0	m^3, kg or J (depends on the process variable to be totalized.)
SD backup name	2600	42601	ASCII 8 characters	SD_FILE	—
Backup name 1	2605	42606	ASCII 16 characters	Backup 1	—
Backup date 1	2613	42614	ASCII 16 characters	01/01/2018	—
Backup name 2	2622	42623	ASCII 16 characters	Backup 1	—
Backup date 2	2630	42631	ASCII 16 characters	01/01/2018	—
Backup name 3	2639	42640	ASCII 16 characters	Backup 1	—
Backup date 3	2647	42648	ASCII 16 characters	01/01/2018	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Backup exec	2656	42657	0 Not execute 1 Store main to 1 2 Store main to 2 3 Store main to 3 4 Store main to SD 5 Store EEP1 to SD 6 Store EEP2 to SD 7 Store EEP3 to SD	0 : Not execute	—
Restore exec	2658	42659	0 Not execute 1 Duplicate data 1 2 Duplicate data 2 3 Duplicate data 3 4 Duplicate SD 5 Restore data 1 6 Restore data 2 7 Restore data 3 8 Restore SD 9 Compulsion data 1 10 Compulsion data 2 11 Compulsion data 3 12 Compulsion SD 13 Restore factory	0 : Not execute	—
Logging file name	2660	42661	ASCII 8 characters	LOG_FILE	—
Logging interval time	2665	42666	0 1 s 1 10 s 2 30 s 3 1 min 4 5 min 5 30 min 6 1 h	3 : 1 min	—
Logging end time	2666	42667	0 10 min 1 30 min 2 1 h 3 3 h 4 12 h 5 24 h 6 72 h 7 240 h 8 720 h 9 1440 h	4 : 12 h	—
Logging 1 select	2668	42669	0 Velocity 1 Volume flow 2 Mass flow 3 Calorie (G) 4 PV 5 Flow noise (G) 6 Adhesion 7 Electrode A 8 Electrode B 9 V peak (G)	4 : PV	—
Logging 2 select	2669	42670	0 Velocity 1 Volume flow 2 Mass flow 3 Calorie (G) 4 PV 5 Flow noise(G) 6 Adhesion 7 Electrode A 8 Electrode B 9 V peak (G)	0 : Velocity	—

Parameter	Relative Address	Register Address	Data range	Default value	Unit
Logging 3 select	2670	42671	0 Velocity 1 Volume flow 2 Mass flow 3 Calorie (G) 4 PV 5 Flow noise(G) 6 Adhesion 7 Electrode A 8 Electrode B 9 V peak (G)	1 : Volume flow	—
Logging 4 select	2671	42672	0 Velocity 1 Volume flow 2 Mass flow 3 Calorie (G) 4 PV 5 Flow noise (G) 6 Adhesion 7 Electrode A 8 Electrode B 9 V peak (G)	2 : Mass flow	—
Logging exec	2673	42674	0 Not execute 1 Execute	0 : Not execute	—
Key code	2800	42801	0000 to 9999	0000	—
Enable write protect	2802	42803	ASCII 8 characters	All Space	—
New password	2807	42808	ASCII 8 characters	All Space	—

3.2.2 Input Register

Parameter	Relative Address	Register Address	Data range	Default value
Current device address	0	30001	1 to 247	1
Current transmission mode	1	30002	0 RTU 1 ASCII	0 : RTU
Current baud rate	2	30003	0 1200 bps 1 2400 bps 2 4800 bps 3 9600 bps 4 19200 bps 5 38400 bps 6 57600 bps 7 115200 bps	4 : 19200 bps
Current parity	3	30004	0 None 1 Odd 2 Even	2 : Even
Current stop bit	4	30005	0 1 bit 1 2 bit	0 : 1 bit
Minimum response time	6	30007	0 to 10000	0 ms
Current data format for float	7	30008	0 ABCD 1 CDAB 2 BADC 3 DCBA	0 : ABCD
Current data format for 4byte	8	30009	0 ABCD 1 CDAB 2 BADC 3 DCBA	0 : ABCD
Current data format for 2byte	9	30010	0 AB 1 BA	0 : AB
Current data format for string	10	30011	0 AB 1 BA	0 : AB
Modbus setting	12	30013	—	R/001/ 19200/E/1
Flowrate%	100	30101	—	—
Flowrate	102	30103	—	—
Total 1	104	30105	—	—
Total 2	106	30107	—	—
Total 3	108	30109	—	—
Total 1 count	110	30111	—	—
Total 2 count	112	30113	—	—
Total 3 count	114	30115	—	—
Velocity	116	30117	—	—
Volume flow	118	30119	—	—
Mass flow	120	30121	—	—
AO2 mA	122	30123	—	—

Parameter	Relative Address	Register Address	Data range		Default value
Velocity status	125	30126	0xF0 0xE0 0xD0 0xC0 0xB0 0xA0 0x90 0x80 0x70 0x60 0x50 0x40 0x30 0x20 0x10 0x00	Good-Const Good-High limited Good-Low limited Good-Not limited Manual-Const Manual-High limited Manual-Low limited Manual-Not limited Poor-Const Poor-High limited Poor-Low limited Poor-Not limited Bad-Const Bad-High limited Bad-Low limited Bad-Not limited	0xC0 : Good-Not limited
Volume flow status	126	30127	0xF0 0xE0 0xD0 0xC0 0xB0 0xA0 0x90 0x80 0x70 0x60 0x50 0x40 0x30 0x20 0x10 0x00	Good-Const Good-High limited Good-Low limited Good-Not limited Manual-Const Manual-High limited Manual-Low limited Manual-Not limited Poor-Const Poor-High limited Poor-Low limited Poor-Not limited Bad-Const Bad-High limited Bad-Low limited Bad-Not limited	0xC0 : Good-Not limited
Mass flow status	127	30128	0xF0 0xE0 0xD0 0xC0 0xB0 0xA0 0x90 0x80 0x70 0x60 0x50 0x40 0x30 0x20 0x10 0x00	Good-Const Good-High limited Good-Low limited Good-Not limited Manual-Const Manual-High limited Manual-Low limited Manual-Not limited Poor-Const Poor-High limited Poor-Low limited Poor-Not limited Bad-Const Bad-High limited Bad-Low limited Bad-Not limited	0xC0 : Good-Not limited
Calorie status (G)	128	30129	0xF0 0xE0 0xD0 0xC0 0xB0 0xA0 0x90 0x80 0x70 0x60 0x50 0x40 0x30 0x20 0x10 0x00	Good-Const Good-High limited Good-Low limited Good-Not limited Manual-Const Manual-High limited Manual-Low limited Manual-Not limited Poor-Const Poor-High limited Poor-Low limited Poor-Not limited Bad-Const Bad-High limited Bad-Low limited Bad-Not limited	0xC0 : Good-Not limited

Parameter	Relative Address	Register Address	Data range		Default value
Status group 0	200	30201	0x00000001 0x00000002 0x00000004 0x00000008 0x00000100 0x00000200 0x00000400 0x00000800 0x00001000 0x00002000 0x00004000 0x00020000 0x00040000 0x00080000 0x00100000 0x00200000 0x01000000 0x02000000 0x04000000 0x08000000 0x10000000 0x20000000 0x40000000	Main board CPU failure Reverse calculation failure Main board EEPROM failure Main board EEPROM default Sensor board failure Sensor communication error A/D1 failure[Signal] A/D2 failure[Exciter] Coil open Coil short Exciter failure PWM2 stop Option board mismatch Option board EEPROM failure Option board A/D failure Option board SPI failure Parameter restore incomplete Indicator board failure Indicator board EEPROM failure LCD driver failure Indicator board mismatch Indicator communication error microSD failure	0x00000000
Status group 1	202	30203	0x00000001 0x00000002 0x00000004 0x00000008 0x00000100 0x00000200 0x00000800 0x00002000 0x00004000 0x00010000 0x00040000 0x00080000 0x00100000 0x00200000 0x02000000 0x04000000 0x10000000 0x20000000 0x40000000 0x80000000	Signal overflow Empty pipe detection H/L or HH/LL alarm Adhesion over level 4 Span configuration error PV flow select configuration error Analog output 2 4-20mA limit error H/L HH/LL configuration error Density configuration error Pulse output 1 configuration error Nominal size configuration error Adhesion configuration error Flow noise configuration error (G) Data logging not started Analog output 2 saturated Pulse output 1 saturated Analog input saturated (G) Cable misconnect Coil insulation warning Transmitter type mismatch	0x00000000

Parameter	Relative Address	Register Address	Data range		Default value
Status group 2	204	30205	0x00000001 0x00000002 0x00000004 0x00000008 0x00000010 0x00000020 0x00000040 0x00000080 0x00000100 0x00000400 0x00000800 0x00002000 0x00010000 0x00020000 0x00040000 0x00080000 0x00100000 0x00200000 0x01000000 0x02000000 0x04000000 0x08000000 0x10000000 0x40000000 0x80000000	Adhesion over level 3 Low conductivity Warning (G) Insulation detection Flow noise over level 3 (G) Flow noise over level 4 (G) Autozero warning Verification warning Factory noise warning Simulation active Analog output 2 fixed Pulse output 1 fixed Analog input fixed Parameter restore running Display over warning microSD card size warning Parameter backup incomplete microSD card mismatch microSD card removal procedure error Watchdog Power off Instant power failure Parameter backup running Data logging running microSD card insert microSD card removed	0x00000000
Status group 3	206	30207	0x00000200 0x00000400	Modbus config update warning G/A mismatch error	0x00000000
Velocity check	300	30301	—		—
Total 1 unit	500	30501	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	Ml(Megaliter) m³ kl(kiloliter) l(liter) cm³ 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 (G) kJ (G) J (G) kcal (G) cal (G) BTU (G)	1 : m³
Analog input value (G)	1100	31101	—		0 mA
IEX power freq	1300	31301	—		—
Measured power freq	1302	31303	—		—

Parameter	Relative Address	Register Address	Data range	Default value
Measured temperature (G)	1305	31306	—	—
Corrected density (G)	1307	31308	—	—
Calorie value (G)	1309	31310	—	—
4-20mA Burnout	1500	31501	0 High 1 Low	—
Alarm record 1	1502	31503	0 All Space 1 010:Main CPU FAIL 2 011:Rev calc FAIL 3 012:Main EEP FAIL 4 013:Main EEP dflt 5 014:Snsr bd FAIL 6 015:Snsr comm ERR 7 016:AD 1 FAIL[Sig] 8 017:AD 2 FAIL[Excit] 9 018:Coil open 10 019:Coil short 11 020:Exciter FAIL 13 022:PWM 2 stop 14 023:Opt bd mismatch 15 024:Opt bd EEP FAIL 16 025:Opt bd A/D FAIL 17 026:Opt bd SPI FAIL 18 027:Restore FAIL 19 028:Ind bd FAIL 20 029:Ind bd EEP FAIL 21 030:LCD drv FAIL 22 031:Ind bd mismatch 23 032:Ind comm ERR 24 033:microSD FAIL 25 050:Signal overflow 26 051:Empty detect 27 052:H/L HH/LL alm 28 053:Adh over lv 4 29 085:Cable miscon 30 120:Watchdog 31 121:Power off 32 122:Inst power FAIL 34 132:Modbus cfg update 35 133:G/A mismatch	—
Alarm record time 1	1503	31504	00000D 00:00 to 99999D 23:59	00000D 00:00

Parameter	Relative Address	Register Address	Data range	Default value
Alarm record 2	1511	31512	0 All Space 1 010:Main CPU FAIL 2 011:Rev calc FAIL 3 012:Main EEP FAIL 4 013:Main EEP dflt 5 014:Snsr bd FAIL 6 015:Snsr comm ERR 7 016:AD 1 FAIL[Sig] 8 017:AD 2 FAIL[Excit] 9 018:Coil open 10 019:Coil short 11 020:Exciter FAIL 13 022:PWM 2 stop 14 023:Opt bd mismatch 15 024:Opt bd EEP FAIL 16 025:Opt bd A/D FAIL 17 026:Opt bd SPI FAIL 18 027:Restore FAIL 19 028:Ind bd FAIL 20 029:Ind bd EEP FAIL 21 030:LCD drv FAIL 22 031:Ind bd mismatch 23 032:Ind comm ERR 24 033:microSD FAIL 25 050:Signal overflow 26 051:Empty detect 27 052:H/L HH/LL alm 28 053:Adh over lv 4 29 085:Cable miscon 30 120:Watchdog 31 121:Power off 32 122:Inst power FAIL 34 132:Modbus cfg update 35 133:G/A mismatch	—
Alarm record time 2	1512	31513	00000D 00:00 to 99999D 23:59	00000D 00:00

Parameter	Relative Address	Register Address	Data range	Default value
Alarm record 3	1520	31521	0 All Space 1 010:Main CPU FAIL 2 011:Rev calc FAIL 3 012:Main EEP FAIL 4 013:Main EEP dflt 5 014:Snsr bd FAIL 6 015:Snsr comm ERR 7 016:AD 1 FAIL[Sig] 8 017:AD 2 FAIL[Excit] 9 018:Coil open 10 019:Coil short 11 020:Exciter FAIL 13 022:PWM 2 stop 14 023:Opt bd mismatch 15 024:Opt bd EEP FAIL 16 025:Opt bd A/D FAIL 17 026:Opt bd SPI FAIL 18 027:Restore FAIL 19 028:Ind bd FAIL 20 029:Ind bd EEP FAIL 21 030:LCD drv FAIL 22 031:Ind bd mismatch 23 032:Ind comm ERR 24 033:microSD FAIL 25 050:Signal overflow 26 051:Empty detect 27 052:H/L HH/LL alm 28 053:Adh over lv 4 29 085:Cable miscon 30 120:Watchdog 31 121:Power off 32 122:Inst power FAIL 34 132:Modbus cfg update 35 133:G/A mismatch	—
Alarm record time 3	1521	31522	00000D 00:00 to 99999D 23:59	00000D 00:00

Parameter	Relative Address	Register Address	Data range	Default value
Alarm record 4	1529	31530	0 All Space 1 010:Main CPU FAIL 2 011:Rev calc FAIL 3 012:Main EEP FAIL 4 013:Main EEP dflt 5 014:Snsr bd FAIL 6 015:Snsr comm ERR 7 016:AD 1 FAIL[Sig] 8 017:AD 2 FAIL[Excit] 9 018:Coil open 10 019:Coil short 11 020:Exciter FAIL 13 022:PWM 2 stop 14 023:Opt bd mismatch 15 024:Opt bd EEP FAIL 16 025:Opt bd A/D FAIL 17 026:Opt bd SPI FAIL 18 027:Restore FAIL 19 028:Ind bd FAIL 20 029:Ind bd EEP FAIL 21 030:LCD drv FAIL 22 031:Ind bd mismatch 23 032:Ind comm ERR 24 033:microSD FAIL 25 050:Signal overflow 26 051:Empty detect 27 052:H/L HH/LL alm 28 053:Adh over lv 4 29 085:Cable miscon 30 120:Watchdog 31 121:Power off 32 122:Inst power FAIL 34 132:Modbus cfg update 35 133:G/A mismatch	—
Alarm record time 4	1530	31531	00000D 00:00 to 99999D 23:59	00000D 00:00
Language package	1700	31701	0 Pack 1 1 Pack 2	—
Operate time	1900	31901	00000D 00:00 to 99999D 23:59	00000D 00:00
Current date	1909	31910	—	01/01/2018
Current time	1917	31918	—	00:00:00
Transmitter type	1926	31927	0 None 1 1A type 2 4A type	2 : 4A type
Option board ID	1927	31928	0 None 1 Multi 3 Modbus	3 : Modbus
Main/B rev	1929	31930	—	—
Sensor/B rev	1933	31934	—	—
Indicator/B rev	1937	31938	—	—
IO1	1942	31943	0 NAN 3 AO2 Act 4 AI Act (G)	0 : NAN
IO2	1943	31944	0 NAN 1 PLS/SO1 Pas	1 : PLS/SO1 Pas
IO3	1944	31945	0 NAN 5 Modbus(GND)	5 : Modbus(GND)
IO4	1945	31946	0 NAN 8 Modbus	8 : Modbus
Adhesion measure value	2200	32201	—	—

Parameter	Relative Address	Register Address	Data range	Default value
Adhesion status	2203	32204	0 Level 0 1 Level 1 2 Level 2 3 Level 3 4 Level 4	—
Flow noise value (G)	2205	32206	—	—
Flow noise status (G)	2208	32209	0 Level 0 1 Level 1 2 Level 2 3 Level 3 4 Level 4	0 : Level 0
Conductivity (G)	2210	32211	—	—
IEX compare	2213	32214	—	—
V peak hold value (G)	2216	32217	—	—
IEX coil resistance	2219	32220	—	—
Electrode voltage A	2221	32222	—	—
Electrode voltage B	2223	32224	—	—
Empty status	2225	32226	0 Full 1 Empty	—
Verification check result	2227	32228	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Verification operate time	2228	32229	—	00000D 00:00
Magnetic result	2236	32237	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Exciting circuit result	2237	32238	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Calculation circuit result	2238	32239	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Device status result	2239	32240	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Connection status result	2240	32241	0 Passed 1 Failed 2 Canceled 3 No data 4 Unknown 5 Skip	—
Factory backup name	2600	32601	—	Factory Delivery

Parameter	Relative Address	Register Address	Data range	Default value
Factory backup date	2608	32609	—	01/01/2018
Restore result	2617	32618	0 Unexecuted 1 Success 2 Failure 3 Running	0 : Unexecuted
Backup result	2618	32619	0 Unexecuted 1 Success 2 Failure 3 Running	0 : Unexecuted
Logging start date	2620	32621	—	01/01/2018
Logging start time	2629	32630	—	00:00:00
Write protect	2800	32801	0 No 1 Yes	0 : No
Software seal	2801	32802	0 Keep 1 Break	0 : Keep

4. Functions

This chapter describes each function of the product. The followings present 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 simultaneously. In addition, the damping time constant for each process value can be specified.
For details about how to check the measurement result and the setting procedure, read Section 4.1.

Totalization function

This product has three totalizers for the process values. In addition to the display with the totalized value, the totalizer function is provided to scale the totalized value with the conversion factor and count a specific flow rate. Also, it has a totalization switch function that compares the specified target value with the totalized value to output the result with the status output, and a totalization preset function that specifies the preset value.
For details about the totalization function and setting procedure, read Section 4.2.

Pulse output, frequency output, and status output

The measurement result can be output with one of the pulse output, frequency output, or status output. When the pulse output is used, the pulse width or pulse rate can be selected. When the frequency output is used, an output at 0% or 100% for the span of the process value can be specified. When the status output is used, the device status can be output with the status output. Both pulse output and frequency output can be set their low cut value each.
For details about each output and the setting procedure, read Section 4.3.

Current output and current input

Up to two current outputs are available. These are 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.
The current input is useful for inputting the fluid temperature via external temperature transmitters.
For details about the current output and current input setting procedures, read Section 4.4.

Auxiliary calculation function

This function performs to calculate the temperature correction for the density or the calorie by inputting the temperature from an external product with the current input. The accuracy for mass flow measurement goes up by setting the temperature correction for density.
For details about the auxiliary calculation function, read Section 4.5.

Alarm

A detected error can be notified as an alarm or warning. This function shows its status based on NAMUR NE107 to suit parameter settings. It is also to record the previously detected alarms as a history and mask unnecessary alarms to disappear them from the display.
For details about the alarm contents and the setting procedure, read Section 4.6.

Display

This display supports multiple languages to select the language to be used on the display. Also, this function shows a time change of the selected parameter as a trend graph on the display.
For details about the display settings, read Section 4.7.

NOTE

The default setting of the language is English upon shipment from the manufacturing plant. Change the language by referring to Subsection 4.7.1 if necessary.
This user's manual shows English at the menu pass of the display.

Device information

This function is to check the parameters specified at the time of ordering, model code, and suffix code of this product on the display.
For details about how to check device information, read Section 4.8.

Diagnostic function

There are many kinds of diagnostic functions, and it is possible to diagnose failure of the product or process status. For example, this function is useful to diagnose the health of the product using the electrode adhesion detecting function, sensor empty check function, or the verification function.
For details about various diagnostic functions, read Section 4.9.

Test mode

This mode is arbitrarily to specify the process value or the value to be output from a connection terminal and test a response from the device.
For details about the test mode, read Section 4.10.

Backup, restore, and duplicate functions

The backup function can be store the setting parameters into the built-in memory in the display. If the optional code MC is selected, the setting parameters are stored in the microSD card supplied with this product in addition to the built-in memory in the display.
The backup data can be used to restore settings in the product in which they were backed up, or duplicate settings to another product.
For details about the backup, restore, and duplicate functions, read Section 4.11.

Software write protection function

The software write protection function for disabling a parameter change is provided separately from the hardware write protection.
For details about the software write protection function, read Chapter 4.12.

4.1 Basic Settings

4.1.1 Overview

This product can simultaneously measure the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise. The measurement result can be output as the current output, frequency output, pulse output, and/or status output.
The table below shows the communication / input-output codes, connection terminals, and input and output for each terminal.

Communication and I/O code		Connection Terminal					
Modbus		I/O1 +/-	I/O2 +/-	I/O3 +	I/O3 -	I/O4 +	I/O4 -
M0	-M	—	P/Sout Passive	—	MODBUS C(Common)	MODBUS B(D1)	MODBUS A(D0)
M2*		Iin Active					
M6	-P	Iout Active					

Iout: Current output
Iin: Current input
P/Sout: Pulse output or status output
MODBUS: MODBUS protocol communication
*: Code M2 is supported by only AXG.
The position of Communication and I/O code:
Integral Type: AXG□□□-□□□□□□□□□□□□□□□-□■■□□
Remote Transmitter: AXG4A-□□□□□□□■■□□

NOTE

The available functions vary depending on the connection terminal type selected at the time of ordering. Need to read above table carefully before use which terminal is applicable to allocate each function.

4.1.2 PV Mapping of Process Value

This function can allows you to map the flow velocity, volumetric flow rate, mass flow rate, and flow noise as 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

Register Address: 40337

Selection	Description
Velocity	Sets the flow velocity to the Primary Value.
Volume	Sets the volumetric flow rate to the Primary Value.
Mass	Sets the mass flow rate to the Primary Value.
Diag	Sets the flow noise to the Primary Value. (Only available for AXG, not for AXW)

Setting example: If the volumetric flow rate is set to PV, and the volumetric flow rate span is set to 100 m^3/h for use, set the parameters as follows.
PV flow select (40337)=“Volume”
Unit (40339)=“m^3”
Time unit (40342)=“/h”
Span (40346)=“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.
Unit (41316)="kg/m^3"
Fixed density (41317)="1000"
PV flow select (40337)="Mass"
Unit (40340)="kg"
Time unit (40342)="/h"
Span (40348)="10000.0"

4.1.3 Display of the Process Value

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

■ Flow rate (PV), Velocity, Volumetric flow rate, Mass flow rate, Totalized value, Calorie

Menu path

Display	Device setup ► Process variables ► (see below)

Register Address	Parameter	Description
30101	Flow rate(%)	Displays the range rate for the process value set to the Primary Value.
30103	Flow rate	Displays the process value set to the Primary Value.
30117	Velocity	Displays the flow velocity.
30119	Volume	Displays the volumetric flow rate.
30121	Mass	Displays the mass flow rate.
30105	Totalizer ►Totalizer 1	Displays the totalized value of totalizer 1.
30107	Totalizer ►Totalizer 2	Displays the totalized value of totalizer 2.
30109	Totalizer ►Totalizer 3	Displays the totalized value of totalizer 3.
31310	Calorie	Displays the calorie. (Only available for AXG, not for AXW)

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Result ► Value

Register Address: 32206

This parameter displays the flow noise.
This parameter is only available for AXG, not for AXW.

4.1.4 Engineering Unit Setting

The unit can be specified for the flow velocity, volumetric flow rate, mass flow rate, and calorie.
Each parameter can be specified using the physical unit and time unit.
For example, when setting "m^3/h" as the volumetric flow rate, specify "m^3" (physical quantity) and "h" (time unit) individually.
However, the time unit is commonly set regardless of the kinds of fluid.
The time unit of the flow velocity is fixed to "/s", and the unit of the flow noise to "cm/s", which do not require settings to be made by the user.
The setting can be configured with the following parameters.

■ Physical unit

Menu path

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

Register Address	Parameter	Description
40338	Velocity ► Unit	Specify the physical unit of the flow velocity.
40339	Volume ► Unit	Specify the physical unit of the volumetric flow rate.
40340	Mass ► Unit	Specify the physical unit of the mass flow rate.
40341	Calorie ► Unit	Specify the physical unit of the calorie. (Only available for AXG, not for AXW)

■ Time unit

Menu path

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

Register Address	Parameter	Description
40342	Volume ► Time unit	Specify the time unit of the volumetric flow rate.
	Mass ► Time unit	Specify the time unit of the mass flow rate.
	Calorie ► Time unit	Specify the time unit of the calorie. (Only available for AXG, not for AXW)

4.1.5 Span Setting

The span can be specified for the flow velocity, volumetric flow rate, mass flow rate, calorie, and flow noise.
However, the span unit conforms to that specified in Subsection 4.1.4. If the unit is changed, the span value is changed to the corresponding value synchronously with the changed unit.
This setting can be configured with the following parameters.

■ Velocity, Volumetric flow rate, Mass flow rate, Calorie

Menu path

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

Register Address	Parameter	Description
40344	Velocity ► Span	Specify the span of the flow velocity.
40346	Volume ► Span	Specify the span of the volumetric flow rate.
40348	Mass ► Span	Specify the span of the mass flow rate.
40350	Calorie ► Span	Specify the span of the calorie. (Only available for AXG, not for AXW)

Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise► Span

Register Address: 42226

This parameter specify the span of the flow noise.
This parameter is only available for AXG, not for AXW.

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 flow rate error as its percentage increases.
- For a line with the stable flow rate, set the flow rate span to approximately 1.5 to 2.0 times toward the normal flow rate.
- Specify the flow rate for which the flow velocity is included within the range from 0.3 to 10 m/s. The flow velocity can be checked using the sizing data described in the general specifications. If the flow velocity is checked using the parameter, it displays the value obtained by converting the specified flow rate span to the flow velocity.

NOTE

Be sure to set the flow rate unit in the beginning 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. When reducing an output fluctuation or changing the response speed, change the damping time constant (default value as 3.0 seconds). It is possible to measure the pulsing flow up to 1 Hz with the value of 0.1 second on this function in case of a piston pump, etc...
This function is applicable to specify each output of the process value (current output or frequency output, and pulse output or totalized value). However, the setting value for flow noise is commonly used the same value from their outputs.
This setting can be configured with the following parameters.

Current output / Frequency output

Menu path

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

Register Address	Parameter	Description
40301	Velocity ►Damp AO/F	Specify the damping time constant of the flow velocity.
40306	Volume ►Damp AO/F	Specify the damping time constant of the volumetric flow rate.
40311	Mass ► Damp AO/F	Specify the damping time constant of the mass flow rate.
40316	Calorie ►Damp AO/F	Specify the damping time constant of the calorie. (Only available for AXG, not for AXW)

■ Pulse output / Totalization

Menu path

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

Register Address	Parameter	Description
40303	Velocity ►Damp pls/ttl	Specify the damping time constant of the flow velocity.
40308	Volume ►Damp pls/ttl	Specify the damping time constant of the volumetric flow rate.
40313	Mass ► Damp pls/ttl	Specify the damping time constant of the mass flow rate.
40318	Calorie ►Damp pls/ttl	Specify the damping time constant of the calorie. (Only available for AXG, not for AXW)

■ Flow noise

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Flow noise ► Damp

Register Address: 42224

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

NOTE

The output fluctuation increases when the damping time constant is set to lower value.
Set the damping time constant to 5 seconds or longer for control processing application.

4.1.7 Low-cut Function Setting

The low-cut value can be specified for the current output, frequency output, pulse output, and totalizer.
The fluctuation output at the flow rate “0” can be reduced when this function is used, because the output of the set value or less becomes “0” forcibly.
However, the unit of low-cut value conforms to that specified in Subsection 4.1.4. If the unit is changed, the low-cut value is changed to the corresponding value synchronously with the changed unit.
Set “0” to the low-cut value if it is unnecessary to use this function.
This setting can be configured with the following parameters.

■ Current output

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO2 ► Low cut

Register Address: 41103

This parameter specify the low-cut value of current output

Frequency output / Pulse output

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Low cut

Register Address: 40708

This parameter specify the low-cut value of frequency output or pulse output.

Totalization

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40505	Totalizer 1 ► Low cut	Specify the low-cut value of totalizer 1.
40524	Totalizer 2 ► Low cut	Specify the low-cut value of totalizer 2.
40543	Totalizer 3 ► Low cut	Specify the low-cut value of totalizer 3.

The hysteresis is set in each case in which the output is changed to “0” through the specified low-cut value and a case in which the output returns to measuring value through the specified low-cut value. The hysteresis in each case is obtained as shown below.

(1) A value with the output changed to “0” through the specified low-cut value

= Low-cut value - (Minimum span specified in multi range x 0.5%)

(2) A value with the output returned through the specified low-cut value

= Low-cut value + (Minimum span specified in multi range x 0.5%)

Example:
Span of volumetric flow rate = 10.0 m^3/h,
Low-cut value = 1.0 m^3/h
In this case, each value is obtained as shown below.

(1) The value with output changed to “0” through the specified low-cut value

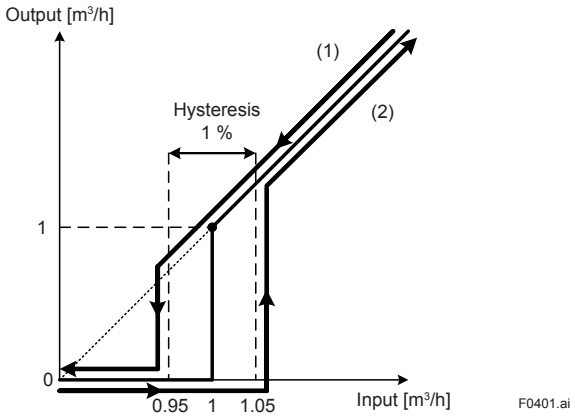
= 1.0 [m^3/h] – (10.0 [m^3/h] × 0.5 [%])

= 0.95 [m^3/h]

(2) The value with output returned through the specified low-cut value

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

= 1.05 [m^3/h]



NOTE

Note that, if the low-cut value is lower, the totalization might be counted due to an influence of output fluctuation near the output 0%.
In particular, if the flow rate span, damping time constant, or conductivity is small or 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 the output process value is changed, specify the low-cut value again.

4.1.8 Sensor’s Nominal Size Setting

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

Menu path

Display	Device setup ► Detailed setup ► Sensor ► (see below)

Register Address	Parameter	Description
40333	Nominal size unit	Specify the unit of the nominal size.
40334	Nominal size	Specify the nominal size.

NOTE

For the integral type, the nominal size and its unit have been set at the factory shipment. Do not change the these parameters.

4.1.9 Density Setting

The density setting is required to measure the mass flow rate. The density can be selected from the fixed density or the density corrected depending on the temperature.
For details about how to measure the mass flow rate or correct the density depending on the temperature, read Subsection 4.5.5.
It will result in a setting error that “0” is set to the density in the situation of mapping the mass flow to PV.
This setting can be configured with the following parameters.

Menu path

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

Register Address	Parameter	Description
41315	Value select	Select the use of the temperature-base density correction function from the following: • Fixed value : Uses the fixed density • Correction value : Uses the corrected density (Only available for AXG, not for AXW)
41316	Unit	Specify the unit of the density.
41317	Fixed density	Specify the fixed density value.
41319	Std density	Specify the reference standard density value to use the temperature-base density correction function. (Only available for AXG, not for AXW)
31308	Correct density	Displays the corrected density. (Only available for AXG, not for AXW)

4.1.10 Temperature Setting

The temperature setting is required to calculate the calorie depending on its difference from the temperature that is input via the current input process.
For details about the calorie measurement, read Subsection 4.5.6.
This parameter is only available for AXG, not for AXW. This setting can be configured with the following parameters.

Menu path

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

Register Address	Parameter	Description
41322	Std temperature	Specify the reference standard temperature to use the temperature-base density correction function.
31306	Meas temperature	Displays the temperature that is input from current input.
41332	Fixed temperature	Specify the reference temperature to use for the calorie caluculation by temperature difference from the temperature which is input from current input.

4.1.11 Zero Adjustment

Zero adjustment is carried out to ensure that the output for zero flow is 0% (i.e., 4 mA). Although adjustment to zero is performed at the manufacturing plant prior to shipment, this procedure must be carried out once again following the installation of piping in order to match the magnetic flowmeter to its operating conditions.
This subsection describes the zero adjustment procedure using the display unit.

IMPORTANT

- Zero adjustment should be carried out before actual operation. Note that setting and update functions cannot be carried out during this procedure (i.e., for approximately 30 seconds).
- Zero adjustment should only be carried out when the sensor has been filled with measurement fluid and the fluid velocity is completely zero by closing the valve.
- Each time that the fluid being measured is changed, it will be necessary for zero adjustment to be carried out for the new fluid.

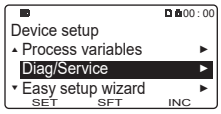
Execution of zero adjustment

Zero adjustment can be executed with the following parameter.

Menu path

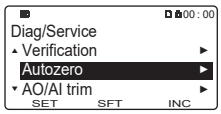
Display	Device setup ▶ Diag/Service ▶ Autozero ▶ Execute ▶ Execute

Register Address: 40361



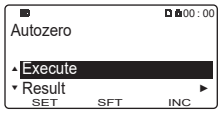
F0402.ai

Select “Diag/Service” accoriding to the menu path above.



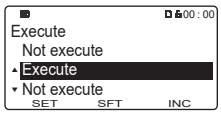
F0403.ai

Select “Autozero”.



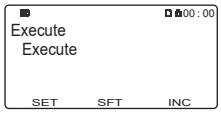
F0404.ai

Select “Execute”.



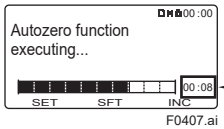
F0405.ai

Select “Execute”.



F0406.ai

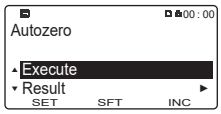
When “Execute” blinks, touch [SET] to execute.



F0407.ai

Autozero starts, and the progress is desplayed with a remaining time and a bar graph. Wait for the completion.

←The time remaining until the end.



F0408.ai

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

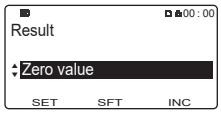
Confirmation of zero adjustment result

Zero adjustment result can be confirmed with the following parameter.

Menu path

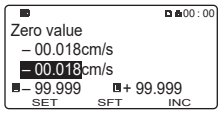
Display	Device setup ► Diag/Service ► Autozero ► Result ► Zero value

Register Address: 40362



F0409.ai

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



F0410.ai

Result of Autozero is indicated as on the left.

NOTE

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

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 provides three totalizers, which can simultaneously operate them for process values.
Totalizer 1 is for the process value PV-mapped described in Subsection 4.1.2. Totalizers 2 and 3 are for the process value in the selected unit.
This setting can be displayed and configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
30501	Totalizer 1 ► Unit	Displays the unit of totalizer 1.
40520	Totalizer 2 ► Unit	Specify the unit of totalizer 2.
40539	Totalizer 3 ► Unit	Specify the unit of totalizer 3.

NOTE

The flow velocity cannot be totalized. If the flow velocity is selected as the Primary Value, totalizer 1 obtains the volumetric flow rate and unit based on “m^3”.

4.2.2 Totalized-Value Display and Totalizer Function

The totalization result can be checked with the totalized value or its value which is scaled with the conversion factor. When the totalized value is scaled with the conversion factor, the specified flow rate is totalized in 1-count increments, which can be used as a totalizer.
If the totalized value on the display exceeds ±99999999, the maximum value of the displayed digits, the displayed value is reset to 0.
The totalized value can be displayed and specified with the following parameters.

■ Display of totalized value

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
30105	Totalizer 1	Displays the totalized value of totalizer 1.
30107	Totalizer 2	Displays the totalized value of totalizer 2.
30109	Totalizer 3	Displays the totalized value of totalizer 3.

NOTE

If Main soft rev (31930) is R1.01.03 or earlier, or Ind soft rev (31938) is R2.01.01 or earlier, the totalized value on the display is held at the upper limit if it exceeds ±99999999, the maximum value of the displayed digits.
For details about how to check the device revision (Main soft rev and Ind soft rev), refer to Subsection 4.8.2.

■ Setting of the conversion factor for scaling

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40503	Totalizer 1 ► Conv factor	Specify the conversion factor of totalizer 1.
40522	Totalizer 2 ► Conv factor	Specify the conversion factor of totalizer 2.
40541	Totalizer 3 ► Conv factor	Specify the conversion factor of totalizer 3.

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

Menu path

Display	This parameter is only available via Modbus communication, not available via display unit.

Register Address	Parameter	Description
30111	Totalizer 1 count	Displays the scaled totalized-value of totalizer 1.
30113	Totalizer 2 count	Displays the scaled totalized-value of totalizer 2.
30115	Totalizer 3 count	Displays the scaled totalized-value of totalizer 3.

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

NOTE

If Main soft rev (31930) is R1.01.03 or earlier, or Ind soft rev (31938) is R2.01.01 or earlier, the totalized value on the display is held at the upper limit if it exceeds ±99999999, the maximum value of the displayed digits.
For details about how to check the device revision (Main soft rev and Ind soft rev), refer to Subsection 4.8.2.

4.2.3 Totalization Switch Function

The totalization switch function is available when the target value (set point) to be totalized is specified using the totalization function. The totalization switch function compares the specified target value with the totalized value to output the result with the status output. Even if the totalized value exceeds the displayed digit limit and is reset to 0 under that state, the status output remains active.
The status output is active while the totalized value is out of the specified target value.
For details about the output, active direction, and status output function setting for each terminal, read Section 4.3.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40517	Totalizer 1 ► Set point	Specify the target value of totalizer 1.
40536	Totalizer 2 ► Set point	Specify the target value of totalizer 2.
40555	Totalizer 3 ► Set point	Specify the target value of totalizer 3.

Example: Setting procedure to use the totalization switch function with the I/O2 terminal
Follow the steps below to set the status output of the I/O2 terminal to “On active” when the totalized value of totalizer 1 reaches the target value.

(1) Set the output of the I/O2 terminal to “Status out”, referring to Subsection 4.3.1.

(2) Set the active direction of the I/O2 terminal to “On active”, referring to Subsection 4.3.3.

(3) Set the status output function to “Total limit 1”, referring to Subsection 4.3.6.

(4) Specify the target value of totalizer 1, referring to this subsection.

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)

Register Address	Parameter	Description
40508	Totalizer 1 ► Failure opts	Specify the totalizer 1 operation to be performed when an alarm has occurred.
40527	Totalizer 2 ► Failure opts	Specify the totalizer 2 operation to be performed when an alarm has occurred.
40546	Totalizer 3 ► Failure opts	Specify the totalizer 3 operation to be performed when an alarm has occurred.

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

Selection	Description
Run	Continues the totalization function after an alarm has occurred.
Hold	Stops the totalization function after an alarm has occurred.
Last valid	Continues the totalization function with the last valid value before an alarm occurs.

4.2.5 Totalization Function Start/Stop Setting

The totalization function can be set to Start/Stop mode.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40511	Totalizer 1 ► Start/Stop	Sets Start/Stop to the totalization function of totalizer 1.
40530	Totalizer 2 ► Start/Stop	Sets Start/Stop to the totalization function of totalizer 2.
40549	Totalizer 3 ► Start/Stop	Sets Start/Stop to the totalization function of totalizer 3.

NOTE

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

4.2.6 Totalization Direction Setting

The totalization direction can be specified to use the totalization function.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40509	Totalizer 1 ► Options	Specify the totalization direction of totalizer 1.
40528	Totalizer 2 ► Options	Specify the totalization direction of totalizer 2.
40547	Totalizer 3 ► Options	Specify the totalization direction of totalizer 3.

From the table below, select the totalization direction.

Selection	Description
Balanced	Totalizes the differential flow rate between the forward and reverse directions.
Absolute	Totalizes the absolute value of the flow rate.
Only positive	Totalizes only the flow rate in the forward direction.
Only negative	Totalizes only the flow rate in the reverse direction.
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. Using the reset function resets the totalized value to “0”. Using the preset function sets the totalized value in advance to the preset value. The preset function is available when starting counting of totalization with 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)

Register Address	Parameter	Description
40513	Totalizer 1 ► Reset/Preset	Uses the reset/preset function of totalizer 1.
40532	Totalizer 2 ► Reset/Preset	Uses the reset/preset function of totalizer 2.
40551	Totalizer 3 ► Reset/Preset	Uses the reset/preset function of totalizer 3.

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

Selection	Description
Not execute	Does not use the totalization value reset/preset function.
Reset	Uses the totalization value reset function.
Preset	Uses the totalization value preset function.

Preset value setting

Menu path

Display	Device setup ► Detailed setup ► Totalizer ► (see below)

Register Address	Parameter	Description
40515	Totalizer 1 ► Preset value	Specify the preset value of totalizer 1.
40534	Totalizer 2 ► Preset value	Specify the preset value of totalizer 2.
40553	Totalizer 3 ► Preset value	Specify the preset value of totalizer 3.

NOTE

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

4.3 Pulse Output, Frequency Output, and Status Output

4.3.1 Outputs of I/O2 Terminals

The I/O2 terminals can be used as the pulse output, frequency output, and status output.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Output mode

Register Address: 40701

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

Selection	Description
No function	Does not use the terminal.
Fixed pulse output	Sets the output to the fixed pulse output.
Frequency output	Sets the output to the frequency output (Duty 50%).
Status output	Sets the output to the status output. For details about the status output, read Subsection 4.3.6.

4.3.2 Alarm Output Function

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

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Alarm out

Register Address: 40711

This parameter specify the alarm output function for the frequency or pulse output.
From the table below, select the use of the alarm output function.

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

4.3.3 Pulse Width Setting

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

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Fix width

Register Address: 40703

This parameter specify the pulse width.
From the table below, select the pulse width.

Pulse width [ms]	Max. output frequency [Hz]
0.05	10000
0.1	5000
0.5	1000

Pulse width [ms]	Max. output frequency [Hz]
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%*	—

* max pulse width is 300 sec.
When “Duty cycle 50%” is selected, Duty 50% can be maintained for 5 minutes.

4.3.4 Active Direction Setting

Whether the pulse signal is set on or off to enable the active mode can be specified when the pulse output or status output is used.
This setting can be configured with the following parameters.

Menu path

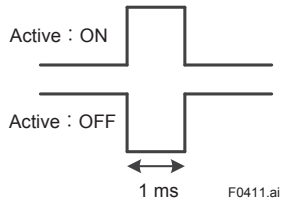
Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Active mode

Register Address: 40702

This parameter specify the active direction for the pulse signal.
From the table below, select the active direction of the pulse signal.

Selection	Description
On active	Sets to Active when the pulse signal is set on.
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”, Active is set as shown below.



4.3.5 Pulse Rate Setting

The pulse rate per pulse and the pulse rate scaling can be specified to use the pulse output when this function is used.
The unit of the pulse rate is set to that of the process value PV-mapped 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 changed synchronously with the changed unit.

■ Pulse rate value

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Rate value

Register Address: 40706

This parameter specify the pulse rate value.

■ Pulse rate scaling

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► Rate unit

Register Address: 40705

This parameter specify the pulse rate scaling.
From the table below, select the pulse rate scaling.

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

Unit: Indicates the unit of the process value to be output as the pulse output.

NOTE

The maximum pulse rate and pulse width must be specified so that the following conditions are satisfied.

Maximum pulse rate value [pps]

= Flow rate span [Unit/s] x Pulse rate [P/Unit]

≤ 10 [k pps]

≤ 1 / (Pulse width × 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.

4.3.6 Frequency Output Range Setting

When the frequency output is used, the frequency at 0% and 100% can be specified for the span of the process value. The frequency output range can be set by specifying the frequency.
Specify the output frequency for the span of the process value PV-mapped described in Subsection 4.1.2.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► (see below)

Register Address	Parameter	Description
40713	Frequency at 0%	Specify the frequency when 0% is set to the process value that is to be output with the frequency output.
40715	Frequency at 100%	Specify the frequency when 100% is set to the process value that is to be output with the frequency output.

4.3.7 Status Output Function Setting

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

Menu path

Display	Device setup ► Detailed setup ► Pulse/Status out ► PO1/SO1 ► SO1 function

Register Address: 40717

This parameter specify the status output function.
From the table below, select the status output function.

Selection	Description
No function	The status output is not available because the status output function is not enabled.
Alarm out	The status output becomes active when an alarm occurs.
Warning output	The status output becomes active when a warning occurs.
Total limit 1	The status output is active while the totalized value of totalizer 1 is out of the specified target value. For details about the totalization switch function, read Subsection 4.2.3.
Total limit 2	The status output is active while the totalized value of totalizer 2 is out of the specified target value. For details about the totalization switch function, read Subsection 4.2.3.
Total limit 3	The status output is active while the totalized value of totalizer 3 is out of the specified target value. For details about the totalization switch function, read Subsection 4.2.3.
H/L alarm	The status output is active while the PV-mapped process value is out of the specified low limit value (L) or high limit value (H). For details about the PV mapping for the process value and alarm information, read Subsection 4.1.2, Section 4.6, and Subsection 4.9.2.
HH/LL alarm	The status output is active while the PV-mapped process value is out of the specified low-low limit value (LL) or high-high limit value (HH). For details about the PV mapping for the process value and alarm information, read Subsection 4.1.2, Section 4.6, and Subsection 4.9.2.

4.4 Current Input and Current Output

4.4.1 Current Output Select

The I/O1 terminals can be used as the current output.
The process value for the current output can be configured with following parameter.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO2 ► AO2 select

Register Address: 41101

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

Selection	Description
No connect	No output.
Velocity	Sets the flow velocity to the output.
Volume flow	Sets the volumetric flow rate to the output.
Mass flow	Sets the mass flow rate to the output.
Calorie	Sets the calorie to the output. (Only available for AXG, not for AXW)
Diag	Sets the flow noise to the output. (Only available for AXG, not for AXW)

4.4.2 Current Output High/Low Limit Function

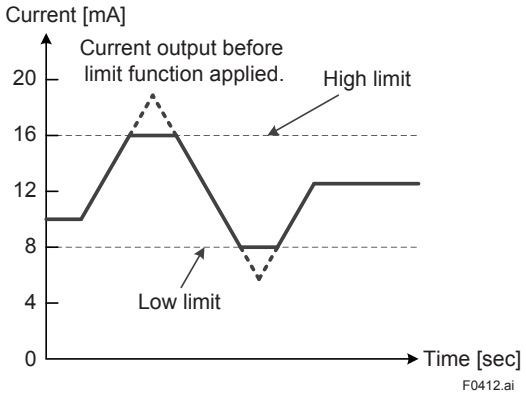
The high/low limit function is available to use the current output. Using the high/low limit function restricts the high limit of 4 to 20 mA current output and the low limit of the 4 to 20 mA current output.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO2 ► (see below)

Register Address	Parameter	Description
41105	High limit	Specify the high limit value to use the I/O1 terminal for the current output.
41107	Low limit	Specify the low limit value to use the I/O1 terminal for the current output.

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



4.4.3 Alarm Output Function

The alarm output function is available to use the current output. The current signal can be output for an occurrence of alarm when this function is used.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AO2 ► Alarm out

Register Address: 41110

This parameter specify the alarm output function to use the I/O1 terminal for the current output.
From the table below, select the use of the alarm output function.

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

4.4.4 Current Output Priority

The priority of the current output functions varies depending on the setting of this product.
The current output is operated based on the following priority level.

Priority level	Output mode
High ↕ Low	Test mode (For details, read Section 4.10.)
	Alarm output function (For details, read Subsection 4.4.2.)
	Verification function, Output during offline diagnosis (For details, read Subsection 4.9.6.)
	Normal output

4.4.5 Current Value Adjustment Function

The current value adjustment function is available to use the current input or current output. To adjust the current output value, after outputting current of 4 mA and 20 mA from this product, connect the ammeter for calibration and measure the current value.
Adjust the current output value by setting the measured current value (adjustment value) to parameter.
To adjust the current input value, after inputting the current of 4 mA and 20 mA from the external product, display the current input value on the indicator of this instrument, See Section 4.7.2.
Adjust the current input value by setting the displayed current value (adjustment value) to parameter.
This setting can be configured with the following parameters.

■ Current input

Menu path

Display	Device setup ► Diag/Service ► AO/AI trim ► AI trim ► (see below)

Register Address	Parameter	Description
41134	Trim 4mA	Specify the adjustment value to use the I/O1 terminal for the 4 mA current input.
41136	Trim 20mA	Specify the adjustment value to use the I/O1 terminal for the 20 mA current input.
41132	Trim clear	Clears the adjustment value to use the I/O1 terminal for the current input.

■ Current output

Menu path

Display	Device setup ► Diag/Service ► AO/AI trim ► AO trim ► (see below)

Register Address	Parameter	Description
41127	AO2 trim 4mA	Specify the adjustment value to use the I/O1 terminal for the 4 mA current output.
41129	AO2 trim 20mA	Specify the adjustment value to use the I/O1 terminal for the 20 mA current output.
41125	AO2 trim clear	Clears the adjustment value to use the I/O1 terminal for the current output.

IMPORTANT

If the input or output does not match the specified current value when the current value adjustment function is used, readjust the current value.

4.4.6 Current Input Function Setting

The output from other product can be set as the current input when the I/O1 terminal is used for the current input.
The current input, which can be used as the temperature input, is available for temperature-base density correction calculation and calorie calculation.
For details about the temperature-input density correction calculation and calorie calculation, read Subsection 4.5.5 and 4.5.6.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► Function

Register Address: 41112

This parameter specify the current input function of the I/O1 terminal.
From the table below, select the current input function.

Selection	Description
No function	The current input is not available because the current input function is not enabled.
Monitoring	Monitoring of the current input is available. However, this function does not give any influences for neither the density correction calculation nor the calorie calculation.
Diff temperature	Uses the current input as a temperature difference. The calorie calculation is available.
Ext temperature	Uses the current input as the absolute temperature. The density correction calculation and calorie calculation are available.

4.4.7 Current Input Range Setting

The input value can be specified with the 4 mA or 20 mA current value when the I/O1 terminal is used for the current input. The current input range can be set by specifying its input value.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► (see below)

Register Address	Parameter	Description
41120	URV	Specify the value that is available when 20 mA is set to the process value that is input with the current input through the I/O1 terminal.
41122	LRV	Specify the value that is available when 4 mA is set to the process value that is input with the current input through the I/O1 terminal.

4.4.8 Current Input High/Low Limit Function

The high/low limit function is available to use the current input. Using the high/low limit function restricts the high limit of 4 to 20 mA current input and the low limit of the 4 to 20 mA current input.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Analog out/in ► AI ► (see below)

Register Address	Parameter	Description
41114	High limit	Specify the high limit value to use the I/O1 terminal for the current input.
41116	Low limit	Specify the low limit value to use the I/O1 terminal for the current input.

4.5 Auxiliary Calculation Function

4.5.1 Fluid Flow Direction Setting

The arrow shown on the surface of the sensor indicates the fluid flow direction. Upon shipment from the manufacturing plant, the flow rate is measured, assuming that the arrow direction is forward.
This product can be changed the parameter setting and measure the flow rate, assuming that the opposite direction of the arrow direction is forward.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► Flow direct

Register Address: 41301

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

Selection	Description
Forward	The arrow direction of the sensor is forward.
Reverse	The opposite direction of the arrow direction of the sensor is forward.

4.5.2 Rate Limit Function Setting

The rate limit function can perform to reduce noises that cannot be all cleared by only 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 process value PV-mapped in Subsection 4.1.2. Set “0” to the dead time if this function is unnecessary to use.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)

Register Address	Parameter	Description
41303	Rate limit	Specify the rate limit value.
41305	Dead time	Specify the dead time.
41308	Noise filter	Specify 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
Manual	The value is specified in the parameter “Rate limit”.	The value is specified in the parameter “Dead time”.
Level 1	0.5%	0.5s
Level 2	1.0%	1.0s
Level 3	5.0%	3.0s

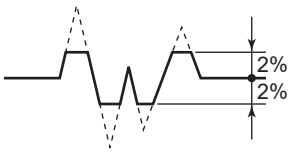
NOTE

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

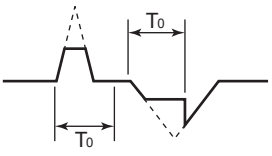
NOTE

Determining the rate limit value and dead time

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



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



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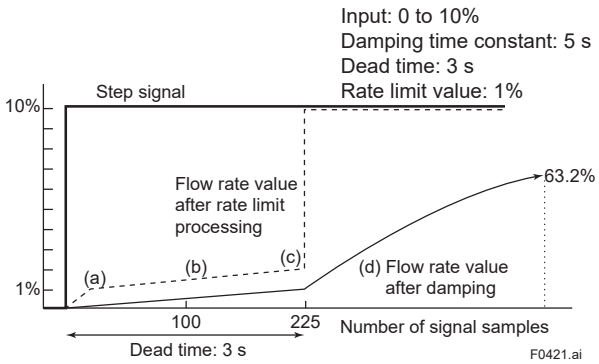
NOTE

For the rate limit function, the dead time is set to “0” upon shipment from the manufacturing plant. 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 value 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 value is in the same direction, this signal is judged to be a flow rate signal.

Example:
(1) Input = 0 to 10%, Damping time constant = 5 seconds, Dead time = 3 seconds, Rate limit value = 1% In this case, the output for the step input is obtained as shown below.



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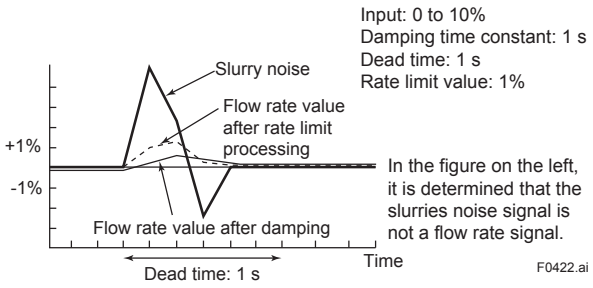
- In the condition above (a), the signal exceeds the rate limit value as compared with the previous value; therefore, the response is set to 1%.
  The actual output, which is damped, is processed as indicated by the solid line.
- Then, the flow rate value in the dead time is set to the “flow rate after damping calculation + signal of rate limit value (1%)”.
- The input signal does not return to the rate limit value or less within the dead time; therefore, it is judged to be a flow rate signal at the time of (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) Input = 0 to 10%, Damping time constant = 1 second, Dead time = 1 seconds, Rate limit value = 1% In this case, the output for a slurry noise is obtained as shown below.



4.5.3 Pulsing Flow Support Function Setting

Using a pump, etc. may cause an error in the average of the flow rate due to the pulsing flow. If the pulsing flow support function is used, an error due to a pulsing flow can be reduced by following a flow 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

Register Address: 41309

This parameter specify the use of the pulsing flow support function.
Select the use of the pulsing flow support function from the table below.

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

4.5.4 Power Frequency Synchronization Setting

This function can be specified whether the excitation frequency (internal signal processing frequency) and power frequency are synchronous or asynchronous.
When making the excitation frequency and power frequency 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)

Register Address	Parameter	Description
41310	Power sync	Makes the excitation frequency and power frequency synchronous.*1
41312	Set power freq	Sets the power frequency when the excitation frequency and power frequency are asynchronous.

*1: From the table below, select the power frequency synchronous/asynchronous mode.

Selection	Description
No	Makes the excitation frequency and power frequency asynchronous.
Yes	Makes 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 to use the transmitter.
Set “Power sync” to Off and specify “Set power freq”.

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

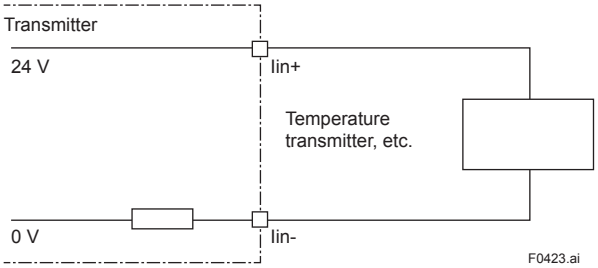
Menu path

Display	Device setup ► Detailed setup ► AUX calculation ► (see below)

Register Address	Parameter	Description
31301	Iex power frequency	Displays the power frequency (synchronous with the excitation frequency).
31303	Meas power freq	Displays the measured power frequency.

4.5.5 Density Correction Calculation

When the temperature from another product (temperature transmitter, etc.) is used as the current input, the density correction calculation can be performed depending on the temperature. Using this function leads to enhancement of the measurement accuracy for the mass flow rate.



The mass flow rate is obtained in the following expression.

$V_m=V_f\times\rho$

V_m: Mass flow rate [kg/s]
V_f: Volumetric flow rate [m³/s]
ρ: Density [kg/m³]

When the density correction calculation is performed depending on the temperature, the density is obtained in the following expression. 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/m³]
ρ_n: Standard density [kg/m³]
T_r: Measured temperature [°C]
T_n: Standard temperature [°C]
a_1: Primary compensating rate
a_2: Secondary compensating rate

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

Menu path

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

Register Address	Parameter	Description
41325	Coef A1	Specify the primary compensating rate.
41327	Coef A2	Specify the secondary compensating rate.

The density correction calculation can be set in the following steps.

(1) Set to the use of the density corrected depending on the temperature, referring to Subsection 4.1.9.

(2) Set the current input of the I/O1 terminal to the temperature, referring to Subsection 4.4.5.

(3) Specify the range of the current input, referring to Subsection 4.4.6.

(4) Specify the standard temperature and standard density, referring to Subsection 4.1.9 and 4.1.10.

(5) Specify the primary compensating rate and secondary compensating rate of the compensation formula.

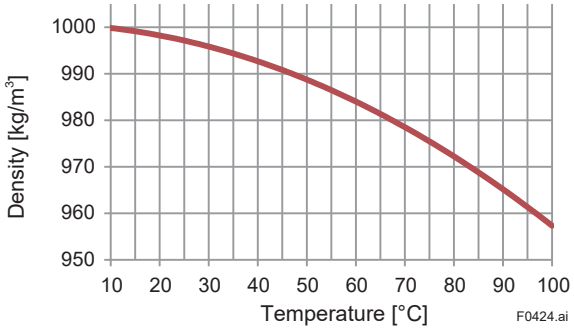
NOTE

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 4.1.9.

Example:

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

Current 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



4.5.6 Calorie Calculation

When the absolute temperature or the temperature difference from other product (temperature transmitter, etc.) is used as the current input, the calorie calculation is executable.

The calorie is obtained in the following expression.

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

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 current input function specified in Subsection 4.4.5. If the temperature difference is selected, specify the temperature used as the current input. If the absolute temperature is selected, specify a difference between the temperature used as the current input and the reference temperature specified in Subsection 4.1.10.
["The temperature of being current input" – "The reference temperature of being set"]

This function is only available for AXG, not for AXW. This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Pro var ► Calorie ► Specific heat

Register Address: 41330

This parameter specify the specific heat.

The calorie calculation can be configured by the following procedure.

- **When the absolute temperature is selected as the current input:**

(1) Set the current input of the I/O1 terminal to the absolute temperature, referring to Subsection 4.4.5.

(2) Specify the range of the current input, referring to Subsection 4.4.6.

(3) Specify the reference temperature, referring to Subsection 4.1.10.

(4) Specify the specific heat.

- **When the temperature difference is selected as the current input:**

(1) Set the current input of the I/O1 terminal to the temperature difference, referring to Subsection 4.4.5.

(2) Specify the range of the current input, referring to Subsection 4.4.6.

(3) Specify the specific heat.

4.6 Alarm

4.6.1 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.
S	Out of specification	The device works in out of specification. The output signal is uncertain for the process or the ambience.
M	Maintenance required	The maintenance is required in the near future.
N	No Effect	Other issue

The following table shows possible countermeasures.

■ System Alarm

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

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
F	010:Main CPU FAIL	Main board CPU failure	CPU (Main board) failure was detected.	Contact Yokogawa service center.
F	011:Rev calc FAIL	Reverse calculation failure	Failure of reverse calculation was detected.	Contact Yokogawa service center.
F	012:Main EEP FAIL	Main board EEPROM failure	Failure of EEPROM (Main board) was detected.	Turn on the power again within the temperature range. If the problem does not improve, contact Yokogawa service center.
F	013:Main EEP dflt	Main board EEPROM default	EEPROM (Main board) was reset to default values.	Contact Yokogawa service center.
F	014:Snsr bd FAIL	Sensor board failure	Failure of sensor board was detected.	Contact Yokogawa service center.
F	015:Snsr comm ERR	Sensor communication error	Communication error of sensor was detected.	Contact Yokogawa service center.
F	016:AD 1 FAIL[Sig]	A/D1 failure[Signal]	Failure of A/D transmitter 1 [flow velocity signal] was detected.	Contact Yokogawa service center.
F	017:AD 2 FAIL[Excit]	A/D2 failure[Exciter]	Failure of A/D transmitter 2 [Exciting current] was detected.	Contact Yokogawa service center.
F	018:Coil open	Coil open	Coil of sensor was disconnected.	Turn off the power, check coil of sensor and excitation cable.
F	019:Coil short	Coil short	Coil of sensor was shorted.	Contact Yokogawa service center.
F	020:Exciter FAIL	Exciter failure	Failure of excitation circuit was detected.	Contact Yokogawa service center.
F	022:PWM 2 stop	PWM2 stop	Error of pulse width modulation 2 was detected.	Contact Yokogawa service center.
F	023:Opt bd mismatch	Option board mismatch	Mismatch of option board was detected.	Contact Yokogawa service center.
F	024:Opt bd EEP FAIL	Option board EEPROM failure	Failure of EEPROM (option board) was detected.	Contact Yokogawa service center.
F	025:Opt bd A/D FAIL	Option board A/D failure	Failure of A/D (option board) was detected.	Contact Yokogawa service center.
F	026:Opt bd SPI FAIL	Option board SPI failure	Failure of SPI (option board) was detected.	Contact Yokogawa service center.

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
F	027:Restore FAIL	Parameter restore incomplete	Restore of parameters was failed.	Retry parameter restoration.
F	028:Ind bd FAIL	Indicator board failure	Failure of indicator board was detected.	Check the ambient temperature of display is within the range. If the problem does not improve, contact Yokogawa service center.
F	029:Ind bd EEP FAIL	Indicator board EEPROM failure	Failure of EEPROM (indicator board) was detected.	Turn on the power again within the temperature range. If the problem does not improve, contact Yokogawa service center.
F	030:LCD drv FAIL	LCD driver failure	Failure of LCD driver was detected.	Contact Yokogawa service center.
F	031:Ind bd mismatch	Indicator board mismatch	Mismatch of Indicator board was detected.	Contact Yokogawa service center.
F	032:Ind comm ERR	Indicator communication error	Communication error of indicator board was detected.	Check connection of Indicator & main board.
F	033:microSD FAIL	microSD card failure	Failure of microSD card was detected.	Change microSD card.

Process Alarm

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

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
S	050:Signal overflow	Signal overflow	Failure of input signal was detected.	Check signal cable and grounding.
S	051:Empty detect	Empty pipe detection	Empty inside of sensor was detected. (Empty pipe detection)	Fill flow tube with fluid.
N	052:H/L HH/LL alm	H/L or HH/LL alarm	Flow rate exceeded upper limit or lower limit.	Check flow rate and setting value.
S	053:Adh over lv 4	Adhesion over level 4	The resistance value of the electrodes exceeded Level 4. (Adhesion detection of insulation to electrode)	Clean electrodes.

Setting Alarm

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

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
S	060:Span cfg ERR	Span configuration error	Setting error of flow span was detected. (fulfill “0.05 m/s < Span < 16 m/s”)	Check or change span parameter setting.
S	061:PV F cfg ERR	PV flow select configuration error	PV was set to flow noise.	Check or change PV FLOW SEL parameter setting.
S	063:AO 2 4-20 lmt	Analog output 2 4-20mA limit error	Setting error of Current output 2 was detected. (fulfill “LRV < HRV”)	Check or change Analog output 2 parameter setting.

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
N	065:H/L cfg ERR	H/L HH/LL configuration error	Setting error of ararm high/low limit function was detected. (fulfill “Hi Alarm - Lo Alarm > H/L Hys” and “HH Alarm - LL Alarm > HH/LL Hys”)	Check and change H/L, HH/LL parameter setting.
S	066:Density cfg ERR	Density configuration error	Setting error of density value was detected when PV was set to mass flow rate.	Check and change Density parameter setting.
S	067:Pls 1 cfg ERR	Pulse output 1 configuration error	Setting error of Pulse output 1 was detected.	Change Pulse output 1 parameter setting.
C	069:Nomi size cfg	Nominal size configuration error	Configuration error of nominal size was detected. (fulfill “0.99 mm < nominal size < 3000.10 mm (0.01 inch < nominal size < 120.10 inch)”)	Check and change nominal paramter setting.
C	070:Adh cfg ERR	Adhesion configuration error	Setting error of electrode adhesion detection function was detected. (fulfill “Level1 < Level2 < Level3 < Level4”)	Check and change adhesion parameter setting.
C	071:FLN cfg ERR	Flow noise configuration error	Setting error of flow noise verification function was detected. (fulfill “Level1 < Level2 < Level3 < Level4”)	Change flow noise paramter setting.
C	072:Log not start	Data logging not started	Data logging failed to start.	Insert microSD card.

■ Warning

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

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
S	081:AO 2 saturate	Analog output 2 saturated	Saturation of Analog output 2 was detected.	Check process value and current output 2 parameter setting.
S	082:Pls 1 saturate	Pulse output 1 saturated	Saturation of Pulse output 1 was detected.	Check process value and pulse output 1 parameter setting.
S	084:AI saturate	Analog input saturated	Saturation of Analog input was detected.	Check current input value and current input parameter setting.
C	085:Cable miscon	Cable misconnect	Misconnection of cable was detected.	Check the signal cable and excitation cable connection.
C	086:Coil insulation	Coil insulation warning	Insulation deterioration of coil was detected.	Contact Yokogawa service center.
M	087:Adhesion lv 3	Adhesion over level 3	The resistance value of electrode exceeded Level 3. (Adhesion detection of insulation to electrode)	Recommend cleaning electrode.
N	088:LC warn	Low conductivity warning	Decrease of conductivity was detected.	Check fluid conductivity.
M	089:Insu detect	Insulation detection	Insulation deterioration of electrode was detected.	Contact Yokogawa service center.
N	090:FLN over lv 3	Flow noise over level 3	Flow noise exceeded Level 3. (Detection of flow noise)	Check fluid conductivity or bubble.
N	091:FLN over lv 4	Flow noise over level 4	Flow noise exceeded Level 4. (Detection of flow noise)	Check fluid conductivity or bubble.

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
C	092:AZ warn	Autozero warning	Result of Autozero adjustment |Mag Flow Zero| exceeded 10 cm/s.	Check fluid is stopped when executing auto-zero adjustment.
C	093:Verif warn	Verification warning	Interruption of verification function was detected.	Execute Verification again.
C	094:Fact noise warn	Factory noise warning	Fluctuation of flow became larger.	Check the fluid.
C	095:Simulate active	Simulation active	Test mode was executed for any of Flow velocity, Volumetric flow rate, Mass flow rate, Calorie, Current output, Pulse output, Status input, Status output.	Release simulation or test mode.
S	097:AO 2 fix	Analog output 2 fixed	It was detected that fixed value is set to Current output 2.	Check current output 2 is test mode or not.
S	098:Pls 1 fix	Pulse output 1 fixed	It was detected that fixed value is set to Pulse output 1.	Check pulse output 1 is test mode or not.
S	100:AI fix	Analog input fixed	It was detected that fixed value is set to Current input.	Check current input is test mode or not.
C	101:Param restore run	Parameter restore running	Restore function of parameter was executed.	—
N	102:Disp over	Display over warning	Number of digits available for display exceeded the limit.	Check Display format parameter.
N	103:SD size warn	microSD card size warning	Free space of microSD card decreased to less than 10%.	microSD card may run out of memory space.
M	104:Bkup incmplt	Parameter backup incomplete	Parameter backup failed.	Retry parameter backup.
S	105:SD mismatch	microSD card mismatch	Mismatch of microSD card was detected.	Change microSD card.
M	106:SD removal ERR	microSD card removal procedure error	Removal of microSD card failed.	Remove microSD in appropriate procedure.
N	131:Trans mismatch	Transmiter type mismatch	Mismatch of sensor and transmitter was detected.	Contact Yokogawa service center.

Information

The device works normally and measurement is also normal. Just reference information.

NE 107	Error Message		Error Description	Countermeasure
	Display	Modbus		
N	120:Watchdog	Watchdog	Error of Watchdog timer was detected.	Contact Yokogawa service center.
N	121:Power off	Power off	Power-off was detected.	—
N	122:Inst power FAIL	Instant power failure	Instantaneous power failure was detected.	—
N	123:Param bkup run	Parameter backup running	Parameter backup is running.	—
N	124:Data log run	Data logging running	Data log is running.	—
N	132:Modbus cfg update	Modbus config update warning	The Modbus configuration has been changed, but the device is not operating according to its configuration.	Restart Modbus communication.
N	133:G/A mismatch	G/A mismatch error	As a result of self-test, inconsistency of internal circuit was detected.	Contact Yokogawa service center.

4.6.2 Operation at the time of error

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

System Alarm

NE 107	Error Message	Output				Total	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	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				Total	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				Total	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	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
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				Total	Process Value	Display
		Alarm	warning	Current	Pulse/ Status			
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	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

NE 107	Error Message	Output				Total	Process Value	Display
		Alarm	warning	Current	Pulse/ Status			
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	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	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				Total	Process Value	Display
		Alarm	warning	Current	Pulse/ Status			
N	120:Watchdog	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	121:Power off	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	122:Inst power FAIL	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	123:Param bkup run	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Execute
N	124:Data log run	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Icon
N	132:Modbus cfg update	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal
N	133:G/A mismatch	Non-Active	Active	Normal	Normal	Continue	Normal Operation	Normal

4.6.3 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: mode to display the process value and alarm name, and mode to display the alarm name and action.
If multiple errors occur on this product, the corresponding alarms are displayed in sequence on the display.
This setting can be configured with the following parameters.

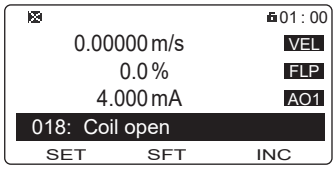
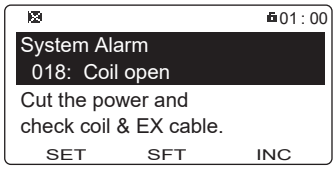
Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Alarm display

Register Address: 41720

This parameter sets the alarm display.

From the table below, select the alarm display.

Selection	Description
Normal	Displays the process value and alarm name.  F0425.ai
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

Register Address: 41719

This parameter sets the alarm display based on NAMUR NE107.

From the table below, select alarm display.

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

4.6.4 Alarm History Function

The alarm history function records the previously detected alarms as a 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)

Register Address	Parameter	Description
31503	Record alarm 1	Displays the name of new alarm 1.
31504	Record time 1	Displays the operating time at which new alarm 1 has occurred.
31512	Record alarm 2	Displays the name of new alarm 2.
31513	Record time 2	Displays the operating time at which new alarm 2 has occurred.
31521	Record alarm 3	Displays the name of new alarm 3.
31522	Record time 3	Displays the operating time at which new alarm 3 has occurred.
31530	Record alarm 4	Displays the name of new alarm 4.
31531	Record time 4	Displays the operating time at which new alarm 4 has occurred.

The operating time at alarm occurrence is displayed in format, “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 operated for 31 days, 12 hours, and 34 minutes.

4.6.5 Alarm Mask Function

The alarm mask function can mask the specified alarm, hide an alarm notification, and record no alarm history. This function can be set for each of the alarm notification and alarm history.
This setting can be configured with the following parameters.

■ Alarm notification mask

If the alarm notification mask function is turned “On”, it disables alarm notification.
Setting example for alarm “Signal overflow”:
To disable the alarm notification, set “Signal overflow” of Alarm out mask 2 to “On”.
To enable the alarm notification, set “Signal overflow” of Alarm out mask 2 to “Off”.

Menu path

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

Register Address	Parameter	Description
41513	Mask 1-1	Specifies the mask function for alarm notification 1-1.
	Mask 1-2	Specifies the mask function for alarm notification 1-2.
41515	Mask 2-1	Specifies the mask function for alarm notification 2-1.
	Mask 2-2	Specifies the mask function for alarm notification 2-2.
41517	Mask 3-1	Specifies the mask function for alarm notification 3-1.
	Mask 3-2	Specifies the mask function for alarm notification 3-2.
41519	Mask 4-1	Specifies the mask function for alarm notification 4-1.

Alarm history mask

If the alarm record mask function is turned “On”, it disables the alarm record.
Setting example for alarm “Empty pipe detection”:
To disable the alarm record, set “Empty pipe detection” of Alarm record mask 2 to “On”.
To enable the alarm record, set “Empty pipe detection” of Alarm record mask 2 to “Off”.

Menu path

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

Register Address	Parameter	Description
41522	Mask 1-1	Specifies the mask function for alarm history 1-1.
	Mask 1-2	Specifies the mask function for alarm history 1-2.
41524	Mask 2-1	Specifies the mask function for alarm history 2-1.
	Mask 2-2	Specifies the mask function for alarm history 2-2.
41528	Mask 3-1	Specifies the mask function for alarm history 3-1.

NOTE

Note that the alarm masked by the alarm notification mask function is not recorded in the alarm history.

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 plant). (✓: Masked, -: Not masked)
Attribute	Indicates whether the mask setting is enabled or disabled. (✓: Enabled, -: Disabled)

Alarm notification mask function

Display		Modbus		Default value	Attribute
Parameter name	**Alarm name**	**Parameter name**	**Alarm name**		
—	010:Main CPU FAIL	—	Main board CPU failure	—	—
—	011:Rev calc FAIL	—	Reverse calculation failure	—	—
—	012:Main EEP FAIL	—	Main board EEPROM failure	—	—
Mask 1-1	013:Main EEP dflt	Alarm out mask 1	Main board EEPROM default	—	✓
—	014:Snsr bd FAIL	—	Sensor board failure	—	—
—	015:Snsr comm ERR	—	Sensor communication error	—	—
—	016:AD 1 FAIL[Sig]	—	A/D1 failure[Signal]	—	—
—	017:AD 2 FAIL[Excit]	—	A/D2 failure[Exciter]	—	—
—	018:Coil open	—	Coil open	—	—
—	019:Coil short	—	Coil short	—	—
—	020:Exciter FAIL	—	Exciter failure	—	—
Mask 1-2	022:PWM 2 stop	Alarm out mask 1	PWM2 stop	—	✓
Mask 1-2	023:Opt bd mismatch	Alarm out mask 1	Option board mismatch	—	✓
Mask 1-2	024:Opt bd EEP FAIL	Alarm out mask 1	Option board EEPROM failure	—	✓

Display		Modbus		Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name		
Mask 1-2	025:Opt bd A/D FAIL	Alarm out mask 1	Option board A/D failure	—	✓
Mask 1-2	026:Opt bd SPI FAIL	Alarm out mask 1	Option board SPI failure	—	✓
—	027:Restore FAIL	—	Parameter restore incomplete	—	—
Mask 1-2	028:Ind bd FAIL	Alarm out mask 1	Indicator board failure	✓	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm out mask 1	Indicator board EEPROM failure	—	✓
Mask 1-2	030:LCD drv FAIL	Alarm out mask 1	LCD driver failure	—	✓
Mask 1-2	031:Ind bd mismatch	Alarm out mask 1	Indicator board mismatch	—	✓
Mask 1-2	032:Ind comm ERR	Alarm out mask 1	Indicator communication error	—	✓
Mask 1-2	033:microSD FAIL	Alarm out mask 1	microSD failure	—	✓
Mask 2-1	050:Signal overflow	Alarm out mask 2	Signal overflow	—	✓
Mask 2-1	051:Empty detect	Alarm out mask 2	Empty pipe detection	—	✓
Mask 2-1	052:H/L HH/LL alm	Alarm out mask 2	H/L or HH/LL alarm	✓	✓
Mask 2-1	053:Adh over lv 4	Alarm out mask 2	Adhesion over level 4	✓	✓
Mask 2-1	060:Span cfg ERR	Alarm out mask 2	Span configuration error	—	✓
Mask 2-1	061:PV F cfg ERR	Alarm out mask 2	PV flow select configuration error	—	✓
Mask 2-1	063:AO 2 4-20 lmt	Alarm out mask 2	Analog output 2 4-20 mA limit error	—	✓
Mask 2-1	065:H/L cfg ERR	Alarm out mask 2	H/L HH/LL configuration error	—	✓
Mask 2-1	066:Density cfg ERR	Alarm out mask 2	Density configuration error	—	✓
Mask 2-2	067:Pls 1 cfg ERR	Alarm out mask 2	Pulse output 1 configuration error	—	✓
Mask 2-2	069:Nomi size cfg	Alarm out mask 2	Nominal size configuration error	—	✓
Mask 2-2	070:Adh cfg ERR	Alarm out mask 2	Adhesion configuration error	—	✓
Mask 2-2	071:FLN cfg ERR	Alarm out mask 2	Flow noise configuration error	—	✓
Mask 2-2	072:Log not start	Alarm out mask 2	Data logging not started	—	✓
Mask 2-2	081:AO 2 saturate	Alarm out mask 2	Analog output 2 saturated	✓	✓
Mask 2-2	082:Pls 1 saturate	Alarm out mask 2	Pulse output 1 saturated	✓	✓
Mask 2-2	084:AI saturate	Alarm out mask 2	Analog input saturated	✓	✓
Mask 2-2	085:Cable miscon	Alarm out mask 2	Cable misconnect	—	✓
Mask 2-2	086:Coil insulation	Alarm out mask 2	Coil insulation warning	✓	✓
Mask 2-2	131:Trans mismatch	Alarm out mask 2	Transmitter type mismatch	—	✓
Mask 3-1	087:Adhesion lv 3	Alarm out mask 3	Adhesion over level 3	✓	✓
Mask 3-1	088:LC warn	Alarm out mask 3	Low conductivity warning	✓	✓
Mask 3-1	089:Insu detect	Alarm out mask 3	Insulation detection	✓	✓
Mask 3-1	090:FLN over lv 3	Alarm out mask 3	Flow noise over level 3	✓	✓
Mask 3-1	091:FLN over lv 4	Alarm out mask 3	Flow noise over level 4	✓	✓
Mask 3-1	092:AZ warn	Alarm out mask 3	Autozero warning	✓	✓
Mask 3-1	093:Verif warn	Alarm out mask 3	Verification warning	✓	✓
Mask 3-1	094:Fact noise warn	Alarm out mask 3	Factory noise warning	✓	✓
Mask 3-1	095:Simulate active	Alarm out mask 3	Simulation active	—	✓

Display		Modbus		Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name		
Mask 3-1	097:AO 2 fix	Alarm out mask 3	Analog output 2 fixed	—	✓
Mask 3-1	098:Pls 1 fix	Alarm out mask 3	Pulse output 1 fixed	—	✓
Mask 3-1	100:AI fix	Alarm out mask 3	Analog input fixed	—	✓
Mask 3-2	101:Param restore run	Alarm out mask 3	Parameter restore running	✓	✓
Mask 3-2	102:Disp over	Alarm out mask 3	Display over warning	✓	✓
Mask 3-2	103:SD size warn	Alarm out mask 3	microSD card size warning	✓	✓
Mask 3-2	104:Bkup incmplt	Alarm out mask 3	Parameter backup incomplete	✓	✓
Mask 3-2	105:SD mismatch	Alarm out mask 3	microSD card mismatch	✓	✓
Mask 3-2	106:SD removal ERR	Alarm out mask 3	microSD card removal procedure error	✓	✓
Mask 3-2	120:Watchdog*1	Alarm out mask 3	Watchdog*1	✓	✓
Mask 3-2	121:Power off*1	Alarm out mask 3	Power off*1	✓	✓
Mask 3-2	122:Inst power FAIL*1	Alarm out mask 3	Instant power failure*1	✓	✓
Mask 3-2	123:Param bkup run	Alarm out mask 3	Parameter backup running	✓	✓
Mask 3-2	124:Data log run	Alarm out mask 3	Data logging running	✓	✓
Mask 4-1	132:Modbus cfg update	Alarm out mask 4	Modbus config update warning	✓	✓
Mask 4-1	133:G/A mismatch	Alarm out mask 4	G/A mismatch error	✓	✓

*1: Recorded in the alarm history regardless of the setting of the alarm notification mask function.

■ Alarm history mask function

Display		Modbus		Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name		
—	010:Main CPU FAIL	—	Main board CPU failure	—	—
—	011:Rev calc FAIL	—	Reverse calculation failure	—	—
—	012:Main EEP FAIL	—	Main board EEPROM failure	—	—
Mask 1-1	013:Main EEP dflt	Alarm record mask 1	Main board EEPROM default	—	✓
—	014:Snsr bd FAIL	—	Sensor board failure	—	—
—	015:Snsr comm ERR	—	Sensor communication error	—	—
—	016:AD 1 FAIL[Sig]	—	A/D1 failure[Signal]	—	—
—	017:AD 2 FAIL[Excit]	—	A/D2 failure[Exciter]	—	—
—	018:Coil open	—	Coil open	—	—
—	019:Coil short	—	Coil short	—	—
Mask 1-1	020:Exciter FAIL	Alarm record mask 1	Exciter failure	—	✓
Mask 1-2	022:PWM 2 stop	Alarm record mask 1	PWM2 stop	—	✓
Mask 1-2	023:Opt bd mismatch	Alarm record mask 1	Option board mismatch	—	✓
Mask 1-2	024:Opt bd EEP FAIL	Alarm record mask 1	Option board EEPROM failure	—	✓
Mask 1-2	025:Opt bd A/D FAIL	Alarm record mask 1	Option board A/D failure	—	✓
Mask 1-2	026:Opt bd SPI FAIL	Alarm record mask 1	Option board SPI failure	—	✓

Display		Modbus		Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name		
—	027:Restore FAIL	—	Parameter restore incomplete	—	—
Mask 1-2	028:Ind bd FAIL	Alarm record mask 1	Indicator board failure	—	✓
Mask 1-2	029:Ind bd EEP FAIL	Alarm record mask 1	Indicator board EEPROM failure	—	✓
Mask 1-2	030:LCD drv FAIL	Alarm record mask 1	LCD driver failure	—	✓
Mask 1-2	031:Ind bd mismatch	Alarm record mask 1	Indicator board mismatch	—	✓
Mask 1-2	032:Ind comm ERR	Alarm record mask 1	Indicator communication error	—	✓
Mask 1-2	033:microSD FAIL	Alarm record mask 1	microSD failure	—	✓
Mask 2-1	050:Signal overflow	Alarm record mask 2	Signal overflow	—	✓
Mask 2-1	051:Empty detect	Alarm record mask 2	Empty pipe detection	—	✓
Mask 2-1	052:H/L HH/LL alm	Alarm record mask 2	H/L or HH/LL alarm	—	✓
Mask 2-1	053:Adh over lv 4	Alarm record mask 2	Adhesion over level 4	—	✓
—	060:Span cfg ERR	—	Span configuration error	✓	—
—	061:PV F cfg ERR	—	PV flow select configuration error	✓	—
—	063:AO 2 4-20 lmt	—	Analog output 2 4-20 mA limit error	✓	—
—	065:H/L cfg ERR	—	H/L HH/LL configuration error	✓	—
—	066:Density cfg ERR	—	Density configuration error	✓	—
—	067:Pls 1 cfg ERR	—	Pulse output 1 configuration error	✓	—
—	069:Nomi size cfg	—	Nominal size configuration error	✓	—
—	070:Adh cfg ERR	—	Adhesion configuration error	✓	—
—	071:FLN cfg ERR	—	Flow noise configuration error	✓	—
—	072:Log not start	—	Data logging not started	✓	—
—	081:AO 2 saturate	—	Analog output 2 saturated	✓	—
—	082:Pls 1 saturate	—	Pulse output 1 saturated	✓	—
—	084:AI saturate	—	Analog input saturated	✓	—
Mask 2-2	085:Cable miscon	Alarm record mask 2	Cable misconnect	—	✓
—	086:Coil insulation	—	Coil insulation warning	✓	—
—	131:Trans mismatch	—	Transmitter type mismatch	✓	—
—	087:Adhesion lv 3	—	Adhesion over level 3	✓	—
—	088:LC warn	—	Low conductivity warning	✓	—
—	089:Insu detect	—	Insulation detection	✓	—
—	090:FLN over lv 3	—	Flow noise over level 3	✓	—
—	091:FLN over lv 4	—	Flow noise over level 4	✓	—
—	092:AZ warn	—	Autozero warning	✓	—

Display		Modbus		Default value	Attribute
Parameter name	Alarm name	Parameter name	Alarm name		
—	093:Verif warn	—	Verification warning	✓	—
—	094:Fact noise warn	—	Factory noise warning	✓	—
—	095:Simulate active	—	Simulation active	✓	—
—	097:AO 2 fix	—	Analog output 2 fixed	✓	—
—	098:Pls 1 fix	—	Pulse output 1 fixed	✓	—
—	100:AI fix	—	Analog input fixed	✓	—
—	101:Param restore run	—	Parameter restore running	✓	—
—	102:Disp over	—	Display over warning	✓	—
—	103:SD size warn	—	microSD card size warning	✓	—
—	104:Bkup incmplt	—	Parameter backup incomplete	✓	—
—	105:SD mismatch	—	microSD card mismatch	✓	—
—	106:SD removal ERR	—	microSD card removal procedure error	✓	—
—	120:Watchdog*1	—	Watchdog*1	—	—
—	121:Power off*1	—	Power off*1	—	—
—	122:Inst power FAIL*1	—	Instant power failure*1	—	—
—	123:Param bkup run	—	Parameter backup running	✓	—
—	124:Data log run	—	Data logging running	✓	—
Mask 3-1	132:Modbus cfg update	Alarm record mask 3	Modbus config update warning	✓	✓
Mask 3-1	133:G/A mismatch	Alarm record mask 3	G/A mismatch error	✓	✓

*1: Recorded in the alarm history regardless of the setting of the alarm notification mask function.

4.7 Display

4.7.1 Language Setting

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

■ Language selection

Menu path

Display	Device setup ► Language

Register Address: 41727

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

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

■ Display of language package

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Language package

Register Address: 31701

This parameter indicates the language package for the display.

4.7.2 Display Item Setting

This product can be shown up to eight items on the display while scrolling the screen. Specify a display item in each of eight display lines.
This setting can be configured with the following parameters.

Menu path

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

Register Address	Parameter	Description
41701	Line 1	Specify item 1 to be shown on the display.
41702	Line 2	Specify item 2 to be shown on the display.
41703	Line 3	Specify item 3 to be shown on the display.
41704	Line 4	Specify item 4 to be shown on the display.
41705	Line 5	Specify item 5 to be shown on the display.
41706	Line 6	Specify item 6 to be shown on the display.
41707	Line 7	Specify item 7 to be shown on the display.
41708	Line 8	Specify item 8 to be shown on the display.

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

Selection	Description
None	Does not display items (item 1 is not selectable).
Flow rate(%)	Displays the flow rate for the span of the process value that is PV-mapped in Subsection 4.1.2.
PV	Displays the process value that is PV-mapped in Subsection 4.1.2.
Velocity	Displays the flow velocity.
Volume flow	Displays the volumetric flow rate.
Mass flow	Displays the mass flow rate.
Flow rate(%Bar)	Displays the flow rate for the span of the process value that is PV-mapped in Subsection 4.1.2, using a bar graph.
Calorie	Displays the calorie. (Only available for AXG, not for AXW)
Totalizer 1*1	Displays the totalized value of totalizer 1.
Totalizer 2*1	Displays the totalized value of totalizer 2.
Totalizer 3*1	Displays the totalized value of totalizer 3.
Tag number	Displays the tag number.
Long tag	Displays the long tag.
Commun protocol	Displays the communication protocol.
Adhesion	Displays the adhesion level of the electrode adhesion detecting function.
Analog out 2	Specify the current value of current output for the I/O1 terminal.
Flow noise	Displays the noise level of the flow noise diagnosis function. (Only available for AXG, not for AXW)
Totalizer 1 count*1	Displays the count value of totalizer 1.
Totalizer 2 count*1	Displays the count value of totalizer 2.
Totalizer 3 count*1	Displays the count value of totalizer 3.
Modbus info	Displays the Modbus information.

*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 4.7.3.
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 (31930) is R1.01.03 or earlier, or Ind soft rev (31938) 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 4.7.3.
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 4.8.2.

4.7.3 Decimal-Point Position Setting

The number of decimal places can be set to the automatic adjustment or fix mode for the totalized value or process value PV-mapped in Subsection 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)

Register Address	Parameter	Description
41710	Format PV	Specify the decimal-point position for the process value that is PV-mapped in Subsection 4.1.2.
41711	Format total 1	Specify the decimal-point position for the totalized value of totalizer 1.
41712	Format total 2	Specify the decimal-point position for the totalized value of totalizer 2.
41713	Format total 3	Specify the decimal-point position for the totalized value of totalizer 3.

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

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

Totalized value

Selection	Description
Auto	Automatically adjusts the number of decimal places.
0 digit	Fixes the number of decimal places to “0”.
1 digit	Fixes the number of decimal places to “1”.
2 digit	Fixes the number of decimal places to “2”.
3 digit	Fixes the number of decimal places to “3”.
4 digit	Fixes the number of decimal places to “4”.
5 digit	Fixes the number of decimal places to “5”.
6 digit	Fixes the number of decimal places to “6”.
7 digit	Fixes the number of decimal places to “7”.

4.7.4 Display Line Count and Scroll Settings

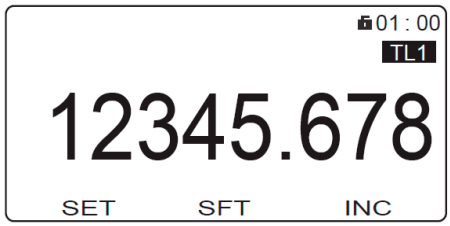
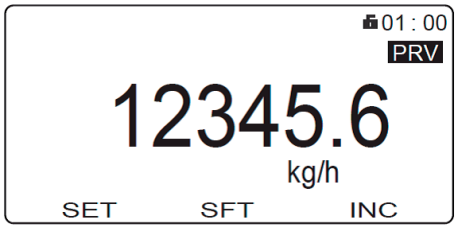
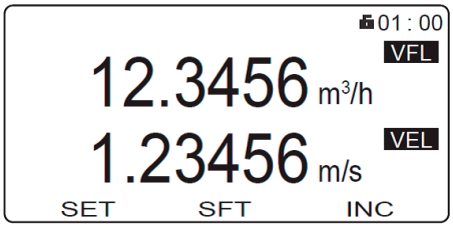
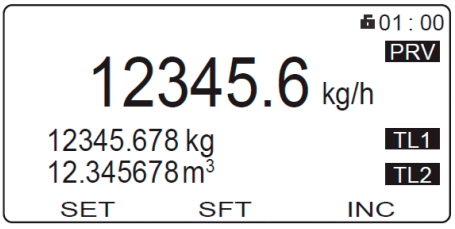
This product can be shown up to four lines on the display while scrolling up to eight items. The scroll method can be selected from the automatic display switching and the display switching using the IR switch.
These settings can be configured with the following parameters.

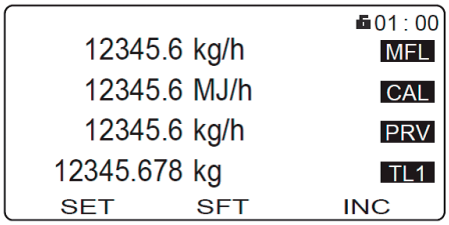
Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)

Register Address	Parameter	Description
41716	Line mode	Specify the number of lines to be shown on the display.*1
41722	Scroll mode	Specify the display scroll method.*2

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

Selection	Description
1 line(big)	1-line display without unit. The numeric value is displayed largely.  F0427.ai
1 line	1-line display with an unit  F0428.ai
2 line	2-line display with units  F0429.ai
3 line	3-line display with units  F0430.ai

Selection	Description
4 line	4-line display with units  F0431.ai

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

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

NOTE

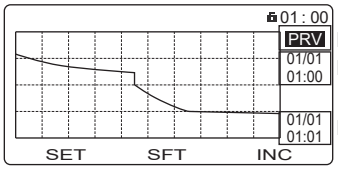
The default value of the scroll method (41722) is “Off”.
If the value of the scroll method is set to “Off”, the 5th line and beyond cannot be checked on the display.
To display the 5th line and beyond, set an option other than “Off”.

NOTE

When Main soft rev (31930) is R1.01.03 or earlier, the default value of the scroll method (41722) is “Manual”.
If the value of the scroll method is set to “Manual/Manual”, the display line is scrolled each time the infrared switch [INC] reacts.

4.7.5 Trend Graph Setting

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



Process value
Display start time
Display end time
F0432.ai

(1) Trend graph display setting

The table below shows the process values, low limit values, and high limit values that can be shown in a trend graph.

Process value	Display	Low limit value	High limit value
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		
Current output 2	AO2	4 mA	20 mA
Totalization 1	TL1	Preset value specified in Subsection 4.2.7	Target value of the totalizer specified in Subsection 4.2.3
Totalization 2	TL2		
Totalization 3	TL3		

* Only available for AXG, not for AXW

This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)

Register Address	Parameter	Description
41729	Display mode	Specifies the display of a trend graph.

From the table below, select the trend graph display.

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

NOTE

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

(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)

Register Address	Parameter	Description
41735	Trend 1	Specify item 1 to be shown in a trend graph.
41736	Trend 2	Specify item 2 to be shown in a trend graph.
41737	Trend 3	Specify item 3 to be shown in a trend graph.
41738	Trend 4	Specify item 4 to be shown in a trend graph.

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

Selection	Description
None	Does not set any items (item 1 is not selectable).
Flow rate(%)	Specify the flow rate for the span of the process value that is PV-mapped in Subsection 4.1.2.
PV	Specify the process value that is PV-mapped in Subsection 4.1.2.
Velocity	Specify the flow velocity.
Volume flow	Specify the volumetric flow rate.

Selection	Description
Mass flow	Specify the mass flow rate.
Calorie	Specify the calorie. (Only available for AXG, not for AXW)
Analog out 2	Specify the current value of current output 1 for the I/O1 terminal.
Totalizer 1	Specify the totalized value of totalizer 1.
Totalizer 2	Specify the totalized value of totalizer 2.
Totalizer 3	Specify 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 ► (see below)

Register Address	Parameter	Description
41717	Period	Specify the trend graph update period on the display.

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

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

4.7.6 Other Setting

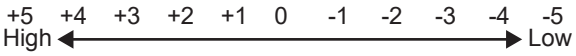
(1) Display contrast setting

The display can be adjusted the contrast in 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 ► (see below)

Register Address	Parameter	Description
41715	Contrast	Specify the contrast of the display.



(2) Display damping time constant setting

This function enables to 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 ► (see below)

Register Address	Parameter	Description
41723	Damp	Specify the damping time constant of the display.

NOTE

The damping time constant of the display is available only for the display. To specify the damping time constant for the output of the physical quantity, read Subsection 4.1.6.

(3) Date display format setting

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

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► (see below)

Register Address	Parameter	Description
41726	Format date	Specify the date display format.

From the table below, specify the date display format.

Selection	Description
MM/DD/YYYY	Displays the date in “month/day/year”.
DD/MM/YYYY	Displays the date in “day/month/year”.
YYYY/MM/DD	Displays the date in “year/month/day”.

(4) Display black/white inverse setting

The black/white inverse function 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 ► (see below)

Register Address	Parameter	Description
41740	Inversion	Specify the display black/white inverse mode.

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

Selection	Description
Normal	Does not set the display to the black/white inverse mode. (Character color: Black, Background color: White)
Invert	Sets the display to the black/white inverse mode. (Character color: White, Background color: Black)

(5) Display squawk setting

The backlight of the display can be squawked at 4-second intervals to identify the communicating product where are installed a number of same models.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Disp indicator ► (see below)

Register Address	Parameter	Description
41744	Squawk	Squawks the display.

From the table below, select whether to squawk the display.

Selection	Description
Off	Does not squawk the display.
On	Squawks the display (continuous).
Squawk once	Squawks the display (once only).

(6) Display lowcut setting

The low-cut value can be specified for the PV value displayed on the display.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Detailed setup ► Display set ► Optional config ► Low cut

Register Address: 41748

4.7.7 microSD Card Setting

The dedicated microSD card performs to use the backup parameters and logging data by inserting into the display if the optional code MC is selected.
For details about backing up parameters and logging data, read Section 4.11.

(1) Removing the microSD card

IMPORTANT

If the microSD card is removed without executing “Unmount” on software, it may cause the stored data 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 ► (see below)

Parameter	Description
Unmount	Specifies the removal of the microSD card.

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

Selection	Description
Cancel	Cancels the removal of the microSD card.
Execute	Applicable to remove the microSD card in safety.

(2) microSD card format

IMPORTANT

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

Formatting is possible with the following parameters.

Menu path

Display	Device setup ► microSD ► (see below)

Parameter	Description
Format	Specify the format of the microSD card.

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

Selection	Description
Cancel	Cancels formatting.
Execute	Executes formatting.

4.8 Device Information

4.8.1 Order Information

Order information can be specified for this product. If the dedicated parameters are specified at the time of ordering, this product is shipped with the parameters configured. Parameters unspecified at the time of ordering must be configured by the user.
The model and suffix code are indicated in the following format.

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

Transmitter:
AXG□A - □□□□□□□□□□□ /□
(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)

Register Address	Parameter	Description
41834	Long tag	Specify the long tag. Max. 32 characters.
41920	MS code►Model code	Specify the model code of the integral flowmeter or remote transmitter.
41929	MS code►Suffix config 1	Specify the suffix code of the integral flowmeter or remote transmitter.
41937	MS code►Suffix config 2	
41946	MS code ► Option 1	Specify the optional code of the integral flowmeter or remote transmitter.
41954	MS code ► Option 2	
41963	MS code ► Option 3	
41971	MS code ► Option 4	
41980	RS MS code►Model code	Specify the model code of the remote sensor.
41989	RS MS code►Suffix config 1	Specify the suffix code of the remote sensor.
41997	RS MS code►Suffix config 2	
42006	RS MS code►Option 1	Specify the optional code of the remote sensor.
42014	RS MS code►Option 2	
42023	RS MS code►Option 3	
42031	RS MS code►Option 4	

Menu path

Display	Device setup ► Detailed setup ► Device info ► Ver/Num info ► (see below)

Register Address	Parameter	Description
42040	Trans serial No	Displays the serial number (product number) of the transmitter.
42048	Sensor serial No	Displays the serial number (product number) of the sensor.

NOTE

Be careful of changing any parameters related to order information defined upon shipment from the manufacturing plant because it cannot be referred.
Recommended to make a backup referring to Section 4.11 for storing the order information defined upon shipment from the manufacturing plant.

4.8.2 Device Revision

The device revision such as software which is 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)

Register Address	Parameter	Description
31927	Transmitter type	Displays the type of the transmitter.
31928	Option board ID	Displays the type of the option board.
31930	Main soft rev	Displays the software revision of the main board.
31934	Snsr soft rev	Displays the software revision of the sensor board.
31938	Ind soft rev	Displays the software revision of the display board.

4.8.3 Memo Function

Three parameters can be used as a 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 ►

Register Address	Parameter	Description
42057	Memo 1	Specifies memo 1.
42066	Memo 2	Specifies memo 2.
42075	Memo 3	Specifies memo 3.

4.9 Self-diagnostic Function

4.9.1 Types of Diagnosis Functions

This product has the self-diagnostic functions to diagnose a device failure or process status. Followings are its diagnosis functions.

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 an 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 a deterioration of insulation from the 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. (Only available for AXG, not for AXW)
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. (Only available for AXG, not for AXW)

4.9.2 Alarm High/Low Limit Function

The alarm high/low limit function displays an alarm when the physical quantity PV-mapped in Subsection 4.1.2 exceeds the specified value. This function also outputs an alarm occurrence as the status output.
For details about the status output, read Subsection 4.3.6.
The alarm judgment value can be specified using 4 types of values: high limit value, high-high limit value, low-limit value, and low-low limit value.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► H/L alarm cfg ► (see below)

Register Address	Parameter	Description
41501	High alarm	Specify the high limit value to judge an alarm.
41503	Low alarm	Specify the low limit value to judge an alarm.
41505	HH alarm	Specify the high-high limit value to judge an alarm.
41507	LL alarm	Specify the low-low limit value to judge an alarm.

When the high and low limit value alarms are reset, the hysteresis is set for each alarm. Specify the hysteresis width with the percentage (%) for the span of the physical quantity PV-mapped in Subsection 4.1.2. The hysteresis in each case can be specified by the following procedure.

Menu path

Display	Device setup ► Diag/Service ► H/L alarm cfg ► (see below)

Register Address	Parameter	Description
41510	H/L alarm hyst	Specify the hysteresis width for the alarm occurrence and resetting.

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

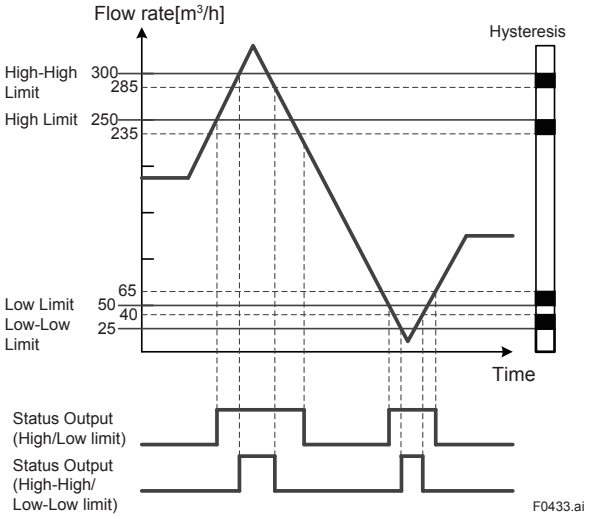
(2) Value that causes a high limit or high-high limit alarm to be reset
= Specified high limit or high-high limit value - Hysteresis value

(3) Value that causes a low limit or low-low limit alarm to be reset
= Specified low limit or low-low limit value + Hysteresis value

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

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

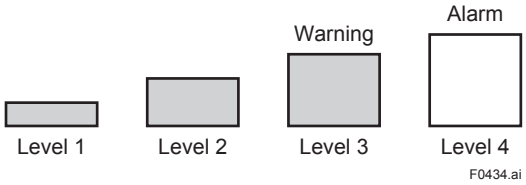


NOTE

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

4.9.3 Electrode Adhesion Detection

The electrode adhesion detecting function diagnoses an electrode adhesion from 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. Each level judgment value can be specified individually. If the level 3 value is exceeded, a warning is displayed. If the level 4 value is exceeded, an alarm is displayed.
For details about alarms and warnings, read Subsection 4.6.1.



This setting can be configured with the following parameters.

Menu path

Display	Device setup ▶ Diag/Service ▶ Diagnosis ▶ Adhesion ▶ (see below)

Register Address	Parameter	Description
42201	Function	Specifies the use of the electrode adhesion detecting function.*1
42203	Threshold level 1	Specify the value to judge level 1.
42205	Threshold level 2	Specify the value to judge level 2.
42207	Threshold level 3	Specify the value to judge level 3.
42209	Threshold level 4	Specify the value to judge level 4.
32201	Result▶Value	Displays the resistance value of the electrode.
32204	Result▶Status	Displays the electrode adhesion detection level.
42211	Check cycle	Specify the data update cycle for electrode adhesion detection.

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

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

NOTE

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

NOTE

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

NOTE

The electrode adhesion detecting function has the fluid conductivity restricted. The recommended conductivity is as follows.

Meter size	Conductivity
2.5 to 10 mm (0.1 to 0.4 in.)	30 µS/cm or larger
15 to 400 mm (0.5 to 16 in.)	10 µS/cm or larger
500 mm (20 in.)	20 µS/cm or larger

NOTE

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

4.9.4 Sensor Empty Check

The sensor empty check function checks whether the sensor is in the empty pipe state, and displays an alarm if the empty pipe state is detected.
For details about alarms and warnings, read Subsection 4.6.1.
This information can be viewed with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)

Register Address	Parameter	Description
32226	Empty status	Displays the result of the sensor empty check function.

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

Selection	Description
Full	Indicates that the sensor is in the full pipe state.
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.

4.9.5 Wiring Connection Diagnosis

The wiring connection diagnostic function performs to diagnose whether the signal line and the excitation line between remote type sensor and transmitter are correctly connected, and displays a warning if a misconnection is detected.
For example, if there are 2 sets of remote type sensors and transmitters, this function performs to check whether the signal line of a transmitter A is misconnected to the signal terminal of a sensor B, or the excitation line of a transmitter A is misconnected to the excitation terminal of a sensor B.
It takes approximately 10 seconds to finish this function.
For details about alarms and warnings, read Subsection 4.6.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)

Register Address	Parameter	Description
42234	Diagnostic execute	Specifies the use of the wiring connection diagnostic function.*1
42239	Diagnostic output	Specifies the output to use the wiring connection diagnostic function.*2

*1 From the table below, select the use of the wiring connection diagnostic function.

Selection	Description
Connect check exe	Starts the wiring connection diagnostic function.

*2: From the table below, select the output required to execute the wiring connection diagnostic function.

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

IMPORTANT

- Before using the wiring connection diagnostic function, be sure to disconnect this product from the control loop.
- While this function is used, the current output and pulse output are invalid.

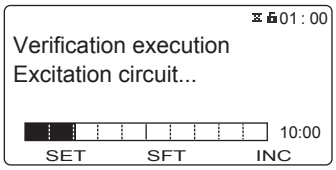
NOTE

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 status.

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

4.9.6 Verification (Device Health Diagnosis) Function

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



This function can perform to inspect each condition of the circuit, and acts the device health diagnosis of the product by detecting its internal alarms history along with its wiring misconnection. And this function evaluates their diagnosis result depending on the condition of the product by showing “Passed” as no problem or “Failed” as problems on the display.
The executing results are shown below.

- **“Passed” with no problem (as an example)**

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

- **“Failed” with problems (as an example)**

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 when the “Failed” massage appears from “Magnetic circuit result” to “Device status result” .
Confirm the wiring misconnection between sensor and transmitter (read Subsection 4.9.5 for detail), or whether its signal cable and excitation cable have no damage when the “Failed” massage appears at “Connection status result”.

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.
The following results will be displayed after the verification function is used.

Total judgment result	Calculation circuit diagnosis result
Operating 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)

Register Address	Parameter	Description
42239	Diagnostic output	Specifies the output to execute the verification function.*1

Menu path

Display	Device setup ► Diag/Service ► Verification ► (see below)

Register Address	Parameter	Description
42241	Mode	Specifies the fluid status to execute the verification function.*2
42243	Execute	Specifies the execution of the verification function. *3
42245	VF No	Specify the diagnosis result display time.*4
42251	VF target select	Specify the target for diagnosis. *5
—	Result	Displays the diagnosis result.*6

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

	Current output	Totalization	Pulse output	Frequency output
Zero	0% output	Input 0 (Output fixed)	0 pps	0% output
Measured value	Output of calculated value (Undefined)	Totalization of calculated value (Undefined)	Output of calculated value (Undefined)	Output of calculated value (Undefined)
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
No flow	Executes the verification function with the fluid not flowing.
Flow	Executes the verification function with the fluid flowing.

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

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

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

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

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

Selection	Description
Magnetic	Magnetic circuit diagnosis.
Excitation	Excitation circuit diagnosis.
Calculation	Calculation circuit diagnosis.
Device status	Device alarm diagnosis.
Conn status	Wiring misconnection check.

*6: The diagnosis result is displayed as shown below.

Register Address	Parameter	Description
32228	Failed/Passed	Execution result
32229	VF operate time	Operating time of verification function when started
32237	Magnetic circuit	Magnetic circuit diagnosis result
32238	Excite circuit	Excitation circuit diagnosis result
32239	Calc circuit	Calculation circuit diagnosis result
32240	Device status	Device alarm diagnosis result
32241	Connect status	Wiring misconnection check result

The diagnosis result is judged as shown below.

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

IMPORTANT

- Before using the verification function, be sure to disconnect this product from the control loop.
- While this function is used, the current output and pulse output are invalid.
- Note that parameters cannot be changed when the verification function is executed.

NOTE

- Before using the verification function, always make sure that the sensor is in the full pipe state. If the sensor is in the empty pipe state, this function may not run normally.
- When using the verification function, correctly specify the fluid status with the parameter.
- If there is a problem with the verification result, read the maintenance manual.

4.9.7 Electrode Insulation Deterioration Diagnosis

The electrode insulation deterioration diagnosis function diagnoses a deterioration of insulation from the resistance value of the electrode, and displays a warning if it is detected. It takes approximately 5 minutes to complete this diagnosis.
For details about alarms and warnings, read Subsection 4.6.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► (see below)

Register Address	Parameter	Description
42234	Diagnostic execute	Specifies the execution of the electrode insulation deterioration diagnosis function.*1
42239	Diagnostic output	Specifies the output to execute the electrode insulation deterioration diagnosis function.*2

*1: The electrode insulation deterioration diagnosis can be configured with the following parameters.

Parameter	Description
Electrode insul exe	Starts the electrode insulation deterioration diagnosis function.

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

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

IMPORTANT

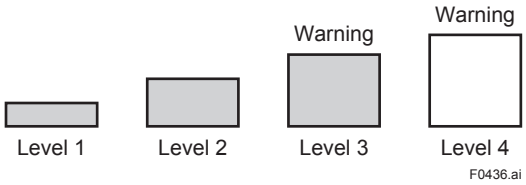
- Before using the electrode insulation deterioration diagnosis function, be sure to disconnect this product from the control loop.
- While this function is used, the current output and pulse output are invalid.

NOTE

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

4.9.8 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. Each level judgment value can be specified individually. If the level 3 or level 4 value is exceeded, a warning message is appeared.
For details about alarms and warnings, read Subsection 4.6.1.
For details about the flow noise span and damping time constant, read Subsection 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)

Register Address	Parameter	Description
42213	Function	Specifies the use of the flow noise diagnosis function.*1
42215	Threshold level 1	Specify the value to judge level 1.
42217	Threshold level 2	Specify the value to judge level 2.
42219	Threshold level 3	Specify the value to judge level 3.
42221	Threshold level 4	Specify the value to judge level 4.
32206	Result►Value	Displays the flow noise value.
32209	Result►Status	Displays the flow noise level.

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

Selection	Description
Disable	Does not use the flow noise diagnosis function.
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.

4.9.9 Low Conductivity Diagnosis

The low conductivity diagnosis function obtains the 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 alarms and warnings, read Subsection 4.6.1.
This setting can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Diagnosis ► Conductivity ► (see below)

Register Address	Parameter	Description
42229	Function	Specifies the use of the low conductivity diagnosis function.*1
32211	Result ► Value	Displays the calculated conductivity.
42231	Low limit	Specify the value used to judge the low conductivity.

Menu path

Display	Device setup ► Detailed setup ► Device info ► Order info ► (see below)

Register Address	Parameter	Description
41918	Electrode size	Displays the electrode size.

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

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

NOTE

The electrode size is specified upon shipment from the manufacturing plant.
Be careful of changing any parameters related to order information defined upon shipment from the manufacturing plant because it cannot be referred.
Recommended to make a backup referring to Section 4.11 for storing the order information defined upon shipment from the manufacturing plant.

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 magnetic flowmeter calibrator, this function may not run normally.

NOTE

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

4.10 Test Mode

4.10.1 Test Mode Setting

The test mode can be executed to arbitrarily specify the process value or the value to be output from a connection terminal and test a response from the device.
However, a warning is displayed to indicate that the test mode is in use while this test mode is used.
The use of the test mode can be specified with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Test ► (see below)

Register Address	Parameter	Description
42403	Input test►Test mode	Specifies the use of the test mode (input).
	Output test►Test mode	Specifies the use of the test mode (output).

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

Display:

Selection	Description
Velocity	Starts testing the flow velocity.
Volume	Starts testing the volumetric flow rate.
Mass	Starts testing the mass flow rate.
Calorie	Starts testing the calorie. (Only available for AXG, not for AXW)
AI	Starts testing the current input of the I/O1 terminal. (Only available for AXG, not for AXW)
AO2	Starts testing current output of the I/O1 terminal.
PO1	Starts testing pulse output or frequency output 1 of the I/O2 terminal.
SO1	Starts testing status output 1 of the I/O2 terminal.

The value on the test mode is executed by turns of Flow velocity, Volumetric flow rate, Mass flow rate, and Calorie. For example, the test values of Mass flow rate and Calorie are decided based on the test value of the volumetric flow rate, when the volumetric flow rate is set as the test value. In this case, the test value of flow velocity is executed with the normal measurement value.

NOTE

To specify each terminal output, read 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 I/O2 terminal is assigned to the frequency output to start the status output test, the test cannot be started.

4.10.2 Test Terminal and Value Setting

Specify the test input value for the terminal and process value to be tested.
This setting can be configured with the following parameters.
However, the unit of the process value to be tested conforms to that specified in Subsection 4.1.4. If the unit is changed, the process value to be tested is also changed synchronously with the changed unit.

Menu path

Display	Device setup ► Diag/Service ► Test ► (see below)

Register Address	Parameter	Description
42406	Input test ► Velocity	Specify the flow velocity.
42408	Input test ► Volume	Specify the volumetric flow rate.
42410	Input test ► Mass	Specify the mass flow rate.
42413	Input test ► Calorie	Specify the calorie. (Only available for AXG, not for AXW)
42425	Input test ► AI	Specify the current value of the current input for the I/O1 terminal. (Only available for AXG, not for AXW)
42419	Output test ► AO2	Specify the current value of current output for the I/O1 terminal.
42416	Output test ► PO1	Specify the frequency of pulse output or frequency output 1 for the I/O2 terminal.
42417	Output test ► SO1	Specify the status of status output 1 for the I/O2 terminal.

4.10.3 Test Mode Auto Reset

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

Menu path

Display	Device setup ► Diag/Service ► Test ► (see below)

Register Address	Parameter	Description
42401	Release time	Specify the time to automatically reset the test mode.

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

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

4.11 Event Management Function

4.11.1 Backup Function

The backup function enables to back up parameter settings in the display built-in memory or microSD card (with the optional code MC selected). Restorating backup data can be used to duplicate parameter settings to another device. The display built-in memory can store backup data for three times and the microSD depends on available free space. There are three backup methods available: backup from the main board of this product to the memory on the display board, backup from the main board of the product to the microSD card, and backup from the memory on the display board to the microSD card. The file name, backup name, and date can be specified to use the backup function.
The data backed up in the microSD card is stored in the “YOKOGAWA” folder as a “.PAR” file.

The backup function can be configured with the following parameters.
For details about the backup parameters, read Subsection 4.11.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)

Register Address	Parameter	Description
32601	F backup name	Displays the backup name defined upon shipment from the manufacturing plant.
32609	F backup date	Displays the backup date upon shipment from the manufacturing plant.
42601	SD backup name	Specify the name of the file to be backed up to the microSD card.
42606	Backup name 1	Specify backup name 1. Up to 16 characters
42614	Backup date 1	Specify date 1.
42623	Backup name 2	Specify backup name 2. Up to 16 characters
42631	Backup date 2	Specify date 2.
42640	Backup name 3	Specify backup name 3. Up to 16 characters
42648	Backup date 3	Specify date 3.
42657	Backup execute	Specifies the use of the backup function.*1
32619	Backup result	Displays the backup result.*2

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

Selection	Description
Not execute	Does not execute the backup function.
Store main to 1	Backs up parameter settings from the main board to memory 1 in the display built-in memory.
Store main to 2	Backs up parameter settings from the main board to memory 2 in the display built-in memory.
Store main to 3	Backs up parameter settings from the main board to memory 3 in the display built-in memory.
Store main to SD	Backs up parameter settings from the main board to the microSD card.
Store EEP1 to SD	Backs up parameter settings from memory 1 in the display built-in memory to the microSD card.
Store EEP2 to SD	Backs up parameter settings from memory 2 in the display built-in memory to the microSD card.
Store EEP3 to SD	Backs up parameter settings from memory 3 in the display built-in memory to the microSD card.

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

Selection	Description
Unexecuted	Does not back data.
Success	Succeeded in backup.
Failure	Failed in backup.
Running	Parameter backup running.

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

✓: Executable when alarm occurs.
—: Not executable when alarm occurs.

Alarm name		Backup
Display	Modbus	
010:Main CPU FAIL	Main board CPU failure	—
011:Rev calc FAIL	Reverse calculation failure	—
012:Main EEP FAIL	Main board EEPROM failure	—
013:Main EEP dflt	Main board EEPROM default	—
014:Snsr bd FAIL	Sensor board failure	✓
015:Snsr comm ERR	Sensor communication error	✓
016:AD 1 FAIL[Sig]	A/D1 failure[Signal]	✓
017:AD 2 FAIL[Excit]	A/D2 failure[Exciter]	✓
018:Coil open	Coil open	✓
019:Coil short	Coil short	✓
020:Exciter FAIL	Exciter failure	✓
022:PWM 2 stop	PWM2 stop	—
023:Opt bd mismatch	Option board mismatch	—
024:Opt bd EEP FAIL	Option board EEPROM failure	—
025:Opt bd A/D FAIL	Option board A/D failure	—
026:Opt bd SPI FAIL	Option board SPI failure	—
027:Restore FAIL	Parameter restore incomplete	✓
028:Ind bd FAIL	Indicator board failure	—
029:Ind bd EEP FAIL	Indicator board EEPROM failure	—
030:LCD drv FAIL	LCD driver failure	—
031:Ind bd mismatch	Indicator board mismatch	—
032:Ind comm ERR	Indicator communication error	—
033:microSD FAIL	microSD failure	—
050:Signal overflow	Signal overflow	✓
051:Empty detect	Empty pipe detection	✓
052:H/L HH/LL alm	H/L or HH/LL alarm	✓
053:Adh over lv 4	Adhesion over level 4	✓
060:Span cfg ERR	Span configuration error	—
061:PV F cfg ERR	PV flow select configuration error	—
063:AO 2 4-20 lmt	Analog output 2 4-20 mA limit error	—
065:H/L cfg ERR	H/L HH/LL configuration error	—
066:Density cfg ERR	Density configuration error	—
067:Pls 1 cfg ERR	Pulse output 1 configuration error	—
069:Nomi size cfg	Nominal size configuration error	—
070:Adh cfg ERR	Adhesion configuration error	—
071:FLN cfg ERR	Flow noise configuration error	—
072:Log not start	Data logging not started	—
081:AO 2 saturate	Analog output 2 saturated	✓
082:Pls 1 saturate	Pulse output 1 saturated	✓
084:AI saturate	Analog input saturated	✓
085:Cable miscon	Cable misconnect	✓
086:Coil insulation	Coil insulation warning	✓
131:Trans mismatch	Transmitter type mismatch	—
087:Adhesion lv 3	Adhesion over level 3	✓
088:LC warn	Low conductivity warning	✓

Alarm name		Backup
Display	Modbus	
089:Insu detect	Insulation detection	✓
090:FLN over lv 3	Flow noise over level 3	✓
091:FLN over lv 4	Flow noise over level 4	✓
092:AZ warn	Autozero warning	✓
093:Verif warn	Verification warning	✓
094:Fact noise warn	Factory noise warning	✓
095:Simulate active	Simulation active	✓
097:AO 2 fix	Analog output 2 fixed	✓
098:Pls 1 fix	Pulse output 1 fixed	✓
100:AI fix	Analog input fixed	✓
101:Param restore run	Parameter restore running	—
102:Disp over	Display over warning	—
103:SD size warn	microSD card size warning	—
104:Bkup incmplt	Parameter backup incomplete	✓
105:SD mismatch	microSD card mismatch	—
106:SD removal ERR	microSD card removal procedure error	—
120:Watchdog	Watchdog	✓
121:Power off	Power off	✓
122:Inst power FAIL	Instant power failure	✓
123:Param bkup run	Parameter backup running	—
124:Data log run	Data logging running	✓
132:Modbus cfg update	Modbus config update warning	—
133:G/A mismatch	G/A mismatch error	—

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.

4.11.2 Restore / Duplicate Function

The restore function can be restore parameter settings, which are backed up in the display built-in memory or microSD card (with the optional code MC selected), to the product. In addition, this function enables to return parameters to the default values defined upon shipment from the manufacturing plant. Also, it is possible 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 service parameters related to the transmitter adjustment) from the product in which the parameter is backed up. Restore is also executable for other product.
Restore Data	Restores the target parameter (including the service parameters related to the transmitter adjustment) from the product in which the parameter is backed up. Restore is not executable for other product.
Compulsion Data	Restores the target parameter (specified upon shipment from the manufacturing plant) from the product in which the parameter is backed up. Restore is also executable for other product.
Restore Factory	Restores all the parameters (specified upon shipment from the manufacturing plant).

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 device information.

M:Items to be Matched.

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

Note: Only between the same model code can be duplicated or restored the data.

The restore function can be configured with the following parameters.
For details about the restorable parameters, read Subsection 4.11.3.

Menu path

Display	Device setup ► Diag/Service ► Param bkup/restore ► (see below)

Register Address	Parameter	Description
42659	Restore execute	Specifies the execution of the restore function.*1
32618	Restore result	Displays the restore result.*2

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

Selection	Description
Not execute	Does not restore data.
Duplicate data 1	Restores the parameter (Duplicate Data) setting from memory 1 on the display board to the main board of the product.
Duplicate data 2	Restores the parameter (Duplicate Data) setting from memory 2 on the display board to the main board of the product.
Duplicate data 3	Restores the parameter (Duplicate Data) setting from memory 3 on the display board to the main board of the product.
Duplicate SD	Restores the parameter (Duplicate Data) setting from the microSD card to the main board of the product.
Restore data 1	Restores the parameter (Restore Data) setting from memory 1 on the display board to the main board of the product.
Restore data 2	Restores the parameter (Restore Data) setting from memory 2 on the display board to the main board of the product.
Restore data 3	Restores the parameter (Restore Data) setting from memory 3 on the display board to the main board of the product.
Restore SD	Restores the parameter (Restore Data) setting from the microSD card to the main board of the product.
Compulsion data 1	Restores the parameter (Compulsion Data) setting from memory 1 on the display board to the main board of the product.

Selection	Description
Compulsion data 2	Restores the parameter (Compulsion Data) setting from memory 2 on the display board to the main board of the product.
Compulsion data 3	Restores the parameter (Compulsion Data) setting from memory 3 on the display board to the main board of the product.
Compulsion SD	Restores the parameter (Compulsion Data) setting from the microSD card to the main board of the product.
Restore factory	Restores to the status that is set upon shipment from the manufacturing plant.

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

Selection	Description
Unexecuted	Does not restore data.
Success	Succeeded in restoration.
Failure	Failed in restoration.
Running	Parameter restore running

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

✓: Executable when alarm occurs.
—: Not executable when alarm occurs.

Alarm name		Restore
Display	Modbus	
010:Main CPU FAIL	Main board CPU failure	—
011:Rev calc FAIL	Reverse calculation failure	—
012:Main EEP FAIL	Main board EEPROM failure	—
013:Main EEP dflt	Main board EEPROM default	—
014:Snsr bd FAIL	Sensor board failure	✓
015:Snsr comm ERR	Sensor communication error	✓
016:AD 1 FAIL[Sig]	A/D1 failure[Signal]	✓
017:AD 2 FAIL[Excit]	A/D2 failure[Exciter]	✓
018:Coil open	Coil open	✓
019:Coil short	Coil short	✓
020:Exciter FAIL	Exciter failure	✓
022:PWM 2 stop	PWM2 stop	—
023:Opt bd mismatch	Option board mismatch	—
024:Opt bd EEP FAIL	Option board EEPROM failure	—
025:Opt bd A/D FAIL	Option board A/D failure	—
026:Opt bd SPI FAIL	Option board SPI failure	—
027:Restore FAIL	Parameter restore incomplete	✓
028:Ind bd FAIL	Indicator board failure	—
029:Ind bd EEP FAIL	Indicator board EEPROM failure	—
030:LCD drv FAIL	LCD driver failure	—
031:Ind bd mismatch	Indicator board mismatch	—
032:Ind comm ERR	Indicator communication error	—
033:microSD FAIL	microSD failure	—
050:Signal overflow	Signal overflow	✓
051:Empty detect	Empty pipe detection	✓
052:H/L HH/LL alm	H/L or HH/LL alarm	✓
053:Adh over lv 4	Adhesion over level 4	✓
060:Span cfg ERR	Span configuration error	—
061:PV F cfg ERR	PV flow select configuration error	—
063:AO 2 4-20 lmt	Analog output 2 4-20 mA limit error	—
065:H/L cfg ERR	H/L HH/LL configuration error	—
066:Density cfg ERR	Density configuration error	—
067:Pls 1 cfg ERR	Pulse output 1 configuration error	—
069:Nomi size cfg	Nominal size configuration error	—
070:Adh cfg ERR	Adhesion configuration error	—
071:FLN cfg ERR	Flow noise configuration error	—

Alarm name		Restore
Display	Modbus	
072:Log not start	Data logging not started	—
081:AO 2 saturate	Analog output 2 saturated	✓
082:Pls 1 saturate	Pulse output 1 saturated	✓
084:AI saturate	Analog input saturated	✓
085:Cable miscon	Cable misconnect	✓
086:Coil insulation	Coil insulation warning	✓
131:Trans mismatch	Transmitter type mismatch	—
087:Adhesion lv 3	Adhesion over level 3	✓
088:LC warn	Low conductivity warning	✓
089:Insu detect	Insulation detection	✓
090:FLN over lv 3	Flow noise over level 3	✓
091:FLN over lv 4	Flow noise over level 4	✓
092:AZ warn	Autozero warning	✓
093:Verif warn	Verification warning	✓
094:Fact noise warn	Factory noise warning	✓
095:Simulate active	Simulation active	✓
097:AO 2 fix	Analog output 2 fixed	✓
098:Pls 1 fix	Pulse output 1 fixed	✓
100:AI fix	Analog input fixed	✓
101:Param restore run	Parameter restore running	—
102:Disp over	Display over warning	—
103:SD size warn	microSD card size warning	—
104:Bkup incmplt	Parameter backup incomplete	✓
105:SD mismatch	microSD card mismatch	—
106:SD removal ERR	microSD card removal procedure error	—
120:Watchdog	Watchdog	✓
121:Power off	Power off	✓
122:Inst power FAIL	Instant power failure	✓
123:Param bkup run	Parameter backup running	—
124:Data log run	Data logging running	✓
132:Modbus cfg update	Modbus config update warning	—
133:G/A mismatch	G/A mismatch error	—

IMPORTANT

When using the restore function, be sure to prepare the backup file in memory or a microSD card. Note that the restore function is not executable if the backup file is not provided.

4.11.3 Backup and Restore Parameters

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

Parameter	Backup	Restore			
		Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Set device address	—	—	—	✓	✓
Set transmission mode	—	—	—	✓	✓
Set baud rate	—	—	—	✓	✓
Set parity	—	—	—	✓	✓
Set stop bit	—	—	—	✓	✓
Minimum response time	—	—	—	✓	✓
Set data format for float	—	—	—	✓	✓
Set data format for 4byte	—	—	—	✓	✓
Set data format for 2byte	—	—	—	✓	✓
Set data format for string	—	—	—	✓	✓
Velocity damping for Freq	✓	✓	✓	—	✓
Velocity damping for PLS/TTL	✓	✓	✓	—	✓
Volume flow damping for Freq	✓	✓	✓	—	✓
Volume flow damping for PLS/TTL	✓	✓	✓	—	✓
Mass flow damping for Freq	✓	✓	✓	—	✓
Mass flow damping for PLS/TTL	✓	✓	✓	—	✓
Calorific damping for Freq	✓	✓	✓	—	✓
Calorific damping for PLS/TTL	✓	✓	✓	—	✓
Low MF	✓	✓	✓	✓	✓
High MF	✓	✓	✓	✓	✓
Low MF(EDF)	✓	✓	✓	—	✓
High MF(EDF)	✓	✓	✓	—	✓
Select flow sensor	✓	✓	✓	—	✓
Measure mode	✓	✓	✓	—	✓
Nominal size unit	✓	✓	✓	✓	✓
Nominal size	✓	✓	✓	✓	✓
PV flow select	✓	✓	✓	✓	✓
Velocity unit	—	—	—	✓	✓
Volume unit	—	—	—	✓	✓
Mass unit	—	—	—	✓	✓
Time unit	—	—	—	✓	✓
Velocity span	✓	✓	✓	✓	✓
Volume flow span	✓	✓	✓	✓	✓
Mass flow span	✓	✓	✓	✓	✓
Calorie span	✓	✓	✓	—	✓
Zero	✓	✓	✓	—	✓
Total 1 conversion factor	—	—	—	✓	✓
Total 1 lowcut	✓	✓	✓	—	✓
Total 1 failure option	✓	✓	✓	—	✓
Total 1 option	✓	✓	✓	—	✓
Total 1 execution	✓	✓	✓	—	✓
Total 1 reset/preset	✓	✓	✓	—	✓
Total 1 preset value	✓	✓	✓	—	✓
Total 1 set point	✓	✓	✓	—	✓
Total 2 lowcut	✓	✓	✓	—	✓
Total 2 failure option	✓	✓	✓	—	✓
Total 2 option	✓	✓	✓	—	✓
Total 2 execution	✓	✓	✓	—	✓
Total 2 reset/preset	✓	✓	✓	—	✓
Total 2 preset value	✓	✓	✓	—	✓

Parameter	Backup	Restore			
		Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Total 2 set point	✓	✓	✓	—	✓
Total 3 lowcut	✓	✓	✓	—	✓
Total 3 failure option	✓	✓	✓	—	✓
Total 3 option	✓	✓	✓	—	✓
Total 3 execution	✓	✓	✓	—	✓
Total 3 reset/preset	✓	✓	✓	—	✓
Total 3 preset value	✓	✓	✓	—	✓
Total 3 set point	✓	✓	✓	—	✓
Pulse status output 1 mode	✓	✓	✓	✓	✓
Pulse output 1 active mode	✓	✓	✓	—	✓
Pulse output 1 width	✓	✓	✓	—	✓
Pulse output 1 rate unit	—	—	—	✓	✓
Pulse output 1 rate value	✓	✓	✓	✓	✓
Pulse output 1 lowcut	✓	✓	✓	—	✓
Pulse output 1 alarm out	✓	✓	✓	—	✓
Frequency output 1 at 0%	✓	✓	✓	✓	✓
Frequency output 1 at 100%	✓	✓	✓	✓	✓
Status output 1 function	✓	✓	✓	—	✓
Analog output 2 select	✓	✓	✓	—	✓
Analog output 2 lowcut	✓	✓	✓	—	✓
Analog output 2 high limit	✓	✓	✓	—	✓
Analog output 2 low limit	✓	✓	✓	—	✓
Analog output 2 alarm out	✓	✓	✓	—	✓
Analog input function	✓	✓	✓	—	✓
Analog input URV	✓	✓	✓	—	✓
Analog input LRV	✓	✓	✓	—	✓
Analog output 2 at 4mA	✓	✓	✓	—	✓
Analog output 2 at 20mA	✓	✓	✓	—	✓
Flow direction	✓	✓	✓	—	✓
Rate limit	✓	✓	✓	—	✓
Dead time	✓	✓	✓	—	✓
Noise filter	✓	✓	✓	—	✓
Pulsing flow	✓	✓	✓	—	✓
Power synchronize	✓	✓	✓	✓	✓
Set power freq	✓	✓	✓	✓	✓
Density select	✓	✓	✓	—	✓
Fixed density	✓	✓	✓	✓	✓
Standard density	✓	✓	✓	—	✓
Standard temperature	✓	✓	✓	—	✓
Temperature coef A1	✓	✓	✓	—	✓
Temperature coef A2	✓	✓	✓	—	✓
Specific heat	✓	✓	✓	—	✓
Fixed temperature	✓	✓	✓	—	✓
High alarm	✓	✓	✓	—	✓
Low alarm	✓	✓	✓	—	✓
High high alarm	✓	✓	✓	—	✓
Low low alarm	✓	✓	✓	—	✓
High/Low alarm hysteresis	✓	✓	✓	—	✓
Alarm out mask 1	✓	✓	✓	—	✓
Alarm out mask 2	✓	✓	✓	—	✓
Alarm out mask 3	✓	✓	✓	—	✓
Alarm out mask 4	✓	✓	✓	—	✓

Parameter	Backup	Restore			
		Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Alarm rec mask 1	✓	✓	✓	—	✓
Alarm rec mask 2	✓	✓	✓	—	✓
Alarm rec mask 3	✓	✓	✓	—	✓
Alarm rec mask 4	✓	✓	✓	—	✓
Display line select 1	—	—	—	✓	✓
Display line select 2	—	—	—	✓	✓
Display line select 3	—	—	—	✓	✓
Display line select 4	—	—	—	✓	✓
Display line select 5	—	—	—	✓	✓
Display line select 6	—	—	—	✓	✓
Display line select 7	—	—	—	✓	✓
Display line select 8	—	—	—	✓	✓
Display format flowrate	—	—	—	✓	✓
Display line	—	—	—	✓	✓
Display language	—	—	—	✓	✓
Display install	—	—	—	✓	✓
Display lowcut	✓	✓	✓	—	✓
Long tag	—	—	—	✓	✓
Tag number	—	—	—	✓	✓
Electrode size	✓	✓	✓	—	✓
Basic model code	✓	✓	✓	—	✓
Suffix config 1	✓	✓	✓	—	✓
Suffix config 2	✓	✓	✓	—	✓
Option 1	✓	✓	✓	—	✓
Option 2	✓	✓	✓	—	✓
Option 3	✓	✓	✓	—	✓
Option 4	✓	✓	✓	—	✓
RS basic model code	✓	✓	✓	—	✓
RS suffix config 1	✓	✓	✓	—	✓
RS suffix config 2	✓	✓	✓	—	✓
RS option 1	✓	✓	✓	—	✓
RS option 2	✓	✓	✓	—	✓
RS option 3	✓	✓	✓	—	✓
RS option 4	✓	✓	✓	—	✓
Transmitter serial No	✓	✓	✓	—	✓
Flow sensor serial No	✓	✓	✓	—	✓
Adhesion check	✓	✓	✓	✓	✓
Adhesion level 1	✓	✓	✓	—	✓
Adhesion level 2	✓	✓	✓	—	✓
Adhesion level 3	✓	✓	✓	—	✓
Adhesion level 4	✓	✓	✓	—	✓
Adhesion check cycle	✓	✓	✓	—	✓
Flow noise check	✓	✓	✓	—	✓
Flow noise level 1	✓	✓	✓	—	✓
Flow noise level 2	✓	✓	✓	—	✓
Flow noise level 3	✓	✓	✓	—	✓
Flow noise level 4	✓	✓	✓	—	✓
Flow noise damping	✓	✓	✓	—	✓
Flow noise span	✓	✓	✓	✓	✓
Low conductivity function	✓	✓	✓	—	✓
Conductivity limit	✓	✓	✓	—	✓
Coil insulation th	✓	✓	✓	—	✓

Parameter	Backup	Restore			
		Duplicate Data	Restore Data	Compulsion Data	Restore Factory
Verification target select	✓	✓	✓	—	✓
Diagnostic output	✓	✓	✓	—	✓
Verification mode	✓	✓	✓	—	✓
Verification No	✓	✓	✓	—	✓
Test auto release time	✓	✓	✓	—	✓

4.11.4 Data Logging Function

The data logging function can be stored up to four process values to the microSD card when the optional code MC (microSD card) is selected. When using this function, it is possible to specify the file name, data storage interval, and data logging function ending time.
The stored data is saved in the “YOKOGAWA” folder as a “.TRD” file.
The data logging function can be configured with the following parameters.

Menu path

Display	Device setup ► Diag/Service ► Data log ► (see below)

Register Address	Parameter	Description
42661	File name	Specify the name of the file to be stored.
42666	Interval time	Specify the data storage interval.*1
32621	Start date	Displays the date to start the data logging function.
32630	Start time	Displays the time to start the data logging function.
42667	End time	Specify the time to end the data logging function.*2
42669	Log 1	Specify process value 1 to be stored.*3
42670	Log 2	Specify process value 2 to be stored.*3
42671	Log 3	Specify process value 3 to be stored.*3
42672	Log 4	Specify process value 4 to be stored.*3
42674	Execute	Specifies the execution of the data logging function.*4

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

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

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

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

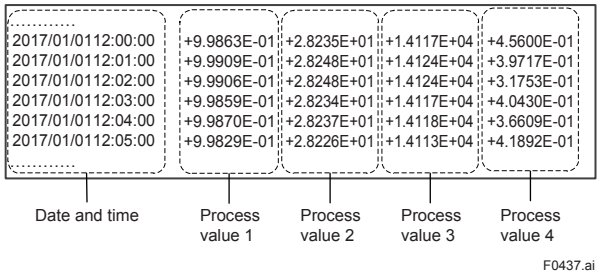
*3: From the table below, select the process value to be stored.

Selection	Description
PV	Stores the process value that is PV-mapped in Subsection 4.1.2.
Velocity	Stores the flow velocity.
Volume flow	Stores the volumetric flow rate.
Mass flow	Stores the mass flow rate.
Calorie	Stores the calorie. (Only available for AXG, not for AXW)
Adhesion	Stores the resistance value of the electrode adhesion detection.
Flow noise	Stores the flow noise value. (Only available for AXG, not for AXW)
Electrode A	Stores the voltage of electrode A.
Electrode B	Stores the voltage of electrode B.
V peak	Stores the peak value of the flow rate signal. (Only available for AXG, not for AXW)

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

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

Data is stored in the microSD card at the specified storage interval during the period from the start of the data logging function to the end. The file stored by the data logging function can be opened as a text file.
Example: If the storage interval is set to “1 min”, data is stored as shown below.



F0437.ai

The access ongoing to the microSD card can be confirmed by the icon on the display. For example, the icons of “microSD card ready” and “Access to microSD card” are displayed alternately repeatedly while the product accesses to the microSD card periodically during its data logging.
The icon of “Error accessing microSD card” is displayed when the micorSD card cannot be accessed in such a case of removing it.
Insert the microSD card again when it is necessary to use this function again. And 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 specify the date and time information.
- Before using the data logging function, make sure that the microSD card is prepared. Approximately 1 minute is required until the product is ready to store data 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.

4.12 Software Write Protection Function

The write protection can be changed by the hardware write protection switch or the parameter setting of the software write protection. When the write protection is enabled by any of them, data writing is forbidden. For details about the hardware write protection, see the Installation Manual.
To enable the software write protection function, specify “New password” (eight alphanumeric characters without lowercase letter) as a password to disable the write protection function. By entering the password in the menu of “Enable write”, it is possible to disable the write protection and change the parameters only for 10 minutes. The write protection is completely disabled if eight spaces are entered to “New password” in the state that the protection is disabled temporarily.
The write protection function can be configured by the following procedure.

Menu path

Display	Device setup ► Detailed setup ► Protection ► (see below)

Register Address	Parameter	Description
32801	Write protect sts	Indicates the use of the write protection function.*1
42803	Enable write	Cancels the write protection function only for 10 minutes.
42808	New password	Specify a new password for the write protection function.

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

Value	Description
No	The write protection function is disabled. (Parameters can be changed.)
Yes	The write protection function is enabled. (Parameters cannot be changed.)

NOTE

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

Icon	Contents
	Write protect Invalid (Parameter change is possible)
	Write protect Valid (Parameter change is impossible)

NOTE

When the write protection switch on the amplifier board is turned on, any parameter cannot be changed.
To change a parameter, cancel the write protection function using the pre-specified password, and specify a new password.

If the password had been forgotten, it is possible to use the Joker password to temporarily disable the software write protection function.
When the write protection function is disabled using the Joker password, “Break” is displayed as the parameter. Re-set a new password to use this function. When this function is disabled using a new password, the parameter returns to “Keep”.
The use of the Joker password seal can be checked by the following procedure.

Menu path

Display	Device setup ► Detailed setup ► Protection ► (see below)

Register Address	Parameter	Description
32802	Soft seal status	Check the use of the Joker password.

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

Value	Description
Keep	Normal
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.

5. Parameter Tree, Display Menu

NOTE

The available menus and parameters vary depending on the connection terminal type and the optional codes selected at the time of ordering.

5.1 Overview of the Display Menu Tree

The following table provides an overview of the display menu structure.
See the installation manual for general information regarding the operation via display unit.

Operation level

- Exit
- Operator
- Maintenance
- Specialist

R	Read only
R/W1	Read and write
R/W2	Read always, write (Operation level : Maintenance, Specialist)
R/W3	Read always, write (Operation level : Specialist)

Device setup

- Current alarm → Section 5.2
- Language R/W1
- Process variables → Section 5.3
  - Flow rate(%)
  - Flow rate
  - Velocity
  - Volume
  - Mass
  - Calorie
  - Analog out 2
  - Totalizer
- Diag/Service → Section 5.4
  - 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 → Section 5.5
  - Volume
  - Pulse/Status out
  - Display set
  - Autozero exe
- Detailed setup → Section 5.6
  - Pro var
  - Sensor
  - Totalizer
  - Pulse/Status out
  - Analog out/in
  - AUX calculation
  - Display set
  - Access cfg
  - Device info
  - Protection
- microSD → Section 5.7
  - Contents
  - Unmount
  - Format
  - Property

5.2 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
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
063:AO 2 4-20 lmt
065:H/L cfg ERR
066:Density cfg ERR

Status 14
067:Pls 1 cfg ERR
069:Nomi size cfg
070:Adh cfg ERR
071:FLN cfg ERR
072:Log not start

Status 15
081:AO 2 saturate
082:Pls 1 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
097:AO 2 fix
098:Pls 1 fix
100:AI fix

Status 18
101:Param restore run
102:Disp over
103:SD size warn
104:Bkup incmplt
105:SD mismatch
106:SD removal ERR

Status 19
120:Watchdog
121:Power off
122:Inst power FAIL
123:Param bkup run
124:Data log run

Status 20
132:Modbus cfg update
133:G/A mismatch

NOTE

Only the status items that occur in Modbus communication type are described above. Other than the above status items are also displayed on the display unit.

5.3 Process variables

Process variables			
	Flow rate(%)		R
	Flow rate		R
	Velocity		R
	Volume		R
	Mass		R
	Calorie		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

5.4 Diag/Service

- **Diag/Service**
  - Sts/Self test → Subsection 5.4.1
  - Time stamp
    - Date R
    - Time R
    - Op time R
  - Diagnosis → Subsection 5.4.2
  - Verification → Subsection 5.4.3
  - Autozero
    - Execute R/W2
    - Result
      - Zero value R/W2
  - AO/AI trim
    - AO trim
      - 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
  - 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
  - Test → Subsection 5.4.4
  - Param bkup/restore
    - F backup name R
    - F backup date R
    - SD backup name R/W3
    - Backup execute R/W3
    - Backup result R/W3
    - Restore execute R/W3
    - Restore result R/W3
    - Backup name 1 R/W3
    - Backup date 1 R/W3
    - Backup name 2 R/W3
    - Backup date 2 R/W3
    - Backup name 3 R/W3
    - Backup date 3 R/W3
  - Data log
    - File name R/W3
    - Interval time R/W3
    - Start date R/W3
    - Start time R/W3
    - End time R/W3
    - Execute R/W3
    - Log 1 R/W3
    - Log 2 R/W3
    - Log 3 R/W3
    - Log 4 R/W3
  - Disp indicator
    - LCD test R/W1
    - Squawk R/W1

5.4.1 Sts/Self test

- **Sts/Self test**
  - Current alarm
    - Status 0 — R
    - Status 1 — R
    - Status 2 — R
    - Status 3 — R
    - Status 4 — R
    - Status 5 — R
    - Status 14 — R
    - Status 15 — R
    - Status 16 — R
    - Status 17 — R
    - Status 18 — R
    - Status 19 — R
    - Status 20 — R
  - Alarm
    - Alarm record mask
      - Mask 1-1 — R/W3
      - Mask 1-2 — R/W3
      - Mask 2-1 — R/W3
      - Mask 2-2 — R/W3
      - Mask 3-1 — R/W3
    - Alarm record
      - Record alarm 1 — R
      - Record time 1 — R
      - Record alarm 2 — R
      - Record time 2 — R
      - Record alarm 3 — R
      - Record time 3 — R
      - Record alarm 4 — R
      - Record time 4 — R
    - Alarm out mask
      - Mask 1-1 — R/W3
      - Mask 1-2 — R/W3
      - Mask 2-1 — R/W3
      - Mask 2-2 — R/W3
      - Mask 3-1 — R/W3
      - Mask 3-2 — R/W3
      - Mask 4-1 — R/W3

5.4.2 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

5.4.3 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

5.4.4 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
	Output test	
		Test mode R/W3
		PO1 R/W3
		SO1 R/W3
		AO2 R/W3

5.5 Easy setup wizard

Easy setup wizard		
Volume		
	Setting upload	
	Damp AO/F	R/W3
	Damp pls/ttl	R/W3
	Unit	R/W3
	Time unit	R/W3
	Span	R/W3
	Setting download	
Pulse/Status out		
	Setting upload	
	P1 unit	R/W3
	P1 val	R/W3
	F1 at 0%	R/W3
	F1 at 100%	R/W3
	Setting download	
Display set		
	Setting upload	
	Line 1	R/W1
	Line 2	R/W1
	Line 3	R/W1
	Setting download	
Autozero exe		R/W2

5.6 Detailed setup

- **Detailed setup**
  - Pro var → Subsection 5.6.1
  - Sensor

Low MF	R/W3
High MF	R/W3
Low MF EDF	R/W3
High MF EDF	R/W3
Flow sensor sel	R/W3
Measure mode	R/W3
Nominal size unit	R/W3
Nominal size	R/W3

  - Totalizer → Subsection 5.6.2
  - Pulse/Status out
    - PO1/SO1

Output mode	R/W3
Active mode	R/W3
Fix width	R/W3
Rate unit	R/W3
Rate value	R/W3
Low cut	R/W3
Alarm out	R/W3
Frequency at 0%	R/W3
Frequency at 100%	R/W3
SO1 function	R/W3

  - Analog out/in
    - 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

  - 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

  - Display set → Subsection 5.6.3
  - Access cfg

User role	R
Chg mainte	R/W2
Chg special	R/W2

  - Device info → Subsection 5.6.4
  - Protection

Key code	R/W3
Write protect sts	R
Enable write	R/W3
New password	R/W3
Soft seal status	R

5.6.1 Pro var

- **Pro var**
  - PV flow select — R/W3
  - Velocity
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Span — R/W3
  - Volume
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Time unit — R/W3
    - Span — R/W3
  - Mass
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Time unit — R/W3
    - Span — R/W3
  - Calorie
    - Damp AO/F — R/W3
    - Damp pls/ttl — R/W3
    - Unit — R/W3
    - Time unit — R/W3
    - Span — R/W3
    - Specific heat — R/W3
  - Density
    - Value select — R/W3
    - Unit — R/W3
    - Fixed density — R/W3
    - Std density — R/W3
    - Correct density — R
  - Temperature
    - Std temperature — R/W3
    - Meas temperature — R
    - Fixed temperature — R/W3
    - Coef A1 — R/W3
    - Coef A2 — R/W3
  - Velocity check — R

5.6.2 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

5.6.3 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
	Low cut	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

5.6.4 Device info

- **Device info**
  - Date/Time
    - Current date — R
    - Current time — R
    - Operation time — R
    - Set date — R/W3
    - Set time — R/W3
  - Order info
    - Long tag — R/W3
    - Electrode size — 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
    - I/O 1 — R
    - I/O 2 — R
    - I/O 3 — R
    - I/O 4 — R
  - Memo
    - Memo 1 — R/W3
    - Memo 2 — R/W3
    - Memo 3 — R/W3
  - Modbus info
    - Cur baud rate — R
    - Set baud rate — R/W3
    - Cur trans mode — R
    - Set trans mode — R/W3
    - Cur parity — R
    - Set parity — R/W3
    - Cur stop bit — R
    - Set stop bit — R/W3
    - Cur resp delay — R
    - Set resp delay — R/W3
    - Cur dev addr — R
    - Set dev addr — R/W3
    - Cur format integer32 — R
    - Set format integer32 — R/W3
    - Cur format float — R
    - Set format float — R/W3
    - Cur format int8/16 — R
    - Set format int8/16 — R/W3
    - Cur format string — R
    - Set format string — R/W3

5.7 microSD

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

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1st	Oct. 2018	—	New publication
2nd	Mar. 2020	— 67, 68 104,105 114 125	Incorporate the manual change 19-0019-E. Correction of errors. 4.1.2 Add the setting example. 4.6.5 Add the setting example. 4.7.4 Add NOTE. 4.9.4 Add IMPORTANT.