azbil

CM2-MGG31F-2001

MagneW™ 3000 PLUS+
Smart Electromagnetic Flowmeter
FOUNDATION™ Fieldbus Transmitter

Model MGG14C

User's Manual

Azbil Corporation

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Be sure that the user receives this manual before the product is used.

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Precaution
This device is designed and manufactured for the use of general applications.
Do not use this device for the nuclear applications and applications which are directly related to the human life. Also do not use this device in the radiation controlled area.

In case the device is used in the following applications, please make sure to use the device with the system designed as failsafe/redundant and the system should be maintained periodically.

- Safety device for human body protection
- Directly control the transport machine
- Aircraft
- Space appliance

Azbil Corporation disclaims any liability for damages caused by any of accidents/results by the above application.

SAFETY PRECAUTIONS

About Icons

The safety precautions described in this manual are indicated by various icons.

Please be sure you read and understand the icons and their meanings described below before reading the rest of the manual.

Safety precautions are intended to ensure the safe and correct use of this product, to prevent injury to the operator and others, and to prevent damage to property.

Be sure to observe these safety precautions.

⚠**WARNING**	Warnings are indicated when mishandling this product might result in death or serious injury.
⚠**CAUTION**	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

Examples

■ In describing the product, this manual uses the icons and conventions listed below.

Use caution when handling the product.

The indicated action is prohibited.

Be sure to follow the indicated instructions.

SAFETY REQUIREMENTS

⚠ To reduce risk of electric shock which could cause personal injury, follow all safety notices in this documentation.

⚠**WARNING** This symbol warns the user of a potential shock hazard where hazardous live voltages may be accessible.

Safety messages

Carefully read this section before installing or operating this device.

Cautions for installation

⚠WARNING
Installation of the device should be done by the expert from the safety perspective.
In case of the installation in the hazardous area, follow the regulation/guidance of the explosion-proof.
In case of the installation in the hazardous area, select the explosion-protected apparatus. Do not use the non-explosion-protected apparatus in the hazardous area.
Install the device in the environment where the following is within in the specifications listed in the specification sheet. • Ambient temperature, process fluid temperature • Process fluid pressure • Humidity • Vibration • Power supply voltage Environment which exceeds the specifications may cause fire or device damage and it may cause injury.

⚠CAUTION
DO NOT use the installed device as foot hold. It may cause the damage of the device.
DO NOT hit the glass of the device by tools. It may cause the damage of the device.
Install the device in a location with an ambient temperature of -25 °C to 60°C (-13 °F to 140 °F) and an ambient humidity of 5 to 100% RH to prevent device malfunction or output errors.
DO NOT install the device near high-current power lines, motors, or transformers to prevent damage from electromagnetic induction, which can cause device malfunction or output errors.
DO NOT use the device to ground a welder. It can damage the device.
Be sure to ground the welding power transformer when welding near the device to avoid output errors.
DO NOT install the device in the severe vibration area or in corrosive environment. It may damage the device, or cause the fume of the device.
DO NOT install the device on the bridge or deck of the ship.
DO NOT install the device on in the severe vibration area on the ship.
Be sure to use the metal conduit for the cables between the remote style transmitter and flowtube.
Be sure to install the flowtube with a distance of 500mm minimum from the other flowtube. Magnetic field generated by a flowtube may affect the other flowtube and it may cause the output errors.
DO NOT install the device in a location subject to direct sunlight, wind, rain, severe vibration, or in a highly corrosive atmosphere. The transmitter and flowtube can be damaged.

Cautions for wiring

⚠WARNING	
⊘	DO NOT wire with wet hands. DO NOT wire while the circuit is alive. It may cause electrical shock.
❗	ELECTRIC SHOCK HAZARD! Turn the power supply OFF before opening the transmitter cover.
❗	Wiring of the device should be done by the expert from safety perspective.
❗	Wire the cables to the correct terminal. Incorrect wiring may damage the device or cause the fume of the device.
❗	Connect the correct power supply. Incorrect power supply may damage the device or cause the fume of the device.

⚠CAUTION	
❗	Be sure to properly ground the device. Improper grounding may cause the output errors
⊘	DO NOT give impact to the device. It may cause the damage of the device.
❗	Be sure to use the power supply with the overcurrent protection function.
❗	Be sure proper wiring. Incorrect wiring may cause the damage of the device.
❗	Be sure to properly tighten the terminal cover on the terminal box so that water does not penetrate in the terminal.
⊘	DO NOT connect AC power supply to the DC power supply model. The wrong power supply damages the device.
❗	Turn off the Fieldbus power supply before connecting the Fieldbus cable to the transmitter. The transmitter or the Fieldbus power supply can be damaged. This type of damage is not covered by Azbil Corporation's warranty.
❗	Be sure to plug all unused conduit connections with a water tight plug.
❗	In case that a remote model is installed in a ship, the cables between the transmitter and flowtube must be covered with a flexible metal conduit.
❗	Switch the control equipment to manual control before terminating the device operation and shutting off the output to the control equipment. This action prevents the power shut-off from directly affecting the control equipment.

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1. Introduction

This chapter contains an overview of the model MGG14C MagneW3000 PLUS+ Flowmeter and FOUNDATION™ fieldbus system. It describes available configurations and provides definitions for all the major parts of the transmitter.

MagneW 3000 PLUS+ Flowmeter

Thank you for purchasing the Azbil Corporation model MGG14C MagneW3000 PLUS+ Flowmeter This system features:

- Advanced multi-variable capacity
- Digital panel display
- Intuitive, versatile operator interface with large characters and backlit liquid crystal display
- I/O Capacity
- Flexible digital communication using the FOUNDATION™ Fieldbus

1.1 System configuration

The model MGG14C MagneW3000 PLUS+ Flowmeter consists of a flowtube and a transmitter which operate on the principles of Faraday's law. The flowmeter is available in two configurations:

Integral – The transmitter is mounted directly on the flowtube and they are installed as an integrated unit on the fluid pipe.

Remote – The transmitter and flowtube are installed separately and connected together via cables

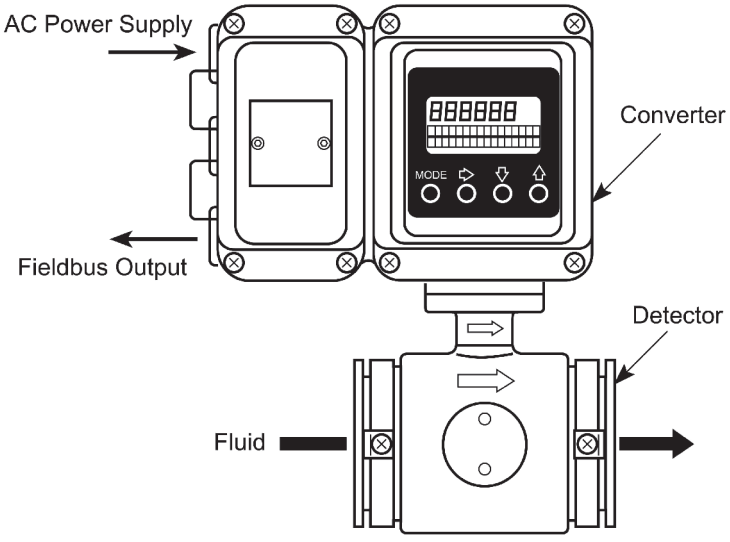


Figure1-1 Indegral system

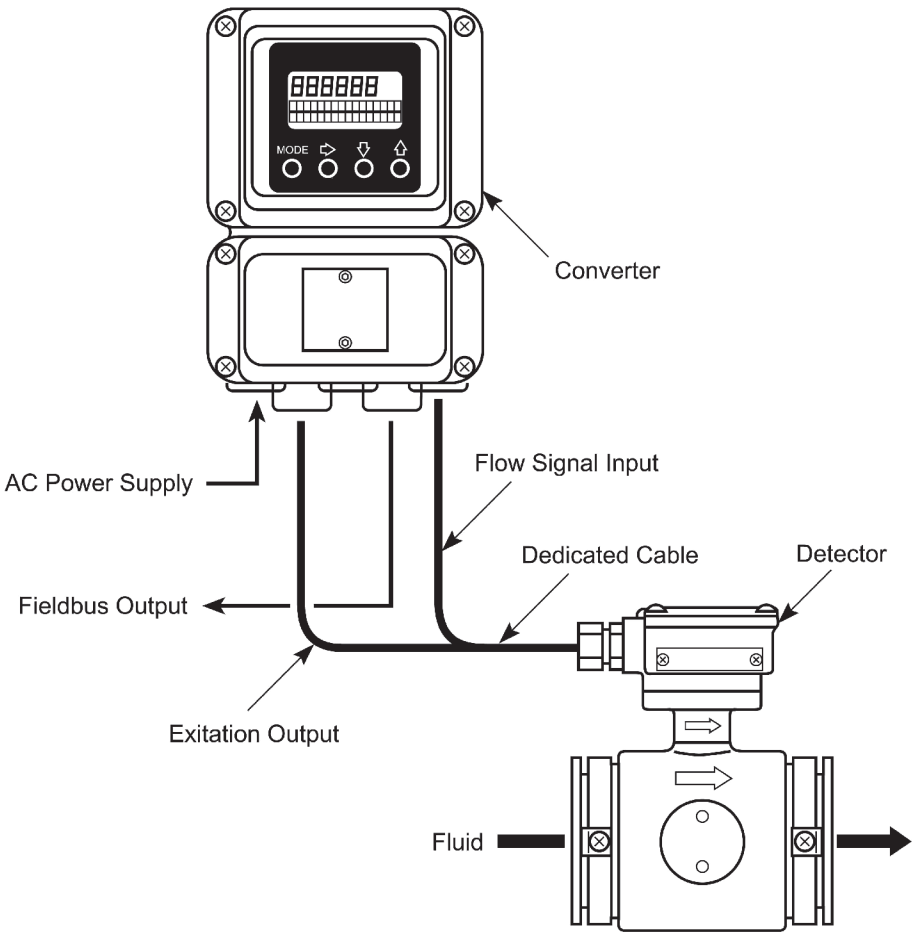


Figure1-2 Remote system

1.2 FOUNDATION™ Fieldbus

The FOUNDATION™ Fieldbus provides communications and programmability for a single or multiple flowmeter system. Some features of the fieldbus include:

- Complies with FOUNDATION Fieldbus H1 (31.25 kbps voltage mode bus) specifications.
- Supports the standard Analog Input (AI) function block.
- Is an externally powered device – AC and DC powered models available.
- Comes with Enhanced Device Description (EDD) files and a Capability File (CF) for automatic configuration.

The following figure shows a system in which the flow rate is output with a FOUNDATION™ Fieldbus.

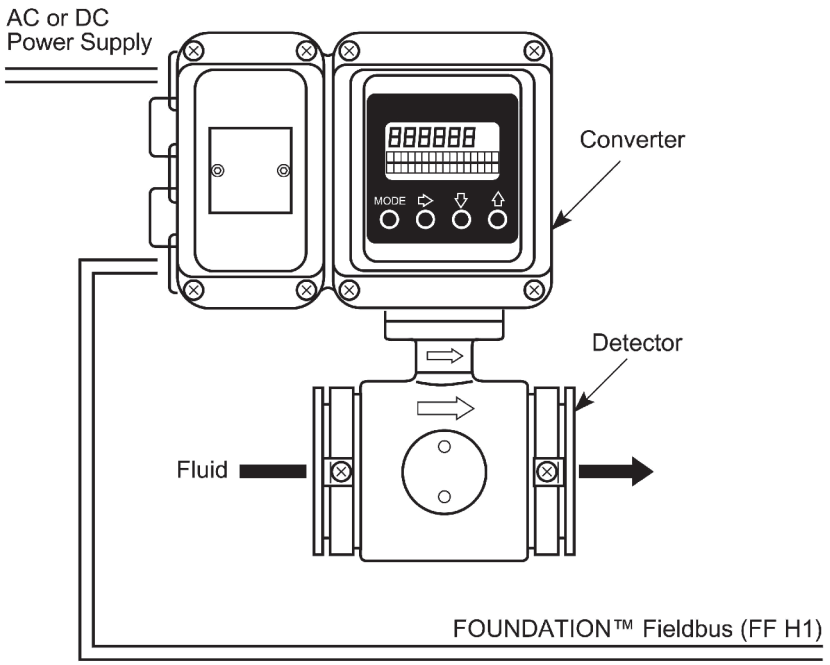


Figure1-3 System using a FOUNDATION™ Fieldbus

1.3 Main components

The transmitter consists of the components shown in the figure below.

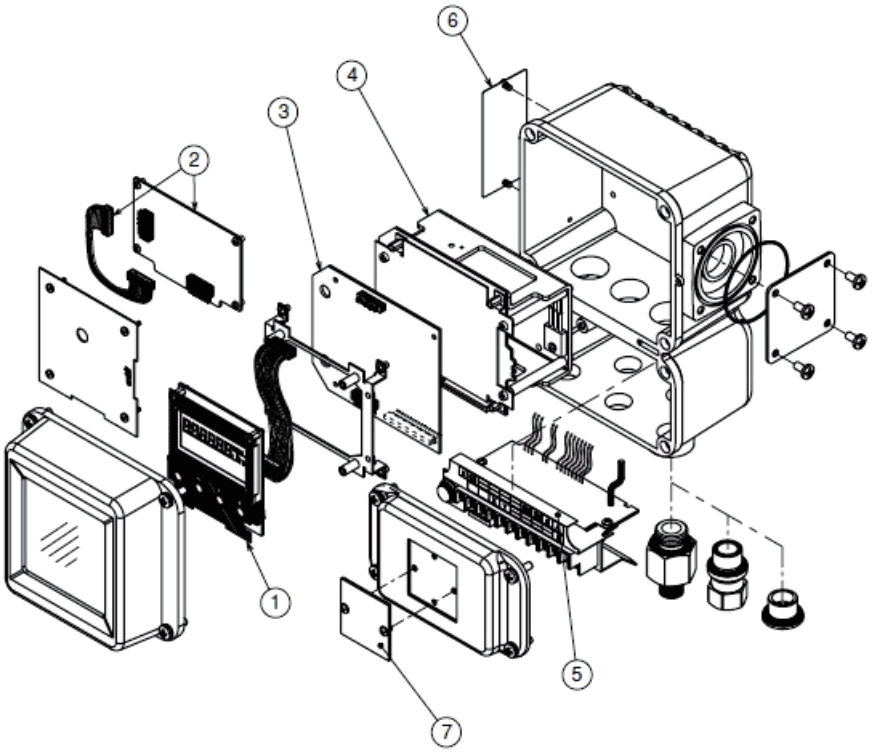


Figure1-4 Main components

(1) **Local user interface** – Indicates the instantaneous flow rate or the totalized valve. The flowmeter functions can be accessed using the four infrared sensor keys on the panel.
(2) **Fieldbus interface board** – Includes the fieldbus communication function.
(3) **Main board** – This board includes fundamental functions of the flow measurement.
(4) **Power supply board** – There are two types, AC power supply, and DC power supply type.
(5) **Terminal** – Encloses the input/output terminals. Contains an integrated 12 kV, 1000A isolator.
(6) **Name plate** – Indicates model numbers and production numbers, power supply requirements, date of manufacture and the flowtube constant (EX) for the flowmeter.
(7) **Tag number plate** – Indicates the tag number as specified in the product order.

1.4 Local user interface

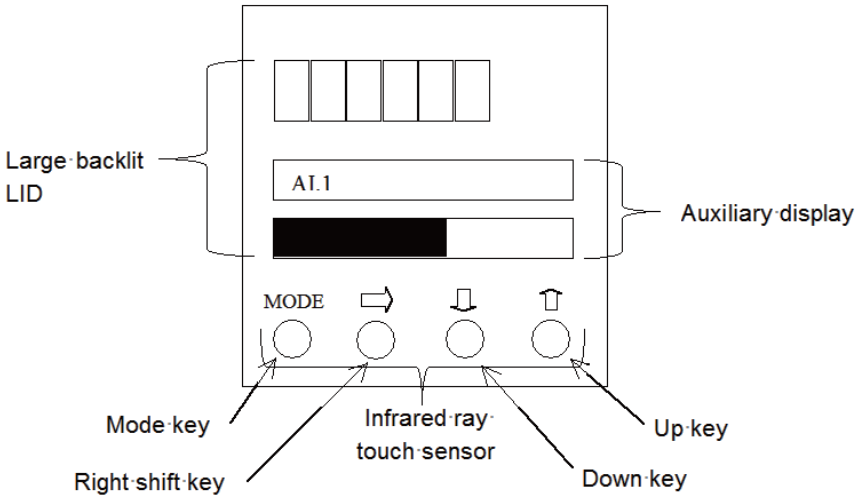
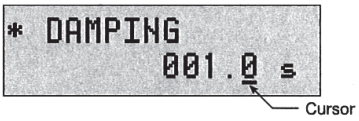
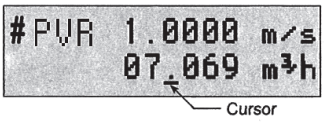
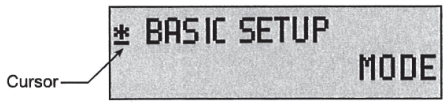
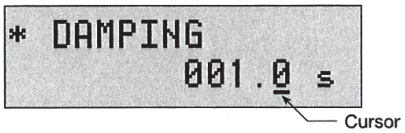
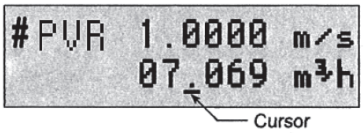
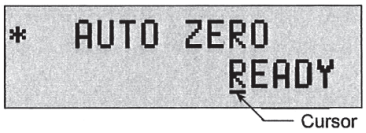


Figure1-5 Local user interface

Display	MEASURING MODE	Other than MEASURING MODE
Main display	Indicates a value set by PARAM_SELECTION under the block selected by BLOCK_TAG_SEL. Indicates maximum four values cyclically.	Indicates flow velocity.
Auxiliary display	Upper auxiliary display Indicates the information of [Tag, unit, or status] set by DISPLAY_INFO_SEL cyclically. Lower auxiliary display Indicates percent flow rate with bar indicator. Range is set by EU_100, and EU_0.	Indicates procedures for the parameter setting or adjustment.

The following table is a summary of the functions of each of the keys.

key	Function
MODE key MODE	Touching and holding this key for more than three seconds opens Basic setup MODE. Writes data into memory after changing the parameters or internal data in engineering mode, maintenance mode or advanced mode.
RIGHT SHIFT key	Shifts the cursor in the display to the right.
DOWN key	When the cursor is on the Mode Indicator as shown below, touching the DOWN key displays the next screen. When the cursor is located at a number, touching the DOWN key decrements the number.  When the cursor is located at the decimal point, touching the DOWN key moves the decimal point to the right. 

key	Function
UP key	When the cursor is on the Mode Indicator as shown below, touching the UP key displays the next screen.  When the cursor is located at a number, touching the UP key increments the number.  When the cursor is located at the decimal point, touching the UP key moves the decimal point to the left.  When the cursor is located at READY, touching the UP key starts operation. 

How to operate the infrared touch sensor

For best results, approach the key from below and completely cover the circle. Then move your finger straight down to its original position. These motions ensure correct operation. Moving sideways across the keys can accidentally activate the wrong control.

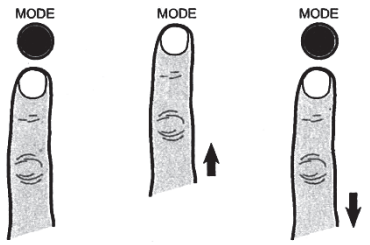


Figure1-6 Using the touch senser keys

Local user interface operation

The following table describes the functions available in each mode.

Display	MEASURING MODE Other than MEASURING MODE
MEASURING MODE	This is the normal operational mode and indicates the measuring status. Each time the MEASURING MODE is selected, data is written into memory. Settings entered in other modes are held in temporary memory for two minutes, but will return to the previously saved value unless the MEASURING MODE is selected to save the data. The only exception is the counter, which is always saved into memory immediately.
BASIC SETUP MODE	This mode is used to change data settings that must be recorded or changed frequently. These settings include: TAG NO. Damping time constant Auto zero Detector data
MAINTENANCE MODE	This mode is used when adjustment or verification is required for regular maintenance of the system or when troubleshooting the system. This mode includes: Shipping information Output adjustment Gain adjustment This mode is further divided into the following two modes: OUTPUT CHECK MODE CALIBRATION MODE
ADVANCED MODE	This mode is used to apply some specific noise immunity functions. This mode includes: Damping Manual zero Averaging Auto spike Cut Coefficient Drop out Low-flow cut off Flow direction change

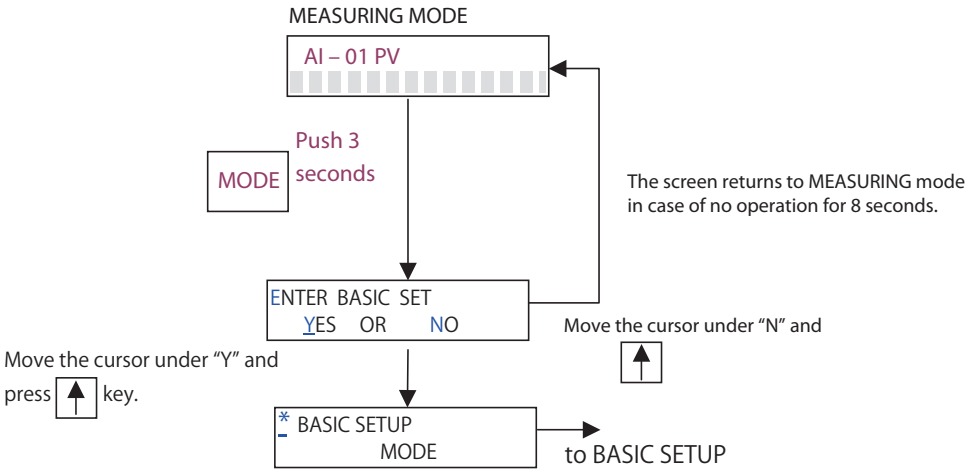


Figure1-7 How to enter BASIC SETUP

* In the BASIC SETUP mode, flow velocity in m/s appears on the upper auxiliary display.
* After entering the BASIC SETIP mode, if do not operate anything for 10 minutes, the screen automatically returns from BASIC SETUP mode to MEASURING MODE.

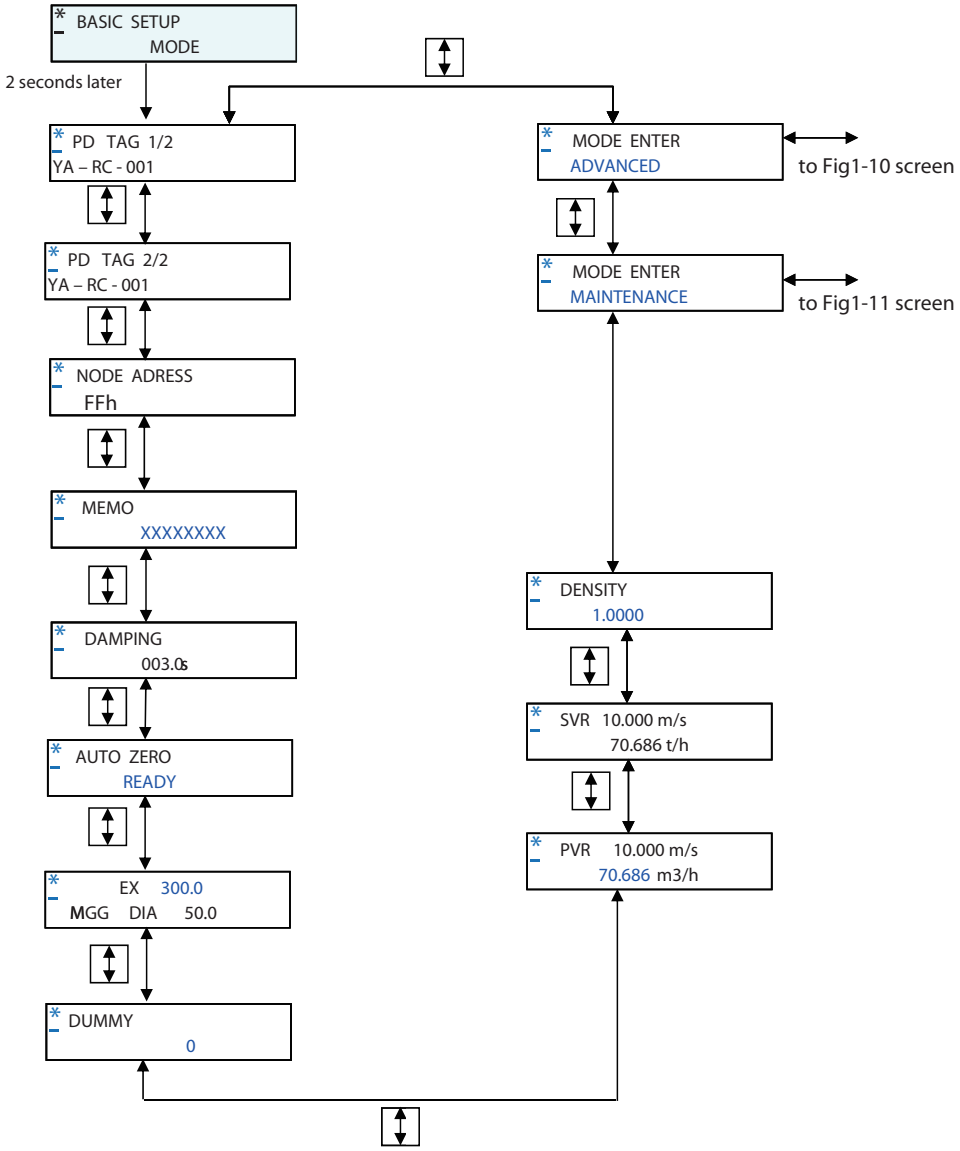


Figure1-8 BASIC SETUP MODE

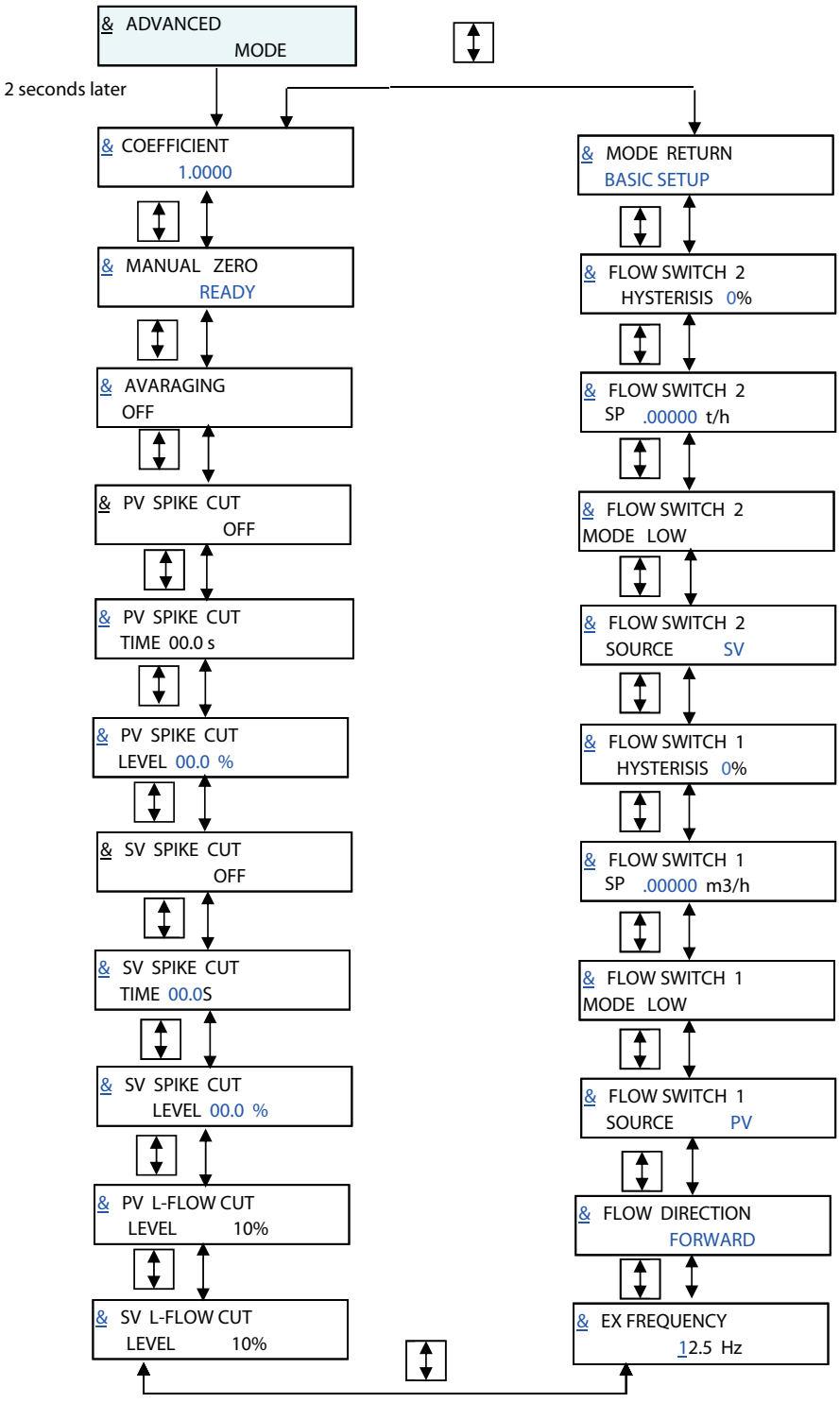


Figure1-9 ADVANCED MODE

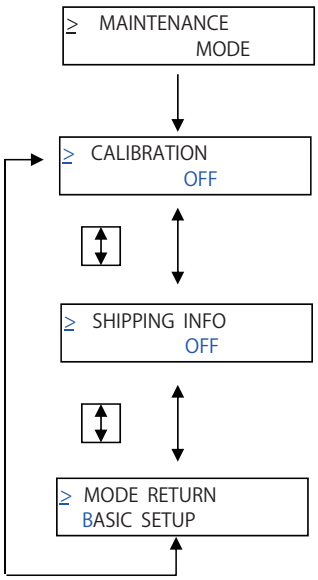


Figure1-10 MAINTENANCE MODE

2. Overview of MagneW3000 PLUS+ FOUNDATION Fieldbus

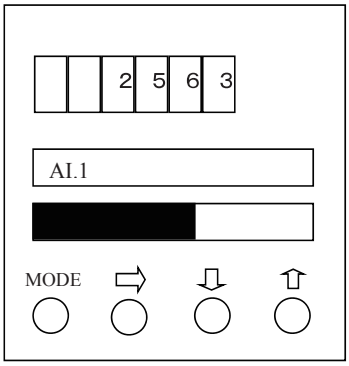
2.1 Overview

This chapter contains an overview of the model MGG14C MagneW3000 PLUS+ FOUNDATION Fieldbus transmitter.

Model MGG14C MagneW3000 PLUS+ FOUNDATION Fieldbus transmitter is coupled with the MagneW3000 PLUS flowtube and measures the conductive fluid flow rate. It outputs the following with the FOUNDATION Fieldbus protocol.

- Primary value of Flow TB: volumetric flow rate
- Secondary value of Flow TB: mass flow rate
- Primary value of Diag TB: scale level by scale diagnostic

Those outputs are displayed on the following Display panel.



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

The MagneW3000 PLUS+ Fieldbus communication type employs the specification standardized by the FieldComm Group, and provides interoperability between Azbil devices and those produced by other manufacturers.

Fieldbus comes with software consisting of three AI function blocks that enable the flexible implementation of systems.

2.2 Structure of MagneW3000 PLUS+ FOUNDATION Fieldbus

The MagneW3000 PLUS+ contains two Virtual Field Devices (VFD), one is System/network Management VFD and the other is Function block VFD.

2.2.1 System/network Management VFD

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

2.2.2 Function Block VFD

It includes some objects to execute function block applications. Resource block, Function block, and Transducer block are one of the objects.

Resource block	• Manages the status of The MagneW3000 PLUS+ hardware. • Automatically informs the host of any detected faults or other problems based on the NAMUR NE107.
Function block	It links together with Transducer block or other function block and provides arithmetic processing and transmits.
Transducer block	It provides interface function between the hardware and function block.
Alert object	It provides processing for the event or alarm generated in function block.
Trend object	Object to transmit trend data collected in short time
View object	Object that provides information of each parameter in the function block.
Link object	Objects that links the above mentioned objects.

2.2.3 Function block

Block name	Number	Execution time (ms)	INDEX	Note
AI *	2 (3)	30	1500, 1600, (1700)	For volumetric flow rate and mass flow rate
DI	2	30	1800, 1900	For flow limit switches
PID	1	45	2000	PID function block execute a control algorithm to minimize the error as the difference between a measured process variable and desired setpoint. It also has functions of cascade control, feed forward control, and alarm detection.
AR	1	30	2100	Arithmetic block perform an arithmetical operation to the flow measurement value.
TOT	2	30	2200, 2300	For totalization volume

* Number of AI becomes three when selecting flow signal analysis function.

Flow signal analysis function will be provided as call factory basis. Consult your azbil representative.

2.2.4 Transducer Block

Block name	Description
Flow transducer block	Block that calculates the flow speed, volumetric flow rate, and mass flow rate
Display transducer block	Block that controls the LCD display
Diag transducer block	Block that executes the diagnosis

2.3 VFD/Object correlation diagram

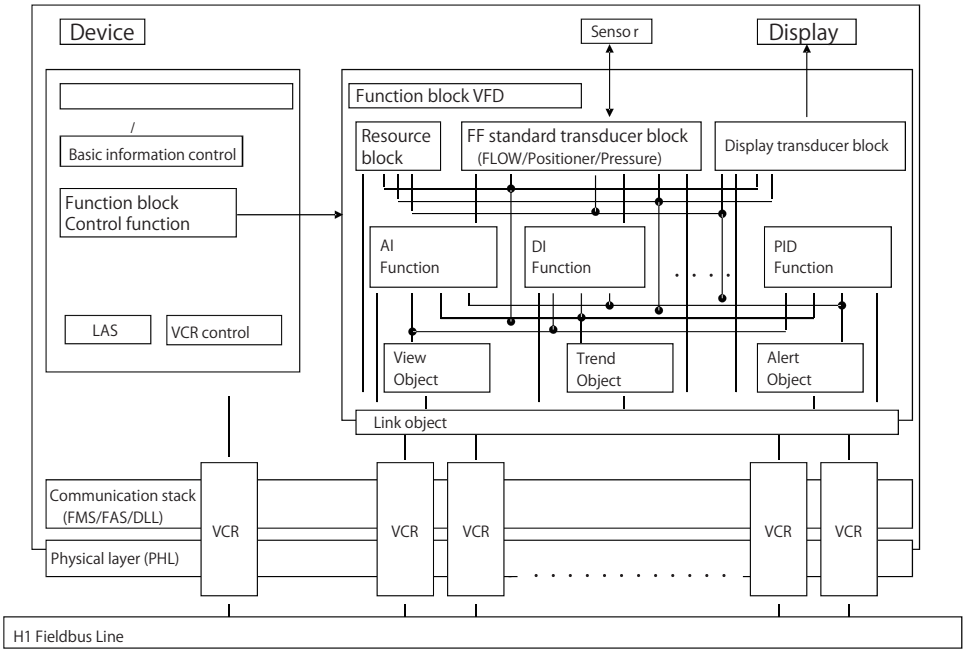


Figure2-1 VFD/Object correlation diagram

2.4 Wiring

The number of devices that can be connected to a single bus and the cable length vary depending on system design. When constructing systems, both the basic and overall design must be carefully considered to achieve optimal performance.

Fig 2-2 shows typical wiring to the Fieldbus network. The following are required for use with Fieldbus devices:

- **Terminator:**
  Fieldbus requires two terminators. Refer to the supplier for details of terminators that are attached to the host.

- **Field devices:**
  Connect Fieldbus communication type MagneW3000 PLUS+. Two or more MagneW3000 PLUS+ devices or other devices can be connected.

- **Host:**
  Used for accessing field devices. A dedicated host (such as DCS) is used for an instrumentation line while dedicated communication tools are used for experimental purposes. For operation of the host, refer to the instruction manual for each host. No other details on the host are given in this manual.

- **Cable:**

  Used for connecting devices. For laboratory or other experimental use, a twisted pair cable two to three meters in length with a cross section of 0.9 mm^2 or more and a cycle period of within 5 cm (2 inches) may be used. Termination processing depends on the type of device being deployed. For MagneW3000 PLUS+, use an M4 screw terminal claw. Some hosts require a connector. Refer to Azbil Corporation when making arrangements to purchase the recommended equipment. Connect the devices as shown in Figure 2-2. Connect the terminators at both ends of the trunk, with a minimum length of the spur laid for connection.

Table 2-1 Fieldbus cable

Classification	Description	Size	Maximum length
A	Type A Fieldbus cable	0.8 mm^2 (18AWG)	1900m
B	Type B Fieldbus cable	0.32 mm^2 (22AWG)	1200m
C	Type C Fieldbus cable	0.13 mm^2 (26AWG)	400m
D	Type D Fieldbus cable	1.25 mm^2 (16AWG)	200m

Table 2-2 Resistance of the Fieldbus cable

Classification	Maximum resistance @ 25°C
A	22 Ω/Km
B	56 Ω/Km
C	132 Ω/Km
D	20 Ω/Km

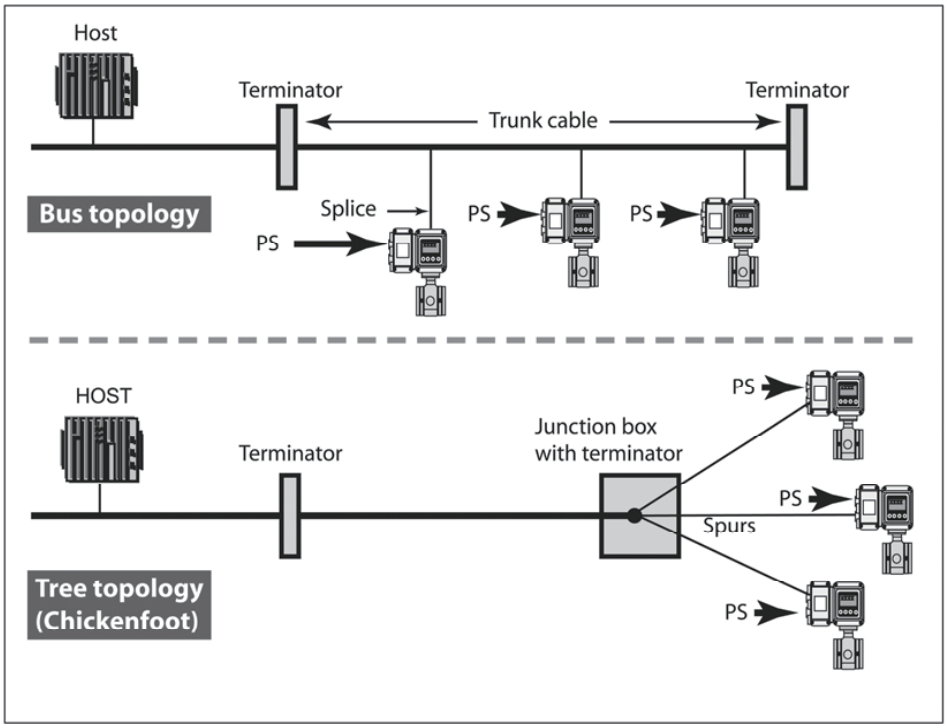


Figure2-2 Cabling

2.5 Others

Connect/disconnect the fieldbus devices

Before connecting/disconnecting the fieldbus device to the network, make sure this activity does not affect the process.

Fieldbus network allows device connection/disconnection to the network while the device circuit is alive. However from the process safety perspective, the device connection/disconnection to the network after turn off the power is suggested.

Make sure to properly isolate the wires after disconnecting the device.

Non-fieldbus device

Non-fieldbus device is not allowed to connect to the fieldbus network.

Communication error and miss-wiring

If communication error appears, the device repeats sending the signal/message until it is received by the host system. This kind of the communication error appears when the wiring is improper.

Check the wiring if communication error appears.

3. Installation

Overview

This chapter describes the installation and wiring of the device in the following order:

- Criteria for selecting the installation environment
- Overview of the device installation
- Wiring of signal cables

⚠ WARNING
Installation of the device should be done by the expert from the safety perspective.
In case of the installation in the hazardous area, follow the regulation/guidance of the explosion-proof.
In case of the installation in the hazardous area, select the explosion-protected apparatus. Do not use the non-explosion-protected apparatus in the hazardous area.
Install the device in the environment where the following is within in the specifications listed in the specification sheet. • Ambient temperature, process fluid temperature • Process fluid pressure • Humidity • Vibration • Power supply voltage Environment which exceeds the specifications may cause fire or device damage and it may cause injury.

⚠ CAUTION
DO NOT use the installed device as foot hold. It may cause the damage of the device.
DO NOT hit the glass of the device by tools. It may cause the damage of the device.
Install the device in a location with an ambient temperature of -25 °C to 60°C (-13 °F to 140 °F) and an ambient humidity of 5 to 100% RH to prevent device malfunction or output errors.
DO NOT install the device near high-current power lines, motors, or transformers to prevent damage from electromagnetic induction, which can cause device malfunction or output errors.
DO NOT use the device to ground a welder. It can damage the device.
Be sure to ground the welding power transformer when welding near the device to avoid output errors.
DO NOT install the device in the severe vibration area or in corrosive environment. It may damage the device, or cause the fume of the device.
DO NOT install the device on the bridge or deck of the ship.
DO NOT install the device on in the severe vibration area on the ship.
Be sure to use the metal conduit for the cables between the remote style transmitter and flowtube.
Be sure to install the flowtube with a distance of 500mm minimum from the other flowtube. Magnetic field generated by a flowtube may affect the other flowtube and it may cause the output errors.
DO NOT install the device in a location subject to direct sunlight, wind, rain, severe vibration, or in a highly corrosive atmosphere. The transmitter and flowtube can be damaged.

3.1 Before installing electromagnetic flowmeter

Criteria for selecting the installation environment Getting started Select the optimal location for installing the device according to the following criteria in order to maximize its performance.

Note:

- Install the device in a location with an ambient temperature of -25 °C to 60 °C (-13 °F to 140 °F) and an ambient humidity of 5 to 100% RH to prevent device malfunction or output errors.
- DO NOT install the device near high-current power lines, motors, or transformers to prevent damage from electromagnetic induction, which can cause device malfunctions or output errors.
- DO NOT use the device to ground a welder. Doing so can damage the device.
- Be sure to ground the welding power transformer when welding near the device.
- DO NOT install the device in an area with severe vibrations or in a corrosive environment. Doing so may cause damage the device.
- DO NOT install the device in a location subject to direct sunlight, wind, or rain.

⚠WARNING

Use this product under the conditions as defined in the specifications (e.g., protection against explosion, pressure rating, temperature, humidity, voltage, vibration, shock, mounting direction, and atmosphere) to avoid failure of the device or harmful physical effects such as fire damage.

⚠WARNING

In case of the installation in the hazardous area, select the explosion-protected apparatus. Do not use the non-explosion-protected apparatus in the hazardous area.

3.2 Installation of transmitter

Installation of transmitter

Basic mounting methods

The transmitter can be mounted in three ways—integrated mounting with the flowtube, wall-mounting, and 2B-pipe mounting

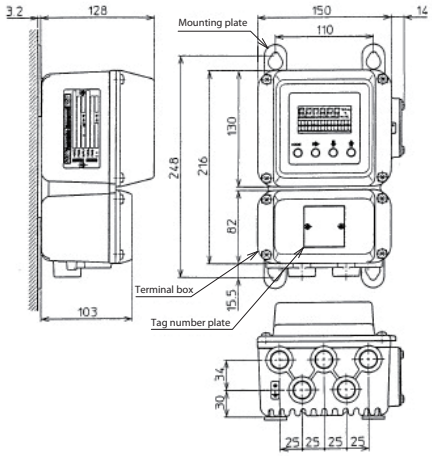


Figure3-1 Wall-mounting of transmitter

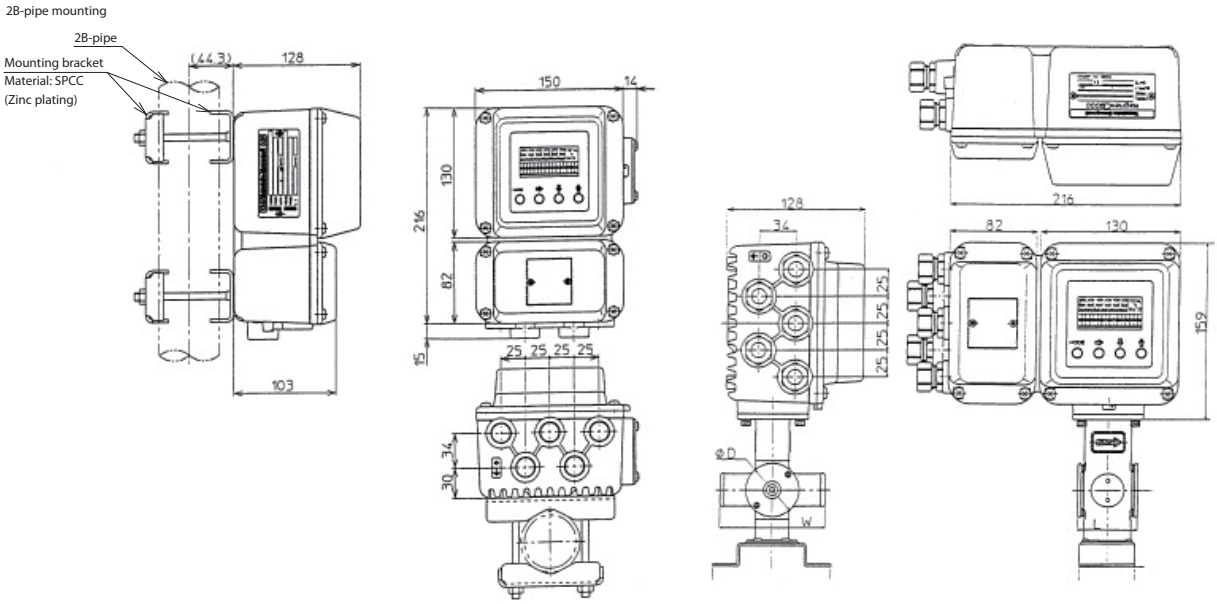


Figure3-2 2B-pipe mounting of transmitter and Integrated mounting

Electrical wiring (1)

⚠WARNING	
⊘	DO NOT wire with wet hands. DO NOT wire while the circuit is alive. It may cause electrical shock.
!	ELECTRIC SHOCK HAZARD! Turn the power supply OFF before opening the transmitter cover.
!	Wiring of the device should be done by the expert from safety perspective.
!	Wire the cables to the correct terminal. Incorrect wiring may damage the device or cause the fume of the device.
!	Connect the correct power supply. Incorrect power supply may damage the device or cause the fume of the device.

⚠CAUTION	
!	Be sure to properly ground the device. Improper grounding may cause the output errors
⊘	DO NOT give impact to the device. It may cause the damage of the device.
!	Be sure to use the power supply with the overcurrent protection function.
!	Be sure proper wiring. Incorrect wiring may cause the damage of the device.
!	Be sure to properly tighten the terminal cover on the terminal box so that water does not penetrate in the terminal.
⊘	DO NOT connect AC power supply to the DC power supply model. The wrong power supply damages the device.
!	Turn off the Fieldbus power supply before connecting the Fieldbus cable to the transmitter. The transmitter or the Fieldbus power supply can be damaged. This type of damage is not covered by Azbil Corporation's warranty.
!	Be sure to plug all unused conduit connections with a water tight plug.
!	In case that a remote model is installed in a ship, the cables between the transmitter and flowtube must be covered with a flexible metal conduit.
!	Switch the control equipment to manual control before terminating the device operation and shutting off the output to the control equipment. This action prevents the power shut-off from directly affecting the control equipment.

Introduction

The electromagnetic flowmeter needs to be connected to the main power supply (AC or DC 24 V) for proper operation.

The following items are described in relation to the electrical wiring of the electromagnetic flowmeter.

- Connection points on the main unit of the electromagnetic flowmeter
- Terminal layout
- Transmitter terminal table
- Cables between flowtube and transmitter
- Cable specifications
- Connection between flowtube and transmitter
- Selection of wiring cable
- Installation of wiring cable
- Connection to the Fieldbus output

Note:

- Do not directly connect the AC power supply to the main unit of the electromagnetic flowmeter if the main power supply is designed to be 24 V DC. AC power supplied to the main unit of the electromagnetic flowmeter causes irreversible damage in the internal measurement circuit.

Connection points on the main unit of the electromagnetic flowmeter

Figure 3-4 presents the terminal block of the main unit of the electromagnetic flowmeter.

⚠WARNING

· In wiring, turn off the power before opening the cover to avoid electric shock.
· DO NOT perform wiring work when current is being applied. Doing so may cause electric shock.

Note:

- Properly align the wiring position as indicated. Improper wiring can damage the device.
- Especially, check the wiring position of the power lines again as they carry a high capacity current.

Terminal layout

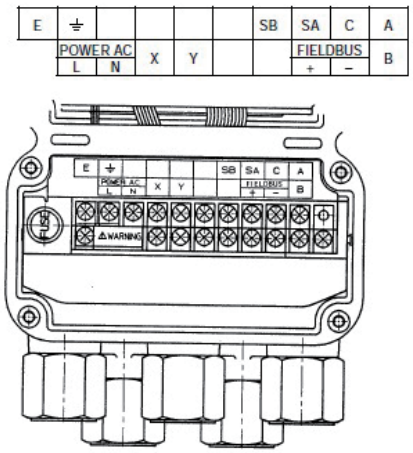


Figure3-3 Terminal layout of remote transmitter

Integral transmitter: Terminal layout

Unlike a remote transmitter, an integral transmitter does not use the terminals X, Y, SB, SA, A, B, C, and E. These terminal symbols are thus erased from the layout.

DC-24V transmitter: Terminal wiring diagram

The power terminal of the DC-24V remote transmitter is indicated as POWER DC 24V. Check carefully if the polarity is positive or negative.

Transmitter terminal table

Terminals for a remote transmitter

Symbol		Description
A		Flow signal input
B		
C		
SA		
SB		
FIELDBUS	+	Fieldbus output
	-	
X		Excitation output
Y		
POWER AC	L	Power supply
	N	
E		Not used
⏚		Grounding (grounding resistance must be <100Ω)

Terminals for an integral transmitter

Symbol		Description
FIELDBUS	+	Fieldbus output
	-	
POWER AC	L	Power supply
	N	
⏚		Grounding (grounding resistance must be <100Ω)

Electrical wiring (2)

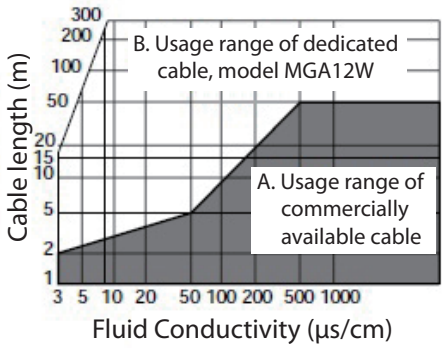
Cables between flowtube and transmitter

Please use a special cable (MGA12W) designated for connecting the flowtube and transmitter.

Select a signal cable (Azbil's special cable or a commercially-available shielded cable) depending on the fluid conductance, cable length, and the diameter of the flowtube. Refer to the figure below.

- Range where Azbil's special cable can be used: A and B
- Range where a commercially-available cable can be used: Only A

2.5mm and 5mm Diameter Cable



>10mm Diameter Cable

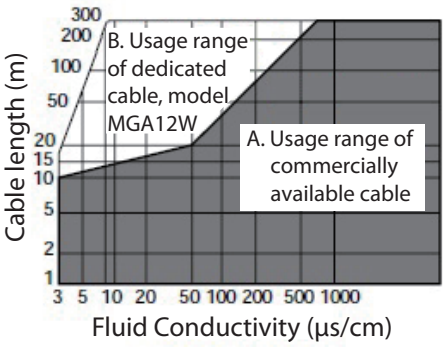


Figure3-4 Relationship between the fluid conductance and cable length

Specifications of cables between flowtube and transmitter

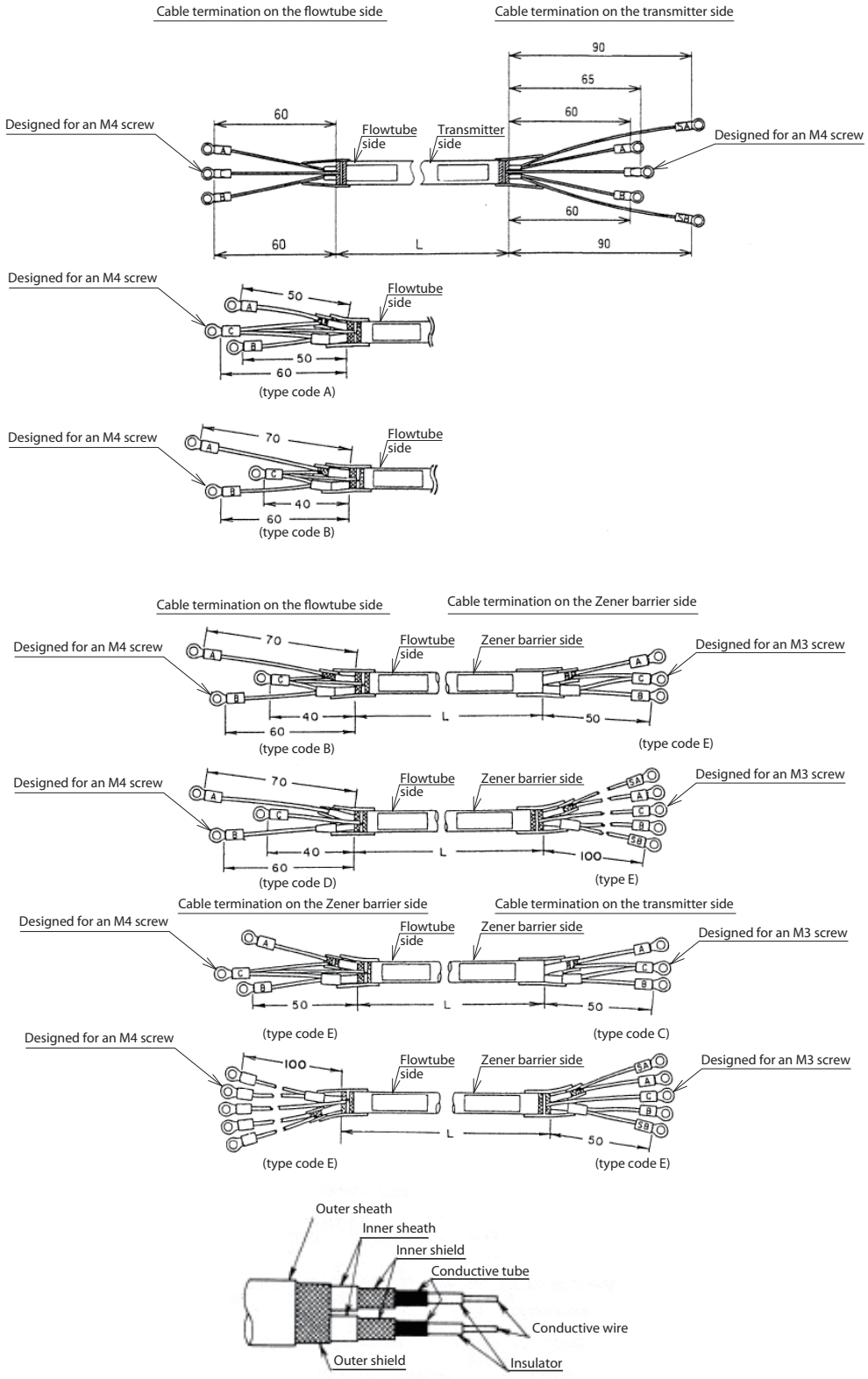
Cable (between remote flowtube and transmitter):

Length:	Maximum 300 m (depends on the fluid conductance)
Outer diameter:	φ 10–12 mm
Signal cable:	Special cable (diameter of 11.4 mm, 0.75 mm^2), or an equivalent among commercially-available shielded cables (e.g., CVVS, CEEV)
Excitation cable:	Special cable (φ 10.5 mm, 2 mm^2), or an equivalent among commercially-available shielded cables (e.g., CVV)

Note:

- Always use a shielded cable as a signal cable.

Signal cable
(Model: MGA12W)



Note) Remove the conductive tubes (black) of conductive cables for terminals A and B up to the edge s of the inner shields.

Figure3-5 Structural drawing of signal cable

Excitation cable
(Model: MGA12W)

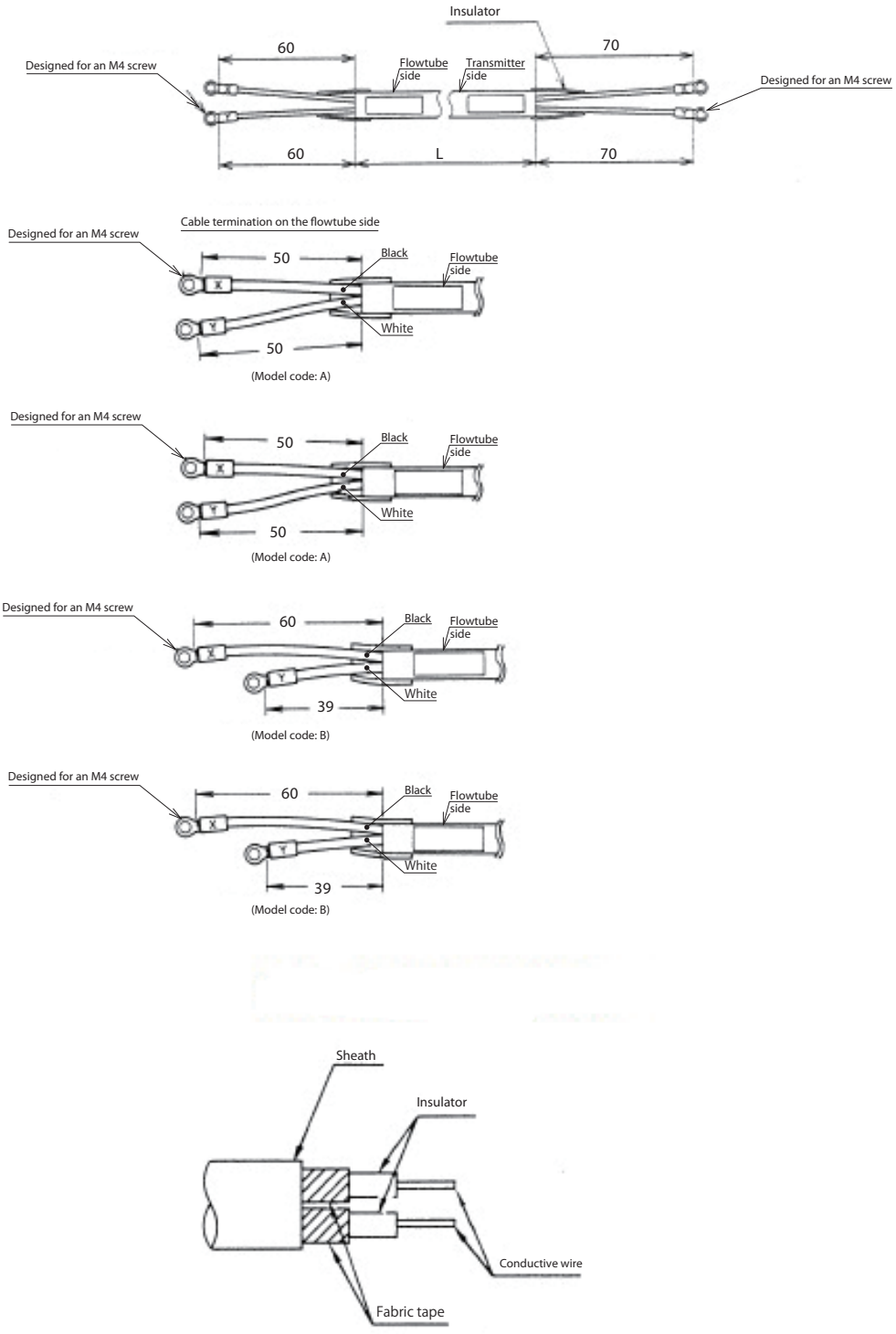


Figure3-6 Structural drawing of excitation cable

Electrical wiring (3)

Connection between flowtube and transmitter

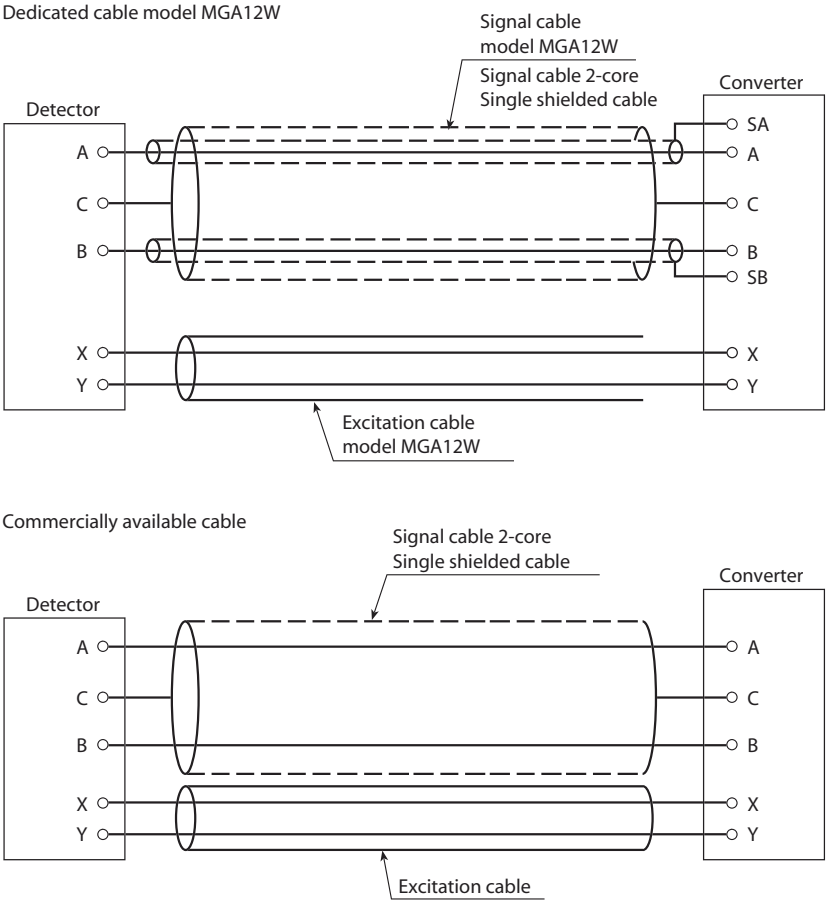


Figure3-7 Connection between flowtube and transmitter

4. Startup and Shutoff

Overview

This chapter describes the procedure for starting up the device and performing zero adjustment.

Follow the instructions in this chapter when you start up and operate the device for the first time.

Zero adjustment can be made in one of the following ways:

- Using the device's LUI
- Using a fieldbus configurator to communicate with the device

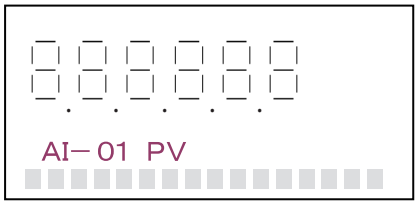
This chapter describes how to perform zero adjustment using the local user interface (LUI). Refer to Chapter 5 for the alternative method using Fieldbus communication.

4.1 Startup

Start up the device

Procedure

Start up the electromagnetic flowmeter according to the following procedure.

Step	Procedure
1	Make sure that the flowtube of the electromagnetic flowmeter is properly connected to the piping.
2	Make sure that the flowtube and transmitter of the electromagnetic flowmeter are securely wired.
3	Fill the flowtube of the electromagnetic flowmeter with a measurement fluid and pause the flowtube.
4	Check for any fluid leakage from the flange, to which the flowtube of the electromagnetic flowmeter is attached.
5	Apply current to the transmitter of the electromagnetic flowmeter.
6	Make sure that the LUI display is turned on. Image  This completes the startup of the electromagnetic flowmeter.

4.2 Steps before measurement

Setting up flowtube data

Getting started

Select and configure the constant of the flowtube used in combination with the transmitter, flowtube type, and diameter.

Default settings

The settings of EX 300.0, MGG, and DIA 050.0 are applied when no flowmeter is specified for the combined use with the transmitter.

Note:

· If you have purchased a combination set including a transmitter and a flowtube, the flowtube data are already configured by real current calibration. Note that any change will result in an output error from the flowmeter. Refer to Table 4-1.

⚠WARNING

Improper setting of flowtube information can result in output errors from the flowmeter.

Step	Procedure	Screen
1	Follow the procedure for entering BASIC SETUP MODE to display the screen for setting up the flowtube data.	
2	Touch the → key to set up the constant for the flowtube. Use the ⇧ and ⇩ keys to enter the value for the EX section which is printed on the name plate of the flowtube to be used in combination with the transmitter.	
3	Next, touch the → key to select the flowtube type.#Use the ⇧ and ⇩ keys to select the MODEL number which is printed on the name plate of the flowtube to be used in combination with the transmitter.	
4	Next, touch the → key to select the diameter.#Use the ⇧ and ⇩ keys to select the diameter of the flowtube used in combination with the transmitter.	
5	Touch the →key to move the cursor underneath the * mark.	

Zero adjustment

Getting started

Make sure to perform zero adjustment after starting up the device. There are three ways to do so.

- Using the device's LUI
- Using the parameter list by communicating with the device
- Using the menu by communicating with the device

Adjust the measured instantaneous flow rate value to zero when the fluid inside the flowtube is sitting still.

Note:

- Zero adjustment is extremely important for ensuring accurate measurement of flow rate. Make sure to perform this adjustment when you first operate the device.
- Before performing zero adjustment, make sure that Class D grounding is reliably performed with the flowtube and that the flowtube is filled with a measurement fluid which is sitting still.
  Zero adjustment is possible when the flow velocity falls below 0.2 m/s. Wait until the fluid comes to a complete rest (a flow velocity of 0.0 m/s) to avoid output errors.
- Zero adjustment requires O/S to be selected for the Actual MODE in Flow Transducer Block. Configure the setting from the host system in advance.

Step	Procedure	Screen
1	Touch the MODE key for 3 seconds or longer. Note: The screen as shown on the right is displayed only for 8 seconds. Perform the following operations within 8 seconds. Touch the ⇧ key four times.	000 m³/h ENTER IN OP. MODE YES OR NO
2	Touch the ⇨ key to move the cursor underneath YES and touch the ⇧ key. is displayed before the screen switches to the one shown on the right in 2 seconds.	000 m³/h * DAMPING 003.0s
3	Touch the ⇧ key once to display the screen as shown on the right.	000 m³/h * AUTO ZERO READY
4	Touch the ⇨ key once to move the cursor underneath READY.	000 m³/h * AUTO ZERO READY
5	Touch the ⇧ key to start zero adjustment. During the adjustment, the value of 0.0 blinks for displaying the large 7-segment flow rate. Once the adjustment is complete, the value stops blinking and the screen returns from ON to READY. This period is about 30 seconds.	000 m³/h * AUTO ZERO ON
6	At the very end, make sure to touch the MODE key to complete the adjustment.	

Checking the operation of Fieldbus
Check to see if the device operates properly with Fieldbus.
Prior to operating Fieldbus, the DD file (device description) and the CF file (capability) of the device need to be copied to the host.
Download the DD file and CF file from the official website of the FieldComm Group.
Operation of Fieldbus requires the following settings in the host.
Ensure that PD_TAG and NODE_ADRS can be set up by configuring the following settings.

1) Network parameter settings for link active scheduler (LAS)

Symbol	Parameter name	Description and setting value
V(ST)	Slot time	Set a value of 5 or greater.
V(MID)	Gap between minimum frames	Set a value of 10 or greater.
V(MRD)	Maximum response delay time	Set the value so that V(MRD) V(ST) is 20 or greater.
V(FUN)	The number of the first unpolled node	Set the value immediately next to the address used by the host. Set a value of 12 or greater in 16-bit representation.
V(NUN)	Total number of unpolled nodes	The number represents the range of unused addresses. Set the value of the minimum address used by the device in the work site minus the value of V(FUN).

1) Checking PD_TAG (physical device tag) and address

Parameter name	Parameter name	Setting value	Data when shipped from the factory
PD_TAG	Physical device tag	Up to 32 ASCII characters	Specified by customers
NODE_ADRS	Node address	Set the minimum address of the BASIC device in hexadecimal notation and F7 or less	Hexadecimal notation and F8

The same address setting as another device cannot be selected for NODE_ADRS. (Such an entry is changed into the default address [0xF8–0xFB])
Assign a different address for each unit.

4.3 Shutoff

⚠CAUTION

- Make sure to switch the controller to manual control mode in order to shut off the device and stop the output to the controller.
  This safeguards the controller from direct impacts caused by the suspended output from the device.
- Do not turn off the power within 60 seconds of any data being rewritten using the LUI or another communication method, to avoid possible errors in saving the data.

Procedure

Take the following procedure to shut off the device.

Step	Procedure
1	Switch the controller of the device you want to shut off to manual control mode.
2	Turn off the power of the device.

5. Basic Settings by Fieldbus Communication

Overview

This chapter outlines zero adjustment as an operation performed using Fieldbus communication, each Transducer block, as well as basic parameter settings.
Some parameters require O/S to be selected for the Block MODE parameter in order to change the settings.
Mode parameters can be switched with MODE_BLK in each block.
In order to use each block after the settings are changed, select AUTO for MODE-BLK.

Note

- The device supports Version 3.8 or later versions of 475.
  Version 3.6 or earlier versions cannot properly display some parameters.
- The device supports host authentication, HTK 6.1.a or later versions, and Standard Dictionary 3.70 or later versions.
  Other versions may fail to display some parameters.
- Some parameters may not be properly displayed when some hosts are used.
- METHOD may not work with some hosts.
  In such cases, access the parameter from the parameter list to configure the settings.

5.1 Fieldbus communication menu

There are four types of menu structures for Fieldbus communication depending on the host being used.
This section describes the device menu for communicators.

- Device menu for communicators
  This menu displays parameters such as setup and adjustment of the positioner.
  A host supporting the device menu can display this menu. (Example: 475 Field Communicator by Emerson)

- Block menu for communicators
  A communicator capable of Fieldbus communication can display this block menu. A menu prepared for each block displays parameters such as setup and adjustment of the positioner. (Example: 475 Field Communicator by Emerson)

- Block menu for PCs
  A compatible host (PC) can display this block menu. A menu prepared for each block displays parameters such as setup and adjustment of the positioner. (Example: Azbil's device management system - InnovativeField Organizer)

- Parameter list
  All parameters are displayed by block.
  Appendix C presents a list of parameters for Flow Transducer Block, Resource Block, and Display Transducer Block.

5.2 Zero adjustment

Getting started

Once the device has started up, make sure to perform zero adjustment in one of the following three ways.

Adjust the measured instantaneous flow rate value to zero when the fluid inside the flowtube is sitting still.

Note:

- Zero adjustment is extremely important for ensuring accurate measurement of flow rate. Make sure to perform this adjustment when you first operate the device.
- Before performing zero adjustment, make sure that Class D grounding is reliably performed with the flowtube and that the flowtube is filled with a measurement fluid which is sitting still. Zero adjustment is possible when the flow velocity falls below 0.2 m/s. Make sure to wait until the fluid comes to a complete rest (a flow velocity of 0.0 m/s) to avoid output errors.
- Zero adjustment requires O/S to be selected for the Actual MODE in Flow Transducer Block.
  Configure the setting from the host system in advance.

Accessing the option from the menu

Note: Use METHOD in the menu to perform zero adjustment. METHOD may not operate with some hosts.
In such cases, perform zero adjustment by accessing the option through the parameter list.

- Device menu for communicators
  Perform zero adjustment by selecting Device → Maintenance → Auto Zero Adjustment (METHOD).

- Block menu for communicators or Block menu for PCs
  Perform zero adjustment by selecting FLOW Transducer Block → Block → Maintenance → Auto Zero Adjustment (METHOD).

Accessing the option from the parameter list

1	Set TARGET in MODE_BLK of FLOW Transducer Block to O/S (Out of Service).
2	Set “1” (Execute) to AUTO_ZERO_CALIBRATION_CMD in FLOW Transducer Block. Zero adjustment starts. Set “4” (Canceled) to AUTO_ZERO_CALIBRATION_CMD in FLOW Transducer Block in order to cancel zero adjustment.
3	Execution results of automatic zero adjustment can be checked at MANUAL_ZERO_CALIBRATION_CMD in FLOW Transducer Block. While “1” (Executing) is displayed during execution of zero adjustment, “2” (Success) is displayed when zero adjustment is completed successfully.
4	For flow measurement, set TARGET of Transducer Block in FLOW Transducer Block to AUTO.

5.3 Basic settings

Flow Transducer Block

Overview of function

Flow Transducer Block enables calculation of flow velocity, volume flow rate, and mass flow rate based on the sensor outputs of the electromagnetic flowmeter.
The calculated volume flow rate and mass flow rate are output to AI Function Block and TOT Function Block. A flow switch is prepared for turning the transducer on or off depending on the volume flow rate and mass flow rate. The value assigned to the flow switch is output to DI Function Block.

Function Block diagram

The following diagram shows the configuration of Flow Transducer Block.

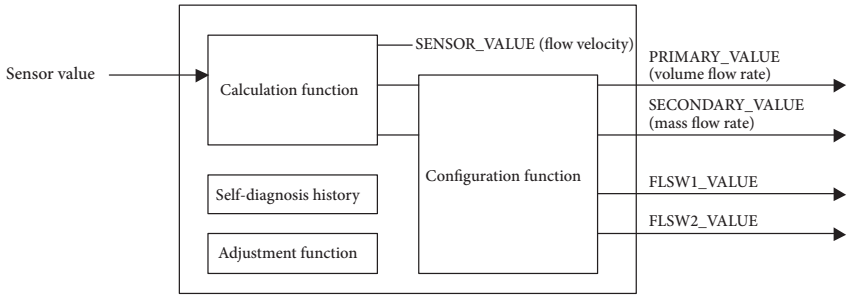


Figure5-1 Function Block diagram

Parameters

Major parameters for Flow Transducer Block are described as follows.
Refer to the attached Parameter List for more descriptions of parameters.

Output

SENSOR_VALUE

Indicates the flow velocity (m/s) of the measurement fluid.

PRIMARY_VALUE

Indicates the volume flow rate and the status.
Channel 1 corresponds to this parameter.
Select 1 for CHANNEL of Function Block you want to use in order to connect to AI Function Block or TOT Function Block.

SECONDARY_VALUE

Indicates the mass flow rate and the status.
Channel 2 corresponds to this parameter.
Select 2 for CHANNEL of Function Block you want to use in order to connect to AI Function Block or TOT Function Block.

FLSW_1_VALUE_D

Indicates the output value of Flow Switch 1 and the status.
Channel 100 corresponds to this parameter.
Select 100 for CHANNEL of Function Block you want to use in order to connect to DI Function Block.

FLSW_2_VALUE_D

Indicates the output value of Flow Switch 2 and the status.
Channel 101 corresponds to this parameter.
Select 101 for CHANNEL of Function Block you want to use in order to connect to DI Function Block.

Settings

PRIMARY_VALUE_RANGE

Indicates setting values for the upper and lower range limits, unit, and the position of the decimal point for the volume flow rate.
The unit for the flow rate must be identical to the unit assigned for XD_SCALE in AI Block.
Refer to Table 5-1 for the units that can be set up.

SECONDARY_VALUE_RANGE
Indicates setting values for the upper and lower range limits, unit, and the position of the decimal point for the mass flow rate.
The unit for the flow rate must be identical to the unit assigned for XD_SCALE in AI Block.
Refer to Table 5-2 for the units that can be set up.

DENSITY_CONSTANT
Fluid density setup
The assigned value is applied to the calculation of SECONDARY_VALUE (mass flow rate).

FLOWTUBE_SIZE
Flowtube diameter setup

FLOWTUBE_TYPE
Flowtube type setup

EMPTY_PIPE_DETECTOR
Indicates whether the empty detection function is enabled or disabled.

Calculation function

DAMPING_CONSTANT
A damping constant can be set up when a tiny variation component needs to be cut off from the measured instantaneous flow rate value.

PRIMARY_VALUE_LOW_FLOW_CUT
A low cut-off threshold can be set for the volume flow rate.
Available range is 0 to 10% (percentage of PRIMARY_VALUE_RANGE.EU100).

SECONDARY_VALUE_LOW_FLOW_CUT
A low cut-off threshold can be set for the mass flow rate.
Available range is 0 to 10% (percentage of SECONDARY _VALUE_RANGE.EU100).

Adjustment function

AUTO_ZERO_CALIBRATION_CMD
This command executes automatic zero adjustment.
Run this command in order to perform zero adjustment when the fluid is filled and sitting still in the flowtube.

GAIN_CALIBRATION_CMD
This command executes gain adjustment of the transmitter.
Run this command in order to perform zero adjustment of the transmitter using a calibrator, etc.

Self-diagnosis history

FLOW_TB_STATUS_RECORD_1–10
Saves self-diagnosis history.

Table 5-1. Units that can be set up for volume flow rate

Unit of volume flow rate	Unit of time			
	d	h	min	s
cm^3	cm^3/d (1514)	cm^3/h (1513)	cm^3/min (1512)	cm^3/s (1511)
m^3	m^3/d (1350)	m^3/h (1349)	m^3/min (1348)	m^3/s (1347)
L	L/d (1354)	L/h (1353)	L/min (1352)	L/s (1351)
bbl	bbl/d (1374)	bbl/h (1373)	bbl/min (1372)	bbl/s (1371)
gal	mgal/d (1461) gal/d (1365) kgal/d (1462)	mgal/h (1457) gal/h (1364) kgal/h (1458)	mgal/min (1453) GPM (1363) kgal/min (1454)	mgal/s (1459) gal/s (1362) kgal/s (1450)
ImpGal	mImpGal_d (1476) ImpGal/d (1370) kImpGal/d (1477)	mImpGal_h (1472) ImpGal/h (1369) kImpGal/h (1473)	mImpGal_min (1468) ImpGal/min (1368) kImpGal/min (1469)	mImpGal_s (1464) ImpGal/s (1367) kImpGal/s (1465)

Table 5-2. Units that can be set up for mass flow rate

Unit of volume flow rate	Unit of time			
	d	h	min	s
g	g/d (1321) kg/d (1325)	g/h (1320) kg/h (1324)	g/min (1319) kg/min (1323)	g/s (1318) kg/s (1322)
t	t/d (1329)	t/h (1328)	t/min (1327)	t/s (1326)
lb	lb/d (1333)	lb/h (1332)	lb/min (1331)	lb/s (1330)

Display Transducer Block

Overview of function

Display Transducer Block controls the display of measurement values and alarm indication in the local user interface (LUI).
Input and output signal values for function blocks installed in the device can be displayed, such as OUT of AI Block and PRIMARY_VALUE and SECONDARY_VALUE of Flow Transducer Block.

Parameter

Major parameters of Display Transducer Block are described as follows.
Refer to the attached Parameter List for more descriptions of parameters.

DISPLAY_PARAM_SELECTION

Select the parameter you want to display from among the parameters configured in the display setting 1 to 4.
Up to four parameters can be displayed in chronological order.
If all of the parameters for 1 to 4 are unselected, O/S is set for MODE_BLK._Actual in Display Transducer Block.

DISPLAY_INFO_SELECTION

Adjunct data (tag, status, and unit) that are commonly assigned for parameters in the display setting 1 to 4 can be configured. Factory default is 0x07 (Tag, Unit, Status are all selected)
For example, if not displaying Tag and Status, and displaying only Unit, change the setting to 0x02.
If all the adjunct data are unselected, O/S is set for MODE_BLK._Actual in Display Transducer Block.

DISPLAY_CYCLE[*1]

The cycle for updating the display can be set in units of seconds, in a range from 1 to 10 seconds. Factory default is 0x05(5 sec).

BLOCK_TAG_SELECTION_n[*2]

Enter BLOCK_TAG for the block to which the parameter is to be displayed in the display setting n. Enter the BLOCK_TAG of the block that has the parameters to be displayed into BLOCK_TAG_SELECTION_n. If an incorrect value is entered, the block cannot be identified and display settings cannot be set up.

PARAM_SELECTION_n[*2]

Select a parameter you want to display in the display setting n.
Available values are presented in Table 5-3.

Note: When writing is not possible for BLOCK_TAG_SELECTION_n (n=1 to 4), or PARAMETER_SELECTION_n (n=1 to 4), switch the settings of RB FEATURE_SEL Bit_12 (Deferral of Inter-Parameter Write Checks) to ON (enabled).

DISPLAY_TAG_n[*2]

Enter the text you want to display in the indicator as a tag for the display setting n.
Up to 16 characters can be entered.

UNIT_SELECTION_n[*2]

You can select whether the parameter in display setting n will be displayed using the unit associated with it or another desired unit.

Select Auto (0) in order to display the parameter with the associated unit as assigned for the displayed value, and select Custom (1) in order to display the parameter with another desired unit.

Please refer to the parameter list, which includes the display parameter, and section in Table 5-4, "LUI Display Unit String."

CUSTOM_UNIT_n[*2]

Enter the text you want to display as the unit.

This parameter is displayed only when Custom is selected in UNIT_SELECTION_n.

Up to 16 characters can be entered for CUSTOM_UNIT_n.

*1 If changing the display time, change the parameter setting.

*2 If changing the display detail from the factory default PV value of the Flow Transducer Block to other parameter, change these parameters.

Regular Display

With the factory default setting, the PV value of Flow Transducer Block is displayed.

With the factory default setting, it gets displayed periodically according to the following sequence.

Seq. No.	1	2	3
Main Disp.	FTB:PV value	FTB:PV value	FTB:PV value
Aux. Disp	PRIMARY_VALUE	(Specified Unit)	(Status)
DisplayTime	5	5	5

For example, if you wish to change the display detail to Out value of AI Function Block,

1. Set AI_FB_01 in BLOCK_TAG_SELECTION_1. (AI_FB_01 of Block Tag is the factory default value. If it has been changed since factory shipment, set this modified value)
2. Verify that BLOCK_TYPE_SELECTION_1 is now AI Function Block(0x0101).
3. Select 8:OUT for PARAM_SELECTION_1
4. For example, change DISPLAY_TAG_1, which is the tag to be displayed, to OUT. For other displayable parameters, please refer to Table 5-3.

Note: If you change the Block Tag of the block that you are trying to set the display for, the setting will not get properly implemented.

If you had changed the Block Tag, turn the device power off and then on again, or write "4{Restart Processor}" to Resource Block's RESTART section and then restart your device.

Several Parameter Display

Display Transducer Block can display a maximum of 4 parameters sequentially and periodically. This section will explain the setting of displaying two parameters as an example.

This explains how to set it to display the PV value of Flow Transducer Block and OUT value of AI Function Block periodically.

- The factory default setting sets it so that it only displays the PV value of Flow Transducer Block. In addition, if adding OUT value of AI Function Block as the second parameter, enable bit1:Parameter 2 of the DISPLAY_PARAM_SELECTION. DISPLAY_PARAM_SELECTION will change from the factory default 0x01 to 0x03.
- Next you will set BLOCK_TAG_SELECTION_2 to AI_FB_01. Verify that BLOCK_TYPE_SELECTION_2 is now set to 0x0101 AI Function Block (AI_FB_01 of Block Tag is the factory default value. If it has been changed since factory shipment, set this modified value).
- Select 8:OUT for PARAM_SELECTION_2.
- Set the DISPLAY_TAG_2, a display tag, to OUT for example.

By conducting the above setting, it gets displayed periodically according to the following sequence.

Seq. No.	1	2	3	4	5	6
Main Disp.	FTB:PV value	FTB:PV value	FTB:PV value	AI:OUT value	AI:OUT value	AI:OUT value
Aux. Disp	PRIMARY_VALUE	(Specified Unit)	(Status)	OUT	(Specified Unit)	(Status)
DisplayTime	5	5	5	5	5	5

Set the following to display the third parameter along with the above.
DISPLAY_PARAM_SELECTION: 0x07 (enable bit2:Parameter 3 as well)
BLOCK_TAG_SELECTION_3: set the Block Tag to be displayed
PARAM_SELECTION_3: select the parameter to be displayed
DISPLAY_TAG_3: set the Tag to be displayed

Set the following to display the fourth parameter as well.
DISPLAY_PARAM_SELECTION: 0x0f (enable bit3:Parameter 4 as well)
BLOCK_TAG_SELECTION_4: set the Block Tag to be displayed
PARAM_SELECTION_4: select the parameter to be displayed
DISPLAY_TAG_4: set the Tag to be displayed

Please refer to Appendix B for detail on Display Transducer Block parameters.

Note: If you change the Block Tag of the block that you are trying to set the display for, the setting will not get properly implemented.
If you had changed the Block Tag, turn the device power off and then on again, or write “4{Restart Processor}” to Resource Block’s RESTART section and then restart your device.

Status Display

Please refer to Table 5-5 for the status displayed by the string part.

Alarm Display

When an alarm is activated, the alarm display strings of Table 5-6 will get periodically displayed.

Irregular Display

During OOS and main board communication error, the regular display will be switched to irregular display.

OOS Display

When Display Transducer Block is OOS (Out Of Service), it will display the following.

Main Disp.		
Aux. Disp	(upper)	DISPLAY OFF
	(lower)	DISP TB O/S

Main Board Communication Error Display

When a main board communication error occurs inside the transmitter, the following gets displayed.

Main Disp.		
Aux. Disp	(upper)	HW ERROR
	(lower)	COMM ERROR

Table 5-3 Display Transducer Block Displayable Parameter List

Block	ProfileNumber	Parameter	Index	Range	Index
FlowTB	0x0113	PRIMARY_VALUE	15	PRIMARY_VALUE_RANGE	16
		SECONDARY_VALUE	18	SECONDARY_VALUE_ RANGE	19
DiagTB	0x8018	SCALE_LEVEL	15	SCALE_LEVEL_RANGE	16
AI	0x0101	OUT	8	OUT_SCALE	11
PID	0x0108	OUT	9	OUT_SCALE	11
		IN	15	PV_SCALE	10
		CAS_IN	18	PV_SCALE	10
		BKCAL_IN	27	OUT_SCALE	11
		BKCAL_OUT	31	PV_SCALE	10
		RCAS_IN	32	PV_SCALE	10
		ROUT_IN	33	OUT_SCALE	11
		RCAS_OUT	35	PV_SCALE	10
		ROUT_OUT	36	OUT_SCALE	11
		TRK_VAL	39	TRK_SCLAE	37
		FF_VAL	40	FF_SCALE	41
AR	0x0127	OUT	8	OUT_RANGE	11
		IN	14	PV_SCALSE	10
		IN_LO	15	PV_SCALSE	10
		IN1	16	PV_SCALSE	10
		IN2	17	PV_SCALSE	10
		IN3	18	PV_SCALSE	10
TOTALIZER	0x0144	OUT	9	OUT_RANGE	12
		PRESET_IN	20	XD_RANGE	11

Table 5-4 LUI Display Unit String List

Unit Code	Unit String Displayed in LUI	Description
1000	K	Kelvin
1001	degC	degree Celsius
1002	degF	degree Fahrenheit
1003	degR	degree Rankine
1034	m3	cubic meter
1036	cm3	cubic centimeter
1038	L	liter
1048	gal	US gallon
1049	ImpGal	Imperial gallon
1051	bbl	barrel
1088	kg	kilogram
1089	g	gram
1092	t	metric ton
1094	lb	pound (mass)
1130	Pa	pascal
1131	GPa	gigapascal
1132	Mpa	megapascal
1133	kPa	kilopascal
1134	mPa	millipascal
1135	uPa	micropascal
1136	hPa	hectopascal
1137	bar	bar
1138	mbar	millibar
1139	torr	torr
1140	atm	atmospheres
1141	psi	pounds per square inch
1142	psia	pounds per square inch absolute
1143	psig	pounds per square inch gauge
1144	gcm2	gram per square centimeter
1145	kgcm2	kilogram per square centimeter
1146	inH2O	inches of water
1147	inH2O_4C	inches of water at 4°C
1148	inH2O_68F	inches of water at 68°F
1149	mmH2O	millimeters of water
1150	mmH2O_4C	millimeters of water at 4°C
1151	mmH2O_68F	millimeters of water at 68°F
1152	ftH2O	feet of water
1153	ftH2O_4C	feet of water at 4°C
1154	ftH2O_68F	feet of water at 68°F
1155	inHg	inches of mercury
1156	inHg_0C	inches of mercury at 0°C
1157	mmHg	millimeters of mercury
1158	mmHg_0C	millimeters of mercury at 0°C
1318	g/s	gram per second
1319	g/min	gram per minute
1320	g/h	gram per hour
1321	g/d	gram per day
1322	kg/s	kilogram per second
1323	kg/min	kilogram per minute
1324	kg/h	kilogram per hour
1325	kg/d	kilogram per day
1326	t/s	metric ton per second
1327	t/min	metric ton per minute
1328	t/h	metric ton per hour
1329	t/d	metric ton per day
1330	lb/s	pound per second

Unit Code	Unit String Displayed in LUI	Description
1331	lb/min	pound per minute
1332	lb/h	pound per hour
1333	lb/d	pound per day
1334	STon/s	short ton per second
1335	STon/min	short ton per minute
1336	STon/h	short ton per hour
1337	STon/d	short ton per day
1338	LTon/s	long ton per second
1339	LTon/min	long ton per minute
1340	LTon/h	long ton per hour
1341	LTon/d	long ton per day
1342	%	percent
1347	m3/ s	cubic meter per second
1348	m3/min	cubic meter per minute
1349	m3/ h	cubic meter per hour
1350	m3/ d	cubic meter per day
1351	L/s	liter per second
1352	L/min	liter per minute
1353	L/h	liter per hour
1354	L/d	liter per day
1355	ML/d	megaliter per day
1356	CFS	cubic feet per second
1357	CFM	cubic feet per minute
1358	CFH	cubic feet per hour
1359	ft3/d	cubic feet per day
1360	SCFM	standard cubic feet per minute
1361	SCFH	standard cubic feet per hour
1362	gal/s	US gallon per second
1363	GPM	US gallon per minute
1364	gal/h	US gallon per hour
1365	gal/d	US gallon per day
1366	Mgal/d	mega US gallon per day
1367	ImpGal/s	Imperial gallon per second
1368	ImpGal/min	Imperial gallon per minute
1369	ImpGal/h	Imperial gallon per hour
1370	ImpGal/d	Imperial gallon per day
1371	bbl/s	barrel per second
1372	bbl/min	barrel per minute
1373	bbl/h	barrel per hour
1374	bbl/d	barrel per day
1449	mgal/s	milli US gallon per second
1450	kgal/s	kilo US gallon per second
1451	Mgal/s	mega US gallon per second
1453	mgal/min	milli US gallon per minute
1454	kgal/min	kilo US gallon per minute
1455	Mgal/min	mega US gallon per minute
1457	mgal/h	milli US gallon per hour
1458	kgal/h	kilo US gallon per hour
1459	Mgal/h	mega US gallon per hour
1461	mgal/d	milli US gallon per day
1462	kgal/d	kilo US gallon per day
1463	Mgal/d	mega US gallon per day
1464	mImpGal/s	milli imperial gallon per second
1465	kImpGal/s	kilo imperial gallon per second
1466	MImpGal/s	mega imperial gallon per second
1468	mImpGal/min	milli imperial gallon per day
1469	kImpGal/min	kilo imperial gallon per day

Unit Code	Unit String Displayed in LUI	Description
1470	MImpGal/min	mega imperial gallon per day
1472	mImpGal/h	milli imperial gallon per hour
1473	kImpGal/h	kilo imperial gallon per hour
1474	MImpGal/h	mega imperial gallon per hour
1476	mImpGal/d	milli imperial gallon per day
1477	kImpGal/d	kilo imperial gallon per day
1478	MImpGal/d	mega imperial gallon per day
1482	Mbbl/s	megabarrel per second
1486	Mbbl/min	megabarrel per minute
1490	Mbbl/h	megabarrel per hour
1494	Mbbl/d	megabarrel per day
1496	mm3/s	cubic millimeter per second
1497	km3/s	cubic kilometer per second
1498	Mm3/s	cubic megameter per second
1500	mm3/min	cubic millimeter per minute
1501	km3/min	cubic kilometer per minute
1502	Mm3/min	cubic megameter per minute
1504	mm3/h	cubic millimeter per hour
1505	km3/h	cubic kilometer per hour
1506	Mm3/h	cubic megameter per hour
1508	mm3/d	cubic millimeter per day
1509	km3/d	cubic kilometer per day
1510	Mm3/d	cubic megameter per day
1511	cm3/s	cubic centimeter per second
1512	cm3/min	cubic centimeter per minute
1513	cm3/h	cubic centimeter per hour
1514	cm3/d	cubic centimeter per day
1518	kL/min	kiloliter per minute
1519	kL/h	kiloliter per hour
1520	kL/d	kiloliter per day
1522	Nm3/s	Normal cubic meter per second
1523	Nm3/min	Normal cubic meter per minute
1524	Nm3/h	Normal cubic meter per hour
1525	Nm3/d	Normal cubic meter per day
1527	Sm3/s	Standard cubic meter per second
1528	Sm3/min	Standard cubic meter per minute
1529	Sm3/h	Standard cubic meter per hour
1530	Sm3/d	Standard cubic meter per day
1532	NL/s	Normal liter per second
1533	NL/min	Normal liter per minute
1534	NL/h	Normal liter per hour
1535	NL/d	Normal liter per day
1537	SL/s	Standard liter per second
1538	SL/min	Standard liter per minute
1539	SL/h	Standard liter per hour
1540	SL/d	Standard liter per day
1589	mL/min	milliliters per minute
1617	ML/h	megaliter per hour
1618	ML/min	megaliter per minute
1619	kL/s	kiloliter per second
1620	kft3/ d	cubic kilofeet per day
1621	kCFH	cubic kilofeet per hour
1622	kCFM	cubic kilofeet per minute
1623	kCFS	cubic kilofeet per second
1624	mft3/ d	cubic millifeet per day
1625	mCFH	cubic millifeet per hour
1626	mCFM	cubic millifeet per minute

Unit Code	Unit String Displayed in LUI	Description
1627	mCFS	cubic millifeet per second
1648	kgal	kilogallon
1649	kImpGal	kilo-imperial gallon
1653	Mft3/ d	cubic Megafeet per day
1654	Mm3/ d	cubic Megameters per day

Table 5-5 Display Transducer Block Display Status List

Quality	Substatus	Display String	Status Detail
0 : Bad	0	Bad-Non_spec	Non-specific
	1	Bad-ConfigError	Configuration Error
	2	Bad-NotConnected	Not Connected
	3	Bad-DeviceFailur	Device Failure
	4	Bad-SensorFailur	Sensor Failure
	5	Bad-NoCommWitL	No Comm, with LUV
	6	Bad-NoCommWitN	No Comm, no LUV
	7	Bad-OutOfService	Out of Service
	8	Bad-TrnsducInMA	Transducer in MAN
1 : Uncertain	0	Uncertn-Non_spec	Non-specific
	1	Uncertn-LUV	Last Usable Value
	2	Uncertn-Substtut	Substitute / Manual Entry
	3	Uncertn-InitValu	Initial Value
	4	Uncertn-S-CvNotA	Sensor Conversion not Accurate
	5	Uncertn-EgUnRaV	Engineering Unit Range Violation
	6	Uncertn-SubNoma	Sub-normal
	7	Uncertn-TrdInMA	Transducer in MAN
2 : GOOD(NC)	0	GOOD-NC-Non_sp	Non-specific
	1	GOOD-NC-ActBkA	Active Block Alarm
	2	GOOD-NC-ActAdA	Active Advisory Alarm
	3	GOOD-NC-ActCrA	Active Critical Alarm
	4	GOOD-NC-UakBk	Unack Block Alarm
	5	GOOD-NC-UakAd	Unack Advisory Alarm
	6	GOOD-NC-UakCr	Unack Critical Alarm
	8	GOOD-NC-IFS	Initiate Fault State(IFS)
3 : GOOD(C)	0	GOOD-C-Non_spec	Non-specific
	1	GOOD-C-InitAck	Initialization Acknowledge
	2	GOOD-C-InitReq	Initialization Request
	3	GOOD-C-NotInvit	Not Invited
	4	GOOD-C-NotSelct	Not Selected
	6	GOOD-C-LoclOvrr	Local Override
	7	GOOD-C-FaltStAc	Fault State Active
	8	GOOD-C-IFS	Initiate Fault State(IFS)

Table 5-6 Display Transducer Block Display Alarm List

FD_xxx_ACTIVE Bit	Display String	Description
0	Check	Check Function Bit
1	Not used	
2	Not used	
3	Not used	
4	Gain Calibration	Gain Calibration
5	Zero Calibration	Zero Calibration
6	Fixed EX Current	Fixed EX Current
7	Touch-Key Active	Touch-Key Active
8	Not used	
9	Not used	
10	Not used	
11	Not used	
12	Not used	
13	Zero Calib. Fail	Zero Calib. Failure
14	Scale Detected	Scale Detected
15	Not Calibrated	Not Calibrated
16	Not used	Not used
17	Not used	Not used
18	Not used	Not used
19	Not used	Not used
20	Not used	Not used
21	Not used	Not used
22	Empty Detected	Empty Detected
23	Flow Rate Over	Flow Rate Over
24	Not used	Not used
25	Not used	Not used
26	Not used	Not used
27	Not used	Not used
28	MainBoardCommErr	MainBoardCommunicationError
29	Extube Coil Open	Extube Coil Open
30	Main Board Fail	Main Board Failure
31	FFopt Board Fail	FF Option Board Failure

Diag Transducer Block

Overview of function

Diag Transducer Block calculates values for diagnosing the integrity of the flow rate signal based on the sensor output from the electromagnetic flowmeter.
The calculated diagnostic value is output to AI Function Block.
The block judges the diagnostic value by comparing it against the threshold value. The result is output in the device status summary of Resource Block as an alarm.

Function Block diagram

The configuration of Diag Transducer Block is presented in the figure below.

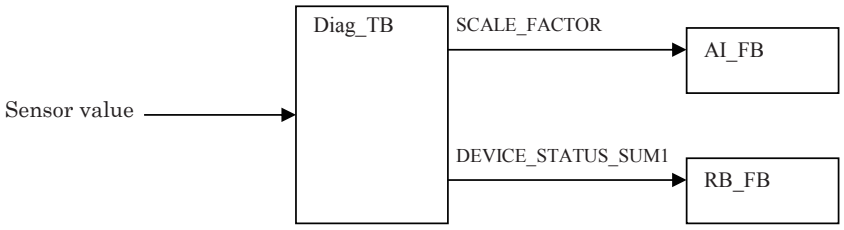


Figure5-2 Function Block diagram

Parameters

Major parameters of Diag Transducer Block are described as follows.
Refer to the attached Parameter List for more descriptions of parameters.

Output

SCALE_LEVEL

Displays the value for diagnosing the integrity of the flow rate signal.

Setting

SCALE_LEVEL_RANGE

Indicates setting values for the upper and lower range limits, unit, and the position of the decimal point for SCALE_LEVEL (value for diagnosing integrity of the flow rate signal).
The unit for the diagnostic value is UNIT_LESS (1615). The unit must be identical to the unit assigned for XD_SCALE of the block being used in order to connect with AI Function Block.

SCALE_LEVEL_MOVING_AVERAGE_MODE

Select whether to calculate a moving average for the diagnostic value.

SCALE_LEVEL_MOVING_AVERAGE_TIME

Assign a moving average time for the diagnostic value.

SCALE_LEVEL_THRESHOLD

Specify a threshold value for diagnosing the integrity of the flow rate signal.
If the diagnostic value exceeds the threshold value, an alarm is generated as an output.

SCALE_LEVEL_HYSTERESIS

Specify a hysteresis for diagnosing the integrity of the flow rate signal.
Assign a value smaller than the threshold value for diagnosing the integrity of the flow rate signal.

6. Maintenance and Troubleshooting

Overview

This chapter describes maintenance and checkup procedures for the electromagnetic flowmeter and reference information for troubleshooting.

6.1 Troubleshooting

Types of trouble

Introduction

There are three types of trouble that could happen when the electromagnetic flowmeter is started up for operation.

- Trouble caused by the deviation of actual conditions of use from the specifications of the electromagnetic flowmeter
- Trouble caused by mistakes in settings or operation
- Trouble caused by failures of the electromagnetic flowmeter

Trouble experienced during the operation of the electromagnetic flowmeter is recognized either as a “major trouble” or a “minor trouble” by the self-diagnosis functions of the transmitter, before it is displayed or addressed.

If any trouble occurs, refer to the troubleshooting guide described here to take appropriate corrective action.

Major trouble

A case of major trouble refers to a state or failure that significantly impairs the operation of the electromagnetic flowmeter and will lead to the damage of the flowmeter if left unaddressed. If a case of major trouble takes place during the operation of the electromagnetic flowmeter, an error message appears in the display panel of the transmitter’s main unit.

Minor trouble

A case of minor trouble refers to a state or failure that does not significantly impair the operation of the electromagnetic flowmeter. If the transmitter self-diagnoses that a trouble event that occurred during operation is a case of minor trouble, the electromagnetic flowmeter continues to output the instantaneous flow rate value.

Trouble at the start of operation

Troubleshooting

Address a problem occurred at the start of operation in accordance with the table below. If the instruction in the table does not help eliminate the trouble, the electromagnetic flowmeter may be out of order. Please contact us by referring to the end of this instruction manual.

Trouble	Checkpoint and action
Nothing is displayed in the LUI even when the power is turned on.	· Check the specifications of the power supply for the transmitter. · Make sure that the ambient temperature is not below -25 °C.
No output signal is transmitted even when the power is turned on.	Make sure that the LUI display is turnThis completes the startup of the electromagnetic flowmeter.

Trouble during operation

Troubleshooting

Address a problem occurred during operation by taking the following steps.

1. Check if the same trouble is described in the table. If yes, address the problem as instructed in the table.
2. If the trouble cannot be resolved after following the above step, the electromagnetic flowmeter may be out of order.
   Please contact us by referring to the end of this instruction manual.

Trouble	Checkpoint and action
The output value fluctuates substantially when compared to the anticipated fluctuation range of flow rate.	· Make sure that the electromagnetic flowmeter is properly grounded. · Make sure that the damping constant is properly configured. · Clean the electrodes.
The output value remains at 0%.	· Check if the piping is empty. (i.e., the empty detection function is activated) · Check if the signal line is properly connected. · Check if the upstream or downstream valves are open.

Display Transducer Block Does Not Switch To Auto (LUI display says "DISPLAY_O/S.")

Trouble	Checkpoint and action
Display TB Does Not Switch To Auto (LUI display says "DISPLAY O/S")	· Check if BLOCK_TYPE_SELECTION_n (n=1 to 4) is configured. If not, BLOCK_TYPE_SELECTION_n will be 0. In that case, assign the BLOCK_TAG(block tag name) of the parameter you want to display to BLOCK_TAG_SELECTION_n (n=1 to 4). · Check if PARAMETER_SELECTION_n (n=1 to 4) is set to the parameter you want to display. · Check if DISPLAY_PARAM_SELECTION is set to the parameters you want to display. Example: If DISPLAY_PARAM_SELECTION=Parameter 1 and Parameter 2 BLOCK_TAG_SELECTION_1, PARAM_SELECTION_1, BLOCK_TAG_SELECTION_2, and PARAM_SELECTION_2 are appropriately configured.

Note: When writing is not possible for BLOCK_TAG_SELECTION_n (n=1 to 4), or PARAMETER_SELECTION_n (n=1 to 4), switch the settings of RB FEATURE_SEL Bit_12 (Deferral of Inter-Parameter Write Checks) to ON (enabled).

Error messages and corrective actions

This section describes errors that may be experienced in each block and corrective actions. Swiftly take proper measures or corrective actions.

Errors experienced with Resource Block

Error display	Error description	Corrective action
Option Board Fail	ROM error or EEPROM error in the option board	1. Reboot. 2. Replace the main P/C.
Main Board Fail	NVM error, AD converter error, ROM error, or RAM error in the main board	1. Reboot. 2. Replace the main P/C.
Extube Coil Open	Coil disconnection	1. Check the connection. 2. Measure the coil's resistance. 3. Reboot.
MainBoardCommErr	Communication error between boards	1. Reboot. 2. Replace the main P/C. 3. Replace the Fieldbus option P/C.
Flow Rate Over-Range	Flow velocity exceeds 10 m/s.	1. Reduce the flow velocity to 10 m/s or below. 2. Replace the flowtube with another one with larger diameter.
Empty Detected	The empty pipe detector is activated.	1. Check if the piping is filled with water. 2. Clean the electrodes.
Not Calibrated	Calibration has not been made.	1. Reboot. 2. Replace the main P/C, then contact us.
Scale Detected	The value for diagnosing the integrity of the flow rate signal exceeds the threshold.	1. It is time to perform maintenance work. Clean inside the flowtube.
Zero Calib. Fail	Failure in zero adjustment	Check if the measurement piping is empty or if the flow velocity exceeds 0.2 m/s
Local User I/F Active	The LUI is enabled.	Return to the measuring mode.
Fixed Excitation Current Mode	Excitation out mode EXX, excitation out mode EXY, or excitation current off	Bring the excitation current to the original state by selecting "0" (None) for EX_OUTPUT_CMD in Flow Transducer Block.
Zero Calibration on	Zero adjustment is being performed.	Wait until zero adjustment is complete.
Gain Calibration on	Transmitter gain is adjusted at 0 m/s, 2.5 m/s, and 10.0 m/s.	Wait until gain adjustment is complete.

Errors experienced with Flow Transducer Block

Error display	Corrective action
SENS EX FAILURE	1. Check the connection. 2. Measure the coil's resistance. 3. Reboot.
SENS NVM FAILURE	1. Reboot. 2. Replace the main P/C.
SENS ADC FAILURE	1. Reboot. 2. Replace the main P/C.
SENS ROM FAILURE	1. Reboot. 2. Replace the main P/C.
SENS RAM FAILURE	1. Reboot. 2. Replace the main P/C.
IO FAILURE	1. Reboot. 2. Replace the main P/C. 3. Replace the Fieldbus option P/C.
AUTO ZERO FAILURE	Check if the measurement piping is empty or if the flow velocity exceeds 0.2 m/s.
NOT CALIBRATED	1. Reboot. 2. Replace the main P/C.
FLOWTUBE_CONFIG ERROR	Check the diameter and flowtube, and then enter the correct data.
PVR CONFIG ERROR	PVR exceeds the flow rate equivalent to 10 m/s. Check the settings of PVR, diameter, flowtube type, and dummy.
SVR CONFIG ERROR	SVR exceeds the flow rate equivalent to 10 m/s. Check the settings of SVR, diameter, flowtube type, dummy, and density.
FLSW_1 CONFIG ERROR	flsw_1_threshold exceeds the value of PVR when flsw_1_source is PV and flsw_1_threshold exceeds the value of SVR when flsw_1_source is SV. Check the settings of flsw_1_threshold.
FLSW_2 CONFIG ERROR	flsw_2_threshold exceeds the value of PVR when flsw_2_source is PV and flsw_2_threshold exceeds the value of SVR when flsw_2_source is SV. Check the settings of flsw_2_threshold.

Errors experienced with Diag Transducer Block

Error display	Corrective action
PARA_ERROR	scale_level_hysteresis exceeds scale_level_threshold. Check the settings of scale_level_threshold.
SENSOR_ERROR	A sensor error has occurred. Check BLOCK_ERR_DESC in Flow Transducer Block.

6.2 Input of simulated signals from calibrator

Introduction

A special calibrator has been designed for the electromagnetic flowmeter. This special calibrator can generate the same kind of signal as the flow rate signal produced by the flowtube. This simulated signal can be used for checking relevant functions of the transmitter.

Getting started

Prepare the following devices and components.

- A special calibrator (MGZ13) and a special cable
- A digital multimeter
- 250-Ω resistance

Checking method

Check the relevant functions in accordance with F1X 1000 Flow Meter Calibrator User's Manual
(CM2-F1X100-2001).

6.3 Measurement of excitation current

Introduction

The value and direction of the excitation current that flows in the coil in the flowtube can be checked.

The current value is checked by connecting an ammeter in series to the excitation cables of the flowtube and transmitter.

Measuring method using LUI

Step	Procedure	Screen
1	Follow the procedure for entering MAINTENANCE MODE to display the screen for checking the excitation current. In this state, the excitation current flows from X to Y. Confirm that the current value becomes 160 mA.	0.0000 ≥ EX CHECK EXX 160.0
2	Touch the ⇨ key once to move the cursor underneath E.	0.0000 > EX CHECK EXX 160.0
3	Touch the ⇧ key once to cause the excitation current to flow from Y to X. This changes the polarity to the opposite of the state in Step 2.	0.0000 > EX CHECK EXY 160.0
4	Touch the ⇧ key once to stop the flow of the excitation current.	0.0000 > EX CHECK EXY 160.0
5	Finally, touch the ⇨ key once to move the cursor underneath >.	0.0000 ≥ EX CHECK OFF 160.0
6	Use the ⇧ or ⇩ key to transit to a different screen. The excitation returns to the current signal of the rectangular wave.	
7	Next, display the screen for setting the excitation current value. In this state, the excitation current flows from X to Y.	
8	Use the ⇧ key or ⇩ key to set the excitation current value that was measured in Step 1.	0.0000 > CAL EX CURRENT 160.000 mA
9	Use the ⇧ or ⇩ key to transit to a different screen. The excitation returns to the current signal of the rectangular wave.	0.0000 > CAL EX CURRENT 160.000 mA

Method using Fieldbus communication

Accessing the option from the parameter list

1. Set TARGET of MODE_BLK in FLOW Transducer Block to O/S (Out of Service).
2. Set "1" (EXX) to EX_OUTPUT_CMD in FLOW Transducer Block.
   The excitation current is fixed to EXX.
   Measure the excitation current and write down the excitation current value.
3. Set "0" (None) to EX_OUTPUT_CMD in FLOW Transducer Block.
   The excitation current is returned to the original state.
4. Read the value of EX_CURRENT_VALUE in FLOW Transducer Block.
   If this value is different from the value written down in Step 2, write the value written down in Step 2 into EX_CURRENT_VALUE.
5. For flow measurement, set TARGET of Transducer Block in FLOW Transducer Block to AUTO.

Accessing the option from the menu

Note: Use METHOD in the menu to check or adjust the excitation current.
METHOD may not operate with some hosts.
In such cases, check or adjust the excitation current by accessing the option through the parameter list.

- Device menu for communicators
  Check or adjust the excitation current by selecting Device → Maintenance → Excitation Current Calibration (METHOD).
- Block menu for communicators or Block menu for PCs
  Check or adjust the excitation current by selecting FLOW Transducer Block → Block → Maintenance → Excitation Current Calibration (METHOD).

6.4 Gain adjustment

Measuring method using LUI

Step	Procedure	Screen
1	Enter CALIBRATION MODE and display the screen shown on the right.	0.0000 > CAL GAIN 50Hz ZERO READY
2	Set the cursor at the position of READY and press the ↑ key to start gain calibration at the zero point (0 m/s). When the screen shown on the right is displayed, the gain calibration at the zero point (0 m/s) has been completed. Perform gain calibration at 2.5 m/s next.	0.0000 > CAL GAIN 50Hz ZERO ON Gain calibration starts (the main display blinks). A few seconds later Gain calibration is complete. ↓ 0.0000 > CAL GAIN 50Hz ZERO READY
3	Display the screen shown on the right. Use the calibrator to input 2.5 m/s.	2.5000 > CAL GAIN1 50Hz 2.50 m/s READY
4	Set the cursor at the position of READY and press the ↑ key to start gain calibration at 2.5 m/s. When the screen shown on the right is displayed, the gain calibration at 2.5 m/s has been completed. Perform gain calibration at 10 m/s in the same way.	2.5000 > CAL GAIN1 50Hz 2.50 m/s ON Gain calibration starts (the main display blinks). A few seconds later Gain calibration is complete. ↓ 2.5000 > CAL GAIN1 50Hz 2.50 m/s READY

Method using Fieldbus communication

Accessing the option from the parameter list

1. Set TARGET of MODE_BLK in FLOW Transducer Block to O/S (Out of Service).
2. Use the calibrator to input 0.0 m/s.
3. Set “1” (0.0 m/s) to GAIN_CALIBRATION_CMD in FLOW Transducer Block.
   Zero adjustment starts.
   To cancel the zero adjustment, set “4” (Canceled) to GAIN_CALIBRATION_CMD in FLOW Transducer Block.
4. Execution results of automatic zero adjustment can be checked at GAIN_CALIBRATION_STATUS in FLOW Transducer Block.
   While “1” (Executing) is displayed during execution of zero adjustment, “2” (Success) is displayed when zero adjustment is completed successfully.
5. Use the calibrator to input 2.5 m/s.
6. Set “2” (2.5 m/s) to GAIN_CALIBRATION_CMD in FLOW Transducer Block.
   Gain adjustment of 2.5 m/s starts.
   To cancel the 2.5 m/s gain adjustment, set “4” (Canceled) to GAIN_CALIBRATION_CMD in FLOW Transducer Block.
7. Execution results of 2.5 m/s gain adjustment can be checked at GAIN_CALIBRATION_STATUS in FLOW Transducer Block.
   While “1” (Executing) is displayed during execution of 2.5 m/s gain adjustment, “2” Success} is displayed when 2.5 m/s gain adjustment is completed successfully.
8. Use the calibrator to input 10.0 m/s.
9. Set “3” (10.0 m/s) to GAIN_CALIBRATION_CMD in FLOW Transducer Block. Gain adjustment of 10.0 m/s starts.
   To cancel the 10.0 m/s gain adjustment, set “4” (Canceled) to GAIN_CALIBRATION_CMD in FLOW Transducer Block.
10. Execution results of 10.0 m/s gain adjustment can be checked at GAIN_CALIBRATION_STATUS in FLOW Transducer Block.
    While “1” (Executing) is displayed during execution of 10.0 m/s gain adjustment, “2” (Success) is displayed when 10.0 m/s gain adjustment is completed successfully.
11. For flow measurement, set TARGET of Transducer Block in FLOW Transducer Block to AUTO.

Accessing the option from the menu

Note: Use METHOD in the menu to perform gain adjustment.
METHOD may not operate with some hosts.
In such cases, perform gain adjustment by accessing the option through the parameter list.

- Device menu for communicators
  Perform gain adjustment by selecting Device → Maintenance → Gain Adjustment (METHOD).
- Block menu for communicators or Block menu for PCs
  Perform gain adjustment by selecting FLOW Transducer Block → Block → Maintenance → Gain Adjustment (METHOD).

Appendix A. View List

Resource Block

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4	VIEW_4_2
1	ST_REV	2	2	2	2	2
2	TAG_DESC					
3	STRATEGY				2	
4	ALERT_KEY				1	
5	MODE_BLK	4		4		
6	BLOCK_ERR	2		2		
7	RS_STATE	1		1		
8	TEST_RW					
9	DD_RESOURCE					
10	MANUFAC_ID				4	
11	DEV_TYPE				2	
12	DEV_REV				1	
13	DD_REV				1	
14	GRANT_DENY		2			
15	HARD_TYPES				2	
16	RESTART					
17	FEATURES				2	
18	FEATURE_SEL		2			
19	CYCLE_TYPE				2	
20	CYCLE_SEL		2			
21	MIN_CYCLE_T				4	
22	MEMORY_SIZE				2	
23	NV_CYCLE_T		4			
24	FREE_SPACE		4			
25	FREE_TIME	4		4		
26	SHED_RCAS		4			
27	SHED_ROUT		4			
28	FAULT_STATE	1		1		
29	SET_FSTATE					
30	CLR_FSTATE					
31	MAX_NOTIFY				1	
32	LIM_NOTIFY		1			
33	CONFIRM_TIME		4			
34	WRITE_LOCK		1			
35	UPDATE_EVT					
36	BLOCK_ALM					
37	ALARM_SUM	8		8		
38	ACK_OPTION				2	
39	WRITE_PRI				1	
40	WRITE_ALM					
41	ITK_VER				2	
42	FD_VER				2	
43	FD_FAIL_ACTIVE	4		4		
44	FD_OFFSPEC_ ACTIVE	4		4		
45	FD_MAINT_ ACTIVE	4		4		
46	FD_CHECK_ ACTIVE	4		4		
47	FD_FAIL_MAP				4	

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4	VIEW_4_2
48	FD_OFFSPEC_MAP				4	
49	FD_MAINT_MAP				4	
50	FD_CHECK_MAP				4	
51	FD_FAIL_MASK				4	
52	FD_OFFSPEC_ MASK				4	
53	FD_MAINT_MASK				4	
54	FD_CHECK_MASK				4	
55	FD_FAIL_ALM					
56	FD_OFFSPEC_ALM					
57	FD_MAINT_ALM					
58	FD_CHECK_ALM					
59	FD_FAIL_PRI				1	
60	FD_OFFSPEC_PRI				1	
61	FD_MAINT_PRI				1	
62	FD_CHECK_PRI				1	
63	FD_SIMULATE			9		
64	FD_RECOMMEN_ ACT	2		2		
65	CAPABILITY_LEV					1
66	HARDWARE_REV					32
67	SOFTWARE_REV					32
68	SIM_ACTIVE_SW					
		40	30	49	69	67

FLOW Transducer Block

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3_1	VIEW_3_2	VIEW_4_1	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5	VIEW_4_6
1	ST_REV	2	2	2	2	2	2	2	2	2	2
2	TAG_DESC										
3	STRATEGY					2					
4	ALERT_KEY					1					
5	MODE_BLK	4		4							
6	BLOCK_ERR	2		2							
7	UPDATE_EVT										
8	BLOCK_ALM										
9	TRANSDUCER_ DIRECTORY										
10	TRANSDUCER_ TYPE	2	2	2		2					
11	TRANSDUCER_ TYPE_VER					2					
12	XD_ERROR	1		1							
13	COLLECTION_ DIRECTORY										
14	PRIMARY_ VALUE_TYPE		2								
15	PRIMARY_ VALUE	5		5							
16	PRIMARY_ VALUE_RANGE		11								

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3_1	VIEW_3_2	VIEW_4_1	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5	VIEW_4_6
17	SECONDARY_ VALUE_TYPE		2								
18	SECONDARY_ VALUE	5		5							
19	SECONDARY_ VALUE_RANGE		11								
20	XD_OPTS		4								
21	SENSOR_TYPE					2					
22	SENSOR_RANGE					11					
23	SENSOR_SN						32				
24	SENSOR_CAL_ METHOD						1				
25	SENSOR_CAL_ LOC						32				
26	SENSOR_CAL_ DATE						7				
27	SENSOR_CAL_ WHO						32				
28	BLOCK_ERR_ DESC_1	4		4							
29	SENSOR_VALUE				4						
30	FLOWTUBE_SIZE							1			
31	FLOWTUBE_ TYPE							1			
32	FLOWTUBE_ FACTOR							4			
33	DUMMY_ NUMBER							1			
34	EMPTY_PIPE_ DETECTOR							1			
35	DENSITY_ CONSTANT							4			
36	DENSITY_ CONSTANT_ UNITS							2			
37	FLOW_ DIRECTION							1			
38	COEFFICIENT							4			
39	DAMPING_ CONSTANT							4			
40	MOVING_ AVERAGE_MODE							1			
41	MOVING_ AVERAGE_TIME							4			
42	PRIMARY_ VALUE_SPIKE_ CUT_MODE							1			
43	PRIMARY_ VALUE_SPIKE_ CUT_TIME							4			

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3_1	VIEW_3_2	VIEW_4_1	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5	VIEW_4_6
44	PRIMARY_ VALUE_SPIKE_ CUT_LEVEL							4			
45	SECONDARY_ VALUE_SPIKE_ CUT_MODE							1			
46	SECONDARY_ VALUE_SPIKE_ CUT_TIME							4			
47	SECONDARY_ VALUE_SPIKE_ CUT_LEVEL							4			
48	PRIMARY_ VALUE_LOW_ FLOW_CUT							1			
49	SECONDARY_ VALUE_LOW_ FLOW_CUT							1			
50	AC_FREQUENCY							1			
51	EX_FREQUENCY							1			
52	EX_OUTPUT_ CMD										
53	EX_OUTPUT_ STATUS				1						
54	EX_CURRENT_ VALUE							4			
55	AUTO_ZERO_ CALIBRATION_ CMD										
56	AUTO_ZERO_ CALIBRATION_ STATUS				1						
57	MANUAL_ZERO_ CALIBRATION_ CMD										
58	GAIN_ CALIBRATION_ CMD										
59	GAIN_ CALIBRATION_ STATUS				1						
60	FLSW_1_ VALUE_D				2						
61	FLSW_1_SOURCE							1			
62	FLSW_1_MODE							1			
63	FLSW_1_ SETPOINT							4			
64	FLSW_1_ HYSTERESIS							1			
65	FLSW_2_ VALUE_D				2						
66	FLSW_2_SOURCE							1			
67	FLSW_2_MODE							1			

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3_1	VIEW_3_2	VIEW_4_1	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5	VIEW_4_6
68	FLSW_2_ SETPOINT							4			
69	FLSW_2_ HYSTERESIS							1			
70	TRANSMITTER_ MODEL_NO								32		
71	TRANSMITTER_ SN								32		
72	FLOWTUBE_ MODEL_NO									32	
73	FLOWTUBE_SN									32	
74	CLEAR_FLOW_ TB_STATUS_ RECORDS										
75	FLOW_TB_ STATUS_ RECORD_1										9
76	FLOW_TB_ STATUS_ RECORD_2										9
77	FLOW_TB_ STATUS_ RECORD_3										9
78	FLOW_TB_ STATUS_ RECORD_4										9
79	FLOW_TB_ STATUS_ RECORD_5										9
80	FLOW_TB_ STATUS_ RECORD_6										9
81	FLOW_TB_ STATUS_ RECORD_7										9
82	FLOW_TB_ STATUS_ RECORD_8										9
83	FLOW_TB_ STATUS_ RECORD_9										9
84	FLOW_TB_ STATUS_ RECORD_10										9
		25	34	25	13	22	106	70	66	66	92

DISPLAY Transducer Block

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5
1	ST_REV	2	2	2	2	2	2	2	2
2	TAG_DESC								
3	STRATEGY				2				
4	ALERT_KEY				1				
5	MODE_BLK	4		4					
6	BLOCK_ERR	2		2					
7	UPDATE_EVT								
8	BLOCK_ALM								
9	TRANSDUCER_ DIRECTORY								
10	TRANSDUCER_ TYPE	2	2	2	2				
11	TRANSDUCER_ TYPE_VER				2				
12	XD_ERROR	1		1					
13	COLLECTION_ DIRECTORY								
14	BLOCK_ERR_ DESC_1	4		4					
15	DISPLAY_ PARAM_SEL					1	1	1	1
16	DISPLAY_INFO_ SEL					1	1	1	1
17	DISPLAY_CYCLE					1	1	1	1
18	BLOCK_TYPE_ SEL_1			2					
19	BLOCK_TAG_ SEL_1					32			
20	PARAM_ SELECTION_1					2			
21	DISPLAY_TAG_1					32			
22	UNIT_ SELECTION_1					1			
23	CUSTOM_UNIT_1					32			
24	EXPONENT_SEL_1					1			
25	BLOCK_TYPE_ SEL_2			2					
26	BLOCK_TAG_ SEL_2						32		
27	PARAM_ SELECTION_2						2		
28	DISPLAY_TAG_2						32		
29	UNIT_ SELECTION_2						1		
30	CUSTOM_UNIT_2						32		
31	EXPONENT_SEL_2						1		
32	BLOCK_TYPE_ SEL_3			2					
33	BLOCK_TAG_ SEL_3							32	
34	PARAM_SEL3							2	
35	DISPLAY_TAG3							32	

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5
36	UNIT_SEL3							1	
37	DISPLAY_UNIT3							32	
38	EXP_MODE3							1	
39	BLOCK_TYPE_ SEL_4			2					
40	BLOCK_TAG_ SEL_4								32
41	PARAM_SEL4								2
42	DISPLAY_TAG4								32
43	UNIT_SEL4								1
44	DISPLAY_UNIT4								32
45	EXP_MODE4								1
46	CLEAR_HISTORY								
47	OPERATION_ HISTORY1				9				
48	OPERATION_ HISTORY2				9				
49	OPERATION_ HISTORY3				9				
50	OPERATION_ HISTORY4				9				
51	OPERATION_ HISTORY5				9				
52	OPERATION_ HISTORY6				9				
53	OPERATION_ HISTORY7				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
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54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4	VIEW_4_2	VIEW_4_3	VIEW_4_4	VIEW_4_5
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
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54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
54	OPERATION_ HISTORY8				9				
56	OPERATION_ HISTORY10				9				
		15	4	23	99	105	105	105	105

DIAG Transducer Block

Index	Parameter Mnemonic	VIEW_1	VIEW_2	VIEW_3	VIEW_4
1	ST_REV			2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	UPDATE_EVT				
8	BLOCK_ALM				
9	TRANSDUCER_ DIRECTORY				
10	TRANSDUCER_ TYPE	2	2	2	2
11	TRANSDUCER_ TYPE_VER				2
12	XD_ERROR	1		1	
13	COLLECTION_ DIRECTORY				
14	BLOCK_ERR_ DESC_1	4		4	
15	SCALE_FACTOR	5		5	
16	SCALE_FACTOR_ RANGE		11		
17	SCALE_FACTOR_ MOVING_ AVERAGE_MODE				1
18	SCALE_FACTOR_ MOVING_ AVERAGE_TIME				1
19	SCALE_FACTOR_ THRESHOLD				4
20	SCALE_FACTOR_ HYSTERESIS				4
21	FB_CYCLE_MIN				
22	FB_CYCLE_MAX				
23	FB_EXEC_MIN				
24	FB_EXEC_MAX				
		20	15	20	19

Appendix B. Parameter List

Resource Block (Base INDEX)

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
1	ST_REV	Indicates the number of changes of the Static parameter that belongs to the Resource block. It is incremented by one (0x0001) when a change is made for a parameter whose access attribute is "S-."	-	S-R	2	0 ≤ X ≤ 65535	0
2	TAG_DESC	A tag name for the Resource block set by the user. It can be referenced by the host devices and thus does not affect the execution of Function block operation at all.	-	S-R/W	32		spaces
3	STRATEGY	An arbitrary group number for the Resource block. It does not affect Function block operation.	-	S-R/W	2	0 ≤ X ≤ 65535	0
4	ALERT_KEY	The identification number of the relevant in-plant device. It does not affect Function block operation.	-	S-R/W	1	1 ≤ X ≤ 255	0
5	MODE_BLK	Indicates the mode parameter group of the Resource block. The configuration is as follows: · Target: Parameter for setting mode from host devices. · Actual: Indicates the current value of the mode. · Permitted: Indicates a mode value used for the Function block. · Normal: Indicates a mode value which should be in a steady state.	Target	N-R/W	1	bit3: Auto bit7: OOS	0x08 bit3:Auto
			Actual	D-R	1	bit3: Auto bit7: OOS	-
			Permitted	S-R/W	1	bit3: Auto bit7: OOS	0x88 bit3: Auto bit7: OOS
			Normal	S-R/W	1	bit3: Auto bit7: OOS	0x08 bit3:Auto
6	BLOCK_ERR	Indicates the error state regarding the Resource block.	-	D-R	2	0: Other 1: Block Configuration Error 2: Link Configuration Error 3: Simulate Active 5: Device Fault State Set 6: Device Needs Maintenance Soon 9: Memory Failure 10: Lost Static Data11:Lost NV Data 13: Device Needs Maintenance Now 14: Power -up 15: Out-of-Service	-
7	RS_STATE	Indicates the operating state of the device.	-	D-R	1	0: Undefined 1: Start/Restart 2: Initialization 3: Online Linking 4: Online 5: Standby 6: Failure	-
8	TEST_RW	This is a parameter for compatibility testing of communication software. Users are not supposed to use this parameter.	-	D-R/W	112		
9	DD_RESOURCE	(Unused)	-	S-R	32		spaces
10	MANUFAC_ID	An identification number specific to each manufacturer registered in the Fieldbus Association.	-	S-R	4	0x0DFC96	0x0DFC96
11	DEV_TYPE	An identification number that indicates a device model defined by the manufacturer.	-	S-R	2	0 ≤ X ≤ 0xFFFF	0x1601
12	DEV_REV	A revision number defined by the manufacturer.	-	S-R	1	0 ≤ X ≤ 0xFF	0x01
13	DD_REV	Revision number of a DD file to be applied to this device.	-	S-R	1	0 ≤ X ≤ 0xFF	0x01

*1 : Refer to Display Transducer Block INDEX18 BLOCK_TYPE_SELECTION_1

*2 : Refer to Table 5-3

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
14	GRANT_DENY	This parameter is used to permit/deny access from MMI or other host devices to parameters in this block.	Grant	D-R/W	1	bit0: Program bit1: Tune bit2: Alarm bit3: Local bit4: Operate bit5: Service bit6: Diagnostic	-
			Deny	D-R/W	1	bit0: Program Denied bit1: Tune Denied bit2: Alarm Denied bit3: Local Denied bit4: Operate Denied bit5: Service Denied bit6: Diagnostics Denied	-
15	HARD_TYPES	Indicates the type of hardware in which this Resource block exists.	-	S-R	2	bit0: Scalar Input	0x01bit0: Scalar Input
16	RESTART	The device is restarted manually. A restart type can be selected from several types in the specification.	-	D-R/W	1	1: Run 2: Restart resource 3: Restart with defaults 4: Restart processor 11: Restores Factory default blocks 12: Resets transducer block Factory calibration	-
17	FEATURES	Sets an option that can be selected for FEATURE_SEL in the option settings for device use.	-	S-R	2	bit0: Unicode strings bit1: Reports supported bit2: Fault State supported bit3: Soft Write lock supportedx bit10: Multi-bit Alarm(Bit-Alarm) Support bit12: Deferral of Inter-Paramter Write Checks	0x140F bit0: Unicode strings bit1: Reports supported bit2: Fault State supported bit3: Soft Write lock supportedx bit10:Multi-bit Alarm(Bit-Alarm) Support bit12:Deferral of Inter-Paramter Write Checks
18	FEATURE_SEL	Makes an option setting for device use.	-	S-R/W	2	bit0: Unicode strings bit1: Reports supported bit2: Fault State supported bit3: Soft Write lock supportedx bit10: Multi-bit Alarm (Bit-Alarm) Support bit12: Deferral of Inter-Paramter Write Checks	0x100A bit1: Reports supported bit3: Soft Write lock supportedx bit12:Deferral of Inter-Paramter Write Checks
19	CYCLE_TYPE	Indicates the current operating state based on the setting of CYCLE_SEL in the Function block execution method.	-	S-R	2	bit0: Scheduled	0x0001 bit0: Scheduled
20	CYCLE_SEL	Sets the Function block execution method.	-	S-R/W	2	bit0: Scheduled	0
21	MIN_CYCLE_T	Indicates the minimum period in which the Function block can be executed.	-	S-R	4	4000	4000
22	MEMORY_SIZE	Indicates the memory capacity that can be used as a guideline for adding Function blocks. (Unused)	-	S-R	2	0	0
23	NV_CYCLE_T	Indicates the minimum time needed for writing N-type parameters in non-volatile memory. (Unused)	-	S-R	4	345600000(3h)	345600000(3hr)
24	FREE_SPACE	Indicates the available memory as a guideline for adding configurations.	-	D-R	4	$0 \leq X \leq 100$	-
25	FREE_TIME	Indicates the loaded condition showing how much idle time is available for Function block execution time. (Unused)	-	D-R	4	$0 \leq X \leq 100$	-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
26	SHED_RCAS	Sets the timeout time for writing the value for a setting value change (SPC) from the host arithmetic unit connected with the RCAS_IN parameter when MODE of the Function block is RCAS. If the setting value is not written within this set time, the Function block automatically transits to the mode which has been set to the SHED_OPT parameter in the Function block.	-	S-R/W	4	0 ≤ X ≤ 0x FFFFFFFF	640000(20sec)
27	SHED_ROUT	Sets the timeout time for writing the value for an output value change (DDC) from the host arithmetic unit connected with the ROUT_IN parameter when MODE of the Function block is ROUT. If the setting value is not written within this set time, the Function block automatically transits to the mode which has been set to the SHED_OPT parameter in the Function block.	-	S-R/W	4	0 ≤ X ≤ 0x FFFFFFFF	640000(20sec)
28	FAULT_STATE	Indicates the fail-safe condition.	-	N-R	1	1: Clear 2: Active	1: Clear
29	SET_FSTATE	Starts the fail-safe state.	-	D-R/W	1	1: Off 2: Set	-
30	CLR_FSTATE	Cancels the fail-safe state.	-	D-R/W	1	1: Off 2: Set	-
31	MAX_NOTIFY	The maximum number of alerts to be retained.	-	S-R	1	3	3
32	LIM_NOTIFY	Limit of the number of alerts. Being set by the user, the number of alerts to be notified to the host can be limited to prevent overflow of the host.	-	S-R/W	1	0 ≤ X ≤ 3	3
33	CONFIRM_TIME	Parameter for setting the wait time for confirmation of an alert.	-	S-R/W	4	0 ≤ X ≤ 0x FFFFFFFF	640000(20sec)
34	WRITE_LOCK	Prohibits setting values from being written from outside.	-	S-R/W	1	1: Unlocked 2: Locked	1: Unlocked
35	UPDATE_EVT	Parameter for generating an alert when fixed data (data whose access attribute is "S-") of the Resource block is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			Update State	D-R	1	0: Undefined 1: Update reported 2: Update not reported	-
			Time Stamp	D-R	8		-
			Static Revision	D-R	2	0 ≤ X ≤ 65535	-
			Relative Index	D-R	2	0 ≤ X ≤ 65535	-
36	BLOCK_ALM	Parameter for generating an alert when fixed data (data whose access attribute is "S-") of the Resource block is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported4 : Active - not reported	-
			Time Stamp	D-R	8		-
			Subcode	D-R	2		-
			Value	D-R	1		-
37	ALARM_SUM	Parameter that indicates the state of BLOCK_ALM of the Resource block comprehensively. The configuration is as follows: · Current: Current generation state · Unacknowledged: Alarm checking state · Unreported: Reporting state to the host devices · Disabled: Alarm detection inhibit state	Current	D-R	2	bit1: High high alarm	-
			Unacknowledged	D-R	2	bit5: Deviation high alarm	-
			Unreported	D-R	2	bit6: Deviation low alarm	-
			Disabled	S-R/W	2	bit7: Block alarm	0

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
38	ACK_OPTION	Permits or inhibits automatic checking for generation of BLOCK_ALM of the Resource block. Automatic checking means acknowledgment in communication which is regarded as equivalent to the operation by an operator.	-	S-R/W	2	0: Auto Ack Disabled 1: Auto Ack Enabled	0: Auto Ack Disabled
39	WRITE_PRI	Sets the priority of WRITE_ALM. Aside from controlling priority, setting this parameter also makes it possible to disable informing alarms and eliminate acknowledgement.	-	S-R/W	1	0 ≤ X ≤ 15	0
40	WRITE_ALM	Generates an alarm when WRITE_LOCK is cancelled.	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			Time Stamp	D-R	8		-
			Subcode	D-R	2		-
			Value	D-R	1		-
41	ITK_VER	Indicates the version of the FF authentication test (interoperability test) conducted on the device.	-	S-R	2		6
42	FD_VER	A value consistent with the major version of the Field Diagnostics specification of the device.	-	S-R	2		1
43	FD_FAIL_ ACTIVE	Parameter that reflects activation of the error state classified into this category (FAIL). Because this parameter is a bit string parameter, it indicates more than one state.	-	D-R	4	*1 bit31: Fieldbus Option Board Failure bit30: Main Board Failure bit29: Flowtube Coil Open Circuit bit28: Main Board Communications Error bit23: Flow Rate Over-Range bit22: Empty Detected bit15: Not Calibrated bit14: Scale Detected bit13: Auto Zero Calibration Failure bit7: Local User I/F Active bit6: Fixed Excitation Current Mode bit5: Performing Auto Zero Calibration bit4: Performing Gain Calibration	-
44	FD_OFFSPEC_ ACTIVE	Parameter that reflects activation of the error state classified into this category (OFFSPEC). Because this parameter is a bit string parameter, it indicates more than one state.	-	D-R	4	*1	-
45	FD_MAINT_ ACTIVE	Parameter that reflects activation of the error state classified into this category (MAINTENANCE). Because this parameter is a bit string parameter, it indicates more than one state.	-	D-R	4	*1	-
46	FD_CHECK_ ACTIVE	Parameter that reflects activation of the error state classified into this category (CHECK). Because this parameter is a bit string parameter, it indicates more than one state.	-	D-R	4	*1	-
47	FD_FAIL_MAP	Parameter that selects a condition classified into this alarm category (FAIL). The same condition may become active for more than one category of the four alarm categories.	-	S-R/W	4	*1	0xF0000000 bit31/bit30/bit29/ bit28

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
48	FD_OFFSPEC_ MAP	Parameter that selects a condition classified into this alarm category (OFFSPEC). The same condition may become active for more than one category of the four alarm categories.	-	S-R/W	4	*1	0x00C00000 bit23/bit22
49	FD_MAINT_MAP	Parameter that selects a condition classified into this alarm category (MAINTENANCE). The same condition may become active for more than one category of the four alarm categories.	-	S-R/W	4	*1	0x0000E000 bit15/bit14/bit13
50	FD_CHECK_ MAP	Parameter that selects a condition classified into this alarm category (CHECK). The same condition may become active for more than one category of the four alarm categories.	-	S-R/W	4	*1	0x000000F 0bit7/bit6/bit5/ bit4
51	FD_FAIL_MASK	Parameter for the user to set multiple states of this category (FAIL), which should not be notified to the host through an alarm parameter. Setting the bit to 1 inhibits the notification, while setting the bit to 0 permits the notification.	-	S-R/W	4	*1	0
52	FD_OFFSPEC_ MASK	Parameter for the user to set multiple states of this category (OFFSPEC), which should not be notified to the host through an alarm parameter. Setting the bit to 1 inhibits the notification, while setting the bit to 0 permits the notification.	-	S-R/W	4	*1	0
53	FD_MAINT_ MASK	Parameter for the user to set multiple states of this category (MAINTENANCE), which should not be notified to the host through an alarm parameter. Setting the bit to 1 inhibits the notification, while setting the bit to 0 permits the notification.	-	S-R/W	4	*1	0
54	FD_CHECK_ MASK	Parameter for the user to set multiple states of this category (CHECK), which should not be notified to the host through an alarm parameter. Setting the bit to 1 inhibits the notification, while setting the bit to 0 permits the notification.	-	S-R/W	4	*1	0
55	FD_FAIL_ALM	Parameter for notifying the state change of unmasked items of this alarm category (FAIL) to the host system.	unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			alarmstate	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			timestamp	D-R	8		-
			subcode	D-R	4		-
			value	D-R	1		-
56	FD_OFFSPEC_ ALM	Parameter for notifying the state change of unmasked items of this alarm category (OFFSPEC) to the host system.	unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			alarmstate	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			timestamp	D-R	8		-
			subcode	D-R	4		-
			value	D-R	1		-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
57	FD_MAINT_ALM	Parameter for notifying the state change of unmasked items of this alarm category (MAINTENANCE) to the host system.	unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			alarmstate	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			timestamp	D-R	8		-
			subcode	D-R	4		-
			value	D-R	1		-
58	FD_CHECK_ALM	Parameter for notifying the state change of unmasked items of this alarm category (CHECK) to the host system.	unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	-
			alarmstate	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			timestamp	D-R	8		-
			subcode	D-R	4		-
			value	D-R	1		-
59	FD_FAIL_PRI	Parameter that sets the priority of this alarm category (FAIL).	-	S-R/W	1	0 ≤ X ≤ 15	0
60	FD_OFFSPEC_ PRI	Parameter that sets the priority of this alarm category (OFFSPEC).	-	S-R/W	1	0 ≤ X ≤ 15	0
61	FD_MAINT_PRI	Parameter that sets the priority of this alarm category (MAINTENANCE).	-	S-R/W	1	0 ≤ X ≤ 15	0
62	FD_CHECK_PRI	Parameter that sets the priority of this alarm category (CHECK).	-	S-R/W	1	0 ≤ X ≤ 15	0
63	FD_SIMULATE	Parameter that can change the state manually when simulation is enabled. When simulation is disabled, both the simulated diagnostic value and the diagnostic value indicate the actual state. While FD_SIMULTE is enabled, the recommended action indicates that simulation is active.	diag_sim_value	D-R/W	4	*1	-
			diag_value	D-R/W	4	*1	-
			enable	D-R/W	1	0: Not Initialized 1: Simulation Disabled 2: Simulation Active	-
64	FD_ RECOMMEN_ ACT	Indicates the most important condition that has been detected by the device.	-	D-R	2	0: Uninitialized 1: No Action Required 2: Replace H/W 3: Check Fluid 4: Recalibrate 5: Remove Scale 6: Calibrating - Please Wait 7: Other	-
65	CAPABILITY_ LEV	Indicates the capability level of the device.	-	S-R	1	0: capability level not supported 1: Standard Model 2: Scale Diagnostic Model	1: Standard Modelor 2: Scale Diagnostic Model
66	HARDWARE_ REV	Indicates the hardware revision of the device.	-	S-R	32	spaces	spaces
67	SOFTWARE_REV	Indicates the software revision of the device.	-	S-R	32		
68	SIM_ACTIVE_SW	Selects between enabled and disabled for the simulation functionality.Select Set Simulate Active to enable the simulation functionality.	-	D-R/W	2	0: Disabled 1: Active	-

FLOW Transducer Block

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
1	ST_REV	Indicates the number of changes of the Static parameter that belongs to FLOW_TB. It is incremented by one (0x0001) when a change is made for a parameter whose access attribute is "S-."		S-R	2	0 ≤ X ≤ 65535	0
2	TAG_DESC	The tag name of FLOW_TB set by the user. It can be referenced by the host devices and thus does not affect the execution of Function block operation at all.		S-R/W	32		spaces
3	STRATEGY	An arbitrary group number for FLOW_TB. It does not affect Function block operation.		S-R/W	2		0
4	ALERT_KEY	The identification number of the relevant in-plant device. It does not affect Function block operation.		S-R/W	1	1 ≤ 255	0
5	MODE_BLK	Indicates the mode parameter group of FLOW_TB. The configuration is as follows: · Target: Parameter for setting mode from host devices. · Actual: Indicates the current value of the mode. · Permitted: Indicates the mode value used for the Function block. · Normal: Indicates the mode value which should be in a steady state.	Target	N-R/W	1	bit3: Auto bit4: Man bit7: O/S	0x80 bit7:O/S
			Actual	D-R	1	bit3: Auto bit4: Man bit7: O/S	-
			Permitted	S-R/W	1	bit3: Auto bit4: Man bit7: O/S	0x98 bit3: Auto bit4: Man bit7: O/S
			Normal	S-R/W	1	bit3: Auto bit4: Man bit7: O/S	0x08 bit3: AUTO
6	BLOCK_ERR	Indicates the error state regarding FLOW_TB.		D-R	2	bit0: Other bit1: Block Configuration Error bit7: Sensor Failure detected byt this block bit15: Out-of-SERVICE	-
7	UPDATE_EVT	Parameter for generating an alert when fixed data (data whose access attribute is "S-" or "N-") of FLOW_TB is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number An alarm should not be issued when data whose access attribute is "N-" is changed.	Unacknowledged	D-R/W	1	(0: undefined) 1: Acknowedged 2: Unacknowledged	-
			Update State	D-R	1	0: Undefined 1: Update reported 2: Updaate not reported	-
			Time Stamp	D-R	8		-
			Static Revision	D-R	2		-
			Relative Index	D-R	2		-
8	BLOCK_ALM	Parameter that indicates the configuration regarding FLOW_TB and the abnormal state in execution. The configuration is as follows: · Unacknowledged: Generation determined state · Alarm_State: Alarm generation state · Time_stamp: Alarm generation/recovery time · Subcode: Alarm content sub-code · Value: Alarm value	Unacknowledged	D-R/W	1	(0: undefined) 1: Acknowedged 2: Unacknowledged	-
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			Time Stamp	D-R	8		-
			Subcode	D-R	2		-
			Value	D-R	1		-
9	TRANSDUCER_DIRECTORY	The header information of FOLW_TB. Users do not directly use this parameter.	[0]	S-R	2		0
10	TRANSDUCER_TYPE	Indicates the type of FLOW_TB.		S-R	2	104: Standard Flow with Calibration	104: Standard Flow with Calibration
11	TRANSDUCER_TYPE_VER	Indicates the version of FLOW_TB.		N-R	2	0x0101	0x0101

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
12	XD_ERROR	Indicates an abnormal state specific to the device.		D-R	1	18: Calibration error 19: Configuration error 20: Electronics Failure 21: Mechanical Failure 22: I/O Failure	-
13	COLLECTION_ DIRECTORY	Definition information of the parameter group for efficient access of the host devices to parameters having the same attribute.	[0]	S-R	4		0
14	PRIMARY_ VALUE_TYPE	Type of the PRIMARY_VALUE value (volume flow rate value)		S-R/W	2	101: volmetric flow	101: volmetric flow
15	PRIMARY_ VALUE	PRIMARY_VALUE value (volume flow rate value) and its status	Status	D-R	1		-
			Value	D-R	4		-
16	PRIMARY_ VALUE_RANGE	Range upper limit value and lower limit value, unit, and setting value of the decimal point position of the PRIMARY_ VALUE value (volume flow rate value).	EU at 100%	S-R/W	4		-
			EU at 0%	S-R/W	4	0	0
			Units Index	S-R/W	2	refer to table 1	-
			Decimal Point	S-R/W	1	-128 to +127	2
17	SECONDARY_ VALUE_TYPE	Type of the SECONDARY_VALUE value (mass flow rate value)		S-R/W	2	100: mass flow	100: mass flow
18	SECONDARY_ VALUE	SECONDARY_VALUE value (mass flow rate value) and its status	Status	D-R	1		-
			Value	D-R	4		-
19	SECONDARY_ VALUE_RANGE	Range upper limit value and lower limit value, unit, and setting value of the decimal point position of the SECONDARY_VALUE value (mass flow rate value).	EU at 100%	S-R/W	4		-
			EU at 0%	S-R/W	4	0	0
			Units Index	S-R/W	2	refer to table 2	-
			Decimal Point	S-R/W	1	-128 to +127	2
20	XD_OPTS	Option setting for determining the status of the output value.		S-R/W	4	bit0: Input Status BAD in MAN bit1: Input Status UNC in MAN	0
21	SENSOR_TYPE	Sensor type.		S-R/W	2	102: Electromagnetic	102: Electromagnetic
22	SENSOR_RANGE	Indicates the upper limit value and lower limit value, unit, and setting value of the decimal point position of the measurable flow velocity.Setting → MeasurementSENSOR_RANGE is a parameter that indicates the measurable range of the sensor. This parameter cannot be set.	EU at 100%	S-R	4		10
			EU at 0%	S-R	4	0	0
			Units Index	S-R	2	1061: m/s	1061: m/s
			Decimal Point	S-R	1	1	1
23	SENSOR_SN	Serial number of the sensor module (Unused for MGG)		S-R	32		spaces
24	SENSOR_CAL_ METHOD	Indicates the method of the flowmeter adjustment that was last carried out.		S-R/W	1	100: volumetric 101: static weigh 102: dynamic weigh 103: factory trim standard calibration 104: user trim standard calibration 105: factory trim special calibration 106: user trim special calibration 255: other	101: static weigh
25	SENSOR_CAL_ LOC	Indicates the location of the flowmeter adjustment that was last carried out.		S-R/W	32		"AZBIL"
26	SENSOR_CAL_ DATE	The time of the flowmeter adjustment that was last carried out can be set.		S-R/W	7		$DATE
27	SENSOR_CAL_ WHO	The person who carried out the flowmeter adjustment last can be set.		S-R/W	32		"AZBIL"

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
28	BLOCK_ERR_ DESC_1	Indicates the details of BLOCK_ERR.		D-R	4	bit0: Flowtube Coil open circuit bit1: Nonvolatile Memory Check Error bit2: A/D Converter Error bit3: ROM Check Erorr bit4: RAM Check Error bit5: Main Board Communications Error bit9: Not Calibrated bit10: Auto Zero Calibration Failure bit16: Flowtube Configuration Error bit17: PVR Configuration Error bit18: SVR Configuration Error bit19: Flowswitch 1 Configuration Error bit20: Flowswitch 2 Configuration Error	-
29	SENSOR_VALUE	Flow velocity (m/s)		D-R	4		-
30	FLOWTUBE_ SIZE	Sets the diameter of the flowtube.		S-R/W	1	refer to table 3	-
31	FLOWTUBE_ TYPE	Selects a flowtube type from MGG, KID, and NNK.		S-R/W	1	0: KID 2: NHK 3: MGG	-
32	FLOWTUBE_ FACTOR	Sets the flowtube constant that is specific to the flowtube.The flowtube constant has been determined based on the actual flow calibration at factory and is stamped on the name plate of the device.		S-R/W	4	100.0 ≤ X ≤ 999.9	-
33	DUMMY_ NUMBER	Sets the number of dummy flowtubes to install.This parameter needs to be set only when an NNK flowtube is used.		S-R/W	1	0: 0 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6 7: 7 8: 8 9: 9	-
34	EMPTY_PIPE_ DETECTOR	Checks whether the empty detection function is set.		D-R	1	0: OFF 1: ON	-
35	DENSITY_ CONSTANT	Sets the density of measurement fluid.		S-R/W	4	0.1 ≤ X ≤ 9.9999	-
36	DENSITY_ CONSTANT_ UNITS	Sets the density unit of measurement fluid.		S-R/W	2	1100: g/cm^3	1100: g/cm^3
37	FLOW_ DIRECTION	Sets the flow direction of measurement fluid.		S-R/W	1	0: Forward 1: Reverse	0: Forward
38	COEFFICIENT	Sets the correction coefficient.A value which is multiplied by the correction coefficient is output.		S-R/W	4	0.1 ≤ X ≤ 9.9999	1.0
39	DAMPING_ CONSTANT	Sets the damping constant to cut small fluctuation components in the measured instantaneous flow rate value.		S-R/W	4	0.1 ≤ X ≤ 199.9	3.0
40	MOVING_ AVERAGE_ MODE	Selects between ON and OFF for the moving average function.When ON is selected, the moving average value of the set moving average time is output.		S-R/W	1	0: OFF 1: ON	0: OFF
41	MOVING_ AVERAGE_TIME	Sets the moving average time.		S-R/W	4	1.0 ≤ X ≤ 30.0	1.0
42	PRIMARY_ VALUE_SPIKE_ CUT_MODE	Selects the spike cut mode from OFF, AUTO, and MANUAL.		S-R/W	1	0: OFF 1: Auto 2: Manual	0: OFF
43	PRIMARY_ VALUE_SPIKE_ CUT_TIME	Sets the spike cut time.This parameter should be set only when the MANUAL spike cut mode is selected.		S-R/W	4	0.0 ≤ X ≤ 99.9	1.0
44	PRIMARY_ VALUE_SPIKE_ CUT_LEVEL	Sets the spike cut level.This parameter should be set only when the MANUAL spike cut mode is selected.		S-R/W	4	1.0 ≤ X ≤ 99.9	1.0

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
45	SECONDARY_ VALUE_SPIKE_ CUT_MODE	Selects the spike cut mode from OFF, AUTO, and MANUAL.		S-R/W	1	0: OFF 1: Auto 2: Manual	0: OFF
46	SECONDARY_ VALUE_SPIKE_ CUT_TIME	Sets the spike cut time.This parameter should be set only when the MANUAL spike cut mode is selected.		S-R/W	4	0.0 ≤ X ≤ 99.9	1.0
47	SECONDARY_ VALUE_SPIKE_ CUT_LEVEL	Sets the spike cut level.This parameter should be set only when the MANUAL spike cut mode is selected.		S-R/W	4	1.0 ≤ X ≤ 99.9	1.0
48	PRIMARY_ VALUE_LOW_ FLOW_CUTOFF	Sets the low flow cut function.This setting can be made between 0% and 10% of the setting range. When 0% is set, the low flow cut function does not work.If the flow rate is lower than the set value, the flow rate output becomes zero and the display is also fixed at zero.		S-R/W	1	0: 0% 1: 1% 2: 2% 3: 3% 4: 4% 5: 5% 6: 6% 7: 7% 8: 8% 9: 9% 10: 10%	0: 0%
49	SECONDARY_ VALUE_LOW_ FLOW_CUTOFF	Sets the low flow cut function.This setting can be made between 0% and 10% of the setting range. When 0% is set, the low flow cut function does not work.If the flow rate is lower than the set value, the flow rate output becomes zero and the display is also fixed at zero.		S-R/W	1	0: 0% 1: 1% 2: 2% 3: 3% 4: 4% 5: 5% 6: 6% 7: 7% 8: 8% 9: 9% 10: 10%	0: 0%
50	AC_FREQUENCY	Indicates the frequency of the AC power supply being used.		D-R	1	50: 50Hz 60: 60Hz	-
51	EX_FREQUENCY	Sets the frequency of excitation current.		S-R/W	1	AC_FREAQUENCY is 50: For 50 Hz 0: 6.25Hz 1: 12.5Hz 2: 25Hz AC_FREAQUENCY is 60: For 60 Hz 0: 7.5Hz 1: 15.0Hz 2: 30.0Hz	AC_ FREQUENCY is50: 1: 12.5Hz For 50 Hz For 60 (60 Hz) 1: 15Hz
52	EX_OUTPUT_ CMD	Outputs the excitation current at a fixed value.		D-R/W	1	0: None 1: EXX 2: EXY 3: EX Current Off 4: Normal	-
53	EX_OUTPUT_ STATUS	Displays the output state of the excitation current.		D-R	1	0: Normal 1: EXX 2: EXY 3: EX Current Off	-
54	EX_CURRENT_ VALUE	A value used to adjust the excitation current.		S-R/W	4	155.000 ≤ X ≤ 165.000	-
55	AUTO_ZERO_ CALIBRATION_ CMD	Executes the automatic zero adjustment.		D-R/W	1	0: None 1: Execute 4: Cancel	-
56	AUTO_ZERO_ CALIBRATION_ STATUS	Displays the result of the automatic zero adjustment.If the automatic zero adjustment cannot be executed, check whether the measurement piping is empty or whether the flow velocity is over 0.2 m/ s.		D-R	1	0: None 1: Executing 2: Success 3: Failed 4: Canceled	-
57	MANUAL_ZERO_ CALIBRATION_ CMD	Executes the manual zero adjustment.		D-R/W	1	0: None 1: Up 2: Down	-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
58	GAIN_ CALIBRATION_ CMD	Executes the gain adjustment of the transmitter.		D-R/W	1	0: None 1: 0.0m/s 2: 2.5m/s 3: 10m/s 4: Cancel	-
59	GAIN_ CALIBRATION_ STATUS	Displays the result of the transmitter gain adjustment.		D-R	1	0: None 1: Executing 2: Success 3: Failed 4: Canceled	-
60	FLSW_1_VALUE_D	Displays the flow switch output and outputs the state from DI Function Block.	Status	D-R	1		-
			Value	D-R	1	0 ≤ X ≤ 1	-
61	FLSW_1_ SOURCE	Selects between Primary Value and Secondary Value for the output to which Flow Switch 1 is applied.		S-R/W	1	15: Primary Value 18: Secondary Value	15: Primary Value
62	FLSW_1_MODE	Selects between High alarm and Low alarm for the alarm output of Flow Switch 1.		S-R/W	1	0: Low1: High	1: High
63	FLSW_1_ THRESHOLD	Sets the threshold value for the flow switch.If Flow Switch 1 Mode is “High,” Flow Switch 1 becomes On when the threshold value exceeds this setting value.If Flow Switch 1 Mode is “Low,” Flow Switch 1 becomes On when the threshold value becomes below this setting value.		S-R/W	4	FLSW_2_SOURCE is 15: For Primary Value PVR.EU0 ≤ X ≤ PVR.EU100 FLSW_2_SOURCE is 18: For Secondary Value SVR.EU0 ≤ X ≤ SVR.EU100	0
64	FLSW_1_ HYSTERESIS	Sets hysteresis until Flow Switch 1 becomes OFF again after it has become ON.		S-R/W	1	0: 0% 1: 1% 2: 2% 3: 3% 4: 4% 5: 5% 6: 6% 7: 7% 8: 8% 9: 9% 10: 10%	0: 0%
65	FLSW_2_VALUE_D	Displays the flow switch output and outputs the state from DI Function Block.	Status	D-R	1		-
			Value	D-R	1	0 ≤ X ≤ 1	-
66	FLSW_2_ SOURCE	Selects between Primary Value and Secondary Value for the output to which Flow Switch 2 is applied.		S-R/W	1	15: Primary Value 18: Secondary Value	15: Primary Value
67	FLSW_2_MODE	Selects between High alarm and Low alarm for the alarm output of Flow Switch 2.		S-R/W	1	0: Low 1: High	1: High
68	FLSW_2_ THRESHOLD	Sets the threshold value for the flow switch.If Flow Switch 2 Mode is “High,” Flow Switch 2 becomes On when the threshold value exceeds this setting value.If Flow Switch 2 Mode is “Low,” Flow Switch 2 becomes On when the threshold value becomes below this setting value.		S-R/W	4	FLSW_2_SOURCE is 15: For Primary Value PVR.EU0 ≤ X ≤ PVR.EU100 FLSW_2_SOURCE is 18: For Secondary Value SVR.EU0 ≤ X ≤ SVR.EU100	0
69	FLSW_2_ HYSTERESIS	Sets hysteresis until Flow Switch 2 becomes OFF again after it has become ON.		S-R/W	1	0: 0% 1: 1% 2: 2% 3: 3% 4: 4% 5: 5% 6: 6% 7: 7% 8: 8% 9: 9% 10: 10%	0: 0%
70	TRANSMITTER_ MODEL_NO	Displays the transmitter model number.		S-R/W	32		-
71	TRANSMITTER_ SN	Displays the serial number of transmitter.		S-R/W	32		-
72	FLOWTUBE_ MODEL_NO	Displays the flowtube model number.		S-R/W	32		-
73	FLOWTUBE_SN	Displays the serial number of the flowtube.		S-R/W	32		-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
74	FLOW_ SOFTWARE_REV	Displays the revision of the main board (flow rate calculation S/W).		S-R	4		-
75	CLEAR_FLOW_ TB_STATUS_ RECORDS	Deletes the self-diagnosis history.		D-R/W	1	0: None 253: Clear	-
76	FLOW_TB_ STATUS_ RECORD_1	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
77	FLOW_TB_ STATUS_ RECORD_2	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error6: Flow Rate Over-Range 7: Empty detected	-
78	FLOW_TB_ STATUS_ RECORD_3	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
79	FLOW_TB_ STATUS_ RECORD_4	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
80	FLOW_TB_ STATUS_ RECORD_5	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0{None} 1{Flowtube Coil open circuit} 2{Nonvolatile Memory Check Error} 3{A/D Converter Error} 4{ROM Check Erorr} 5{RAM Check Error} 6{Flow Rate Over-Range} 7{Empty detected}	-
81	FLOW_TB_ STATUS_ RECORD_6	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
82	FLOW_TB_ STATUS_ RECORD_7	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
83	FLOW_TB_ STATUS_ RECORD_8	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
84	FLOW_TB_ STATUS_ RECORD_9	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error 4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-
85	FLOW_TB_ STATUS_ RECORD_10	Saves up to 10 data items of the time at which Flow_TB has detected an error and the details of the error.	Date	N-R	8		-
			Value	N-R	1	0: None 1: Flowtube Coil open circuit 2: Nonvolatile Memory Check Error 3: A/D Converter Error4: ROM Check Erorr 5: RAM Check Error 6: Flow Rate Over-Range 7: Empty detected	-

Display Transducer Block

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
1	ST_REV	Indicates the number of changes of the Static parameter that belongs to DISPLAY_TB. It is incremented by one (0x0001) when a change is made for a parameter whose access attribute is "S-."	-	S-R	2	0 ≤ X ≤ 65535	0
2	TAG_DESC	The tag name of DISPLAY_TB set by the user. It can be referenced by the host devices and thus does not affect the execution of Function block operation at all.	-	S-R/W	32		spaces
3	STRATEGY	An arbitrary group number for DISPLAY_TB. It does not affect Function block operation.	-	S-R/W	2		0
4	ALERT_KEY	An identification number of the relevant in-plant device. It does not affect Function block operation.	-	S-R/W	1	1 ≤ X ≤ 255	0
5	MODE_BLK	Indicates the mode parameter group of DISPLAY_TB. The configuration is as follows: · Target: Parameter for setting mode from host devices. · Actual: Indicates the current value of the mode. · Permitted: Indicates the mode value used for the Function block. · Normal: Indicates the mode value which should be in a steady state.	Target	N-R/W	1	O/S, AUTO	bit3:AUTO 0x08
			Actual	D-R	1		-
			Permitted	S-R/W	1		bit3:AUTO bit7:O/S 0x88
			Normal	S-R/W	1		bit3:AUTO 0x08
6	BLOCK_ERR	Indicates the error state regarding DISPLAY_TB.	-	D-R	2	bit0: Other bit1: Block Configuration Error bit15: Out-of-Service	-
7	UPDATE_EVT	Parameter for generating an alert when fixed data (data whose access attribute is "S-" or "N-") of DISPLAY_TB is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number	Unacknowledged	D-R/W	1	(0: Undefined) 1: Acknowledged 2: Unacknowledged	-
			Update State	D-R	1	0: Undefined 1: Update reported 2: Update not reported	-
			Time Stamp	D-R	8		-
			Static Revision	D-R	2		-
			Relative Index	D-R	2		-
8	BLOCK_ALM	Parameter that indicates the configuration regarding DISPLAY_TB and the abnormal state in execution. The configuration is as follows: · Unacknowledged: Generation determined state · Alarm_State: Alarm generation state · Time_stamp: Alarm generation/recovery time · Subcode: Alarm content sub-code · Value: Alarm value	Unacknowledged	D-R/W	1	(0=Undefined)1=Acknowledged2=Unacknowledged	-
			Alarm State	D-R	1	0=Undefined1=Clear - reported2=Clear - not reported3=Active - reported4=Active - not reported	-
			Time Stamp	D-R	8		-
			Subcode	D-R	2		-
			Value	D-R	1		-
9	TRANSDUCER_DIRECTORY	The header information of DISPLAY_TB. Users do not directly use this parameter.	-	S-R	2		0
10	TRANSDUCER_TYPE	Indicates the type of DISPLAY_TB.	-	S-R	2		0xffff
11	TRANSDUCER_TYPE_VER	Indicates the version of DISPLAY_TB.	-	N-R	2		-
12	XD_ERROR	Indicates an abnormal state specific to the device.	-	D-R	1	19: Configration Error	-
13	COLLECTION_DIRECTORY	Definition information of the parameter group for efficient access of the host devices to parameters having the same attribute.	-	S-R	4		0

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
14	BLOCK_ERR_ DESC_1	Indicates the details of BLOCK_ERR.	-	D-R	4	bit0: Parameter 1 Configuration Error bit1: Parameter 2 Configuration Error bit2: Parameter 3 Configuration Error bit3: Parameter 4 Configuration Error bit4: Parameter/Information Selection Error	-
15	DISPLAY_ PARAM_ SELECTION	Select a parameter to be displayed from four display formats.	-	S-R/W	1	bit0: Parameter 1 bit1: Parameter 2 bit2: Parameter 3 bit3 :Parameter 4	0x01
16	DISPLAY_INFO_ SELECTION	Selects at least one of TAG, status, and unit of the parameter for display.	-	S-R/W	1	bit0: Tag bit1: Unit bit2: Status	0x07
17	DISPLAY_CYCLE	Selects a display update cycle.	-	S-R/W	1	1 ≤ X ≤ 10	5
18	BLOCK_TYPE_ SELECTION_1	Displays the block type of the block selected by BLOCK_TAG_SEL_1.	-	D-R	2	*1 0x0000: - 0x0101: Analog Input (AI) 0x0108: Proportional-Integral-Differential (PID) 0x0127: Arithmetic (AR) 0x0144: Totalizer (TOT) 0x0113: Flow 0x8018: Diagnostic 0x0145: Positioner_TB 0x0102: Analog Output(AO) 0x0126: Input Selector(IS) 0x011C: Output Separator(OS)	0x0113
19	BLOCK_TAG_ SELECTION_1	Inputs Block TAG of the parameter to be displayed on Screen 1.	-	S-R/W	32		"FLOW_TB"
20	PARAM_ SELECTION_1	Selects a parameter to be displayed on Screen 1.	-	S-R/W	1	*2	-
21	DISPLAY_TAG_1	Enter the name (TAG) of a parameter to display on Screen 1.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	-
22	UNIT_ SELECTION_1	Select a unit of the parameter to be displayed on Screen 1.	-	S-R/W	1	0: Auto 1: Custom	0
23	CUSTOM_ UNIT_1	Freely set a unit of the parameter to be displayed on Screen 1.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
24	EXPONENT_ SELECTION_1	Select an exponent of the parameter to be displayed on Screen 1.	-	S-R/W	1	0: None 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6	0
25	BLOCK_TYPE_ SELECTION_2	Displays the block type of the block selected by BLOCK_TAG_SEL_2.	-	D-R	2	*1	0
26	BLOCK_TAG_ SELECTION_2	Inputs Block TAG of the parameter to be displayed on Screen 2.	-	S-R/W	32		spaces
27	PARAM_ SELECTION_2	Selects a parameter to be displayed on Screen 2.	-	S-R/W	1	*2	0
28	DISPLAY_TAG_2	Enter the name (TAG) of a parameter to display on Screen 2.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
29	UNIT_ SELECTION_2	Select a unit of the parameter to be displayed on Screen 2.	-	S-R/W	1	0: Auto 1: Custom	0
30	CUSTOM_ UNIT_2	Freely set a unit of the parameter to be displayed on Screen 2.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
31	EXPONENT_ SELECTION_2	Select an exponent of the parameter to be displayed on Screen 2.	-	S-R/W	1	0: None 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6	0
32	BLOCK_TYPE_ SELECTION_3	Displays the block type of the block selected by BLOCK_TAG_SEL_3.	-	D-R	2	*1	0

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
33	BLOCK_TAG_ SELECTION_3	Inputs Block TAG of the parameter to be displayed on Screen 3.	-	S-R/W	32		spaces
34	PARAM_ SELECTION_3	Selects a parameter to be displayed on Screen 3.	-	S-R/W	1	*2	0
35	DISPLAY_TAG_3	Enter the name (TAG) of a parameter to display on Screen 3.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
36	UNIT_ SELECTION_3	Select a unit of the parameter to be displayed on Screen 3.	-	S-R/W	1	0: Auto 1: Custom	0
37	CUSTOM_ UNIT_3	Freely set a unit of the parameter to be displayed on Screen 3.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
38	EXPONENT_ SELECTION_3	Select an exponent of the parameter to be displayed on Screen 3.	-	S-R/W	1	0: None 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6	0
39	BLOCK_TYPE_ SELECTION_4	Displays the block type of the block selected by BLOCK_TAG_SEL_4.	-	D-R	2	*1	0
40	BLOCK_TAG_ SELECTION_4	Inputs Block TAG of the parameter to be displayed on Screen 4.	-	S-R/W	32		spaces
41	PARAM_ SELECTION_4	Selects a parameter to be displayed on Screen 4.	-	S-R/W	1	*2	0
42	DISPLAY_TAG_4	Enter the name (TAG) of a parameter to display on Screen 4.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
43	UNIT_ SELECTION_4	Select a unit of the parameter to be displayed on Screen 4.	-	S-R/W	1	0: Auto 1: Custom	0
44	CUSTOM_ UNIT_4	Freely set a unit of the parameter to be displayed on Screen 4.	-	S-R/W	32	1 character ≤ X ≤ 32 characters	spaces
45	EXPONENT_ SELECTION_4	Select an exponent of the parameter to be displayed on Screen 4.	-	S-R/W	1	0: None 1: 1 2: 2 3: 3 4: 4 5: 5 6: 6	0
46	ERASE_ OPERATOR_ ACTION_ RECORDS	Deletes the operation history sent from the digital operator panel.	-	S-R/W		0{None} 1{Erase}	0
47	OPERATOR_ ACTION_ RECORD_1	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
48	OPERATOR_ ACTION_ RECORD_2	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
49	OPERATOR_ ACTION_ RECORD_3	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
50	OPERATOR_ ACTION_ RECORD_4	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
51	OPERATOR_ ACTION_ RECORD_5	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
52	OPERATOR_ ACTION_ RECORD_6	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
53	OPERATOR_ ACTION_ RECORD_7	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
54	OPERATOR_ ACTION_ RECORD_8	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
55	OPERATOR_ ACTION_ RECORD_9	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0
56	OPERATOR_ ACTION_ RECORD_10	Saves up to 10 data items of the time at which LUI input mode was changed and the mode after the change.	Date	N-R	8		0
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0

Display Transducer Block

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
1	ST_REV	Indicates the number of changes of the Static parameter that belongs to DIAG_TB. It is incremented by one (0x0001) when a change is made for a parameter whose access attribute is "S-."	-	S-R	2	0–65535	0
2	TAG_DESC	The tag name of DIAG_TB set by the user. It can be referenced by the host devices and thus does not affect the execution of Function block operation at all.	-	S-R/W	32		spaces
3	STRATEGY	An arbitrary group number for DIAG_TB. It does not affect Function block operation.	-	S-R/W	2	0–65535	0
4	ALERT_KEY	An identification number of the relevant in-plant device. It does not affect Function block operation.	-	S-R/W	1	1–255	0
5	MODE_BLK	Indicates the mode parameter group of Diag Transducer Block. The configuration is as follows: · Target: Parameter for setting mode from host devices. · Actual: Indicates the current value of the mode. · Permitted: Indicates the mode value used for the Function block. · Normal: Indicates the mode value which should be in a steady state.	Target	N-R/W	1	bit3: Auto bit7: O/S	0x80bit7: O/S
			Actual	D-R	1	bit3: Auto bit4: Man bit7: O/S	0x80bit7: O/S
			Permitted	S-R/W	1	bit3: Auto bit7: O/S	0x88bit3: Autobit7: O/S
			Normal	S-R/W	1	bit3: Auto	0x08bit3: Auto
6	BLOCK_ERR	Indicates the error state regarding DIAG_ TB.	-	D-R	2	bit1: Block Configuration Error bit7: Input Failure/Process has BAD status bit15: Out-of-Service	-
7	UPDATE_EVT	Parameter for generating an alert when fixed data (data whose access attribute is "S-") of Diag Transducer Block is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number	Unacknowledged	D-R/W	1	(0: Undefined) 1: Acknowledged 2: Unacknowledged	-
			Update State	D-R	1	0: Undefined 1: Update reported 2: Update not reported	-
			Time Stamp	D-R	8		-
			Static Revision	D-R	2		-
			Relative Index	D-R	2		-

INDEX	Parameter name	Description	Sub-parameter name	Access attribute	Size (Byte)	Range	Factory default setting
8	BLOCK_ALM	Parameter for generating an alert when fixed data (data whose access attribute is "S-") of Diag Transducer Block is changed. The configuration is as follows: · Unacknowledged: Determined state · Update_State: Change state · Time_stamp: Change time · Static_Revision: Revision after change · Relative_Index: Changed parameter identification number	Unacknowledged	D-R/W	1	(0: Undefined) 1: Acknowledged 2: Unacknowledged	-
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	-
			Time Stamp	D-R	8		-
			Subcode	D-R	2		-
			Value	D-R	1		-
9	TRANSDUCER_ DIRECTORY	The header information of DIAG_TB. Users do not directly use this parameter.		S-R	2	0	0
10	TRANSDUCER_ TYPE	Indicates the type of DIAG_TB.		S-R	2	0xffff: Other	0xffff
11	TRANSDUCER_ TYPE_VER	Indicates the version of DIAG_TB.		N-R	2	0x0101	0x0101
12	XD_ERROR	Indicates an abnormal state specific to the device.		D-R	1	19: Configration Error 20: Electronics Failure	-
13	COLLECTION_ DIRECTORY	Definition information of the parameter group for efficient access of the host devices to parameters having the same attribute.		S-R	4	0	0
14	BLOCK_ERR_ DESC_1	Indicates the details of BLOCK_ERR.		D-R	4	bit0: Scale Level value not guaranteed bit1: Main Board Communications Error bit2: Hysteresis Configuration Error	-
15	SCALE_LEVEL	Indicates the scale diagnostic value.	Status	D-R	1		-
			Value	D-R	4		-
16	SCALE_LEVEL_ RANGE	Range of the scale diagnostic value.	EU at 100%	N-R	4	99.0	99
			EU at 0%	N-R	4	0.0	0
			Units Index	N-R	2	1615: Unitless	1615
			Decimal Point	N-R	1	0	0
17	SCALE__LEVEL_ MOVING_ AVERAGE_ MODE	Specifies whether to perform a moving average of the scale diagnostic value.		S-R/W	1	0: Off 1: On	0
18	SCALE__LEVEL_ MOVING_ AVERAGE_TIME	Specifies the moving average time for the scale diagnostic value.		S-R/W	1	0 ≤ X ≤ 30	0
19	SCALE__LEVEL_ THRESHOLD	Specifies the threshold value for scale diagnosis.		S-R/W	4	0.0 ≤ X ≤ 99.0	99
20	SCALE__LEVEL_ HYSTERESIS	Specifies hysteresis for scale diagnosis.		S-R/W	4	0.0 ≤ X ≤ 99.0	0

Appendix C. Menu Configuration

Device Level Menu

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
Process Variables						Displays the current flow rate, integrated value, and chart.	WINDOW	Flow_TB
	Volumetric Flow						GROUP	Flow_TB
		Primary Value.Status					Parameter	Flow_TB
		Primary Value.VALUE					Parameter	Flow_TB
		Volumetric Flow Trend					Chart	Flow_TB
	Mass Flow					GROUP	Flow_TB	
		Secondary Value.Status					Parameter	Flow_TB
		Secondary Value.Value					Parameter	Flow_TB
		Mass Flow Trend					Chart	Flow_TB
Block						WINDOW	All	
	Basic Setup					Default setting that should be implemented before the device starts operation upon delivery. General users do not need to touch categories other than this category in the initialization phase.	PAGE	Flow_TB
		Flow Guided Setup					Method	Flow_TB
		Volumetric Flow					GROUP	Flow_TB
			Primary Value Range.Units Index				Parameter	Flow_TB
			Primary Value Range.EU at 100%				Parameter	Flow_TB
		Mass Flow					GROUP	Flow_TB
			Secondary Value Range.Units Index				Parameter	Flow_TB
			Secondary Value Range.EU_100				Parameter	Flow_TB
			Density Constant				Parameter	Flow_TB
		Damping Constant					Parameter	Flow_TB
		Auto Zero Calibration					Method	Flow_TB
	Configuration					Detailed settings	PAGE	All
		Flowmeter Configuration					PAGE	Flow_TB
			Volumetric Flow				GROUP	Flow_TB
				Primary Value Type			Parameter	Flow_TB
				Primary Value Range. EU at 100%			Parameter	Flow_TB
				Primary Value Range. EU at 0%			Parameter	Flow_TB
				Primary Value Range. Units Index			Parameter	Flow_TB
				Primary Value Range. Decimal			Parameter	Flow_TB
			Mass Flow				GROUP	Flow_TB
				Secondary Value Type			Parameter	Flow_TB
				Secondary Value Range.EU at 100%			Parameter	Flow_TB
				Secondary Value Range.EU at 0%			Parameter	Flow_TB
				Secondary Value Range.Units Index			Parameter	Flow_TB
				Secondary Value Range.Decimal			Parameter	Flow_TB
				Density			GROUP	Flow_TB
					Density Constant		Parameter	Flow_TB
			Damping Constant				Parameter	Flow_TB
			Flow Direction				Parameter	Flow_TB
			Coefficient				Parameter	Flow_TB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
			Flow Switch 1				GROUP	Flow_TB
				Flow Switch 1 Value Descrete.Status			Parameter	Flow_TB
				Flow Switch 1 Value Descrete.Value			Parameter	Flow_TB
				Flow Switch 1 Source			Parameter	Flow_TB
				Flow Switch 1 Mode			Parameter	Flow_TB
				Flow Switch 1 Threshold			Parameter	Flow_TB
				Flow Switch 1 Hysteresis			Parameter	Flow_TB
			Flow Switch 2				GROUP	Flow_TB
				Flow Switch 2 Value Descrete.Status			Parameter	Flow_TB
				Flow Switch 2 Value Descrete.Value			Parameter	Flow_TB
				Flow Switch 2 Source			Parameter	Flow_TB
				Flow Switch 2 Mode			Parameter	Flow_TB
				Flow Switch 2 Threshold			Parameter	Flow_TB
				Flow Switch 2 Hysteresis			Parameter	Flow_TB
			Noise Immunity				GROUP	Flow_TB
				Damping Constant			Parameter	Flow_TB
				Spike Cut			GROUP	Flow_TB
					Primary ValueSpike Cut Mode		Parameter	Flow_TB
					Primary ValueSpike Cut Time		Parameter	Flow_TB
					Primary ValueSpike Cut Level		Parameter	Flow_TB
					Secondary ValueSpike Cut Mode		Parameter	Flow_TB
					Secondary ValueSpike Cut Time		Parameter	Flow_TB
					Secondary ValueSpike Cut Level		Parameter	Flow_TB
				Moving Average			GROUP	Flow_TB
					Moving Average Mode		Parameter	Flow_TB
					Moving Average Time		Parameter	Flow_TB
				Low Flow Cutoff			GROUP	Flow_TB
					Primary ValueLow Flow Cutoff		Parameter	Flow_TB
					Secondary ValueLow Flow Cutoff		Parameter	Flow_TB
		Display Configuration					PAGE	Disp_TB
			Display Parameter Selection				Parameter	Disp_TB
			Display Information Selection				Parameter	Disp_TB
			Display Cycle				Parameter	Disp_TB
			Display Parameter 1				GROUP	Disp_TB
				Block Type Selection 1			Parameter	Disp_TB
				Block Tag Selection 1			Parameter	Disp_TB
				Parameter Selection 1			Parameter	Disp_TB
				Display Tag 1			Parameter	Disp_TB
				Unit Selection 1			Parameter	Disp_TB
				Custom Unit 1			Parameter	Disp_TB
				Exponent Selection 1			Parameter	Disp_TB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
			Display Parameter 2				GROUP	Disp_TB
				Block Type Selection 2			Parameter	Disp_TB
				Block Tag Selection 2			Parameter	Disp_TB
				Parameter Selection 2			Parameter	Disp_TB
				Display Tag 2			Parameter	Disp_TB
				Unit Selection 2			Parameter	Disp_TB
				Custom Unit 2			Parameter	Disp_TB
				Exponent Selection 2			Parameter	Disp_TB
			Display Parameter 3				GROUP	Disp_TB
				Block Type Selection 3			Parameter	Disp_TB
				Block Tag Selection 3			Parameter	Disp_TB
				Parameter Selection 3			Parameter	Disp_TB
				Display Tag 3			Parameter	Disp_TB
				Unit Selection 3			Parameter	Disp_TB
				Custom Unit 3			Parameter	Disp_TB
				Exponent Selection 3			Parameter	Disp_TB
			Display Parameter 4				GROUP	Disp_TB
				Block Type Selection 4			Parameter	Disp_TB
				Block Tag Selection 4			Parameter	Disp_TB
				Parameter Selection 4			Parameter	Disp_TB
				Display Tag 4			Parameter	Disp_TB
				Unit Selection 4			Parameter	Disp_TB
				Custom Unit 4			Parameter	Disp_TB
				Exponent Selection 4			Parameter	Disp_TB
		Flowtube Setup					PAGE	Flow_TB
			Flowtube Model Number				Parameter	Flow_TB
			Flowtube Serial Number				Parameter	Flow_TB
			Flowtube Size				Parameter	Flow_TB
			Flowtube Type				Parameter	Flow_TB
			Flowtube Factor				Parameter	Flow_TB
			Excitation Frequency				Parameter	Flow_TB
			Dummy Number				Parameter	Flow_TB
	Maintenance					Used by the user service provider at the time of maintenance.	PAGE	All
		Auto Zero Calibration					Method	Flow_TB
		Manual Zero Calibration					Method	Flow_TB
		Gain Calibration					Method	Flow_TB
		Excitation Current Calibration					Method	Flow_TB
		Restores Factory default blocks					Method	RB
		Resets transducer block Factory calibration					Method	RB
		Calibration Details					GROUP	Flow_TB
			Sensor Calibration method				Parameter	Flow_TB
			Sensor Calibration Location				Parameter	Flow_TB
			Sensor Calibration Date				Parameter	Flow_TB
			Sensor Calibration Who				Parameter	Flow_TB
	Device Information					Item that has been set as a factory default.	PAGE	RB
		Device Image					Image	RB
		Device Identification				GROUP	RB	
			Manufacturer Id				Parameter	RB
			Device Type				Parameter	RB
			ITK Version				Parameter	RB
			Revisions				GROUP	RB
				Device Revision			Parameter	RB
				DD Revision			Parameter	RB
				Hardware Revision			Parameter	RB
				Software Revision			Parameter	RB
				Capability Level			Parameter	RB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
		Flowmeter Information					GROUP	GROUP
			Flow Software Revision				Parameter	Flow_TB
			Transmitter Information				GROUP	Flow_TB
				Transmitter Model Number			Parameter	Flow_TB
				Transmitter Serial Number			Parameter	Flow_TB
			Flowtube Information			GROUP	Flow_TB	
				Flowtube Model Number			Parameter	Flow_TB
				Flowtube Serial Number			Parameter	Flow_TB
				Flowtube Size			Parameter	Flow_TB
				Flowtube Type			Parameter	Flow_TB
				Flowtube Factor			Parameter	Flow_TB
				AC Frequency			Parameter	Flow_TB
				Excitation Frequency			Parameter	Flow_TB
				Dummy Number			Parameter	Flow_TB
				Empty Pipe Detector			Parameter	Flow_TB
				Sensor Type			Parameter	Flow_TB
				Sensor Range			GROUP	Flow_TB
					Sensor Range.EU at 100%		Parameter	Flow_TB
					Sensor Range.EU at 0%		Parameter	Flow_TB
					Sensor Range. Units Index		Parameter	Flow_TB
					Sensor Range. Decimal		Parameter	Flow_TB
		Write Lock					Parameter	RB
	Block Mode						PAGE	All
		Resource Block Mode					GROUP	RB
			Block Mode. Target				Parameter	RB
			Block Mode. Actual				Parameter	RB
			Change Mode to OOS				Method	RB
			Change Mode to AUTO				Method	RB
		Flow_TB Mode						
			Block Mode. Target				Parameter	Flow_TB
			Block Mode. Actual				Parameter	Flow_TB
			Change Mode to OOS				Method	Flow_TB
			Change Mode to AUTO				Method	Flow_TB
		Display_TB Mode						
			Block Mode. Target				Parameter	Disp_TB
			Block Mode. Actual				Parameter	Disp_TB
			Change Mode to OOS				Method	Disp_TB
			Change Mode to AUTO				Method	Disp_TB
		Diagnostic_TB Mode						
			Block Mode. Target				Parameter	Diag_TB
			Block Mode. Actual				Parameter	Diag_TB
			Change Mode to OOS				Method	Diag_TB
			Change Mode to AUTO				Method	Diag_TB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
Diagnostics						WINDOW	All	
	Device Alarm Detection					Display/setting of the alert information on four categories of NAMUR	PAGE	RB
		Alarm Indication				Display of errors which are currently occurring	GROUP	RB
			Fail Active				Parameter	RB
			Offspec Active				Parameter	RB
			Maintenance Active				Parameter	RB
			Check Active				Parameter	RB
		Alarm Detection Enable				User setting: Four categories of NAMUR	GROUP	RB
			Fail Map				Parameter	RB
			Offspec Map				Parameter	RB
			Maintenance Map				Parameter	RB
			Check Map				Parameter	RB
		Field Diagnostic Simulate				NAMUR bit assign simulation	GROUP	RB
			Field Diagnostic Simulate. Diagnostic Simulate Value				Parameter	RB
			Field Diagnostic Simulate. Diagnostic Value				Parameter	RB
			Field Diagnostic Simulate.En/ Disable				Parameter	RB
		Recommended Action					Parameter	RB
	Alert Reporting					Alert notice to the host	PAGE	RB
		Alarm Broadcast Record				Whether the host has checked the notice from the device	GROUP	RB
			Fail Diagnostic Alarm				GROUP	RB
				Fail Diagnostic Alarm. Unacknowledged			Parameter	RB
				Fail Diagnostic Alarm. Alarm State			Parameter	RB
				Fail Diagnostic Alarm. Time Stamp			Parameter	RB
				Fail Diagnostic Alarm. Subcode			Parameter	RB
				Fail Diagnostic Alarm. Value			Parameter	RB
			Offspec Alarm				GROUP	RB
				Offspec Alarm. Unacknowledged			Parameter	RB
				Offspec Alarm.Alarm State			Parameter	RB
				Offspec Alarm.Time Stamp			Parameter	RB
				Offspec Alarm. Subcode			Parameter	RB
				Offspec Alarm.Value			Parameter	RB
			Maintenance Alarm				GROUP	RB
				Maintenance Alarm. Unacknowledged			Parameter	RB
				Maintenance Alarm. Alarm State			Parameter	RB
				Maintenance Alarm. Time Stamp			Parameter	RB
				Maintenance Alarm. Subcode			Parameter	RB
				Maintenance Alarm. Value			Parameter	RB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
			Check Alarm				GROUP	RB
				Check Alarm. Unacknowledged			Parameter	RB
				Check Alarm.Alarm State			Parameter	RB
				Check Alarm.Time Stamp			Parameter	RB
				Check Alarm.Subcode			Parameter	RB
				Check Alarm.Value			Parameter	RB
		Alarm Broadcast Enable				User setting: Whether to send notice to the host	GROUP	RB
			Fail Mask				Parameter	RB
			Offspec Mask				Parameter	RB
			Maintenance Mask				Parameter	RB
			Check Mask				Parameter	RB
		Priority				User setting: Priority of alarms	GROUP	RB
			Fail Priority				Parameter	RB
			Offspec Priority				Parameter	RB
			Maintenance Priority				Parameter	RB
			Check Priority				Parameter	RB
	Flow_TB Status Records						PAGE	Flow_TB
		Erase Flow_TB Status Records					Parameter	Flow_TB
		Flow_TB Status Record 1					GROUP	Flow_TB
			Flow TB Status Record 1.Date				Parameter	Flow_TB
			Flow TB Status Record 1.Value				Parameter	Flow_TB
		Flow_TB Status Record 2					GROUP	Flow_TB
			Flow TB Status Record 2.Date				Parameter	Flow_TB
			Flow TB Status Record 2.Value				Parameter	Flow_TB
		Flow_TB Status Record 3					GROUP	Flow_TB
			Flow TB Status Record 3.Date				Parameter	Flow_TB
			Flow TB Status Record 3.Value				Parameter	Flow_TB
		Flow_TB Status Record 4					GROUP	Flow_TB
			Flow TB Status Record 4.Date				Parameter	Flow_TB
			Flow TB Status Record 4.Value				Parameter	Flow_TB
		Flow_TB Status Record 5					GROUP	Flow_TB
			Flow TB Status Record 5.Date				Parameter	Flow_TB
			Flow TB Status Record 5.Value				Parameter	Flow_TB
		Flow_TB Status Record 6					GROUP	Flow_TB
			Flow TB Status Record 6.Date				Parameter	Flow_TB
			Flow TB Status Record 6.Value				Parameter	Flow_TB
		Flow_TB Status Record 7					GROUP	Flow_TB
			Flow TB Status Record 7.Date				Parameter	Flow_TB
			Flow TB Status Record 7.Value				Parameter	Flow_TB
		Flow_TB Status Record 8					GROUP	Flow_TB
			Flow TB Status Record 8.Date				Parameter	Flow_TB
			Flow TB Status Record 8.Value				Parameter	Flow_TB
		Flow_TB Status Record 9					GROUP	Flow_TB
			Flow TB Status Record 9.Date				Parameter	Flow_TB
			Flow TB Status Record 9.Value				Parameter	Flow_TB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
		Flow_TB Status Record 10					GROUP	Flow_TB
			Flow TB Status Record 10.Date				Parameter	Flow_TB
			Flow TB Status Record 10.Value				Parameter	Flow_TB
	Operator Action Records						PAGE	Disp_TB
		Erase Operator Action Records				Clears the operation history.	Method	Disp_TB
		Operator Action Record 1					GROUP	Disp_TB
			Opeartor Action Record 1.Date				Parameter	Disp_TB
			Opeartor Action Record 1.Value				Parameter	Disp_TB
		Operator Action Record 2					GROUP	Disp_TB
			Opeartor Action Record 2.Date				Parameter	Disp_TB
			Opeartor Action Record 2.Value				Parameter	Disp_TB
		Operator Action Record 3					GROUP	Disp_TB
			Opeartor Action Record 3.Date				Parameter	Disp_TB
			Opeartor Action Record 3.Value				Parameter	Disp_TB
		Operator Action Record 4					GROUP	Disp_TB
			Opeartor Action Record 4.Date				Parameter	Disp_TB
			Opeartor Action Record 4.Value				Parameter	Disp_TB
		Operator Action Record 5					GROUP	Disp_TB
			Opeartor Action Record 5.Date				Parameter	Disp_TB
			Opeartor Action Record 5.Value				Parameter	Disp_TB
		Operator Action Record 6					GROUP	Disp_TB
			Opeartor Action Record 6.Date				Parameter	Disp_TB
			Opeartor Action Record 6.Value				Parameter	Disp_TB
		Operator Action Record 7					GROUP	Disp_TB
			Opeartor Action Record 7.Date				Parameter	Disp_TB
			Opeartor Action Record 7.Value				Parameter	Disp_TB
		Operator Action Record 8					GROUP	Disp_TB
			Opeartor Action Record 8.Date				Parameter	Disp_TB
			Opeartor Action Record 8.Value				Parameter	Disp_TB
		Operator Action Record 9					GROUP	Disp_TB
			Opeartor Action Record 9.Date				Parameter	Disp_TB
			Opeartor Action Record 9.Value				Parameter	Disp_TB
		Operator Action Record 10					GROUP	Disp_TB
			Opeartor Action Record 10.Date				Parameter	Disp_TB
			Opeartor Action Record 10.Value				Parameter	Disp_TB
	Scale Diagnostics						PAGE	Diag_TB
		Scale Level					GROUP	Diag_TB
			Scale Level.Status				Parameter	Diag_TB
			Scale Level.Value				Parameter	Diag_TB

1st layer	2nd layer	3rd layer	4th layer	5th layer	6th layer	Description	STYLE	BLOCK
		Scale Diagnostic Setup					GROUP	Diag_TB
			Scale Level				GROUP	Diag_TB
				Scale Level Range.EU at 100%			Parameter	Diag_TB
				Scale Level Range.EU at 0%			Parameter	Diag_TB
				Scale Level Range. Units Index			Parameter	Diag_TB
				Scale Level Range. Decimal			Parameter	Diag_TB
			Scale Level Moving Average Mode				Parameter	Diag_TB
			Scale Level Moving Average Time				Parameter	Diag_TB
			Scale Level Threshold				Parameter	Diag_TB
			Scale Level Hysteresis				Parameter	Diag_TB
	Block Diagnostics						PAGE	All
		Resource Block Diagnostics					GROUP	RB
			Block Error				Parameter	RB
		Flow_TB Diagnostics					GROUP	Flow_TB
			Block Error				Parameter	Flow_TB
			Block Error Description				Parameter	Flow_TB
		Display_TB Diagnostics					GROUP	Disp_TB
			Block Error				Parameter	Disp_TB
			Block Error Description				Parameter	Disp_TB
		Diagnostic_TB Diagnostics					GROUP	Diag_TB
			Block Error				Parameter	Diag_TB
			Block Error Description				Parameter	Diag_TB

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products. You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

(1) Failure caused by your improper use of azbil product
(noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
(2) Failure caused for other reasons than Azbil Corporation's product;
(3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
(4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
(5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
(6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

(1) Regulations and standards or laws that your Equipment is to comply with.
(2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
(3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down.
You are required to provide your Equipment with safety design such as fool-proof design, *1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance, *3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.
*2. A design that is safe even if the device fails.
*3. Avoidance of device failure by using highly reliable components, etc.
*4. The use of redundancy.

3. Precautions and restrictions on application

Azbil Corporation's products other than those explicitly specified as applicable (e.g. azbil Limit Switch For Nuclear Energy) shall not be used in a nuclear energy controlled area (radiation controlled area).
Any Azbil Corporation's products shall not be used for/with medical equipment.
The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.
In addition,
you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below.
Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals

(2) For use of specific purposes, such as:
* Nuclear energy/radiation related facilities
[For use outside nuclear energy controlled areas] [For use of Azbil Corporation's Limit Switch For Nuclear Energy]
* Machinery or equipment for space/sea bottom
* Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
* Antidisaster/crime-prevention equipment
* Burning appliances
* Electrothermal equipment
* Amusement facilities
* Facilities/applications associated directly with billing

(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification.
Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.
In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used.
Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc.
as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals.
System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts.
For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason.
For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice.
For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts.
For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service.
Accordingly, a separate fee will be charged in any of the following cases:
(1) Installation, adjustment, guidance, and attendance at a test run
(2) Maintenance, inspection, adjustment, and repair
(3) Technical guidance and technical education
(4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

AAS-511A-014-09

Document Number:	CM2-MGG31F-2001
Document Name:	MagneW™ 3000 PLUS+ Smart Electromagnetic Flowmeter FOUNDATION™ Fieldbus Transmitter Model MGG14C User's Manual
Date:	1st Edition : Nov. 2014 2nd Edition : Feb. 2017
Issued/Edited by:	Azbil Corporation

Azbil Corporation