User´s Manual

ROTA*METER* RAMC

Variable Area Flowmeter

PROFIBUS PA Communication Type

IM 01R01B02-01E-E, supplementary instructions to standard RAMC User´s Manual IM 01R01B02-00E-E

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Contents

1. Introduction

1.1 Target group

The following persons are the target group of this manual:
- Technicians
- Engineers

This manual along with its applicable documents enable the target group to complete the following steps:
- Installation
- Commissioning
- Configuration (parametrization)
- Integration of the flow meter into a process control system
- Troubleshooting
- Maintenance and repair

1.2 Applicable documents

The following documents supplement this manual:
- User´s Manual (IM) IM01R01B02-00□-E
- General Specifications (GS) GS01R01B02-00E-E

1.3 General items

This manual is additional to IM01R01B02-00□-E.
For safety instructions and warranty please see chapter 1 of IM01R01B02-00□-E.

This manual contains a description of the RAMC Metal Rotameter with PROFIBUS PA Communication Type. PROFIBUS PA communication type is similar to the HART communication type in terms of basic performance and operation.
This manual describes only those topics that are required for operation of the PROFIBUS PA communication type and that are not contained in IM01R01B02-00□-E.
Before use, read this manual thoroughly and familiarize yourself fully with the features, operations and handling of Rotameter RAMC to have the instrument deliver its full capabilities and to ensure its efficient and correct use.

2. About PROFIBUS PA

2.1 Outline

PROFIBUS is a registered trademark of PROFIBUS Nutzerorganisation e.V., Karlsruhe, Germany.

PROFIBUS is a manufacturer-independent and open fieldbus communication protocol based on the international standards IEC 61158 and IEC 61784. It covers a wide range of applications in manufacturing and process control systems. Profibus PA is a bi-directional digital communication protocol for field devices, which offers an advancement in implementation technologies for process control systems and is widely employed by numerous field devices.

RAMC PROFIBUS communication type employs the specification standardized by the PNO, and provides interoperability between Yokogawa devices and those produced by other manufacturers.

2.2 Internal Structure of RAMC PROFIBUS PA

RAMC contains three function blocks which are implemented in accordance with Profile 3.02.

(1) Physical block
- Manages the status of RAMC hardware.
- Automatically informs the host of any detected faults or other problems.

(2) Transducer block
- Converts sensor output to flow rate signal and transfers to AI function block.

(3) AI function block
- Conditions raw data from the Transducer block.
- Outputs flow rate signals.
- Carries out scaling extraction.

2.3 Logical Device Structure

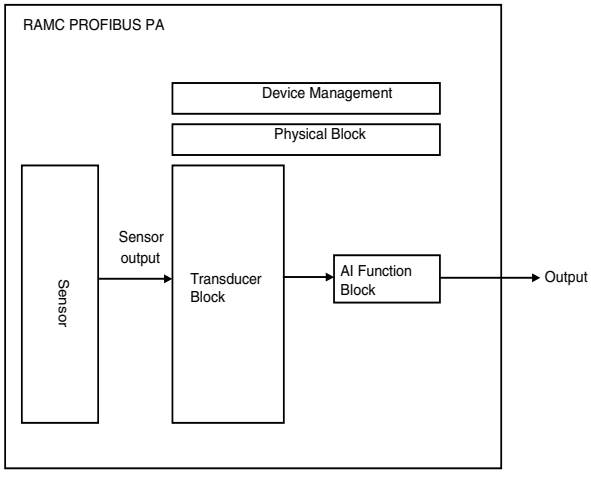


Figure 2.1 Logical Device Structure

3. Installation

3.1 Wiring System Configuration

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

3.2 Connection of Devices

The following instruments are required for use with PROFIBUS PA devices:

- **Terminator:**
  PROFIBUS PA requires two terminators at the end of the segment
- **Segment Coupler:**
  PROFIBUS PA requires the segment coupler which adopts to the RS-485 signals to the IEC 61158-2 signal level.
- **Field devices:**
  Connect RAMC PROFIBUS PA communication type. Two or more RAMC devices or other devices can be connected.
- **Master:**
  Used for accessing field devices. A dedicated master (such as DCS or PLC) is used for an instrumentation line while dedicated communication tools are used for experimental purposes. For operation of the master, refer to the instruction manual for each master. No details of the master are explained in the rest of this manual.
- **Cable:**

NOTE

The PROFIBUS specification must be regarded.

Two-core twisted and shielded cables are recommended, otherwise the EMC-requirements for industrial flow meters can not be guaranteed.
EN 50170 specifies two types of bus cables. For transmission rates up to 1.5 Mbit/s, cable type A is recommended.

It is recommended to connect the shield on both sides to ground. Compensation currents on ground lines must be avoided. Therefore the shield may be connected to ground on one side (e.g. in control cubicle) via capacitor to ground.
The potential equalization must be connected to the flow meter.
If the shield is only connected on supply side, reduction of EMC immunity is possible.

NOTE

In case of insufficient cable shielding and grounding, degrading of EMC immunity is possible.

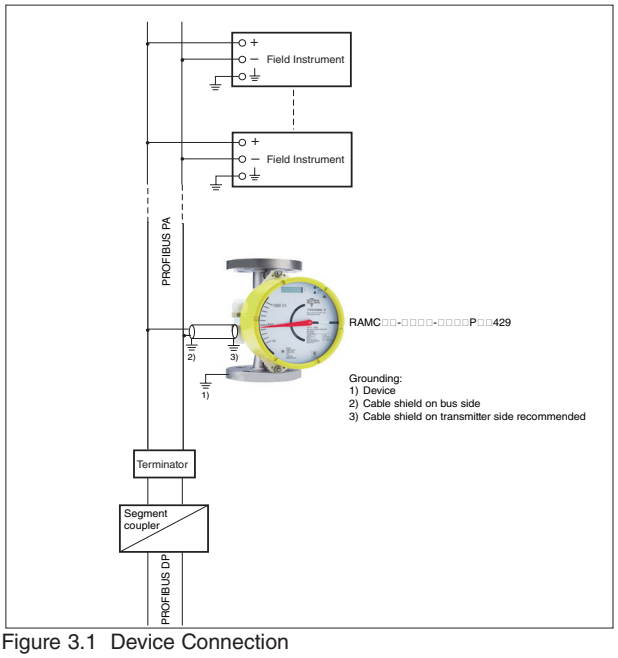


Figure 3.1 Device Connection

Connection assignment in RAMC housing:

Connect the cable conductors of the fieldbus cable to the fieldbus terminals 2 and 3.

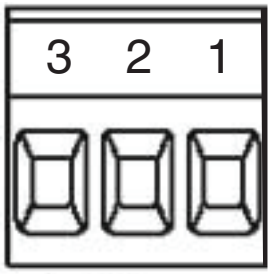


Figure 3.2 Connector at transmitter

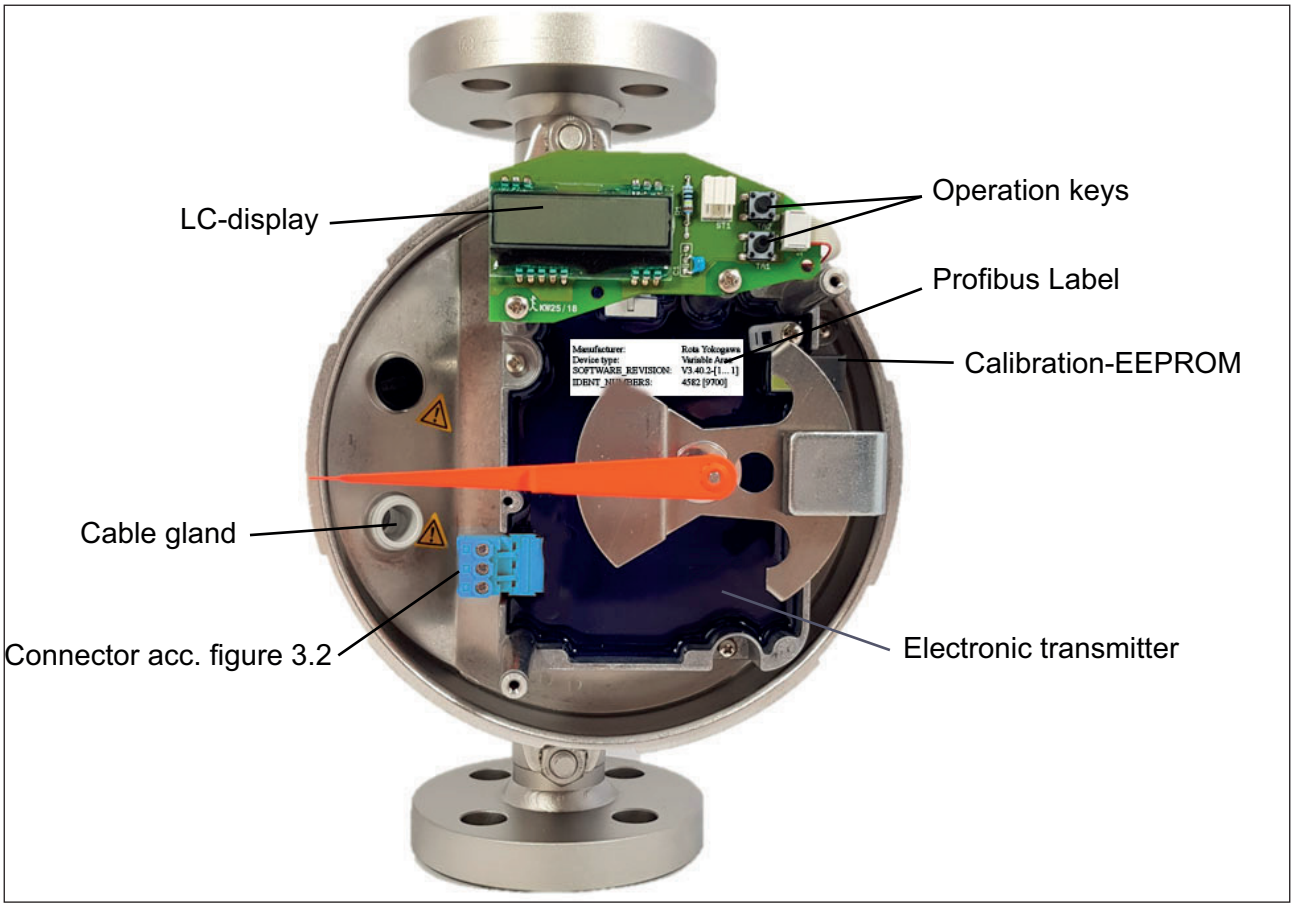


Figure 3.3 RAMC PA Overview

CAUTION

- If the fieldbus device is operated at ambient temperatures above +50 °C, the supply voltage of the device must be above 9.5 V.
- For installation in hazardous area chapter 7 must be regarded.

4. Start of Operation

4.1 Integration of GSD

PROFIBUS PA system requires GSD file which describes the device parameters such as the transmission rate supported, input, output data, data format and data length.
The GSD files described below are available to RAMC.
You can download the GSD file from http://www.profibus.com/products/gsd-files/.
Table 4.1 GSD files

GSD file name	Ident. Number	Comment
PA139700.GSD (AIx1)	0x9700	Profile specific
RY014582.GSD	0x4582	Device specific

4.2 Important Device Settings

The tables below show items (parameters) which need special care to ensures a proper working of the RAMC Profibus type.

Table 4.1 General settings

Item	Settings
Bus address	Set to 0x7E (126) by default unless otherwise specified when ordered

In case of unit change (compared to initial ordering) it is recommended to change the OUT_SCALE parameter as described in table 4.3 only. Change of the Process Variable needs in addition the changes described in the tables 4.2 and 4.3.

Table 4.2 Initial settings of Transducer Block

Item	Settings for Volume flow	Settings for Mass flow
Parameter: VOLUME_FLOW_UNITS	Choose unit (initially set to unit specified when ordered)	Not active 1("Volume flow passivated")
Parameter: MASS_FLOW_UNITS	Not active 1 ("Mass flow passivated")	Choose unit (initially set to unit specified when ordered)

NOTE

Change of the parameters VOLUME_FLOW_UNITS to MASS_FLOW_UNITS or vice versa needs in addition the adaptation of the parameter CHANNEL inside the AI block, to make the change effective on the OUT parameter.

Table 4.3 Initial settings of AI Function Block

Item	Settings for Volume flow	Settings for Mass flow
Parameter: PV_SCALE Sub-parameter: Array 1	Set upper range limit (set to scale upper range as specified when ordered)	
Parameter: PV_SCALE Sub-parameter: Array 2	Set lower range limit (set to scale lower range as specified when ordered)	
Parameter: OUT_SCALE Sub-parameter: Units_Index	Choose unit (set to unit specified when ordered)	
Parameter: OUT_SCALE Sub-parameter: EU_at_100%	Set upper range limit (set to scale upper range as specified when ordered)	
Parameter: OUT_SCALE Sub-parameter: EU_at_0%	Set lower range limit (set to scale lower range as specified when ordered)	
Parameter: CHANNEL	0x0111 (273)	0x0115 (277)

4.3 Cyclic Data Exchange

The RAMC is preset in factory and should work after integration into the system. In case of parameter adjustment the items described in former section need special care to ensure cyclic data exchange.
The OUT parameter transfers Value and Status of the device.

NOTE

The parameters OUT_SCALE and PV_SCALE need reconfiguration in case of:
- Factory Reset
- Unit change of the Process Variable (PV)

4.4 Setting of Write Protection

A write protection is a function to forbid changing of parameters. It is possible to set the software write protection by the Physical Block parameter WRITE_LOCKING. When WRITE_LOCKING is "0: Lock", the status of write protect becomes protected mode. When WRITE_LOCKING is "2457: Disabled", the status becomes unprotected mode.

4.5 Using the Keys

In PA devices there is no local operating menu available.
Pressing the "arrow up" button the indication can be changed between flow, totalizer and temperature.
Factory default is totalizer.
Pressing the "arrow right" button an error indication appears on display.
- 00000000 or
- 00000000

A detailed explanation see chapter 6.

4.6 Menu Structure

Within this chapter the EDD and DTM labels of the menu structures are shown. The labels are also indicated in the parameters description in Appendix 1.

Offline structure:

Device	Physical Block	Block Configuration	Static Revision No.	
			TAG	
			Strategy	
			Alert Key	
			Target Mode	
			Actual Mode	
			Block Object	
			Parent Class	
			Class	
			Device Revision	
			Device Revision Compatibility	
			Profile	
			Profile Revision	
			No. of Parameters	
			Current State Alarm Sum	
		Device Identification	Manufacturer	
			Device Id	
			Device Serial Num	
			Software Revision	
			Hardware Revision	
			Electr. Serial No.	
		Device Features	FEATURE_Supported	
			FEATURE_Enabled	
		Device Settings	Write Locking	
			Descriptor	
			Message	
			Installation Date	
			Ident Number Selector	
		Device Diagnosis	Diagnosis Mask	
			Diagnosis	
		Device Diagnosis Extension	Diagnosis Extension Mask	
			Diagnosis Extension	
		Diagnosis/Status Configuration	Condensed Status/Diagnosis	
			Serial Communication Failure	Diagnosis Mapping:
				Status Mapping:

RAM Error	Diagnosis Mapping:
	Status Mapping:
ADC Error	Diagnosis Mapping:
	Status Mapping:
Adj-EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Cal-EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Totalizer Value False	Diagnosis Mapping:
	Status Mapping:
EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Float Blocking Error	Diagnosis Mapping:
	Status Mapping:
Temperature Error	Diagnosis Mapping:
	Status Mapping:
Volume Flow Overrun	Diagnosis Mapping:
	Status Mapping:
Mass Flow Overrun	Diagnosis Mapping:
	Status Mapping:
Autozero Running	Diagnosis Mapping:
	Status Mapping:
Operate Timer Error	Diagnosis Mapping:
	Status Mapping:
Float Blocking Active	Diagnosis Mapping:
	Status Mapping:
Volume Flow Low Limit	Diagnosis Mapping:
	Status Mapping:
Volume Flow High Limit	Diagnosis Mapping:
	Status Mapping:
Mass Flow Low Limit	Diagnosis Mapping:
	Status Mapping:
Mass Flow High Limit	Diagnosis Mapping:
	Status Mapping:

Transducer Block	Block Configuration	Static Revision No.	
		TAG	
		Strategy	
		Alert Key	
		Target Mode	
		Actual Mode	
		Block Object	
		Parent Class	
		Class	
		No. of Parameters	
		Current State Alarm Sum	
	Flow Configuration	Settings	Volume Flow Unit
			Mass Flow Unit
			Default Channel
			Display Selection
		Volume Flow	Volume Flow
			Volume Flow Status
			Volume Flow High Limit
			Volume Flow Low Limit
			Flow Percent
		Mass Flow	Mass Flow
			Mass Flow Status
			Mass Flow High Limit
			Mass Flow Low Limit
			Flow Percent
		Totalizer	Totalizer
			Totalizer Unit
			Totalizer Reset
		Fluid	Fluid Phase
			Flow Reference
			Fluid Name
	Device Information	Operation Parameter	Calibration Factor
			Nominal Size
			Nominal Size Unit
			Low Flow Cutoff
			Low Flow Cutoff Unit
		Operation Condition	Density
			Viscosity
			Pressure
			Ref. Pressure
			Temperature
			Oper. Condition

		Operation Time	Operation Time (Days)
			Operation Time (Hours)
			Operation Time (Minutes)
			Oper. Time Shadow (Days)
			Oper. Time Shadow (Hours)
			Oper. Time Shadow (Minutes)
		Indicator	FW Version
			HW Version
			Scale 100% Value
			Pointer Position
			Temperature
			Temperature Unit
			Electr. Long Tag
			EEPROM Version
			WT-MAG Type
			Module Version
		Device Identification	Serial Number (S/N)
			Model Code
			Device Version
	Diagnostic Functions	Event Handling	Event Overview 1
			Event Overview 2
			Event Overview 3
			Reset Errors
			Flow Status Handling
		Float Blocking	Float Blocking On
			Float Blocking Limit
			Float Blocking Time
			Float Blocking AZ On
			Float Blocking Autozero
Analog Input Block	Block Configuration	Static Revision No.	
		TAG	
		Strategy	
		Alert Key	
		Target Mode	
		Actual Mode	
		Block Object	
		Parent Class	
		Class	
		No. of Parameters	
		Current State Alarm Sum	
		Batch ID	
		Batch Unit	
		Batch Operation	
		Batch Phase	

PV Configuration	Channel
	Characterization Type
	PV Scale Upper Value
	PV Scale Lower Value
Output Configuration	Filter Time Constant
	OUT Scale Upper Value
	OUT Scale Lower Value
	OUT Unit
	Decimal Point
	OUT Unit Text
	OUT Value
	OUT Status
Failsafe	Fail Safe Mode
	Fail Safe Default Value
Alarms/Warnings	Limit Hysteresis
	Upper Limit Alarm
	Upper Limit Warning
	Lower Limit Warning
	Lower Limit Alarm
	Upper Unack. Alarm
	Upper Alarm Status
	Upper Alarm Output Value
	Upper Unack. Warning
	Upper Warning Status
	Upper Warning Output Value
	Lower Unack. Warning
	Lower Warning Status
	Lower Warning Output Value
	Lower Unack. Alarm
	Lower Alarm Status
	Lower Alarm Output Value
Simulation	Simulation Status
	Simulation Value
	Simulation

Online structure:

Device	PB Configuration	Block Configuration	Static Revision No.	
			TAG	
			Strategy	
			Alert Key	
			Target Mode	
			Actual Mode	
			Block Object	
			Parent Class	
			Class	
			Device Revision	
			Device Revision Compatibility	
			Profile	
			Profile Revision	
			No. of Parameters	
			Current State Alarm Sum	
		Device Identification	Manufacturer	
			Device Id	
			Device Serial Num	
			Software Revision	
			Hardware Revision	
			Electr. Serial No.	
		Device Features	FEATURE_Supported	
			FEATURE_Enabled	
		Device Settings	Write Locking	
			Descriptor	
			Message	
			Installation Date	
			Ident Number Selector	
		Device Diagnosis	Diagnosis Mask	
			Diagnosis	
		Device Diagnosis Extension	Diagnosis Extension Mask	
			Diagnosis Extension	
		Diagnosis/Status Configuration	Condensed Status/Diagnosis	
			Serial communication failure	Diagnosis Mapping:
				Status Mapping:
			RAM Error	Diagnosis Mapping:
				Status Mapping:

ADC Error	Diagnosis Mapping:
	Status Mapping:
Adj-EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Cal-EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Totalizer Value False	Diagnosis Mapping:
	Status Mapping:
EEPROM Error	Diagnosis Mapping:
	Status Mapping:
Float Blocking Error	Diagnosis Mapping:
	Status Mapping:
Temperature Error	Diagnosis Mapping:
	Status Mapping:
Volume Flow Overrun	Diagnosis Mapping:
	Status Mapping:
Mass Flow Overrun	Diagnosis Mapping:
	Status Mapping:
Autozero Running	Diagnosis Mapping:
	Status Mapping:
Operate Timer Error	Diagnosis Mapping:
	Status Mapping:
Float Blocking Active	Diagnosis Mapping:
	Status Mapping:
Volume Flow Low Limit	Diagnosis Mapping:
	Status Mapping:
Volume Flow High Limit	Diagnosis Mapping:
	Status Mapping:
Mass Flow Low Limit	Diagnosis Mapping:
	Status Mapping:
Mass Flow High Limit	Diagnosis Mapping:
	Status Mapping:

TB Configuration	Block Configuration	Static Revision No.
		TAG
		Strategy
		Alert Key
		Target Mode
		Actual Mode
		Block Object
		Parent Class
		Class
		No. of Parameters
		Current State Alarm Sum
	Settings	Volume Flow Unit
		Mass Flow Unit
		Default Channel
		Display Selection
	Volume Flow	Volume Flow
		Volume Flow Status
		Volume Flow High Limit
		Volume Flow Low Limit
		Flow Percent
	Mass Flow	Mass Flow
		Mass Flow Status
		Mass Flow High Limit
		Mass Flow Low Limit
		Flow Percent
	Totalizer	Totalizer
		Totalizer Unit
		Totalizer Reset
	Fluid	Fluid Phase
		Flow Reference
		Fluid Name
TB Device Information	Operation Parameter	Calibration Factor
		Nominal Size
		Nominal Size Unit
		Low Flow Cutoff
		Low Flow Cutoff Unit
	Operation Condition	Density
		Viscosity
		Pressure
		Ref. Pressure
		Temperature
		Oper. Condition

	Operation Time	Operation Time (Days)
		Operation Time (Hours)
		Operation Time (Minutes)
		Oper. Time Shadow (Days)
		Oper. Time Shadow (Hours)
		Oper. Time Shadow (Minutes)
	Indicator	FW Version
		HW Version
		Scale 100% Value
		Pointer Position
		Temperature
		Temperature Unit
		Electr. Long Tag
		EEPROM Version
		WT-MAG Type
		Module Version
	Device Identification	Serial Number (S/N)
		Model Code
		Device Version
TB Diagnostic Functions	Event Handling	Event Overview 1
		Event Overview 2
		Event Overview 3
		Reset Errors
		Flow Status Handling
	Float Blocking	Float Blocking On
		Float Blocking Limit
		Float Blocking Time
		Float Blocking AZ On
		Float Blocking Autozero
Analog Input Block	Block Configuration	Static Revision No.
		TAG
		Strategy
		Alert Key
		Target Mode
		Actual Mode
		Block Object
		Parent Class
		Class
		No. of Parameters
		Current State Alarm Sum
		Batch ID
		Batch Unit

			Batch Operation
			Batch Phase
		PV Configuration	Channel
			Characterization Type
			PV Scale Upper Value
			PV Scale Lower Value
		Output Configuration	Filter Time Constant
			OUT Scale Upper Value
			OUT Scale Lower Value
			OUT Unit
			Decimal Point
			OUT Unit Text
			OUT Value
			OUT Status
		Failsafe	Fail Safe Mode
			Fail Safe Default Value
		Alarms/Warnings	Limit Hysteresis
			Upper Limit Alarm
			Upper Limit Warning
			Lower Limit Warning
			Lower Limit Alarm
			Upper Unack. Alarm
			Upper Alarm Status
			Upper Alarm Output Value
			Upper Unack. Warning
			Upper Warning Status
			Upper Warning Output Value
			Lower Unack. Warning
			Lower Warning Status
			Lower Warning Output Value
			Lower Unack. Alarm
			Lower Alarm Status
			Lower Alarm Output Value
		Simulation	Simulation Status
			Simulation Value
			Simulation
	Factory Reset		

View	TB Process Variable VF	Volume Flow
		Volume Flow Status
		Volume Flow Unit
		Flow Percent

	TB Process Variable MF	Mass Flow
		Mass Flow Status
		Mass Flow Unit
		Flow Percent
	Analog Input Block	OUT Value
		OUT Status
Diag-nostics	Device Diagnosis	Diagnosis Mask
		Diagnosis
	Extended Device Diagnosis	Extended Diagnosos Mask
		Diagnosis Extension

5. Block Setting

This chapter contains information on how to adapt the function and performance of the RAMC to suit specific applications. If two or more devices are connected to PROFIBUS PA, settings including the requirements of all devices need to be determined. The following steps must be taken.

The following section describes each step of the procedure in the order given. Using a dedicated configuration tool allows the procedure to be significantly simplified. This section describes the procedure to be assigned for a master which has relatively simple functions.

5.1 Parameters and Initial Settings

The block parameters of the RAMC are listed and described inside the Appendix 1 “List of parameters for each block of the RAMC”. The initial parameter settings are also described there. Block parameters can be read and set (if writeable) from the host.

5.2 Physical Block (PB) Parameters

All important Physical Block parameters are listed below and described with more details to guide through the settings.

TARGET_MODE:
Indicates what mode of operation is desired for the Physical Block. Two block modes are available:
- Out of Service (O/S)
- Auto (AUTO)

MODE_BLK:
The sub-parameter “Actual” indicates the actual mode which is one of the target modes. The actual mode may differ from the target mode (e.g. affected by block mode setting of Physical Block).
- Out of Service: The copying of the DIAGNOSIS and DIAGNOSIS_EXTENSION parameter content to the PROFIBUS DP Slave_Diag service is stopped.

NOTE

In case of O/S the target mode of the AI Block is set to O/S too.

- Auto: Block function is set to active.

WRITE_LOCKING:
This parameter allows the protection of the Device setting (see also chapter 4.4):
- “0”: Lock
- “2457”: Disabled

FACTORY_RESET:
Using the Factory reset changes the setting of the device. The following different resets are available:
- “0”: No Function.
- “1”: Factory Reset. Sets all parameters to default settings. Bus address is not affected.
  Note: Chapter 4.2 needs to be considered.
- “2506”: Warm Start. Restart the device. All non-volatile parameters remain unchanged, all dynamic parameters are reset to their defaults.
- “2712”: Reset Address to 126. Other parameters are not affected.

COND_STATUS_DIAG:
This parameter allows changing of status and diagnosis handling:
- “0”: Classic Status and Diagnosis
- “1”: Condensed Status and Diagnosis

DIAG_EVENT_SWITCH:
This parameter enables changing of status and diagnosis handling in Condensed Status and Diagnosis state. It allows the user to set the event handling according to user's needs.

5.3 Analog Input (AI) Block Parameters

All important AI Block parameters are listed below and described with more details to guide through the settings.

TARGET_MODE:
Indicates what mode of operation is desired for the AI Function Block. The AI Function Block modes are:
- Out of Service (O/S)
- Manual (MAN)
- Auto (AUTO)

MODE_BLK:
The sub-parameter "Actual" indicates the actual mode which is one of the available modes of the TARGET _MODE. The actual mode may differ from the target mode (e.g. affected by block mode setting of Physical Block):
- Out of Service: the AI Block does not operate.
- Manual: Allows manual setting of the parameter OUT by the user. It does not allow automatic updated.
- Auto: Causes the OUT parameter to be updated automatically.

CHANNEL:
Defines the output parameter of the transducer block to be input to the AI block. AI block is assigned to:
- Volumetric flow rate
- Mass flow rate

OUT:
This parameter contains the value and the status used for cyclic data transfer. The content depends on several settings and status handling. It is writable in block mode: MAN.

OUT_SCALE:
Defines the output scale (range and unit). The output range needs setting from 0 % to 100 %. Available units are defined in chapter 5.4.

PV_SCALE:
Defines the input scale from the transducer block. The engineering unit of PV_SCALE high and low scale values are direct related to the VOLUME_FLOW_UNIT resp. MASS_FLOW_UNIT of the Transducer block. The unit is determined by order and printed on the indicator scale. Available units are defined in chapter 5.4.

PV_FTIME:
Sets the time constant of the damping function within AI block (primary delay) in seconds.

FSAFE_TYPE:
Used to set the handling of the AI block in case of "BAD" status messages, depending on the setting OUT value and status are affected as defined below:
- "0": Value: FSAFE_VALUE, Status: UNCERTAIN - Substitute Value
- "1": Value: last stored valid value, Status: UNCERTAIN - last usable value
- "2": Value: actual, Status: no adjustment

 **NOTE**

Depending on COND_STATUS_DIAG setting the OUT status differs.

5.4 Transducer Block (TB) Parameters

All important Transducer Block parameters are listed below and described with more details to guide through the settings.

TARGET_MODE:
Indicates what mode of operation is desired for the Transducer Block. Two block modes are available:
- Out of Service (O/S)
- Auto (AUTO)

MODE_BLK:
The sub-parameter "Actual" indicates the actual mode which is one of the target modes. The actual mode may differ from the target mode:
- Out of Service: sets the status of the Process Variables to "BAD…"
- Auto: Block function able to work.

NOMINAL_SIZE:
Shows the size of the flow tube in mm or inches.

NOMINAL_SIZE_UNIT:
Sets the unit of the flow tube size (in mm or inches).

VOLUME_FLOW_UNIT:
The units in table 5.5 are selectable. Presetting is determined by order.

LOW_FLOW_CUTOFF:
Sets low cut range for output. Setting range is 5 to 15 % of VOLUME_FLOW_HI_LIMIT or MASS_FLOW_HI_LIMIT. Factory setting: " 5 %"

VOLUME_FLOW:
Indicates the current measured value and status of the Process Variable (volumetric flow). This parameter is an input to the AI Function Block, if a volumetric unit is selected on the scale.

MASS_FLOW_UNIT:
The units in table 5.5 are selectable. Presetting is determined by order.

MASS_FLOW
Indicates the current measured value and status of the Process Variable (mass flow). This parameter is an default input to the AI Function block, if a mass flow unit is selected.

TEMPERATURE_UNIT
The unit in table 5.1 is determined by order and derived from the selected flow unit.

Table 5.1 Units for Indicator temperature

Unit Symbol	Unit Description	Unit Code
°C	Degree Celsius	1001
°F	Degree Fahrenheit	1002
K	Kelvin	1000

TEMPERATURE
Indicates the indicator temperature value as selected by TEMPERATURE_UNIT.
This parameter can not be used for cyclic communication on AI Function Block.

TOTALIZER_UNIT

The totalizer unit is defined from the selected flow unit and determined by order. Table 5.2 and 5.3 show the available units as defined in the PROFIBUS standard.

Table 5.2 Totalizer units for volumetric flow

Unit Symbol	Unit Description	Unit Code
m^3	Cubic meter	1034
m^3 normal	Normal cubic meter (0 °C, 1atm = 101325 Pa)	1573
L	Liter	1038
L normal	Normal liter (0 °C, 1 atm = 101325 Pa)	1574
ft^3	Cubic foot	1043
ft^3 std.	Standard cubic foot	1053
gal	Gallon (U.S.)	1048
bbl	Barrel (U.S. petroleum)	1051
ImpGal	Gallon (Imperial)	1049
m^3 std.	Standard cubic meter (20 °C, 1 atm = 101325 Pa)	1575
L std.	Standard liter (20 °C, 1 atm = 101325 Pa)	1576

Table 5.3 Totalizer units for mass flow

Unit Symbol	Unit Description	Unit Code
kg	Kilogram SI	1088
t	Metric ton	1092
lb	Pound (Avoirdupois)	1094
LTon	Long ton	1096
STon	Short ton	1095
g	Gram	1089

TOTALIZER

Indicates the totalized volumetric or mass flow depending on the selected flow unit.
Changing the flow unit will cause a reset of the actual totalizer value.
The parameter TOTALIZER can not be used for cyclic communication on AI Function Block.

FLOW UNITS

The tables 5.4 and 5.5 show all flow units available for the process variables as defined inside the PROFIBUS standard. These units are also available for the OUT parameter.

Table 5.4 Volume Flow

Unit Symbol PA Standard	Unit Symbol EDD	Unit Description	Unit Code
L/h	L/h	L/h	1353
L/min	L/min	Liter per minute	1352
L/s	L/s	Liter per second	1351
m³/d	m³/d	Cubic meter per day	1350
m³/h	m³/h	Cubic meter per hour	1349
m³/min	m³/min	Cubic meter per minute	1348
m³/s	m³/s	Cubic meter per second	1347
ImpGal/d	ImpGal/d	Gallon (Imperial) per day	1370
ImpGal/h	ImpGal/h	Gallon (Imperial) per hour	1369
ImpGal/min	ImpGal/min	Gallon (Imperial) per minute	1368
ImpGal/s	ImpGal/s	Gallon (Imperial) per second	1367
gal/d	gal/d	Gallon (U.S.) per day	1365
gal/h	gal/h	Gallon (U.S.) per hour	1364
gal/min	gal/min	Gallon (U.S.) per minute	1363
gal/s	gal/s	Gallon (U.S.) per second	1362
ft³/d	CFD	Cubic foot per day	1359
ft³/h	CFH	Cubic foot per hour	1358
ft³/min	CFM	Cubic foot per minute	1357
ft³/s	CFS	Cubic foot per second	1356
bbl/d	bbl/d	Barrel per day	1374
bbl/h	bbl/h	Barrel per hour	1373
bbl/min	bbl/min	Barrel per minute	1372
bbl/s	bbl/s	Barrel per second	1371
L/h normal	L/h normal	Normal liter per hour (0 °C, 1 atm = 1013.25 hPa)	1594
L/min normal	L/min normal	Normal liter per minute (0 °C, 1atm = 1013.25 hPa)	1593
m³/h normal	m³/h normal	Normal cubic meter per hour (0 °C, 1 atm = 1013.25 hPa)	1590
m³/min normal	m³/min normal	Normal cubic meter per minute (0 °C, 1 atm = 1013.25 hPa)	1589
ft³/h std.	SCFH	Standard cubic foot per hour	1361
ft³/min std.	SCFM	Standard cubic foot per minute	1360
L/h std.	L/h std.	Standard liter per hour (60 °F, 14.7 psia)	1602
L/min std.	L/min std.	Standard liter per minute (60 °F, 14.7 psia)	1601
m³/h std.	m³/h std.	Standard cubic meter per hour (60 °F, 14.7 psia)	1598
m³/min std.	m³/min std.	Standard cubic meter per minute (60 °F, 14.7 psia)	1597
-	-	Not Active	32768

Table 5.5 Mass Flow

Unit Symbol PA standard	Unit Symbol EDD	Unit Description	Unit Code
kg/d	kg/d	Kilogram per day	1325
kg/h	kg/h	Kilogram per hour	1324
kg/min	kg/min	Kilogram per minute	1323
kg/s	kg/s	Kilogram per second	1322
g/h	g/h	Gram per hour	1320
g/min	g/min	Gram per minute	1319
g/s	g/s	Gram per second	1318
t/d	t/d	Metric ton per day	1329
t/h	t/h	Metric ton per hour	1328
t/min	t/min	Metric ton per minute	1327
lb/d	lb/d	Pound per day	1333
lb/h	lb/h	Pound per hour	1332
lb/min	lb/min	Pound per minute	1331
lb/s	lb/s	Pound per second	1330
LTon/d	LTon/d	Long ton per day	1341
LTon/h	LTon/h	Long ton per hour	1340
LTon/min	LTon/min	Long ton per minute	1339
-	-	Not Active	32768

6. Status and Diagnostic Information

Status and Diagnostic Information is an important feature of PROFIBUS PA communication. This chapter helps to understand important details. The status enables a quality judgement of the delivered information and the Diagnostic allows the analysis of the cause.

In case of event the status byte of the OUT parameter indicates the changed situation. By using the Physical Block parameter DIAGNOSIS the user is able to get more information about the cause. The parameter DIAGNOSIS_EXTENSION makes specific information available.

All flagged diagnostic items in the parameters DIAGNOSIS_MASK and DIAGNOSIS_MASK _EXTENSION are supported inside RAMC.

As described in chapter 5.2 the user can switch between classical and condensed status and diagnostic information. Choosing the classical indication gives more details. The condensed indication is reduced and the status is aligned with NE 107 (see table 6.2).

In addition inside the Transducer Block the parameter DEVICE_STATUS1 to DEVICE_STATUS3 indicates several diagnostic information.

6.1 Status description

The status Byte attached to the Process Variables and the OUT parameter consists of three parts:

- Quality: informs about the status
- Substatus: details the status information
- Limits: Indicates limit violations

The status indication is based on the priority of the status, starting with the highest priority.
The tables below indicates the status information which may arise in case of events:

Table 6.1 Classic status

Quality	Substatus EDD	Limits	Value*	Priority
GOOD	-	*	0x80 … 0x83	Lowest
GOOD	warning	*	0x88 ... 0x8B	
GOOD	alarm	*	0x8B ... 0x8F	
UNCERTAIN	last usable value	*	0x44 … 0x47	
UNCERTAIN	substitute value	Value constant	0x4B	
UNCERTAIN	initial value	*	0x4C … 0x4F	
UNCERTAIN	Range violation	Limit overflow	0x56	
UNCERTAIN	sub-normal	ok	0x58 … 0x5B	
UNCERTAIN	Value uncertain	*	0x50 … 0x53	
BAD	configuration error	*	0x04 … 0x07	
BAD	sensor failure	*	0x10 … 0x13	
BAD	device failure	*	0x0C … 0x0F	
BAD	out of service	Value constant	0x1F	
BAD	out of service	ok	0x1C	Highest
* Limits status information as defined in table 6.3 cause value ranges				

Table 6.2 Condensed status

Quality	Sub status EDD	Limits	Value*	NE 107	Priority
GOOD	-	-	0x80	Good (G)	Lowest
GOOD	advisory alarm	Limit-underflow, Limit-overflow	0x89 0x8A	Good (G)	
GOOD	alarm	Limit-ok	0x8C	Good (G)	
GOOD	critical alarm	Limit-underflow, Limit-overflow	0x8D 0x8E	Good (G)	
GOOD	maintenance required	*	0xA4...0xA7	Maintenance (M)	
GOOD	maintenance demanded	*	0xA8...0xAB	Maintenance (M)	
GOOD	function check	*	0xBC…0xBF	Good (G)	
GOOD	update event	*	0x84 … 0x87	Good (G)	
UNCERTAIN	initial value	constant	0x4F	Failure (F)	
UNCERTAIN	process related, no maintenance	*	0x78...0x7B	Out of specification (S)	
UNCERTAIN	maintenance demanded	*	0x68...0x6B	Maintenance (M)	
UNCERTAIN	substitute set	constant	0x4B	Failure (F)	
BAD	process related, no maintenance	*	0x28...0x2B	Failure (F)	
BAD	maintenance alarm, more diagnosis available	*	0x24…0x27	Failure (F)	
UNCERTAIN	simulated value, start	-	0x73	Check (C)	
UNCERTAIN	simulated value, end	*	0x74 …0x77	Check (C)	
BAD	function check/local override	*	0x3C...0x3F	Check (C)	
BAD	passivated (diagnostic alerts inhibited)	-	0x23	Failure (F)	highest
* Limits status information as defined in table 6.3 cause value ranges					

Table 6.3 Limits indication in EDD

Limits indication in EDD				Additive value
Value-ok	Limit-ok	no limit	ok	+0x00
Limit underflow	Limit-underflow			+0x01
Limit overflow	Limit-overflow			+0x02
Value constant	Limit-Value constant	constant		+0x03

Table 6.4 Condensed Status configuration

Label	Low nibble (Diag_Status_Link)
GOOD, ok	0
GOOD, maintenance required	1
GOOD, maintenance demanded	2
UNCERTAIN, maintenance demanded	3
BAD, maintenance demanded	4
UNCERTAIN, process related, no maintenance	5
BAD, process related, no maintenance	6
BAD, function check /local overrride	7
GOOD, function check	8

6.2 Diagnostics

The table below indicates the Bit setting in case of Event:

Table 6.5 Event description and the effect on Display and Bit setting

			Bits of parameter					
			DEVICE_STATUS □			DIAGNOSIS_ EXTENSION		
Event description	**Blinking bars**	**Event on display**	**□ = 1**	**□ = 2**	**□ = 3**	**[1]****	**[2]****	**[3]****
Serial Communication Failure*	n.a.	n.a.				0		
RAM Error*	_ _ _ _ _ _ _ _	0000 0001	0			1		
ADC Error*	_ _ _ _ _ _ _ _	0000 0010	1			2		
Adj-EEPROM Error	_ _ _ _ _ _ _ _	0000 0100	2			3		
Cal-EEPROM Error*	_ _ _ _ _ _ _ _	0000 1000	3			4		
Totalizer Value False	_ _ _ _ _ _ _ _	0001 0000	4			5		
Flow Overrun	_ _ _ _ _ _ _ _	0010 0000	5			6		
EEPROM Error	_ _ _ _ _ _ _ _	0100 0000	6			7		
Float Blocking Error	_ _ _ _ _ _ _ _	1000 0000	7				0	
Temperature Error	_ _ _ _ _ _ _ _	0000 0001		0			1	
Volume Flow Overrun	_ _ _ _ _ _ _ _	0000 0010		1			2	
Mass Flow Overrun	_ _ _ _ _ _ _ _	0000 0100		2			3	
Autozero Running	n.a.	0000 1000		3			4	
Power Supply Failure	n.a.	0001 0000		4			5	
Operate Timer Error	n.a.	0010 0000		5			6	
Reserved 15	-	0100 0000		6			7	
Float Blocking Active	n.a.	1000 0000		7				0
Volume Flow Passivated	n.a.	n.a.			0			1
Mass Flow Passivated	n.a.	n.a.			1			2
Volume Flow Low Limit	n.a.	n.a.			2			3
Volume Flow High Limit	n.a.	n.a.			3			4
Mass Flow Low Limit	n.a.	n.a.			4			5
Mass Flow High Limit	n.a.	n.a.			5			6
Reserved 23	-	-			6			7
Reserved 24	-	-			7	-	-	-

* Note: In case of missing EEPROM, Display indicates "Cal-EEPROM Error" and BUS generates "Serial Communication Failure".
** Note: [n] indicates the n-th byte of the Parameter

Table 6.6 Classic diagnostics

Label	Octet	Bit
Memory checksum error	1	4
Electronic temperature too high	1	3
Hardware failure mechanics	1	1
Hardware failure of the electronic	1	0
Maintenance required	2	5
New start-up (warm startup) carried out	2	3
Restart (cold startup) carried out	2	4
Ident Number Violation	2	7
More information available	4	7

Table 6.7 Condensed diagnostics

Label	Octet	Bit
Maintenance required	2	5
New start-up (warm startup) carried out	2	3
Restart (cold startup) carried out	2	4
Ident Number Violation	2	7
Invalid process condition	3	3
Function check	3	2
Maintenance demanded	3	1
Failure of the device or armature	3	0
More information available	4	7

Table 6.8 Condensed Diagnosis configuration (Diag_Event_Switch)

Label	Octet	Bit	High nibble (Diag_Status_Link)
Ok	n.a.	n.a.	0
Check request	2	5	1
Immediate check request	3	1	2
Failure	3	0	3
Invalid process condition	3	3	4
Function check	3	2	5

6.3 Status impacts of Alarm settings

Within the Analog Input Block the RAMC provides the possibility to set alarms and warnings for indication of limit violations of the OUT parameter. The setting is done with the following parameters:

- HI_HI_LIM
- HI_LIM
- LO_LIM
- LO_LO_LIM

Limit violations of the OUT value directly affect the limit bits and the status information of the OUT status.

⚠ **CAUTION**

To avoid unusable alarm status information, the upper alarm /warning limits must always be used above the lower alarm /warning limit.

7. Explosion Protected Type Instruments

WARNING

- Only trained personnel may use the instrument in an industrial location.
- The instrument modification or replacement of parts by other than an authorized Representative of Yokogawa is prohibited and will void the certification.
- Electrostatic charge on painted or other non- metallic surfaces may cause an explosion hazard. Avoid any actions that cause the generation of electrostatic charge, such as rubbing with a dry cloth on painted surface of the indicator or on potting of electronic transmitter.

WARNING

The electronic transmitter RAMC□□-□□□□-□□□□-P□□429 /□S1 is an intrinsically safe device.
To ensure intrinsic safety it is not permitted to repair or to modify the electronic transmitter, the display or the calibration EEPROM.

In the case of high fluid temperatures, heated metering tubes or heat radiation by heat tracing, make sure that the temperature in the indicator housing does not exceed the permissible maximum ambient temperature of the transmitter (see below chapter 7.1.1).

7.1 Intrinsically Safe ATEX and IECEx certified electronic transmitter (/KS1, /ES1)

7.1.1 Technical data

The electronic transmitter is an intrinsically safe device. This device is certified for hazardous areas of zone 1 (category 2) and zone 2 (category 3). It is not homologated for zone 0 (category 1). The classifications in brackets are given according to Directive 2014/34/EU (ATEX).

EU-Type Examination Certificate No.: PTB 12 ATEX 2003 X
IECEx certificate No.: IECEx PTB12.0020X

Applicable standards:
EN 60079-0: 2018
EN 60079-11: 2012
IEC 60079-0: 2017 edition 7
IEC 60079-11: 2011 edition 6

Identification in accordance with Directive 2014/34/EU (ATEX):

CE 0344 Ex II 2 G

Type of protection:	Variant #1:	Ex ia IIB/IIC T4 Gb
	Variant #2:	Ex ia IIB/IIC T6 Gb
	Variant #3:	Ex ia IIB T6 Gb
	Variant #4:	Ex ia IIB/IIC T4 Gb
Ambient temperature:	Variant #1:	-40 °C to +70 °C
	Variant #2:	-40 °C to +50 °C
	Variant #3:	-40 °C to +60 °C
	Variant #4:	-40 °C to +70 °C

Parameters of PROFIBUS terminal:
Table 7.1 Variant #1 and #2:

Type	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	24 V	According IEC 60079-11 Annex G
Ii	380 mA	250 mA	
Pi	1.31 W	1.31 W	
Ci	negligible	negligible	
Li	negligible	negligible	

Table 7.2 Variant #3:

Type	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	---	According IEC 60079-11 Annex G
Ii	380 mA	---	
Pi	0.95 W	---	
Ci	negligible	---	
Li	negligible	---	

Table 7.3 Variant #4:

Type	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	24 V	According IEC 60079-11 Annex G
Ii	380 mA	250 mA	
Pi	2.53 W	2.53 W	
Ci	negligible	negligible	
Li	negligible	negligible	

7.1.2 Marking

Name plates on electronic transmitter:

Rota Yokogawa
Rheinstrasse 8
D-79664 Wehr
WT-MAG Mat. No. M38□□□□
Serial No. □□□□□□□

Ex ia IIB/IIC T6/T4 Gb
PTB 12 ATEX 2003 X
See certificate for data
FISCO field device
CE 0344 Ex **II 2G**

Ex ia IIB/IIC T6/T4 Gb
IECEx PTB12.0020X
See certificate for data
FISCO field device

7.1.3 Installation

For general installation description chapter 3.1 must be regarded.

Connection in RAMC housing:

Connect the cable conductors of the fieldbus cable to the fieldbus terminals as followed (see also Figure 3.3):

Table 7.4

	Connector ST1		
Variant	**Pin 1**	**Pin 2**	**Pin 3**
#1	X	X	not used
#2	X	X	not used
#3	X	X	not used
#4	not used	X	X

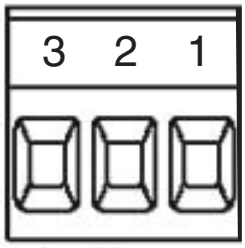


Figure 7.1 Profibus PA connector

NOTE

If the fieldbus device is operated as variant #1, #2 or #3, the supply voltage must be greater than 9.5 V below an ambient temperature of 50 °C, and greater than 10 V above 50 °C.

Grounding connection:

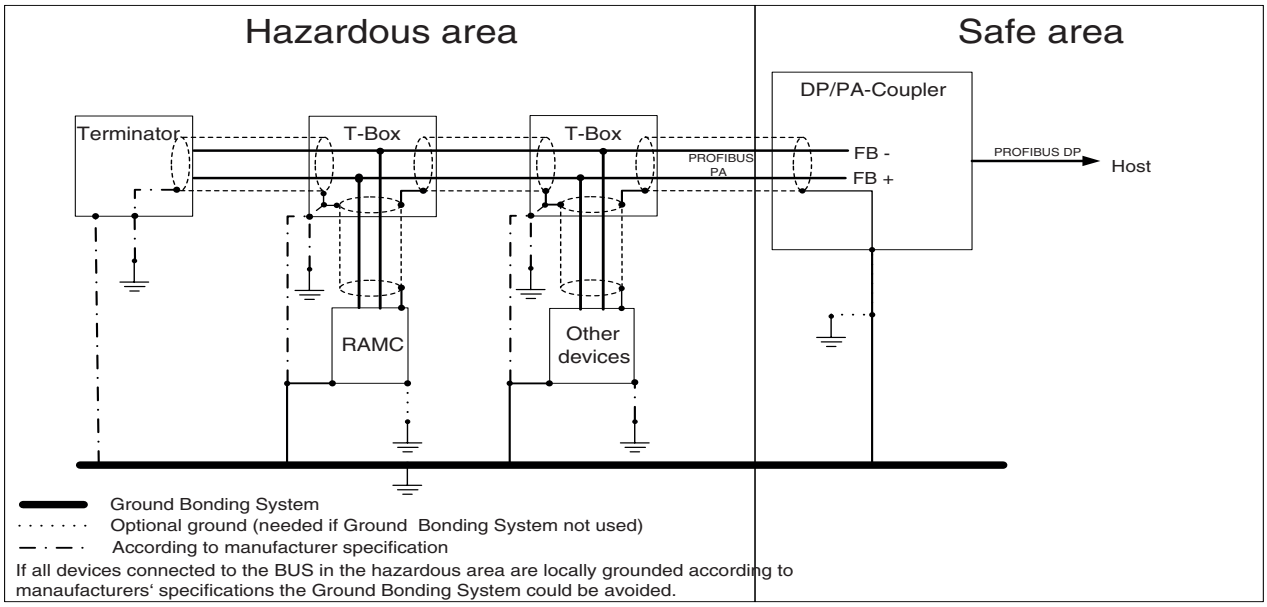


Figure 7.2 Possibility 1: Shield grounded in hazardous and safe area

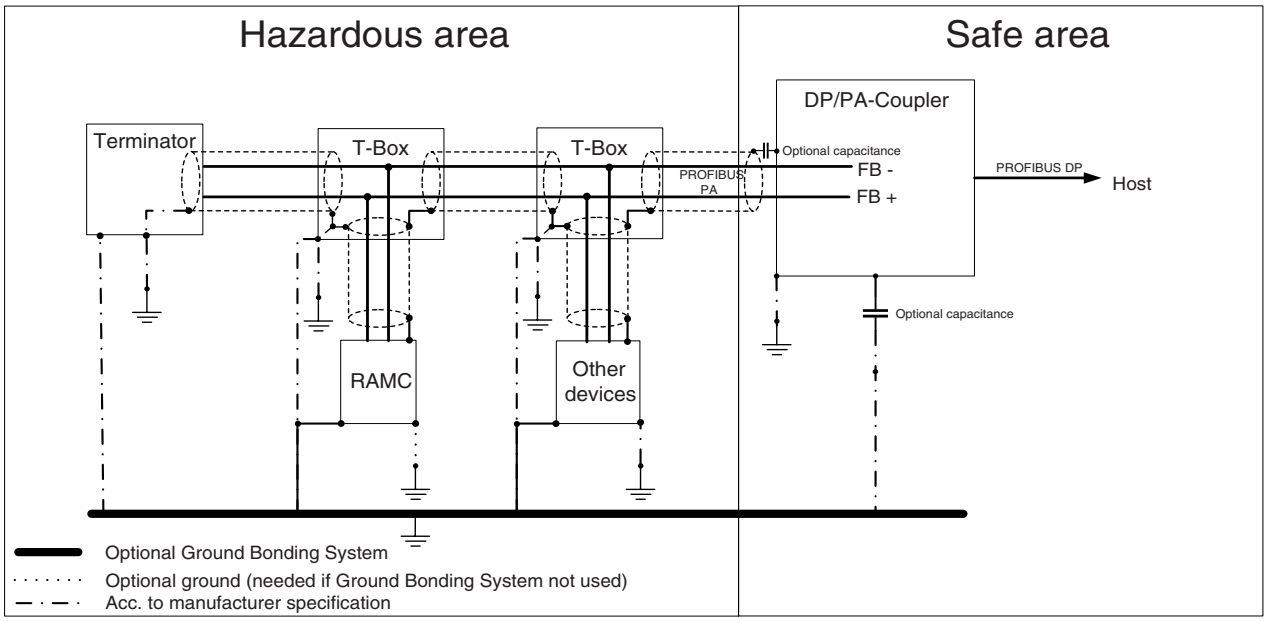


Figure 7.3 Possibility 2: Shield grounded in hazardous area

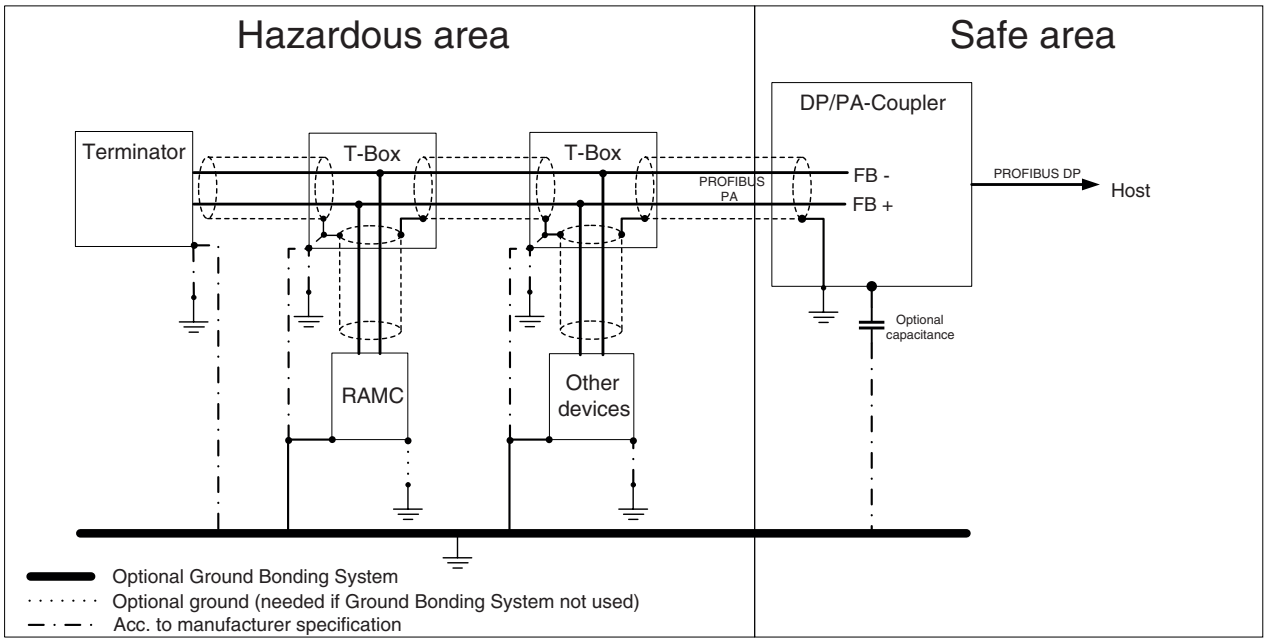


Figure 7.4 Possibility 3: Shield grounded in safe area

8. Service

In case of power down or defect electronic the device indicates compatibility information on an equipped label (see figure 3.3 for label position).

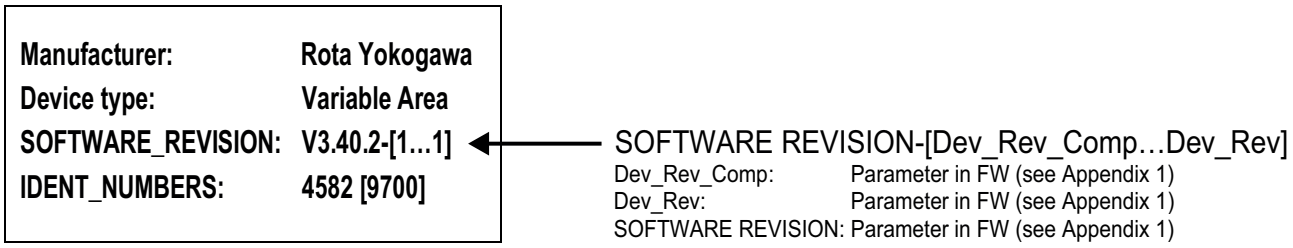


Figure 8.1 Profibus PA example label

The information enables a compatibility judgement for Device driver's revision (DEVICE_REVISION).

If the DEVICE_REVISION fulfils:

Dev_Rev_Comp ≤ DEVICE_REVISION ≤ Dev_Rev

the drivers are compatible with the device. E.g. an installed device driver (EDD or DTM) inside the host system can be used with a newer device as long as the Dev_Rev_Comp parameter indicates that the MS1/MS2 related behaviour of the device supports the older version.

The DEVICE_REVISION is integrated in the file name of the EDD as number nn, e.g. filename_nn_xx.

Appendix 1. List of Parameters for each Block of RAMC

NOTE

- With Factory Reset (setting: 1) the parameters OUT_SCALE and PV_SCALE must be reconfigured.
- When changing flow units, the parameter PV_SCALE must be reconfigured.
- Changes to the process variables between mass- and volume flow also require a change of the parameter CHANNEL in the AI block to make this change available in the OUT parameter.
- To avoid unusable alarm status information, the upper alarm/warning limits must always be above the lower alarm/warning limit.

Legend:

- "-": not defined
- "n.a.": not applicable
- R: Read
- W: Write

A1.1 Physical Block

Block name	Physical Block
Slot	0

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
16	BLOCK_OBJECT		-	DS-32	R/-	-	Indicates the following block characteristics
		Reserved	-	Unsigned8	R/-	250: Not used	For future use (not available)
		Block_Object	Block Object	Unsigned8	R/-	0x01: Physical Block	Kind of block
		Parent_Class	Parent Class	Unsigned8	R/-	0x01: Transmitter	Superior device classification
		Class	Class	Unsigned8	R/-	0x06: Variable Area Flow Meter	Device classification
		Dev_Rev	Device Revision	Unsigned16	R/-	1	Assigned device driver versions (e.g. EDD)
		Dev_Rev_Comp	Device Revision Compatibility	Unsigned16	R/-	1	Lowest device revision supported by the device
		DD_Revision	-	Unsigned16	R/-	1	For future use (not available)
		Profile	Profile	OctetString	R/-	0x40: PROFIBUS PA Profile for Process Control Devices, 0x02: Compact Class B	Used Profile
		Profile_Revision	Profile Revision	Unsigned16	R/-	0x0302: Version 3.02	Used Profile version
		Execution_Time	-	Unsigned8	R/-	0	For future use (not available)
		Number_of_ Parameters	No. of Parameters	Unsigned16	R/-	39	Number of used parameters
		Address_of_ View_1	-	Unsigned16	R/-	0x00E6: slot 0, index 230	Reference to View_1 parameter
		Number_of_Views	-	Unsigned8	R/-	2	Number of Views available
17	ST_REV		Static Revision No.	Unsigned16	R/-	0	Indicates the revision level of the described block. Increments each time a static parameter (S) changes
18	TAG_DESC		TAG	OctetString	R/W	RAMC-PA_P or det. by ordered scale	Block specific TAG for customer use
19	STRATEGY		Strategy	Unsigned16	R/W	0	User-specified value e.g. for configu-ration or diagnostics as a sorting key

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
20	ALERT_KEY		Alert Key	Unsigned8	R/W	0	User-specified value for event allocation e.g. identification of the plant unit
21	TARGET_MODE		Target Mode	Unsigned8	R/W	0x08: AUTO (permitted bit only!)	Indicates and sets the target mode of the block
22	MODE_BLK		-	DS-37	R/-	-	Indicates block mode overview by sub-parameters
		Actual	Actual Mode	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the current mode
		Permitted	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates possible modes
		Normal	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the usual mode during normal operation
23	ALARM_SUM		-	DS-42	R/-	-	Maintain alert status by sub-parameters
		Current	Current State Alarm Sum	OctetString	R/-	0x0000: No Alarm (no modification indicated)	Indicates Update Events (static parameter modification)
		Unacknowledged	-	OctetString	R/-	0	For future use (not available)
		Unreported	-	OctetString	R/-	0	For future use (not available)
		Disabled	-	OctetString	R/-	0	For future use (not available)
24	SOFTWARE_ REVISION		Software Revision	Visible String	R/-	E.g.: V3.40.2.21846	Indicates revision-number of the software of the field device.
25	HARDWARE_ REVISION		Hardware Revision	Visible String	R/-	E.g.: cM-MBP V1.04	Indicates revision-number of the hardware of the field device.
26	DEVICE_MAN_ID		Manufacturer	Unsigned16	R/-	0x0037: Yokogawa	Indicates the field device manufacturer
27	DEVICE_ID		Device Id	Visible String	R/-	Rotameter RAMC	Indicates the name of the field device
28	DEVICE_SER_ NUM		Device Serial Num	Visible String	R/-	E.g.: commMod 173200252	Indicates the serial number of the communication module.
29	DIAGNOSIS		Diagnosis	Octet String	R/-	0x00,0x00,0x00, 0x00	Shows diagnostic device information (simultaneous messages possible)
30	DIAGNOSIS_ EXTENSION		Diagnosis Extension	Octet String	R/-	0x00,0x00,0x00, 0x00,0x00,0x00	Shows additional diagnostic device information
31	DIAGNOSIS_ MASK		Diagnosis Mask	Octet String	R/-	Condensed: 0x00,0xB8,0x0F, 0x80 Classic: 0x1B, 0xB8, 0x00,0x80	Definition of supported DIAGNOSIS bits.
32	DIAGNOSIS_ MASK_ EXTENSION		Extended Diagnosis Mask	Octet String	R/-	0xBF,0x5F,0x79, 0x00,0x00,0x00	Definition of supported DIAGNOSIS_ EXTENSION bits
34	WRITE_LOCKING		Write Locking	Unsigned16	R/W	2457: Disabled	Enables write lock to acyclic write service until reversed (see chapter 4.5)
35	FACTORY_ RESET		Factory Reset	Unsigned16	R/W	0: No Function	Enables different kinds of factory resets
36	DESCRIPTOR		Descriptor	Octet String	R/W	-	User defined string for device description
37	DEVICE_ MESSAGE		Message	Octet String	R/W	-	User defined string for device description
38	DEVICE_ INSTAL_DATE		Installation Date	Octet String	R/W	-	Date of installation of the device
40	IDENT_NUMBER_ SELECTOR		Ident Number Selector	Unsigned8	R/W	127: Adaption mode	Enables Ident_Number selection
42	FEATURE		-	DS-68	R/-	-	Indicates supported and enabled status and diagnosis device features
		Supported	FEATURE_ Supported	Octet String	R/-	0x03,0x00,0x-00,0x00	Indicates supported status and diagnosis information
		Enabled	FEATURE_ Enabled	Octet String	R/-	0x01,0x00,0x-00,0x00	Indicates enabled status and diagnosis information
43	COND_STATUS_ DIAG		Condensed Status/Diagnosis	Unsigned8	R/W	1: Condensed Status and Diagnosis	Setting and indication of status and diagnostic device mode
44	DIAG_EVENT_ SWITCH		-	Diag_ Event_ Switch	R/W	-	Indicates and controls device's event reactions (if FEATURE_Enabled --> Condensed Status = 1)
		Diag_Status_Link	-	Array of Unsigned8	R/W	-	Array of switches for each specific event
			Status Mapping:	Unsigned8 (low nibble)	R/W	According to default	Allows user specific status control
			Diagnosis Mapping:	Unsigned8 (high nibble)	R/W	According to default	Allows user specific diagnosis control
		Slot	-	Unsigned8	R/W	0	Not used
		Index	-	Unsigned8	R/W	0	Not used

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
52	HART_DEV_ IDENT		-	Record	R/-	-	Identification of field device electronic
		device	-	Unsigned16	R/-	0x3741: Yokogawa RAMC	For future use (not available)
		devrev	-	Unsigned8	R/-	E.g.: 10	For future use (not available)
		sw_rev	-	Unsigned8	R/-	E.g.: 30	For future use (not available)
		hw_rev	-	Unsigned8	R/-	E.g.: 1	For future use (not available)
		dev_id	Electr. Serial No.	Unsigned32	R/-	E.g.: 7999999	Indicates electronic serial number
230	VIEW_1				R/-	n.a.	Indicates a Profile defined parameter preselection
231	VIEW_2				R/-	n.a.	Indicates a Profile defined parameter preselection

A1.2 AI Function Block

Block name	Analog Input Function Block
Slot	1

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
16	BLOCK_OBJECT		-	DS-32	R/-	-	Indicates the following block characteristics
		Reserved	-	Unsigned8	R/-	250: Not used	For future use (not available)
		Block_Object	Block Object	Unsigned8	R/-	0x02: Function Block	Kind of block
		Parent_Class	Parent Class	Unsigned8	R/-	0x01: Input	Superior device classification
		Class	Class	Unsigned8	R/-	0x01: Analog Input	Device classification
		Dev_Rev	-	Unsigned16	R/-	1	Assigned device driver versions (e.g. EDD)
		Dev_Rev_Comp	-	Unsigned16	R/-	1	Lowest device revision supported by the device
		DD_Revision	-	Unsigned16	R/-	1	For future use (not available)
		Profile	-	OctetString	R/-	0x40: PROFIBUS PA Profile for Process Control Devices, 0x02: Compact Class B	Used Profile
		Profile_Revision	-	Unsigned16	R/-	0x0302: Version 3.02	Used Profile version
		Execution_Time	-	Unsigned8	R/-	0	For future use (not available)
		Number_of_ Parameters	No. of Parameters	Unsigned16	R/-	45	Number of used parameters
		Address_of_ View_1	-	Unsigned16	R/-	0x01E6: slot 1, index 230	Reference to VIEW_1 parameter
		Number_of_Views	-	Unsigned8	R/-	2	Number of Views available
17	ST_REV		Static Revision No.	Unsigned16	R/-	0	Indicates the revision level of the described block. Increments each time a static parameter (S) changes
18	TAG_DESC		TAG	OctetString	R/W		Block specific TAG for customer use
19	STRATEGY		Strategy	Unsigned16	R/W	0	User-specified value e.g. for configuration or diagnostics as a sorting key
20	ALERT_KEY		Alert Key	Unsigned8	R/W	0	User-specified value for event allocation e.g. identification of the plant unit
21	TARGET_MODE		Target Mode	Unsigned8	R/W	0x08: AUTO (permitted bit only!)	Indicates and sets the target mode of the block
22	MODE_BLK		-	DS-37	R/-	-	Indicates block mode overview by sub-parameters
		Actual	Actual Mode	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the current mode
		Permitted	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates possible modes
		Normal	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the usual mode during normal operation
23	ALARM_SUM		-	DS-42	R/-	-	Maintain alert status by sub-parameters
		Current	Current State Alarm Sum	OctetString	R/-	0x0000: No Alarm (no modification indicated)	Indicates Update Events (static parameter modification)
		Unacknowledged	-	OctetString	R/-	0	For future use (not available)
		Unreported	-	OctetString	R/-	0	For future use (not available)
		Disabled	-	OctetString	R/-	0	For future use (not available)
24	BATCH		-	DS-67	R/W	-	Identification of available channels and current batch in case of alerts
		Batch_ID	Batch ID	Unsigned32	R/W	0	Input and indication of batch ID for identification
		Rup	Batch Unit	Unsigned16	R/W	0	Input and indication of active Control Recipe Unit Procedure/related Unit
		Operation	Batch Operation	Unsigned16	R/W	0	Input and indication of active Control Recipe Operation
		Phase	Batch Phase	Unsigned16	R/W	0	Input and indication of active Control Recipe Phase
26	OUT		-	101	R/W*	-	Cyclic indication of process variable/ input in manual block mode

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
		Value	OUT Value	Float	R/W	0	Indication and input of value (setting dependent)
		Status	OUT Status	Unsigned8	R/W	0x80: GOOD	Indication and input of status (setting dependent)
27	PV_SCALE		-	Array of Float	R/W	-	Conversion of the process variable into percent using the high and low scale values
		Array1	PV Scale Upper Value	Float	R/W	Det. by ordered scale	Input and indication of the value corresponding to 100 % of scale
		Array2	PV Scale Lower Value	Float	R/W	0	Input and indication of the value corresponding to 0 % of scale
28	OUT_SCALE		-	DS-36	R/W	-	Input and indication of process variable's scale
		EU_at_100%	OUT Scale Upper Value	Float	R/W	Det. by ordered scale	Corresponding OUT scale value to 100 %
		EU_at_0%	OUT Scale Lower Value	Float	R/W	0	Corresponding OUT scale value to 0 %
		Units_Index	Unit	Unsigned16	R/W	Det. by ordered scale	Indication and setting of the OUT scale unit
		Decimal_Point	Decimal Point	Integer8	R/W	2	Memo of the number of valid digits below decimal point
29	LIN_TYPE		Characterization Type	Unsigned8	R/W	0: No Linearisation	Input and indication of linearization type
30	CHANNEL		Channel	Unsigned16	R/W	Det. by ordered scale	Reference to the active Transducer Block which provides the measurement value
32	PV_FTIME		Filter Time Constant	Float	R/W	0.0	Time constant of a single exponential filter for the PV, in seconds
33	FSAFE_TYPE		Fail Safe Mode	Unsigned8	R/W	1	In case of BAD status the OUT is adjusted based on the following settings: 0: Value: FSAFE_VALUE, Status: UNCERTAIN - Substitute Value 1: Value: last stored valid value, Status: UNCERTAIN-last usable value 2: Value: actual, Status: no adjustment
34	FSAFE_VALUE		Fail Safe Default Value	Float	R/W	0	Default value for the OUT parameter in case of BAD status.
35	ALARM_HYS		Limit Hysteresis	Float	R/W	0.5	Absolute value of OUT value must return within the alarm limits before alarm condition clears (in OUT scale unit).
37	HI_HI_LIM		Upper Limit Alarm	Float	R/W	3.40282346E+38: INF	Setting of the upper limit alarm value (in OUT scale unit)
39	HI_LIM		Upper Limit Warning	Float	R/W	3.40282346E+38: INF	Setting of the upper limit warning value (in OUT scale unit)
41	LO_LIM		Lower Limit Warning	Float	R/W	-3.40282346E+38: -INF	Setting of the lower limit warning value (in OUT scale unit)
43	LO_LO_LIM		Lower Limit Alarm	Float	R/W	-3.40282346E+38: -INF	Setting of the lower limit alarm value (in OUT scale unit)
46	HI_HI_ALM		-	DS-39	R/-	-	State of the upper alarm limit
		Unacknowledged	Upper Unack. Alarms	Unsigned8	R/-	0	For future use (not available)
		Alarm_State	Upper Alarm Status	Unsigned8	R/-	0: No Alarm	Indicates the alarm status
		Time Stamp	-	Time Value	R/-	0	For future use (not available)
		Subcode	-	Unsigned16	R/-	0	For future use (not available)
		Value	Upper Alarm Output Value	Float	R/-	0	Indicates the value which caused the alarm
47	HI_ALM		-	DS-39	R/-	-	State of the upper warning limit
		Unacknowledged	Upper Unack. Warnings	Unsigned8	R/-	0	For future use (not available)
		Alarm_State	Upper Warning Status	Unsigned8	R/-	0: No Warning	Indicates the warning status
		Time Stamp	-	Time Value	R/-	0	For future use (not available)
		Subcode	-	Unsigned16	R/-	0	For future use (not available)
		Value	Upper Warning Output Value	Float	R/-	0	Indicates the value which caused the warning

* Writable in block mode "MAN" only!

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
48	LO_ALM		-	DS-39	R/-	-	State of the lower warning limit
		Unacknowledged	Lower Unack. Warnings	Unsigned8	R/-	0	For future use (not available)
		Alarm_State	Lower Warning Status	Unsigned8	R/-	0: No Warning	Indicates the warning status
		Time Stamp	-	Time Value	R/-	0	For future use (not available)
		Subcode	-	Unsigned16	R/-	0	For future use (not available)
		Value	Lower Warning Output Value	Float	R/-	0	Indicates the value which caused the warning
49	LO_LO_ALM		-	DS-39	R/-	-	State of the lower alarm limit
		Unacknowledged	Lower Unack. Alarms	Unsigned8	R/-	0	For future use (not available)
		Alarm_State	Lower Alarm Status	Unsigned8	R/-	0: No Alarm	Indicates the alarm status
		Time Stamp	-	Time Value	R/-	0	For future use (not available)
		Subcode	-	Unsigned16	R/-	0	For future use (not available)
		Value	Lower Alarm Output Value	Float	R/-	0	Indicates the value which caused the alarm
50	SIMULATE		-	DS-50	R/-	-	Simulation of Transducer Block input into the Analog Input Function Block
		Simulate_Status	Simulation Status	Unsigned8	R/-	-	Indication and input of simulation value
		Simulate_Value	Simulation Value	Float	R/-	0.0	Indication and input of simulation status
		Simulate_Enabled	Simulation	Unsigned8	R/-	0: Disabled	Enables and disables simulation (interrupts transducer block input)
51	OUT_UNIT_TEXT		Out unit text	Octet String	R/-	-	Indication and input of customer specific textual unit of OUT parameter (used for units not contained in the code list).
230	VIEW_1		-		R/-	n.a.	Indicates a Profile defined parameter preselection
231	VIEW_2		-		R/-	n.a.	Indicates a Profile defined parameter preselection

A1.3 Transducer Block

Block name	Flow Transducer Block
Slot	2

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
16	BLOCK_OBJECT		-	DS-32	R/-	-	Indicates the following block characteristics
		Reserved	-	Unsigned8	R/-	250: Not used	For future use (not available)
		Block_Object	Block Object	Unsigned8	R/-	0x03: Transducer Block	Kind of block
		Parent_Class	Parent Class	Unsigned8	R/-	0x03: Flow	Superior device classification
		Class	Class	Unsigned8	R/-	0x06: Variable Area Flow Meter	Device classification
		Dev_Rev	-	Unsigned16	R/-	1	Assigned device driver versions (e.g. EDD)
		Dev_Rev_Comp	-	Unsigned16	R/-	1	Lowest device revision supported by the device
		DD_Revision	-	Unsigned16	R/-	1	For future use (not available)
		Profile	-	OctetString	R/-	0x40: PROFIBUS PA Profile for Process Control Devices, 0x02: Compact Class B	Used Profile
		Profile_Revision	-	Unsigned16	R/-	0x0302: Version 3.02	Used Profile version
		Execution_Time	-	Unsigned8	R/-	0	For future use (not available)
		Number_of_ Parameters	No. of Parameters	Unsigned16	R/-	101	Number of used parameters
		Address_of_ View_1	-	Unsigned16	R/-	0x02E6: slot 2, index 230	Reference to View_1 parameter
		Number_of_Views	-	Unsigned8	R/-	6	Number of Views available
17	ST_REV		Static Revision No.	Unsigned16	R/-	0	Indicates the revision level of the described block. Increments each time a static parameter (S) changes
18	TAG_DESC		TAG	OctetString	R/W		Block specific TAG for customer use
19	STRATEGY		Strategy	Unsigned16	R/W	0	User-specified value e.g. for configuration or diagnostics as a sorting key
20	ALERT_KEY		Alert Key	Unsigned8	R/W	0	User-specified value for event allocation e.g. identification of the plant unit
21	TARGET_MODE		Target Mode	Unsigned8	R/W	0x08: AUTO (permitted bit only!)	Indicates and sets the target mode of the block
22	MODE_BLK		-	DS-37	R/-	-	Indicates block mode overview by sub-parameters
		Actual	Actual Mode	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the current mode
		Permitted	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates possible modes
		Normal	-	Unsigned8	R/-	0x08: AUTO (permitted bit only!)	Indicates the usual mode during normal operation
23	ALARM_SUM		-	DS-42	R/-	-	Maintain alert status by sub-parameters
		Current	Current State Alarm Sum	OctetString	R/-	0x0000: No Alarm (no modification indicated)	Indicates Update Events (static parameter modification)
		Unacknowledged	-	OctetString	R/-	0	For future use (not available)
		Unreported	-	OctetString	R/-	0	For future use (not available)
		Disabled	-	OctetString	R/-	0	For future use (not available)
24	CALIBR_FACTOR		Calibration Factor	Float	R/W	1.0	Gain compensation factor to adjust flow accuracy
25	LOW_FLOW_ CUTOFF		Low Flow Cutoff	Float	R/W	5 % of flow span	Setting of limit value. Below this limit, the flow is set to zero.
31	NOMINAL_SIZE		Nominal Size	Float	R/W	Det. by ordered device	Indicates the value of the ideal size of the measuring pipe
32	NOMINAL_SIZE_ UNITS		Nominal Size Unit	Unsigned16	R/W	Det. by ordered device	Indicates the unit of the ideal size of the measuring pipe

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
33	VOLUME_FLOW		-	101	R/-	-	Indicates the measured volume flow
		Value	Volume Flow	Float	R/-	-	Volume flow value
		Status	Volume Flow Status	Unsigned8	R/-	-	Volume flow status
34	VOLUME_FLOW_ UNITS		Volume Flow Unit	Unsigned16	R/W	Det. by ordered scale	Volume flow unit selection and enabling of measured variable (disables mass flow)
35	VOLUME_FLOW_ LO_LIMIT		Volume Flow Low Limit	Float	R/W	0 % of flow span	Sensor's lower range value (volume flow)
36	VOLUME_FLOW_ HI_LIMIT		Volume Flow High Limit	Float	R/W	100 % of flow span	Sensor's upper range value (volume flow)
37	MASS_FLOW		-	101	R/-	-	Indicates the measured mass flow
		Value	Mass Flow	Float	R/-	-	Mass flow value
		Status	Mass Flow Status	Unsigned8	R/-	-	Mass flow status
38	MASS_FLOW_ UNITS		Mass Flow Unit	Unsigned16	R/W	Det. by ordered scale	Mass flow unit selection and enabling of measured variable (disables volume flow)
39	MASS_FLOW_ LO_LIMIT		Mass Flow Low Limit	Float	R/W	0 % of flow span	Sensor's lower range value (mass flow)
40	MASS_FLOW_HI_ LIMIT		Mass Flow High Limit	Float	R/W	100 % of flow span	Sensor's upper range value (mass flow)
45	TEMPERATURE		-	101	R/-	-	Measured on board temperature
		Value	Temperature	Float	R/-	According to ambient temperature	Indicates the on board temperature value
		Status	-	Unsigned8	R/-	0x80: Good	Not supported
46	TEMPERATURE_ UNITS		Temperature Unit	Unsigned16	R/W	1001: °C	On board temperature unit selection
69	OPER_VISCOSITY		Viscosity	Float	R/-	Det. by ordered scale	Indicates fluid's viscosity configuration value
70	OPER_VISCOSITY _UNIT		-	Unsigned16	R/-	Det. by ordered scale	Configurated unit of fluid's viscosity
71	OPER_PRESSURE		Pressure	Float	R/-	Det. by ordered scale	Indicates fluid's pressure configuration value
72	OPER_PRESSURE _UNIT		-	Unsigned16	R/-	Det. by ordered scale	Configurated unit of fluid's pressure
73	OPER_PRESSURE _REF		Ref. Pressure	Float	R/-	Det. by ordered scale	Indicates fluid's pressure reference configuration value
74	OPER_PRESSURE _REF_UNIT		-	Unsigned16	R/-	Det. by ordered scale	Configurated unit of fluid's pressure reference
75	OPER_ TEMPERATURE		Temperature	Float	R/-	Det. by ordered scale	Indicates fluid's process temperature configuration value
76	OPER_ TEMPERATURE_ UNIT		-	Unsigned16	R/-	Det. by ordered scale	Configurated unit of fluid's process temperature configuration unit
77	OPER_ CONDITION		Oper. Condition	Unsigned8	R/-	Det. by ordered scale	Indicates configured fluid's pressure operation condition
78	OPER_FLUID_ PHASE		Fluid Phase	Unsigned8	R/-	Det. by ordered scale	Indicates fluid's operation condition
79	OPER_FLOW_ REFERENCE		Flow Reference	Unsigned8	R/-	Det. by ordered scale	Indicates fluid's operation flow reference
80	DEVICE_SERIAL_ NO		Serial Number (S/N)	OctetString	R/-	Det. by ordered device	Indicates the serial number of the device
81	DEVICE_MODEL_ CODE		Model Code	OctetString	R/-	Det. by ordered device	Indicates the model code of the device
82	OPER_FLUID_ NAME		Fluid Name	OctetString	R/-	Det. by ordered scale	Indicates fluid's name
83	TOTALIZER		Totalizer	Float	R/-	0	Indicates totalized value (volume or mass) of the enabled process variable
84	TOTALIZER_UNIT		Totalizer Unit	Unsigned16	R/W	Det. by ordered scale	Indicates totalizer unit
85	TOTALIZER_ RESET		Totalizer Reset	Unsigned8	R/W	-	Performs totalizer reset to zero
86	RESET_ERROR_ BIT		Reset Errors	Unsigned8	R/W	-	Execution resets specific error bits
87	DIST_OPTION_ A16		Device Version	Unsigned8	R/-	Det. by ordered device	Indicates the mechanical indicator version (Distance: option /A16)
88	SCALE_SPAN_ VALUE		Scale 100% Value	Float	R/-	Det. by ordered scale	Indicates flow value printed on scale (at 100 %)
89	SOFT_REVISION		FW Version	OctetString	R/-	e.g. V1.00	Indicates transmitter's firmware version

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
90	HARD_REVISION		HW Version	OctetString	R/-	e.g. V1.00	Indicates transmitter's electronical hardware version
91	PERCENT		Flow Percent	Float	R/-	-	Indicates flow value in % of scale span
92	PERCENT_UNIT		-	Unsigned16	R/-	1342: %	Fixed unit (%) of the percent indication
93	PRIMARY_VALUE		-	Float	R/-	-	Indicates flow value in arc length of scale
94	PRIMARY_VALUE _UNIT		-	Unsigned16	R/-	1013: mm	Fixed unit (mm) of the pointer position
95	DEVICE_STATUS1		Event Overview 1	Unsigned8	R/-	not active	Indicates 1st part of event overview
96	DEVICE_STATUS2		Event Overview 2	Unsigned8	R/-	0x10: Power Failure (active)	Indicates 2nd part of event overview
97	DEFAULT_ CHANNEL		Default Channel	Unsigned16	R/-	Det. by ordered scale	Indicates the process variable (index) selected for channel transfer
98	EEPROM_ REVISION		EEPROM Version	Unsigned16	R/-	Cal-EEPROM (high byte): e.g. 0x07: 7 Adj-EEPROM (low byte): e.g. 0x08: 8	Indicates the revision of Cal- and Adj-EEPROM
99	STATUS_ HANDLING		Flow Status Handling	Unsigned8	R/W	0: Normal Status Handling	Disables upper and lower measurement range violation events (5 % to 105 %).
100	SCALE_SPAN_ UNIT		-	Unsigned16	R/-	Det. by ordered scale	Indicates the flow unit printed on the scale
101	WTM_REVISION		WT-MAG Type	Unsigned8	R/-	30	Indicates the transmitter type
102	FBK_REVISION		Module Version	Unsigned8	R/-	30	Indicates the communication module version
103	DISPLAY_ SELECT		Display Selection	Unsigned8	R/W	1: Total Value	Allows variable selection for local display indication
104	OPER_DENSITY		Density	Float	R/-	Det. by ordered scale	Indicates fluid's density value
105	OPER_DENSITY _UNIT		-	Unsigned16	R/-	Det. by ordered scale	Configurated unit of fluid's density
106	FLOAT_BLOCKING		-	Record	R/-	-	Indicates and controls the float blocking function
		FLOAT_BLOCK_ ON	Float Blocking On	Unsigned8	R/-	0: Off	Enables and disables functionality
		FLOAT_BLOCK_ LIMIT	Float Blocking Limit	Unsigned8	R/-	0: 5 %	Sets lower limit value of supervision range
		FLOAT_BLOCK_ TIME	Float Blocking Time	Unsigned8	R/-	0: Turbulent Flow	Sets reaction time according to flow type
		FLOAT_BLOCK_ AZ_ON	Float Blocking AZ On	Unsigned8	R/-	0: Off	Executes float blocking autozero
107	FLOAT_BLOCK_ AUTOZERO		Float Blocking Autozero	Float	R/-	0.000	Indicates float blocking autozero value
108	LOW_FLOW_ CUTOFF_UNIT		Low Flow Cutoff Unit	Unsigned16	R/-	Det. by ordered scale	Indicates the unit of low flow cut-off value
109	DEVICE_STATUS3		Event Overview 3	Unsigned8	R/-	Det. by ordered scale 0x01: Volume Flow Passivated 0x02: Mass Flow Passivated	Indicates 3rd part of event overview
111	OPER_ACT_TIME		-	Record	R/-	-	Indicates the total powered operation time
		minutes	Operation Time (Minutes)	Unsigned8	R/-	Delivery condition	Duration in minutes (0 to 59)
		hours	Operation Time (Hours)	Unsigned8	R/-	Delivery condition	Duration in hours (0 to 23)
		days	Operation Time (Days)	Unsigned16	R/-	Delivery condition	Duration in days
112	OPER_SDW_ TIME		-	Record	R/-	-	Indicates the total powered operation time before last power down
		minutes	Oper. Time Shadow (Minutes)	Unsigned8	R/-	Delivery condition	Duration in minutes (0 to 59)
		hours	Oper. Time Shadow (Hours)	Unsigned8	R/-	Delivery condition	Duration in hours (0 to 23)
		days	Oper. Time Shadow (Days)	Unsigned16	R/-	Delivery condition	Duration in days
114	LONG_TAG		Electr. Long Tag	OctetString	R/W	Optionally det. by ordered device	Indicates and changes transmitter's Long Tag Number (32 characters)
230	VIEW_1				R/-	n.a.	Indicates a Profile defined parameter preselection

Abs. Index	Parameter	Sub-Parameter	Label	Data Type/ Structure	Read/ Write	Initial value	Functional Description
234	VIEW_5				R/-	n.a.	Indicates a manufacturer specific parameter preselection
235	VIEW_6				R/-	n.a.	Indicates a manufacturer specific parameter preselection

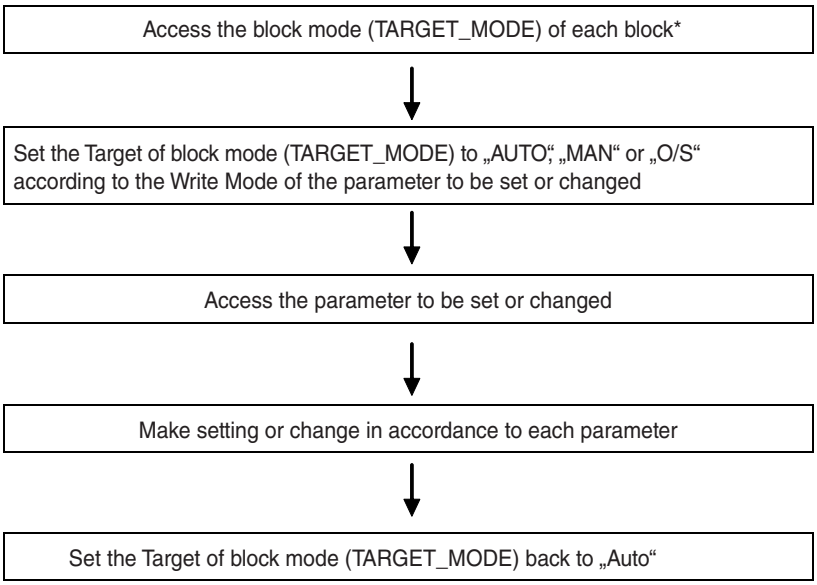
Appendix 2. Application, Setting and Change of basic Parameters

A2.1 Applications and Selection of Basic Parameters

Setting Item (applicable parameters)	Summary
Tag No.	Sets TAG_DESC for each block tag. Up to 32 alphanumeric characters can be set. See appendix 1.
Calibration range setup (PV_SCALE)	Sets the range of input from the transducer block corresponding to the 0 % and 100 % points in operation within the AI Function Block. The calibrated range (0 % and 100 %) is the factory default setting.
Output scale setup (OUT_SCALE)	Sets the scale of output corresponding to the 0 % and 100 % points in operation within the AI function Block. It is possible to set a unit and scale range that differs from the measurement range. Sets the range unit, input value of the 0 % point (lower limit of output scale), input value of the 100 % point (upper limit of output scale).
Simulation setup (SIMULATE)	Performs simulation of the AI Function Block. The input value and status for the Variable Process (channel) can be set. It is recommended to use this parameter for loop checks and other purposes.
Output signal low cut setup	Sets the low cut between 5 % to 15 % of VOLUME_FLOW_HI_LIMIT or MASS_FLOW_HI_LIMIT.

A2.2 Setting and Change of Basic Parameters

This section describes the procedure taken to set and change the parameters for each block. Obtaining access to each parameter differs depending on the configuration system used. For details, refer to the instruction manual for each configuration system.



* It is assumed that write protection is disabled. Otherwise disable write protection first.

IMPORTANT

Do not turn the power OFF immediately after parameter setting. When the parameters are saved to the EEPROM, the redundant processing is executed for the improvement of reliability. If the power is turned OFF within 60 seconds after setting of parameters, changed parameters are not saved and may return to their original values.
When the consecutive parameter setting to the multiple parameters is not executed via the acyclic data exchange, the time interval between each parameter setting must not be within 2 seconds.
Changed parameters may not be written to the device.

Refer to the “List of parameters for each block of the RAMC” for details of the Write Mode for each block.

A2.3 Setting the AI Function Blocks

The AI function block outputs the flow rate signals.

(1) Setting the output scale

Access the OUT_SCALE parameter.
Set the necessary unit of output to Units Index on OUT_SCALE. Set an output value corresponding to the higher range value to EU at 100 % on OUT_SCALE.
Set an output value corresponding to the lower range value to EU at 0 % on OUT_SCALE.
Optional: Set the decimal position to Decimal Point.

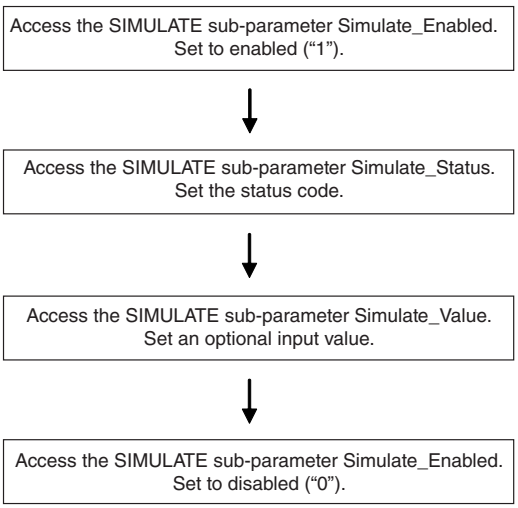
Example:
To set the output to 0.00 to 120.00 kg/h,

1. Set kg/h (1324)* to sub-parameter Units_Index on parameter OUT_SCALE.
2. Set 120 to sub-parameter EU_at_100 % on parameter OUT_SCALE.
3. Set 0 to EU at 0% on OUT_SCALE.
4. Set 2 to sub-parameter Decimal_Point on parameter OUT_SCALE.

* Each unit is expressed using a 4-digit numeric code.
  Refer to chapter 5.4 for comparison.

(2) Simulation

The AI Function Block could be simulated by using the simulation functionality.



If simulation is enabled, AI block uses SIMULATE_STATUS and SIMULATE_VALUE as the input, and if disabled, the AI block uses the Status and Value of the TB's Process Variable selected by the channel as input.

Manufacturer:

Rota Yokogawa GmbH & Co. KG
Rheinstr. 8
D-79664 Wehr
Germany

For the actual manufacturing location of your device refer to the model code and/or serial number.

**COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV GL
= ISO 9001 =**

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