# User's Manual

## Model DX100/DX200/MV100/MV200

# Fieldbus Communication Interface

YOKOGAWA
Yokogawa Electric Corporation

IM 04L02A01-18E
2nd Edition

## Foreword

Thank you for purchasing the YOKOGAWA DAQSTATION or MobileCorder.
This User's Manual contains information about the communication function based on the FOUNDATION Fieldbus. To ensure correct use, please read this manual thoroughly before operation.
Keep this manual in a safe place for quick reference in the event a question arises.
The following manuals are provided as manuals for the DX100, DX200, MV100, and MV200.

| Manual Name | Manual No. | Description |
|---|---|---|
| DX100 User's Manual | IM 04L01A01-01E | Explains all functions and procedures of the DX100 excluding the communication functions and the fieldbus functions. |
| DX200 User's Manual | IM 04L02A01-01E | Explains all functions and procedures of the DX200 excluding the communication functions and the fieldbus functions. |
| MV100 User's Manual | IM MV100-01E | Explains all functions and procedures of the MV100 excluding the communication functions and the fieldbus functions. |
| MV200 User's Manual | IM MV200-01E | Explains all functions and procedures of the MV200 excluding the communication functions and the fieldbus functions. |

## Notes

- This manual describes the fieldbus functions of the DX100, DX200, MV100, and MV200 style number "S4."
- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the DX's and the MV's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer as listed on the back cover of this manual.
- Copying or reproducing all or any part of the contents of this manual without YOKOGAWA's permission is strictly prohibited.
- For details related to the FOUNDATION Fieldbus, refer to the specifications issued by the Fieldbus Foundation.

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# How to Use this Manual

## Structure of the Manual

This user's manual consists of the following sections:

| Chapter | Title and Contents |
|---|---|
| 1 | **Overview of Functions**<br>Describes the overview of the fieldbus functions. |
| 2 | **Connecting to the fieldbus**<br>Describes the specifications and the installation and wiring procedures. |
| 3 | **Setting the Functions**<br>Describes the functions and the related parameters. |
| 4 | **Operation**<br>Describes how to start the running operation, how to respond to the alert, how to use the simulation function, and how to use the Fieldbus Data screen on the DX and MV. |
| 5 | **Troubleshooting**<br>Describes the status of the input/output data, the block error, and the device status, and the corrective actions to them. |
| **Appendix** | Explains the terminology. Describes the data types, the attributes, and the initial values of the parameters. |
| **Index** | Provides an index. |

## Conventions Used in this Manual

0x..... Denotes a hexadecimal number. Example: 0xf1 (Hexadecimal number “f1”)
V( )..... Denotes a value of the parameter enclosed in parentheses.
Example: V(ST) (Value of “ST” (Slot Time))
K..... Denotes “1024.” Example: 768 KB (File capacity)
k..... Denotes “1000.”

### Symbols

The following symbols are used in this manual.

Affixed to the instrument. Indicates danger to personnel or instrument and the operator must refer to the User’s Manual. The symbol is used in the User’s Manual to indicate the reference.

**WARNING** Describes precautions that should be observed to prevent injury or death to the user.

**CAUTION** Describes precautions that should be observed to prevent minor or moderate injury, or damage to the instrument.

***Note*** Provides important information for the proper operation of the instrument.

# Contents

# 1.1 Overview of the DX/MV

## Fieldbus Standard

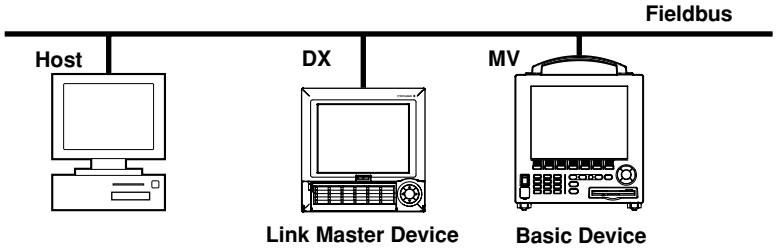
The DX/MV can connect to FOUNDATION Fieldbus H1 (transmission speed of 31.25 kb/s) as defined by Fieldbus Foundation.

## Device Type

**Link Master Device and Basic Device**

The DX/MV is a link master device. It has the function as a scheduler.
The DX/MV can also operate as a Basic Device without using the link master function.

**Device Type**




**Bus Powered Device**

The fieldbus function of the DX/MV is driven by the bus power (the DX/MV itself requires its own power supply. The hardware section that controls the fieldbus functions of the DX/MV is driven by the bus power).

## Node Address and PD Tag (Physical Device Tag)

All devices on the fieldbus (except power supplies and terminators) are required to have a unique node address and PD tag. The address is used to specify the device during communications. The PD tag acts as a tag for field devices. The initial values for the node address and PD tag are as follows.

- **Node address: 245**
- **PD tag: DAQSTATION**

## IDs

The DX/MV has the following ID numbers. These values can be confirmed with the parameter values in the resource block*.

* For details on the resource block, see section 1.2.

**IDs**

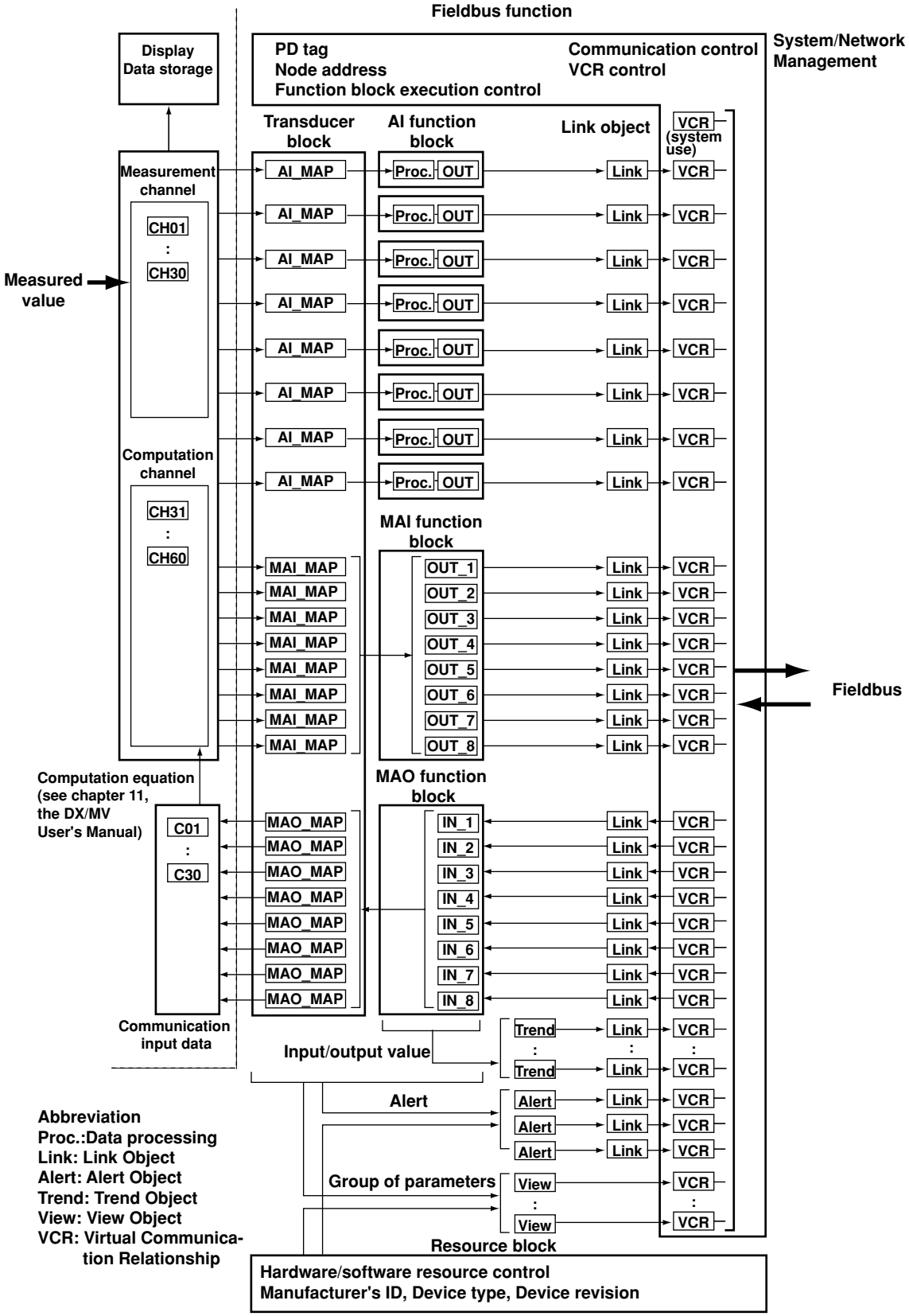
| ID | Parameter*1 | Value (Hexadecimal) | Description |
|---|---|---|---|
| Manufacturer ID | MANUFAC_ID | 594543 | A fixed ID for YOKOGAWA. |
| Device type | DEV_TYPE | 1801 | A fixed ID indicating the DX/MV. |
| Device revision number | DEV_REV | xx | Device revision number. The value changes when a function is modified. |
| Device description*2 revision number | DD_REV | xx | Device description revision number. The value changes when the device description is modified. |

*1 Parameters in the resource block.
*2 For details on the device description, see section 3.1.

# 1.2 Basic Function

## Structure of Functions

The DX/MV functions are shown in the figure.



### Resource Block (RB)

Resource block stores the information of hardware and software resources of the DX/MV. It stores the device information such as Manufacturer's ID, Device Type. Only one resource block exists on each device.
For the resource block parameters, see sections 3.7, 3.9, and appendix 2.

### Transducer Block (TB)

Transducer block connects the measured, computed, and communication input data on the DX/MV to the function block. It processes measured or computed data so that the AI or MAI can handle, and the data from the MAO so that the computation channel of the DX/MV can handle.
For the parameters of the transducer block, see sections 3.5, 3.6, 3.7, and appendix 2.

### AI (Analog Input) Function Block

Retrieves the measured and computed data (CH01 to CH60, the number of channels differs depending on models) of the DX/MV to the block and outputs the data to the fieldbus ("OUT" in the figure). At this point, the following processing can be carried out on the measured and computed data ("Proc." in the figure).

- Scaling (scale to value in an appropriate engineering unit)
- Set alarms
- Square root computation
- Filtering
- Low cut filtering (output 0 for values less than or equal to the specified value)

In addition, there is a simulation function that outputs specified values to the fieldbus as measured and computed values (see section 4.3).
The DX/MV has 8 AI function blocks. The transducer block parameter ("AI_MAP" in the figure) is used to specify the measurement or computation channel data that is to be retrieved to the AI function block. An AI function block can handle a measured or computed datum.
For the AI function block parameters, see section 3.5 and appendix 2.

### MAI (Multiple Analog Input) Function Block

Retrieves the measured and computed data (CH01 to CH60, the number of channels differs depending on models) of the DX/MV to the block and outputs the data to the fieldbus ("OUT_1" to "OUT_8" in the figure). Up to 8 data sets can be handled simultaneously. The MAI does not have the computation functions as with the AI, but it allows transmission of large amounts of data using a small number of setup parameters with a short execution time.
The DX/MV has one MAI function block. The transducer block parameter ("MAI_MAP" in the figure) is used to specify the measurement or computation channel data of the DX/MV that is to be retrieved to the MAI function block.
For the MAI function block parameters, see section 3.6 and appendix 2.

### MAO (Multiple Analog Output) Function Block

Retrieves the data from the fieldbus ("IN_1" to "IN_8" in the figure) so that the DX/MV can use the data as communication input data (CH01 to CH30, the number of communication input data differs depending on models). Up to 8 data sets can be handled simultaneously.
The DX/MV has one MAO function block. The transducer block parameter is used to assign the data sets of MAO function block to the communication input data of the DX/MV. Computation channels are used to display communication input data on DX/MV.
For the MAO function block parameters, see section 3.7 and appendix 2.

## System/Network Management Function

The DX/MV has the following system/network management functions.

**System/Network Management Function**

| Function | Description |
|---|---|
| Address management | Sets the node address and PD tag of the DX/MV. |
| Time synchronization | Synchronizes the time using the time broadcast from the scheduler. |
| Tag search | Searches for a specified tag. |
| Schedule management | Executes the function block according to the schedule. |
| Communication control | Controls communication resources. |

For the parameters of the system/network management functions, see sections 3.11 to 3.15, and appendix 2.

**Virtual Communication Relationship (VCR)**

The virtual communication relationship determines the communication method between devices. Once it is configured, communication with other devices can be carried out simply by specifying the virtual communication relationship number. The DX/MV has 31 virtual communication relationships. One of them is for system use and cannot be altered.

For the virtual communication relationship parameters, see section 3.11.

## Link Object

Link object is a function used by the function block to perform communication. There are 26 link objects provided on the DX/MV assuming the following application. The link objects are used by specifying the parameter for each application.

**Assumed Use of Link Objects**

| Application | Number of the link object (assumed) |
|---|---|
| For trends | 1 |
| For alerts | 1 |
| For the output (OUT) of the AI function block 1 to 8 | 8 |
| For MAI function block OUT_1 to OUT_8 | 8 |
| For MAO function block IN_1 to IN_8 | 8 |

For the link object parameters, see section 3.11.

## Alert Object

Transmits[*1] an alert when a specified process alarm occurs or is released, when a block alarm (block error) occurs or is released, when the prohibition of writing to static parameters[*2] is set or released, or when an update event (when a static parameter[*2] is overwritten) occurs. The alert shown in the table below can be transmitted for each block.

*1 Communication starts when a link object and a virtual communication relationship are specified.

*2 For the attributes of parameters, see appendix 2.

**Cause of an Alert and Number of Alert Objects**

| Block | Process Alarm | Block Alarm, Write Lock Alarm | Update Event |
|---|---|---|---|
| RB | | Block alarm, Write prohibition alarm | Update event |
| TB | | Block alarm | Update event |
| AI-1, AI-2, AI-3, AI-4, AI-5, AI-6, AI-7, AI-8 | HI_HI alarm x 8<br>HI alarm x 8<br>LO alarm x 8<br>LO_LO alarm x 8 | Block alarm x 8 | Update event x 8 |
| MAI | | Block alarm | Update event |
| MAO | | Block alarm | Update event |
| Number of causes (total) | 32 | 13 | 12 |
| Number of alert objects | 1 | 1 | 1 |

The DX/MV has three alert objects. When multiple alarms occur, alert is transmitted by using these alert objects. However, if there is no free alert object, the transmission is put on wait.
For the alert object parameters, see appendix 2. For the parameters related to alert transmission, see section 3.9.

## Trend Object

The trend object samples and holds the values of a specified input/output parameter, and periodically transmits[*] the values in groups (16 samples).

* Communication starts when a trend object, link object, and a virtual communication relationship are specified.

There are eight trend objects in the DX/MV. The trend of the parameters in the table below can be transmitted.

**Trend Target Parameters**

| Function Block | Target parameter |
|---|---|
| Eight AIs | FIELD_VAL, PV, OUT |
| MAI | OUT_1, OUT_2, OUT_3, OUT_4, OUT_5, OUT_6, OUT_7, OUT_8 |
| MAO | IN_1, IN_2, IN_3, IN_4, IN_5, IN_6, IN_7, IN_8 |
| Total | 40 |

The execution time (see p.1-11) that is specified for the FB of the DX/MV is a value that is derived with the premise that up to one trend object is to be used. If multiple trend objects are used on a single function block, the execution time may exceed the specified value (30 ms) and cause problems in which the function block is not executed according to the schedule.
For the trend object parameters, see appendix 2. For the parameter settings, see section 3.8.

## View Object

View object is used when reading several parameters of a function block at once. By collectively retrieving the parameters,* the load of the communication process is reduced. There are four types of view objects.

* The grouping of the parameters in VIEW_1 to VIEW_4 is fixed for each block and cannot be changed.

**View Object Types**

| No. | Symbol | Description |
|---|---|---|
| 1 | VIEW_1 | A set of dynamic parameters* required by the operator for operation (OUT, PV, IN, for example). |
| 2 | VIEW_2 | A set of static parameters* that need to be indicated to the operator (scaling parameter, for example). |
| 3 | VIEW_3 | A set of all dynamic parameters.* |
| 4 | VIEW_4 | A set of static parameters* not included in VIEW_2. |

* For the parameter attributes, see appendix 2.

All the blocks of the DX/MV have one of each type VIEW_1 to VIEW_4. You can read them using the following index numbers.*

* For the index numbers, see “Parameters” in this section.

**Index Number of the View Object**

| Function Block | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|
| RB | 40100 | 40101 | 40102 | 40103 |
| TB | 40200 | 40201 | 40202 | 40203 |
| AI-1 | 40400 | 40401 | 40402 | 40403 |
| AI-2 | 40410 | 40411 | 40412 | 40413 |
| AI-3 | 40420 | 40421 | 40422 | 40423 |
| AI-4 | 40430 | 40431 | 40432 | 40433 |
| AI-5 | 40440 | 40441 | 40442 | 40443 |
| AI-6 | 40450 | 40451 | 40452 | 40453 |
| AI-7 | 40460 | 40461 | 40462 | 40463 |
| AI-8 | 40470 | 40471 | 40472 | 40473 |
| MAI | 40900 | 40901 | 40902 | 40903 |
| MAO | 41000 | 41001 | 41002 | 41003 |

The parameters of VIEW_1 through VIEW_4 that are specified for each function block are stored in order in the view object.
For example, the view object corresponding to VIEW_2 of the transducer block (index number 40201) has the following construction.

**Construction of the View Object Corresponding to VIEW_2 of the TB**

| Index No. | Parameter |
|---|---|
| 40201 | ST_REV<br>TRANSDUCER_TYPE |

The parameters that are stored in VIEW_1 through VIEW_4 of each block are shown on the next pages. The value in the VIEW column represents the parameter size (in bytes). “R” denotes the relative index No. (see p.1-10).

**Parameters in the View Object of the Resource Block**

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 1 | ST_REV | 2 | 2 | 2 | 2 |
| 2 | TAG_DESC | | | | |
| 3 | STRATEGY | | | | 2 |
| 4 | ALERT_KEY | | | | 1 |
| 5 | MODE_BLK | 4 | | 4 | |
| 6 | BLOCK_ERR | 2 | | 2 | |
| 7 | RS_STATE | 1 | | 1 | |
| 8 | TEST_RW | | | | |
| 9 | DD_RESOURCE | | | | |
| 10 | MANUFAC_ID | | | | 4 |
| 11 | DEV_TYPE | | | | 2 |
| 12 | DEV_REV | | | | 1 |
| 13 | DD_REV | | | | 1 |
| 14 | GRANT_DENY | | 2 | | |
| 15 | HARD_TYPES | | | | 2 |
| 16 | RESTART | | | | |
| 17 | FEATURES | | | | 2 |
| 18 | FEATURE_SEL | | 2 | | |
| 19 | CYCLE_TYPE | | | | 2 |
| 20 | CYCLE_SEL | | 2 | | |
| 21 | MIN_CYCLE_T | | | | 4 |
| 22 | MEMORY_SIZE | | | | 2 |
| 23 | NV_CYCLE_T | | 4 | | |
| 24 | FREE_SPACE | | 4 | | |
| 25 | FREE_TIME | 4 | | 4 | |
| 26 | SHED_RCAS | | 4 | | |
| 27 | SHED_ROUT | | 4 | | |
| 28 | FAULT_STATE | 1 | | 1 | |
| 29 | SET_FSTATE | | | | |
| 30 | CLR_FSTATE | | | | |
| 31 | MAX_NOTIFY | | | | 1 |
| 32 | LIM_NOTIFY | | 1 | | |
| 33 | CONFIRM_TIME | | 4 | | |
| 34 | WRITE_LOCK | | 1 | | |
| 35 | UPDATE_EVT | | | | |
| 36 | BLOCK_ALM | | | | |
| 37 | ALARM_SUM | 8 | | 8 | |
| 38 | ACK_OPTION | | | | 2 |
| 39 | WRITE_PRI | | | | 1 |
| 40 | WRITE_ALM | | | | |
| 41 | ITK_VER | | | | 2 |
| 42 | SOFT_REV | | | | |
| 43 | SOFT_DESC | | | | |
| 44 | SIM_ENABLE_MSG | | | | |
| 45 | DEVICE_STATUS_1 | | | 4 | |
| 46 | DEVICE_STATUS_2 | | | 4 | |
| 47 | DEVICE_STATUS_3 | | | 4 | |
| 48 | DEVICE_STATUS_4 | | | 4 | |
| 49 | DEVICE_STATUS_5 | | | 4 | |
| 50 | DEVICE_STATUS_6 | | | 4 | |
| 51 | DEVICE_STATUS_7 | | | 4 | |
| 52 | DEVICE_STATUS_8 | | | 4 | |
| | Total | 22 | 30 | 54 | 31 |

**Parameters in the View Object of the Transducer Block**

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 1 | ST_REV | 2 | 2 | 2 | 2 |
| 2 | TAG_DESC | | | | |
| 3 | STRATEGY | | | | 2 |
| 4 | ALERT_KEY | | | | 1 |
| 5 | MODE_BLK | 4 | | 4 | |
| 6 | BLOCK_ERR | 2 | | 2 | |
| 7 | UPDATE_EVT | | | | |
| 8 | BLOCK_ALM | | | | |
| 9 | TRANSDUCER_DIRECTORY | | | | |
| 10 | TRANSDUCER_TYPE | 2 | 2 | 2 | 2 |
| 11 | XD_ERROR | 1 | | 1 | |
| 12 | COLLECTION_DIRECTORY | | | | |
| 13 | AI_MAP | | | | 16 |
| 14 | MAI_MAP | | | | 16 |
| 15 | MAO_MAP | | | | 16 |
| 16 | ALARM_SUM | 8 | | 8 | |
| 17 | DEV_ID | | | | |
| 18 | DEV_KEY | | | | |
| 19 | EEPROM_STATE | | | | |
| 20 | UART_STATISTICS | | | | |
| 21 | STACK_STATISTICS_1 | | | | |
| 22 | STACK_STATISTICS_2 | | | | |
| 23 | STACK_CONF | | | | |
| 24 | EXEC_FB_CNT | | | | |
| | Total | 19 | 4 | 19 | 55 |

**Parameters in the View Object of the AI Function Block**

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 1 | ST_REV | 2 | 2 | 2 | 2 |
| 2 | TAG_DESC | | | | |
| 3 | STRATEGY | | | | 2 |
| 4 | ALERT_KEY | | | | 1 |
| 5 | MODE_BLK | 4 | | 4 | |
| 6 | BLOCK_ERR | 2 | | 2 | |
| 7 | PV | 5 | | 5 | |
| 8 | OUT | 5 | | 5 | |
| 9 | SIMULATE | | | | |
| 10 | XD_SCALE | | 11 | | |
| 11 | OUT_SCALE | | 11 | | |
| 12 | GRANT_DENY | | 2 | | |
| 13 | IO_OPTS | | | | 2 |
| 14 | STATUS_OPTS | | | | 2 |
| 15 | CHANNEL | | | | 2 |
| 16 | L_TYPE | | | | 1 |
| 17 | LOW_CUT | | | | 4 |
| 18 | PV_FTIME | | | | 4 |
| 19 | FIELD_VAL | 5 | | 5 | |
| 20 | UPDATE_EVT | | | | |
| 21 | BLOCK_ALM | | | | |
| 22 | ALARM_SUM | 8 | | 8 | |
| 23 | ACK_OPTION | | | | 2 |
| 24 | ALARM_HYS | | | | 4 |

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 25 | HI_HI_PRI | | | | 1 |
| 26 | HI_HI_LIM | | | | 4 |
| 27 | HI_PRI | | | | 1 |
| 28 | HI_LIM | | | | 4 |
| 29 | LOW_PRI | | | | 1 |
| 30 | LOW_LIM | | | | 4 |
| 31 | LOW_LOW_PRI | | | | 1 |
| 32 | LOW_LOW_LIM | | | | 4 |
| 33 | HI_HI_ALM | | | | |
| 34 | HI_ALM | | | | |
| 35 | LOW_ALM | | | | |
| 36 | LOW_LOW_ALM | | | | |
| | Total | 31 | 26 | 31 | 46 |

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 16 | MO_OPTS | | | | 2 |
| 17 | FSTATE_TIME | | | | 4 |
| 18 | FSTATE_VAL1 | | | | 4 |
| 19 | FSTATE_VAL2 | | | | 4 |
| 20 | FSTATE_VAL3 | | | | 4 |
| 21 | FSTATE_VAL4 | | | | 4 |
| 22 | FSTATE_VAL5 | | | | 4 |
| 23 | FSTATE_VAL6 | | | | 4 |
| 24 | FSTATE_VAL7 | | | | 4 |
| 25 | FSTATE_VAL8 | | | | 4 |
| 26 | FSTATE_STATUS | 1 | | 1 | |
| 27 | UPDATE_EVT | | | | |
| 28 | BLOCK_ALM | | | | |
| | Total | 49 | 2 | 49 | 45 |

**Parameters in the View Object of the MAI Function Block**

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 1 | ST_REV | 2 | 2 | 2 | 2 |
| 2 | TAG_DESC | | | | |
| 3 | STRATEGY | | | | 2 |
| 4 | ALERT_KEY | | | | 1 |
| 5 | MODE_BLK | 4 | | 4 | |
| 6 | BLOCK_ERR | 2 | | 2 | |
| 7 | CHANNEL | | | | 2 |
| 8 | OUT_1 | 5 | | 5 | |
| 9 | OUT_2 | 5 | | 5 | |
| 0 | OUT_3 | 5 | | 5 | |
| 11 | OUT_4 | 5 | | 5 | |
| 12 | OUT_5 | 5 | | 5 | |
| 13 | OUT_6 | 5 | | 5 | |
| 14 | OUT_7 | 5 | | 5 | |
| 15 | OUT_8 | 5 | | 5 | |
| 16 | UPDATE_EVT | | | | |
| 17 | BLOCK_ALM | | | | |
| | Total | 48 | 2 | 48 | 7 |

**Parameters in the View Object of the MAO Function Block**

| R | Parameter | VIEW_1 | VIEW_2 | VIEW_3 | VIEW_4 |
|---|---|---|---|---|---|
| 1 | ST_REV | 2 | 2 | 2 | 2 |
| 2 | TAG_DESC | | | | |
| 3 | STRATEGY | | | | 2 |
| 4 | ALERT_KEY | | | | 1 |
| 5 | MODE_BLK | 4 | | 4 | |
| 6 | BLOCK_ERR | 2 | | 2 | |
| 7 | CHANNEL | | | | 2 |
| 8 | IN_1 | 5 | | 5 | |
| 9 | IN_2 | 5 | | 5 | |
| 10 | IN_3 | 5 | | 5 | |
| 11 | IN_4 | 5 | | 5 | |
| 12 | IN_5 | 5 | | 5 | |
| 13 | IN_6 | 5 | | 5 | |
| 14 | IN_7 | 5 | | 5 | |
| 15 | IN_8 | 5 | | 5 | |

## Parameters

The fieldbus function of the DX/MV is configured by setting parameters that belong to the Virtual Field Devices (see appendix 1). Parameters for the system/network management function are in the Management Information Base Virtual Field Device (MIB-VFD), and parameters for function blocks are in the Function Block Virtual Field Device (FB-VFD).

**Management Information Base Virtual Field Device (MIB-VFD)**

| Index No. | Function |
|---|---|
| 0<br>: | Common items |
| | |
| 258<br>: | System management |
| | |
| 290<br>: | Network management |
| | |

**Function Block Virtual Field Device(FB-VFD)**

| Index No. | Function |
|---|---|
| 0<br>: | Common items |
| | |
| 1000<br>: | Resource block |
| | |
| 2000<br>: | Transducer block |
| | |
| 4000<br>: | AI function block-1 |
| | |
| 4100<br>: | AI function block-2 |
| | |
| 4200<br>: | AI function block-3 |
| | |
| 4300<br>: | AI function block-4 |
| | |
| 4400<br>: | AI function block-5 |
| | |
| 4500<br>: | AI function block-6 |
| | |
| 4600<br>: | AI function block-7 |
| | |
| 4700<br>: | AI function block-8 |
| | |
| 9000<br>: | MAI function block |
| | |
| 10000<br>: | MAO function block |
| | |
| 30000<br>: | Link object |
| | |
| 31000<br>: | Alert object |
| | |
| 32000<br>: | Trend Object |
| | |
| 40000<br>: | View object |
| | |

**Index No., Sub Index No., Relative Index No.**

The DX/MV assigns the index numbers to the parameters. If the parameter consists of a set of sub parameters, sub parameters have sub index numbers. In addition, the parameters of the resource block, transducer block, AI function blocks, MAI function block, and MAO function block have a relative index number that are assigned the values 0, 1, 2, and so on from the head of the block.
For example, the parameters of the resource block are stored in the area corresponding to index numbers 1000 to 1052. The parameters are assigned relative index numbers from 0 to 52. The parameter “MODE_BLK” at the relative index number 5 has sub parameters with subindex numbers 1 to 4.

**Parameters of the Resource Block**

| Index No. | Relative Index No. | Parameter | |
|---|---|---|---|
| 1000 | 0 | Block | |
| 1001 | 1 | ST_REV | |
| 1002 | 2 | TAG_DESC | |
| 1003 | 3 | STRATEGY | |
| 1004 | 4 | ALERT_KEY | |
| 1005 | 5 | MODE_BLK | |
| | | **Sub Index No.** | **Sub parameter** |
| | | 1 | Target |
| | | 2 | Actual |
| | | 3 | Permitted |
| | | 4 | Normal |
| 1006 | 6 | BLOCK_ERR | |
| : | : | : | |
| 1051 | 51 | DEVICE_STATUS_7 | |
| 1052 | 52 | DEVICE_STATUS_8 | |

A parameter is identified using the index number, sub index number and the relative index number.
For the parameters of the DX/MV, see appendix 2.

## Execution of the Function Block

### Execution Time

Execution time refers to the time that is required to execute the process of the function block. The table below shows the execution times that are set before shipping. The time cannot be changed.
The execution time is set to a value with a slight margin. However, if there is too much information to be processed, the process may not be completed within the execution time. In such case, lighten the processing load of the block.

### Period of Execution

The period of execution is the time duration at which the process of each block is repeated. However, since the I/O data is updated at the period of execution of the transducer block (250 ms), specifying a shorter period may result in the same value to be retrieved at consecutive periods.

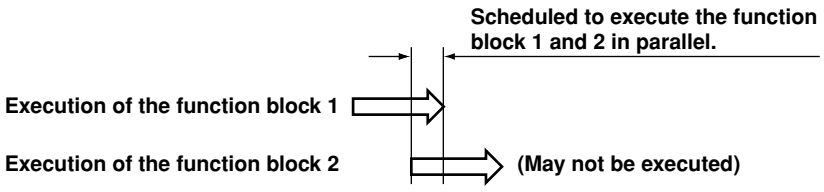
**Block Execution Time and Period of Execution**

| Block | Execution Time | Period of Execution |
|---|---|---|
| Resource block | Self-run | Self-run (500 ms) |
| Transducer block | Self-run | Self-run (250 ms) |
| AI function block | 30 ms | Determined by the schedule. |
| MAI function block | 30 ms | Determined by the schedule. |
| MAO function block | 30 ms | Determined by the schedule. |

### Schedule

Since the DX/MV can only process the function blocks sequentially, the function block 2 may not be executed, as it is scheduled to run in parallel with the function block 1. Scheduling is not required for the resource and transducer blocks, since they are self-run.

**Schedule That May Not Be Executed**




## Communication with Other Field Device

To transmit data to or receive data from other devices on the fieldbus, the link objects and the virtual communication relationships (VCR) are used.

# 1.3 Link Master Function

### Link Master Functions

The following scheduler functions are supported.

**Link Master Functions**

| Function*1 | Description |
|---|---|
| Detection of New Devices on the Fieldbus | Periodically checks the devices on the fieldbus for new devices. |
| Control of Unscheduled Communications | Provides permissions to all devices on the fieldbus in sequence and periodically when unscheduled communication is possible. |
| Control of Scheduled Communications | Instructs publishing/subscribing of measured data to field devices according to the schedule. |
| Time Synchronization | Periodically broadcasts time information. This allows all devices to have the same time information. |
| Live List Equalization | Broadcasts the live list (LL)*2 to all the link master devices on the fieldbus. This allows all the link master devices to have the same live list. |
| Assignment of the Scheduler Rights | Assigns the scheduler rights to other link master devices. |

*1 The DX/MV does not support the transmission of RR (Round Trip Delay Reply) and Long Address.
*2 Live list is a list of devices that are detected on the fieldbus.

### Transition to Scheduler

If the DX/MV determines that there is no scheduler on the fieldbus such as when starting up a fieldbus or a preexisting scheduler malfunctions, it declares that it will become a scheduler and makes the transition. For the transition condition to the scheduler, see appendix 1, “Terminology.”

# 2.1 Fieldbus Communication Interface Specifications



The fieldbus communication interface specifications of the DX/MV are indicated below.

**Fieldbus Communication Interface Specifications**

| Item | Description | |
|---|---|---|
| Terminal type | M4 screws | |
| Output signal | Digital signal based on the FOUNDATION Fieldbus H1 | |
| Physical layer | 113 (standard-power signaling, bus powered, non I.S.) | |
| Number of connected devices*1 | Up to 32 (Including the DX/MV) | |
| Connection | Multidrop | |
| Intrinsic safety | Not applicable | |
| Transmission mode | Transmission mode based on the FOUNDATION Fieldbus H1 | |
| Transmission speed | 31.25 kbps | |
| Communication line condition | Power supplied by the communication line<br>Supply voltage: 9 to 32 VDC<br>Supply current: 16.5 mA (maximum) | |
| Isolation | Dielectric strength (between communication terminals and the ground terminal): 500 Vrms (50/60 Hz, 1 min.) | |
| Transmission distance*2 | **Cable type** | **Maximum cable length (reference value)** |
| | Type A<br>(twisted pair, shielded per pair)<br>#18AWG (0.82 $mm^2$) | 1900 m |
| | Type B<br>(twisted pair, shielded collectively)<br>#22AWG (0.32 $mm^2$) | 1200 m |

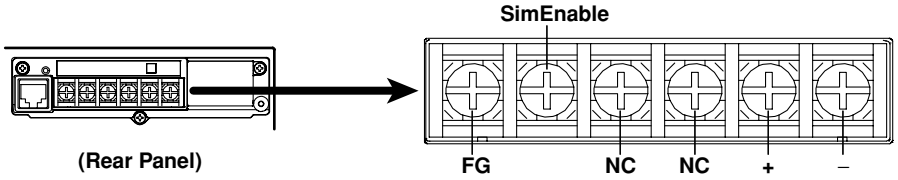
*1 “32” means the theoretical number of connectable devices. The actual number of connectable devices varies depending on the installation conditions.

*2 The transmission distance is limited by the installation conditions such as the cable type, the power supply to the bus.

# 2.2 Connecting to the Terminal

## Terminal Arrangement

**Terminal Names**




**Terminal Description**

| Terminal | Description |
|---|---|
| FG (Frame Ground) | Case ground of the DX/MV. |
| SimEnable | Connect to FG when using the simulation function. For information on how to use this terminal, see section 4.3. |
| NC (No Connection) | Not used. |
| + | Connect to the cable on the positive side of the fieldbus power supply. This terminal is isolated from the ground terminal (including FG terminal). |
| – | Connect to the cable on the negative side of the fieldbus power supply. This terminal is isolated from the ground terminal (including FG terminal). |

## Connection Procedure

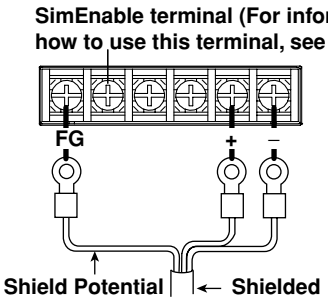
**WARNING**

To prevent the possibility of electric shock, connect the cables with the power turned OFF.

**How to Connect the Cable**

As shown in the following figure, attach a crimp-on lug with isolation sleeves for 4 mm screws to the end of the cable. Keep the exposed section from the end of the shield within 5 cm.

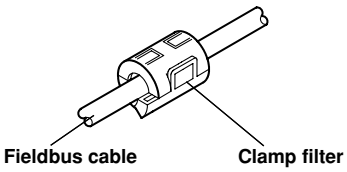
**Connection**




**Attaching the Clamp Filter**

Attach the clamp filter that came with the package to the cable. Attach it near the DX/MV's terminal.

**Clamp Filter**



# 3.1 Overview of the Procedure in Setting the Parameters

## Scope of This Chapter

This chapter describes the settings of the main parameters using the expression when the Device Description of the DX/MX (see below) is used. For parameters that are not described in this chapter, see appendix 2.
The procedure in setting the parameters varies depending on the configurator that you are using. See the respective user's manual.

## Integrating the Device Description (DD)

Before connecting the DX/MV to the fieldbus, you will install the Device Description of the DX/MV to the host or the configurator. The DD allows devices that are made by various manufacturers to be operated in a uniform manner on the fieldbus.
When you use the DD, the parameters and settings are displayed using easy-to-understand symbols. For example, a configurator may display values using hexadecimals such as "0x08." When the DD is installed, it is displayed using easy-to-understand symbols such as "Auto."
The DD can be thought of as a driver software for the device.

### Obtaining the DD

The DD file is included in the DAQSTANDARD Software CD-ROM.
**Pass name: \Fieldbus\DAQ_F00\594543\1801**

You can also obtain the DD file in the following way.

- **From Yokogawa's Home Page**
  Download the DD file from Yokogawa's home page.
  **URL http://www.yokogawa.com/tm/Bu/DX/**

- **From The Fieldbus Foundation**
  Please contact the Fieldbus Foundation.

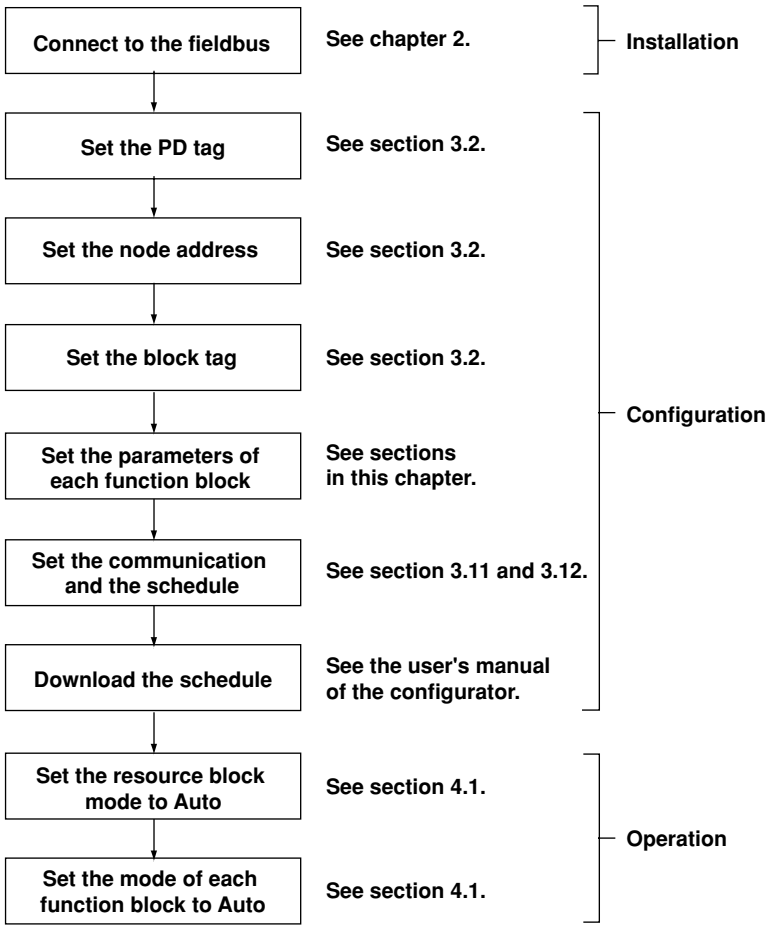
### Installing the DD

For the procedure of installing the DD, see the user's manual for the configurator.

## Adding the DX/MV to the Fieldbus

The following figure shows the steps to add the DX/MV to the fieldbus.

**Steps to Add the DX/MV to the Fieldbus**




### Installation

See chapter 2.

### Setting the PD Tag

The initial PD tag of the DX/MV is “DAQSTATION.” The PD tag must be unique on the fieldbus. For the setting procedure, see section 3.2.

### Setting the Node Address

The initial node address of the DX/MV is 245 (0xf5). The node address must be unique on the fieldbus. For the setting procedure, see section 3.2.

### Setting the Block Tag

The block tag is the name of the block. Each block of all the devices on the fieldbus (resource block, transducer block, AI function block, MAI function block, and MAO function for the DX/MV) has a block tag. The block tag must be unique on the fieldbus. For the setting procedure, see section 3.2.

**Setting the Parameters of Each Function Block**

Carry out the following steps in setting the parameters of each function block (resource block, transducer block, AI, MAI, and MAO function blocks).

1. Set the block mode of the block to a mode* that allows the relevant parameter to be written. For the procedure in changing the mode, see section 3.4.
   * For details on the modes that allow writing of each parameter, see appendix 2.
2. Set the parameter values. For the parameter values to be set, see sections in this chapter.

***Note***

Do not turn off the power immediately after the setting. If the power is turned off within 30 seconds after setting is made, the modified parameters may not saved and the settings return to the original values.

**Setting the Communication and the Schedule**

You must specify the following items. The communication method is specified using the parameters of the link object and virtual communication relationship.

- Link between function blocks*1
- Alert transmission
- Trend transmission
- Schedule*2

*1 For the link object and virtual communication relationship (VCR) to specify links, see section 3.11.

*2 Determine the control period and the execution timing of the function blocks and create a schedule. See section 3.12.

**Downloading the Schedule**

Download the schedule that you specified to the DX/MV. For the procedure in downloading the schedule, see the user's manual of the configurator that you are using.

**Operation**

See section 4.1.

# 3.2 Setting the Node Address, PD Tag, and Block Tag

***Note***

The PD tag, node address, and block tag must be unique on the fieldbus. When connecting multiple DX/MV to the fieldbus, we recommend you connect and configure one DX/MV at a time.

## Setting the PD Tag

You cannot write the PD tag directly to the parameter (PD_TAG) of the Management Information Base Virtual Field Device (MIB-VFD). It is set using a special communication service. Set the PD tag according to the operation of the configurator that you are using.
Set the PD tag using up to 32 alphanumeric characters. The specified PD tag can be confirmed through the following parameter.

**Parameter for Displaying the PD Tag (MIB)**

| Index | Parameter | Description |
|---|---|---|
| 271 | PD_TAG | Displays the PD tag. The initial value is "DAQSTATION." |

## Setting the Node Address

You cannot write the node address directly to the parameter (This Node of DLME_BASIC_INFO) of the Management Information Base Virtual Field Device (MIB-VFD). It is set using a special communication service. Set the PD tag according to the operation of the configurator that you are using. The selectable range of node addresses is the node address range that is managed by the scheduler.
The specified node address can be confirmed through the following parameter.

**Parameter for Displaying the Node Address (MIB)**

| Index | Parameter | Description |
|---|---|---|
| 361 | DLME_BASIC_INFO | |
| | 4 This Node | Displays the node address. The initial value is 245 (0xf5). |

## Setting the Block Tag

The block tag is included in the first parameter of each block (BLOCK, relative index number of 0). It is set using a special communication service. Set the PD tag according to the operation of the configurator that you are using.
Set the block tag using up to 32 alphanumeric characters. The initial value of the block tag of the DX/MV is as follows:

**Initial Value of the Block Tag**

| Block | Initial Value of the Block Tag |
|---|---|
| Resource block | RB |
| Transducer block | TB |
| AI function blocks | AI-1, AI-2, AI-3, AI-4, AI-5, AI-6, AI-7, AI-8 |
| MAI function block | MAI-1 |
| MAO function block | MAO-1 |

# 3.3 Setting Example

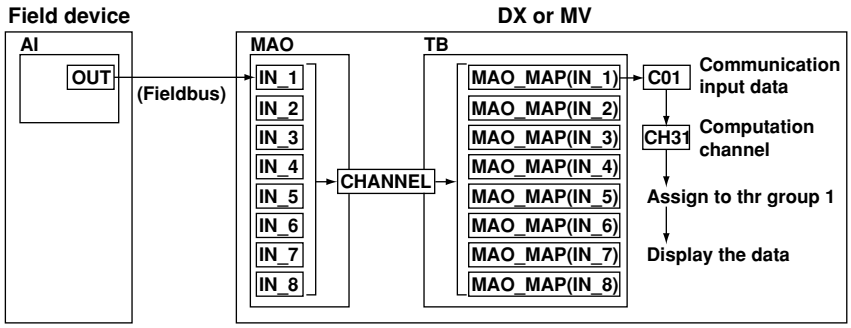
Explains the settings of DX/MV using an example below.

## Measurement Loop and the Schedule

### Measurement Loop

Retrieves the OUT of an AI function block of a field device and pass it to the computation channel CH31 of the DX/MV.

**Measurement Loop**

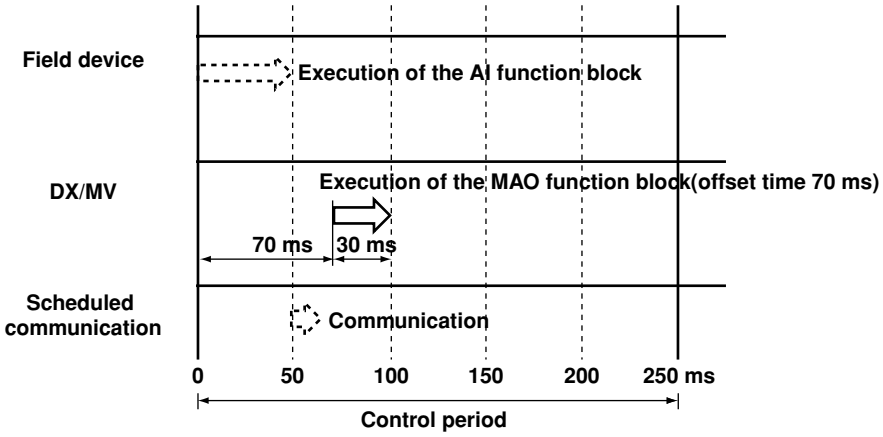



### Schedule

Executes the MAO function block of the DX/MV as follows.

- Control period: 250 ms
- Offset time for MAO execution of the DX/MV: 70 ms
- Execution time of the MAO function block of the DX/MV: 30 ms

**Schedule**



## Settings

**Setting the Block Mode to OOS**

1. Set the block mode of the resource block (RB), transducer block (TB), and MAO function block to OOS (see section 3.4).

**Communication**

2. Set the communication to subscribe OUT of the AI function block of the field device to IN_1 of the MAO function block of the DX/MV. Setting Link Object and related Virtual Communication Relationship is necessary (see section 3.11).

**Connection between MAO Function Block and the Transducer Block**

3. CHANNEL used to connect the MAO function block and the transducer block is 10 and not changeable (MAO, relative index number 7, see section 3.7).

**Connection between Transducer Block and the Communication Input Data C01**

4. Set "1" to MAO_MAP(IN_1) on the transducer block to connect the communication input data C01, and set "0" to MAO_MAP(IN_2) through MAO_MAP(IN_8) as they are not used (see section 3.7).
   **MAO_MAP (TB, relative index number 15)**
   MAO_MAP (IN_1): 1, MAO_MAP (IN_2) through MAO_MAP (IN_8): 0

**Schedule**

5. Set the schedule by setting parameters on the Management Information Base Virtual Field Device (see section 3.12).

   **MACRO_CYCLE_DURATION (MIB, index number 269)**
   Set "8000" (= 250 x 32), as the unit is 1/32 ms.

   **FB_START_ENTRY.10 (MIB, index number 285)**
   **Start Time Offset**
   Set "2240" (= 70 ms x 32), as the unit is 1/32 ms.
   **Fb Object Index**
   Set "10000," the first index number of the MAO function block.

**Download**

6. Download the schedule to the DX/MV. For the operating procedure, see the user's manual of the configurator that you are using.

**Settings on the DX/MV**

- **Computation Channel**

7. Set the computation channel CH31 as follows:
   Equation: C01
   Lower limit of span, Upper limit of span: Set the lower and upper limits of span
   Unit: Set the unit.

- **Channel Assignment to Group**

  8. Assign the channel 31 to Group 1.

**Confirmation**

- **Start Computation**

  9. Start computation by pressing the FUNC key and then the MATH START soft key.

- **Set the Block Mode to Auto**

  10. Set the block mode of the resource block, transducer block, and MAO function block to Auto (see section 3.4).

- **Displaying Data**

  11. The computation channel 31 is displayed on the screen for Group 1.
      If "+*******" is displayed as a value, the data have some abnormality. Confirm the status of IN_1 and take corrective actions (see section 5.1).
      The status of the communication input data can be confirmed on the FIELDBUS DATA screen of the DX/MV (see section 4.4).

# 3.4 Changing the Block Mode

The MODE_BLK is a parameter that is used to set the mode of the block.

**Block Mode Parameter (RB, TB, AI, MAI, and MAO)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 5 | MODE_BLK | |
| | 1 Target | All modes |
| | 2 Actual | - |
| | 3 Permitted | All modes |
| | 4 Normal | All modes |

- **Target**
  Set the mode you want the block transit to. Only the modes specified in Permitted are acceptable. For information about the mode and set value, see section “Permitted.”

- **Actual**
  Indicates the current mode of the block. You cannot set this value.

- **Permitted**
  The parameter that indicates the modes that can be set to Target and Normal. The following table shows the modes that each block of the DX/MV can transit to. Set the value within this range.

**Modes That the Block Can Transit to**

| Block | Mode | | | |
|---|---|---|---|---|
| Resource block | Auto | | | OOS |
| Transducer block | Auto | | | OOS |
| AI function block | Auto | Man | | OOS |
| MAI function block | Auto | Man | | OOS |
| MAO function block | Auto | | LO | OOS |

**Auto**
Condition in which the operations are carried out automatically.

**Man (Manual)**
The AI and MAI function blocks stop updating the output value. In this mode, you can manually write values to the block parameters and output them. However, you cannot change the parameter status. The following parameters are applicable.
- **AI-1 to AI-8: OUT**
- **MAI: OUT_1 to OUT_8**

**OOS (Out of Service)**
Condition in which the operation of the block is stopped.

**LO (Local Override)**
The mode of the MAO function block transits to LO, when the value of FAULT_STATE (relative index No. 28) of the resource block is “Active” (the value is “2”).

The value of Permitted, Target, and Normal is a single byte bit sequence. The correspondence between the bits and modes are as follows:

**Parameter Value**

| Bit | Symbol |
|---|---|
| 0 | - |
| 1 | - |
| 2 | - |
| 3 | Auto |
| 4 | Man |
| 5 | Local Override (LO)* |
| 6 | - |
| 7 | Out of Service (OOS) |

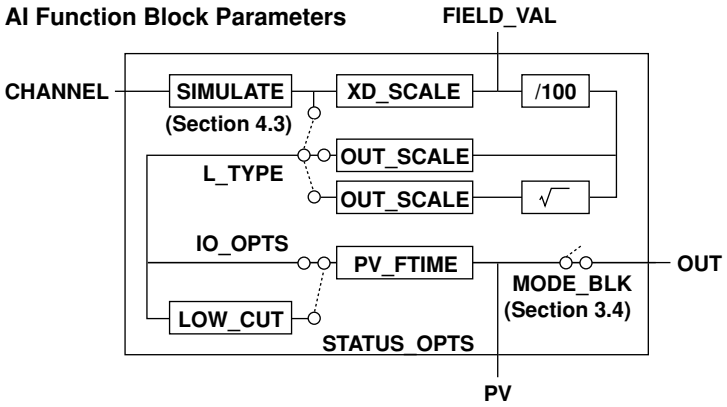
* You cannot set LO (Local Override) to the MAO Target.

- **Normal**
  This parameter is provided for the configurator. It is used to specify the transition destination when returning to normal operation. Only the modes specified in Permitted are acceptable. For information about the mode and set value, see section "Permitted."

# 3.5 Setting the Function That Outputs the Measured Data (AI Function Block)

## Structure of AI Function Block

The following figure shows the data process flow and the main parameters. For SIMULATE and MODE_BLK, see sections 4.3 and 3.4 respectively.




**The parameters in the framed area specifies the data process procedures.**
**The dotted lines denote options specified by the parameters.**

## Measured/Computed Data to Be Connected

The connection between the measured and computed data of the DX/MV and the transducer block is set using AI_MAP of the transducer block. In addition, the connection between the transducer block and each AI function block is set using CHANNEL of the AI function block.

### Setting the Connection between the Measured/Computed Data and the Transducer Block

**Parameter for Setting the Connection (TB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 13 | AI_MAP | |
| | 1 AI_MAP(CHANNEL-1) | OOS |
| | 2 AI_MAP(CHANNEL-2) | OOS |
| | 3 AI_MAP(CHANNEL-3) | OOS |
| | 4 AI_MAP(CHANNEL-4) | OOS |
| | 5 AI_MAP(CHANNEL-5) | OOS |
| | 6 AI_MAP(CHANNEL-6) | OOS |
| | 7 AI_MAP(CHANNEL-7) | OOS |
| | 8 AI_MAP(CHANNEL-8) | OOS |

- **AI_MAP(CHANNEL-1) to AI_MAP(CHANNEL-8)**
  Sets the channel number of the DX/MV (1 through 60) to connect to AI-1 to AI-8.

### Setting the Connection between the Transducer Block and Each AI

**Parameter for Setting the Connection (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 15 | CHANNEL | OOS |

- **CHANNEL**
  A CHANNEL parameter exists for each AI. Set the CHANNEL number (1 to 8) of AI_MAP to connect to each AI.

## Process Procedure of the Measured/Computed Data

L_TYPE specifies how to process the measured/computed data from the transducer block to create FIELD_VAL or PV.

**Parameter for Specifying the Process Procedure of the Measured/Computed Data (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 16 | L_TYPE | Man, OOS |

- **L_TYPE**
  Specify the process procedure from the table.

**L_TYPE Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Direct | Make the value from the TB into FIELD_VAL and PV. |
| 2 | Indirect | Scale FIELD_VAL to create PV. |
| 3 | Ind Sqr Root | Take the square root and scale FIELD_VAL to create PV. |

FIELD_VAL and PV are calculated in the equations below. The [EU at 100%] and [EU at 0%] of FIELD_VAL are set using the XD_SCALE parameter; the [EU at 100%] and [EU at 0%] of PV are set using the OUT_SCALE parameter (see the “Scaling” section).

- **When Set to Direct**
  FIELD_VAL = 100(SIMULATE*–[EU at 0%])/([EU at 100%]–[EU at 0%])
  PV = SIMULATE*
  * Output value of SIMULATE. During normal operation, the value from the transducer block is output from SIMULATE. When using the simulation function, the simulation value is output from SIMULATE (see section 4.3).

- **When Set to Indirect**
  FIELD_VAL: Same as when set to Direct
  PV = (FIELD_VAL/100)([EU at 100%]–[EU at 0%])+[EU at 0%]

- **When Set to Ind Sqr Root**
  FIELD_VAL: Same as when set to Direct
  PV = $\sqrt{(\text{FIELD\_VAL}/100)}$ x ([EU at 100%]–[EU at 0%])+[EU at 0%]

***Note***

When using the filter, PV delays from SIMULATE or FIELD_VAL because of the time constant of the filter.

## Scaling

XD_SCALE and OUT_SCALE are for FIELD_VAL and PV, respectively.

**Scaling Parameter (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 10 | XD_SCALE | |
| | 1 EU at 100% | OOS |
| | 2 EU at 0% | OOS |
| | 3 Units Index | OOS |
| | 4 Decimal Point | OOS |
| 11 | OUT_SCALE | |
| | 1 EU at 100% | OOS |
| | 2 EU at 0% | OOS |
| | 3 Units Index | OOS |
| | 4 Decimal Point | OOS |

- **EU at 100%, EU at 0%**

  **For XD_SCALE**

  Specify the values with an engineering unit that correspond to 0 to 100% of FIELD_VAL.

  **For OUT_SCALE**

  Specify the values with an engineering unit that correspond to 0 to 100% of PV.

- **Units Index, Decimal Point**

  Set the unit and the number of display digits below the decimal point if the device used to display the data needs these information. Units Index is specified through a value that correspond to the unit.

**Units Index Value (representative examples only)**

| Value | Unit |
|---|---|
| 1001 | °C |
| 1243 | mV |
| 1240 | V |
| 1342 | % |

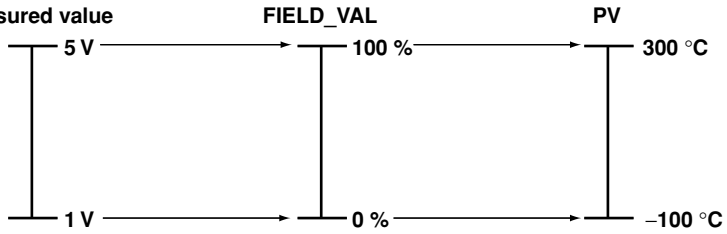
***Note***

- EU at 100% and EU at 0% cannot be set to the same value.
- The set values for Unit Index and Decimal Point do not apply to FIELD_VAL, PV and OUT. Use Unit Index and Decimal Point if the device to display FIELD_VAL, PV or OUT need these information.

**Example**

When the measured value from the TB is 1 to 5 V and you wish to convert it to 0 to 100% of FIELD_VAL and –100 to 300 °C of PV, set the parameters as follows:

**Measured Value, FIELD_VAL, and PV**




**Set Values for XD_SCALE and OUT_SCALE**

| Parameter | Sub parameter | Set value |
|---|---|---|
| XD_SCALE | 1 EU at 100% | 5 |
| | 2 EU at 0% | 1 |
| | 3 Units Index | V (1240)* |
| | 4 Decimal Point | 0 (Initial value) |
| OUT_SCALE | 1 EU at 100% | 300 |
| | 2 EU at 0% | –100 |
| | 3 Units Index | °C (1001)* |
| | 4 Decimal Point | 0 (Initial value) |

* Set as necessary.

## Low Cut

When a value for PV is less than or equal to the low cut value, PV value is set to “0.”

**Enabling/Disabling Low Cut**

You can specify whether to use low cut in IO_OPTS. IO_OPTS is used to specify the AI output (OUT) process. The DX/MV only supports low cut.

**Parameter for Enabling/Disabling Low Cut (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 13 | IO_OPTS | OOS |

- **IO_OPTS**
  The value is a two-byte bit sequence.

**IO_OPTS Value**

| Value | Symbol | Description |
|---|---|---|
| Bit 10 is 1 | Low Cutoff | Use low cut. |
| Bit 10 is 0 | - | Do not use low cut. |

**Setting the Low Cut Value**

**Low Cut Parameter (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 17 | LOW_CUT | All modes |

- **LOW_CUT**
  Set the low cut value to a positive value with the same engineering unit as PV or 0.

## Filter

PV is smoothed through the filter specified by PV_FTIME.

**Filter Parameter (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 18 | PV_FTIME | All modes |

- **PV_FTIME**
  Set the time constant of the first order delay filter in units of seconds.

## Actions Related to OUT Status

STATUS_OPTS specifies the actions related to Status of OUT. For details on Status, see section 5.1.

**Parameter Related to OUT Status**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 14 | STATUS_OPTS | OOS |

- **STATUS_OPTS**
  The value is a two-byte bit sequence. The correspondence between the bits and the actions are shown in the table (only the used bit are indicated). The action is enabled when the corresponding bit is set to “1.”

**STATUS_OPTS Value**

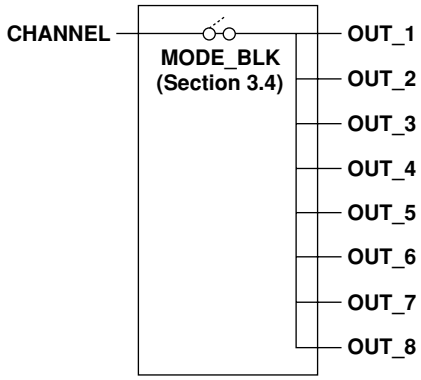
| Bit | Symbol | Description |
|---|---|---|
| 3 | Propagate Fail Forward | Even if the Status of the data from TB is “Bad, Device failure” or “Bad, Sensor failure,” the data will be passed to OUT without generating an alarm. |
| 8 | Uncertain if MAN mode | When the block mode is Man or when OUT value is changed manually, “Uncertain, Non-specific, Const” is set to the Status of OUT. |

# 3.6 Setting the Function That Outputs the Measured Data (MAI Function Block)

## Structure of MAI Function Block

The following figure shows the data process flow and the main parameters. For MODE_BLK, see section 3.4.

**MAI Function Block Parameters**




**The parameters in the framed area specifies the data process procedures.**
**The dotted lines denote options specified by the parameters.**

## Measured/Computed Data to Be Connected

The connection between the measured/computed data of the DX/MV and the transducer block is set using MAI_MAP of the transducer block. In addition, the connection between the transducer block and the MAI function block is set using CHANNEL of the MAI function block (CHANNEL used by the MAI is “9”).

### Setting the Connection between the Measured/Computed Data and the Transducer Block

**Parameter for Setting the Connection (TB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 14 | MAI_MAP | |
| | 1 MAI_MAP(OUT_1) | OOS |
| | 2 MAI_MAP(OUT_2) | OOS |
| | 3 MAI_MAP(OUT_3) | OOS |
| | 4 MAI_MAP(OUT_4) | OOS |
| | 5 MAI_MAP(OUT_5) | OOS |
| | 6 MAI_MAP(OUT_6) | OOS |
| | 7 MAI_MAP(OUT_7) | OOS |
| | 8 MAI_MAP(OUT_8) | OOS |

- **MAI_MAP(OUT_1) to MAI_MAP(OUT_8)**
  Sets the channel number of the DX/MV (1 through 60) to connect to OUT_1 to OUT_8.

### Connecting the Transducer Block and MAI

**Parameter for Setting the Connection (MAI)**

| Relative Index No. | Parameter | Value (fixed) |
|---|---|---|
| 7 | CHANNEL | 9 |

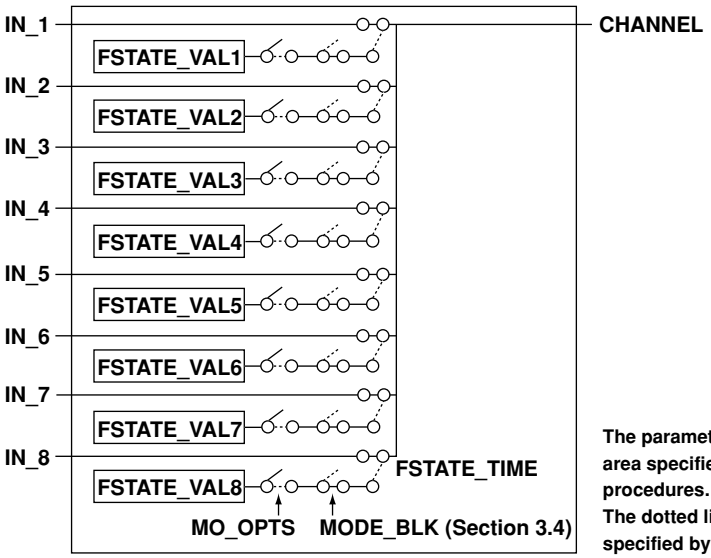
- **CHANNEL**
  The CHANNEL value for the MAI is “9.” You cannot change this value.

# 3.7 Setting the Function That Receives Measured Data (MAO Function Block)

## Structure of MAO Function Block

The following figure shows the data process flow and the main parameters. For MODE_BLK, see section 3.4.

**MAO Function Block Parameters**




**The parameters in the framed area specifies the data process procedures.**
**The dotted lines denote options specified by the parameters .**

## Communication Input Data to Be Connected (C01 to C30)

The connection between the communication input data of the DX/MV and the transducer block is set using MAO_MAP of the transducer block. In addition, the connection between the transducer block and the MAO function block is set using CHANNEL of the MAO function block (CHANNEL used by the MAO is “10”).

### Setting the Connection between the Communication Input Data and the Transducer Block

**Parameter for Setting the Connection to the Communication Input Data (TB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 15 | MAO_MAP | |
| | 1 MAO_MAP(IN_1) | OOS |
| | 2 MAO_MAP(IN_2) | OOS |
| | 3 MAO_MAP(IN_3) | OOS |
| | 4 MAO_MAP(IN_4) | OOS |
| | 5 MAO_MAP(IN_5) | OOS |
| | 6 MAO_MAP(IN_6) | OOS |
| | 7 MAO_MAP(IN_7) | OOS |
| | 8 MAO_MAP(IN_8) | OOS |

- **MAO_MAP(IN_1) to MAO_MAP(IN_8)**
  Sets the communication input data number of the DX/MV (1 through 30) to connect to IN_1 to IN_8. If you specify "0," data transfer to the communication input data is not performed.

**Connecting the Transducer Block and MAO**

**Parameter for Setting the Connection (MAO)**

| Relative Index No. | Parameter | Value (fixed) |
|---|---|---|
| 7 | CHANNEL | 10 |

- **CHANNEL**
  The CHANNEL value for the MAO is "10." You cannot change this value.

## Displaying the Communication Input Data (settings on the DX/MV)

The communication input data can be displayed on the computation channels of the DX/MV. The data is written in an equation using C01 through C12 on the DX100/MV100 and C01 through C30 on the DX200/MV200. The communication input data is in a floating-point format. However, whether the value can be used as-is (as a value with an engineering unit) depends on the device that transmitted the data. Correct the value using an equation of the DX/MV as necessary. For information on the use of the computation channel, see chapter 11 of the DX100/DX200/MV100/MV200 User's Manual.

## Output When in Fault State

When any of IN_1 to IN_8 fall into Fault State while the block mode is Auto, you can have a specified value be passed to the communication input data of the DX/MV.
Fault State refers to a condition in which the data is not updated due to a disruption in communications.

**Output When in Fault State (MAO)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 16 | MO_OPTS | All modes |
| 17 | FSTATE_TIME | All modes |
| 18 | FSTATE_VAL1 | All modes |
| 19 | FSTATE_VAL2 | All modes |
| 20 | FSTATE_VAL3 | All modes |
| 21 | FSTATE_VAL4 | All modes |
| 22 | FSTATE_VAL5 | All modes |
| 23 | FSTATE_VAL6 | All modes |
| 24 | FSTATE_VAL7 | All modes |
| 25 | FSTATE_VAL8 | All modes |
| 26 | FSTATE_STATUS | - |

- **MO_OPTS**
  Specify whether to use the function.
  The value is a two-byte bit sequence. The function corresponding to the bit that is set to “1” in the following table is activated.

**Correspondence between the Bits and Functions**

| Bit | Symbol | Description |
|---|---|---|
| 0 | Fault state to value 1 | When in Fault State, output the specified value to the connection destination of IN_1. |
| 1 | Fault state to value 2 | Same as above (for the connection destination of IN_2) |
| 2 | Fault state to value 3 | Same as above (for the connection destination of IN_3) |
| 3 | Fault state to value 4 | Same as above (for the connection destination of IN_4) |
| 4 | Fault state to value 5 | Same as above (for the connection destination of IN_5) |
| 5 | Fault state to value 6 | Same as above (for the connection destination of IN_6) |
| 6 | Fault state to value 7 | Same as above (for the connection destination of IN_7) |
| 7 | Fault state to value 8 | Same as above (for the connection destination of IN_8) |
| 8 | Use fault state to value on restart 1 | When restarting, output the specified value to the connection destination of IN_1. |
| 9 | Use fault state to value on restart 2 | Same as above (for the connection destination of IN_2) |
| 10 | Use fault state to value on restart 3 | Same as above (for the connection destination of IN_3) |
| 11 | Use fault state to value on restart 4 | Same as above (for the connection destination of IN_4) |
| 12 | Use fault state to value on restart 5 | Same as above (for the connection destination of IN_5) |
| 13 | Use fault state to value on restart 6 | Same as above (for the connection destination of IN_6) |
| 14 | Use fault state to value on restart 7 | Same as above (for the connection destination of IN_7) |
| 15 | Use fault state to value on restart 8 | Same as above (for the connection destination of IN_8) |

- **FSTATE_TIME**
  Time from the point when any of IN_1 to IN_8 of MAO becomes abnormal to the point when Fault State is entered. Set the time in units of seconds.

- **FSTATE_VAL1 to FSTATE_VAL8**
  Values written to the communication input data of the connection destination of the DX/MV when IN_1 to IN_8 of MAO enters Fault State.

- **FSTATE_STATUS (read only)**
  You can check whether IN_1 to IN_8 are in Fault State. The value is a one-byte bit sequence. Bit 0 to bit 7 correspond to IN_1 to IN_8 respectively. When the bit value is "1," the corresponding IN_x is in Fault State.

## Setting Fault State/Releasing Fault State

By setting values to the following parameters, You can set IN_1 to IN_8 to Fault State at once.

**Parameter Used to Set Fault State or Release Fault State (RB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 28 | FAULT_STATE | - |
| 29 | SET_FSTATE | All modes |
| 30 | CLR_FSTATE | All modes |

- **SET_FSTATE**
  If you specify "Set," IN_1 to IN_8 are automatically set to Fault State (regardless of the FSTATE_TIME value). When Fault State is entered, the SET_FSTATE value returns to "Off."

**SET_FSTATE Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Off | - |
| 2 | Set | Set to Fault State |

- **CLR_FSTATE**
  When you specify "Set," IN_1 to IN_8 are released from Fault State. When Fault State is released, the CLR_FSTATE value returns to "Off."

**CLR_FSTATE Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Off | - |
| 2 | Set | Release Fault State |

- **FAULT_STATE**
  You can check whether Fault State is active (read only).

**FAULT_STATE Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Clear | Not Fault State |
| 2 | Active | Fault State |

# 3.8 Setting the Trend Function (Trend Object)

## Setting the VCR and Link Object

You must set the link object and the corresponding VCR to transmit the trend. For setting the link object and VCR, see section 3.11.

## Setting the Trend Object

The DX/MV has eight Trend Objects (index numbers 32000 to 32007). Set the following four parameters for the trend object to be used.

**Trend Object Parameter (Trend Object)**

| Index No. | Parameter | |
|---|---|---|
| 32000 to 62007 | Trend Float | |
| | **Sub index No.** | **Sub parameter** |
| | 1 | Block Index |
| | 2 | Relative Index |
| | 3 | Sample Type |
| | 4 | Sample Interval |

- **Block Index**
  Specify the first index number of the block with the parameter for transmitting the trend.

- **Relative Index**
  Specify the relative index number of the parameter that is to transmit the trend.

- **Sample Type**
  Specify the trend sample type using any of the following values.

**Sample Type value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Sample value at a time of execution | Instantaneous value. |
| 2 | Average value used between the times the value is sampled | Average value. |

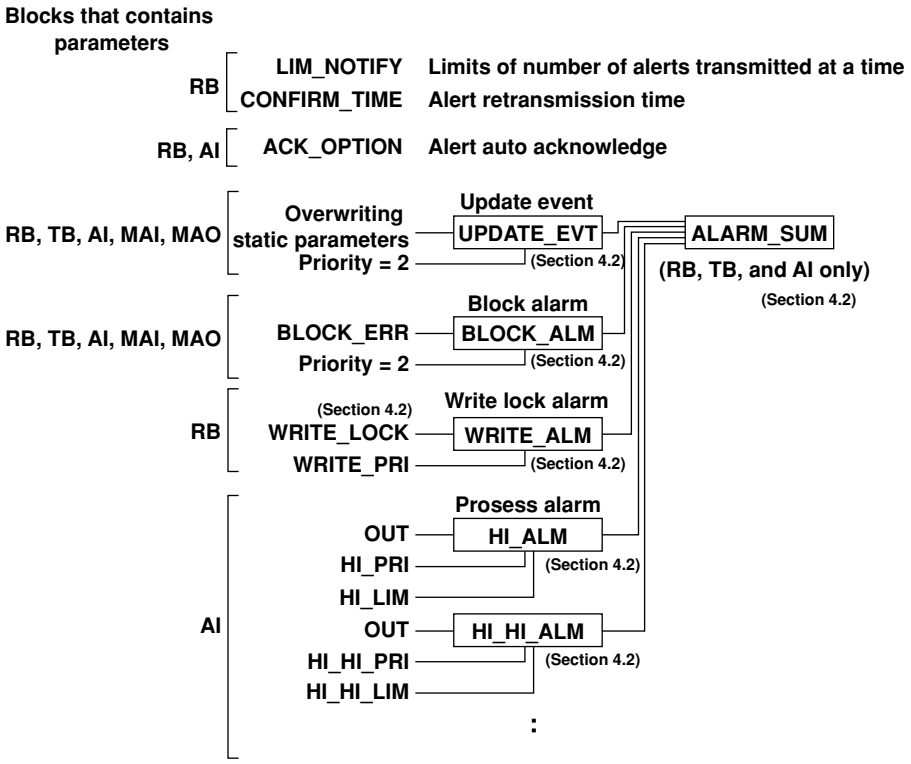
- **Sample Interval**
  Set the sampling interval of the trend in units of 1/32 ms. This value must be an integer multiple of the Period of Execution of the function block.

# 3.9 Setting the Function That Transmits Alerts

## Parameters Related to Alert

The following figure shows the parameters related to alert. For BLOCK_ERR, see section 5.2. For WRITE_LOCK, see section 3.10. For ALARM_SUM, UPDATE_EVT, BLOCK_ALM, WRITE_ALM, HI_ALM, HI_HI_ALM, etc., see section 4.2. Alert status transition is explained in section 4.2.

**Parameters Related to Alert**




## Setting the VCR and Link Object

You must set the link object and the corresponding VCR to use the function that transmits alerts. For setting the link object and VCR, see section 3.11.

## Process Alarm (AI function block)

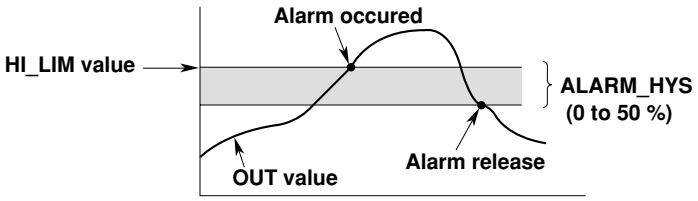
You can set HI, HI_HI, LO, and LO_LO alarms for the OUT value. An explanation of the HI alarm is given below. Other alarms can be specified in a similar fashion.

**HI alarm parameter (AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 24 | ALARM_HYS | All modes |
| 27 | HI_PRI | All modes |
| 28 | HI_LIM | All modes |

- **ALARM_HYS**
  Set the hysteresis for determining the alarm release in the range 0 to 50% of the span of the OUT value. Use the unit of %. This value applies to all process alarms of the particular block.

**HI alarm**




- **HI_PRI**
  Set the value to 0, 1, or 3 to 15. Transmission with a higher number is prioritized. The value “2” is reserved for block alarm and update event and cannot be used. See “Alert Priority” below.

- **HI_LIM**
  Set the alarm value using a value with the same engineering unit as the OUT value.

## Alert Priority

The following table shows the alert priority value and the corresponding actions.

**Alert Priority**

| Prioroty*1 | Value | Type of alert | Transmission | Parameter values*4 |
|---|---|---|---|---|
| Low | 0 | No alert | Not | No change |
| | 1 | | | Partially changed |
| | 2 | Diagnostic alert *2 | Transmittted | Overwritten by the newest alert |
| | 3 : 7 | Alert caused by advisory alarm *3 | | |
| High | 8 : 15 | Alert caused by critical alarm *3 | | |

*1 Transmission with a higher number is prioritized.
*2 The priority of the block alarm (BLOCK_ALM) and update event (UPDATE_EVT) is fixed to “2.”
*3 Status of I/O data indicates information on “advisory alarm” and “critical alarm.”
*4 Indicates if the values of the following parameters are updated or not.
ALARM_SUM, BLOCK_ALM, WRITE_ALM, HI_ALM, HI_HI_ALM, LO_ALM, LO_LO_ALM, and UPDATE_EVT

For setting the priority of process alarms (HI_ALM, HI_HI_ALM, LO_ALM, and LO_LO_ALM), see “Process Alarm (AI function block).”

**Setting the Priority of the Write Lock Alarm (WRITE_LOCK)**
The write lock alarm is transmitted when write lock is specified or released through the WRITE_LOCK parameter.

**Priority Parameter of the Write Lock Alarm (RB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 39 | WRITE_PRI | All modes |

- **WRITE_PRI**
  Set the value to 0, 1, or 3 to 15. The value “2” is reserved for block alarm and update event and cannot be used.

## Limit on the Number of Alerts to Be Transmitted

LIM_NOTIFY in the resource block is used to limit the number of alerts that can be transmitted simultaneously.

**Parameter for Limiting the Number of Alerts That Are Transmitted simultaneously (RB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 32 | LIM_NOTIFY | All modes |

- **LIM_NOTIFY**
  The maximum number of alerts that can be transmitted simultaneously is set using MAX_NOTIFY (resource block, relative index number 31). It is set to “3” on the DX/MV. You can specify a value that is less than or equal to 3 for LIM_NOTIFY.

***Note***

If you set “0” to LIM_NOTIFY, no alert is transmitted.

## Alert Retransmission Time

The alert is retransmitted when there is no confirm message from the host in response to the alert transmission. Set the time until the alert is retransmitted using CONFIRM_TIME in the resource block.

**Alarm Retransmission Time Parameter (RB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 33 | CONFIRM_TIME | All modes |

- **CONFIRM_TIME**
  Set the time from the point when an alert is transmitted until it is retransmitted in units of 1/32 ms. If you specify “0,” alert retransmission is disabled.

## Settings to Disable Alerts

You can disable the generation of alarms from the resource block, transducer block, and AI function block. Use the Disabled parameter of ALARM_SUM.

**Parameter for Disabling Alarms (RB, TB, and AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| RB: 37 | ALARM_SUM | |
| TB: 16 | 1 Current | - |
| AI: 22 | 2 Unacknowledged | - |
| | 3 Unreported | - |
| | 4 Disabled | All modes |

- **Disabled**
  The value is a two-byte bit sequence. Set the bit corresponding to the alarm to be disabled to “1.” The correspondence between the bits and alarms are as follows:

**Disabled Value**

| Bit | Symbol | Description |
|---|---|---|
| 0 | Discrete alarm disabled | Write lock alarm |
| 1 | High high alarm disabled | HI_HI alarm |
| 2 | High alarm disabled | HI alarm |
| 3 | Low low alarm disabled | LO_LO alarm |
| 4 | Low alarm disabled | LO alarm |
| 5 | - | Not used |
| 6 | - | Not used |
| 7 | Block alarm disabled | Block alarm |
| 8 to 15 | - | (Reserved) |

## Alert Auto Acknowledge

You can have the alert automatically acknowledged even if there is no acknowledge from the host in response to the alert transmission.

**Alert Auto Acknowledge Parameter (RB and AI)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| RB: 38<br>AI: 23 | ACK_OPTION | All modes |

- **ACK_OPTION**
  The value is a two-byte bit sequence. The alert corresponding to the bit that is set to “1” is automatically acknowledged.

**ACK_OPTION Value**

| Bit | Symbol | Description |
|---|---|---|
| 0 | Discrete alarm | Write lock alarm |
| 1 | High high alarm | HI_HI alarm |
| 2 | High alarm | HI alarm |
| 3 | Low low alarm | LO_LO alarm |
| 4 | Low alarm | LO alarm |
| 5 | - | Not used |
| 6 | - | Not used |
| 7 | Block alarm | Block alarm |
| 8 to 15 | - | (Reserved) |

# 3.10 Prohibiting Writing to Parameters

You can prohibit writing to all static parameters of RB, TB, AI, MAI, and MAO. The applicable parameters are those with "/S (Static)" attribute in appendix 2. The WRITE_LOCK parameter is not applicable.

**Parameter for Prohibiting Writing to Parameters (RB)**

| Relative Index No. | Parameter | Write Mode |
|---|---|---|
| 34 | WRITE_LOCK | All modes |

- **WRITE_LOCK**
  Set using the following values.

**WRITE_LOCK Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Unlocked | Allow writing |
| 2 | Locked | Prohibit writing |

# 3.11 Setting the Communications between Function Blocks (Link Object and Virtual Communication Relationship)

You must set the link object and virtual communication relationship to perform data exchange between function blocks and transmission of alerts and trends. Setting the parameters of the link object and virtual communication relationship for each parameter individually can lead to contradictions in the operation. Thus, change the link object and virtual communication relationship per communication path collectively (the parameters of the link object and virtual communication relationship are set automatically by the configurator you use in most cases).
A brief explanation of the parameters of the link object and virtual communication relationship is given below. For further information on parameters, see the specifications issued by the Fieldbus Foundation.

## Setting the Link Object

**Link Object Parameter (Link Object)**

| Index No. | Parameter | |
|---|---|---|
| 30000 to 30025 | FB Link | |
| | **Sub index No.** | **Sub parameter** |
| | 1 | Local Index |
| | 2 | VCR Number |
| | 3 | Remote Index |
| | 4 | Service Operation |
| | 5 | Stale Count Limit |

**Local Index**
The index number of the parameter to be published or subscribed. The value is “0,” when Service Operation is set to some operation other than Publisher or Subscriber.

**VCR Number**
The index number of VCR_STATIC_ENTRY of the VCR to be used. The same type of VCR as the service specified by Service Operation is used.

**Remote Index**
The index number of the parameter to be subscribed. The value is “0,” when Service Operation is set to some operation other than Subscriber.

**Service Operation**
The value indicates the service to be used (2: Publisher, 3: Subscriber, 5: Server, 6: Alert, 7: Trend). If the link object is not to be used, the value is “0.”

**Stale Count Limit**
This is the upper limit of communication attempts* during which the value is held when the parameter cannot be subscribed continuously, in the case of subscriber communication. When this limit is exceeded, the Status of the subscribed parameter is set to Bad. The value to “0,” when Service Operation is set to some operation other than Subscriber.

* To avoid oversensitive transition of Status, we recommend that you set Stale Count Limit to a value greater than or equal to 2.

## Setting the Virtual Communication Relationship (VCR)

There are 31 virtual communication relationships on the DX/MV. The VCR is set using VCR_STATIC_ENTRY. VCR_STATIC_ENTRY 1 (index No. 293) is for system use and cannot be altered. An explanation of the VCR_STATIC_ENTRY 2 to 31 (index No. 294 to 323) is given below.

**Virtual Communication Relationship Parameter (MIB)**

| Index No. | Parameter |
|---|---|
| 294 to 323 | VCR_STATIC_ENTRY.2 to VCR_STATIC_ENTRY.31 |
| | 1 Fas Ar Type and Role |
| | 2 Fas Dll Local Addr |
| | 3 Fas Dll Configured Remote Addr |
| | 4 Fas Dll SDAP |
| | 5 Fas Dll Max Confirm on Connect |
| | 6 Fas Max Confirm on Data |
| | 7 Fas Dll Max Dlsdu Size |
| | 8 Fas Dll Residual Activity Supported |
| | 9 Fas Dll Timeliness Class |
| | 10 Fas Dll Publisher Time Window Size |
| | 11 Fas Dll Publisher Synchronizing Dlcep |
| | 12 Fas Dll Subscriber Time Window Size |
| | 13 Fas Dll Subscriber Synchronizing Dlcep |
| | 14 Fms Vfd Id |
| | 15 Fms Max Outstanding Service Calling |
| | 16 Fms Max Outstanding Service Called |
| | 17 Fms Features Supported |

In the explanation below, the first number of the items is the subindex number.

**1. Fas Ar Type and Role**

Type of VCR (Server, Source, Publisher, Subscriber) to be used. The value is a hexadecimal. When the VCR is not used, the value is “0.”

**2. Fas Dll Local Addr**

Address used to specify the access point within the DX/MV (DLSAP address or DLCEP address).

DLSAP: Data Link Service Access point

DLCEP: Data Link Connection End point

**3. Fas Dll Configured Remote Addr**

Address used to specify the access point of the device to communicate with (DLSAP address or DLCEP address). The addresses of subindex 2 and 3 must be set to the same setting (local and remote is reversed) with the VCR of the remote device.

**4. Fas Dll SDAP**

Communication features. The value is a hexadecimal and varies depending on the communication types (Server, Source (Alert), Source (Trend), Publisher/Subscriber).

SDAP: Scheduled, Data Delivery Feature, Authentication, Priority

**5. Fas Dll Max Confirm Delay on Connect**

Maximum time for waiting for the response from the remote device when establishing connection. The unit is ms.

**6. Fas Dll Max Confirm Delay on Data**

Maximum time for waiting for confirmation by the remote device in response to a data request. The unit is ms.

**7. Fas Dll Max Dlsdu Size**

Maximum size of the data section. The unit is bytes. The value 256 is set for Server and Trend VCRs, and 64, for other VCRs (The value is determined by the value of Priority of Fas Dll SDAP).

Dlsdu: Data Link Service Data Unit

**8. Fas Dll Residual Activity Supported**

Specifies whether to monitor the connection. Specify true (0xff, monitor) for Server. This parameter is not used for other types of communications.

**9. Fas Dll Timeliness Class**

Not used on the DX/MV.

**10.Fas Dll Publisher Time Window Size**

Not used on the DX/MV.

**11.Fas Dll Publisher Synchronizing Dlcep**

Not used on the DX/MV.

**12.Fas Dll Subscriber Time Window Size**

Not used on the DX/MV.

**13.Fas Dll Subscriber Synchronizing Dlcep**

Not used on the DX/MV.

**14.Fms Vfd Id**

Indicates the virtual field device (VFD) of the DX/MV to be used. Management Information Base VFD (the value is “0x1”) or Function Block VFD (the value is “0x1234”) is specified.

**15.Fms Max Outstanding Service Calling**

The value is “0” (integer) when the VCR type is Server. This parameter is not used for other types of communications.

**16.Fms Max Outstanding Service Called**

The value is “1” (integer) when the VCR type is Server. This parameter is not used for other types of communications.

**17.Fms Features Supported**

Indicates the type of service on application layer. This value is automatically set according to the application.

# 3.12 Setting the Schedule of Function Blocks

The function blocks must be executed in sync with the other blocks or the communication schedule. The following parameters are used to set the schedule.

**Schedule Parameters (MIB)**

| Index No. | Parameter |
|---|---|
| 269 | MACRO_CYCLE_DURATION |
| 276 | FB_START_ENTRY.1 |
| | 1 Start Time Offset |
| | 2 Fb Object Index |
| 277 | FB_START_ENTRY.2 |
| : | : |
| 285 | FB_START_ENTRY.10 |

- **MACRO_CYCLE_DURATION**
  The control period of the device. The unit is 1/32 ms.

The following parameters are common to FB_START_ENTRYs of index numbers 276 to 285.

- **Start Time Offset**
  The time when the function block specified by Fb Object Index is started. It is an offset time from the start time of the macro cycle. The unit is 1/32 ms.

- **Fb Object Index**
  First index umber of the applicable function block.

# 3.13 Specifying Link Master Device or Basic Device

Specify whether the DX/MV is to be a link master device or a basic device.

**Parameter for Specifying Link Master Device or Basic Device (MIB)**

| Index No. | Parameter |
|---|---|
| 367 | BOOT_OPERAT_FUNCTIONAL_CLASS |

- **BOOT_OPERAT_FUNCTIONAL_CLASS**

**BOOT_OPERAT_FUNCTIONAL_CLASS Value**

| Value | Symbol | Description |
|---|---|---|
| 1 | Basic | Basic device. |
| 2 | Link Master | Link master device. |

***Note***

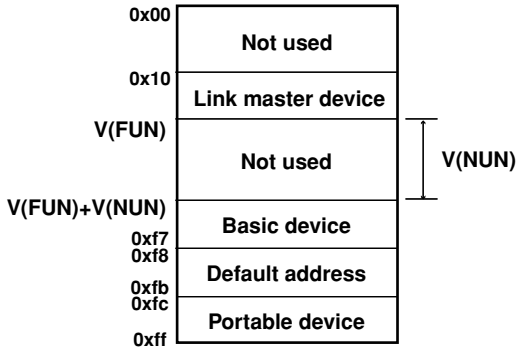
- The DX/MV starts as the device specified by BOOT_OPERAT_FUNCTIONAL_CLASS, when restarting the DX/MV by either operation below after the above setting is completed.
  - Turnig OFF and ON the power.
  - Writing the value “4” (restart processor, the DX/MV automatically restarts) to RESTART parameter (see page App-13).
- When set to link master device, you must set the performance as a scheduler.

# 3.14 Setting the Node Address Range to Be Used (Link Master Function)

## Node Address Range to Be Used

The node address is used to specify a device during communication. In a fieldbus network, the address range of devices is defined as shown in the following figure.

**Node Address Range**




V(FUN) and V(NUN) are values for First Unpolled Node Id and Number of Consecutive Unpolled Node Id, respectively.

The range that can be specified for the devices is 16 through 247 (10 through f7 in hexadecimal notation). Normally, link master devices are assigned smaller address and basic devices are assigned larger address.
The following parameter is used to set the address range that is not used.

**Parameter for Setting the Address Range (MIB)**

| Index No. | Parameter |
|---|---|
| 369 | CONFIGURED_LINK_SETTING_RECORD |
| | 4 First Unpolled Node Id |
| | 7 Number of Consecutive Unpolled Node Id |

- **First Unpolled Node Id**
  Indicates the first address of the address range that the link master device does not use. Set an address from 20 to 247 (14 to f7 in hexadecimal notation).

- **Number of Consecutive Unpolled Node Id**
  Number of addresses that are not used.

The address range to be used is 10 to (V(FUN) –1)) and (V(FUN) + V(NUN)) to f7 in hexadecimal notation.
Devices that have addresses in the address range that is not used cannot participate in the fieldbus. All other address ranges are periodically checked to find new devices that are connected. To lighten the communication load of the fieldbus, keep the address range to be used small.

# 3.15 Setting the Operating Conditions of Communications (Link Master Function)

Set the following parameters.

**Communication Parameter (MIB)**

| Index No. | Parameter |
|---|---|
| 369 | CONFIGURED_LINK_SETTING_RECORD |
| | 1 Slot Time |
| | 3 Max Response Delay |
| | 6 Min Inter Pdu Delay |

Pdu: Protocol Data Unit

- **Slot Time**
  Slot Time indicates the time necessary for an immediate reply of the device. The unit is octet time (256 μs).
  Set the worst case value, that is, the maximum value among the capability values of Slot Time of all devices. The DX/MV's capability value is "4."

- **Min Inter Pdu Delay**
  Min Inter Pdu Delay indicates the minimum time interval the device becomes ready to reply after receiving an command. The unit is octet time (256 μs).
  Set the worst case value, that is, the maximum value among the capability values of Min Inter Pdu Delay of all devices. The DX/MV's capability value is "4."

- **Max Response Delay**
  Max Response Delay indicates the maximum time interval the device transmits an response after receiving an command. The unit is Slot Time.
  Set the worst case value, that is, the maximum value among the capability values of Max Response Delay of all devices. The DX/MV's capability value of is "3."

**Example**

Take the capability value* of each device to be as shown in the following table.

* The capability value can be confirmed by referring to the DLME_BASIC_INFO parameter (index number 361 (MIB) for the DX/MV).

**Device's Capability Value (DLME_BASIC_INFO. Bold numbers represent the worst case value.)**

| Parameter | DX/MV | Device 1 | Device 2 | Device 3 |
|---|---|---|---|---|
| 1 Slot Time | 4 | 8 | 10 | **20** |
| 3 Max Response Delay | 3 | **6** | 3 | 5 |
| 6 Min Inter Pdu Delay | 4 | 8 | **12** | 10 |

Set the values as follows for the DX/MV.

**Settings for the DX/MV (CONFIGURED_LINK_SETTING_RECORD)**

| Parameter | Settings on the DX/MV |
|---|---|
| 1 Slot Time | 20 |
| 3 Max Response Delay | 6 |
| 6 Min Inter Pdu Delay | 12 |

# 4.1 Starting the Operation and Operations on the Host and the DX/MV

## Operations on the Host

Running operations are carried out on the host. See the user's manual of the host that you are using.
This chapter explains the relevant parameters to start running operations, check the alert, and use the simulation function of the AI function block.

**Checking Alert and I/O Data Conditions**

- **Process Alarm, Block Alarm Conditions**
  Indicated by corresponding parameters. See section 4.2.
- **I/O Data Conditions**
  Indicated by Status of I/O parameters. See section 5.1.

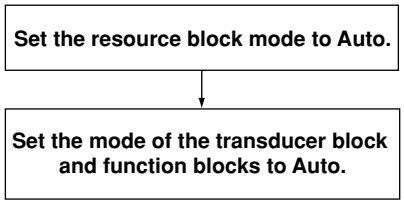
## Operations on the DX/MV

On the DX/MV, you can check the Status of the data received from other devices at the MAO function block on the FIELDBUS DATA screen. See section 4.4.
For operations of the DX/MV other than the FIELDBUS DATA screen, see the DX100/DX200/MV100/MV200 User's Manual.

## Starting the Operation

Start the operation according to the following steps.

**Steps to start operation**




**Setting the Resource Block Mode**

1. Set the resource block mode to Auto. If the resource block is not set to Auto, the resources controlled by the resource block cannot be used and other blocks cannot shift to modes other than OOS.
   For the procedure in changing the mode, see section 3.4.

**Setting the Mode of the Transducer Block and Function Blocks**

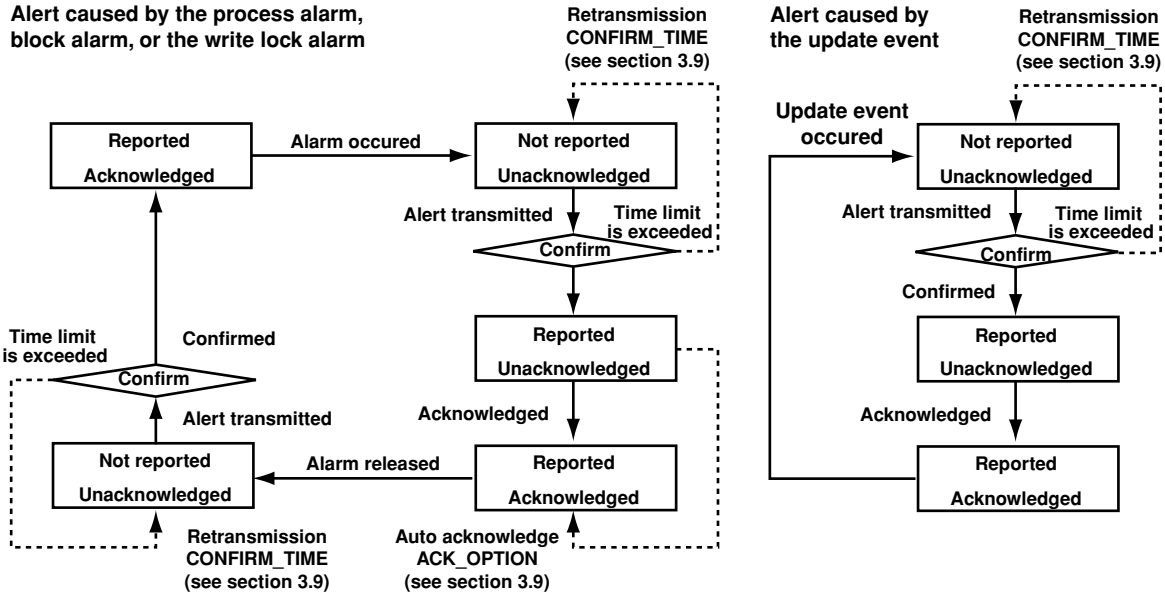
2. Set the mode of the transducer block, AI, MAI, and MAO function blocks to Auto.
   For the procedure in changing the mode, see section 3.4.

# 4.2 Handling Alerts

## Transmitting Responses

When an alert message is received, the host should return an response message. The DX/MV retransmits the alert until the confirm message from the host is received (see section 3.9). The alert status transits as shown in the figure below. You can check the alert status by the parameters explained here. If alarms or update events occur before the alert status cycle completes, the parameters are overwritten by the newest alarm or update event status.

**Alert Status Transition**




## Checking the State of the Process Alarm (AI)

The alarm state of HI, HI_HI, LO, and LO_LO alarms can be checked through the following parameter. Enclosed in parentheses is the relative index number.
HI alarm: HI_ALM (34), HI_HI alarm: HI_HI_ALM (33)
LO alarm: LO_ALM (35), LO_LO alarm: LO_LO_ALM (36)

The HI_ALM is explained here. Other alarms can be checked in a similar fashion.

**HI Alarm Parameter (AI)**

| Relative Index | Parameter | Description (Value: Symbol) |
|---|---|---|
| 34 | HI_ALM | |
| | 1 Unacknowledged | Presence or absence of an acknowledge message<br>1: Acknowledged (can be written)<br>2: Unacknowledged |
| | 2 Alarm State | Alarm state<br>1: Clear-reported (Alarm release transmitted)<br>2: Clear-not reported (Waiting to transmit alarm release)<br>3: Active-reported (Alarm occurrence transmitted)<br>4: Active-not reported (Waiting to transmit alarm occurrence) |
| | 3 Time Stamp | Time when the alarm was detected |
| | 4 Subcode | Not used |
| | 5 Value | OUT value when the alarm occurred |

## Checking the State of the Block Alarm (RB, TB, AI, MAI, MAO)

### Checking the Alarm State

You can check the block alarm state through BLOCK_ALM of each block.

**Block Alarm Parameter (RB, TB, AI, MAI, and MAO)**

| Relative Index | Parameter | Description (Value: Symbol) |
|---|---|---|
| RB: 36 | BLOCK_ALM | |
| TB: 8<br>AI: 21<br>MAI: 17 | 1 Unacknowledged | Presence or absence of an acknowledge message<br>1: Acknowledged (can be written)<br>2: Unacknowledged |
| MAO: 28 | 2 Alarm State | Alarm state<br>1: Clear-reported (Alarm release transmitted)<br>2: Clear-not reported (Waiting to transmit alarm release)<br>3: Active-reported (Alarm occurrence transmitted)<br>4: Active-not reported (Waiting to transmit alarm occurrence) |
| | 3 Time Stamp | Time when the alarm was detected |
| | 4 Subcode | BLOCK_ERR value |
| | 5 Value | Not used |

### Checking the Alarm Information

You can check the alarm information through the BLOCK_ERR value of each block. For details on the BLOCK_ERR values, see section 5.2.

**Parameter Indicating the Block Alarm Information (RB, TB, AI, MAI, and MAO)**

| Relative Index | Parameter |
|---|---|
| 6 | BLOCK_ERR |

## Checking the State of the Write Lock Alarm

You can check the state of the write lock alarm through WRITE_ALM of the resource block.

**Write Lock Alarm Parameter (RB)**

| Relative Index | Parameter | Description (Value: Symbol) |
|---|---|---|
| 40 | WRITE_ALM | |
| | 1 Unacknowledged | Presence or absence of an acknowledge message<br>1: Acknowledged (can be written)<br>2: Unacknowledged |
| | 2 Update State | Write lock alarm state<br>1: Clear-reported (Write lock release transmitted)<br>2: Clear-not reported (Waiting to transmit write lock release)<br>3: Active-reported (Write lock enable transmitted)<br>4: Active-not reported (Waiting to transmit write lock enable) |
| | 3 Time Stamp | Time when the write lock alarm occurred |
| | 4 Subcode | Not used |
| | 5 Value | WRITE_LOCK value when the write lock alarm occurred |

## Checking the State of the Update Event

You can check the state of the update event through UPDATE_EVT of each block. While the block mode is OOS (the value of Actual of MODE_BLK is OOS), no alert will be transmitted even if the parameters are written. The retained alert will be transmitted when the block goes out of OOS mode.

**Update Event Parameter (RB, TB, AI, MAI, and MAO)**

| Relative Index | Parameter | Description (Value: Symbol) |
|---|---|---|
| RB: 35 | UPDATE_EVT | |
| TB: 7<br>AI: 20<br>MAI: 16 | 1 Unacknowledged | Presence or absence of an acknowledge message<br>1: Acknowledged (can be written)<br>2: Unacknowledged |
| MAO: 27 | 2 Update State | Update event state<br>1: Update-reported (Update event transmitted)<br>2: Update-not reported (Waiting to transmit update event) |
| | 3 Time Stamp | Time when the update event occurred |
| | 4 Static Revision | Revision value of the static parameter when the update event occurred (ST_REV value) |
| | 5 Relative Index | Relative index number of the updated parameter. However, the value is set to 0 when an update event occurs as a result of updating multiple parameters simultaneously. |

## Checking through the Alarm Summary

You can check the state of all the alarms of the RB, TB, or AI function block through ALARM_SUM of each block.

**Alarm Summary Parameter (RB, TB, and AI)**

| Relative Index | Parameter | Description (Value: Symbol) |
|---|---|---|
| RB: 37 | ALARM_SUM | |
| TB: 16 | 1 Current | Indicates the alarm that is currently occurring |
| AI: 22 | 2 Unacknowledged | Indicates the alarms that have not received an acknowledge message from the host in response to the alarm transmission |
| | 3 Unreported | Indicates the alarms which have not been transmitted |
| | 4 Disabled | Sets whether to generate the alarm (see section 3.9) |

The alarm type is indicated using a two-byte bit sequence. The alarm corresponding to the bit that is set to “1” is the alarm that meets the above conditions.

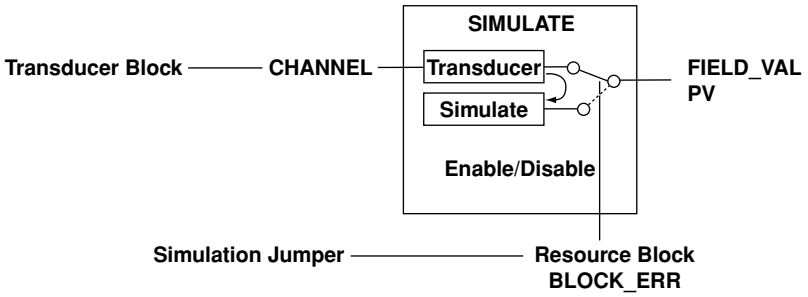
**ALARM_SUM Value**

| Bit | Symbol | Description |
|---|---|---|
| 0 | Discrete alarm | Write lock alarm |
| 1 | High high alarm | HI_HI alarm |
| 2 | High alarm | HI alarm |
| 3 | Low low alarm | LO_LO alarm |
| 4 | Low alarm | LO alarm |
| 5 | - | Not used |
| 6 | - | Not used |
| 7 | Block alarm | Block alarm |
| 8 to 15 | - | (Reserved) |

# 4.3 Using the Simulation Function (AI Function Block)

The AI function block is capable of outputting a manually specified value in place of the actual value from the sensor.
When the simulation function is not in use, the value received from the transducer block is transmitted to FIELD_VAL and PV through SIMULATE.

**SIMULATE Parameter**






## Turning ON the Simulation Jumper

To use the simulation function, turn ON the Simulation Jumper. A block alarm is generated from the resource block (Simulate Active (bit 3) of the BLOCK_ERR parameter is set to "1") and the simulation function is enabled.
There are two methods in turning ON the Simulation Jumper.

**Turning ON the SimEnable Terminal**

Short the SimEnable terminal on the rear panel of the DX/MV and the FG terminal. For details on the SimEnable terminal, see section 2.2.

**Using the SIM_ENABLE_MSG Parameter**

**Parameter for Turning ON the Simulation Jumper (RB)**

| Relative Index | Parameter | Write Mode |
|---|---|---|
| 44 | SIM_ENABLE_MSG | All modes |

Specifying "REMOTE_LOOP_TEST_SWITCH" (all capitals, "_" indicates a space) to this parameter turns ON the Simulation Jumper. However, this setting is lost when the power is turned OFF.

## Outputting Simulation Values

### Setting Whether to Output Simulation Values

Set whether to output simulation values through Enable/Disable of SIMULATE of the AI function block.

**Parameter for Setting the Simulation (AI)**

| Relative Index | Parameter | Description (Value: Meaning) |
|---|---|---|
| 9 | SIMULATE | |
| | 1 Simulate Status | Status value* when simulation is enabled |
| | 2 Simulate Value | Process value when simulation is enabled |
| | 3 Transducer Status | Status value* from the transducer block.<br>You cannot change this value. |
| | 4 Transducer Value | Process value from the transducer block.<br>You cannot change this value. |
| | 5 Enable/Disable | Controls the enable/disable of the simulation<br>1: Simulation disabled<br>2: Simulation enabled |

* For details on the status values, see section 5.1.

### Setting the Simulation Value

Simulation value is set through SIMULATE of the AI function block. The relationship between the specified simulation value and the output value is expressed by the equation given in “Process Procedure of the Measured/Computed Data” in section 3.5.

***Note***

- The specified simulation value can only be output when the simulation jumper is ON and Enable/Disable of SIMULATE is set to “Active” (Enable, the value is “2”). If this condition is not satisfied, the value from the transducer block is output.
- When the simulation function is not used, the values from the transducer block are copied to Simulation Value and Simulation Status.

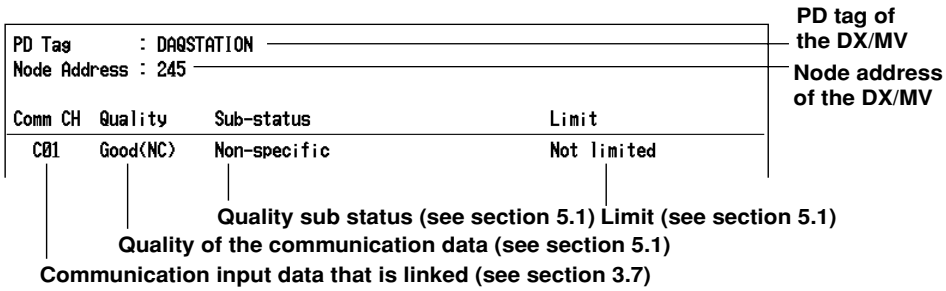
# 4.4 Checking the Status of the Communication Input Data

The PD tag, node address, and the status of the process value that the MAO function block of the DX/MV has retrieved from the fieldbus can be confirmed on the FIELDBUS DATA screen of the DX/MV.

## FIELDBUS DATA Screen

For the items displayed at Quality, Sub-status, and Limit and their meanings, see “Status of IN_1 through IN_8 (MAO)” in section 5.1.

**FIELDBUS DATA Screen**




## Procedure in Displaying the Status Screen

1. Press the FUNC key. The FUNC menu appears.
2. Press the Fieldbus soft key. The FIELDBUS DATA screen appears.

# 5.1 Handling the I/O Status

When correct data are not displayed on the DX/MV or the host, the cause can be identified by checking the data processing process one by one in the reverse order to the publisher. In that case, Status of I/O parameters has useful information. For how to use Status of I/O parameters, see an example on the latter part of this section.

## I/O Parameter Status

### Applicable Parameters

The following parameters have two values, Status and Value.

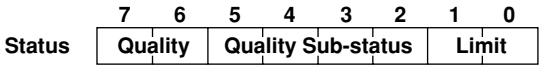
**Parameters That Have Status and Value**

| Parameter | Description |
|---|---|
| PV | AI-1 through AI-8 function blocks |
| OUT | AI-1 through AI-8 function blocks |
| SIMULATE | AI-1 through AI-8 function blocks<br>The following parameters of SIMULATE<br>• Simulate Status, Simulate Value<br>• Transducer Status, Transducer Value |
| FIELD_VAL | AI-1 through AI-8 function blocks |
| OUT_1 to OUT_8 | MAI function block |
| IN_1 to IN_8 | MAO function block |

### Status Structure

Status consists of Quality, Quality Sub-status, and Limit. It indicates the status of Value. Status uses the 8 bits as shown in the following figure.

**Status Structure**




### Value and Meaning of Quality and Quality Sub-status

Quality and Quality Sub-status have the following values and meanings. The values and meanings that the I/O parameters of the DX/MV can have, and corrective action to them, see pages 5-4 and 5-5.

**Quality and Quality Sub-status (when the quality value is "0.")**

| Quality Value | Quality Indication (Top Row) and Meaning (Bottom Row) | |
|---|---|---|
| 0 | Bad<br>Value is invalid. | |
| | **Sub-status Value** | **Sub-status Indication (Top) and Meaning (Bottom)** |
| | 0 | Non-specific<br>The cause cannot be determined. |
| | 1 | Configuration Error<br>A problem exists in the FB. |
| | 2 | Not Connected<br>No connection to the input. |
| | 3 | Device Failure<br>The value is influenced by device failure. |
| | 4 | Sensor Failure<br>The value has exceeded the limits of the device. |
| | 5 | No communication, with last usable value<br>Failed to communicate the value. |
| | 6 | No communication, with no usable value<br>No value has been communicated after the last OOS. |
| | 7 | Out of Service<br>The value is unreliable because the FB is not operating. |

### Quality and Quality Sub-status (when the quality value is "1.")

| Quality Value | Quality Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 1 | Uncertain<br>The quality of Value is inferior as compared to the normal case, but it may be used. |

| Sub-status Value | Sub-status Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 0 | Non-specific<br>The cause cannot be determined. |
| 1 | Last Usable Value*<br>The remote device that was writing the value stopped the operation. |
| 2 | Substitute<br>The value was written when the FB was not OOS. |
| 3 | Initial Value<br>The input has not changed since the value was written when the FB was OOS. |
| 4 | Sensor Conversion not Accurate<br>The value has exceeded the limits of the sensor or the precision of the sensor is not appropriate. |
| 5 | Engineering Unit Range Violation<br>The value has exceeded the range of values that has been defined with an engineering unit. |
| 6 | Sub-normal<br>Value that has been generated without the required number of information. |

* This occurs when the input is disconnected by the configurator.

### Quality and Quality Sub-status (when the quality value is "2.")

| Quality Value | Quality Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 2 | Good (Non-Cascade)<br>Value is invalid. |

| Sub-status Value | Sub-status Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 0 | Non-specific<br>The cause cannot be determined. |
| 1 | Active Block Alarm<br>An active block alarm exists. |
| 2 | Active Advisory Alarm<br>An alarm with a priority less than 8 is occurring. |
| 3 | Active Critical Alarm<br>An alarm with a priority greater than or equal to 8 is occurring. |
| 4 | Unacknowledged Block Alarm<br>A block alarm that has not received an acknowledge message from the host exists. |
| 5 | Unacknowledged Advisory Alarm<br>An alarm with a priority less than 8 that has not received an acknowledge from the host exists. |
| 6 | Unacknowledged Critical Alarm<br>An alarm with a priority greater than or equal to 8 that has not received an acknowledge from the host exists. |

### Quality and Quality Sub-status (when the quality value is “3.”)

| Quality Value | Quality Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 3 | Good (Cascade)<br>Value is valid and can be used for control. |

| Sub-status Value | Sub-status Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 0 | Non-specific<br>The cause cannot be determined. |
| 1 | Initialization Acknowledged (IA)<br>The value is set to the initial value on the source side. |
| 2 | Initialization Request (IR)*<br>The value is set to the initial value on the source side. |
| 3 | Not Invited (NI)<br>Value from the FB that is not looping back this input. |
| 4 | Not Selected (NS)<br>Value from the selected Control Selector that is not looping back this input. |
| 5 | Reserved |
| 6 | Local Override (LO)<br>Value that has been overwritten by the internal logic of the FB. |
| 7 | Fault State Active (FSA)<br>Value from the FB of which Fault State is Active. |
| 8 | Initial Fault State (IFS)<br>Value from the FB that is requesting the FB on the data receiving side to become "Fault State." |

* This occurs when the downstream side of the control loop is disconnected.

### Value and Meaning of Limit

#### Limit

| Limit Value | Limit Indication (Top Row) and Meaning (Bottom Row) |
|---|---|
| 0 | Not limited<br>The value can change freely. |
| 1 | Low limited<br>There is a lower limit placed on the value. |
| 2 | High limited<br>There is an upper limit placed on the value. |
| 3 | Constant (high and low limited)<br>The value cannot change. |

## OUT (AI) Status and Corrective Actions

| Quality | Sub status | Limit | Cause | Corrective Action/Reference Section |
|---|---|---|---|---|
| Bad | Non-specific | Not limited | The connected channel is not correct. | Check AI_MAP value (section 3.5), or see chapter 5 or 11 of the DX/MV's User's Manual. |
| | | | The connected channel is skipped. | See chapter 5 of the DX/MV's User's Manual. |
| Bad | Device Failure | Not limited | Internal error | Check DEVICE_STATUS (section 5.3). |
| Bad | Sensor Failure | Not limited | The sensor has burned out. | Check the sensor. |
| | | | Error data<br>Invalid data<br>Positive/negative over range<br>Positive/negative computation over display range | See chapter 5 or 11 of the DX/MV's User's Manual. |
| Bad | Out of Service | Not limited | The RB is in OOS mode. | 3.4 |
| | | | EEPROM failure | Check DEVICE_STATUS (section 5.3). |
| | | | TB or AI is in OOS mode. | 3.4 |
| Uncertain | Non-specific | Const | Bit 8 of STATUS_OPTS is set to "1." | 3.5 |
| Good (Non-Cascade) | Non-specific | Not limited | Data is valid | |
| Good (Non-Cascade) | Active Block Alarm | Not limited | Data is valid | An active block alarm exists. 4.2 |
| Good (Non-Cascade) | Active Advisory Alarm | Not limited | Data is valid | Alarm with a priority less than 8 is occurring. 4.2 |
| Good (Non-Cascade) | Active Critical Alarm | Not limited | Data is valid | Alarm with a priority greater than or equal to 8 is occurring. 4.2 |
| Good (Non-Cascade) | Unacknowledged Block Alarm | Not limited | Data is valid | A block alarm that has not received an acknowledge message from the host exists. 4.2 |
| Good (Non-Cascade) | Unacknowledged Advisory Alarm | Not limited | Data is valid | An alarm with a priority less than 8 that has not received an acknowledge from the host exists. 4.2 |
| Good (Non-Cascade) | Unacknowledged Critical Alarm | Not limited | Data is valid | An alarm with a priority greater than or equal to 8 that has not received an acknowledge from the host exists. 4.2 |

## FIELD_VAL (AI) Status and Corrective Actions (when the simulation function is not in use)

| Quality | Sub status | Limit | Cause | Corrective Action/Reference Section |
|---|---|---|---|---|
| Bad | Non-specific | Not limited | The RB is in OOS mode. | 3.4 |
| | | | EEPROM failure | Check DEVICE_STATUS (section 5.3). |
| Bad | Configuration Error | Not limited | The connected channel is not correct. | Check AI_MAP value (section 3.5), or see chapter 5 or 11 of the DX/MV's User's Manual. |
| | | | The connected channel is skipped. | See chapter 5 of the DX/MV's User's Manual. |
| Bad | Device Failure | Not limited | Internal error | Check DEVICE_STATUS (section 5.3). |
| Bad | Sensor Failure | Not limited | The sensor has burned out. | Check the sensor. |
| | | | Error data<br>Invalid data<br>Positive/negative over range<br>Positive/negative computation over display range | See chapter 5 or 11 of the DX/MV's User's Manual. |
| Bad | Out of Service | Not limited | TB or AI is in OOS mode. | 3.4 |
| Good (Non-Cascade) | Non-specific | Not limited | Data is valid | |

## Status of OUT_1 through OUT_8 (MAI) and Corrective Actions

| Quality | Sub status | Limit | Cause | Corrective Action/Reference Section |
|---|---|---|---|---|
| Bad | Configuration Error | Not limited | The connected channel is not correct. | See chapter 5 or 11 of the DX/MV's User's Manual. |
| | | | The connected channel is skipped. | See chapter 5 of the DX/MV's User's Manual. |
| Bad | Device Failure | Not limited | Internal error | Check DEVICE_STATUS (section 5.3). |
| Bad | Sensor Failure | Not limited | The sensor has burned out. | Check the sensor. |
| | | | Error data<br>Invalid data<br>Positive/negative over range<br>Positive/negative computation over display range | See chapter 5 or 11 of the DX/MV's User's Manual. |
| Bad | Out of Service | Not limited | The RB is in OOS mode. | 3.4 |
| | | | EEPROM failure | Check DEVICE_STATUS (section 5.3). |
| | | | TB or AI is in OOS mode. | 3.4 |
| Good (Non-Cascade) | Non-specific | Not limited | Data is valid | |
| Good (Non-Cascade) | Active Block Alarm | Not limited | Data is valid | An active block alarm exists. 4.2 |
| Good (Non-Cascade) | Unacknowledged Block Alarm | Not limited | Data is valid | A block alarm that has not received an acknowledge message from the host exists. 4.2 |

## Status of IN_1 through IN_8 (MAO)

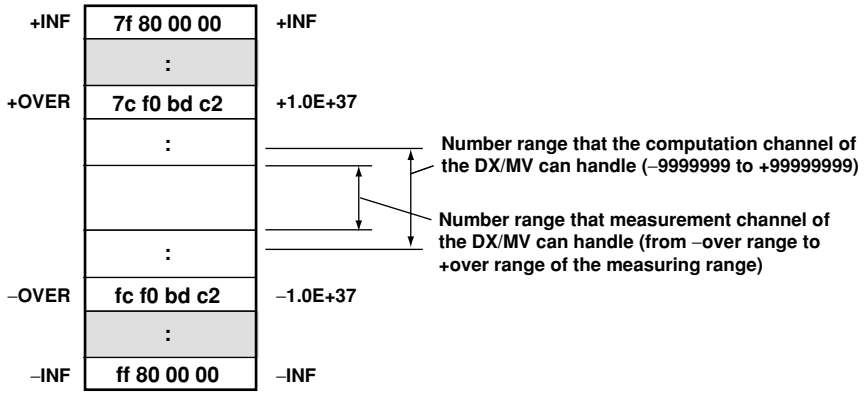
IN_1 through IN_8 are data that is received externally. Determine the quality of the data by referring to the value and meaning of Quality and Quality Sub-status in the "I/O Parameter Status" section.

## Value of Input/Output Parameters

Value is a floating-point decimal that can take on the values in the range in the white area in the following figure. In addition to this range, there is also a range of values that the measurement and computation channels of the DX/MV can handle. For information on this range, see the DX/MV's User's Manual.

If the value on the measurement channel becomes ±over range or the value on the computation channel becomes ±over display range in the processing of the DX/MV, the value ±OVER (±1.0E+37) is passed to the transducer block.

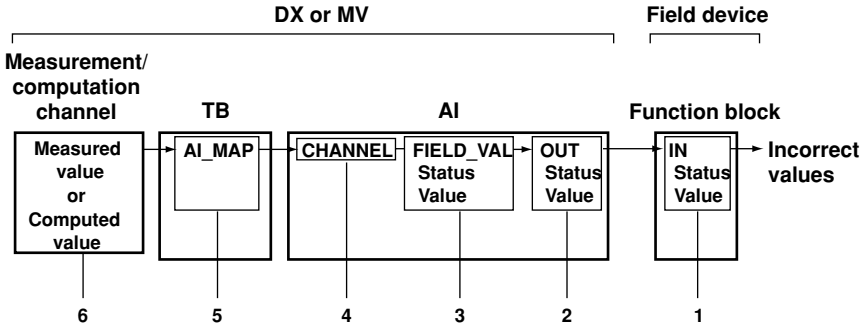
**Value Range**



## An Example Explaining How to Use Status of I/O Parameters

The figure shows the case in which the data retrieved from AI function block OUT of the DX/MV is erroneous.

**Status of I/O Parameters**




Start from the step No.1 in the figure. If the cause is not identified, go to the next step.

1. **Checking Value and Status of IN of the field device**
   See the user's manual for the field device.
2. **Checking Value and Status of AI function block OUT**
   - **Status is "Good (Non-Cascade)"**
     If the Status is "Good (Non-Cascade)" and the Value is correct, the problem exists after the AI function block (communication via fieldbus in this case).
   - **Status is "Bad"**
     If the Status is "Bad," check the information through the Sub-Status value.
     - **Status is "Bad" and Sub-Status is "Non-specific"**
       The resource block is not set to Auto mode. Set the block mode of the resource block to Auto (see section 3.4).
     - **Status is "Bad" and Sub-Status is "Sensor Failure"**
       Positive/negative over range (if OUT is connected to the measurement channel), positive/negative over display range (if OUT is connected to the computation channel), or data error is occurring. Check the input signal to the measurement channel, or the equation and the data used in the equation.

     Check the Sub-Status and Limit value in the similar fashion as described above, and take proper corrective actions.

3. **Checking Value and Status of AI function block FIELD_VAL**
   - **Status is "Good (Non-Cascade)"**
     If the Status is "Good (Non-Cascade)" and the Value is correct, the problem exists in the data processing after FIELD_VAL.
   - **Status is "Bad"**
     If the Status is "Bad," check the information through the Sub-Status value.
     - **Status is "Bad" and Sub-Status is "Non-specific"**
       The resource block is not set to Auto mode. Set the block mode of the resource block to Auto (see section 3.4).

     Check the Sub-Status and Limit value in the similar fashion as described above, and take proper corrective actions.

**4., 5., 6.**
Check the settings of CHANNEL of the AI function block, AI_MAP of the transducer block, and the measurement/computation channel.

# 5.2 Handling Block Errors

You can check the cause of the block alarm through BLOCK_ERR of each block. For the transducer block, also check the XD_ERROR value, which indicates “transducer” * error.

* Transducers are components of the transducer block.

**Parameter Indicating Block Error (RB, TB, AI, MAI, and MAO)**

| Relative Index No. | Parameter |
|---|---|
| 6 | BLOCK_ERR |

**Parameter Indicating the Information of the Transducer Error (TB)**

| Relative Index No. | Parameter |
|---|---|
| 11 | XD_ERROR |

BLOCK_ERR information is expressed using a two-byte bit sequence. The block alarm corresponding to the bit that is set to “1” is occurring. The cause of the block alarm of each function block is shown below.

## Resource Block

Only the used bits are indicated.

**BLOCK_ERR Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 3 | Simulate Active | Simulation Jumper is ON | 4.3 |
| 5 | Device Fault State Set | FAULT_STATE of the RB is active | 3.7 |
| 10 | Lost Static Data | Internal error | Check DEVICE_STATUS (section 5.3). |
| 11 | Lost NV Data | Internal error | Check DEVICE_STATUS (section 5.3). |
| 13 | Device Needs Maintenance Now | Internal error | Check DEVICE_STATUS (section 5.3). |
| 15 | Out of Service | RS_STATE is not “Online,” or Target. MODE_BLK is OOS. | 3.4 and “States and Transition of the Resource Block” in this section |

## Transducer Block

Only the used bits are indicated.

**BLOCK_ERR Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 7 | Input Failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 8 | Output Failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 13 | Device Needs Maintenance Now | Internal error | Check DEVICE_STATUS (section 5.3). |
| 15 | Out of Service | RS_STATE is not “Online,” or Target. MODE_BLK is OOS. | 3.4 and “States and Transition of the Resource Block” in this section |

XD_ERROR takes the following values.

**XD_ERROR Value and Corrective Action**

| Value | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 20 | Electronic failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 22 | I/O failure | Internal error | Check DEVICE_STATUS (section 5.3). |

## AI Function Block

Only the used bits are indicated.

**BLOCK_ERR Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 1 | Block Configuration Error | The CHANNEL value of the FB is not correct. | 3.4 |
| 3 | Simulate Active | Simulate Enable/Disable of SIMULATE of the AI is set to “Active” (Enable). | 4.3 |
| 7 | Input Failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 15 | Out of Service | The MODE_BLK Target of the RB or AI is OOS. | 3.4 |

## MAI Function Block

Only the used bits are indicated.

**BLOCK_ERR Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 1 | Block Configuration Error | The CHANNEL value of the FB is not correct. | 3.6 |
| 7 | Input Failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 15 | Out of Service | The MODE_BLK Target of the RB or MAI is OOS. | 3.4 |

## MAO Function Block

Only the used bits are indicated.

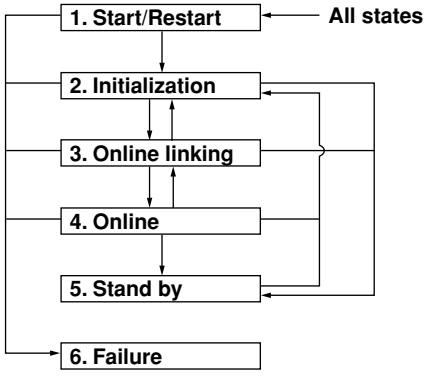
**BLOCK_ERR Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 1 | Block Configuration Error | The CHANNEL value of the FB is not correct. | 3.7 |
| 4 | Local Override | Actual of MODE_BLK of the MAO is Local Override (LO). | Fault State condition. 3.4 and 3.7 |
| 8 | Output Failure | Internal error | Check DEVICE_STATUS (section 5.3). |
| 15 | Out of Service | The MODE_BLK Target of the RB or MAO is OOS. | 3.4 |

## States and Transition of the Resource Block

The following figure shows the various states of the resource block.

**States of the Resource Block**




**Start/Restart**

This is the state at the time the DX/MV is started or restarted. An initial check is executed, and upon success, transition is made to Initialization.

**Initialization**

The node address is not specified in this state. The function block does not operate.
When the node address is set and the block mode is set to Auto, transition is made to Online or Online linking state.
When the node address is set and the block mode is set to OOS, transition is made to Stand by.

**Online linking**

This is the state in which the block mode is set to Auto and the block mode is running automatically. However, there is one or more VCRs used in the communication that are not opened, and their links are not established. When the link is established, the transition is made to Online.
If the node address is cleared, the state returns to Initialization.

**Online**

This is the state in which the block mode is set to Auto and the block is running automatically.
If the node address is cleared, the state returns to Initialization.

**Stand by**

This is the state in which the block mode is OOS, and the resource block is in a state other than Failure. When the block mode is set to Auto, transition is made to Initialization, Online linking, or Online.

**Failure**

If the result of self diagnosis in any state is failure, transition is made to Failure. After transmitting a block alarm, the parameters of all function blocks are reset to their initial values. The DX/MV has malfunctioned.

## Checking the State of the Resource Block

The RS_STATE parameter of the resource block can be used to check the state of the resource block.

**Parameter That Indicates the State of the Resource Block (RB)**

| Relative Index No. | Parameter | Description |
|---|---|---|
| 7 | RS_STATE | The state is indicated using an 8-bit unsigned integer (read only). |

The correspondence between the bits and states are as follows:

**RS_STATE Value**

| Value | State |
|---|---|
| 1 | Start/Restart |
| 2 | Initialization |
| 3 | Online linking |
| 4 | Online |
| 5 | Stand by |
| 6 | Failure |

# 5.3 Handling the Device Status (DEVICE_STATUS)

## Displaying the Status

You can check the status of the DX/MV through DEVICE_STATUS_1 to DEVICE_STATUS_8 of the resource block.

**Parameter for Confirming the DX/MV Status (RB)**

| Relative Index No. | Parameter | Description |
|---|---|---|
| 45 | DEVICE_STATUS_1 | Status of the RB and VCR |
| 46 | DEVICE_STATUS_2 | Status of the TB and the identification information of the DX/MV |
| 47 | DEVICE_STATUS_3 | Status of AI-1 to AI-8 |
| 48 | DEVICE_STATUS_4 | Status of the MAI |
| 49 | DEVICE_STATUS_5 | Status of the MAO |
| 50 | DEVICE_STATUS_6 | Not used |
| 51 | DEVICE_STATUS_7 | Not used |
| 52 | DEVICE_STATUS_8 | Not used |

The value of each parameter is a four-byte bit sequence. The correspondence between the bits and statuses and the corrective actions are shown below. When the bit value is "1," the DX/MV is in the described status.

## DEVICE_STATUS_1

Only the used bits are indicated.

**DEVICE_STATUS_1 Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 23 | Sim.enable Jmpr On | Simulation Jumper is ON | 4.3 |
| 22 | RB in OOS mode | MODE_BLK.ACTUAL of the RB is OOS | 3.4 |
| 19 | EEPROM failure | Problems in the non-volatile memory (EEPROM). | Contact your nearest YOKOGAWA dealer. |
| 15 | Link Obj.1/17 not open | The VCR corresponding to the VCR Number of the Link Object is not open. | 3.11 |
| 14 | Link Obj.2/18 not open | Same as above | Same as above |
| 13 | Link Obj.3/19 not open | Same as above | Same as above |
| 12 | Link Obj.4/20 not open | Same as above | Same as above |
| 11 | Link Obj.5/21 not open | Same as above | Same as above |
| 10 | Link Obj.6/22 not open | Same as above | Same as above |
| 9 | Link Obj.7/23 not open | Same as above | Same as above |
| 8 | Link Obj.8/24 not open | Same as above | Same as above |
| 7 | Link Obj.9/25 not open | Same as above | Same as above |
| 6 | Link Obj.10/26 not open | Same as above | Same as above |
| 5 | Link Obj.11/27 not open | Same as above | Same as above |
| 4 | Link Obj.12/28 not open | Same as above | Same as above |
| 3 | Link Obj.13/29 not open | Same as above | Same as above |
| 2 | Link Obj.14/30 not open | Same as above | Same as above |
| 1 | Link Obj.15/31 not open | Same as above | Same as above |
| 0 | Link Obj.16/32 not open | Same as above | Same as above |

## DEVICE_STATUS_2

Only the used bits are indicated.

**DEVICE_STATUS_2 Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 30 | DEVICE_ID failure | Invalid DEVICE_ID. | Contact your nearest YOKOGAWA dealer. |
| 29 | REVISION failure | Invalid DEV_TYPE, DEV_REV, or DD_REV. | Contact your nearest YOKOGAWA dealer. |
| 28 | UART failure | Problems in the internal communication (UART). | Contact your nearest YOKOGAWA dealer. |
| 15 | TB in O/S mode | MODE_BLK.ACTUAL of the TB is OOS. | 3.4 |

## DEVICE_STATUS_3

Only the used bits are indicated.

**DEVICE_STATUS_3 Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 30 | AI-1 in O/S mode | MODE_BLK.ACTUAL of AI-1 is OOS. | 3.4 |
| 29 | AI-2 in O/S mode | MODE_BLK.ACTUAL of AI-2 is OOS. | 3.4 |
| 28 | AI-3 in O/S mode | MODE_BLK.ACTUAL of AI-3 is OOS. | 3.4 |
| 27 | AI-4 in O/S mode | MODE_BLK.ACTUAL of AI-4 is OOS. | 3.4 |
| 26 | AI-5 in O/S mode | MODE_BLK.ACTUAL of AI-5 is OOS. | 3.4 |
| 25 | AI-6 in O/S mode | MODE_BLK.ACTUAL of AI-6 is OOS. | 3.4 |
| 24 | AI-7 in O/S mode | MODE_BLK.ACTUAL of AI-7 is OOS. | 3.4 |
| 23 | AI-8 in O/S mode | MODE_BLK.ACTUAL of AI-8 is OOS. | 3.4 |
| 15 | AI-1 not scheduled | AI-1 is not scheduled. | 3.12 |
| 14 | AI-2 not scheduled | AI-2 is not scheduled. | 3.12 |
| 13 | AI-3 not scheduled | AI-3 is not scheduled. | 3.12 |
| 12 | AI-4 not scheduled | AI-4 is not scheduled. | 3.12 |
| 11 | AI-5 not scheduled | AI-5 is not scheduled. | 3.12 |
| 10 | AI-6 not scheduled | AI-6 is not scheduled. | 3.12 |
| 9 | AI-7 not scheduled | AI-7 is not scheduled. | 3.12 |
| 8 | AI-8 not scheduled | AI-8 is not scheduled. | 3.12 |

## DEVICE_STATUS_4

Only the used bits are indicated.

**DEVICE_STATUS_4 Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 30 | MAI-1 in O/S mode | MODE_BLK.ACTUAL of MAI is OOS. | 3.4 |
| 15 | MAI-1 not scheduled | MAI is not scheduled. | 3.12 |

## DEVICE_STATUS_5

Only the used bits are indicated.

**DEVICE_STATUS_5 Value and Corrective Action**

| Bit | Indication | Description | Corrective Action/Reference Section |
|---|---|---|---|
| 30 | MAO-1 in O/S mode | MODE_BLK.ACTUAL of MAO is OOS. | 3.4 |
| 15 | MAO-1 not scheduled | MAO is not scheduled. | 3.12 |

# 5.4 Troubleshooting the Link Master Function

## When the Scheduler Stops, the DX/MV Does Not Transit to Scheduler

1. **Check that the DX/MV is configured as an link master device.**
   Check that the BOOT_OPERAT_FUNCTIONAL_CLASS (MIB, index number 367) value is set to “Link Master” (the value is “2,” see section 3.13).

2. **Check that the node address of the DX/MV is smaller than other link master devices.**
   This Node value of DLME_BASIC_INFO (MIB, index number 361) indicates the node address (see section 3.2).

## Would Like to Transit the DX/MV to Scheduler while the Scheduler Is in Operation

1. **Check that the version number of the schedule in execution matches between the scheduler in operation and the DX/MV.**
   On the DX/MV, the Active Schedule Version value of LINK_SCHEDULE_LIST_ CHARACTERISTICS_RECORD (MIB, index number 374) is the schedule version number.

2. **Declare the DX/MV to become the scheduler**
   First, set the PRIMARY_LINK_MASTER_FLAG_VARIABLE parameter of the scheduler in operation to “0x00” (false).
   Then, set PRIMARY_LINK_MASTER_FLAG_VARIABLE (MIB, index number 364) of the DX/MV to “0xff” (true).

## Other Devices Cannot Be Connected to the Fieldbus on Which the DX/MV is Operating as the Scheduler

1. **Check that the following parameter value of the DX/MV is greater than the parameter value of the device to be connected.**

| DX/MV | | Device to Be Connected |
|---|---|---|
| V(ST) | > | V(ST) |
| V(MID) | > | V(MID) |
| V(MRD) | > | V(MRD) |

   - **DX/MV parameter**
     The Slot Time value (subindex number 1) of CONFIGURED_LINK_SETTING_ RECORD (MIB, index number 369) is V(ST). The Min Inter Pdu Delay value is V(MID). The MAX Response Delay value is V(MRD).
   - **Parameter of the device to be connected**
     The Slot Time value of DLME_BASIC_INFO is V(ST). The Min Inter Pdu Delay value is V(MID). The MAX Response Delay value is V(MRD).

2. **Check that the node address of the device to be connected is included in the node address range to be used specified by the DX/MV.**
   For the procedure in setting the node address range to be used, see section 3.14.

# Appendix 1 Terminology

## Basic Device

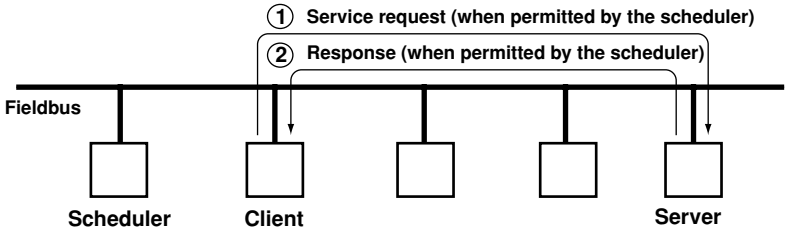
Basic device is a field deice that does not have scheduler functionality. There can be multiple basic devices on a single fieldbus.

## Communication Types (Client/Server)

The device that wishes to communicate (client) transmits a message to the destination device (server) when it receives permission from the scheduler. The server does not respond immediately; it responds when it receives permission from the scheduler.

- This type of communication is used for unscheduled communications such as the downloading of all the parameters of a device.
- It is one to one communication.
- The messages are transmitted or received in order without a loss or overwriting.

**Client/Server**

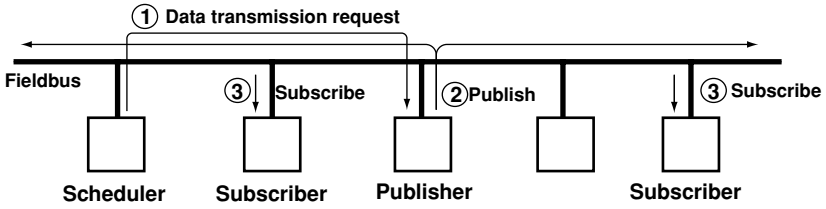



## Communication Types (Publisher/Subscriber)

The device (publisher) that receives a transmit request from the scheduler broadcasts the data to all devices on the fieldbus. Devices that are set to receive the data (subscriber) saves the data.

- This type of communication is used for scheduled, cyclic data transfers.
- It is one to many communications.
- A scheduler issues the data transfer request.
- The subscriber saves only the latest version of the data. New data overwrites previous data.

**Publisher/Subscriber**

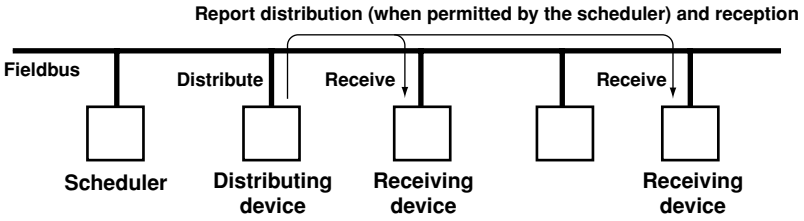


## Communication Types (Report distribution)

The device that wishes to distribute a message transmits the message to the specified addresses when it receives permission from the scheduler. The receiving devices receive the message.

- This type of communication is used for unscheduled communications such as the transmission of alarms.
- It is one to many communications.
- The messages are transmitted or received in order without overwriting.

**Report Distribution**




## Link Master Device (LM device)

Link master device has functions that control the fieldbus communications. There can be multiple link master devices on a single fieldbus. One of them controls the fieldbus communications as a scheduler. If the preexisting scheduler malfunctions, one of other link master devices will become a scheduler.

## Object Dictionary (OD)

The fieldbus function is expressed using a framework called objects. The function blocks are expressed as a group of objects.
Objects are stored in a list called an object dictionary (OD). The object dictionary is referenced externally by a logical device called a virtual field device (VFD).

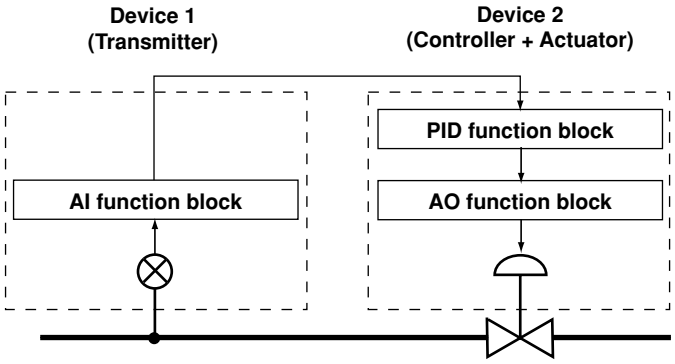
## Scheduler (LAS, Link Active Scheduler)

Controls the fieldbus communications. One of the link master devices on the fieldbus become a scheduler.

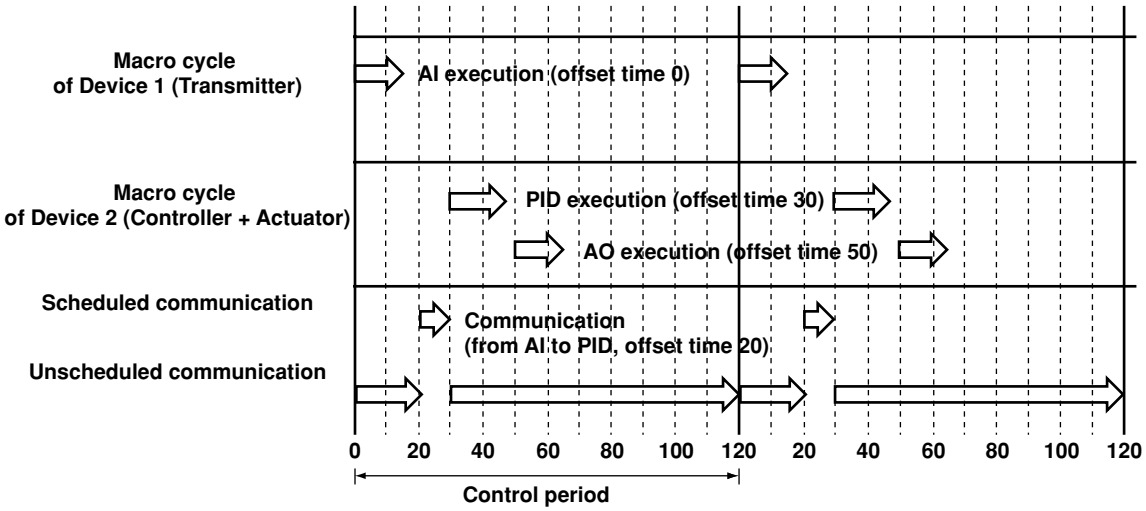
## Schedule

Operations are scheduled and repeated at specified periods (control periods).
The following figure shows an example of schedule for a control loop with a transmitter and a controller + actuator.

**Control Loop**



**Schedule**




At offset 0, device 1 (transmitter) executes the analog input (AI) function block and prepares the measured data.
At offset 20, the scheduler issues a request to device 1 for transferring the measured data. The measured data is transmitted from device 1 to the fieldbus. The measured data is received by device 2.
At offset 30, device 2 (controller + actuator) executes the PID control function block and prepares the output data.
At offset 50, device 2 executes the analog output (AO) function block to read the output data of the PID function block and adjusts the valve. In this case, the data is exchanged within the same device. Thus, communication is not used.

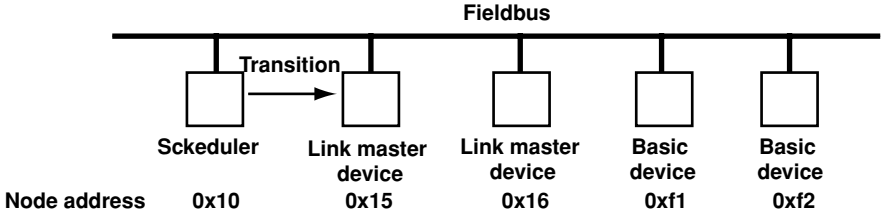
## Scheduled Communications

Scheduled Communications are used for periodic data transmission.
The scheduler has a schedule list that determines transmission times for all buffers of all devices that need data transmission, and issues transmission requests to publishers based on the list.
The publisher broadcasts the data in the specified buffer to the fieldbus, when it receives the request. Subscribers on the fieldbus stores the published data accordingly.

## Transition to Scheduler

If there is no scheduler on the fieldbus such as when starting up a fieldbus or a preexisting scheduler malfunctions, a link master device declares that it will become a scheduler and makes the transition.
If there are multiple link master devices on the fieldbus, the link master device with a smallest value of the node address can become a scheduler.
When a time period of V(ST) x V(TN) elapses after the fieldbus has become silent, the link master device requests for an assignment of the scheduler rights. V(ST) and V(TN) are Slot Time (CURRENT_LINK_SETTING_RECORD) and node address value, respectively.

**Transition to Scheduler**



## Unscheduled Communications

Communications that transmit device alarms and configure devices are unscheduled communications. Unscheduled communications can occur during the time when scheduled communications are not being performed. The scheduler gives permission for communication to the devices on the fieldbus in order and repeatedly.
Devices are allowed to communicate till the message transmission ends or for the predetermined time period, either one which is shorter.

## Virtual Communication Relationship (VCR)

The virtual communication relationship is a logical communication pass to exchange messages. Communication with other devices is carried out based on the method determined by the VCR. Once it is configured, communication with other devices can be carried out simply by specifying the virtual communication relationship number.
The virtual communication relationships include three types that correspond to the communication types (Publisher/Subscriber, Report Distribution, Client/Server).

## Virtual Field Device (VFD)

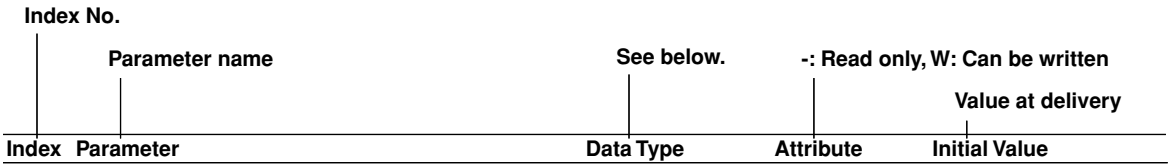
A virtual field device is a logical device used to externally reference data described in Object Dictionary. There are two types of VFD, a system and network management VFD (Management Information Base VFD of the DX/MV) and a function block VFD (Function Block VFD of the DX/MV).
You can access to VCR, communication, or schedule parameters through the system and network management VFD. While the parameters in the resource block, transducer block, and function blocks can be accessed through the function block VFD.

# Appendix 2 Parameters

## Management Information Base Virtual Field Device Parameters

The entire list of parameters in Management Information Base Virtual Field Device (MIB-VFD) is given below. For the functions of parameters, see the specifications issued by the Fieldbus Foundation.

### How to Read the Management Information Base Virtual Field Device Table




### Data Type

| Type | Size (byte) | Description |
|---|---|---|
| Domain | - | Domain |
| Boolean | 1 | true or false |
| Sign8 | 1 | 8-bit signed integer |
| Sign16 | 2 | 16-bit signed integer |
| Sign32 | 4 | 32-bit signed integer |
| Usign8 | 1 | 8-bit unsigned integer |
| Usign16 | 2 | 16-bit unsigned integer |
| Usign32 | 4 | 32-bit unsigned integer |
| Float | 4 | Floating-point data |
| Visible[ ] | 1, 2, .. | Character string. Enclosed in parentheses is number of bytes. |
| Octet[ ] | 1, 2, .. | Hexadecimal. Enclosed in parentheses is number of bytes. |
| Date | 7 | Date |
| Day | 4 or 6 | Time |
| Time Diff | 4 or 6 | Time difference |
| Bit[ ] | 1, 2, .. | Bit sequence. Enclosed in parentheses is number of bytes. |
| Time | 8 | Time |
| Array | - | Array |
| DS-xx | xx | Records. xx denotes number of records. |

| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| 258 | SM_SUPPORT | Bit[4] | - | 0x00003c1f |
| 259 | T1 | Usign32 | W | 480000 |
| 260 | T2 | Usign32 | W | 2880000 |
| 261 | T3 | Usign32 | W | 1440000 |
| 262 | CURRENT_TIME | Time | - | 0 |
| 263 | LOCAL_TIME_DIFF | Sign32 | W | 60 |
| 264 | AP_CLOCK_SYNC_INTERVAL | Usign8 | W | 60 |
| 265 | TIME_LAST_RCVD | Time | - | 0 |
| 266 | PRIMARY_AP_TIME_PUBLISHER | Usign8 | W | 0 |
| 267 | TIME_PUBLISHER_ADDR | Usign8 | - | 0 |
| 269 | MACRO_CYCLE_DURATION | Usign32 | W | 32000 |
| 270 | DEV_ID | Visible[32] | - | 5945431801 .. |
| 271 | PD_TAG | Visible[32] | - | DAQSTATION |
| 272 | OPERATIONAL_POWERUP | Boolean | W | true |
| 273 | VFD_REF_ENTRY.1 | DS-90 | | |
| | 1 Vfd Ref | Usign32 | - | 1 |
| | 2 Vfd Tag | Visible[32] | W | MIB-VFD |
| 274 | VFD_REF_ENTRY.2 | DS-90 | | |
| | 1 Vfd Ref | Usign32 | - | 4660 |
| | 2 Vfd Tag | Visible[32] | W | FB-VFD |
| 275 | VERSION_OF_SCHEDULE | Usign16 | W | 1 |
| 276 | FB_START_ENTRY.1 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 0 |
| | 2 Fb Object Index | Usign16 | W | 4000 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 277 | FB_START_ENTRY.2 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 960 |
| | 2 Fb Object Index | Usign16 | W | 4100 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 278 | FB_START_ENTRY.3 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 1920 |
| | 2 Fb Object Index | Usign16 | W | 4200 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 279 | FB_START_ENTRY.4 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 2880 |
| | 2 Fb Object Index | Usign16 | W | 4300 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 280 | FB_START_ENTRY.5 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 3840 |
| | 2 Fb Object Index | Usign16 | W | 4400 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 281 | FB_START_ENTRY.6 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 4800 |
| | 2 Fb Object Index | Usign16 | W | 4500 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 282 | FB_START_ENTRY.7 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 5760 |
| | 2 Fb Object Index | Usign16 | W | 4600 |
| | 3 Vfd Ref | Usign32 | - | 4660 |

| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| 283 | FB_START_ENTRY.8 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 6720 |
| | 2 Fb Object Index | Usign16 | W | 4700 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 284 | FB_START_ENTRY.9 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 7680 |
| | 2 Fb Object Index | Usign16 | W | 9000 |
| | 3 Vfd Ref | Usign32 | - | 4660 |
| 285 | FB_START_ENTRY.10 | DS-91 | | |
| | 1 Start Time Offset | Usign32 | W | 8640 |
| | 2 Fb Object Index | Usign16 | W | 10000 |
| | 3 Vfd Ref | Usign32 | - | 4660 |

| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| 290 | STACK_CAPABILITIES | DS-95 | | |
| | 1 Fas Ar Type and Role Supported | Octet[4] | - | 0x40860000 |
| | 2 Max Dlsap Addresses Supported | Usign16 | - | 32 |
| | 3 Max Dlcep Addresses Supported | Usign16 | - | 31 |
| | 4 Dlcep Delivery Features Supported | Octet[1] | - | 0xbb |
| | 5 Version of Nm Spec Supported | Usign16 | - | 260 |
| | 6 Agent Functions Supported | Octet[1] | - | 0x07 |
| | 7 Fms Features Supported | Bit[8] | - | 0x1610c0100090000 |
| 291 | VCR_LIST_CONTROL | Usign8 | W | 0 |
| 292 | VCR_LIST_CHARACTERISTICS | DS-96 | | |
| | 1 Version | Usign32 | - | 0 |
| | 2 Max Entries | Usign16 | - | 31 |
| | 3 Num Permanent Entries | Usign16 | - | 1 |
| | 4 Num Currently Configured | Usign16 | - | 15 |
| | 5 First Unconfigured Entry | Usign16 | - | 308 |
| | 6 Dynamics Supported Flag | Boolean | - | true |
| | 7 Statistics Supported | Octet[1] | - | 0x00 |
| | 8 Num of Statistics Entries | Usign16 | - | 0 |
| 293 | VCR_STATIC_ENTRY.1 | DS-97 | | |
| | 1 Fas Ar Type and Role | Octet[1] | - | 0x32 |
| | 2 Fas Dll Local Addr | Usign32 | - | 248 |
| | 3 Fas Dll Configured Remote Addr | Usign32 | - | 0 |
| | 4 Fas Dll SDAP | Octet[1] | - | 0x2b |
| | 5 Fas Dll Max Confirm Delay on Connect | Usign16 | - | 60000 |
| | 6 Fas Dll Max Confirm Delay on Data | Usign16 | - | 60000 |
| | 7 Fas Dll Max Dlsdu Size | Usign16 | - | 128 |
| | 8 Fas Dll Residual Activity Supported | Boolean | - | true |
| | 9 Fas Dll Timeliness Class | Octet[1] | - | 0x00 |
| | 10 Fas Dll Publisher Time Window Size | Usign16 | - | 0 |
| | 11 Fas Dll Publisher Synchronizing Dlcep | Usign32 | - | 0 |
| | 12 Fas Dll Subscriber Time Window Size | Usign16 | - | 0 |
| | 13 Fas Dll Subscriber Synchronizing Dlcep | Usign32 | - | 0 |
| | 14 Fms Vfd Id | Usign32 | - | 1 |

| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| | 15 Fms Max Outstanding Services Calling | Usign8 | - | 0 |
| | 16 Fms Max Outstanding Services Called | Usign8 | - | 1 |
| | 17 Fms Features Supported | Bit[8] | - | 0x1000c0100000000 |
| 294 | VCR_STATIC_ENTRY.2 | DS-97 | | |
| | 1 Fas Ar Type and Role | Octet[1] | W | - |
| | 2 Fas Dll Local Addr | Usign32 | W | - |
| | 3 Fas Dll Configured Remote Addr | Usign32 | W | - |
| | 4 Fas Dll SDAP | Octet[1] | W | - |
| | 5 Fas Dll Max Confirm Delay on Connect | Usign16 | - | - |
| | 6 Fas Dll Max Confirm Delay on Data | Usign16 | - | - |
| | 7 Fas Dll Max Dlsdu Size | Usign16 | - | - |
| | 8 Fas Dll Residual Activity Supported | Boolean | - | - |
| | 9 Fas Dll Timeliness Class | Octet[1] | - | - |
| | 10 Fas Dll Publisher Time Window Size | Usign16 | - | - |
| | 11 Fas Dll Publisher Synchronizing Dlcep | Usign32 | - | - |
| | 12 Fas Dll Subscriber Time Window Size | Usign16 | - | - |
| | 13 Fas Dll Subscriber Synchronizing Dlcep | Usign32 | - | - |
| | 14 Fms Vfd Id | Usign32 | W | - |
| | 15 Fms Max Outstanding Services Calling | Usign8 | W | - |
| | 16 Fms Max Outstanding Services Called | Usign8 | W | - |
| | 17 Fms Features Supported | Bit[8] | W | - |
| 295 | VCR_STATIC_ENTRY.3 | DS-97 | | |
| : | : | | | |
| 323 | VCR_STATIC_ENTRY.31 | DS-97 | | |
| 324 | VCR_DYNAMIC_ENTRY.1 | DS-98 | | |
| | 1 Fms State | Usign8 | - | 1 |
| | 2 Fms Actual Max Outstanding Services Calling | Usign8 | - | 0 |
| | 3 Fms Actual Max Outstanding Services Called | Usign8 | - | 1 |
| | 4 Fms Outstanding Services Counter Calling | Usign8 | - | 0 |
| | 5 Fms Outstanding Services Counter Called | Usign8 | - | 1 |
| | 6 Fas State | Usign8 | - | 1 |
| | 7 Fas Dll Actual Remote Address | Usign32 | - | 4128 |
| | 8 Fas Dll Max Sending Queue Depth | Usign8 | - | 1 |
| | 9 Fas Dll Max Receiving Queue Depth | Usign8 | - | 1 |
| 325 | VCR_DYNAMIC_ENTRY.2 | DS-98 | | |
| : | : | | | |
| 354 | VCR_DYNAMIC_ENTRY.31 | DS-98 | | |
| 360 | DLME_BASIC_CHARACTERISTICS | DS-100 | | |
| | 1 Version | Usign8 | - | 1 |
| | 2 Basic Statistics Supported Flag | Boolean | - | false |
| | 3 Dl Operat Functional Class | Usign8 | - | 2 |
| | 4 Dl Device Conformance | Octet[4] | - | 0x20210c84 |

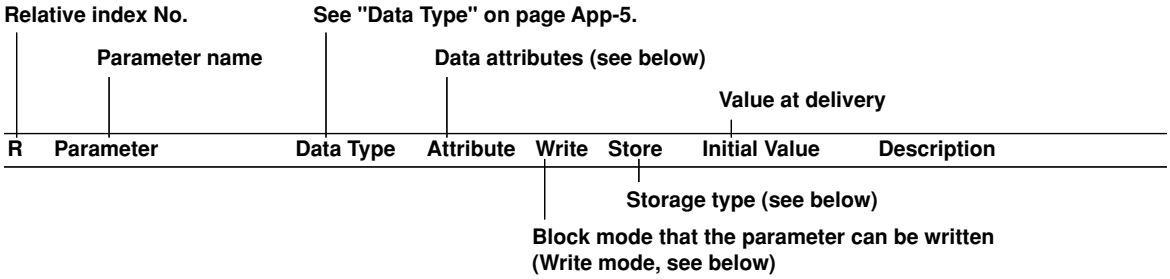
| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| 361 | DLME_BASIC_INFO | DS-101 | | |
| | 1 Slot Time | Usign16 | - | 4 |
| | 2 Per Dlpdu Phl Overhead | Usign8 | - | 0 |
| | 3 Max Response Delay | Usign8 | - | 3 |
| | 4 This Node | Usign8 | - | 245 |
| | 5 This Link | Usign16 | - | 0 |
| | 6 Min Inter Pdu Delay | Usign8 | - | 4 |
| | 7 Time Sync Class | Usign8 | - | 4 |
| | 8 Preamble Extension | Usign8 | - | 2 |
| | 9 Post Trans Gap Extension | Usign8 | - | 1 |
| | 10 Max Inter Chan Signal Skew | Usign8 | - | 0 |
| 362 | DLME_LINK_MASTER_CAPABILITIES_ VARIABLE | Octet[1] | W | 0x04 |
| 363 | DLME_LINK_MASTER_INFO_RECORD | DS-104 | | |
| | 1 Max Scheduling Overhead | Usign8 | W | 0 |
| | 2 Def Min Token Deleg Time | Usign16 | W | 100 |
| | 3 Def Token Hold Time | Usign16 | W | 300 |
| | 4 Target Token Rot Time | Usign16 | W | 4096 |
| | 5 Link Maint Tok Hold Time | Usign16 | W | 400 |
| | 6 Time Distribution Period | Usign32 | W | 5000 |
| | 7 Maximum Inactivity to Claim Las Delay | Usign16 | W | 2 |
| | 8 Las Database Status Spdu Distribution Period | Usign16 | W | 6000 |
| 364 | PRIMARY_LINK_MASTER_FLAG_VARIABLE | Boolean | W | false |
| 365 | LIVE_LIST_STATUS_ARRAY_VARIABLE | Octet[32] | - | 0x0 |
| 366 | MAX_TOKEN_HOLD_TIME_ARRAY | Array | | |
| | 1 Element 1 | Octet[64] | W | - |
| | 2 Element 2 | Octet[64] | W | - |
| | 3 Element 3 | Octet[64] | W | - |
| | 4 Element 4 | Octet[64] | W | - |
| | 5 Element 5 | Octet[64] | W | - |
| | 6 Element 6 | Octet[64] | W | - |
| | 7 Element 7 | Octet[64] | W | - |
| | 8 Element 8 | Octet[64] | W | - |
| 367 | BOOT_OPERAT_FUNCTIONAL_CLASS | Usign8 | W | 2 |
| 368 | CURRENT_LINK_SETTING_RECORD | DS-111 | | |
| | 1 Slot Time | Usign16 | - | - |
| | 2 Per Dlpdu Phl Overhead | Usign8 | - | - |
| | 3 Max Response Delay | Usign8 | - | - |
| | 4 First Unpolled Node Id | Usign8 | - | - |
| | 5 This Link | Usign16 | - | - |
| | 6 Min Inter Pdu Delay | Usign8 | - | - |
| | 7 Num Consec Unpolled Node Id | Usign8 | - | - |
| | 8 Preamble Extension | Usign8 | - | - |
| | 9 Post Trans Gap Extension | Usign8 | - | - |
| | 10 Max Inter Chan Signal Skew | Usign8 | - | - |
| | 11 Time Sync Class | Usign8 | - | - |
| 369 | CONFIGURED_LINK_SETTING_RECORD | DS-111 | | |
| | 1 Slot Time | Usign16 | W | 10 |
| | 2 Per Dlpdu Phl Overhead | Usign8 | W | 4 |
| | 3 Max Response Delay | Usign8 | W | 10 |

| Index | Parameter | Data Type | Attribute | Initial Value |
|---|---|---|---|---|
| | 4 First Unpolled Node Id | Usign8 | W | 37 |
| | 5 This Link | Usign16 | W | 0 |
| | 6 Min Inter Pdu Delay | Usign8 | W | 16 |
| | 7 Num Consec Unpolled Node Id | Usign8 | W | 186 |
| | 8 Preamble Extension | Usign8 | W | 2 |
| | 9 Post Trans Gap Extension | Usign8 | W | 1 |
| | 10 Max Inter Chan Signal Skew | Usign8 | W | 0 |
| | 11 Time Sync Class | Usign8 | W | 4 |
| 370 | PLME_BASIC_CHARACTERISTICS | DS-108 | | |
| | 1 Channel Statistics Supported | Octet[1] | - | 0 |
| | 2 Medium and Data Rates Supported | Octet[8] | - | 49000000 00000000 |
| | 3 Iec Version | Usign16 | - | 1 |
| | 4 Num of Channels | Usign8 | - | 1 |
| | 5 Power Mode | Usign8 | - | 0 |
| 371 | CHANNEL_STATES_VARIABLE | Array | | |
| | 1 Channel 1 | Usign8 | - | 0 |
| | 2 Channel 2 | Usign8 | - | 128 |
| | 3 Channel 3 | Usign8 | - | 128 |
| | 4 Channel 4 | Usign8 | - | 128 |
| | 5 Channel 5 | Usign8 | - | 128 |
| | 6 Channel 6 | Usign8 | - | 128 |
| | 7 Channel 7 | Usign8 | - | 128 |
| | 8 Channel 8 | Usign8 | - | 128 |
| 372 | PLME_BASIC_INFO | DS-109 | | |
| | 1 Interface Mode | Usign8 | - | 0 |
| | 2 Loop Back Mode | Usign8 | - | 0 |
| | 3 Xmit Enabled | Usign8 | - | 1 |
| | 4 Rcv Enabled | Usign8 | - | 1 |
| | 5 Preferred Receive Channel | Usign8 | - | 1 |
| | 6 Media Type Selected | Usign8 | - | 73 |
| | 7 Receive Select | Usign8 | - | 1 |
| 373 | LINK_SCHEDULE_ACTIVATION_VARIABLE | Usign16 | W | 0 |
| 374 | LINK_SCHEDULE_LIST_CHARACTERISTICS_RECORD | DS-106 | | |
| | 1 Num of Schedules | Usign8 | - | 1 |
| | 2 Num of Subschedules per Schedule | Usign8 | - | 1 |
| | 3 Active Schedule Version | Usign16 | - | 1 |
| | 4 Active Schedule Od Index | Usign16 | - | 377 |
| | 5 Active Schedule Starting Time | Time | - | 0 |
| 375 | DLME_SCHEDULE_DESCRIPTOR.1 | DS-107 | | |
| | 1 Version | Usign16 | - | 1 |
| | 2 Macrocycle Duration | Usign32 | - | 32000 |
| | 3 Time Resolution | Usign16 | - | 0 |
| 376 | DLME_SCHEDULE_DESCRIPTOR.2 | DS-107 | | |
| | 1 Version | Usign16 | - | 0 |
| | 2 Macrocycle Duration | Usign32 | - | 0 |
| | 3 Time Resolution | Usign16 | - | 0 |
| 377 | DOMAIN.1 | Domain | - | - |
| 378 | DOMAIN.2 | Domain | - | - |

## Function Block Virtual Field Device Parameters

The entire list of parameters in Function Block Virtual Field Device (FB-VFD) is given below. For details on the parameter functions, see the specifications issued by the Fieldbus Foundation.

### How to Read the Function Block Virtual Field Device Table




### Data Attributes

| Symbol | Description |
|---|---|
| I/* | Input parameter (subscribed by other function blocks) |
| O/* | Output parameter (published by the DX/MV) |
| C/* | Contained parameter (cannot be subscribed or published) |
| */S | Static parameter (when a value is written, ST_REV value is increased by 1. Non-volatile.) |
| */N | Non-volatile parameter |
| */D | Dynamic parameter |
| */M | Mixture of parameters with different attributes |

### Write Mode

| Value | Description |
|---|---|
| - | Read only |
| OOS | Writable when the block mode is OOS |
| MAN | Writable when the block mode is MAN or OOS |
| ANY | Writable in all block modes |

### Storage Type

| Value | Description |
|---|---|
| - | ROM data |
| RAM | Stored in RAM (erased when the power is turned OFF) |
| EEP | Stored in EEPROM (held even when the power is turned OFF) |

## Resource Block (First index number: 1000)

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 0 | BLOCK | DS-64 | C/S | | | | Structure information of the block |
| | 1 Block Tag | Visible[32] | C/S | OOS | EEP | RB | Block tag (up to 32 characters). Must be unique within the segment. |
| | 2 DD Member ID | Usign32 | C/S | - | - | 0x0 | DD search key |
| | 3 DD Item ID | Usign32 | C/S | | - | 0x80020af0 | DD search key |
| | 4 DD Revision | Usign16 | C/S | - | - | 1 | DD revision |
| | 5 Profile | Usign16 | C/S | - | - | 0x010b | Block type, RB is “0x010b” |
| | 6 Profile Revision | Usign16 | C/S | - | - | 0x0101 | Profile revision |
| | 7 Execution Time | Usign32 | C/S | - | - | 0 | Execution time (“0” for RB because it is self-run at all times) |
| | 8 Period of Execution | Usign32 | C/S | ANY | - | 0 | Execution period (“0” for RB because it is self-run at all times) |
| | 9 Number of Parameters | Usign16 | C/S | - | - | 53 | Number of parameters making up the block |
| | 10 Next FB to Execute | Usign16 | C/S | ANY | - | 0 | Only a value “0” is acceptable. |
| | 11 Starting Index of Views | Usign16 | C/S | - | - | 40100 | Start index of VIEW_1 |
| | 12 Number of VIEW_3 | Usign8 | C/S | - | - | 1 | Number of VIEW_3s |
| | 13 Number of VIEW_4 | Usign8 | C/S | - | - | 1 | Number of VIEW_4s |
| 1 | ST_REV | Usign16 | C/S | - | EEP | 0 | Static parameter revision. The value increases every time a value is written to the static parameter. |
| 2 | TAG_DESC | Octet[32] | C/S | ANY | EEP | (all space) | User memo area |
| 3 | STRATEGY | Usign16 | C/S | ANY | EEP | 1 | User memo area |
| 4 | ALERT_KEY | Usign8 | C/S | ANY | EEP | 1 | Indicates the source of the alarm using a value between 1 and 255 (the user defines the relationship between the values and meanings). Copied to Alert Key of the alert object. |
| 5 | MODE_BLK | DS-69 | C/M | | | - | Mode setting and indication |
| | 1 Target | Bit[1] | C/N | ANY | EEP | auto | Transition destination mode setting |
| | 2 Actual | Bit[1] | C/D | - | RAM | auto | Current mode |
| | 3 Permitted | Bit[1] | C/S | ANY | EEP | auto\|oos | Permitted modes for transition |
| | 4 Normal | Bit[1] | C/S | ANY | EEP | auto | Transition destination mode when resuming to normal operation. |
| 6 | BLOCK_ERR | Bit[2] | C/D | - | RAM | 0 | Block error state (section 5.2) |
| 7 | RS_STATE | Usign8 | C/D | - | RAM | start | Resource block state (section 5.2) |
| 8 | TEST_RW | DS-85 | C/D | | | | Variable used to test the Read/Write to the parameter (Data can be written freely to Values 1 through 15) |
| | 1 Value 1 | Boolean | C/D | ANY | RAM | 0 | |
| | 2 Value 2 | Sign8 | C/D | ANY | RAM | 0 | |
| | 3 Value 3 | Sign16 | C/D | ANY | RAM | 0 | |
| | 4 Value 4 | Sign32 | C/D | ANY | RAM | 0 | |
| | 5 Value 5 | Usign8 | C/D | ANY | RAM | 0 | |
| | 6 Value 6 | Usign16 | C/D | ANY | RAM | 0 | |
| | 7 Value 7 | Usign32 | C/D | ANY | RAM | 0 | |
| | 8 Value 8 | Float | C/D | ANY | RAM | 0 | |
| | 9 Value 9 | Visible[32] | C/D | ANY | RAM | | |
| | 10 Value 10 | Octet[32] | C/D | ANY | RAM | (null) | |
| | 11 Value 11 | Date | C/D | ANY | RAM | uninitialized | |
| | 12 Value 12 | Day | C/D | ANY | RAM | 0 | |
| | 13 Value 13 | Time Diff | C/D | ANY | RAM | 0 | |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| | 14 Value 14 | Bit[2] | C/D | ANY | RAM | 0 | |
| | 15 Value 15 | Time | C/D | ANY | RAM | 0 | |
| 9 | DD_RESOURCE | Visible[32] | C/S | - | EEP | | Variable used by the configurator to determine the location of the DD |
| 10 | MANUFAC_ID | Usign32 | C/S | - | - | 0x594543 | Manufacturer ID, Used when the configurator determines the location of the DD |
| 11 | DEV_TYPE | Usign16 | C/S | - | EEP | 0x1801 | Device type<br>Used when the configurator determines the location of the DD |
| 12 | DEV_REV | Usign8 | C/S | - | EEP | 3 | Device revision number<br>Used when the configurator determines the location of the DD |
| 13 | DD_REV | Usign8 | C/S | - | EEP | 1 | DD revision number<br>Used when the configurator determines the location of the DD |
| 14 | GRANT_DENY | DS-70 | C/D | | | | Not used |
| | 1 Grant | Bit[1] | C/D | ANY | RAM | 0 | Not used |
| | 2 Deny | Bit[1] | C/D | ANY | RAM | 0 | Not used |
| 15 | HARD_TYPES | Bit[2] | C/S | - | - | input | Hardware type<br>The DX/MV only supports Scalar Input (bit 0 is “1”) |
| 16 | RESTART | Usign8 | C/D | ANY | RAM | run | Variable indicating the block initialization level.<br>1: Run (do not initialize)<br>2: Restart resource (do not initialize)<br>3: Restart with defaults (Set the parameters to fieldbus foundation default)<br>4: restart processor (Restart the CPU) |
| 17 | FEATURES | Bit[2] | C/S | - | - | report\|soft_lock | Options that the RB supports<br>DX/MV supports the following two items.<br>Report (bit 1 is “1”)<br>soft write lock (bit 3 is “1”) |
| 18 | FEATURE_SEL | Bit[2] | C/S | ANY | EEP | report\|soft_lock | Of those options that the RB supports (FEATURES), the one that is to be used |
| 19 | CYCLE_TYPE | Bit[2] | C/S | - | - | scheduled | Type of execution cycle that the DX/MV supports<br>“Scheduled” (bit 0 is “1”) only |
| 20 | CYCLE_SEL | Bit[2] | C/S | ANY | RAM | scheduled | Of those types of execution cycles (CYCLE_TYPE) that the DX/MV supports, the one that is to be used<br>“Scheduled” only |
| 21 | MIN_CYCLE_T | Usign32 | C/S | - | - | 3200 | Minimum value of execution cycle that the RB can permit (the unit is 1/32 ms)<br>Since the RB of the DX/MV is self-run, the value does not affect the process (the initial value is a provisional value) |
| 22 | MEMORY_SIZE | Usign16 | C/S | - | - | 0 | Size of memory that can be used in the configuration<br>Memory area is not available on the DX/MV (the value is “0”) |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 23 | NV_CYCLE_T | Usign32 | C/S | - | - | 0 | Cycle at which the non-volatile parameters of the FB are to be automatically written to the non-volatile memory (the unit is 1/32 ms).<br>On the DX/MV, values are written only when the operation is carried out (values are not written automatically, the value is "0") |
| 24 | FREE_SPACE | Float | C/D | - | - | 0 | Size of free memory that can be used in the configuration<br>Memory area is not available on the DX/MV (the value is "0") |
| 25 | FREE_TIME | Float | C/D | - | - | 0 | Free time that can be used in the additional processing of the block<br>There is no time that can be used in the additional processing on the DX/MV (the value is "0") |
| 26 | SHED_RCAS | Usign32 | C/S | ANY | EEP | 640000 | Time from the point when the status of the remote control input from the upper system has gone bad to the point when the mode transition is made (the unit is 1/32 ms)<br>Not used on the DX/MV (the initial value is a provisional value) |
| 27 | SHED_ROUT | Usign32 | C/S | ANY | EEP | 640000 | Time from the point when the status of the remote control input from the upper system has gone bad to the point when the mode transition is made (the unit is 1/32 ms)<br>Not used on the DX/MV (the initial value is a provisional value) |
| 28 | FAULT_STATE | Usign8 | C/N | - | EEP | clear | Variable that determines the operation of the block when the communication is cut<br>1: Clear (not Fault State condition)<br>2: active (Fault State condition)<br>Can be specified using SET_FSTATE or CLR_FSTATE |
| 29 | SET_FSTATE | Usign8 | C/D | ANY | RAM | off | Variable used to set the DX/MV to Fault State condition (see CLR_FSTATE)<br>1: Off<br>2: Set (Set to Fault State condition. Return to Off after Fault State condition.) |
| 30 | CLR_FSTATE | Usign8 | C/D | ANY | RAM | off | Variable used to release the Fault State condition of the DX/MV (see SET_FSTATE)<br>1: Off<br>2: Set (Release the condition. Return to Off after releasing the Fault State condition.) |
| 31 | MAX_NOTIFY | Usign8 | C/S | - | - | 3 | Maximum number of alerts that can be transmitted simultaneously<br>Fixed to "3" on the DX/MV |
| 32 | LIM_NOTIFY | Usign8 | C/S | ANY | EEP | 3 | Number of alerts that can be transmitted simultaneously<br>Value less than or equal to MAX_NOTIFY can be specified.<br>When set to "0," alert is not transmitted. |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 33 | CONFIRM_TIME | Usign32 | C/S | ANY | EEP | 640000 | Time until the alert is retransmitted when there is no acknowledge in response to the alert transmission (the unit is 1/32 ms)<br>If you specify “0,” alert retransmission is disabled. |
| 34 | WRITE_LOCK | Usign8 | C/S | ANY | EEP | unlock | Variable used to control the writing to the FB parameter<br>1: Unlocked (writable)<br>2: Locked (not writable) |
| 35 | UPDATE_EVT | DS-73 | C/D | | | | Update event state |
| 1 | Unacknowledged | Usign8 | C/D | ANY | RAM | ack | Response to the event transmission<br>1: Acknowledged (acknowledged, specifiable)<br>2: Unacknowledged (no acknowledge) |
| 2 | Update State | Usign8 | C/D | - | RAM | report | Event transmission<br>1: Reported (transmitted)<br>2: Not reported (not transmitted) |
| 3 | Time Stamp | Time | C/D | - | RAM | 0 | Time when the update was executed |
| 4 | Static Revision | Usign16 | C/D | - | RAM | 0 | ST_REV value during the update execution |
| 5 | Relative Index | Usign16 | C/D | - | RAM | 0 | Relative index number of the updated parameter<br>The value is set to “0” when multiple parameters are updated simultaneously. |
| 36 | BLOCK_ALM | DS-72 | C/D | | | | Block alarm status |
| 1 | Unacknowledged | Usign8 | C/D | ANY | RAM | ack | Response to the alert transmission<br>1: Acknowledged (acknowledged, specifiable)<br>2: Unacknowledged (no acknowledge) |
| 2 | Alarm State | Usign8 | C/D | - | RAM | report | Alert transmission<br>1: Reported (transmitted)<br>2: Not reported (not transmitted) |
| 3 | Time Stamp | Time | C/D | - | RAM | 0 | Time when the alarm occurred |
| 4 | Subcode | Usign16 | C/D | - | RAM | 0 | BLOCK_ERR value when the alarm occurred |
| 5 | Value | Usign8 | C/D | - | RAM | 0 | Not used |
| 37 | ALARM_SUM | DS-74 | C/M | | | | Alarm summary of the RB |
| 1 | Current | Bit[2] | C/D | - | RAM | 0 | Alarm that is currently in effect (indicated using Bits)<br>Bit 0: Write lock alarm<br>Bit 1: HI_HI alarm<br>Bit 2: HI alarm<br>Bit 3: LO_LO alarm<br>Bit 4: LO alarm<br>Bit 7: Block alarm |
| 2 | Unacknowledged | Bit[2] | C/D | - | RAM | 0 | Alert not acknowledged by the host (the correspondence between the bits and alarms is the same as Current) |
| 3 | Unreported | Bit[2] | C/D | - | RAM | 0 | Untransmitted alert (the correspondence between the bits and alarms is the same as Current) |
| 4 | Disabled | Bit[2] | C/S | ANY | EEP | 0xffff | Variable used to set whether to activate the alarm (the correspondence between the bits and alarms is the same as Current) |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 38 | ACK_OPTION | Bit[2] | C/S | ANY | EEP | 0x81 | Variable used to set the auto acknowledge of alarms (specify the alarms to auto acknowledge using bits. The correspondence between the bits and alarms is the same as Current of ALARM_SUM) |
| 39 | WRITE_PRI | Usign8 | C/S | ANY | EEP | 0 | Priority of the WRITE_LOCK alarm<br>Value: 0, 1, 3 through 15 |
| 40 | WRITE_ALM | DS-72 | C/D | | | | State of the WRITE_LOCK alert |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | Response to the alert transmission<br>1: Acknowledged (acknowledged, specifiable)<br>2: Unacknowledged (no acknowledge) |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | Alert state<br>1: Clear-reported (clear write lock, transmitted)<br>2: Clear-not reported (clear write lock, not transmitted)<br>3: Active-reported (write lock transmitted)<br>4: Active-not reported (write lock not transmitted) |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | Time when the alarm occurred |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | Not used. |
| | 5 Value | Usign8 | C/D | - | RAM | 0 | WRITE_LOCK value when the alarm occurred |
| | 41 ITK_VER | Usign16 | C/S | - | - | 4 | Version of the interoperability test (ITK) that the DX/MV conducted |
| 42 | SOFT_REV | Visible[32] | C/N | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 43 | SOFT_DESC | Visible[32] | C/N | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 44 | SIM_ENABLE_MSG | Visible[32] | C/N | ANY | - | | Variable used to turn On/Off the Simulation Jumper<br>The Simulation Jumper is turned ON when "REMOTE LOOP TEST SWITCH" is written (Off otherwise. Off when the power is turned Off) |
| 45 | DEVICE_STATUS_1 | Bit[4] | C/D | - | RAM | 0 | Variable that indicates the status of the RB and VCR (section 5.3) |
| 46 | DEVICE_STATUS_2 | Bit[4] | C/D | - | RAM | 0 | Variable that indicates the status of the TB and identification information (section 5.3) |
| 47 | DEVICE_STATUS_3 | Bit[4] | C/D | - | RAM | 0 | Variable that indicates the status of AI-1 through AI-8 (section 5.3) |
| 48 | DEVICE_STATUS_4 | Bit[4] | C/D | - | RAM | 0 | Variable that indicates the status of the MAI (section 5.3) |
| 49 | DEVICE_STATUS_5 | Bit[4] | C/D | - | RAM | 0 | Variable that indicates the status of the MAO (section 5.3) |
| 50 | DEVICE_STATUS_6 | Bit[4] | C/D | - | RAM | 0 | Not used |
| 51 | DEVICE_STATUS_7 | Bit[4] | C/D | - | RAM | 0 | Not used |
| 52 | DEVICE_STATUS_8 | Bit[4] | C/D | - | RAM | 0 | Not used |

## Transducer Block (First index number: 2000)

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 0 | BLOCK | DS-64 | C/S | | | | Structure information of the block |
| | 1 Block Tag | Visible[32] | C/S | OOS | EEP | TB | Block tag (up to 32 characters). Must be unique within the segment. |
| | 2 DD Member ID | Usign32 | C/S | - | - | 0x0 | DD search key |
| | 3 DD Item ID | Usign32 | C/S | - | - | 0x20010 | DD search key |
| | 4 DD Revision | Usign16 | C/S | - | - | 1 | DD revision |
| | 5 Profile | Usign16 | C/S | - | - | 0x9801 | Block type, TB is “0x9801” |
| | 6 Profile Revision | Usign16 | C/S | - | - | 0x0001 | Profile revision |
| | 7 Execution Time | Usign32 | C/S | - | - | 0 | Execution time (“0” for TB because it is self-run at all times) |
| | 8 Period of Execution | Usign32 | C/S | ANY | EEP | 0 | Execution period (“0” for TB because it is self-run at all times) |
| | 9 Number of Parameters | Usign16 | C/S | - | - | 25 | Number of parameters making up the block |
| | 10 Next FB to Execute | Usign16 | C/S | ANY | EEP | 0 | Only a value “0” is acceptable. |
| | 11 Starting Index of Views | Usign16 | C/S | - | - | 40200 | Start index of VIEW_1 |
| | 12 Number of VIEW_3 | Usign8 | C/S | - | - | 1 | Number of VIEW_3s |
| | 13 Number of VIEW_4 | Usign8 | C/S | - | - | 1 | Number of VIEW_4s |
| 1 | ST_REV | Usign16 | C/S | - | EEP | 0 | Static parameter revision. The value increases every time a value is written to the static parameter. |
| 2 | TAG_DESC | Octet[32] | C/S | ANY | EEP | (all space) | User memo area |
| 3 | STRATEGY | Usign16 | C/S | ANY | EEP | 1 | User memo area |
| 4 | ALERT_KEY | Usign8 | C/S | ANY | EEP | 1 | See the explanation of the RB parameter. |
| 5 | MODE_BLK | DS-69 | C/M | | | | Mode setting and indication |
| | 1 Target | Bit[1] | C/N | ANY | EEP | auto | Transition destination mode setting |
| | 2 Actual | Bit[1] | C/D | - | RAM | auto | Current mode |
| | 3 Permitted | Bit[1] | C/S | ANY | EEP | auto\|oos | Permitted modes for transition |
| | 4 Normal | Bit[1] | C/S | ANY | EEP | auto | Transition destination mode when resuming to normal operation. |
| 6 | BLOCK_ERR | Bit[2] | C/D | - | RAM | 0 | Block error state (section 5.2) |
| 7 | UPDATE_EVT | DS-73 | C/D | | | | Update event state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Update State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Static Revision | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Relative Index | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 8 | BLOCK_ALM | DS-72 | C/D | | | | Block alarm status |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Value | Usign8 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 9 | TRANSDUCER_DIREC.. | Array[1] | C/N | | | | Information of the “Transducer” of the TB |
| | 1 Number of Transduc.. | Usign16 | C/N | - | - | 0 | The number of “Transducers.” The DX/MV has a single Transducer. |
| 10 | TRANSDUCER_TYPE | Usign16 | C/N | - | - | other | “Transducer” type. |
| 11 | XD_ERROR | Usign8 | C/D | - | RAM | 0 | “Transducer” error state. |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 12 | COLLECTION_DIRECT.. | Array[1] | C/N | | | | Information of the “Transducer” of the TB |
| | 1 Number of Collections | Usign32 | C/N | - | - | 0 | The number of “Collections.” The DX/MV has a single Collection. |
| 13 | AI_MAP | Array[8] | C/S | | | | Mapping between the measurement and computation channels of the DX/MV and the AI channels |
| | 1 AI_MAP | Usign16 | C/S | OOS | EEP | 1 | Measurement or computation channel number to be connected to AI-1 |
| | 2 AI_MAP | Usign16 | C/S | OOS | EEP | 2 | Measurement or computation channel number to be connected to AI-2 |
| | 3 AI_MAP | Usign16 | C/S | OOS | EEP | 3 | Measurement or computation channel number to be connected to AI-3 |
| | 4 AI_MAP | Usign16 | C/S | OOS | EEP | 4 | Measurement or computation channel number to be connected to AI-4 |
| | 5 AI_MAP | Usign16 | C/S | OOS | EEP | 5 | Measurement or computation channel number to be connected to AI-5 |
| | 6 AI_MAP | Usign16 | C/S | OOS | EEP | 6 | Measurement or computation channel number to be connected to AI-6 |
| | 7 AI_MAP | Usign16 | C/S | OOS | EEP | 7 | Measurement or computation channel number to be connected to AI-7 |
| | 8 AI_MAP | Usign16 | C/S | OOS | EEP | 8 | Measurement or computation channel number to be connected to AI-8 |
| 14 | MAI_MAP | Array[8] | C/S | | | | Mapping between the measurement and computation channels of the DX/MV and the OUT_1 through OUT_8 of the MAI. |
| | 1 MAI_MAP | Usign16 | C/S | OOS | EEP | 1 | Measurement or computation channel number to be connected to OUT_1 |
| | 2 MAI_MAP | Usign16 | C/S | OOS | EEP | 2 | Measurement or computation channel number to be connected to OUT_2 |
| | 3 MAI_MAP | Usign16 | C/S | OOS | EEP | 3 | Measurement or computation channel number to be connected to OUT_3 |
| | 4 MAI_MAP | Usign16 | C/S | OOS | EEP | 4 | Measurement or computation channel number to be connected to OUT_4 |
| | 5 MAI_MAP | Usign16 | C/S | OOS | EEP | 5 | Measurement or computation channel number to be connected to OUT_5 |
| | 6 MAI_MAP | Usign16 | C/S | OOS | EEP | 6 | Measurement or computation channel number to be connected to OUT_6 |
| | 7 MAI_MAP | Usign16 | C/S | OOS | EEP | 7 | Measurement or computation channel number to be connected to OUT_7 |
| | 8 MAI_MAP | Usign16 | C/S | OOS | EEP | 8 | Measurement or computation channel number to be connected to OUT_8 |
| 15 | MAO_MAP | Array[8] | C/S | | | | Mapping between the communication input channels of the DX/MV and IN_1 through IN_8 of the MAO |
| | 1 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_1 |
| | 2 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_2 |
| | 3 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_3 |
| | 4 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_4 |
| | 5 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_5 |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| | 6 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_6 |
| | 7 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_7 |
| | 8 MAO_MAP | Usign16 | C/S | OOS | EEP | 0 | Communication input channel number to be connected to IN_8 |
| 16 | ALARM_SUM | DS-74 | C/M | | | | Displays the alarm summary of the TB |
| | 1 Current | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 2 Unacknowledged | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 3 Unreported | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Disabled | Bit[2] | C/S | ANY | EEP | 0xffff | See the explanation of the RB parameter. |
| 17 | DEV_ID | Visible[32] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 18 | DEV_KEY | Usign16 | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 19 | EEPROM_STATE | Octet[32] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 20 | UART_STATISTICS | Array[5] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 21 | STACK_STATISTICS_1 | Array[17] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 22 | STACK_STATISTICS_2 | Array[2] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 23 | STACK_CONF | Usign16 | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |
| 24 | EXEC_FB_CNT | Array[11] | C/D | --------For Manufacturer's use only. Do not operate this parameter.--------- | | | |

## AI Function Block
## (First index numbers: 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700)

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 0 | BLOCK | DS-64 | C/S | | | | Structure information of the block |
| | 1 Block Tag | Visible[32] | C/S | OOS | EEP | AI-1*1 | Block tag (up to 32 characters). Must be unique within the segment. |
| | 2 DD Member ID | Usign32 | C/S | - | - | 0x0 | DD search key |
| | 3 DD Item ID | Usign32 | C/S | - | - | 0x800201d0 | DD search key |
| | 4 DD Revision | Usign16 | C/S | - | - | 1 | DD revision |
| | 5 Profile | Usign16 | C/S | - | - | 0x0101 | Block type<br>MAI is “0x0101.” |
| | 6 Profile Revision | Usign16 | C/S | - | - | 0x0001 | Profile revision |
| | 7 Execution Time | Usign32 | C/S | - | - | 960 | Execution time (the unit is 1/32 ms, read only) |
| | 8 Period of Execution | Usign32 | C/S | ANY | EEP | 32000 | Execution period (the unit is 1/32 ms, read only) |
| | 9 Number of Parameters | Usign16 | C/S | - | - | 37 | Number of parameters making up the block |
| | 10 Next FB to Execute | Usign16 | C/S | ANY | EEP | 0 | The FB to be executed next. Only a value “0” is acceptable. |
| | 11 Starting Index of Views | Usign16 | C/S | - | - | 40400*2 | Start index of VIEW_1 |
| | 12 Number of VIEW_3 | Usign8 | C/S | - | - | 1 | Number of VIEW_3s |
| | 13 Number of VIEW_4 | Usign8 | C/S | - | - | 1 | Number of VIEW_4s |
| 1 | ST_REV | Usign16 | C/S | - | EEP | 0 | Static parameter revision.<br>The value increases every time a value is written to the static parameter. |
| 2 | TAG_DESC | Octet[32] | C/S | ANY | EEP | (all space) | User memo area |
| 3 | STRATEGY | Usign16 | C/S | ANY | EEP | 1 | User memo area |
| 4 | ALERT_KEY | Usign8 | C/S | ANY | EEP | 1 | See the explanation of the RB parameter. |
| 5 | MODE_BLK | DS-69 | C/M | | | | Mode setting and indication |
| | 1 Target | Bit[1] | C/N | ANY | EEP | oos | Transition destination mode setting |
| | 2 Actual | Bit[1] | C/D | - | RAM | oos | Current mode |
| | 3 Permitted | Bit[1] | C/S | ANY | EEP | auto\|man\|oos | Permitted modes for transition |
| | 4 Normal | Bit[1] | C/S | ANY | EEP | auto | Transition destination mode when resuming to normal operation. |
| 6 | BLOCK_ERR | Bit[2] | C/D | - | RAM | 0 | Block error state (section 5.2) |
| 7 | PV | DS-65 | C/D | | | | Analog data |
| | 1 Status | Usign8 | C/D | - | RAM | bad, non-specific | PV Status |
| | 2 Value | Float | C/D | - | RAM | 0 | PV Value |
| 8 | OUT | DS-65 | O/N | | | | Output data from the AI |
| | 1 Status | Usign8 | O/N | - | RAM | bad, non-specific | OUT Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT Value |
| 9 | SIMULATE | DS-82 | C/D | | | | Pass the specified value to FIELD_VAL or PV in place of the value received from the TB. |
| | 1 Simulate Status | Usign8 | C/D | ANY | RAM | bad, non-specific | Status of the manually set value |
| | 2 Simulate Value | Float | C/D | ANY | RAM | 0 | Manually set value |
| | 3 Transducer Status | Usign8 | C/D | - | RAM | bad, non-specific | Status of the value received from the TB |
| | 4 Transducer Value | Float | C/D | - | RAM | 0 | Value received from the TB |

*1 Initial values for eight AIs are AI-1, AI-2, AI-3, AI-4, AI-5, AI-6, AI-7, and AI-8 respectively.
*2 Initial values for eight AIs are 40400, 40410, 40420, 40430, 40440, 40450, 40460, and 40470, respectively.

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| | 5 Enable/Disable | Usign8 | C/D | ANY | RAM | disable | Turns On/Off Simulate<br>1: simulate Disabled (disable output of the manually set value)<br>2: simulate Enabled (enable output of the manually set value) |
| 10 | XD_SCALE | DS-68 | C/S | | | | Scaling variable<br>The scaled value is FIELD_VAL. |
| | 1 EU at 100 % | Float | C/S | OOS | EEP | 100 | 100% value (engineering unit) |
| | 2 EU at 0 % | Float | C/S | OOS | EEP | 0 | 0% value (engineering unit) |
| | 3 Units Index | Usign16 | C/S | OOS | EEP | % | Unit (enter using a value)<br>1001: °C, 1243: mV, etc. |
| | 4 Decimal Point | Usign8 | C/S | OOS | EEP | 0 | Number of digits below the decimal point to be displayed |
| 11 | OUT_SCALE | DS-68 | C/S | | | | Scaling variable<br>The scaled value is PV. |
| | 1 EU at 100 % | Float | C/S | OOS | EEP | 100 | 100% value (engineering unit) |
| | 2 EU at 0 % | Float | C/S | OOS | EEP | 0 | 0% value (engineering unit) |
| | 3 Units Index | Usign16 | C/S | OOS | EEP | % | Unit (enter using a value)<br>1001: °C, 1243: mV, etc. |
| | 4 Decimal Point | Usign8 | C/S | OOS | EEP | 0 | Number of digits below the decimal point to be displayed |
| 12 | GRANT_DENY | DS-70 | C/D | | | | Not used |
| | 1 Grant | Bit[1] | C/D | ANY | RAM | 0 | Not used |
| | 2 Deny | Bit[1] | C/D | ANY | RAM | 0 | Not used |
| 13 | IO_OPTS | Bit[2] | C/S | OOS | EEP | 0 | Specify the selections for the process procedure of the output parameter (OUT).<br>The DX/MV supports only low cut (bit 10 is 1). |
| 14 | STATUS_OPTS | Bit[2] | C/S | OOS | EEP | propagate failure | Specify the selections for the process procedure of the Status of the output parameter (OUT).<br>The DX/MV only supports "pass the value to OUT without activating the alarm even when the Status from the TB is “Bad, Device Failure” or “Bad, sensor failure.” |
| 15 | CHANNEL | Usign16 | C/S | OOS | EEP | 1* | Channel number for connecting the TB and AI (specify 1 through 8) |
| 16 | L_TYPE | Usign8 | C/S | MAN | EEP | direct | Method in making the value from the TB into FIELD_VAL or PV.<br>1: Direct<br>2: Indirect<br>3: Ind Sqr Root |
| 17 | LOW_CUT | Float | C/S | ANY | EEP | 0 | Low cut value for the PV (value with an engineering unit, non-negative value) |
| 18 | PV_FTIME | Float | C/S | ANY | EEP | 0 | Time constant of the first order delay filter for the PV (the unit is seconds) |

* Initial values for eight AIs are 1, 2, 3, 4, 5, 6, 7, and 8 respectively.

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 19 | FIELD_VAL | DS-65 | C/D | | | | Analog value |
| | 1 Status | Usign8 | C/D | - | RAM | bad, non-specific | FIELD_VAL Status |
| | 2 Value | Float | C/D | - | RAM | 0 | FIELD_VAL Value |
| 20 | UPDATE_EVT | DS-73 | C/D | | | | Update event state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Update State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Static Revision | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Relative Index | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 21 | BLOCK_ALM | DS-72 | | | | | Block alarm status |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Value | Usign8 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 22 | ALARM_SUM | DS-74 | C/D | | | | Displays the alarm summary of the AI |
| | 1 Current | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 2 Unacknowledged | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 3 Unreported | Bit[2] | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Disabled | Bit[2] | C/S | ANY | EEP | 0 | See the explanation of the RB parameter. |
| 23 | ACK_OPTION | Bit[2] | C/S | ANY | EEP | 0 | Sets auto acknowledge of the alarm (specify the alarm to auto acknowledge using bits. Section 3.9) |
| 24 | ALARM_HYS | Float | C/S | ANY | EEP | 0.5 | Alarm hysteresis<br>Specify in the range 0 to 50% of the alarm value (for HI, HI_HI, LO, and LO_LO alarms) |
| 25 | HI_HI_PRI | Usign8 | C/S | ANY | EEP | 0 | Priority of the HI_HI alarm<br>Value: 0, 1, 3 through 15 |
| 26 | HI_HI_LIM | Float | C/S | ANY | EEP | +INF | HI_HI alarm value for OUT (value with the same engineering unit as OUT) |
| 27 | HI_PRI | Usign8 | C/S | ANY | EEP | 0 | Priority of the HI alarm<br>Value: 0, 1, 3 through 15 |
| 28 | HI_LIM | Float | C/S | ANY | EEP | +INF | HI alarm value for OUT (value with the same engineering unit as OUT) |
| 29 | LO_PRI | Usign8 | C/S | ANY | EEP | 0 | Priority of the LO alarm<br>Value: 0, 1, 3 through 15 |
| 30 | LO_LIM | Float | C/S | ANY | EEP | -INF | LO alarm value for OUT (value with the same engineering unit as OUT) |
| 31 | LO_LO_PRI | Usign8 | C/S | ANY | EEP | 0 | Priority of the LO_LO alarm<br>Value: 0, 1, 3 through 15 |
| 32 | LO_LO_LIM | Float | C/S | ANY | EEP | -INF | LO_LO alarm value for OUT (value with the same engineering unit as OUT) |
| 33 | HI_HI_ALM | DS-71 | C/D | | | | HI_HI Alarm state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | Response to the alarm transmission<br>1: Acknowledged (acknowledged, specifiable)<br>2: Unacknowledged (no acknowledge) |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | Alarm transmission<br>1: Clear-Reported (cleared, transmitted)<br>2: Clear-Not reported (cleared, not transmitted)<br>3: Active-Reported (active, transmitted)<br>4: Active-Not reported (active, not transmitted) |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | Time when the alarm occurred |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | Not used |
| | 5 Value | Float | C/D | - | RAM | 0 | OUT value when the alarm occurred |
| 34 | HI_ALM | DS-71 | C/D | | | | HI Alarm state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the description of the HI_HI alarm section. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the description of the HI_HI alarm section. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 5 Value | Float | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| 35 | LO_ALM | DS-71 | C/D | | | | LO alarm state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the description of the HI_HI alarm section. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the description of the HI_HI alarm section. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 5 Value | Float | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| 36 | LO_LO_ALM | DS-71 | C/D | | | | LO_LO alarm state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the description of the HI_HI alarm section. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the description of the HI_HI alarm section. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |
| | 5 Value | Float | C/D | - | RAM | 0 | See the description of the HI_HI alarm section. |

## MAI Function Block (First index number: 9000)

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 0 | BLOCK | DS-64 | C/S | | | | Structure information of the block |
| | 1 Block Tag | Visible[32] | C/S | OOS | EEP | MAI-1 | Block tag (up to 32 characters). Must be unique within the segment. |
| | 2 DD Member ID | Usign32 | C/S | - | - | 0x0 | DD search key |
| | 3 DD Item ID | Usign32 | C/S | - | - | 0x800209b0 | DD search key |
| | 4 DD Revision | Usign16 | C/S | - | - | 1 | DD revision |
| | 5 Profile | Usign16 | C/S | - | - | 0x0130 | Block type<br>MAI is “0x0130.” |
| | 6 Profile Revision | Usign16 | C/S | - | - | 0x0001 | Profile revision |
| | 7 Execution Time | Usign32 | C/S | - | - | 960 | Execution time (the unit is 1/32 ms, read only) |
| | 8 Period of Execution | Usign32 | C/S | ANY | EEP | 32000 | Execution period (the unit is 1/32 ms, read only) |
| | 9 Number of Parameters | Usign16 | C/S | - | - | 18 | Number of parameters making up the block |
| | 10 Next FB to Execute | Usign16 | C/S | ANY | EEP | 0 | The FB to be executed next. Only a value “0” is acceptable. |
| | 11 Starting Index of Views | Usign16 | C/S | - | - | 40900 | Start index of VIEW_1 |
| | 12 Number of VIEW_3 | Usign8 | C/S | - | - | 1 | Number of VIEW_3s |
| | 13 Number of VIEW_4 | Usign8 | C/S | - | - | 1 | Number of VIEW_4s |
| 1 | ST_REV | Usign16 | C/S | - | EEP | 0 | Static parameter revision<br>The value increases every time a value is written to the static parameter. |
| 2 | TAG_DESC | Octet[32] | C/S | ANY | EEP | (all space) | User memo area |
| 3 | STRATEGY | Usign16 | C/S | ANY | EEP | 1 | User memo area |
| 4 | ALERT_KEY | Usign8 | C/S | ANY | EEP | 1 | See the explanation of the RB parameter. |
| 5 | MODE_BLK | DS-69 | C/M | | | | Mode setting and indication |
| | 1 Target | Bit[1] | C/N | ANY | EEP | oos | Transition destination mode setting |
| | 2 Actual | Bit[1] | C/D | - | RAM | oos | Current mode |
| | 3 Permitted | Bit[1] | C/S | ANY | EEP | auto\|man\|oos | Permitted modes for transition |
| | 4 Normal | Bit[1] | C/S | ANY | EEP | auto | Transition destination mode when resuming to normal operation. |
| 6 | BLOCK_ERR | Bit[2] | C/D | - | RAM | 0 | Block error state (section 5.2) |
| 7 | CHANNEL | Usign16 | C/S | OOS | EEP | 9 | Channel number used to connect the TB and MAI |
| 8 | OUT_1 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_1 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_1 Value |
| 9 | OUT_2 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_2 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_2 Value |
| 10 | OUT_3 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_3 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_3 Value |
| 11 | OUT_4 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_4 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_4 Value |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 12 | OUT_5 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_5 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_5 Value |
| 13 | OUT_6 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_6 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_6 Value |
| 14 | OUT_7 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_7 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_7 Value |
| 15 | OUT_8 | DS-65 | O/N | | | | Data to be output |
| | 1 Status | Usign8 | O/N | MAN | EEP | bad, non-specific | OUT_8 Status |
| | 2 Value | Float | O/N | MAN | EEP | 0 | OUT_8 Value |
| 16 | UPDATE_EVT | DS-73 | C/D | | | | Update event state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Update State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Static Revision | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Relative Index | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 17 | BLOCK_ALM | DS-72 | C/D | | | | Block alarm status |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Value | Usign8 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |

## MAO Function Block (First index number: 10000)

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 0 | BLOCK | DS-64 | C/S | | | | Structure information of the block |
| | 1 Block Tag | Visible[32] | C/S | OOS | EEP | MAO-1 | Block tag (up to 32 characters). Must be unique within the segment. |
| | 2 DD Member ID | Usign32 | C/S | - | - | 0x0 | DD search key |
| | 3 DD Item ID | Usign32 | C/S | - | - | 0x800209d0 | DD search key |
| | 4 DD Revision | Usign16 | C/S | - | - | 1 | DD revision |
| | 5 Profile | Usign16 | C/S | - | - | 0x0131 | Block type, MAO is “0x0131.” |
| | 6 Profile Revision | Usign16 | C/S | - | - | 0x0001 | Profile revision |
| | 7 Execution Time | Usign32 | C/S | - | - | 960 | Execution time (the unit is 1/32 ms, read only) |
| | 8 Period of Execution | Usign32 | C/S | ANY | EEP | 32000 | Execution period (the unit is 1/32 ms, read only) |
| | 9 Number of Parameters | Usign16 | C/S | - | - | 29 | Number of parameters making up the block |
| | 10 Next FB to Execute | Usign16 | C/S | ANY | EEP | 0 | The FB to be executed next. Only a value “0” is acceptable. |
| | 11 Starting Index of Views | Usign16 | C/S | - | - | 41000 | Start index of VIEW_1 |
| | 12 Number of VIEW_3 | Usign8 | C/S | - | - | 1 | Number of VIEW_3s |
| | 13 Number of VIEW_4 | Usign8 | C/S | - | - | 1 | Number of VIEW_4s |
| 1 | ST_REV | Usign16 | C/S | - | EEP | 0 | Static parameter revision. The value increases every time a value is written to the static parameter. |
| 2 | TAG_DESC | Octet[32] | C/S | ANY | EEP | (all space) | User memo area |
| 3 | STRATEGY | Usign16 | C/S | ANY | EEP | 1 | User memo area |
| 4 | ALERT_KEY | Usign8 | C/S | ANY | EEP | 1 | See the explanation of the RB parameter. |
| 5 | MODE_BLK | DS-69 | C/M | | | | Mode setting and indication |
| | 1 Target | Bit[1] | C/N | ANY | EEP | oos | Transition destination mode setting |
| | 2 Actual | Bit[1] | C/D | - | RAM | oos | Current mode |
| | 3 Permitted | Bit[1] | C/S | ANY | EEP | auto\|man\|oos | Permitted modes for transition |
| | 4 Normal | Bit[1] | C/S | ANY | EEP | auto | Transition destination mode when resuming to normal operation. |
| | 6 BLOCK_ERR | Bit[2] | C/D | - | RAM | 0 | Block error status (section 5.2) |
| 7 | CHANNEL | Usign16 | C/S | OOS | EEP | 10 | Channel number used to connect the TB and MAO |
| 8 | IN_1 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_1 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_1 Value |
| 9 | IN_2 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_2 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_2 Value |
| 10 | IN_3 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_3 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_3 Value |
| 11 | IN_4 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_4 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_4 Value |
| 12 | IN_5 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_5 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_5 Value |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| 13 | IN_6 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_6 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_6 Value |
| 14 | IN_7 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_7 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_7 Value |
| 15 | IN_8 | DS-65 | I/N | | | | Retrieved data |
| | 1 Status | Usign8 | I/N | ANY | RAM | bad, not connect | IN_8 Status |
| | 2 Value | Float | I/N | ANY | RAM | 0 | IN_8 Value |
| 16 | MO_OPTS | Bit[2] | C/S | ANY | EEP | 0 | Set the process procedure of IN_1 through IN_8 Values.<br>Bit 0: Set whether to store (1: yes/0: no) the FSTATE_VAL1 value to IN_1 Value when IN_1 lapse into fault state.<br>Bit 1: IN_2, FSTATE_VAL2<br>Bit 2: IN_3, FSTATE_VAL3<br>Bit 3: IN_4, FSTATE_VAL4<br>Bit 4: IN_5, FSTATE_VAL5<br>Bit 5: IN_6, FSTATE_VAL6<br>Bit 6: IN_7, FSTATE_VAL7<br>Bit 7: IN_8, FSTATE_VAL8<br>Bits 8-15: See section 3.7 |
| 17 | FSTATE_TIME | Float | C/S | ANY | EEP | 0 | Time from the point when IN_1 through IN_8 become abnormal to the point when transition is made to Fault State. |
| 18 | FSTATE_VAL1 | Float | C/S | ANY | EEP | 0 | Value to store in IN_1 Value when IN_1 enters the Fault State condition |
| 19 | FSTATE_VAL2 | Float | C/S | ANY | EEP | 0 | Value to store in IN_2 Value when IN_2 enters the Fault State condition |
| 20 | FSTATE_VAL3 | Float | C/S | ANY | EEP | 0 | Value to store in IN_3 Value when IN_3 enters the Fault State condition |
| 21 | FSTATE_VAL4 | Float | C/S | ANY | EEP | 0 | Value to store in IN_4 Value when IN_4 enters the Fault State condition |
| 22 | FSTATE_VAL5 | Float | C/S | ANY | EEP | 0 | Value to store in IN_5 Value when IN_5 enters the Fault State condition |
| 23 | FSTATE_VAL6 | Float | C/S | ANY | EEP | 0 | Value to store in IN_6 Value when IN_6 enters the Fault State condition |
| 24 | FSTATE_VAL7 | Float | C/S | ANY | EEP | 0 | Value to store in IN_7 Value when IN_7 enters the Fault State condition |
| 25 | FSTATE_VAL8 | Float | C/S | ANY | EEP | 0 | Value to store in IN_8 Value when IN_8 enters the Fault State condition |
| 26 | FSTATE_STATUS | Usign8 | C/D | - | RAM | 0 | Indicates whether IN_1 through IN_8 is in the Fault State condition.<br>Bit 0: 1 when IN_1 is fault state<br>Bits 1-7: Corresponds to the IN_2 through IN_8 conditions |
| 27 | UPDATE_EVT | DS-73 | C/D | | | | Update event state |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Update State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 4 Static Revision | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Relative Index | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| 28 | BLOCK_ALM | DS-72 | C/D | | | | Block alarm status |
| | 1 Unacknowledged | Usign8 | C/D | ANY | RAM | ack | See the explanation of the RB parameter. |
| | 2 Alarm State | Usign8 | C/D | - | RAM | report | See the explanation of the RB parameter. |
| | 3 Time Stamp | Time | C/D | - | RAM | 0 | See the explanation of the RB parameter. |

| R | Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| | 4 Subcode | Usign16 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |
| | 5 Value | Usign8 | C/D | - | RAM | 0 | See the explanation of the RB parameter. |

## Link Object (Index number 30000 to 30025)

| Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|
| FB Link | DS-81 | - | | | | Link Object |
| 1 Local Index | Usign16 | - | ANY | EEP | 0 | See section 3.11. |
| 2 VCR Number | Usign16 | - | ANY | EEP | 0 | See section 3.11. |
| 3 Remote Index | Usign16 | - | ANY | EEP | 0 | See section 3.11. |
| 4 Service Operation | Usign8 | - | ANY | EEP | 0 | See section 3.11. |
| 5 Stale Count Limit | Usign8 | - | ANY | EEP | 0 | See section 3.11. |

## Alert Object (Index number 31000 to 31002)

- Three Alert Objects with index numbers 31000 through 31002 are for process alarms (31000), for block alarms and write lock alarms (31001), and for update events (31002), respectively.
- Alert Object for update events does not have subparameters “8 Subcode” and “9 Value.” They are replaced by “8 Relative Index” and “9 Unit Index” in the following table.

| Parameter | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|
| Alert | DS-75 | - | | | | Alert Object |
| 1 Block Index | Usign16 | - | - | - | - | First index No. of the block alarm occurred |
| 2 Alert Key | Usign8 | - | - | - | - | A copy of ALERT_KEY value |
| 3 Standard Type | Usign8 | - | - | - | - | Type of alarm<br>1: LO - Low limit<br>2: HI - High limit<br>3: LO_LO - Criticl low limit<br>4: HI_HI - Critical high limit<br>8: BLOCK - Block alarm<br>9: UPDATE - Static data update<br>10: WRITE - Write protect changed |
| 4 Mfr Type | Usign8 | - | - | - | - | Not used |
| 5 Message Type | Usign8 | - | - | - | - | Cause of alert<br>1: Event Notification (update event)<br>2: Alarm Clear<br>3: Alarm Occur |
| 6 Priority | Usign8 | - | - | - | - | Priority of alert (1 to 15) |
| 7 Time Stamp | Time | - | - | - | - | Time alarm or update event occurred |
| 8 Subcode | Usign16 | - | - | - | - | Subcode (see section 4.2) |
| 9 Value | Float | - | - | - | - | Value (see section 4.2) |
| 10 Relative Index | Usign16 | - | - | - | - | Relative index number of the parameter that indicate the state of the alarm (BLOCK_ALM, HI_ALM, WRITE_ALM, UPDATE_EVT, etc.) |
| 11 Unit Index | Usign16 | - | - | - | - | A copy of Unit Index of the parameters that indicate alarm state (HI_ALM, WRITE_ALM, etc). For BLOCK_ALM and UPDATE_EVT, “0” enters. |

## Trend Object (Index number 32000 to 32007)

| Parameter | | Data Type | Attribute | Write | Store | Initial Value | Description |
|---|---|---|---|---|---|---|---|
| Trend Float | | DS-78 | - | | | | Trend Object |
| 1 | Block Index | Usign16 | - | ANY | EEP | 0 | See section 3.8. |
| 2 | Relative Index | Usign16 | - | ANY | EEP | 0 | See section 3.8. |
| 3 | Sample Type | Usign8 | - | ANY | EEP | 0 | See section 3.8. |
| 4 | Sample Interval | Usign32 | - | ANY | EEP | 0 | See section 3.8. |
| 5 | Last Update | Time | - | - | - | - | The last sampling time |
| 6 | Status | Usign8 | - | - | - | - | Status* of the sampled data |
| : | : | : | - | - | - | - | : |
| 21 | Status | Usign8 | - | - | - | - | Status of the sampled data |
| 22 | Value | Float | - | - | - | - | Value* of the sampled data |
| : | : | : | - | - | - | - | : |
| 37 | Value | Float | - | - | - | - | Value of the sampled data |

* Status of the subindex No.6 and Value of the subindex No.22 are Status and Value of the the latest data.

## Veiw Object

See section 1.2.

# Index

## A



## B



## C



## D



## E



## F



## G



## H

## I



## L



## M



## N



## O



## P



## Q



## R



## S

## T



## U



## V



## W



## X