

General Specifications

N-IO Node
(For RIO System Upgrade)



GS 33J64F10-01EN

[Release 6]

N-IO Node for RIO (*1) System Upgrade consists of Node Interface Unit (NIU) and I/O Units which are mounted on NIU. Two types of NIU are available: a 19-inch Rack Mountable Type and a Cabinet Installation Type.

*1: RIO stands for Remote Input/Output.

Contents

1	Model A2NN10D Node Interface Unit (For RIO System Upgrade, 19-inch Rack Mountable).....	5
1.1	GENERAL	5
1.2	HARDWARE SPECIFICATIONS	5
1.2.1	Configuration	5
1.2.2	N-ESB Bus Interface	5
1.2.3	I/O Unit.....	5
1.2.4	Maintenance Function	5
1.2.5	Power Supply.....	5
1.2.6	Weight.....	5
1.2.7	Layouts of the N-ESB Bus Modules	6
1.3	EXTERNAL DIMENSIONS	7
1.4	I/O UNIT MOUNTING POSITIONS.....	9
1.5	MODELS AND SUFFIX CODES	10
1.6	ACCESSORIES.....	10
2	Model A2NN20D Node Interface Unit (For RIO System Upgrade, Cabinet Installation Type).....	11
2.1	GENERAL	11
2.2	HARDWARE SPECIFICATIONS	11
2.2.1	Configuration	11
2.2.2	N-ESB Bus Interface	11
2.2.3	I/O Unit.....	11
2.2.4	HKU Interface.....	11
2.2.5	Maintenance Function	11
2.2.6	Power Supply.....	11
2.2.7	Weight.....	11
2.2.8	Layouts of the N-ESB Bus Modules	12
2.3	EXTERNAL DIMENSIONS	13
2.4	NIU, IOU INSTALLATION POSITIONS	15
2.5	MODELS AND SUFFIX CODES	15
2.6	ACCESSORIES.....	15

3	I/O Unit	16
3.1	GENERAL	16
3.2	I/O ADAPTORS AND NEST FOR I/O ADAPTOR	16
3.2.1	Nest for I/O Adaptor	16
3.2.1.1	Specifications	16
3.2.1.2	Configurations	17
3.2.1.3	External dimensions	18
3.2.1.4	Models and suffix codes	20
3.2.1.5	Accessories (Only for A2BA3D-□3□□□)	20
3.2.2	I/O adaptors	20
3.2.2.1	Specifications	21
3.2.2.2	External dimensions	25
3.2.2.3	Model and suffix codes	27
3.2.3	Field Interface	29
3.3	MULTI-CHANNEL I/O MODULES	31
3.3.1	Analog I/O modules	31
3.3.1.1	Specifications	32
3.3.1.2	Model and suffix codes	37
3.3.2	Digital I/O Modules	39
3.3.2.1	Specifications	40
3.3.2.2	Model and suffix codes	43
3.3.3	External dimensions	44
3.4	TERMINAL BLOCKS	51
3.4.1	Combination of Terminal blocks and I/O modules	51
3.4.2	Weight	51
3.4.3	External Dimensions	52
3.4.4	Model and suffix codes	53
3.5	LIMITATIONS OF INSTALLATION ON NIU	54
3.5.1	Number of nest and I/O modules mountable per I/O Unit	54
3.5.2	Remarks for Installation of AAT145-SM□	55
3.5.3	Connecting Digital I/O modules in dual-redundant configuration	56
3.6	HART COMMUNICATION	60
3.6.1	Communication with HART Field Devices	60
3.6.2	HART Communication Functional Specifications	60

4	INTRINSIC SAFETY (I.S.) BARRIER SOLUTIONS.....	61
4.1	Model A2NN30D Node Interface Unit (for N-IO)	61
4.1.1	General	61
4.1.2	Standard specifications.....	61
4.1.2.1	Module Configuration	61
4.1.2.2	N-ESB Bus Interface	61
4.1.2.3	Number of I/O Unit for N-IO Connections	61
4.1.2.4	External Alarm Input Function.....	61
4.1.2.5	Maintenance Function	61
4.1.2.6	Installation Method.....	61
4.1.2.7	Supply Power.....	61
4.1.2.8	Withstandng voltage	61
4.1.2.9	Insulation resistance.....	61
4.1.2.10	Power Supply Input Connection.....	62
4.1.2.11	Power Consumption.....	62
4.1.2.12	Weight.....	62
4.1.3	External Dimensions.....	63
4.1.4	Details of the Node interface Unit	65
4.1.5	Details of the N-ESB Bus Modules	66
4.1.6	Model and Suffix Codes	67
4.2	Models A2MMM843 and A2MDV843 I/O Modules (for N-IO)	68
4.2.1	General	68
4.2.2	Standard specifications.....	68
4.2.2.1	Analog Digital I/O Module	68
4.2.2.2	Digital I/O Module.....	71
4.2.3	Hart Communication.....	73
4.2.3.1	Communication with HART Devices.....	73
4.2.3.2	HART Communication Functional Specifications	73
4.2.4	External Dimensions.....	74
4.2.5	Model and Suffix Codes	75
4.3	Models A2BN4D and A2BN5D Base Plates (for N-IO).....	76
4.3.1	General	76
4.3.2	Standard specifications.....	76
4.3.2.1	Base Plate for Barrier (A2BN4D).....	76
4.3.2.2	Base Plate for barrier (A2BN5D).....	78
4.3.3	Engineering Notes.....	80
4.3.4	External Dimension.....	81
4.3.4.1	Base Plate for Barrier (A2BN4D).....	81
4.3.4.2	Base Plate for Barrier (A2BN5D).....	83
4.3.5	Model and Suffix Codes	85
4.3.6	Standard Accessories.....	85

4.4	Cables (for N-IO).....	86
4.4.1	General	86
4.4.2	External Dimensions, Models and Suffix Codes	86
4.4.2.1	Bus Cable.....	86
4.4.2.2	Power Supply Cable.....	89
5	APPLICABLE STANDARDS.....	91
6	ORDERING INFORMATION	91
7	TRADEMARK.....	91

1 Model A2NN10D Node Interface Unit (For RIO System Upgrade, 19-inch Rack Mountable)

1.1 GENERAL

A2NN10D is a 19-inch rack mountable type node interface unit (NIU) used for upgrading the existing AND10, ANS10, AND50, or ANS50 of the RIO system.

By mounting the I/O units (IOU) into an NIU, the N-IO node can be configured for upgrading the RIO System. The NIU interfaces analog and contact I/O signals from the field with the Field Control Unit (FCU) via an N-ESB bus or an optical ESB bus. The NIU also supplies power to the IOU. The power supply of the NIU can be selected from a dual-redundant power supply (single power system) or a dual-redundant power supply (dual power system).

From CENTUM VP R6.03 and later, A2NN10D is available.

A2FV70□, ANB10□, ANB11□, and ANT10U can also be constructed by combining the Base Plate and each module. Refer to "Field Control Unit" (GS 33J64E10-01EN).

1.2 HARDWARE SPECIFICATIONS

For the installation specifications and environmental conditions that are common throughout the CENTUM VP system, refer to the general specifications of GS 33J64E10-01EN.

1.2.1 Configuration

Number of 24 V DC Output Power Supply Unit (A2PW503 or A2PW504): 2
Number of N-ESB Bus Modules (A2EN501): 2
Power Supply Wiring Terminal: M4 screw

1.2.2 N-ESB Bus Interface

Uplink: 1 port / N-ESB Bus Module
(For an N-ESB bus or an optical ESB bus)
Downlink: 1 port / N-ESB Bus Module
(For an N-ESB bus or an optical ESB bus)

1.2.3 I/O Unit

A set of I/O Unit (IOU) is composed of "an I/O adaptor to connect field signals and an I/O adaptor nest to house those I/O adaptors" or "a multiple I/O module (1 to 4 units) to connect field signals," which interfaces field signals with the NIU. For the details of the IOU, refer to Chapter 3.

Number of I/O units

A2NN10D-□□2□□□□□□: Up to 2 sets

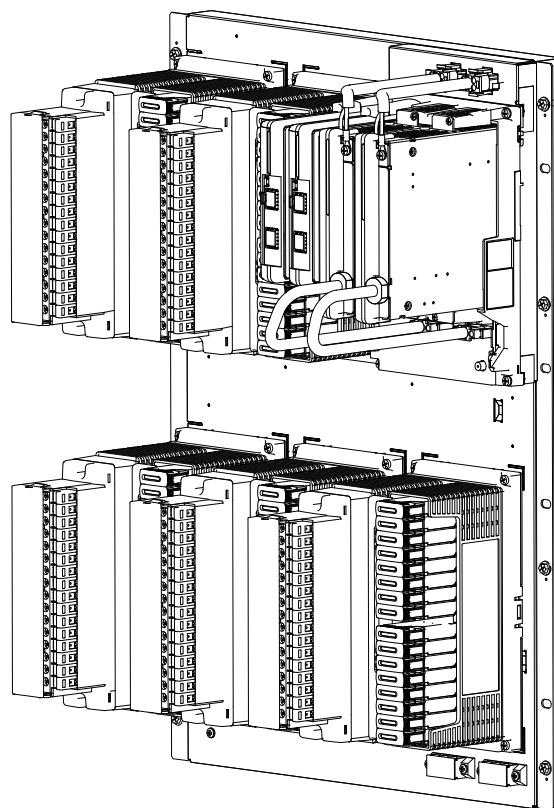
A2NN10D-□□5□□□□□□: Up to 5 sets

1.2.4 Maintenance Function

The NIU is equipped with a Micro-USB maintenance port.

The node number can be assigned by the NIU Node Number Setting tool. (*1)

*1: The NIU Node Number Setting tool is provided by the CENTUM VP R6 software media.



F010101E.ai

A2NN10D-□□5□□□□□□
(When 5 IOUs are mounted)

1.2.5 Power Supply

A2NN10D-□3□□□□□□□

Input voltage: 100 to 240 V AC, Frequency: 50/60 Hz

Power consumption: 320 VA

A2NN10D-□4□□□□□□□

Input voltage: 24 V DC

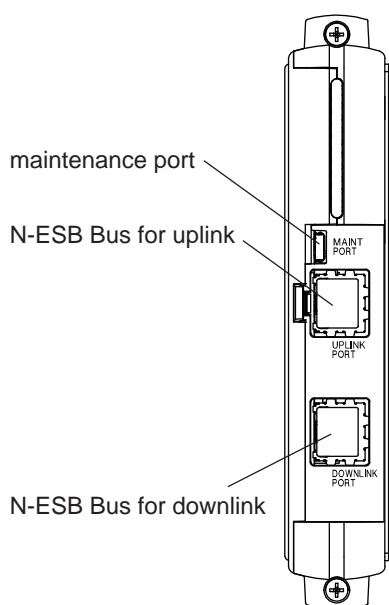
Power consumption: 180 W (7.5 A, 24 V DC)

1.2.6 Weight

A2NN10D-□□2□□□□□□□: Approx. 8.5kg

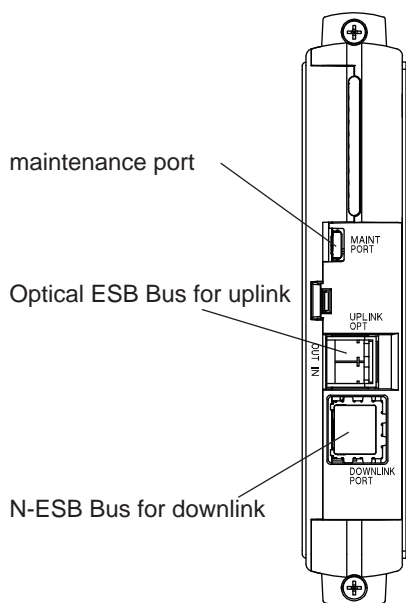
A2NN10D-□□5□□□□□□□: Approx. 13kg

1.2.7 Layouts of the N-ESB Bus Modules



F010201E.ai

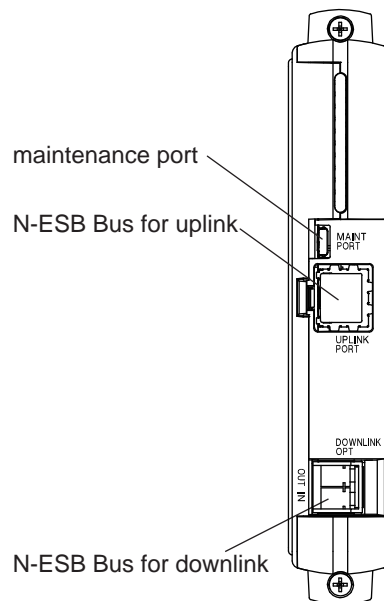
A2NN10D-□□□□□00□□
(N-ESB Bus for uplink,
N-ESB Bus for downlink)



F010202E.ai

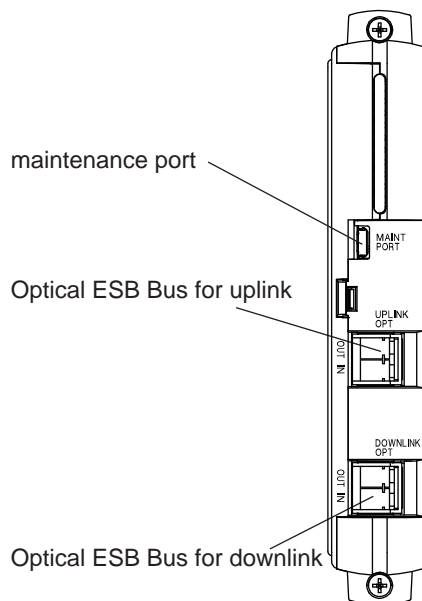
A2NN10D-□□□□□10□□
(Optical ESB Bus (0 to 5 km) for uplink,
N-ESB Bus for downlink)

A2NN10D-□□□□□20□□
(Optical ESB Bus (5 to 50 km) for uplink,
N-ESB Bus for downlink)



F010203E.ai

A2NN10D-□□□□□01□□
(N-ESB Bus for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN10D-□□□□□02□□
(N-ESB Bus for uplink,
Optical ESB bus (5 to 50 km) for downlink)



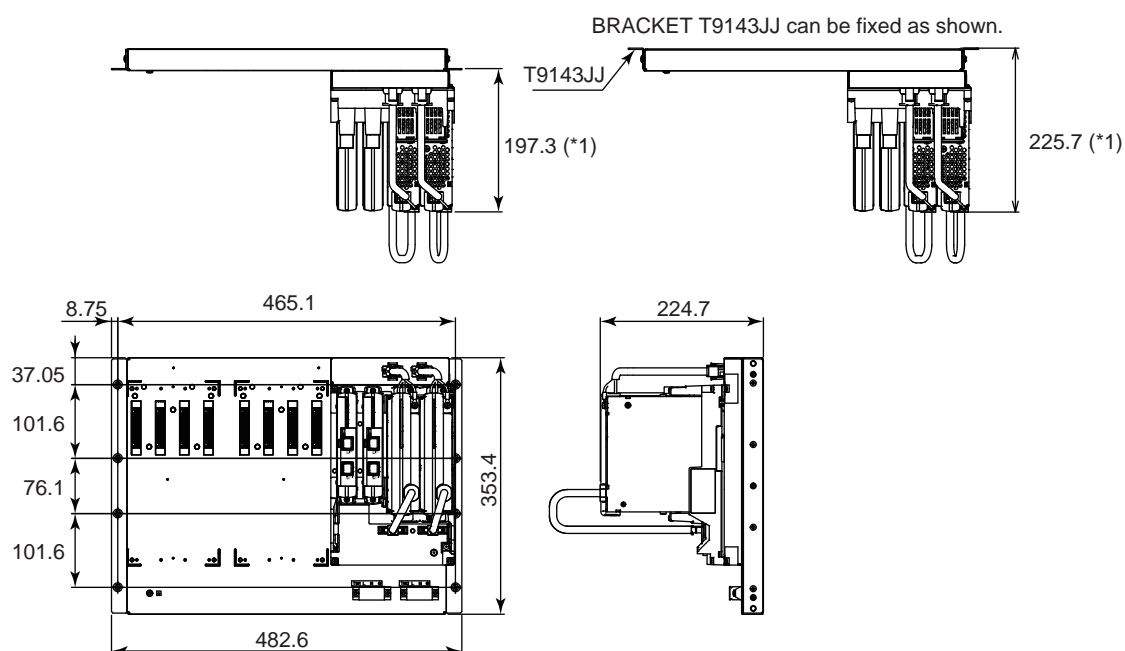
F010204E.ai

A2NN10D-□□□□□11□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN10D-□□□□□21□□
(Optical ESB bus (5 to 50 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN10D-□□□□□12□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)
A2NN10D-□□□□□22□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)

1.3 EXTERNAL DIMENSIONS

A2NN10D-□□2□□□□□□ (Figure of A2NN10D-6□2□□□□□□)

Unit: mm



F010301E.ai

*1: When mounting the NIU into a cabinet, add 70 mm for cable space.

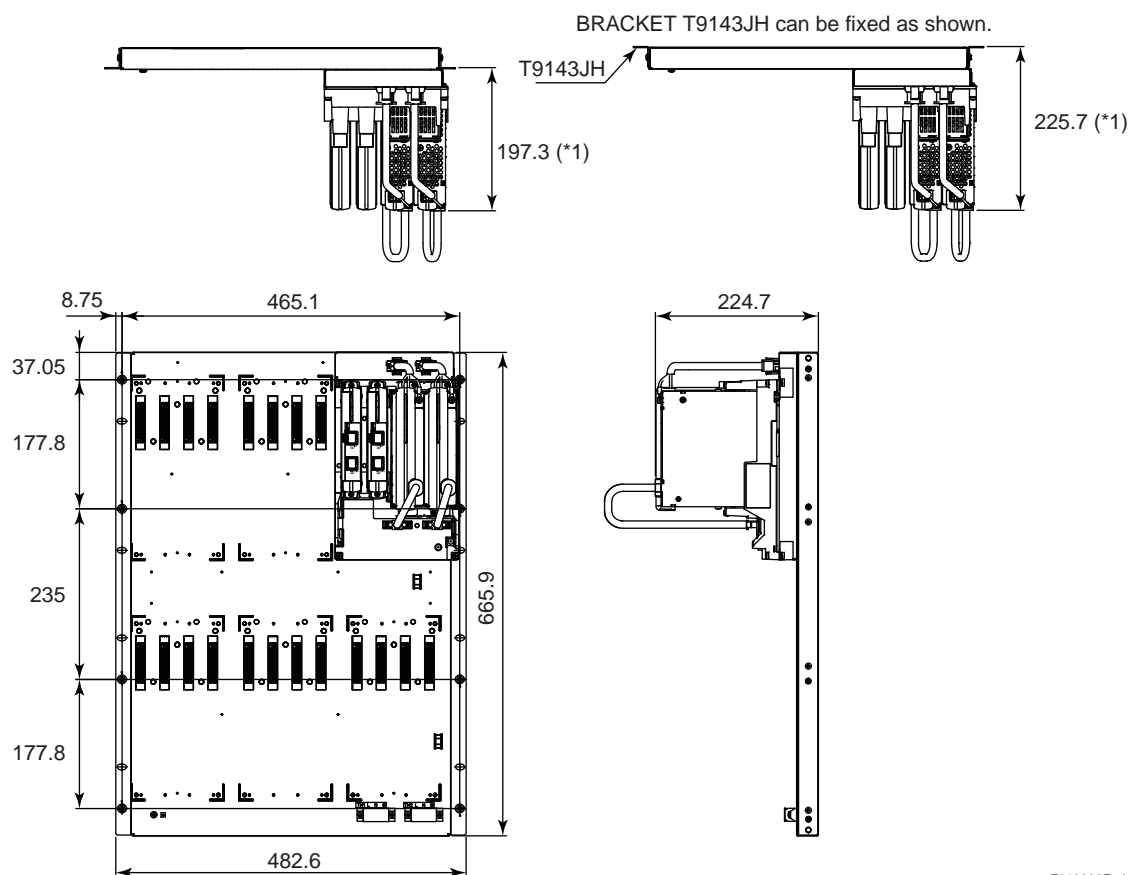
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

A2NN10D-□□5□□□□□□ (Figure of A2NN10D-6□□5□□□□□□)

Unit: mm



F010302E.ai

*1: When mounting the NIU into a cabinet, add 70 mm for cable space.

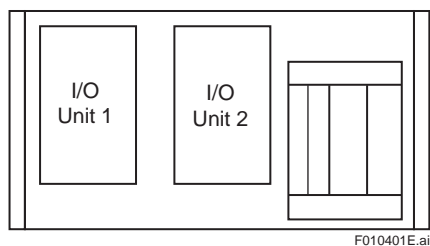
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

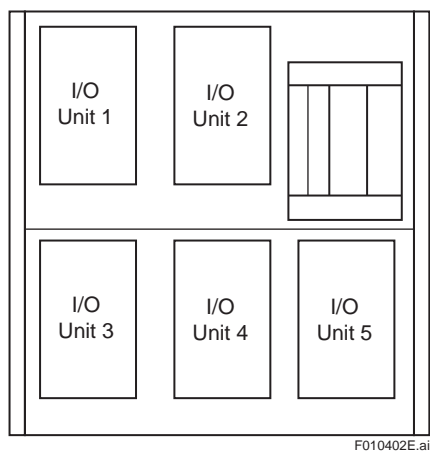
The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

1.4 I/O UNIT MOUNTING POSITIONS

For A2NN10D-□□2□□□□□□



For A2NN10D-□□5□□□□□□



1.5 MODELS AND SUFFIX CODES

Node Interface Unit (for RIO System Upgrade, 19-inch Rack Mountable)

		Description
Model	A2NN10D	Node Interface Unit (for RIO System Upgrade, 19-inch Rack Mountable)
Suffix Codes	-4	Dual-redundant communication, dual-redundant power supply (single power system)
	-6	Dual-redundant communication, dual-redundant power supply (dual power system)
	3	24 V DC output power supply (100 to 240 V AC input)
	4	24 V DC output power supply (24 V DC input)
	2	2 I/O Units type
	5	5 I/O Units type
	2	Always 2
	0	Always 0
	0	N-ESB Bus for uplink
	1	Optical ESB Bus (0 - 5 km) for uplink
	2	Optical ESB Bus (5 - 50 km) for uplink
	0	N-ESB Bus for downlink
	1	Optical ESB Bus (0 - 5 km) for downlink
	2	Optical ESB Bus (5 - 50 km) for downlink
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option

1.6 ACCESSORIES

Part Number	Description	Quantity
T9143JJ	Bracket (Exclusive for A2NN10D-□□2□□□□□□□)	2
T9143JH	Bracket (Exclusive for A2NN10D-□□5□□□□□□□)	2
Y9406LK	Screw for the bracket	8
G9307EM	Screw for A2NN10D	8
S9049PM	Insulating bush	8
T9143GZ	Connector cover (10 pieces / set)	1 set

2 Model A2NN20D Node Interface Unit (For RIO System Upgrade, Cabinet Installation Type)

2.1 GENERAL

A2NN20D is a cabinet installation type node interface unit (NIU) to use for upgrading the existing AND20 or ANS20 of RIO system.

By mounting the I/O Unit (IOU) into an NIU, the N-IO Node can be configured for upgrading the RIO System. The NIU interfaces analog and contact I/O signals from the field with the Field Control Unit (FCU) via an N-ESB bus or an optical ESB bus. The NIU also supplies power to the IOU. A2NN20D is a cabinet installation type NIU.

From CENTUM VP R6.03 and later, A2NN20D is available.

A2FV70□, ANB10□, ANB11□, and ANT10U can also be constructed by combining the Base Plate and each module. Refer to "Field Control Unit" (GS 33J64E10-01EN).

2.2 HARDWARE SPECIFICATIONS

For the installation specifications and environmental conditions that are common throughout the CENTUM VP system, refer to the general specifications of GS 33J64E10-01EN.

2.2.1 Configuration

Vertical Type Structure: Mounted on the cabinet

- Applicable cabinet:
AF□20D and AF□20S cabinets
ACB21 I/O expansion cabinet
A2NN20D must be used with Cabinet Utility Kit (A2CUKT3-N□□□)

Module Configuration:

- Number of 24 V DC Output Power Supply Unit (A2PW503 or A2PW504): 2
- Number of N-ESB Bus Modules (A2EN501): 2

2.2.2 N-ESB Bus Interface

- Uplink: 1 port / N-ESB Bus Module
(For an N-ESB bus or an optical ESB bus)
- Downlink: 1 port / N-ESB Bus Module
(For an N-ESB bus or an optical ESB bus)

2.2.3 I/O Unit

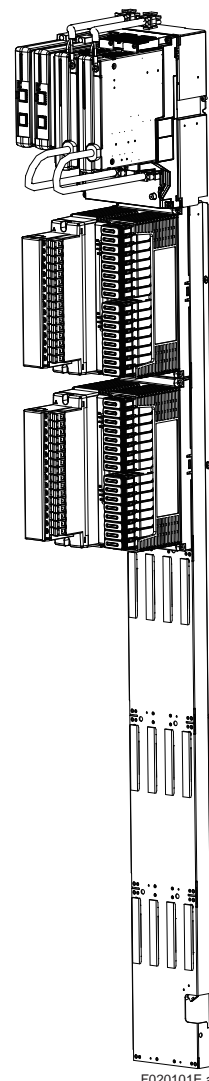
A set of I/O Unit (IOU) is composed of "an I/O adaptor to connect field signals and an I/O adaptor nest to house the I/O adaptor" or "an I/O module to connect field signals (1 to 4 units)," which interfaces field signals with the NIU. For details of the IOU, refer to Chapter 3.

Number of I/O units

- A2NN20D-□□4□□□□□□□: Up to 4 sets
- A2NN20D-□□5□□□□□□□: Up to 5 sets

2.2.4 HKU Interface

A2NN20D-□□5□□□□□□□ has a function to communicate with House Keeping Unit (HKU) of A2CUKT3-N□□□ Cabinet Utility Kit that transmits the status of the inside of the cabinet to an FCU via N-ESB Bus interface.



A2NN20D-□□5□□□□□□□
(When 2 IOUs are mounted)

2.2.5 Maintenance Function

The NIU is equipped with a Micro-USB maintenance port.

The node number can be assigned by the NIU Node Number Setting tool. (*1)

- *1: The NIU Node Number Setting tool is provided by the CENTUM VP R6 software media.

2.2.6 Power Supply

A2NN20D-□3□□□□□□□□

Input voltage: 100 to 240 V AC, Frequency: 50/60 Hz
Power consumption: 320 VA

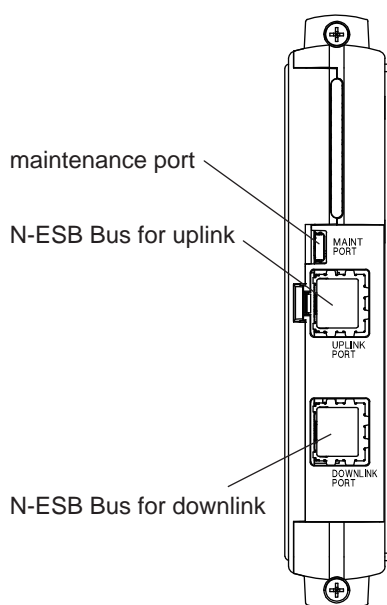
A2NN20D-□4□□□□□□□□

Input voltage: 24 V DC
Power consumption: 180 W (7.5 A, 24 V DC)

2.2.7 Weight

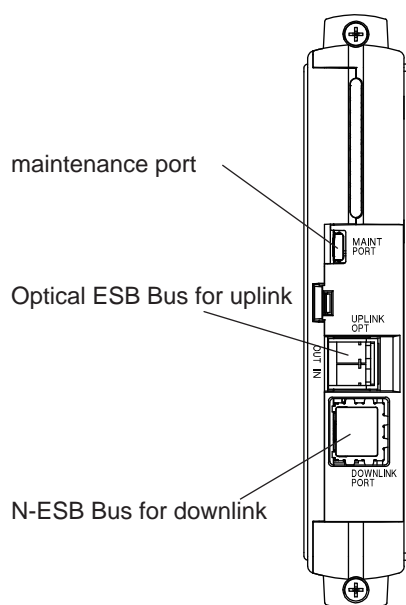
- A2NN20D-□□4□□□□□□□: Approx. 7.4 kg
- A2NN20D-□□5□□□□□□□: Approx. 8.2 kg

2.2.8 Layouts of the N-ESB Bus Modules



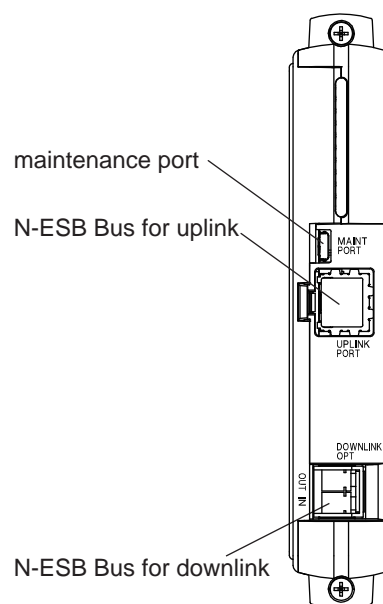
F020201E.ai

A2NN20D-□□□□□00□□
(N-ESB Bus for uplink,
N-ESB Bus for downlink)



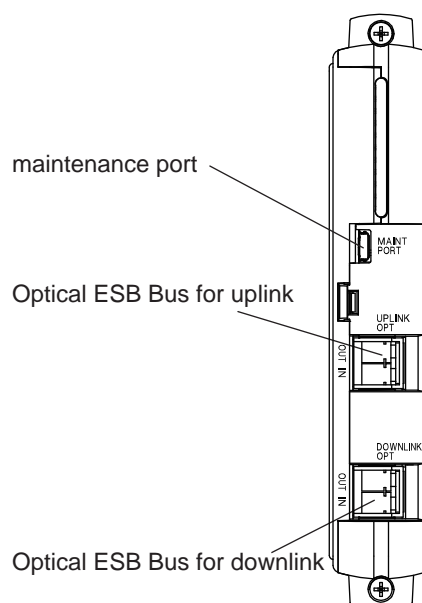
F020202E.ai

A2NN20D-□□□□□10□□
(Optical ESB Bus (0 to 5 km) for uplink,
N-ESB Bus for downlink)
A2NN20D-□□□□□20□□
(Optical ESB Bus (5 to 50 km) for uplink,
N-ESB Bus for downlink)



F020203E.ai

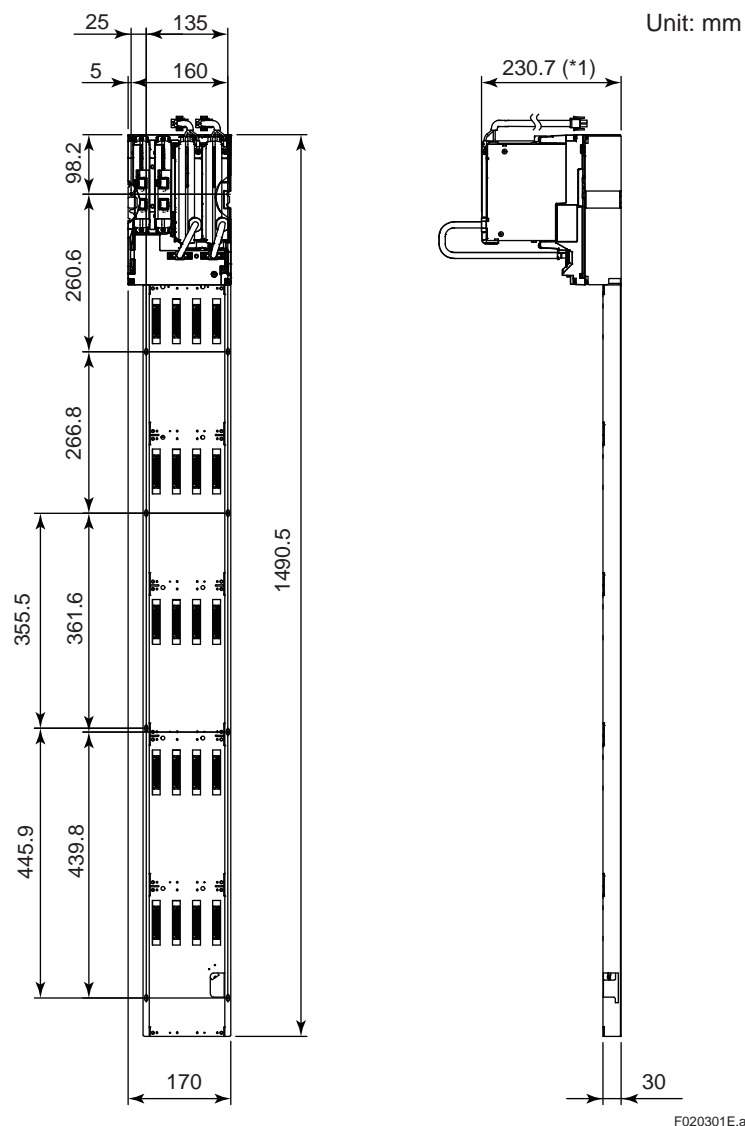
A2NN20D-□□□□□01□□
(N-ESB Bus for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN20D-□□□□□02□□
(N-ESB Bus for uplink,
Optical ESB bus (5 to 50 km) for downlink)



F020204E.ai

A2NN20D-□□□□□11□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN20D-□□□□□21□□
(Optical ESB bus (5 to 50 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN20D-□□□□□12□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)
A2NN20D-□□□□□22□□
(Optical ESB bus (5 to 50 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)

A2NN20D-□□5□□□□□□



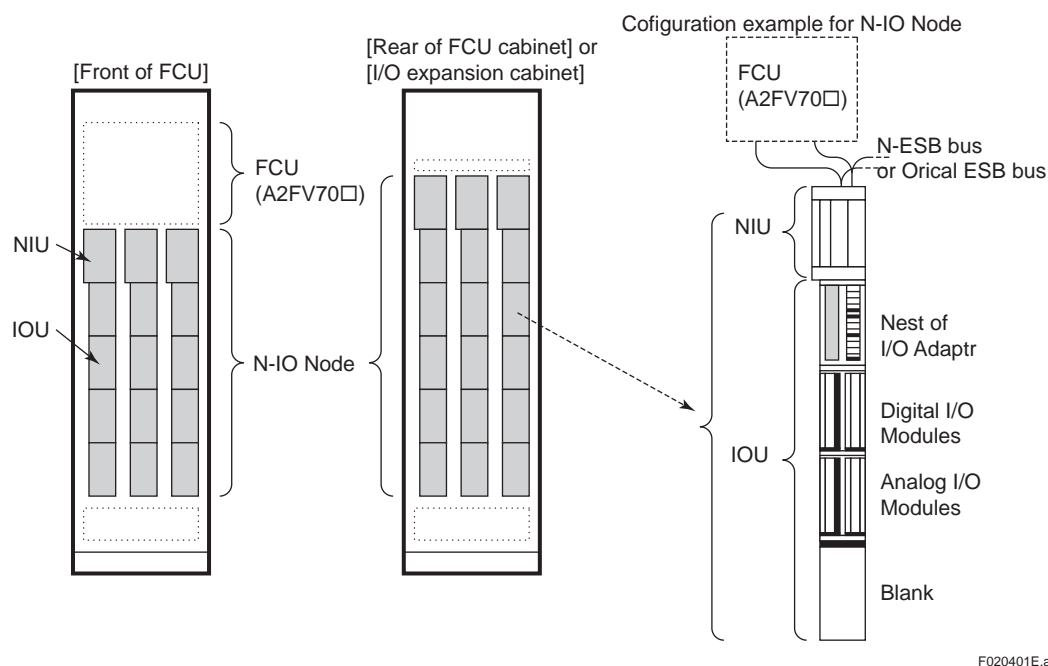
*1: When mounting the NIU into a cabinet, add 70 mm for cable space.

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

2.4 NIU, IOU INSTALLATION POSITIONS



Note: Up to four IOUs are installed in a NIU at the front of FCU cabinet.

2.5 MODELS AND SUFFIX CODES

Node Interface Unit (for RIO System Upgrade, Cabinet Installation Type)

		Description
Model	A2NN20D	Node Interface Unit (for RIO System Upgrade, Cabinet Installation Type)
Suffix Codes	-4	Dual-redundant communication, dual-redundant power supply
	3	24 V DC output power supply (100 to 240 V AC input)
	4	24 V DC output power supply (24 V DC input)
	4	For Installation in the front of FCU (for 4 I/O units)
	5	For Installation in the ACB21 and Rear of FCU (for 5 I/O units)
	2	Always 2
	0	Always 0
	0	N-ESB Bus for uplink
	1	Optical ESB Bus (0 - 5 km) for uplink
	2	Optical ESB Bus (5 - 50 km) for uplink
	0	N-ESB Bus for downlink
	1	Optical ESB Bus (0 - 5 km) for downlink
	2	Optical ESB Bus (5 - 50 km) for downlink
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option

2.6 ACCESSORIES

Part Number	Description	Quantity
Y9406LB	Mounting Screw to A2NN20D (Supplied with A2NN20D-□□4□□□□□□)	8
Y9406LB	Mounting Screw to A2NN20D (Supplied with A2NN20D-□□5□□□□□□)	10
T9143GZ	Connector cover (10 pieces / set)	1 set

3 I/O Unit

3.1 GENERAL

An I/O unit consists of "I/O Adaptors and a Nest for I/O Adaptor" or "multi-channel I/O modules (1 to 4 units)," which interfaces field signals to NIU.

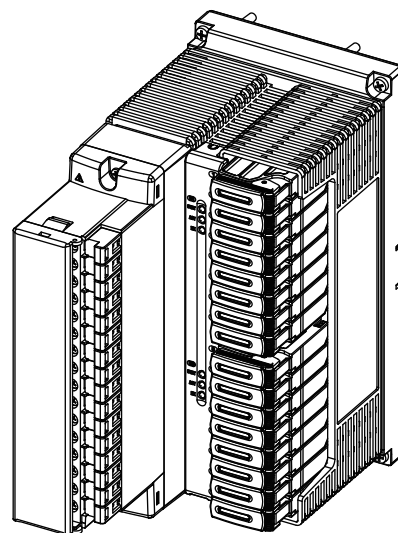
From CENTUM VP R6.03 and later, the I/O unit is available.

A2FV70□, ANB10□, ANB11□, and ANT10U can also be constructed by combining the Base Plate and each module. Refer to "Field Control Unit"(GS 33J64E10-01EN).

3.2 I/O ADAPTORS AND NEST FOR I/O ADAPTOR

A2BA3D Nest for I/O Adaptor is a housing equipped with duplexed I/O modules (*1) and a field interface (an M4 screw terminal block or ELCO connector), and up to 16 I/O adaptors interfacing various field signals such as current or thermocouple signals with I/O modules can be mounted. All channels have a disconnection function by making an I/O adaptor half-inserted that can disconnect the signal line between the field terminal and the I/O adaptor.

By mounting 1 to 16 units of I/O adaptors in an A2BA3D Nest for I/O Adaptor, an I/O unit is configured on a N-IO unit.



F030101E.ai

**Nest for I/O adaptors
(M4 screw terminal type)
(with 16 I/O Adaptors mounted)**

*1: A2MME041 I/O Module for A2BA3D

3.2.1 Nest for I/O Adaptor

The A2BA3D Nest for I/O Adaptor is used for upgrading the AMN11 or AMN12 nest for analog I/O module for RIO.

3.2.1.1 Specifications

Item	Specifications	
Model	A2BA3D-□3□□□	A2BA3D-□4□□□
Field interface (*1)	M4 screw terminal block	ELCO connector (*2)
Number of I/O modules (standard)	2	
Number of slots for I/O adaptors	16	
Weight	Approx. 2.2 kg	Approx. 1.7 kg
Withstanding voltage (Between field and the system)	1500 V AC for 1 minute 42 V DC	30 V AC for 1 minute
Withstanding voltage (Among field channels)		—
Insulation resistance (Between field and the system)	100 MΩ or higher (500 V DC)	100 MΩ or higher (30 V DC)
Insulation resistance (Among field channels)		—
Input power supply voltage	24 V DC	
Current consumption (Without I/O adaptors)	100 mA or lower	
Current consumption (With 16 I/O adaptors)	900 mA or lower	

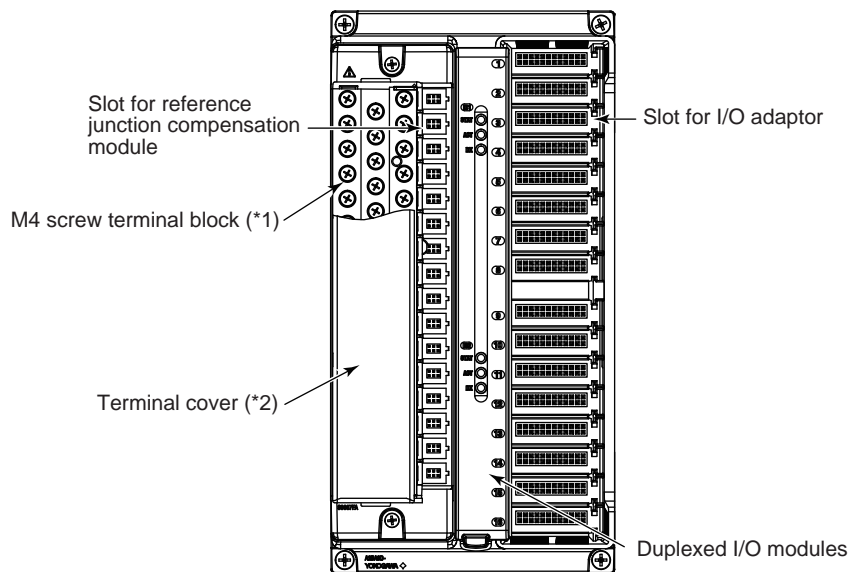
*1: The auxiliary output equipped with AMN11 and AMN12 is not available for A2BA3D.

SPBD Standby Manual Station supported by AMN11 and AMN12 is not available for A2BA3D.

*2: The Guide pin position of the ELCO connector is 4-4 only (Upper: thick pin, Lower: thin pin).

3.2.1.2 Configurations

A2BA3D-□3□□□

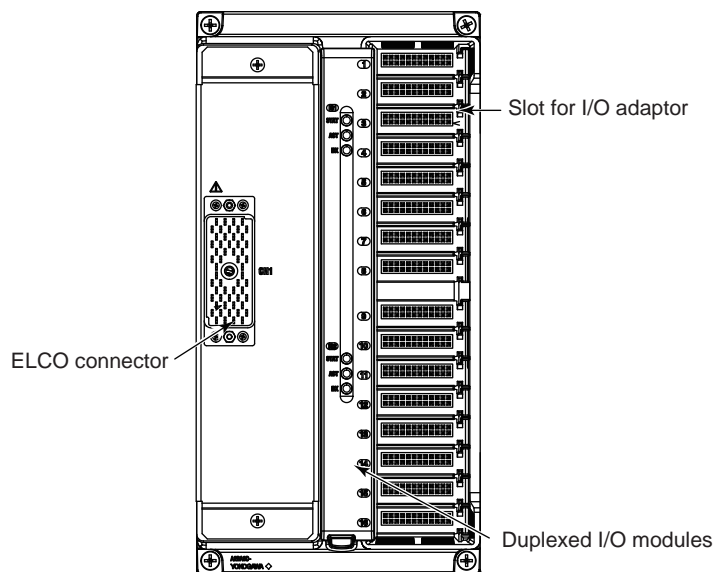


F030201E.ai

*1: Part No.: S9887FA (Basic type), S9889FA (With ISA Standard G3 option) (A terminal cover is not included.)

*2: Part No.: T9081CF (An accessory of A2BA3D-□3□□□).

A2BA3D-□4□□□



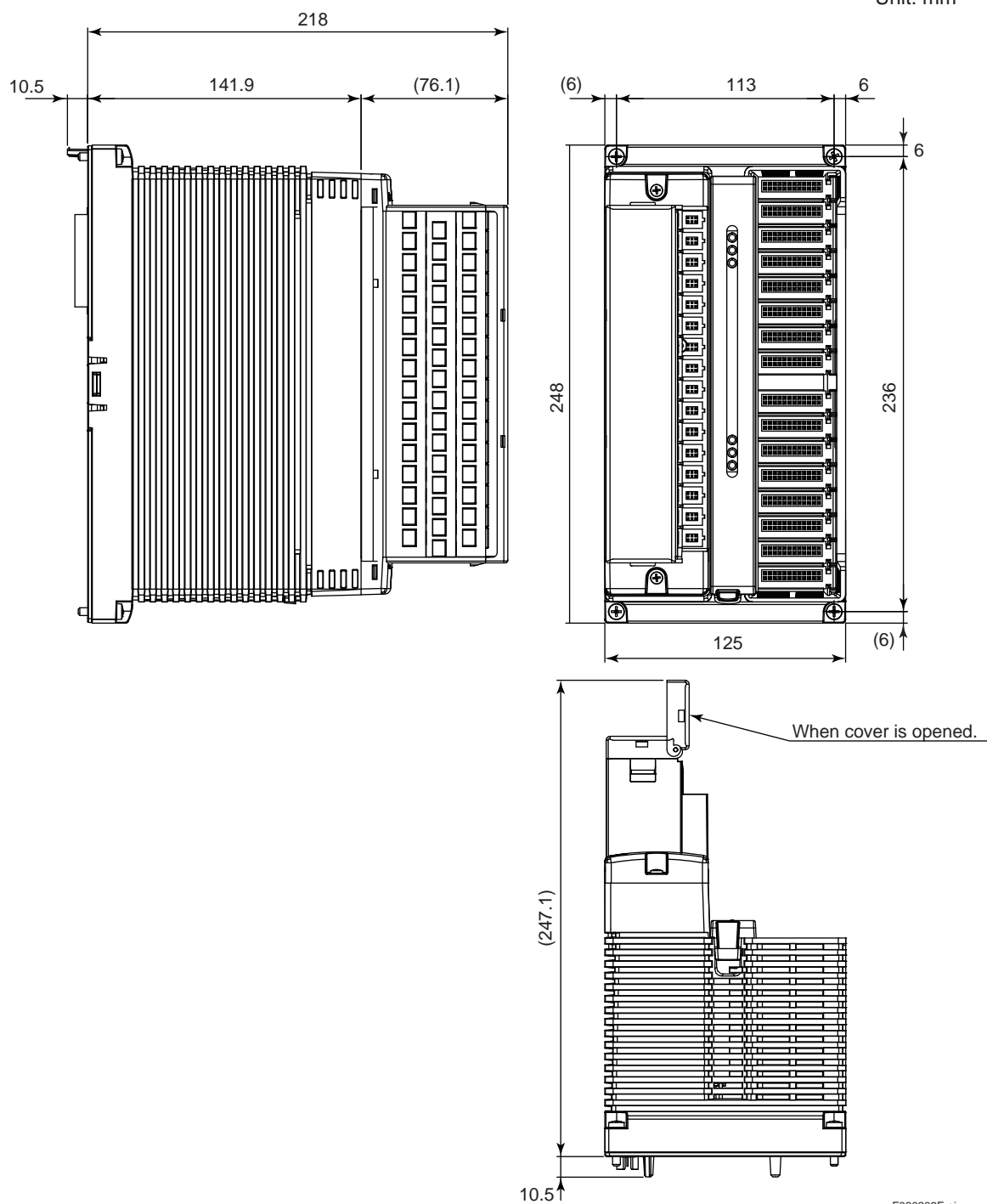
F030202E.ai

Note: No slot for reference junction compensation module is available with A2BA3D-□4□□□.

3.2.1.3 External dimensions

A2BA3D-□3□□□

Unit: mm



F030203E.ai

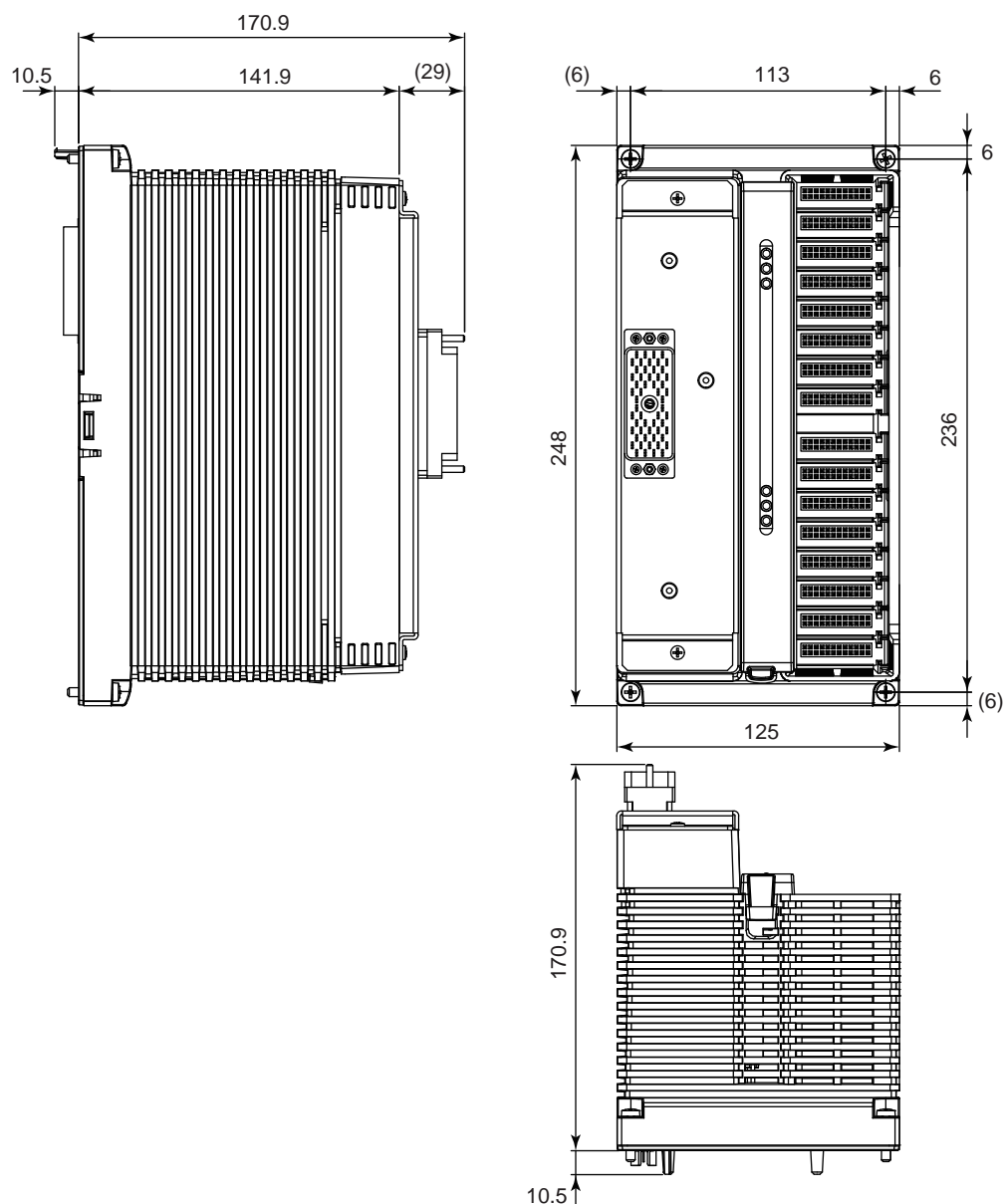
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

A2BA3D-□4□□□

Unit: mm



F030204E.ai

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

3.2.1.4 Models and suffix codes**Nest for I/O Adaptor (for RIO System Upgrade, With I/O Module)**

		Description
Model	A2BA3D	Nest for I/O Adaptor (for RIO System Upgrade, With I/O Module)
Suffix Codes	-3	Always 3
	3	M4 Screw Terminal type
	4	ELCO Connector type
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	0	Always 0

3.2.1.5 Accessories (Only for A2BA3D-□3□□□)

Part Number	Description	Quantity
T9081CN	Sheet	1
T9081CF	Cover (Terminal cover)	1
T9081CM	Plate	1

3.2.2 I/O adaptors

I/O adaptors are used for upgrading each of the analog I/O module for RIO.

Analog I/O modules (RIO)before upgrading			I/O adaptors after upgrading		
Model	Name	Number of modules mountable per nest	Model	Name	Number of adaptors mountable per nest
AAM10	Current/Voltage Input Module (Simplified Type)	Total 16	A2SAM105	Current Input / Voltage Input Adaptor	Total 16
AAM11	Current/Voltage Input Module				
AAM11B	Current/Voltage Input Module (for BRAIN)				
AAM50	Current Output Module		A2SAM505	Current Output / Voltage Output Adaptor	
AAM51	Current/Voltage Output Module				
AAM21	mV, Thermocouple, and RTD Input Module		A2SAT105	mV / TC / RTD Input Adaptor	
AAM21J	mV, Thermocouple, and RTD Input Module (compliant with JIS C1602: 1995, C1604: 1997)				
APM11	Pulse Input Module				

3.2.2.1 Specifications

A2SAM105 Current Input/Voltage Input Adaptor (For RIO System Upgrade AAM10/AAM11/AAM11B)

Item	Specifications	
Model	A2SAM105 (*1)	
Input signal	Voltage input	Current input
Input range	0 to 10 V DC	0 to 20 mA DC (*2)
Input resistance	1 M Ω at power-on 100 k Ω or higher at power-off	280 Ω (20 mA) to 440 Ω (4 mA) at power-on (*3) 100 k Ω or higher at power-off (*4)
Allowable input voltage/current	0 to 30 V DC	0 to 25 mA DC (*4) (*5) (*6)
Transmitter power supply	—	25.0 to 25.5 V DC (Output current limit: 60 mA DC or lower)
Accuracy rating	± 4 mV	± 16 μ A
Drift due to ambient temperature change	± 4 mV \pm 0.15% of indicating value by every 10 $^{\circ}$ C	± 32 μ A by every 10 $^{\circ}$ C
Data update period	For A2SAM105 alone : 2 ms (*7)	
Current consumption	For 24 V system power supply: 46 mA or lower (24.0 V DC) For 5 V DC internal power supply: 10 mA or lower (5.0 V DC) (*8)	
Withstanding voltage	Between field and the system: 1500 V AC for 1 minute, 42 V DC	
Mounting	Mounted on the nest for I/O adaptor (A2BA3D)	
Wiring connection	Connected to the terminals of the A2BA3D (with M4 screws or ELCO connector)	
HART communication function Input signal setting	—	HART7 is supported (*9) (*10)
Input signal setting	Input signals and input signal ranges are set by the software.	
Weight	Approx. 0.10 kg	

*1: An auxiliary voltage output equipped with AAM11 and AAM11B is not available for A2SAM105.

*2: The combination with MTL barrier 728 is valid, however, the minimum operating voltage of a 2-wire transmitter must be 12 V DC or lower where the wiring resistance is 10 Ω .

*3: The module input resistance viewed from the terminals is calculated as below:
240 Ω + (voltage drop in the input protection circuit / current value).

*4: When the power of A2SAM105 is off or overcurrent is detected, the current input loop is open.

*5: Operation when A2SAM105 detects over current depending on style is different.

Style S1 : When over current is detected and the protection circuit operates, the system alarm (Adaptor Fail) is notified to HIS.

Style S2 or later : When over current is detected and the protection circuit operates, the system alarm (Adaptor Fail) is not notified to the HIS. The abnormal state is detected as IOP (input open).

*6: If the input current is 25 to 40 mA due to the inrush current of the equipment or the like, connect a zener diode and bypass the current. For details, refer to "CENTUM VP Installation Guidance" (TI 33J01J10-01EN).

*7: The data update period is max. 10 ms, when the A2SAM105 is used with the A2MME041 I/O module.

*8: The internal power supply is empowered by I/O modules housed in the A2BA3D.

*9: The BRAIN communication function supported by AMM11B is not available for A2SAM105.

*10: Up to 5 HART communication field devices (e.g. transmitter) can be connected to A2SAM105 by multi drop connection. A2SAM105 can drive up to 24 mA including inrush current of field devices.

A2SAM505 Current Input/Voltage Input Adaptor (For RIO System Upgrade AAM50/AAM51)

Item	Specifications	
Model	A2SAM505	
Output signal	Voltage output	Current output (*1)
Rated output range (maximum guaranteed accuracy range)	0 to 10 V DC	4 to 20 mA DC
Output resistance	1 Ω or lower	500 k Ω or higher
Allowable load resistance	10 k Ω or higher	0 to 750 Ω
Output range	-0.3 to 10.3 V DC	1.0 to 21.5 mA
Output voltage limit	—	25.5 V DC or lower
Output current limit	15 mA DC or lower	—
Output open detection	—	0.65 mA or lower
Accuracy rating	± 12 mV	± 48 μ A
Drift due to ambient temperature change	± 4 mV + $\pm 0.15\%$ of specified value by every 10 $^{\circ}$ C	± 32 μ A by every 10 $^{\circ}$ C
Influence of load resistance change	± 4 mV for changes within the allowable load resistance range	± 16 μ A for changes from 0 to 750 Ω
Data update period	For A2SAM505 alone : 2 ms (*2) or 22 ms (*3) for step response	
Current consumption	For 24 V DC system power supply: 38 mA or lower (24.0 V DC) For 5 V DC internal power supply: 10 mA or lower (5.0 V DC) (*4)	
Withstanding voltage	Between field and the system: 1500 V AC for 1 minute, 42 V DC	
Mounting	Mounted on the nest for I/O adaptor (A2BA3D)	
Wiring connection	Connected to the terminals of A2BA3D (with M4 screws or ELCO connector)	
HART communication function	—	HART7 is supported
Output signal setting	Output signals and output signal ranges are set by the software.	
Weight	Approx. 0.10 kg	

- *1: A2SAM505 can be used in dual redundant configuration for current output mode.
When A2SAM505 is mounted on A2BA3D-□3□□□ (M4 screw terminal type) to use in dual redundant configuration, two (2) pieces of short bars [Part No.: A1534JT] are needed.
- *2: The data update period is max. 10 ms, when the A2SAM505 is used with A2MME041 I/O module.
- *3: The data update period is max. 30 ms, when the A2SAM505 is used with A2MME041 I/O module.
- *4: The Internal power supply is empowered by the I/O modules housed in the A2BA3D.

A2SAT105 mV/Thermocouple/RTD Input Adaptor (For RIO System Upgrade AAM21/AAM21J)

Item	Specifications			
Model	A2SAT105 (*1)			
Input signal	mV (*2)	Thermocouple (*3) • JIS C 1602, IEC 60584-1 (ITS-90) Type J, K, E, B (*4), R, S, T, N • JIS C 1602: 1981, IEC 584-1: 1989 (IPTS-68) Type J, K, E, B (*2), R, S, T • IEC 584-1: 1989 (IPTS-68) Type N	RTD (3-wire type) • JIS C 1604, IEC 60751 (ITS-90) Pt100 • JIS C 1604: 1989, IEC 751: 1986 (IPTS-68) Pt100 • JIS C 1604: 1989 (IPTS-68) JPt100	3-wire potentiometer
Input range	-50 to 150 mV	-50 to 150 mV	0 to 400 Ω	Total resistance: 100 to 2000 Ω Span resistance: 50% or higher of the total resistance (*5)
Allowable input voltage	-0.5 to 4.0 V DC (between terminals B and C)		—	
Input resistance	1 MΩ (at power-on), 10 kΩ (at power-off)		—	
Accuracy rating	±20 μV	±20 μV	±0.08 Ω	±0.2%
Data update period	For A2SAT105 alone : 124 ms (*6)			
Signal source resistance	1000 Ω or lower		150 Ω or lower (wiring resistance per wire)	
RJC input	—	-10 to 70 °C	—	
RJC accuracy	—	±1 (*7)	—	
Measuring current	—		1 mA	—
Burnout detection	Select from UP, DOWN, or OFF (*8)			
Burnout detection time	60 s or less			
Burnout detection current	0.1 μA			
Withstanding voltage	Between field and the system: 1500 V AC for 1 minute, 42 V DC			
Mounting	Mounted on the nest for I/O adaptor (A2BA3D)			
Wiring connection	Connected to the terminals of A2BA3D (with M4 screws or ELCO connector) (Only M4 screw terminal supports Temperature Compensation Module for Thermocouple Input.)			
Current consumption	For 24 V system power supply: 12 mA or lower (24.0 V DC) For 5 V DC internal power supply: 10 mA or lower (5.0 V DC) (*9)			
Input linearization	None	Available	Available	None
Influence of signal source resistance/wiring resistance (burnout is OFF)	For 1 kΩ signal source resistance: Input conversion ±20 μV or lower		For wiring resistance 10 Ω of terminals A and C: Input conversion ±40 mΩ or lower (wiring of terminals A and C must have the same resistance)	—
Influence by Drift due to ambient temperature change	For 10 °C change: ±20 μV		For 10 °C change: ±0.16 Ω	For 10 °C change: ±4% of span
Input signal setting	Input signals and input signal ranges are set by the software setting.			
Weight	Approx. 0.10 kg			

*1: The auxiliary voltage output equipped with AAM21 and AAM21J is not available for A2SAT105.

*2: Only mV input is available when A2SAT105 is mounted on A2BA3D-□4□□□ (ELCO connector type).

*3: For using the thermocouple input, the reference junction compensation module for thermocouple input (Part No. S9393UK) is required in addition to mounting A2SAT105 on the A2BA3D-□3□□□ (M4 screw terminal type).

*4: Type B does not perform reference junction compensation.

*5: The allowable input range is defined as 0 to 30000 Ω, however, using the A2SAT105 within the input range is suggested for maintaining the accuracy rating.

*6: The data update period is max. 132 ms, when the A2SAT105 is used with the A2MME041 I/O module.

*7: When the measuring temperature is under 0 °C, multiply the following coefficient (K) with the above value.

$$K = \frac{\text{(Thermo-electromotive force per degree at 0 °C)}}{\text{(Thermo-electromotive force per degree at measured temperature)}}$$

*8: When using with a zener barrier or such, the burnout detection function has to be disabled. The impedance of the measuring system and voltage drop by the burnout current may cause errors.

*9: The Internal power supply is empowered by the I/O modules housed in the A2BA3D.

A2SAP105 Pulse Input Adaptor (For RIO System Upgrade APM11)

Item	Specifications
Model	A2SAP105
Input signal	2-wire type: Contact ON/OFF, voltage pulse, current pulse (possible to supply power to a transmitter) 3-wire type: Power supply type voltage pulse
Input frequency	0 to 10 kHz (*2)
Minimum input pulse width	40 μ s
Input signal level	Contact input Open/close levels of relay contact and transistor contact Open: 100 k Ω or more, Close: 200 Ω or lower Contact capacity When supplying 12 V DC: 15 V DC 15 mA or higher When supplying 24 V DC: 30 V DC 30 mA or higher Voltage/current pulse input (Current input is converted to voltage.) VH (high level): 3 to 24 V DC VL (low level): -1 to 8 V DC VH-VL (swing width): 3 V or higher Signal source resistance: 1 k Ω or lower
Shunt resistance	External (220 Ω /510 Ω /1.02 k Ω), 4k Ω , or OFF are selectable (*3)
Filter	Filter for eliminating chattering can be set. (*4)
Pull-up resistance	68 k Ω (12 V or 24 V)
Transmitter power supply	12 V DC or 24 V DC is selectable 12 V DC \pm 10%, 35 mA or lower 24 V DC \pm 10%, 24 mA or lower (Output current limit: 40 mA DC or lower) (*5)
Data Update period	For A2SAP105 alone : 2 ms (*6)
Current consumption	For 24 V DC system power supply: 50 mA or lower (24.0 V DC) For 5 V DC internal power supply: 10 mA or lower (5.0 V DC) (*7)
Withstanding voltage	Between field and the system: 1500 V AC for 1 minute, 42 V DC
Mounting	Mounted on the nest for I/O adaptors (A2BA3D)
Input wiring	Connected to the terminals of A2BA3D (with M4 screws or ELCO connector)
Weight	Approx. 0.10 kg

*1: An auxiliary output signal equipped with APM11 is not available for A2SAP105.

*2: Signal connection patterns for non-voltage contact input are as follows:

0 to 800 Hz : Wire the input signal to the terminals B and C.

0 to 5 kHz : Wire the input signal to the terminals A and B.

0 to 10 kHz : Wire the input signal to the terminals A and B, and shunt resistor to the terminal B and C.

*3: When receiving dry contact signal inputs with 0 to 10 kHz input frequencies or current pulse signal inputs by using pulse input signal adaptors, Connect a shunt resistor (220 Ω , 510 Ω , 1.02k Ω) according to the type of signal. For details on shunt resistance, refer to "CENTUM VP Installation Guidance" (TI33J01J10-01EN).As for the shunt resistor, Shunt resistor unit (model name: A2EXR001) integrated with a 4-channel resistor module is available.

Input signal type		Shunt Resistor Unit	Resistance value of Shunt Unit
Voltage pulse		Not required	—
Dry contact signal	0 to 800 Hz	Not required	—
	0 to 5 kHz	Not required	—
	0 to 10 kHz	required	1.02 k Ω
Current pulse		required	220 Ω , 510 Ω , or 1.02 k Ω are selectable

*4: When the pulse input is at 10 Hz or lower, chattering noise can be eliminated from non-voltage contacts (e.g. mechanical relays).

*5: When the A2SAP105 is off power or overcurrent is detected, the transmitter power supply terminal is open.

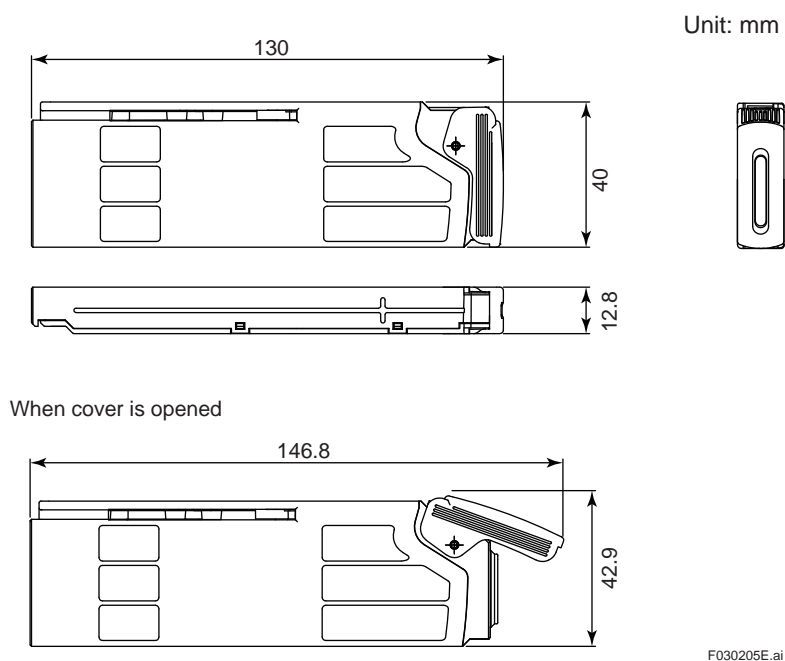
*6: The data update period is max. 10 ms, when the A2SAP105 is used with the A2MME041 I/O module.

*7: The internal power supply is empowered by the I/O modules on the A2BA3D.

A2EXR001/KFR Shunt Resistor Unit with Kit for RIO System Upgrade

Item	Specifications
Model	A2EXR001 (*1)
Connection	Pressure clamp terminal
Mounting	Wall mount type (With 4 M3 screws)
Number of channels	4 channels
Resistance	220 Ω / 510 Ω / 1.02 k Ω (use 2 pieces of 510 Ω)
Tolerance	± 5 % (per resistor)
Maximum power consumption	3 W (per unit)
Weight	Approx. 0.60 kg with /KFR (Approx. 0.30 kg without /KFR)

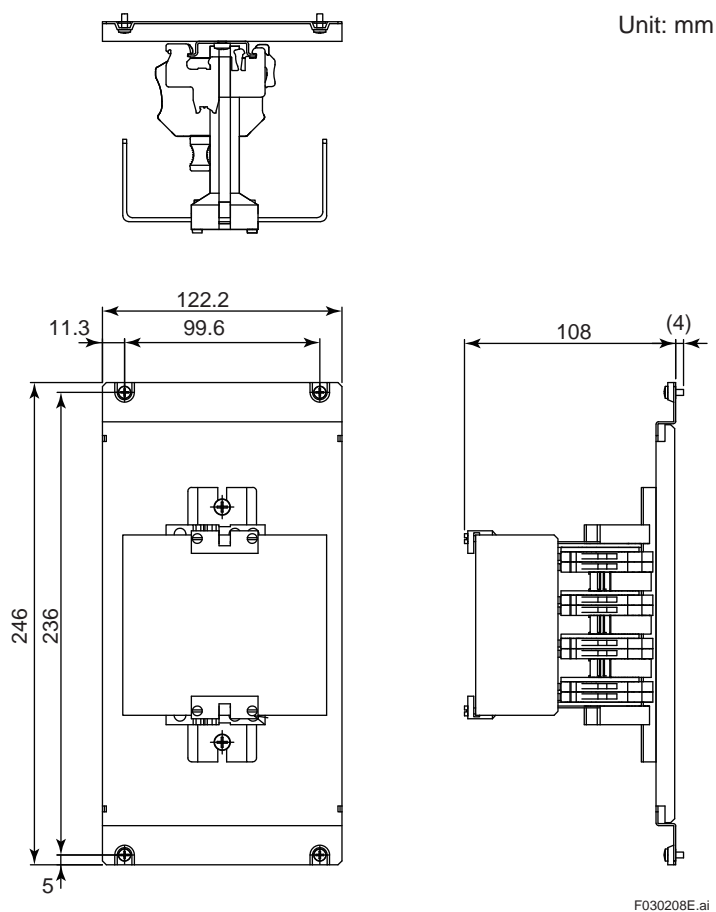
*1: For details on mounting, refer to the TI "CENTUM VP installation guidance" (TI 33J01J10-01EN). Handle a shunt resistor with care as it may become high in temperature. Use a cover to prevent from touching the resistor directly to avoid being burned.

3.2.2.2 External dimensions**Adaptor****Nominal tolerance:**

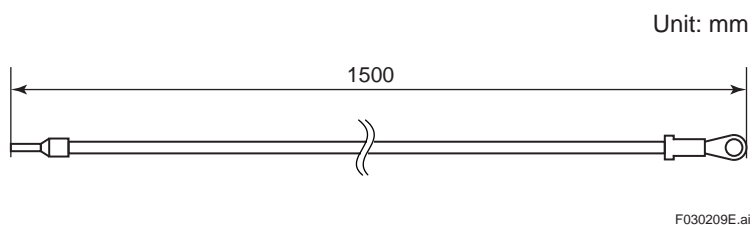
Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

Shunt Resistor Unit A2EXR001/KFR



Included cable



Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.
The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

3.2.2.3 Model and suffix codes

Current Input/Voltage Input Adaptor

		Description
Model	A2SAM105	Current Input/Voltage Input Adaptor
Suffix Codes	-H	With digital communication (HART protocol)
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	0	Always 0
Option Code	/DCV	Dummy Cover (for RIO System Upgrade, for Reference Junction Compensation module slot) [Part No.: T9081FB] (*1)

*1: T9081FB is a dummy cover for the reference junction compensation module slot of A2BA3D-□3□□□. When this module is not mounted, the dummy cover must be attached. The T9081FB mounted on the existing AMN11 or AMN12 can also be utilized. Specify the option code of /DCV only when the existing T9081FB cannot be utilized.

Current Input/Voltage Input Adaptor

		Description
Model	A2SAM505	Current Output/Voltage Output Adaptor
Suffix Codes	-H	With digital communication (HART protocol)
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	0	Always 0
Option Code	/DCV	Dummy Cover (for RIO System Upgrade, for Reference Junction Compensation module slot) [Part No.: T9081FB] (*1)
	/SHRTB	Short Bar (for RIO System Upgrade) [Part No.: A1534JT] (*2)

*1: T9081FB is a dummy cover for the reference junction compensation module slot of A2BA3D-□3□□□. When this module is not mounted, the dummy cover must be attached. The T9081FB mounted on the existing AMN11 or AMN12 can also be utilized. Specify the option code of /DCV only when the existing T9081FB cannot be utilized.

*2: A1534JT is a short bar which is used with A2SAM505 in dual-redundant configuration annexed in even-number and odd-number slots mounted on A2BA3D-□3□□□ (M4 screw terminal type). The A1534JT for the existing dual redundant AAM51 and AAM50 can also be utilized. Only when the existing T9081FB cannot be utilized, specify the option code of /SHRTB for each A2SAM505, on ordering it in dual redundant configuration.

mV/TC/RTD Input Adaptor

		Description
Model	A2SAT105	mV/TC/RTD Input Adaptor
Suffix Codes	-S	Standard type
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	0	Always 0
Option Code	/DCV	Dummy Cover (for RIO System Upgrade, for Reference Junction Compensation module slot) [Part No.: T9081FB] (*1)
	/RJ	Reference Junction Compensation Module for Thermocouple Input [Part No.: S9393UK] (*2)

*1: T9081FB is a dummy cover for the reference junction compensation module slot of A2BA3D-□3□□□. When this module is not mounted, the dummy cover must be attached. The T9081FB mounted on the existing AMN11 or AMN12 can also be utilized. Specify the option code of /DCV only when the existing T9081FB cannot be utilized.

*2: A unit of S9393UK is required per every A2SAT105 for a reference junction compensation module when A2SAT105 is used as a thermocouple input. The S9393UK is used by mounting it in the slot for the reference junction compensation module of A2BA3D-□3□□□. The S9393UK for the existing AAM21 and AAM21J can also be utilized. Specify option code /RJ only when the existing S9393UK cannot be utilized.

Pulse Input Signal Adaptor (0 to 10 kHz)

		Description
Model	A2SAP105	Pulse Input Signal Adaptor (0 to 10 kHz)
Suffix Codes	-S	Standard type
	0	With no explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	0	Always 0
Option Code	/DCV	Dummy Cover (for RIO System Upgrade, for Reference Junction Compensation module slot) [Part No.: T9081FB] (*1)

*1: T9081FB is a dummy cover for the reference junction compensation module slot of A2BA3D-□3□□□. When this module is not mounted, the dummy cover must be attached. The T9081FB mounted on the existing AMN11 or AMN12 can also be utilized. Specify the option code of /DCV only when the existing T9081FB cannot be utilized.

Shunt Resistor Unit

		Description
Model	A2EXR001	Shunt Resistor Unit
Suffix Codes	-S	Standard type
	000	For pressure clamp terminal
	0	With no explosion protection
	3	With ISA standard G3 option and temperature (-40 to 70 °C) option
	0	Always 0
Option Code	/KFR	Kit for RIO System Upgrade (*1)

*1: This Kit can be mounted A2NN10D and A2NN20D. Cables for connecting the terminal block of A2BA3D and A2EXR001 are included.

Dummy Cover (for A2BA3D)

		Description
Model	A2DCV02	Dummy Cover (for A2BA3D) (*1)
Suffix Codes	-0	Always 0
Option Code	/DCV	Dummy Cover (for RIO System Upgrade, for Reference Junction Compensation module slot) [Part No.: T9081FB] (*2)

*1: On A2BA3D, A2DCV02-0 has to be applied for empty slots not mounted with I/O adaptors. Specify option code of /DCV when the existing T9081FB cannot be utilized.

*2: T9081FB is a dummy cover for the reference junction compensation module slot of A2BA3D-□3□□□. When this module is not mounted, the dummy cover must be attached. The T9081FB mounted on the existing AMN11 or AMN12 can also be utilized. Specify the option code of /DCV only when the existing T9081FB cannot be utilized.

3.2.3 Field Interface

Signal connection of I/O adaptors

I/O adaptor	Contact terminals/ pins of A2BA3D (*1)	Signal type (*2)				
A2SAM105 (*3)	<input type="checkbox"/> A (*4)	2-wire transmitter input +	NC	NC	—	—
	<input type="checkbox"/> B	2-wire transmitter input -	4-wire transmitter Current input +	Voltage input +	—	—
	<input type="checkbox"/> C	NC	4-wire transmitter Current input -	Voltage input -	—	—
A2SAM505	<input type="checkbox"/> A	Current output +	Voltage output +	—	—	—
	<input type="checkbox"/> B	NC (*5)	NC (*5)	—	—	—
	<input type="checkbox"/> C	Current output -	Voltage output -	—	—	—
A2SAT105	<input type="checkbox"/> A	NC	RTD input A (*5)	Potentiometer input 100% (*5)	—	—
	<input type="checkbox"/> B	Thermocouple/mV input +	RTD input B	Potentiometer input variable	—	—
	<input type="checkbox"/> C	Thermocouple/mV input -	RTD input B (*5)	Potentiometer input 0% (*5)	—	—
A2SAP105 (*6)	<input type="checkbox"/> A	NC	Contact + (*7) (*8)	NC	Power supply type, 2-wire, power supply	Power supply type, 3-wire, power supply
	<input type="checkbox"/> B	2-wire type (contact) + (*9)	Contact - (*7) (*8) Connect to A2EXR001(*7)	2-wire type (voltage) +	Power supply type, 2-wire, signal, Connect to A2EXR001	Power supply type, 3-wire, +
	<input type="checkbox"/> C	2-wire type (contact) - (*9)	Connect to A2EXR001(*7)	2-wire type (voltage) -	Connect to A2EXR001	Power supply type, 3-wire, -

*1: The field interface of each I/O adaptor consists of three contact terminals (☐A, ☐B, and ☐C).

☐ represents slot number of the A2BA3D (1 to 16).

*2: Do not connect anything to "NC." NC terminal or pin is connected to the internal circuit of the I/O adaptor.

*3: When the A2SAM105 is off power or overcurrent is detected, the current input loop becomes high impedance. Do not share current signals with other receiving devices; or in such case, use it in voltage input mode with a shunt resistor. (250 Ω Shunt Resistor Module [Part No.: A1080RZ])

*4: ☐A terminal is to output the transmitter power supply. When overcurrent is detected, ☐A terminal becomes open.

*5: Wiring resistances for ☐A and ☐C terminals/pins must be identical.

*6: ☐A terminal is to output the transmitter power supply. When the A2SAP105 is off power or overcurrent is detected, ☐A terminal becomes open. When an shunt resistor unit (model: A2EXR001) is used, it must be fastened together with an input signal wire on the ☐B terminal. For details of A2EXR001 connection, refer to "CENTUM VP Installation Guidance" (TI 33J01J10-01EN)

*7: When the input frequency is 0 to 10 kHz.

*8: When the input frequency is 0 to 5 kHz.

*9: When the input frequency is 0 to 800 Hz.

Pin assignment of ELCO connector (front view)

1A	1B	1C
2A	2B	2C
3A	3B	3C
4A	4B	4C
⋮	⋮	⋮
15A	15B	15C
16A	16B	16C

F030206E.ai

Pin assignment of ELCO connector (front view)

Pin No.						Pin No.
4	2A	1C	1B	1A		1
9	3C	3B	3A	2C	2B	5
13	5A	4C	4B	4A		10
18	6C	6B	6A	5C	5B	14
12	N.C	N.C	7B	7A		19
26	8C	8B		8A	7C	23
28	9B			9A		27
30	10A			9C		29
34	11B	11A		10C	10B	31
38	12C	12B	12A	11C		35
43	N.C	14C	13C	13B	13A	39
47	15A	14C	14B	N.C		44
52	16C	16B	16A	15C	15B	48
56	FG	N.C	N.C	N.C		53

F030207E.ai

3.3 MULTI-CHANNEL I/O MODULES

An I/O unit is composed of one or up to four multi-channel I/O module(s).

3.3.1 Analog I/O modules

Analog I/O modules are used for upgrading the multipoint control analog I/O and the multiplexer modules for the RIO system.

Multipoint Control Analog I/O Module and Multiplexer Module (RIO) before upgrading		Analog I/O Module after upgrading	
Model	Name	Model	Name
AMC80	Multipoint Control Analog I/O Module	AAB841-SK□	Analog I/O Module (1 to 5 V input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated) (RIO System Upgrade for AMC80)
AMM12T	Voltage Input Multiplexer Module (*1)	AAV144-SM□	Analog Input Module (-10 to +10 V, 16-channel, Isolated) (RIO System Upgrade for AMM12T)
AMM22M	mV Input Multiplexer Module (*2)	AAT145-SM□	TC/mV Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM22M/AMM22T/ AMM22TJ)
AMM22T	Thermocouple Input Multiplexer Module(*3)		
AMM22TJ	Thermocouple Input Multiplexer Module (supports IEC584-1995)		
AMM32T	RTD Input Multiplexer Module (*4)	AAR145-SM□	RTD/POT Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM32T/AMM32TJ) (*5)
AMM32TJ	RTD Input Multiplexer Module (supports IEC751-1995)		
AMM42T	2-Wire Transmitter Input Multiplexer Module	AAI143-HM□	Analog Input Module (4 to 20 mA, 16-channel, Isolated) (RIO System Upgrade for AMM42T)
AMM52T	Output Multiplexer Module	AAI543-HM□	Analog Output Module (4 to 20 mA, 16-channel, Isolated) (RIO System Upgrade for AMM52T)
AMM12C	Voltage Input Multiplexer Module	AAV144-SK□	Analog Input Module (-10 to +10 V, 16-channel, Isolated) (RIO System Upgrade for AMM12C)
AMM22C	mV Input Multiplexer Module (16 Points)	AAT145-SK□	TC/mV Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM22C/AMM25C)
AMM25C	mV Input Multiplexer Module with Thermocouple Interface (15 Points, RJC Input port added)		
AMM32C	RTD Input Multiplexer Module (16 Points)	AAR145-SK□	RTD/POT Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM32C/AMM32CJ) (*5)
AMM32CJ	RTD Input Multiplexer Module (16 Points, conforms to IEC751-1995)		

*1: The old model AMM11T is included.

*2: The old model AMM21M is included.

*3: The old model AMM21T is included.

*4: The old model AMM31T is included.

*5: Potentiometer input function is not supported by the RIO System Upgrade.

3.3.1.1 Specifications

AAB841-SK□ Analog I/O Module

(1 to 5 V input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated)
(For RIO System Upgrade AMC80)

Items		Specifications
Model		AAB841-SK□
Input	Input signal	1 to 5 V DC (differential input: non-insulated)
	Number of inputs	8
	Input resistance	1 MΩ or higher (at power-on) / 340 kΩ or higher (at power-off)
	Allowable input voltage	-7.5 to 7.5 V DC
	Input accuracy	±4 mV
	Drift due to ambient temperature change	±0.1% / 10 °C
	Input data update period	10 ms
	Input step response	100 ms @ 10 to 90%
	Input signal isolation	No isolation between field and the system, and between channels
	Allowable common mode voltage	±1 V or lower
Output	Output signal	4 to 20 mA DC
	Number of outputs	8
	Allowable load resistance	0 to 750 Ω
	Output range	0 to 23 mA
	Output open detection	0.65 mA or lower
	Output accuracy rating	± 48 μA
	Drift due to ambient temperature change	±0.1% / 10 °C
	Output data update period	10 ms
	Output step response	40 ms @ 10 to 90%
	Output signal isolation	No isolation between field and the system, and between channels
Common	Signal connection	KS1 cable
	Power consumption	330 mA (24 V DC)
	Operating temperature range	0 to 50 °C
	Weight	Approx. 0.55 kg

AAV144-SM□ Analog Input Module (-10 to +10 V, 16-channel, Isolated) (For RIO System Upgrade AMM12T)

AAV144-SK□ Analog Input Module (-10 to +10 V, 16-channel, Isolated) (For RIO System Upgrade AMM12C)

Item	Specifications	
Model	AAV144-SM□	AAV144-SK□
Input signal	DC voltage	
Number of inputs	16	
Input range	1 to 5 V DC, ± 10 V DC	
Allowable input voltage	± 30 V DC	
Input resistance	1 M Ω at power-on, 200 k Ω at power-down	
Signal isolation	16-channel Isolation <ul style="list-style-type: none"> No insulation between channels Isolation between field and the system Withstanding voltage: 1500 V AC per minute (*1)	
Data update period	10 ms	
Accuracy rating	± 4 mV @ $V_{in} = 1$ to 5 V DC ± 20 mV @ $V_{in} = \pm 10$ V DC	
Signal connection	AMT16M (*2)	KS1, KS2, or KS3 cable
Drift due to ambient temperature change	± 4 mV / 10°C @ $V_{in} = 1$ to 5 V ± 20 mV / 10°C @ $V_{in} = \pm 10$ V	
Current consumption	130 mA (24 V DC)	
Operating temperature range	0 to 50°C	
Weight	Approx. 0.93 kg	Approx. 0.47 kg

*1: The withstanding voltage is 500 V AC when using with AAV144-SK□ or KS□ cable (between field and the system).

*2: AMT16M terminal block of the existing AMM12T can also be used. The status display lamp of the AMT16M is disabled. Terminal block disconnection detecting function equipped with AMM12T is not available for AAV144-SM□.

AAT145-SM□ TC/mV Input Module (16-channel, Isolated channels)
(For RIO System Upgrade AMM22M/AMM22T/AMM22TJ)
AAT145-SK□ TC/mV Input Module(16-channel, Isolated channels)
(For RIO System Upgrade AMM22C/AMM25C)

Item	Specifications			
Model	AAT145-SM□		AAT145-SK□	
Input signal	-100 to 150 mV, -20 to 80 mV	Thermocouple • JIS C 1602, IEC 60584-1 (ITS-90) Type J, K, E, B (*1), R, S, T, N • JIS C 1602: 1981, IEC 584-1: 1989 (IPTS-68) Type J, K, E, B (*1), R, S, T • IEC 584-1: 1989 (IPTS-68) Type N	-100 to 150 mV, -20 to 80 mV	Thermocouple • JIS C 1602, IEC 60584-1 (ITS-90) Type J, K, E, B (*1), R, S, T, N • JIS C 1602: 1981, IEC 584-1: 1989 (IPTS-68) Type J, K, E, B (*1), R, S, T • IEC 584-1: 1989 (IPTS-68) Type N
Number of inputs	16	16	16	15 (*2)
Input range	-100 to 150 mV	-20 to 80 mV	-100 to 150 mV	-20 to 80 mV
Allowable input voltage	±5 V			
Input resistance	1 MΩ at power-on, 1 MΩ at power-down			
Signal isolation	16channel, Isolated channels • Insulation between input channels Withstanding voltage: 200 V AC for 1 minute • Isolation between field and the system Withstanding voltage: 1500 V AC for 1 minute (*3)			
Data update period	1 s			
Accuracy rating	±40 μV			
Disconnection detection time	60 s			
Allowable signal source resistance	1 kΩ or lower			
RJC input	—	-20 to 70°C	—	—
RJC accuracy	—	±1°C (*4)	—	±1°C
Allowable common mode voltage	200 V AC for 1 minute			
Burnout detection	Select from UP, DOWN, or OFF			
Signal connection	AMT16M (*5)	AMT16T (*6)	KS1 cable or KS2 cable	KS1 cable
Drift due to ambient temperature change	±80 μV or lower / 10 °C			
Current consumption	130 mA (24 V DC)			
Operating temperature range	0 to 50 °C			
Weight	Approx. 0.56 kg		Approx. 0.50 kg	

*1: Reference junction compensation is not performed by the Type B, and temperatures under 44 °C are not measurable.

*2: When AAT145-SK□ module is connected to MTC terminal board or TETC terminal board via KS1 cable, the input channels are 15.

*3: The withstanding voltage is 500 V AC (between field and the system) when AAT145-SK□ is used with KS1 cable.

*4: This figure may vary depending on the installation environment. When the measured temperature is below 0 °C, multiply the following coefficient (K) with the above value.

$$K = \frac{\text{(Thermo-electromotive force per degree at 0 °C)}}{\text{(Thermo-electromotive force per degree at measured temperature)}}$$

*5: AMT16M terminal block for the existing AMM22M can also be used. The status display lamp of the AMT16M is disabled. Terminal block disconnection detecting function equipped with AMM22M is not available for AAT145-SM□.

*6: AMT16T terminal block of the existing AMM22T or AMM22TJ can also be used. The status display lamp of the AMT16T is disabled. Terminal block disconnection detecting function equipped with AMM22T and AMM22TJ is not available for AAT145-SM□.

AAR145-SM□ RTD/POT Input Module (16-channel, Isolated channels)
(For RIO System Upgrade AMM32T/AMM32TJ)**AAR145-SK□ RTD/POT Input Module (16-channel, Isolated channels)**
(For RIO System Upgrade AMM32C/AMM32CJ)

Item	Specifications	
Model	AAR145-SM□	AAR145-SK□
Input signal (*1)	RTD (3-wire type) <ul style="list-style-type: none"> • JIS C 1604, IEC 60751 (ITS-90) Pt100 • JIS C 1604: 1989, IEC 751: 1986 (IPTS-68) Pt100 • JIS C 1604: 1989 (IPTS-68) JPt100 	
Number of inputs	16	
Allowable input voltage	±5 V	
Signal isolation	16-channel, Isolated channels <ul style="list-style-type: none"> • Insulation between input channels Withstanding voltage: 200 V AC for 1 minute • Isolation between field and the system Withstanding voltage: 1500 V AC for 1 minute (*2) 	
Data update period	1 s	
Accuracy rating	±0.15 Ω	
Disconnection detection time	60 s	
Allowable wiring Resistance	150 Ω or lower (per wire) (*3)	
Measuring current	1 mA	
Burnout detection	Select from UP, DOWN, or OFF	
Signal connection	AMT16R (*4)	KS8 cable or AKB335 cable
Drift due to ambient temperature change	±0.3 Ω or lower / 10 °C	
Current consumption	120 mA (24 V DC)	
Operating temperature range	0 to 50 °C	
Weight	Approx. 1.2 kg	Approx. 0.50 kg

*1: AAR145's POT input function is disabled in the RIO System Upgrade.

*2: The withstanding voltage is 500 V AC (between field and the system) when using AAR145-SK□ with KS8 cable.

*3: Wiring resistance of IN□A and IN□B signal cables must be identical.

*4: AMT16R terminal block of the existing AMM32T or AMM32TJ can also be used. The status display lamp of AMT16R is disabled. Terminal block disconnection detecting function equipped with AMM32T and AMM32TJ is not available for AAR145-SM□.

AAI143-HM□ Analog Input Module
(4 to 20 mA, 16-channel, Isolated) (For RIO upgrading System for AMM42T)

Item	Specifications
Model	AAI143-HM□ (*1)
Input signal	2-wire transmitter input 4 to 20 mA DC (*2)
Number of inputs	16
Allowable input current	24 mA or lower
Transmitter power supply	19.0 V or higher (at 20 mA), 25.5 V or lower (at 0 mA) (Output current limit: 25 mA) (* 3)
Input resistance	At power-up: 270 Ω (20 mA) to 350 Ω (4 mA) (*4) At power-down: 500 kΩ or higher
Signal isolation	16-channel isolated <ul style="list-style-type: none"> No insulation between channels Isolation between field and the system Withstanding voltage: 1500 V AC for 1 minute
Data update period	10 ms
Accuracy rating	±16 μA
Signal connection	AMT16M (*5)
Drift due to ambient temperature change	±16 μA / 10 °C
Power consumption	600 mA (24 V DC)
HART communication function	HART 5 is supported
Operating temperature range	0 to 50 °C
Weight	Approx. 1.0 kg

- *1: A zener barrier cannot be connected with this module. Use an isolation barrier when the module is used in an intrinsically safe application.
- *2: AAI143-HM□ is dedicated for use with 2-wire transmitter input. Switching between 2-wire and 4-wire is not applicable.
- *3: This voltage is generated between the connecting terminals for 2-wire transmitters of this module. When calculating the minimum operating voltage of transmitters, consider allowing margins for voltage drop in external wiring.
- *4: The module input resistance viewed from the terminals depends on the current strength as calculated as below:
250 Ω+ (Voltage drop in the input protection circuit / Current value)
- *5: AMT16M terminal block of the existing AMM42T can be also used. The status display lamp of AMT16M is disabled. Terminal block disconnection detecting function equipped with AMM42T is not available for AAI143-HM□.

AAI543-HM□ Analog Output Module
(4 to 20 mA, 16-channel, Isolated) (For RIO System Upgrade AMM52T)

Item	Specification
Model	AAI543-HM□
Output signal	4 to 20 mA DC
Allowable load resistance	0 to 750 Ω
Output range	1.0 to 23 mA DC
Output open detection	0.65 mA or lower
Signal isolation	16-channel isolated <ul style="list-style-type: none"> No insulation between channels Isolation between field and the system Withstanding voltage: 1500 V AC for 1 minute
Data update period	10 ms
Accuracy rating	± 48 μA
Signal connection	AMT16M (*1)
Drift due to ambient temperature change	±16 μA / 10°C
Power consumption	680 mA (24 V DC)
HART communication function	HART 5 is supported
Operating temperature range	0 to 50°C
Weight	Approx. 1.1 kg

- *1: AMT16M terminal block of the existing AMM52T can also be used. The status display lamp of the AMT16M is disabled. Terminal block disconnection detecting function equipped with AMM52T is not available for AAI543-HM□.

3.3.1.2 Model and suffix codes

Analog I/O Module (1 to 5 V input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated)

		Description
Model	AAB841	Analog I/O Module (1 to 5 V input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated)
Suffix Codes	-S	Standard type
	K	RIO System Upgrade for AMC80 (KS Cable connection type) (*1)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: The operating temperature range for suffix code "-SK3" is 0 to 50 °C.

Analog Input Module (-10 to +10 V, 16-channel, Isolated)

		Description
Model	AAV144	Analog Input Module (-10 to +10 V, 16-channel, Isolated)
Suffix Codes	-S	Standard type
	K	RIO System Upgrade for AMM12C (KS Cable connection type) (*1)
	M	RIO System Upgrade for AMM12T (M4 Screw Terminal connection type) (*2)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: The operating temperature range for suffix code "-SK3" is 0 to 50 °C.

*2: The operating temperature range for suffix code "-SM3" is 0 to 50 °C.

TC/mV Input Module (16-channel, Isolated channels)

		Description
Model	AAT145	TC/mV Input Module (16-channel, Isolated channels)
Suffix Codes	-S	Standard type
	K	RIO System Upgrade for AMM22C/AMM25C (KS Cable connection type) (*1)
	M	RIO System Upgrade for AMM22M/AMM22T/AMM22TJ (M4 Screw Terminal connection type) (*2)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: The operating temperature range for suffix code "-SK3" is 0 to 50 °C.

*2: The operating temperature range for suffix code "-SM3" is 0 to 50 °C.

RTD/POT Input Module (16-channel, Isolated channels)

		Description
Model	AAR145	RTD/POT Input Module (16-channel, Isolated channels) (*1)
Suffix Codes	-S	Standard type
	K	RIO System Upgrade for AMM32C/AMM32CJ (KS Cable connection type) (*2)
	M	RIO System Upgrade for AMM32T/AMM32TJ (M4 Screw Terminal connection type) (*3)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: AAR145's POT input function is disabled in the RIO System Upgrade.

*2: The operating temperature range for suffix code "-SK3" is 0 to 50 °C.

*3: The operating temperature range for suffix code "-SM3" is 0 to 50 °C.

Analog Input Module (4 to 20 mA, 16-channel, Isolated)

		Description
Model	AAI143	Analog Input Module (4 to 20 mA, 16-channel, Isolated)
Suffix Codes	-H	With digital communication (HART protocol)
	M	RIO System Upgrade for AMM42T (M4 Screw Terminal connection type) (*1)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: The operating temperature range for suffix code "-HM3" is 0 to 50 °C.

Analog Output Module (4 to 20 mA, 16-channel, Isolated)

		Description
Model	AAI543	Analog Output Module (4 to 20 mA, 16-channel, Isolated)
Suffix Codes	-H	With digital communication (HART protocol)
	M	RIO System Upgrade for AMM52T (M4 Screw Terminal connection type) (*1)
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

*1: The operating temperature range for suffix code "-HM3" is 0 to 50 °C.

3.3.2 Digital I/O Modules

The digital I/O modules are used to upgrade the digital I/O modules for RIO.

Digital I/O Module (RIO) before upgrading		Digital I/O Module after upgrading	
ADM11T	Contact Input Module (16 Points, Terminal Type)	ADV159-PM□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM11T, I/O channel is limited to 16 channels.)
ADM12T	Contact Input Module (32 Points, Terminal Type)	ADV169-PM□	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM12T, I/O channel is limited to 32 channels.)
ADM51T	Contact Output Module (16 Points, Terminal Type)	ADV559-PM□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM51T, I/O channel is limited to 16 channels.)
ADM52T	Contact Output Module (32 Points, Terminal Type)	ADV569-PM□	Digital Output Module for Compatible ST7 (64-channel output, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM52T, I/O channel is limited to 32 channels.)
ADM11C	Contact Input Module (16 Points, Connector Type)	ADV159-PK□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM11C, I/O channel is limited to 16 channels.)
ADM12C	Contact Input Module (32 Points, Connector Type)	ADV169-PK□	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM12C, I/O channel is limited to 32 channels.)
ADM51C	Contact Output Module (16 Points, Connector Type)	ADV559-PK□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM51C, I/O channel is limited to 16 channels.)
ADM52C	Contact Output Module (32 Points, Connector Type)	ADV569-PK□	Digital Output Module for Compatible ST7 (64-channel output, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM52C, I/O channel is limited to 32 channels.)
ADM15R	Relay Input Module	ADV159-PY□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM15R, I/O channel is limited to 16 channels.)
ADM55R	Relay Output Module	ADV559-PY□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM55R, I/O channel is limited to 16 channels.)

3.3.2.1 Specifications

ADV159-PM□□Digital Input Module for Compatible ST3
(32-channel, Isolated channels) (For RIO System Upgrade ADM11T)

ADV159-PK□□Digital Input Module for Compatible ST3
(32-channel, Isolated channels) (For RIO System Upgrade ADM11C)

Item	Specifications	
Model	ADV159-PM□	ADV159-PK□
Number of input channels	16 (*1)	
Input signal	Contact input: OFF signal 100 kΩ or higher, ON signal 200 Ω or lower Voltage input: OFF signal 4.5 to 25 V DC, ON signal ±1 V DC, 200 Ω or lower	
Input contact rating	5 V DC, 20 mA or higher	
Input response time	8 ms (for status input)	
Min. ON detection time	20 ms (for push button input)	
Min. ON/OFF period	40 ms (25 Hz) (for push button input)	
Current consumption	120 mA (24 V DC)	
Functions		
Status input	For detecting ON/OFF status	
Pushbutton input	For counting the pushbutton edge	
Signal isolation	Isolated channels	
Signal connection	ADT16 (*2)	KS2 or KS3 cable
Weight	Approx. 1.1 kg	Approx. 0.58 kg

*1: ADV159 is a 32-channel module, however, the number of input channels is limited to 16 for the RIO System Upgrade.

*2: ADT16M terminal block of the existing ADM11T can also be utilized. The status display lamp of ADT16 is disabled.
Terminal block disconnection detecting function equipped with ADM11T is not available for ADV159-PM□.

ADV159-PY□□Digital Input Module for Compatible ST3
(32-channel, Isolated channels) (For RIO System Upgrade ADM15R)

Item	Specifications
Model	ADV159-PY□
Number of input channels	16 (*1)
Input signal	Non-voltage contact (between terminals A-B) Terminal B is common with system common. (*2)
Input rating	24 V DC 8.3 mA±10 % Induction load (*2) (*3)
Relay operation time	10 ms or less(*2) (*4)
Relay return time	10 ms or less (*2) (*4)
Current consumption	300 mA (24 V DC) (*2)
Signal isolation	Minus common 16-channel isolation (*2) (*5)
Signal connection	ADT16A (*6)
Weight	Approx. 1.3 kg
Others	Status display lamps (bit-displays) are built into the module body

*1: ADV159 is a 32-channel module, however, the number of input channels is limited to 16 for the RIO System Upgrade.

*2: ADV159-PY□ must be used in combination with the ADT16A terminal block. Relays are mounted on the ADT15A.
These specifications are valid only when ADV159-PY□ and ADT16A are used in combination.

*3: 24 V DC is supplied by the built-in power supply.

*4: These figures are the operation and return times of the relay alone, and the communication process time between the module and a supervisory computer must be added.

*5: ADV159 is an isolated channels module, however, it becomes a common 16-channel isolation module when the suffix code "-PY□" is specified.

*6: ADT16A terminal block of the existing ADM15R can also be utilized. The status display lamp of ADT16A is disabled.
Terminal block disconnection detecting function equipped with ADM15R is not available for ADV159-PY□.

ADV169-PM□ Digital Input Module for Compatible ST6
(64-channel, Isolated, Common Minus Side Every 16-channel) (For RIO System Upgrade ADM12T)

ADV169-PK□ Digital Input Module for Compatible ST6
(64-channel, Isolated, Common Minus Side Every 16-channel) (For RIO System Upgrade ADM12C)

Item	Specifications	
Model	ADV169-PM□	ADV169-PK□
Number of input channels	32 (*1)	
Input signal	Contact input: OFF signal 100 kΩ or more, ON signal 200 Ω or lower Voltage input: OFF signal 4.5 to 25 V DC, ON signal ±1 V DC, 200 Ω or lower	
Input contact rating	5 V DC, 20 mA or higher	
Input response time	8 ms (for status input)	
Current consumption	170 mA (24 V DC)	
Min. ON detection time	20 ms (for pushbutton input)	
Min. ON/OFF period	40 ms (25 Hz) (for pushbutton input)	
Functions		
Status input	Function for detecting ON/OFF status	
Pushbutton input	Function for counting the pushbutton edges	
Signal isolation	Common on the minus (-) side for every 16 channels	
Signal connection	ADT32 (*2)	KS9 or KS10 cable
Weight	Approx. 1.0 kg	Approx. 0.56 kg

*1: ADV169 is a 64-channel module, however the number of inputs is limited to 32 for the RIO System Upgrade.

*2: ADT32 terminal block of the existing ADM12T can also be utilized. The status display lamp of ADT32 is disabled.
Terminal block disconnection detecting function equipped with ADM12T is not available for ADV169-PM□.

ADV559-PM□ Digital Output Module for Compatible ST4
(32-channel, output, Isolated channels) (For RIO System Upgrade ADM51T)

ADV559-PK□ Digital Output Module for Compatible ST4
(32-channel, output, Isolated channel) (For RIO System Upgrade ADM51C)

Item	Specifications	
Model	ADV559-PM□	ADV559-PK□
Number of outputs	16 (*1)	
Output signal	Transistor contact	
Contact	Inductive load, resistance load: 30 V DC, 100 mA or lower (*2)	
Pulse width	8 ms to 7200 s	
Pulse width resolution	8 ms. / Max. 1 ms for ON/OFF delay time must be added.	
Current consumption	130 mA (24 V DC)	
Functions (*3)		
Status output	ON/OFF status output function	
Pulse width output	One-shot pulse width output function	
Time-proportioning output	Time-proportioning ON/OFF	
Signal isolation	Isolated channels	
Signal connection	ADT16 (*4)	KS2 or KS3 cable
Weight	Approx. 1.0 kg	Approx. 0.56 kg

*1: ADV559 is a 32-channel module, however, the number of output channels is limited to 16 for the RIO System Upgrade.

*2: A diode must be connected when driving a DC relay by the output contact.

*3: "Pulse type output" function that existing ADM51□ had is alternated by software (Control function for field control station).

*4: ADT16 terminal block of the existing ADM51T can also be utilized. The status display lamp of ADT16 is disabled.
Terminal block disconnection detecting function equipped with ADM51T is not available for ADV559-PM□.

ADV559-PY□ Digital Output Module for Compatible ST4
(32-channel output, Isolated channels) (For RIO System Upgrade ADM55R)

Item	Specifications
Model	ADV559-PY□
Number of output channels	16 (*1)
Output format	Relay contact (*2) (*3) A contact between terminals AC B contact between terminals BC
Output rating	250 V AC 1.5 A or lower (*4)/125 V AC 1.5 A or lower/125 V DC 0.1 A or lower/24 V DC 1.5 A or lower (*2)
Relay operation time	10 ms or less(*2) (*5)
Relay return time	10 ms or less (*2) (*5)
Current consumption	410 mA (24 V DC) (*2)
Signal isolation	Isolated channels (*2)
Signal connection	ADT16B (*6)
Weight	Approx. 1.3 kg
Others	Status display lamps (bit-displays) are built in the module body

- *1: ADV559 is a 32-channel module, however, the number of output channels is limited to 16 for the RIO System Upgrade.
- *2: ADV559-PY□ must be used in combination with the ADT16B terminal block. Relays are mounted on the ADT15B. These specifications are valid only when the ADV559-PY□ and the ADT16B are used in combination.
- *3: A diode must be connected when driving a DC relay by the output contact.
- *4: 250 V AC can only be applicable when ADT16B terminal block is style S2 or later.
- *5: These figures are the operation and return times of the relay alone, and the communication process time between the module and a supervisory computer must be added.
- *6: ADT16B terminal block of the existing ADM55R can also be utilized. The status display lamp of ADT16B is disabled. Terminal block disconnection detecting function equipped with ADM55R is not available for ADV559-PY□.

ADV569-PM□ Digital Output Module for Compatible ST7
(64-channel output, Isolated, Common Minus Side Every 16-channel) (For RIO System Upgrade ADM52T)
ADV569-PM□ Digital Output Module for Compatible ST7
(64-channel output, Isolated, Common Minus Side Every 16-channel) (For RIO System Upgrade ADM52C)

Item	Specifications	
Model	ADV569-PM□	ADV569-PK□
Number of output channels	32 (*1)	
Output signal	Transistor contact	
Contact	Inductive load and resistance load: 30 V DC, 100 mA or lower (*2)	
Pulse width	8 ms to 7200 s	
Pulse width resolution	8 ms / Max. 1ms for ON/OFF delay time must be added.	
Current consumption	190 mA (24 V DC)	
Functions (*3)	ON/OFF status output function One-shot pulse width output function Time-proportioning ON/OFF	
Signal isolation	Common on the minus (-) side for every 16-channel	
Signal connection	ADT32 (*4)	KS9 or KS10 cable
Weight	Approx. 1.0 kg	Approx. 0.56 kg

- *1: ADV569 is a 64-channel module, however, the number of outputs is limited to 32 for the RIO System Upgrade.
- *2: A diode must be connected when driving a DC relay by the output contact.
- *3: "Pulse type output" function that existing ADM52□ had is alternated by software (Control function for field control station).
- *4: ADT32 terminal block of the existing ADM52T can also be utilized. The status display lamp of ADT32 is disabled. Terminal block disconnection detecting function equipped with ADM52T is not available for ADV569-PM□.

3.3.2.2 Model and suffix codes**Digital Input Module for Compatible ST3 (32-channel, Isolated channels)**

		Description
Model	ADV159	Digital Input Module for Compatible ST3 (32-channel, Isolated channels)
Suffix Codes	-P	With pushbutton input
	K	RIO System Upgrade for ADM11C (KS cable connection type) (*1)
	M	RIO System Upgrade for ADM11T (M4 screw terminal connection type) (*1)
	Y	RIO System Upgrade for ADM15R (Relay terminal connection type) (*1)
	0	Basic type
	1	With ISA Standard G3 option

*1: I/O channel is limited to 16 channels.

Digital Input Module for Compatible ST6**(64-channel, Isolated, Common Minus Side Every 16-channel)**

		Description
Model	ADV169	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel)
Suffix Codes	-P	Standard type
	K	RIO System Upgrade for ADM12C (KS cable connection type) (*1)
	M	RIO System Upgrade for ADM12T (M4 screw terminal connection type) (*1)
	0	Basic type
	1	With ISA Standard G3 option

*1: I/O channel is limited to 32 channels.

Digital Input Module for Compatible ST6**(64-channel, Isolated, Common Minus Side Every 16-channel)**

		Description
Model	ADV559	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels)
Suffix Codes	-P	With pulse width function/time-proportional output function
	K	RIO System Upgrade for ADM51C (KS cable connection type) (*1)
	M	RIO System Upgrade for ADM51T (M4 screw terminal connection type) (*1)
	Y	RIO System Upgrade for ADM55R (Relay terminal connection type) (*1)
	0	Basic type
	1	With ISA Standard G3 option

*1: I/O channel is limited to 16 channels.

Digital Input Module for Compatible ST6**(64-channel, Isolated, Common Minus Side Every 16-channel)**

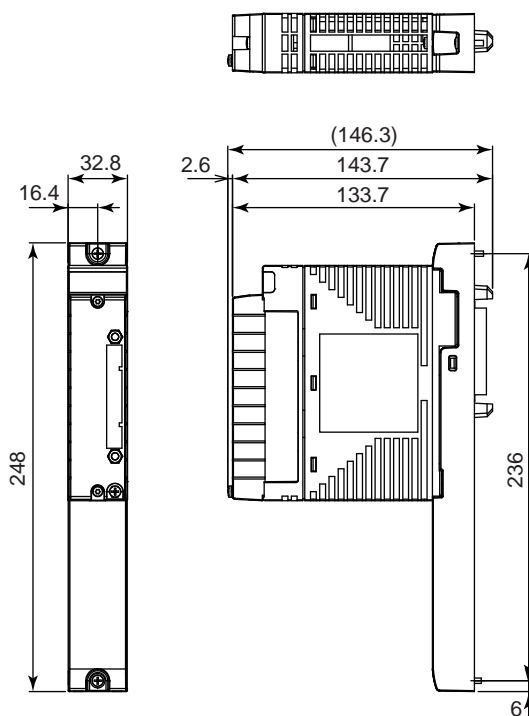
		Description
Model	ADV569	Digital Output Module for Compatible ST7 (64-channel output, Isolated, Common Minus Side Every 16-channel)
Suffix Codes	-P	With pulse width function/time-proportional output function
	K	RIO System Upgrade for ADM52C (KS cable connection type) (*1)
	M	RIO System Upgrade for ADM52T (M4 screw terminal connection type) (*1)
	0	Basic type
	1	With ISA Standard G3 option

*1: I/O channel is limited to 32 channels.

3.3.3 External dimensions

AAB841-SK□, AAV144-SK□

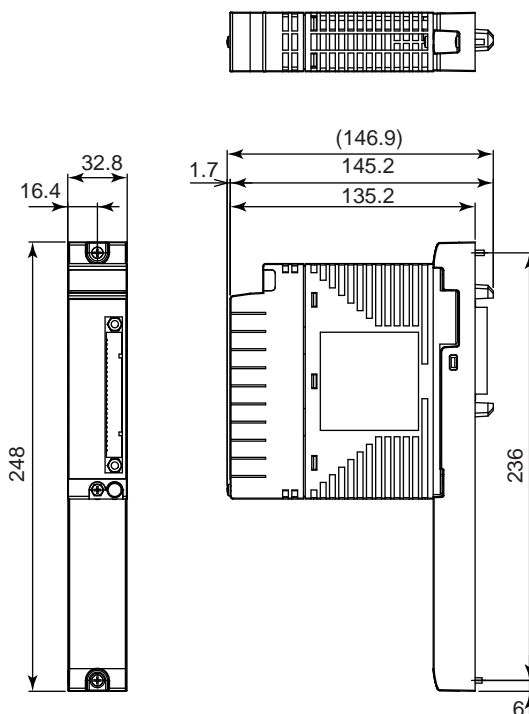
Unit: mm



F030301E.ai

AAR145-SK□

Unit: mm



F030302E.ai

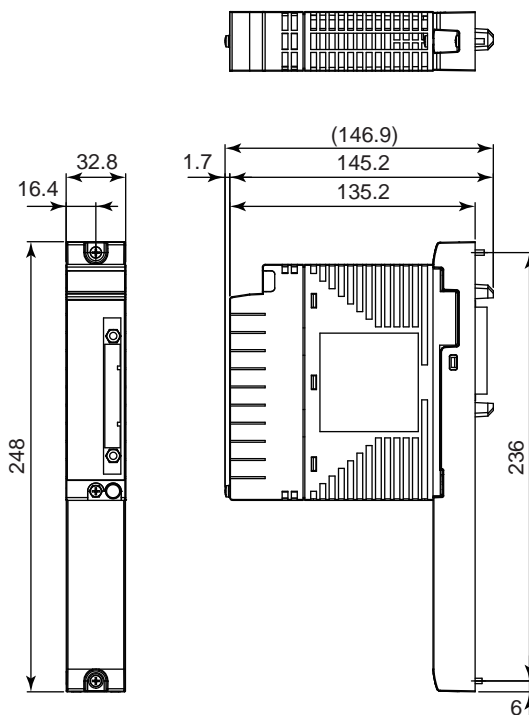
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

AAT145-SK□

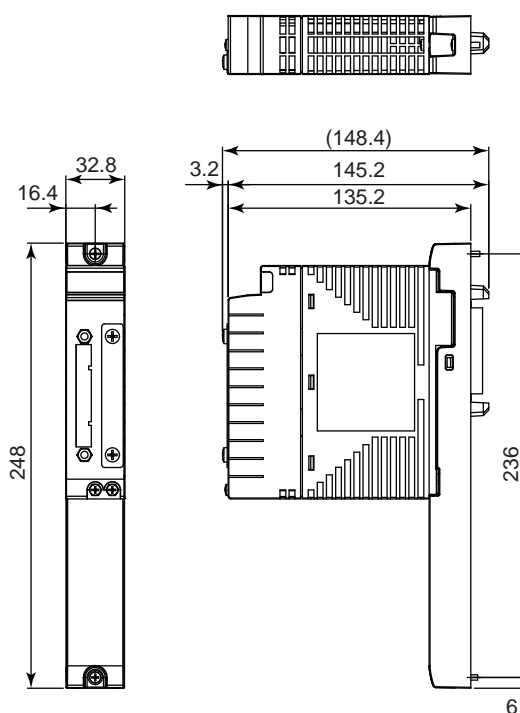
Unit: mm



F030303E.ai

ADV159-PK□, ADV559-PK□

Unit: mm



F030304E.ai

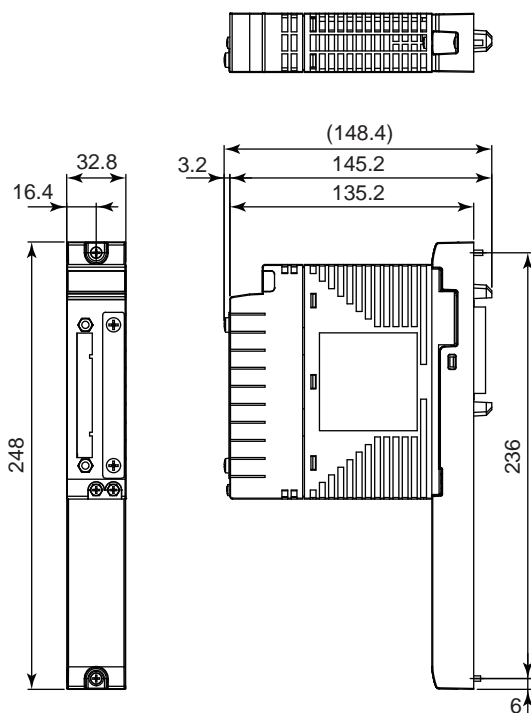
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

ADV169-PK□, ADV569-PK□

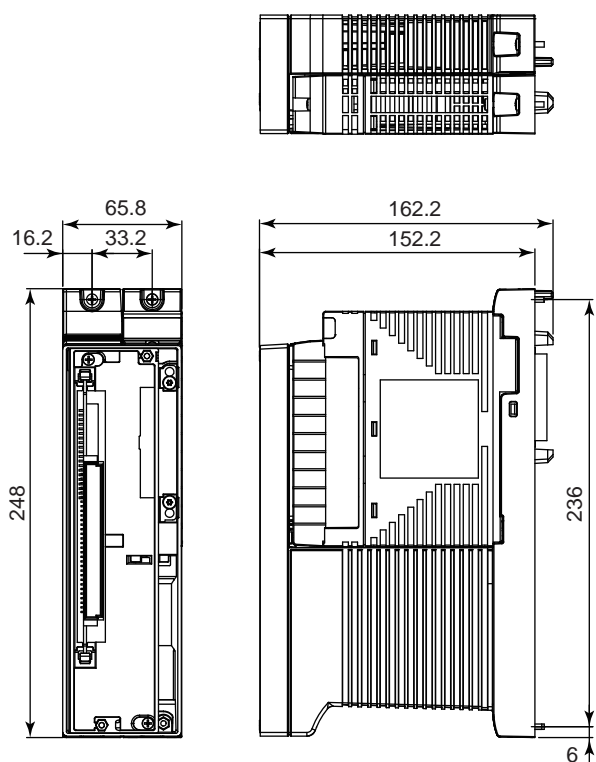
Unit: mm



F030305E.ai

AAI143-HM□, AAI543-HM□, AAV144-SM□

Unit: mm



F030306E.ai

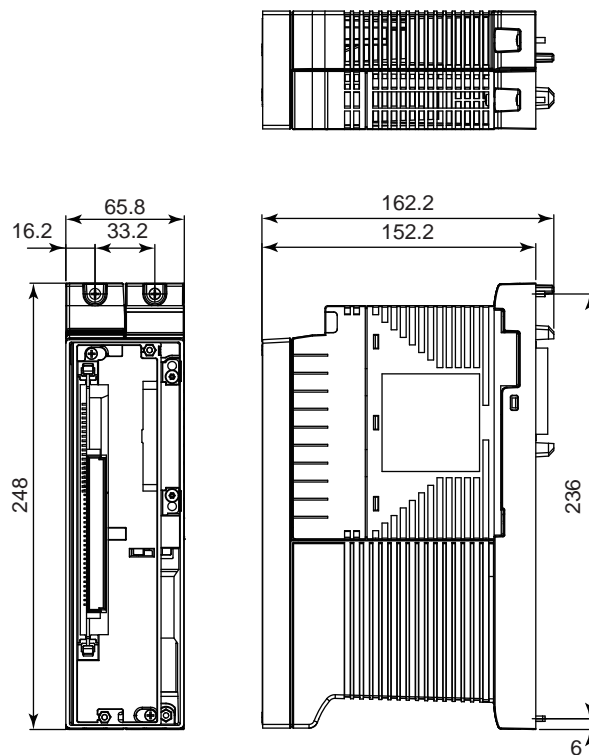
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

AAT145-SM□

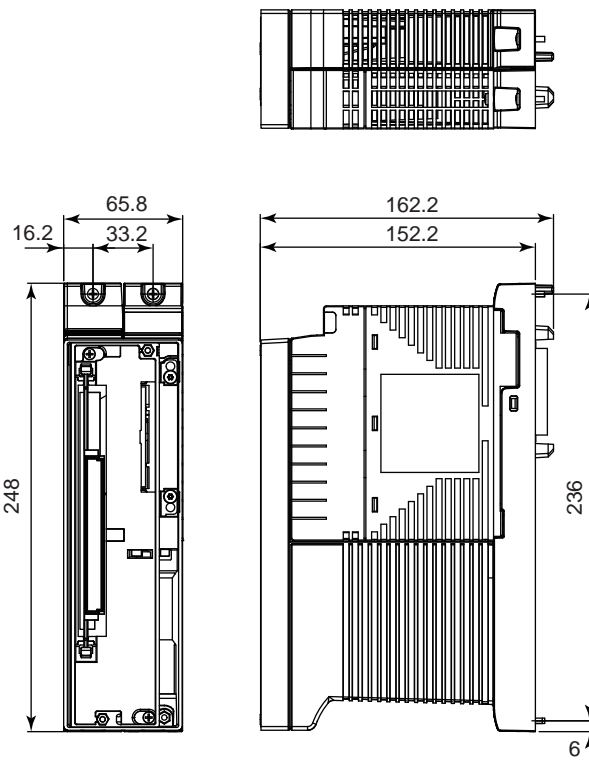
Unit: mm



F030307E.ai

ADV159-PM□, ADV559-PM□

Unit: mm



F030308E.ai

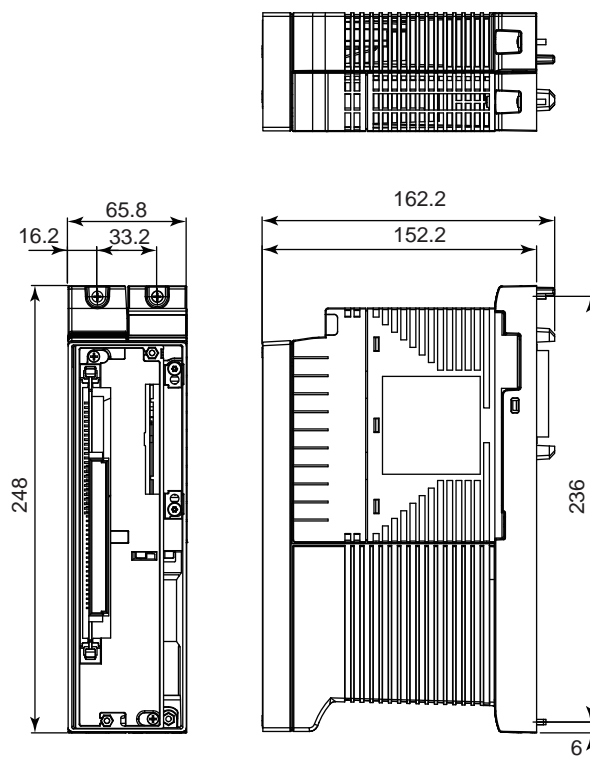
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

ADV169-PM□, ADV569-PM□

Unit: mm



F030309E.ai

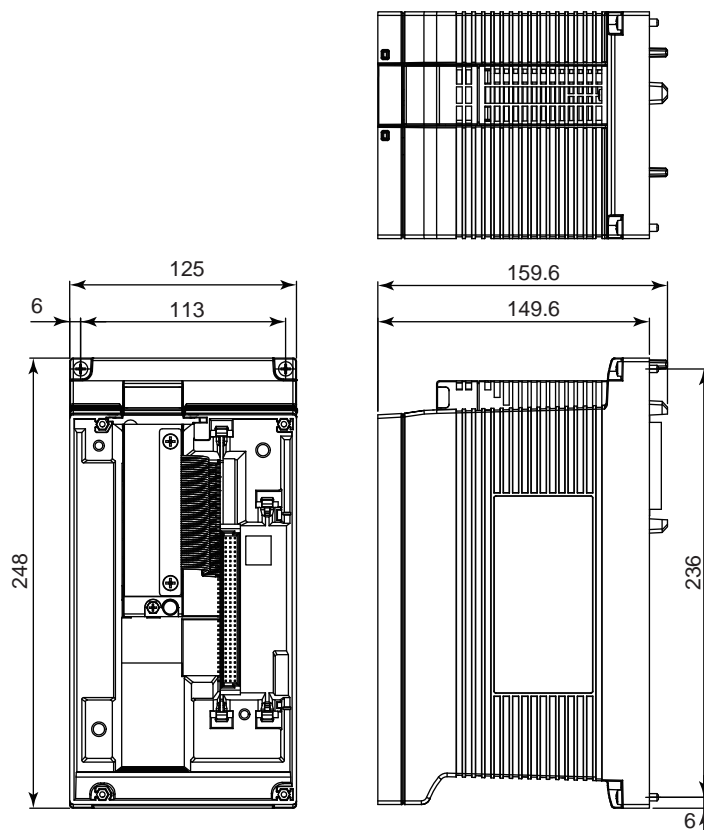
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

AAR145-SM□

Unit: mm



F030310E.ai

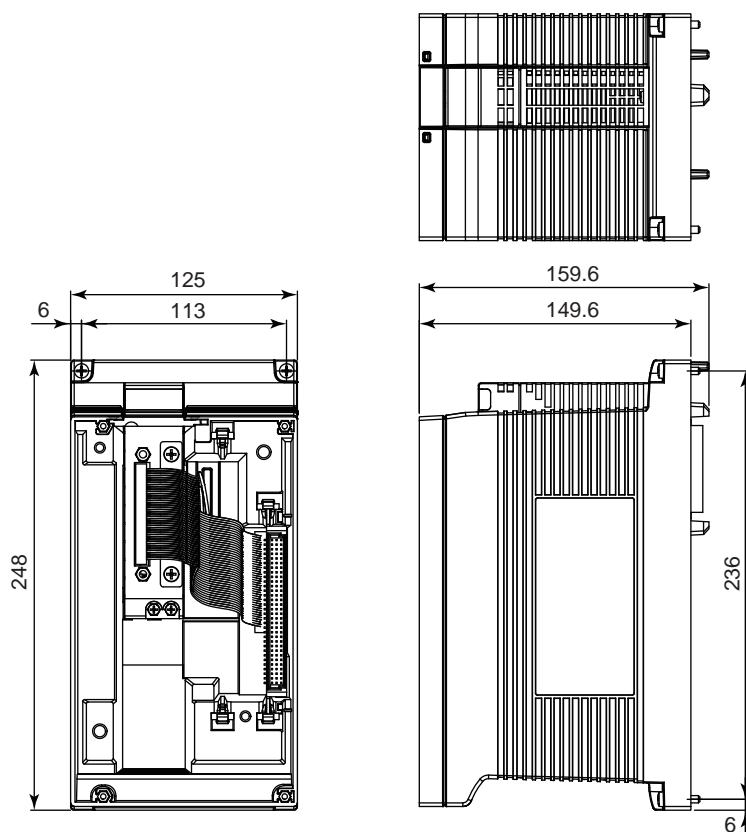
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

ADV159-PY□, ADV559-PY□

Unit: mm



F030311E.ai

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

3.4 TERMINAL BLOCKS

M4 screw type terminal blocks which are used in combination with I/O modules are described in this section. Those terminal blocks which have been used with the existing RIO modules can be utilized as well.

The status display lamps of the terminal blocks are disabled after the RIO system upgrade performed.

3.4.1 Combination of Terminal blocks and I/O modules

Terminal block	Applicable I/O modules after upgrading
AMT16M	AAV144-SM□ AAT145-SM□ (for mV input) AAI143-HM□ AAI543-HM□
AMT16R	AAR145-SM□
AMT16T	AAT145-SM□ (for Thermocouple input)
ADT16	ADV159-PM□ ADV559-PM□
ADT32	ADV169-PM□ ADV569-PM□
ADT16A	ADV159-PY□
ADT16B	ADV559-PY□

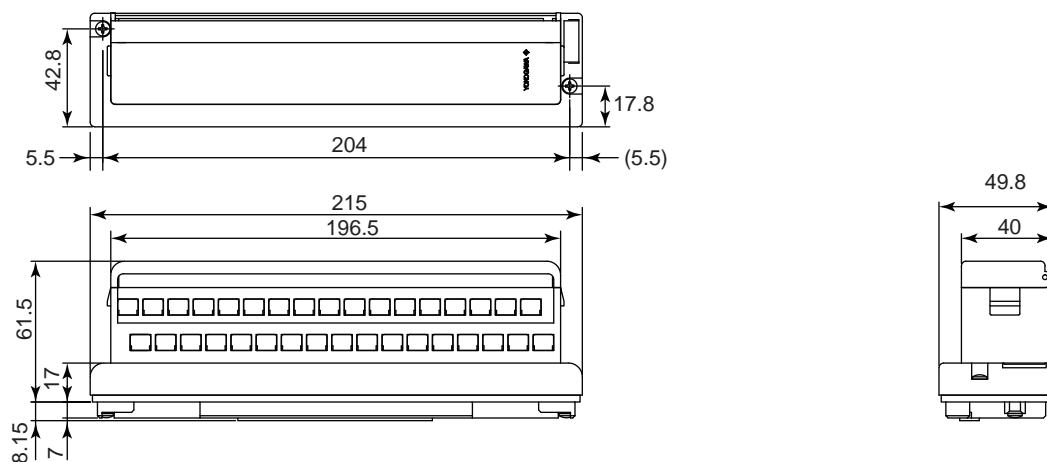
3.4.2 Weight

Terminal block	Weight
AMT16M	Approx. 0.5 kg
AMT16R	Approx. 0.8 kg
AMT16T	Approx. 0.9 kg
ADT16	Approx. 0.5 kg
ADT32	Approx. 0.6 kg
ADT16A	Approx. 0.9 kg
ADT16B	Approx. 0.9 kg

3.4.3 External Dimensions

AMT16M, AMT16T, ADT16, and ADT32

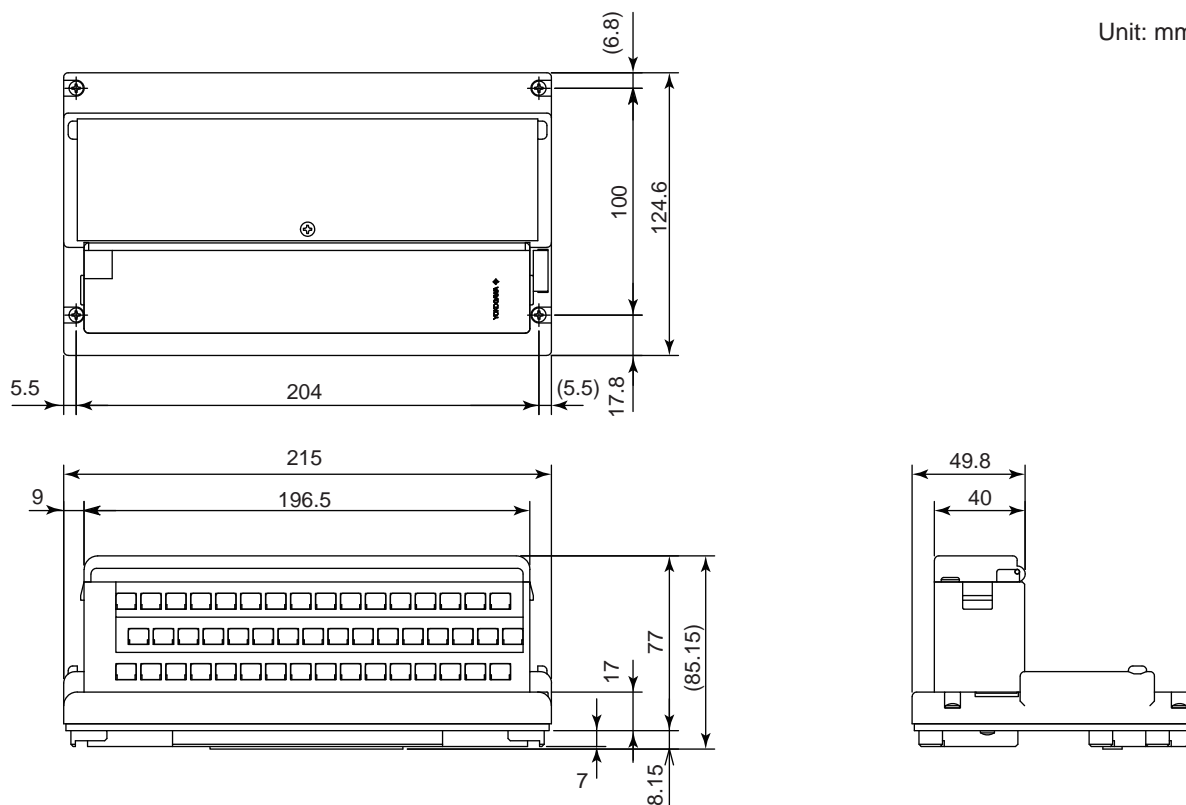
Unit: mm



F030401E.ai

AMT16R, ADT16A, and ADT16B

Unit: mm



F030402E.ai

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

3.4.4 Model and suffix codes

Model	Description
AMT16M	Terminal block (for AMM12T, AMM22M, AMM42T, AMM52T)
AMT16R	Terminal block (for AMM32T)
AMT16T	Terminal block (for AMM22T)
ADT16	Terminal block (for Contact I/O modules of 16 point types)
ADT32	Terminal block (for Contact I/O modules of 32 point types)
ADT16A	Terminal block (for Relay input module)
ADT16B	Terminal block (for Relay output module)

3.5 LIMITATIONS OF INSTALLATION ON NIU

3.5.1 Number of nest and I/O modules mountable per I/O Unit

Model	Name	Dual redundant configuration	Number of modules mountable per I/O Unit
Nest for I/O adaptor			
A2BA3D	Nest for I/O adaptor	—	1
Analog I/O modules (*1)			
AAB841-SK□	Analog I/O Module (1 to 5 V input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated) (RIO System Upgrade for AMC80)	X (*2)	2
AAV144-SM□	Analog Input Module (-10 to +10 V, 16-channel, Isolated) (RIO System Upgrade for AMM12T)	—	Total 2
AAT145-SM□	TC / mV Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM22M/AMM22T/AMM22TJ) (*3)	—	
AAR145-SM□	RTD / POT Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM32T / AMM32TJ)	—	1
AAI143-HM□	Analog Input Module (4 to 20 mA, 16-channel, Isolated) (RIO System Upgrade for AMM42T)	—	
AAI543-HM□	Analog Output Module (4 to 20 mA, 16-channel, Isolated) (RIO System Upgrade for AMM52T)	—	
AAV144-SK□	Analog Input Module (-10 to +10 V, 16-channel, Isolated) (RIO System Upgrade for AMM12C)	—	Total 4
AAT145-SK□	TC / mV Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM22C / AMM25C)	—	
AAR145-SK□	RTD/POT Input Module (16-channel, Isolated channels) (RIO System Upgrade for AMM32C/AMM32CJ)	—	
Digital I/O modules (*1)			
ADV159-PM□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM11T, (I/O channel is limited to 16 channels.)	— (*4)	Total 2
ADV169-PM□	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM12T, I/O channel is limited to 32 channels.)	— (*4)	
ADV559-PM□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM51T, I/O channel is limited to 16 channels.)	— (*4)	
ADV569-PM□	Digital Output Module for Compatible ST7 (64-channel output, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM52, I/O channel is limited to 32 channels.)	— (*4)	
ADV159-PK□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM11C, I/O channel is limited to 16 channels.)	— (*4) (*5)	Total 4
ADV169-PK□	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM12C, I/O channel is limited to 32 channels.)	— (*4) (*5)	
ADV559-PK□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM51C, I/O channel is limited to 16 channels.)	— (*4) (*5)	
ADV569-PK□	Digital Output Module for Compatible ST7 (64-channel output, Isolated, Common Minus Side Every 16-channel) (RIO System Upgrade for ADM52C, I/O channel is limited to 32 channels.)	— (*4) (*5)	

X: possible -: not possible

*1: Analog I/O modules (AAB841, AAV144, AAT145, AAR145, AAI143, and AAI543) cannot be used together with digital I/O modules (ADV159, ADV559, ADV169, and ADV569), in one I/O Unit.

*2: Installing two modules in one I/O unit allows one to use a pair of redundant modules or two sets of module.

*3: See the chapter 3.5.2 for another limitations about AAT145-SM□.

*4: Dual-redundant configuration can be made by the FCS system software, not by the hardware functions of the I/O modules. Refer to chapter 3.5.3 for more details.

*5: Dual-redundant configuration can be applied only when replacing the digital I/O modules (ADM11C, ADM51C, ADM12C, or ADM52C) with duplex configuration in the existing RIO system.

Model	Name	Dual redundant configuration	Number of modules mountable per I/O Unit
Digital I/O modules (*1)			
ADV159-PY□	Digital Input Module for Compatible ST3 (32-channel, Isolated channels) (RIO System Upgrade for ADM15R, I/O channel is limited to 16 channels.)	— (*4)	1
ADV559-PY□	Digital Output Module for Compatible ST4 (32-channel output, Isolated channels) (RIO System Upgrade for ADM55R, I/O channel is limited to 16 channels.)	— (*4)	

X: possible -: not possible

*1: Analog I/O modules (AAB841, AAV144, AAT145, AAR145, AAI143, and AAI543) cannot be used together with digital I/O modules (ADV159, ADV559, ADV169, and ADV569), in one I/O Unit.

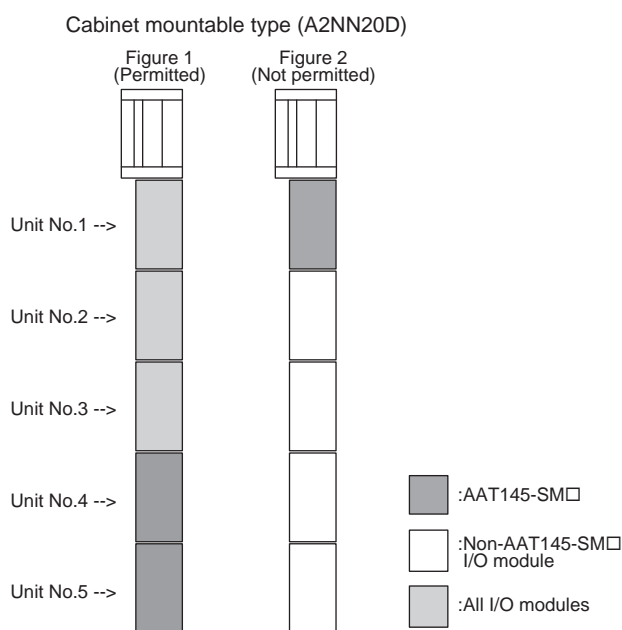
*4: Dual-redundant configuration can be made by the FCS system software, not by the hardware functions of the I/O modules. Refer to chapter 3.5.3 for more details.

*5: Dual-redundant configuration can be applied only when replacing the digital I/O modules (ADM11C, ADM51C, ADM12C, or ADM52C) with duplex configuration in the existing RIO system.

3.5.2 Remarks for Installation of AAT145-SM□

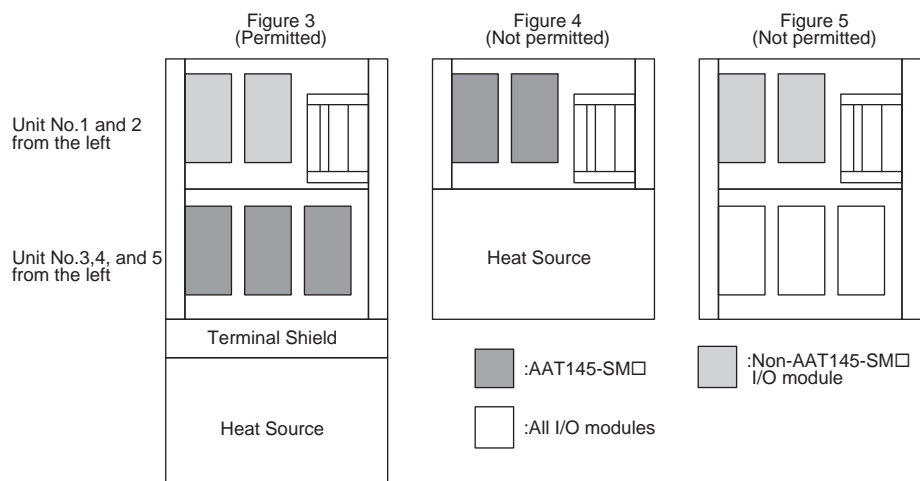
AAT145-SM□ is used with AMT16T terminal block for thermocouple input, which causes reference junction compensation error where there is a heat source underneath.

- Do not install any I/O module or I/O nest for adaptor other than AAT145-SM□ under the AAT145-SM□ (See Figures 1, 2 and 5).
- In case placing a heat source underneath the AAT145-SM□ is unavoidable, a thermal shield must be installed. (See Figures 3 and 4).



F030501E.ai

19-inch Rack mountable type (A2NN10D)



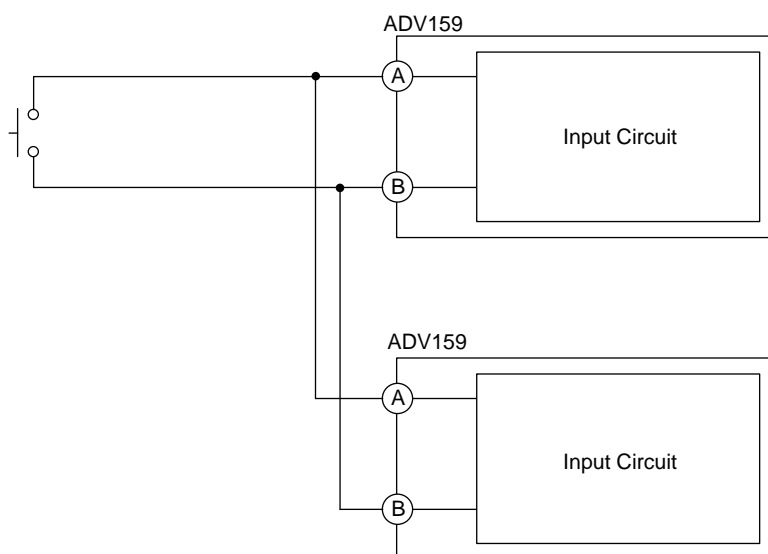
F030502E.ai

3.5.3 Connecting Digital I/O modules in dual-redundant configuration

Examples and remarks of connecting digital I/O modules in dual-redundant configuration are as described below.

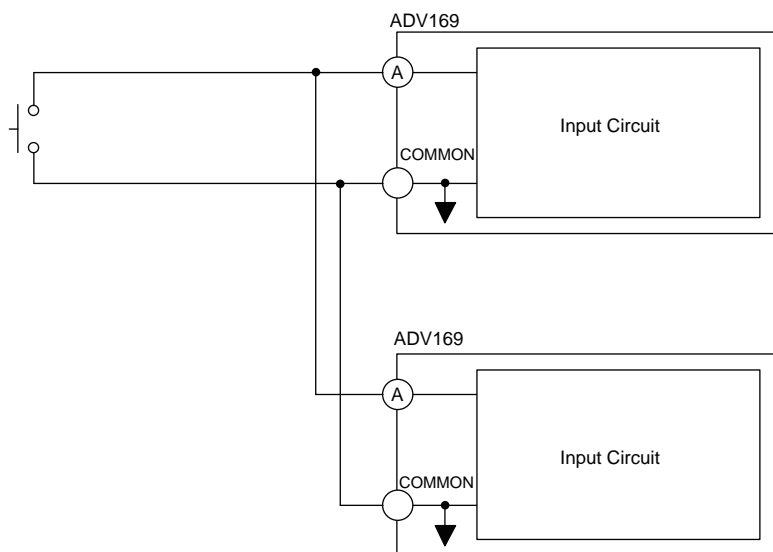
Connecting ADV159 - PM□ and PK□

(Contact input - A: Input +, B: Input -)



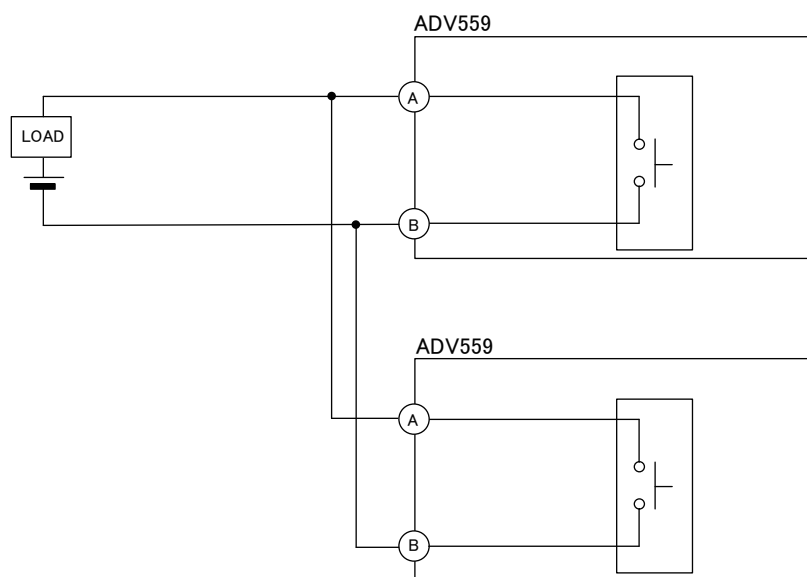
F030503E.ai

The connection sample of ADV169 - PM□ and PK□ (Contact input - A: Input +, Input - is common)



F030504E.ai

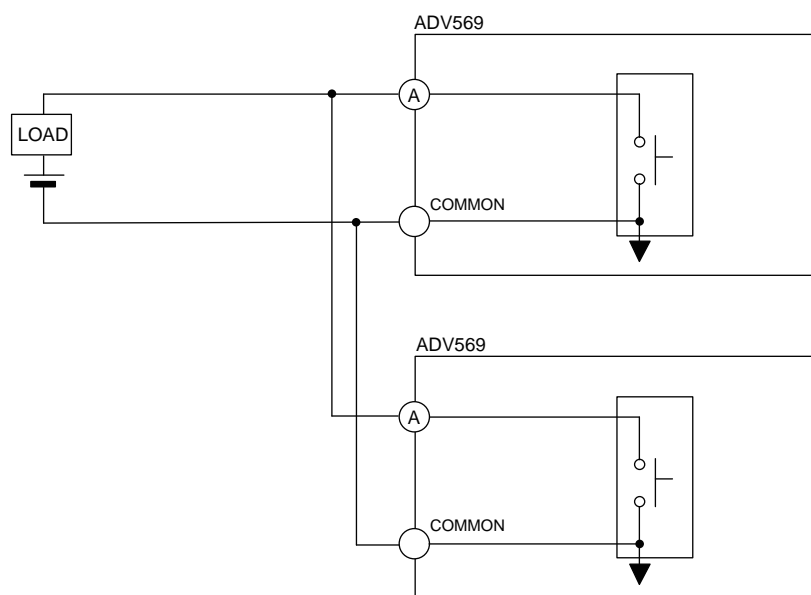
Connecting ADV559-PM□ and PK□ (A: Output +, B: Output -)



F030505E.ai

The connection sample of ADV569-PM□ and PK□

(A: Output +, Output – is common)



F030506E.ai

Connection of ADV159-PY□

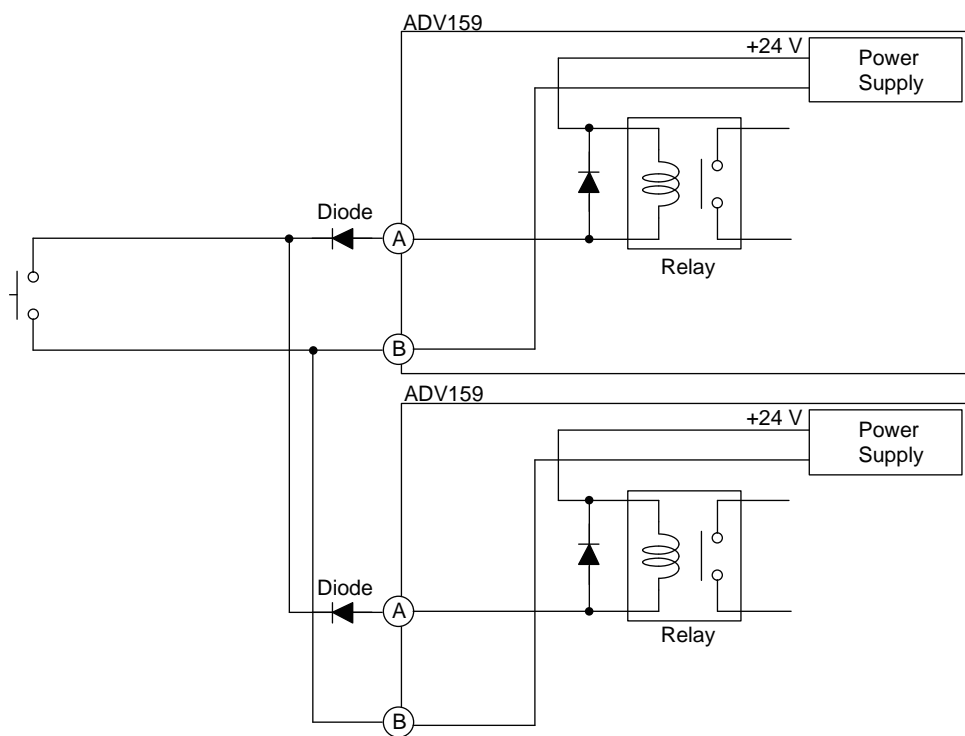
(A: Input +, B: Input -)

IMPORTANT

Affix diodes on terminals A of each channel as shown below for configuring dual-redundant ADV159-PY□.

Required rating of the diode:

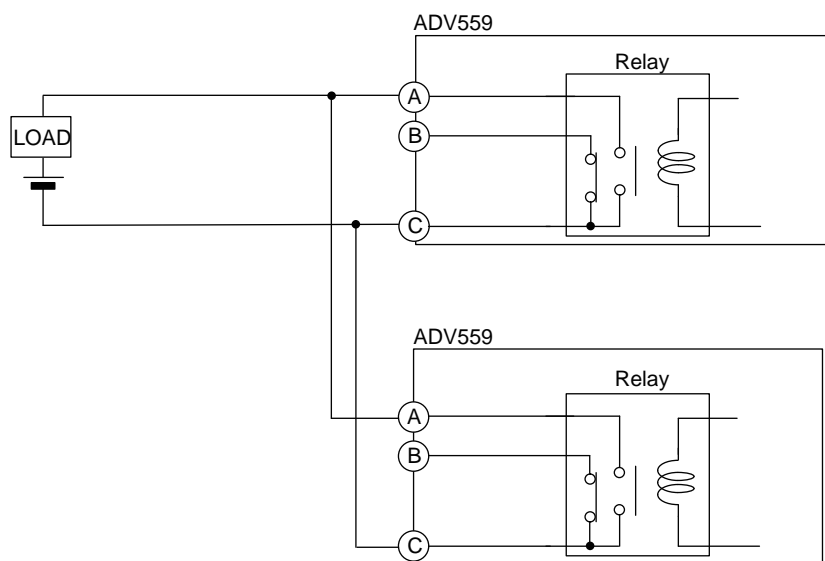
- Reverse voltage: 50 V or higher
- Forward current: 100 mA or higher



F030507E.ai

Connection of ADV559-PY□

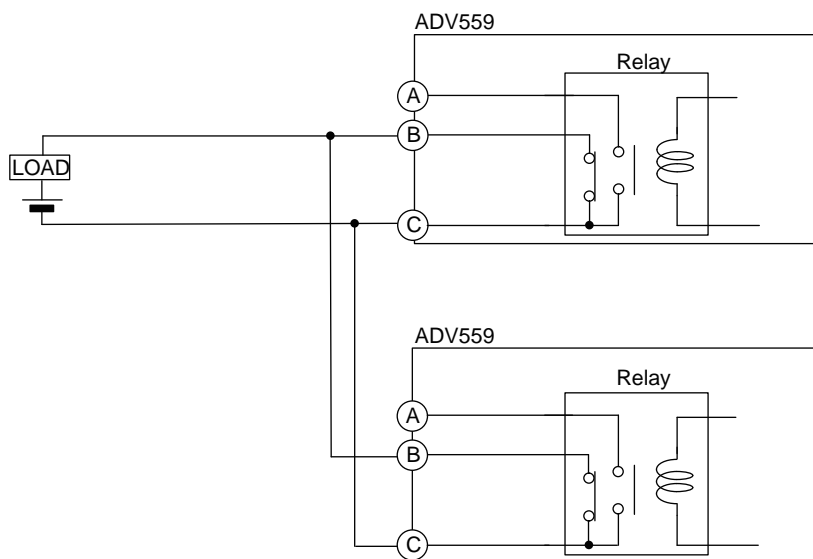
(Between A and C: A-contact) (Contact closed when energized)



F030508E.ai

The connection sample of ADV559-PY□

(Between B and C: B-contact) (Contact closed when not-energized)



F030509E.ai

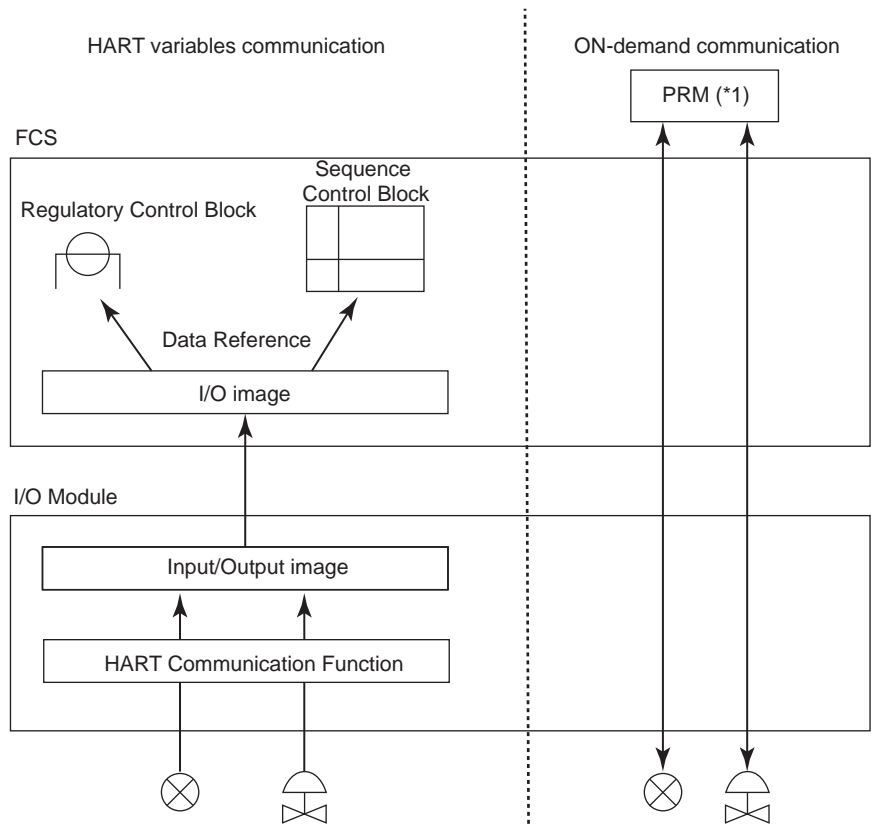
3.6 HART COMMUNICATION

A field control station (FCS) communicates with HART communication transmitters and valve positioners using the HART communication function of the I/O Module (*1) and receives HART variable (*2) in addition to 4 to 20 mA analog input/output data. On-demand communication is also available.

- *1: In chapter 3.6, the term "I/O modules" mean the following four products:
- A2MME041 I/O module in A2BA3D Nest for I/O adaptor with A2SAM105 Current input /Voltage input adaptor
 - A2MME041 I/O module in A2BA3D Nest for I/O adaptor with A2SAM505 Current output /Voltage output adaptor
 - AAI143-HM□ Analog input module
 - AAI543-HM□ Analog output module
- *2: HART variables can be read by HART commands.

3.6.1 Communication with HART Field Devices

The I/O modules communicate with HART field devices and stores HART variables together with analog data in the input/output image area. The FCS refers to the input/output image by accessing the I/O module. The FCS utilizes HART variables via I/O terminals of the function block (Regulatory Control Block and Sequence Control Block) in the same way as other analog/digital I/O signals.



F01E.ai

*1: R3.31.00 or later.

Figure Process Data Flow of HART Communications

3.6.2 HART Communication Functional Specifications

The I/O modules are equipped with HART modems which enable HART communication (*1) by connecting HART field devices directly to the modules without modems and so on.

No. of HART field devices: Max. 16 devices/module (*2)

HART variables: Max. 32 points/module

HART variables can be regarded as ordinary process input data via %Y terminal connection.

HART multi-drop connection (*3): Max. 5 devices/channel

HART variables minimum data refresh cycle: 0.5 sec/device

- *1: I/O modules handle HART variables communication and on-demand communication of HART communication. Hand held terminal (HHT) can also be available. Auxiliary devices must be applicable for HART communication when I/O modules are to perform HART communication with HART field devices via the auxiliary devices such as barriers.
- *2: For A2MME041, this is the maximum figure for mounting A2SAM105 or A2SAM505 to all channels.
- *3: A2SAM505 and AAI543-HM□ do not support HART multi-drop connection because only input devices can be connected. 4 to 20 mA analog data value and burst function are not supported.

4 INTRINSIC SAFETY (I.S.) BARRIER SOLUTIONS

From CENTUM VP 6.04 and later, the I.S. barrier solutions are available. When installing the I.S. barrier solutions in a cabinet, ensure that any of the following product is not resided, which are A2FV70□, A2NN10D, and A2NN20D.

4.1 Model A2NN30D Node Interface Unit (for N-IO)

4.1.1 General

The Node Interface Unit (NIU) has an interface function that allows a Field Control Unit (FCU) to communicate with an I/O unit for N-IO and an interface function that allows NIUs to communicate each other. Furthermore, the NIU supplies power to the I/O unit for N-IO. Refer to the GS "N-IO System Overview" (GS 33J62A10-01EN) together with this GS.

A2FV70□, ANB10□, ANB11□, and ANT10U can also be constructed by combining the Base Plate and each module. Refer to "Field Control Unit" (GS 33J64E10-01EN).

4.1.2 Standard specifications

For the installation environment for this product, refer to the GS "N-IO System Overview" (GS 33J62A10-01EN).

4.1.2.1 Module Configuration

24 V DC Output Power Supply Units (A2PW503 or A2PW504): 2

N-ESB Bus Modules (A2EN501): 2

4.1.2.2 N-ESB Bus Interface

Uplink : 1 port / N-ESB Bus Module
(for N-ESB bus or optical ESB bus)

Downlink: 1 port / N-ESB Bus Module
(for N-ESB bus or optical ESB bus)

4.1.2.3 Number of I/O Unit for N-IO Connections

Up to 6 units / NIU

A2ZN4DC and A2ZN5DC I/O Units are usable.

(A2BN4D and A2BN5D Base plates are usable.)

4.1.2.4 External Alarm Input Function

The NIU has an external alarm input terminal for an external device and an alarm is displayed as a system alarm on a Human Interface Station (HIS).

Input terminal: Pressure clamp terminal (2-pin)

Input signal: Voltage input (*1)

ON voltage 18 to 26.4 V

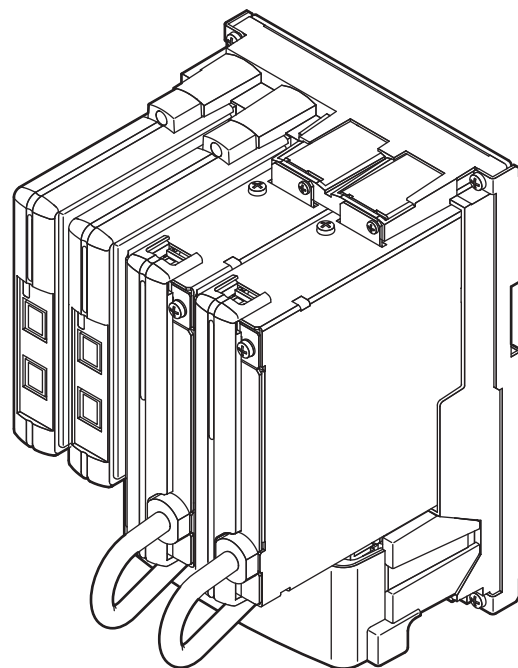
OFF voltage 5.0 V or lower

Input current (when 24 V input): 2.4 mA±20%

Cable thickness: 0.5 to 2.5 mm² (AWG 20 to 14) (*2)

*1: The withstanding voltage between the input signal and system is 500 V AC for 1 minute.

*2: For the cable termination process, refer to the section "Signal Cable for A2BN3D" of the GS "Field Connection Specifications (for N-IO)" (GS 33J62A20-01EN).



F040001E.ai

4.1.2.5 Maintenance Function

The NIU has a Micro-USB maintenance port for maintenance.

The Setting of the node address is possible with a NIU Node Number Setting tool. (*1)

*1: NIU Node Number Setting tool is stored in the software medium for CENTUM VP R6

4.1.2.6 Installation Method

Specified by suffix code.

DIN rail mount type

Wall mount type (M4 x 4 screws)

4.1.2.7 Supply Power

Specified by suffix code.

Voltage: 100 to 240 V AC, frequency: 50/60 Hz

Voltage: 24 V DC

4.1.2.8 Withstanding voltage

Between Input and Output terminal:

3000 V AC, for 1 minute (100 to 240 V AC)

500 V AC, for 1 minute (24 V DC)

Between Input and Ground terminal:

1500 V AC for 1 minute (100 to 240 V AC)

500 V AC for 1 minute (24 V DC)

4.1.2.9 Insulation resistance

Between Input and Output /Ground terminal :

50 MΩ or higher at 500 V DC.

4.1.2.10 Power Supply Input Connection

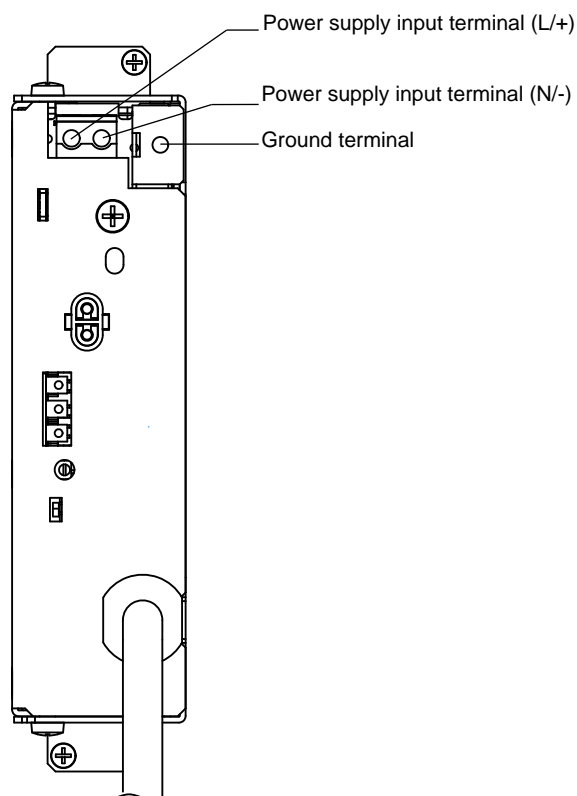
Use the dedicated power supply input cable included with the main unit by connecting it to the Power Supply Bus Unit, Vertical Type (AEPV7D) (Style S2 or later). The operating temperature range is different between this product and the Power Supply Bus Unit, Vertical Type (AEPV7D) so be careful when installing them.

Node Interface Unit (A2NN30D): 0 to 60 °C (-40 to 70 °C optional temperature environment)

Power Supply Bus Unit, Vertical Type (AEPV7D): -20 to 70 °C

If you do not use the dedicated cable, you need to supply power to the power supply input terminal of the following power supply unit.

For the cable termination process, refer to the TI "CENTUM VP Installation Guidance" (TI 33J01J10-01EN).



F040101E.ai

Terminal	Connection	For A2PW503	For A2PW504
Power supply input terminal (L/+)	Pressure clamp terminal	AC input (L)	DC input (+)
Power supply input terminal (N/-)	Pressure clamp terminal	AC input (N)	DC input (-)
Ground terminal	M4 screws	Protective grounding	Functional grounding

4.1.2.11 Power Consumption

100 to 240 V AC input: 190 V A

24 V DC input: 150 W

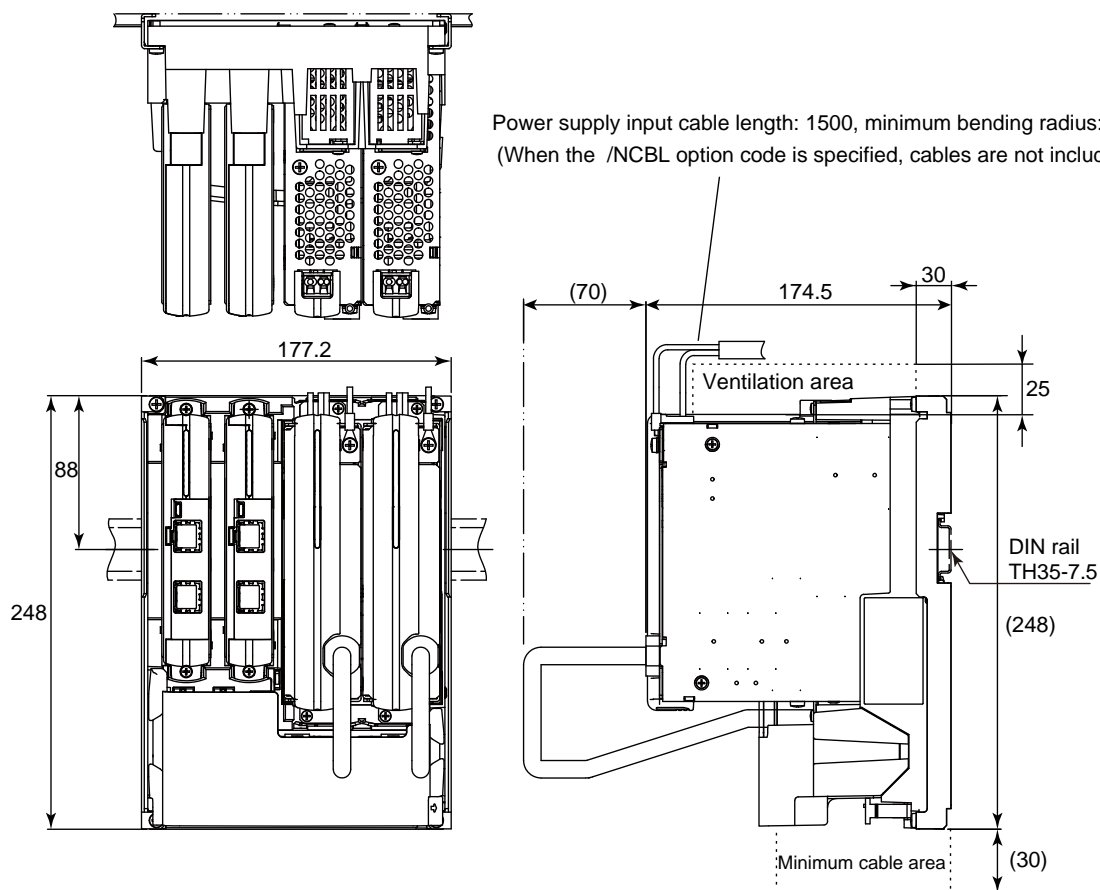
4.1.2.12 Weight

Approx. 4.2 kg (configuration maximum value)

4.1.3 External Dimensions

A2NN30D-□□□0□□□□ (DIN rail mount type)

Unit: mm



F040102E.ai

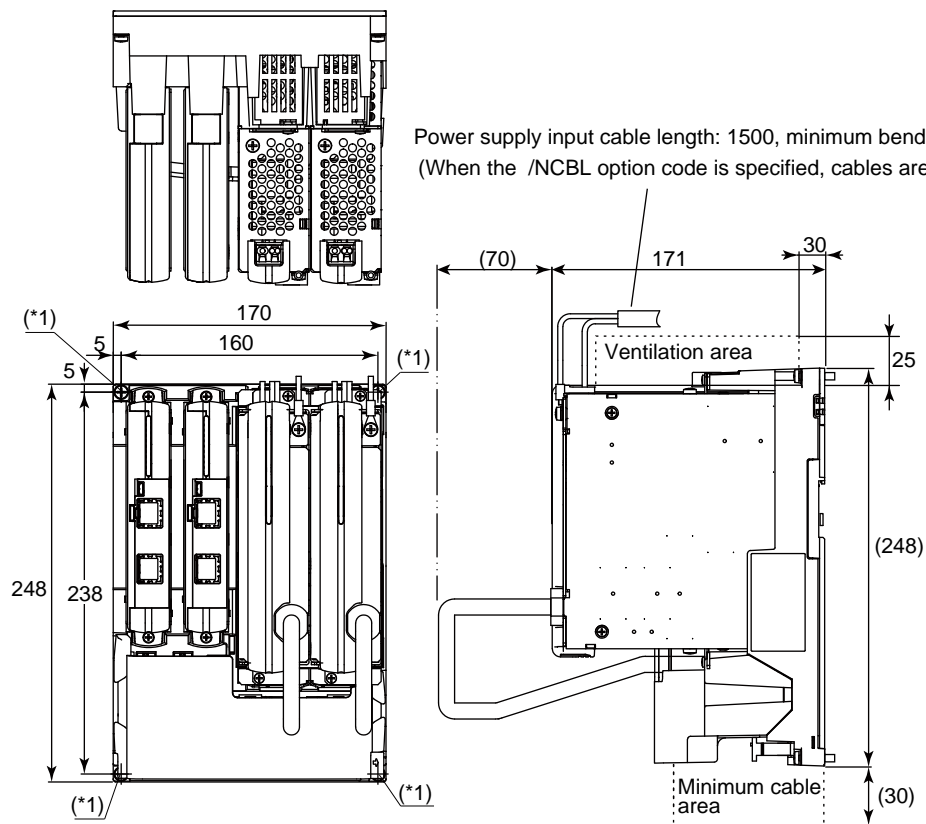
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

A2NN30D-□□□1□□□□ (Wall mount type)

Unit: mm



F040103E.ai

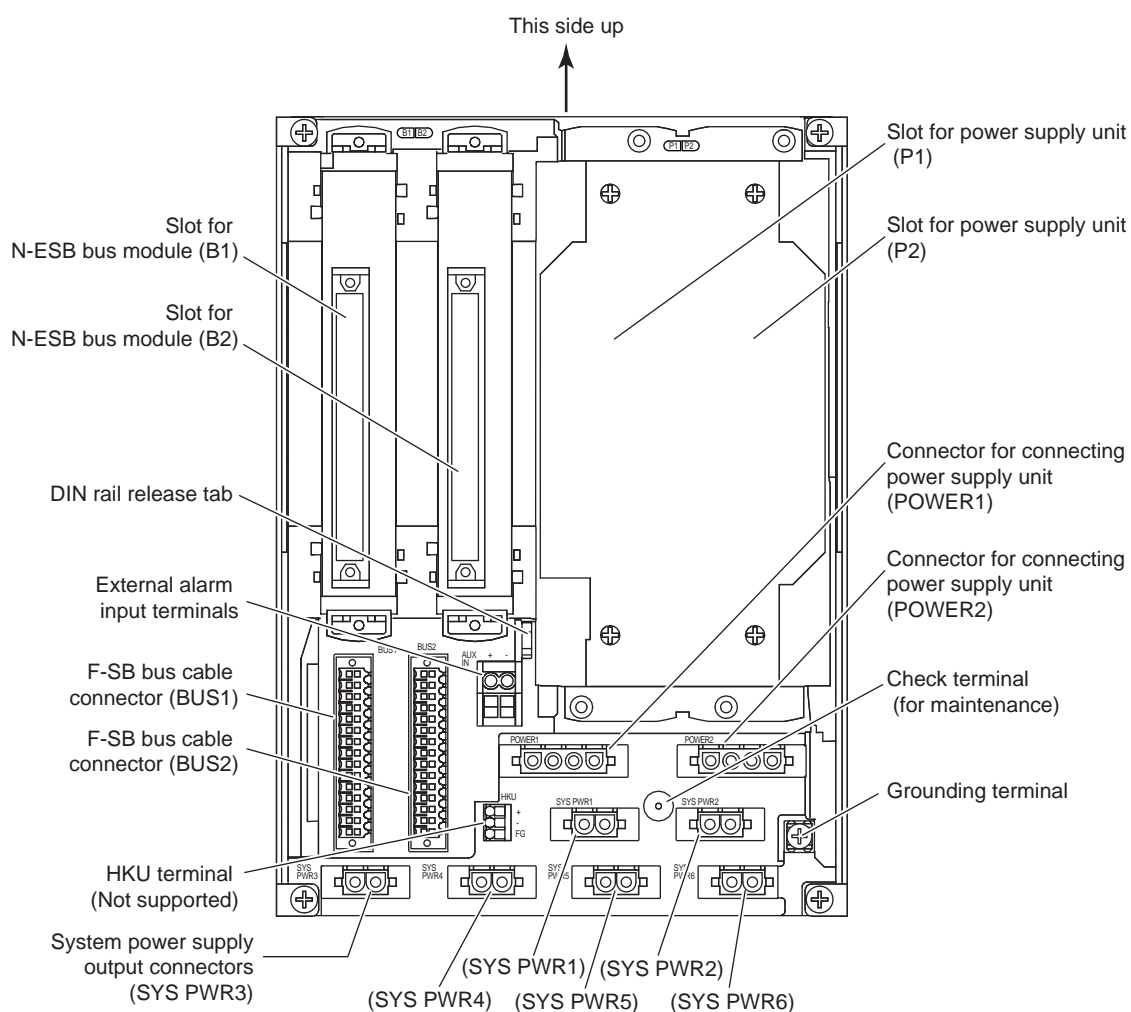
*1: M4 screws for Wall mount type: effective screw length 6 mm x 4.

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

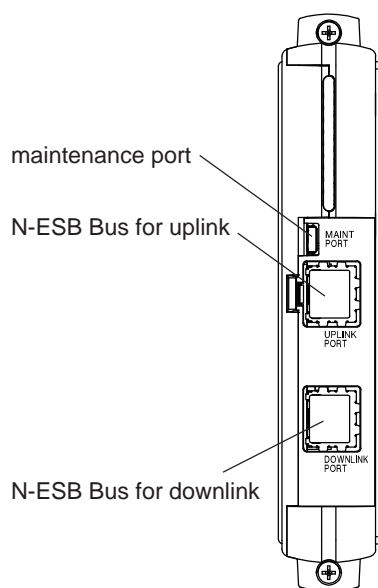
The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

4.1.4 Details of the Node interface Unit



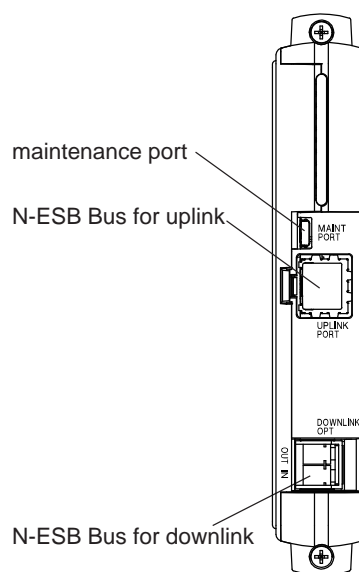
F040104E.ai

4.1.5 Details of the N-ESB Bus Modules



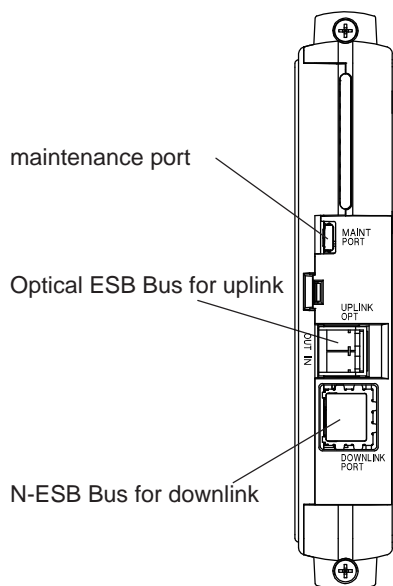
F040105E.ai

A2NN30D-□□□□00□□
(N-ESB Bus for uplink,
N-ESB Bus for downlink)



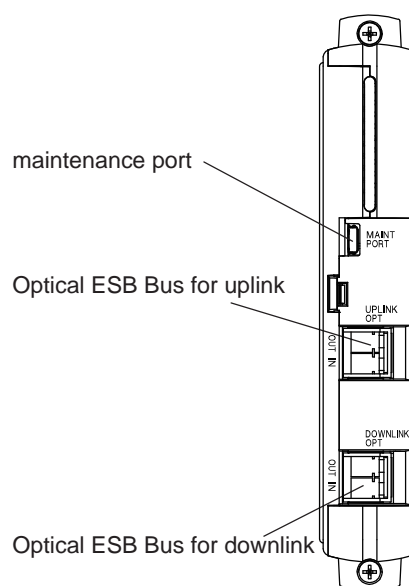
F040106E.ai

A2NN30D-□□□□01□□
(N-ESB Bus for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN30D-□□□□02□□
(N-ESB Bus for uplink,
Optical ESB bus (5 to 50 km) for downlink)



F040107E.ai

A2NN30D-□□□□10□□
(Optical ESB Bus (0 to 5 km) for uplink,
N-ESB Bus for downlink)
A2NN30D-□□□□20□□
(Optical ESB Bus (5 to 50 km) for uplink,
N-ESB Bus for downlink)



F040108E.ai

A2NN30D-□□□□11□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN30D-□□□□21□□
(Optical ESB bus (5 to 50 km) for uplink,
Optical ESB bus (0 to 5 km) for downlink)
A2NN30D-□□□□12□□
(Optical ESB bus (0 to 5 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)
A2NN30D-□□□□22□□
(Optical ESB bus (5 to 50 km) for uplink,
Optical ESB bus (5 to 50 km) for downlink)

4.1.6 Model and Suffix Codes

Node Interface Unit (for N-IO)

		Description
Model	A2NN30D	Node Interface Unit (for N-IO)
Suffix Codes	-4	Dual-redundant Communication, Dual-redundant power supply
	3	24 V DC output power supply (100 to 240 V AC input)
	4	24 V DC output power supply (24 V DC input)
	0	Always 0
	0	DIN rail mount type
	1	Wall mount type
	0	Always 0
	0	N-ESB Bus for uplink
	1	Optical ESB Bus(0 - 5 km) for uplink
	2	Optical ESB Bus(5 - 50 km) for uplink
	0	N-ESB Bus for downlink
	1	Optical ESB Bus(0 - 5 km) for downlink
	2	Optical ESB Bus(5 - 50 km) for downlink
	0	With no explosion protection
	1	With explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	2	With temperature (-40 to 70 °C) option
	3	With ISA Standard G3 option and temperature (-40 to 70 °C) option
Option Codes	/NCBL	With no power supply cable (*1)
	/ATDOC	Explosion Protection Manual (*2)

*1: An input cable for the power supply unit.

*2: Select the option code "/ATDOC" to follow the ATEX Directive and UKEX Regulation when any of N-IO components are used for explosion protection.

4.2 Models A2MMM843 and A2MDV843 I/O Modules (for N-IO)

4.2.1 General

This section covers the hardware specifications of I/O modules (for N-IO) that can be mounted on the Base Plate for N-IO I/O (A2BN4D or A2BN5D).

4.2.2 Standard specifications

4.2.2.1 Analog Digital I/O Module

Analog Digital I/O Module (A2MMM843) has an analog I/O function and a digital I/O function for each channel. The analog input function, analog output function, digital input function and digital output function can be switched by configuring the setting for each channel in the software. A pair of these modules can be mounted in a dual-redundant configuration. The function can be extended for each channel by mounting barriers on the Base Plate (A2BN4D or A2BN5D), refer to section 4.3 "Base plates (for N-IO)."

Common Specifications

Item	Specifications
Model	A2MMM843
Number of channels	16 (isolated) (*1)
Maximum current consumption	700 mA (24 V DC) (When all channels are set to the digital I/O function and the source load is 20 mA)
Withstanding voltage (*2)	Between input/output and system : 1500 V AC for 1 minute : 42 V DC, continuous
Weight	Approx. 0.41 kg

Note: A Zener barrier is not allowed to be connected with this module.

Use an isolation barrier when the module is used in intrinsic safety explosion protection instrumentation.

*1: The setting of analog input function, analog output function, digital input function and digital output function is possible for each channel.

*2: The specification is for the A2MMM843 module alone. For the withstanding voltage when mounted on the Base Plate for Barriers (A2BN4D and A2BN5D), refer to the section 4.3 "Base Plates (for N-IO)".

Analog Input Function (Current Input) Specifications

Item		Specifications
Rated input range (maximum guaranteed accuracy range)		4 to 20 mA
Allowable input range		0 to 24 mA
Input resistance	Power ON	250 Ω (4-wire type DC, typical)
	Power OFF/ Dual-redundant standby side	500 k Ω or higher
Accuracy (Power supply voltage = 24 V)		$\pm 12 \mu\text{A}$ (23°C $\pm 2^\circ\text{C}$) $\pm 24 \mu\text{A}$ (0°C to 60°C) $\pm 40 \mu\text{A}$ (-40°C to 70°C)
Transmitter power supply (2-wire type)		15.0 V or higher (20 mA) 24.0 V or lower (0 mA)
Setting of 2-wire or 4-wire transmitter		Can be set for each channel
Data update period		8 ms
HART communication		Support for HART7
Current limitation (2-wire type)		26 mA or lower

Analog Output Function (Current Output) Specifications

Item		Specifications
Rated output range (maximum guaranteed accuracy range)		4 to 20 mA
Allowable load resistance		0 to 750 Ω (20 mA), 0 to 600 Ω (23 mA)
Output burnout detection		0.65 mA or lower
Accuracy (Power supply voltage = 24 V)		$\pm 48 \mu\text{A}$ (23°C $\pm 2^\circ\text{C}$) $\pm 64 \mu\text{A}$ (0°C to 60°C) $\pm 80 \mu\text{A}$ (-40°C to 70°C)
Data update period		8 ms
HART communication		Support for HART7
Current limitation		23 mA or lower

Digital Input Function Specifications

Item		Specifications
Input format		Dry contact input (*1)
Maximum absolute input		30.0 V DC
External resistance when input ON		1 k Ω or lower (6 mA continuous)
External resistance when input OFF		10 k Ω or higher (2.4 mA or lower)
Input current		6 mA $\pm 20\%$
Contact rating		30 V DC or higher 10 mA or higher
Function	Status input	Function for detecting ON/OFF status
	Pushbutton input	Function for counting the pushbutton edges
	SOE input	Function for capturing the SOE data
Data update period		Status input: 2 ms Pushbutton input: 8 ms
Input response time		11 ms or less (for status input)
Minimum ON detection time		20 ms (for pushbutton input)
Maximum ON/OFF cycle		25 Hz (for pushbutton input)
Current limitation		7.2 mA or lower

*1: Digital input Adaptor (A2SDV105) is available for Voltage input or isolated input from analog I/O signals of the other channels.

Digital Input Function (NAMUR Standard Compliant) Specifications

Item		Specifications
Input format		NAMUR (IEC 60947-5-6) standard compliant ON level detection: 2.1 mA or higher OFF level detection: 1.2 mA or lower Burnout detection: 50 μ A or lower Short-circuit detection: Load resistance 100 Ω or lower
Function	Status input	Function for detecting ON/OFF status
	Pushbutton input	Function for counting the pushbutton edge
Data update period		Status input: 2 ms Pushbutton input: 8 ms
Input response time		11 ms or less (for status input) 15 ms or less (for status input, when burnout or short-circuit diagnosis is enabled)
Minimum ON detection time		20 ms (for pushbutton input)
Maximum ON/OFF cycle		25 Hz (for pushbutton input)
Current limitation		16 mA or lower

Digital Output Function Specifications

Item			Specifications	
Output format			Current sink	Current source
Rated applied voltage			24 V DC	—
Maximum absolute rating			30 V	—
Output ON voltage maximum value			2 V DC (100 mA)	—
Output voltage			—	Typical: 24.6 V (0 mA) Maximum: 28 V (0 mA) Minimum 19.2 V (20 mA)
Leak current maximum value when output OFF			0.1 mA	
Minimum load current			—	1 mA (when disconnection diagnosis is enabled)
Maximum load current			100 mA	20 mA
Function	Status output		ON/OFF status output function	
	Pulse output	Pulse width output	One-shot pulse width output function	
		Time-proportioning output	Time-proportioning ON/OFF	
Data update period			Status output: 2 ms Pulse output: 8 ms	
Output response time			6 ms or less (for status output) 12 ms or less (for pulse output)	
Pulse width (for pulse output)			8 ms to 7200 s	
Pulse width resolution (for pulse output)			8 ms, but ON/OFF delay of maximum 1 ms is added	
Current limitation			—	25 mA or lower

—: Not applicable

4.2.2.2 Digital I/O Module

Digital I/O Module (A2MDV843) has a digital I/O function for each channel. The digital input function and digital output function can be switched by configuring the setting for each channel in the software. A pair of these modules can be mounted in a dual-redundant configuration. The function can be extended for each channel by mounting barriers on the Base Plate (A2BN4D and A2BN5D).

Common Specifications

Item	Specifications
Model	A2MDV843
Number of channels	16 (isolated) (*1)
Maximum current consumption	700 mA (24 V DC) (When all channels are set to the digital I/O function and the source load is 20 mA)
Withstanding voltage (*2)	Between input/output and system : 1500 V AC for 1 minute : 42 V DC, continuous
Weight	Approx. 0.41 kg

Note: A Zener barrier is not allowed to be connected with this module.

Use an isolation barrier when the module is used in intrinsic safety explosion protection instrumentation.

*1: The setting of digital input function and digital output function is possible for each channel.

*2: The specification is for the A2MDV843 module alone. For the withstanding voltage when mounted on the Base Plate for Barriers (A2BN4D and A2BN5D), refer to section 4.3 "Base Plates (for N-IO)."

Digital Input Function Specifications

Item		Specifications
Input format		Dry contact input
Maximum absolute input		30.0 V DC
External resistance when input ON		1 kΩ or lower (6 mA continuous)
External resistance when input OFF		10 kΩ or higher (2.4 mA or lower)
Input current		6 mA ±20%
Contact rating		30 V DC or higher 10 mA or higher
Function	Status input	Function for detecting ON/OFF status
	Pushbutton input	Function for counting the pushbutton edges
	SOE input	Function for capturing the SOE data
Data update period		Status input: 2 ms Pushbutton input: 8 ms
Input response time		11 ms or less (for status input)
Minimum ON detection time		20 ms (for pushbutton input)
Maximum ON/OFF cycle		25 Hz (for pushbutton input)
Current limitation		7.2 mA or lower

Digital Input Function (NAMUR Standard Compliant) Specifications

Item		Specifications
Input format		NAMUR (IEC 60947-5-6) standard compliant ON level detection: 2.1 mA or higher OFF level detection: 1.2 mA or lower Burnout detection: 50 μ A or lower Short-circuit detection: Load resistance 100 Ω or lower
Function	Status input	Function for detecting ON/OFF status
	Pushbutton input	Function for counting the pushbutton edge
Data update period		Status input: 2 ms Pushbutton input: 8 ms
Input response time		11 ms or less (for status input) 15 ms or less (for status input, when burnout or short-circuit diagnosis is enabled)
Minimum ON detection time		20 ms (for pushbutton input)
Maximum ON/OFF cycle		25 Hz (for pushbutton input)
Current limitation		16 mA or lower

Digital Output Function Specifications

Item			Specifications	
Output format			Current sink	Current source
Rated applied voltage			24 V DC	—
Maximum absolute rating			30 V	—
Output ON voltage maximum value			2 V DC (100 mA)	—
Output voltage			—	Typical: 24.6 V (0 mA) Maximum: 28 V (0 mA) Minimum 19.2 V (20 mA)
Leak current maximum value when output OFF			0.1 mA	
Minimum load current			—	1 mA (when disconnection diagnosis is enabled)
Maximum load current			100 mA	20 mA
Function	Status output		ON/OFF status output function	
	Pulse output	Pulse width output	One-shot pulse width output function	
		Time-proportioning output	Time-proportioning ON/OFF	
Data update period			Status output: 2 ms Pulse output: 8 ms	
Output response time			6 ms or less (for status output) 12 ms or less (for pulse output)	
Pulse width (for pulse output)			8 ms to 7200 s	
Pulse width resolution (for pulse output)			8 ms, but ON/OFF delay of maximum 1 ms is added	
Current limitation			—	25 mA or lower

—: Not applicable

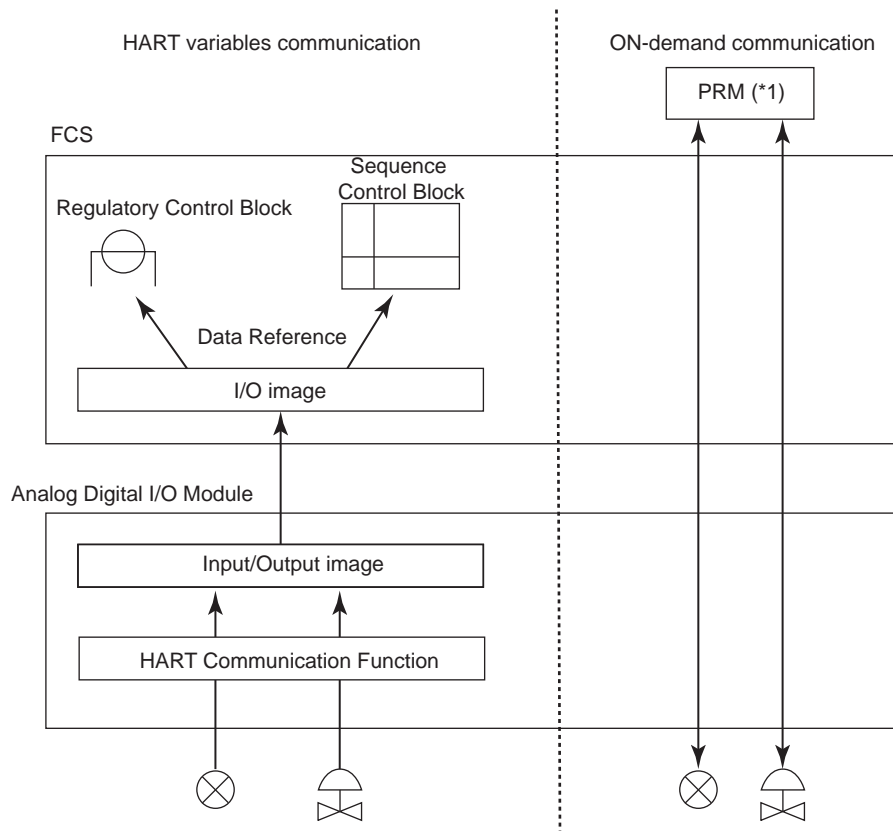
4.2.3 Hart Communication

The Analog Digital I/O Module (A2MMM843), using the HART communication function, connected to a transmitter or a valve positioner receives HART variable (*1) in addition to exchange analog input/output data by 4 to 20 mA signal with field control stations (FCS). On-demand communication is also available.

*1: HART variables can be read by HART commands.

4.2.3.1 Communication with HART Devices

The Analog Digital I/O Module (A2MMM843) communicates with HART-compliant field devices and stores HART variables with analog data in the Input/Output image area in the Analog Digital I/O module. An FCS refers to the Input/Output image by accessing the Analog Digital I/O Module. The FCS utilizes the HART variables via I/O terminals of the function block (Regulatory Control Block, Sequence Control Block) in the same way as other analog/digital I/O signals.



F040201E.ai

*1: For further details of corresponding PRM revision and contents, refer to the GS "Plant Resource Manager" (GS 33Y05Q10-32E).

Figure Process Data Flow of HART Communications

4.2.3.2 HART Communication Functional Specifications

The Analog Digital I/O Module (A2MMM843) is equipped with HART modems and enable HART communication (*1) by directly connecting the HART devices to the modules without a modem, etc.

No. of HART devices: Max. 16 devices/module

HART variables: Max. 32 points/module

HART variables can be treated as ordinary process input data via %Y terminal connection.

HART multidrop connection (*2): Max. 5 devices/channel

HART variables data minimum refresh cycle time: 0.5 sec/device

*1: The HART communication with Analog Digital I/O Module refers to HART variable communication and on-demand communication. Hand held terminal (HHT) is also available.

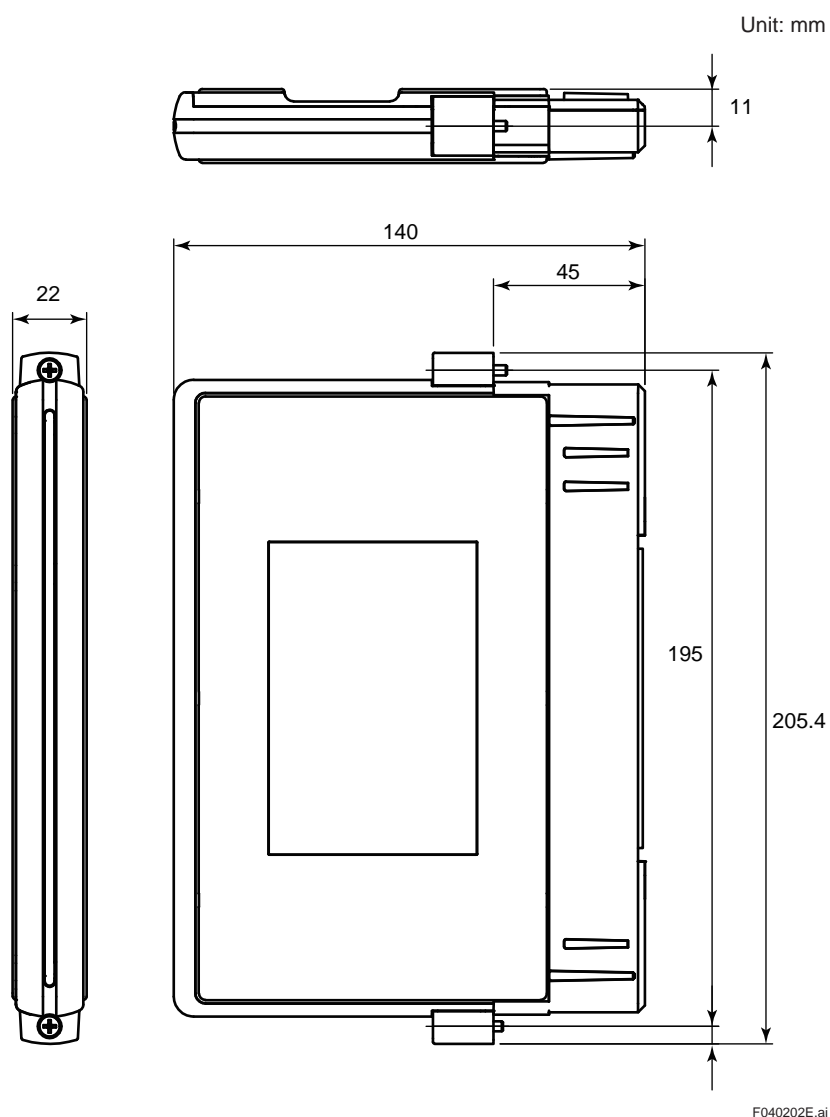
*2: It is possible to connect only input devices.

This connection does not support analog data value by 4 to 20 mA signal.
This connection does not support burst function.

4.2.4 External Dimensions

A2MMM843 Analog Digital I/O Module

A2MDV843 Digital I/O Module



Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

4.2.5 Model and Suffix Codes

Analog Digital I/O Module

		Description
Model	A2MMM843	Analog Digital I/O Module (16-channel, Isolated)
Suffix Codes	-S	Analog I/O function Standard type
	S	Digital I/O function Standard type
	1	Always 1
	0	With no explosion protection
	1	With explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	2	With temperature (-40 to 70 °C) option
	3	With ISA Standard G3 option and temperature (-40 to 70 °C) option
	0	Always 0

Digital I/O Module

		Description
Model	A2MDV843	Digital I/O Module (16-channel, Isolated)
Suffix Codes	-0	Always 0
	S	Digital I/O function Standard type
	1	Always 1
	0	With no explosion protection
	1	With explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	2	With temperature (-40 to 70 °C) option
	3	With ISA Standard G3 option and temperature (-40 to 70 °C) option
	0	Always 0

Protection of Unused Slot

An unused slot where no I/O module is mounted must be covered by a dummy cover.

		Description
Model	A2DCV01	Dummy Cover (for N-IO, I/O module)
Suffix Code	-0	Always 0

4.3 Models A2BN4D and A2BN5D Base Plates (for N-IO)

4.3.1 General

This section covers the specifications of the Base plates for N-IO I/O units used in the N-IO system of CENTUM VP. There are two types of base plates, one for MTL barriers and the other for P + F barriers.

4.3.2 Standard specifications

For the installation environmental standards of this product, refer to the GS “N-IO System Overview” (GS 33J62A10-01EN).

4.3.2.1 Base Plate for Barrier (A2BN4D)

This base plate allows for communication with the node interface unit via an F-SB bus by connecting the field signal to the terminal on the intrinsic safety (hereinafter I.S.) barrier mounted to this base plate.

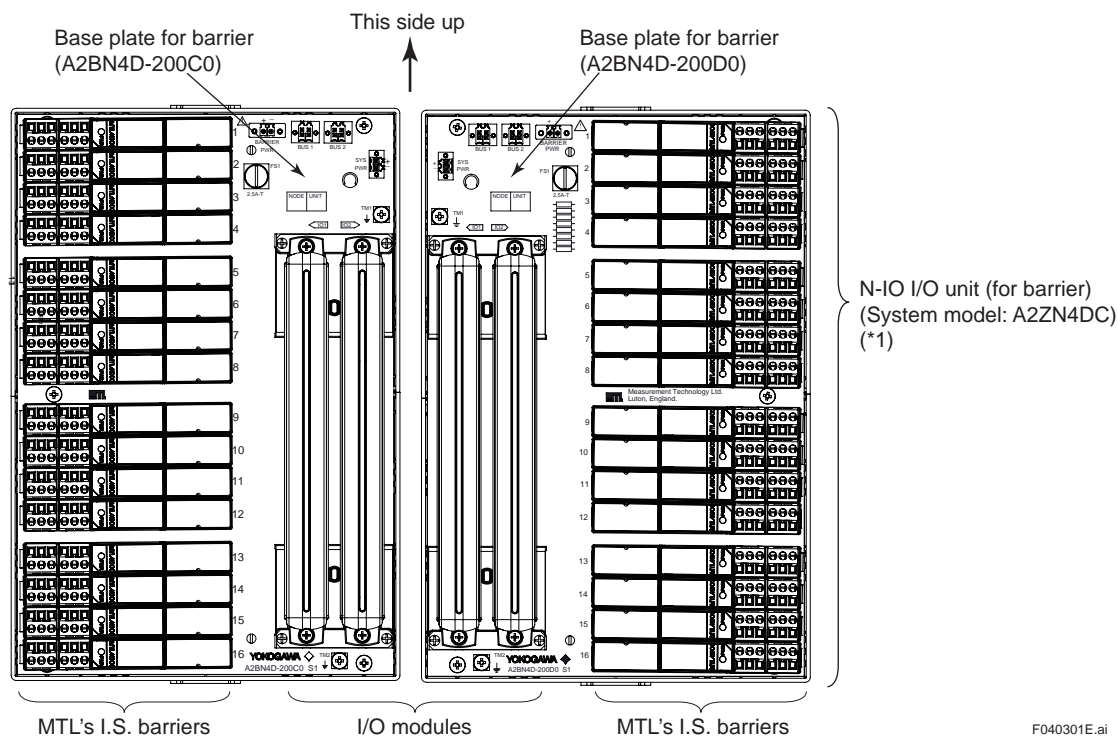
The Base plate for barrier, one of the components of the N-IO I/O unit (for Barrier) which is defined as A2ZN4DC for the system model, allows for mounting the I/O module and various I.S. barriers of MTL products from Eaton Electric Limited to it. The I.S. barrier has a field connection terminal (pressure clamp terminal) for connecting the field signal. The I/O modules can be mounted in a single or dual-redundant configuration. Up to 16 I.S. barriers can be mounted per channel. Furthermore, this base plate has a system power supply and field power supply interface and has a function to supply power to the I/O module from the Node interface unit via the Power supply cable for base plate (A2KPB00), and has a function to supply field power to the I.S. barriers by connecting the specified power line. The following shows the I/O module and I.S. barriers that can be mounted to this base plate.

Table I/O Module

Signal Type	Description	Model
Universal Input/Output	Analog Digital I/O Module (16-channel, isolated)	A2MMM843
Digital Input/Output	Digital I/O Module (16-channel, isolated)	A2MDV843

Table MTL's I.S. barriers

Signal Type	Description	Model
Analog Input	4 to 20 mA, 2/3 wire, HART	MTL4541Y
	4 to 20 mA, 4 wire, HART	MTL4541YA
Analog Output	4 to 20 mA, HART	MTL4545Y
Digital Input	Dry contact or NAMUR, LFD	MTL4514N
Digital Output	Voltage output	MTL4521Y
	Voltage output, LFD	MTL4523Y
Temp. Input	TC/RTD	MTL4573Y



*1: MTL's I.S. barriers are not included in A2ZN4DC.

Figure Hardware Configuration (Base Plate for barrier: A2BN4D)

Basic Specifications

Item		Specification
Input power supply	System power supply (*1) [SYS PWR]	24 V DC +10%/-14 %
	Field power supply [BARRIER PWR] (*2)	24 V DC +10%/-14 %, up to 1.6 A
Mounting		DIN rail mount/Wall mount (M4 screws)
Number of components that can be mounted	I/O module	2 modules
	I.S. barrier	16 barriers
Number of channels		16 channels
Connection	Power supply	System power supply: Connected by the Power supply cable for base plate (A2KPB00) Field power supply: Connected the cable (*3) to the field power supply terminal
	Grounding	M4 screw terminal (*4)
	Field signal (*5)	Pressure clamp terminal
	F-SB bus	Connected the F-SB Bus Cable (A2KLF00)
Weight		Approx. 0.85 kg
Withstanding voltage		Between field and system: 1500 V AC for 1 minute 42 V DC, continuous
Insulation resistance		Between field and system: 100 M Ω or higher (500 V DC)
Mounting conditions		A Dummy Cover (A2DCV01) must be attached to any unused slot of the I/O module.

Note: Response time of the I.S. barriers, it depends on the specifications of each I.S. barrier and affects the response time of its control-loop. The response time of some I.S. barriers are more than a few tens of milliseconds. So, please check the specifications of the I.S. barrier provided by the vendor.

*1: Power supply from the Node interface unit using the Power supply cable for base plate (A2KPB00).

*2: Field power supply shall not be provided directly from a DC distribution network.

*3: A cable must be prepared separately: Cable size (0.5 to 1.5 mm²).

*4: The screw terminal is on the MTL's I.S. barrier.

*5: Cable specification of field signal depends on the requirements specification of MTL's I.S. barriers. Refer to the instruction manual of I.S. barriers provided by the vendor.

4.3.2.2 Base Plate for barrier (A2BN5D)

This base plate allows for communication with the node interface unit via an F-SB bus by connecting the field signal to the terminal on the I.S. barrier mounted to this base plate.

The Base plate for barrier, one of the components of the N-IO I/O unit (for Barrier) which is defined as A2ZN5DC for the system model, allows for mounting the I/O module and various I.S. barriers from Pepperl+Fuchs GmbH (hereinafter P+F) to it. This base plate has a field connection terminal (spring clamp terminal) for connecting the field signal.

The I/O modules can be mounted in a single or dual-redundant configuration. Up to 16 I.S. barriers can be mounted per channel. Furthermore, this base plate has a system power supply and field power supply interface and has a function to supply power to the I/O module from the Node interface unit via the Power supply cable for base plate (A2KPB00), and has a function to supply field power to the I.S. barriers by connecting the specified power line. The following shows the I/O module and I.S. barriers that can be mounted to this base plate.

Table I/O Module

Signal Type	Description	Model
Universal input/output	Analog Digital I/O Module (16-channel, isolated)	A2MMM843
Digital input/output	Digital I/O Module (16-channel, isolated)	A2MDV843

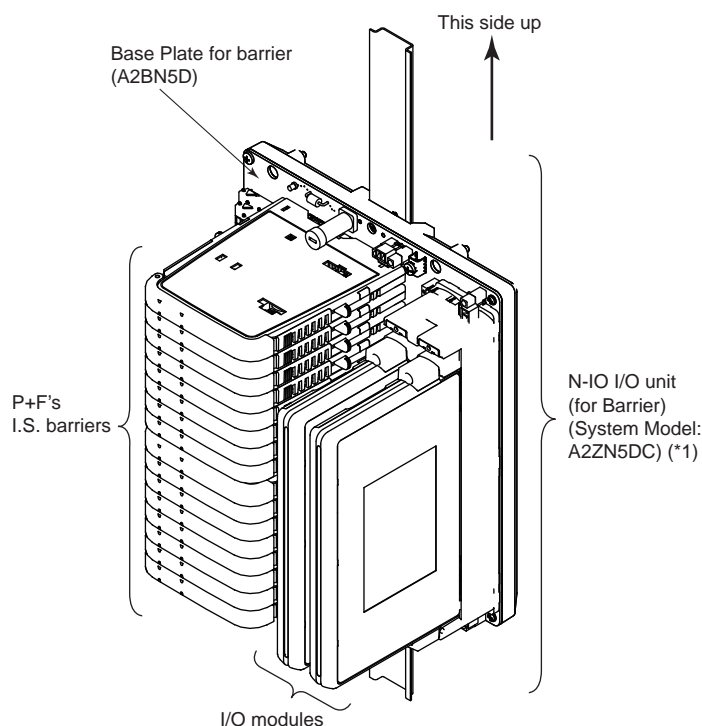
Table P+F's I.S. barriers

Signal Type	Description	Model	Part No.
Analog input	4 to 20 mA, 2 wire/4 wire, HART	HiC2025	272017
	4 to 20 mA, 2-wire/4-wire, HART, LFD	HiC2025ES (*3)	292850
Analog output	4 to 20 mA, HART	HiC2031	272020
	4 to 20 mA, HART long field cables (> 1000 m)	HiC2031HC (*1)	226027
Digital input	Dry contact or NAMUR, LFD	HiC2831	272022
Digital output	Voltage output, LFD	HiC2883	70140020
Temp. input	TC/RTD	HiC2081	275178
—	Polarizing pin (*2)	H-CP	—

*1: Unavailable in South Korea, USA and Canada.

*2: About the usage of polarizing pin, refer to the instruction manual of H-System provided by P+F.

*3: Unavailable in Australia, New Zealand, South Korea, USA and Canada.



F040302E.ai

*1: P+F's I.S. barriers are not included in A2ZN5DC.

Figure Hardware Configuration (Base Plate for Barrier: A2BN5D)

Basic Specifications

Item		Specification
Input power supply	System power supply [SPS] (*1)	24 V DC +10%/-14 %
	Field power supply [BPS] (*2)	24 V DC +10%/-14 %, up to 1.2 A
Mounting		DIN rail mount/ wall mount (4xM4 screws)
Number of components that can be mounted	I/O module	2 modules
	I.S. barrier	16 barriers
Number of channels		16 channels
Connection	Power supply [SPS/BPS]	System power supply: Connected with the power supply cable for base plate (A2KPB00) Field power supply: Connected with the cable (*3)
	Grounding [TM1/TM2]	M4 screw terminal
	Field signal (*4) [TB1/TB2]	Spring clamp terminal
	F-SB bus [BUS1/BUS2]	Connected with the F-SB Bus Cable (A2KLF00)
Weight		Approx. 0.93 kg
Withstanding voltage		Between field and system: 1500 V AC for 1 minute 42 V DC, continuous
		Between channels: 500 V AC for 1 minute
Insulation resistance		Between field and system: 100 M Ω or higher (500 V DC)
		Between channels: 100 M Ω or higher (500 V DC)
Mounting conditions		A Dummy Cover (A2DCV01) must be attached to any unused slot of the I/O module.

Note: Response time of the I.S. barriers, it depends on the specifications of each I.S. barrier and affects the response time of its control-loop. The response time of some I.S. barriers are more than a few tens of milliseconds. So, please check the specifications of the I.S. barrier provided by the vendor.

*1: Power supply from the Node interface unit using the Power supply cable for base plate (A2KPB00).

*2: Field power supply shall not be provided directly from a DC distribution network.

*3: A cable and a connector must be prepared separately.

Cable size: 0.5 to 1.5 mm²

Connector: BCZ 3.81/02/180F SN BK BX (Weidmüller Interface GmbH & Co. KG)

*4: A cable must be prepared separately. Cable size: 0.5 to 2.5 mm²

4.3.3 Engineering Notes

To ensure that a field signal alarm can be detected, the settings for the I.S. barrier and I/O modules need to be configured in the barrier base plate engineering. The column of "Field cable status" shows the causes of failures to generate the process alarm. If, for example, a setting is not correct or has not been configured, the alarm signal cannot be detected correctly and the alarm may not be displayed in the system appropriately.

For the settings of the I.S. barrier, refer to the instruction manual provided by the vendor.

Table Settings for I.S. barrier and I/O modules when using Base plate for barrier (A2BN4D)

Signal type	I.S. barrier settings		I/O module settings		Field cable status	Process alarm (*5)
	Model	Settings	Signal	Settings		
Analog Input	MTL4541Y	None	AI-4wire	Detect IOP (enabled)	Disconnection	IOP-
					Short circuit	IOP
	MTL4541YA	None		Detect IOP (enabled)	Disconnection	IOP-
					Short circuit	IOP-
Analog Output	MTL4545Y	None	AO	Detect OOP (enabled)	Disconnection	OOP
Digital Input	MTL4514N	LFD function (enabled) (*1)	DI-NAMUR	Detect Disconnection (enabled)	Disconnection	IOP
					Short circuit	IOP
Digital Output	MTL4523Y	None	DO-Source	Detect LFD (enabled)	Disconnection	OOP
					Short circuit	OOP
	MTL4521Y	None	DO-Sink	None	Disconnection	—
					Short circuit	—
Temperature Input	MTL4573Y	Sensor type, error setting (Disconnection), etc. (*2)	AI-4wire	Detect IOP (enabled)	Disconnection	IOP or IOP- (*3)
					Short circuit	IOP or IOP- (*3) (*4)

*1: Can be set with the DIP switch on the I.S. barrier (for details, refer to the instruction manual for the I.S. barrier provided by MTL). LFD: Line Fault Detection.

*2: Can be set with a Setting Tool (PCS45) provided by MTL (for details, refer to MTL's website).

*3: The alarm type for the burnout/short-circuit can be selected by setting the I.S. barrier.

*4: Could not be detected depending on the setting value of the sensor type for the I.S. barrier.

*5: Only when the process I/O identifier, %Y is connected to the functional block with IOP process alarm, IOP process alarm occurs.

Table Settings for I.S. barrier and I/O modules when using Base plate for barrier (A2BN5D)

Signal type	I.S. barrier settings		I/O module settings		Field cable status	Process alarm (*5)
	Model	Settings	Signal	Settings		
Analog Input (2-wire/4-wire)	HiC2025	I/O module I/F (*2)	AI-4wire	Detect IOP (enabled)	Disconnection	IOP-
					Short circuit	IOP for 2-wire IOP- for 4-wire
	HiC2025ES	I/O module I/F (*2)	AI-4wire	Detect IOP (enabled)	Disconnection	IOP-
					Short circuit	IOP for 2-wire IOP- for 4-wire
Analog output	HiC2031, HiC2031HC	I/O module I/F (*2)	AO	Detect OOP (enabled)	Disconnection	OOP
Digital input	HiC2831	LFD function (*2)	DI-NAMUR	Detect Disconnection (enabled)	Disconnection	IOP
					Short circuit	IOP
Digital output	HiC2883	LFD function, I/O module I/F (*2)	DO-Source	Detect Disconnection (enabled)	Disconnection	OOP (*6)
					Short circuit	OOP (*6)
Temperature input	HiC2081	Sensor type, error setting (Disconnection), etc. (*1) I/O module I/F (*2)	AI-4wire	Detect IOP (enabled)	Disconnection	IOP or IOP- (*3)
					Short circuit	IOP or IOP- (*3) (*4)

*1: Please set with the software (PACTware). (for details, refer to the instruction manual for the I.S. barrier provided by P+F).

*2: Please set with the DIP switch on the I.S. barrier (for details, refer to the instruction manual for the I.S. barrier provided by P+F). LFD: Line Fault Detection.

HiC2025 and HiC2025ES: Current source 4 mA ... 20 mA

HiC2031: Open loop voltage of the control system < 27 V

HiC2031HC: Open loop voltage of the control system < 26 V

HiC2831: LFD function: Enable or Disable

HiC2883: LFD function: Enable

Operating mode: Bus powered with logic input

Minimum load: Disable

HiC2081: Output mode: source

*3: The alarm type for the disconnection/short-circuit can be selected by setting the I.S. barrier.

*4: Could not be detected depending on the setting value of the sensor type for the I.S. barrier.

*5: Only when the process I/O identifier, %Y is connected to the functional block with IOP process alarm, IOP process alarm occurs.

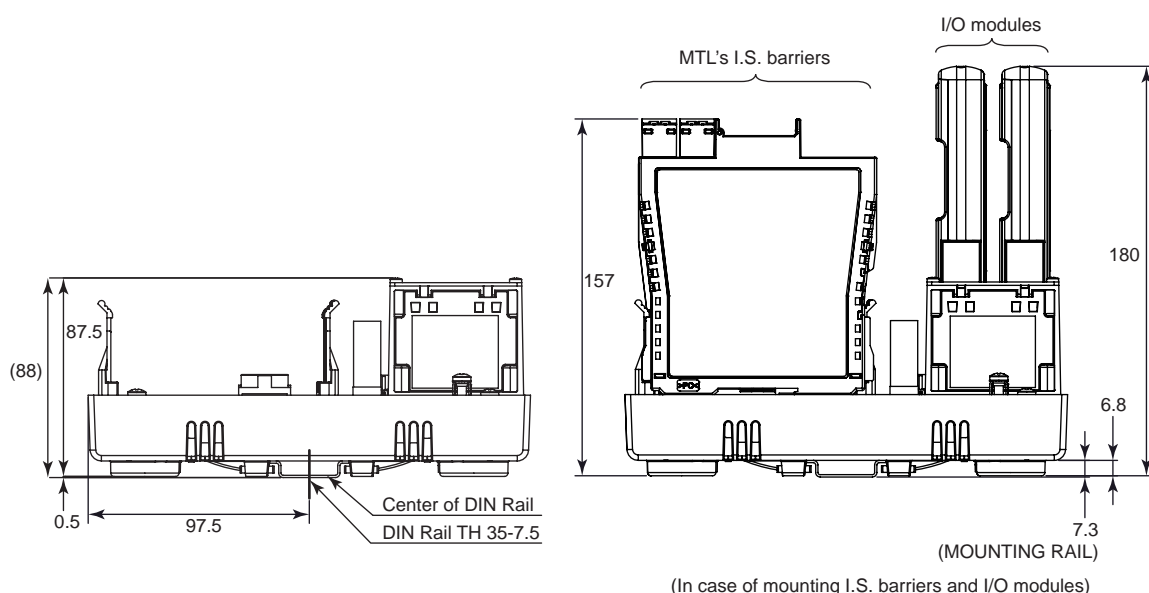
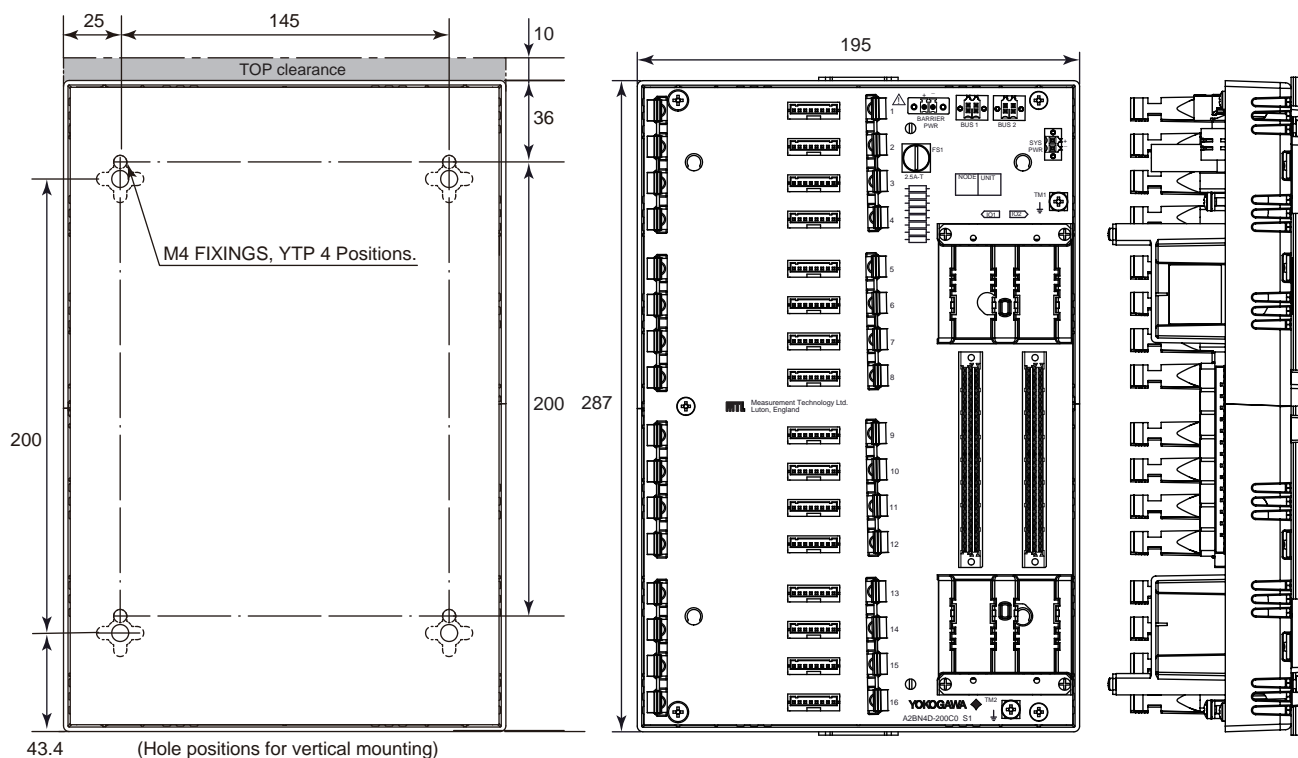
*6: This function is available when output ON.

4.3.4 External Dimension

4.3.4.1 Base Plate for Barrier (A2BN4D)

With I.S. wiring on the left side of the base plate (A2BN4D-200C0)

Unit: mm



F040303E.ai

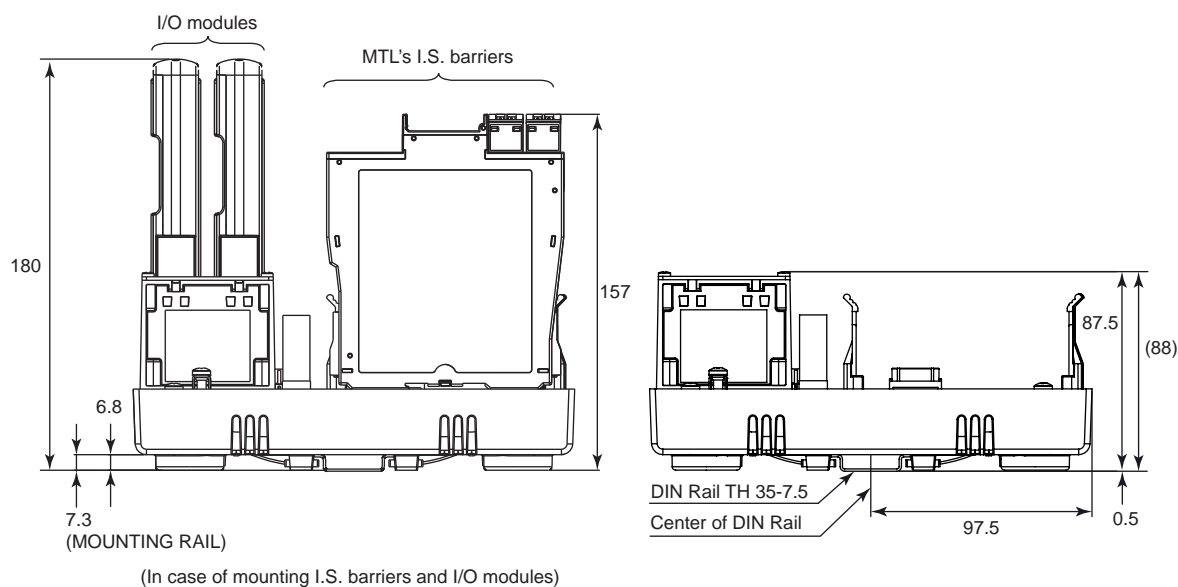
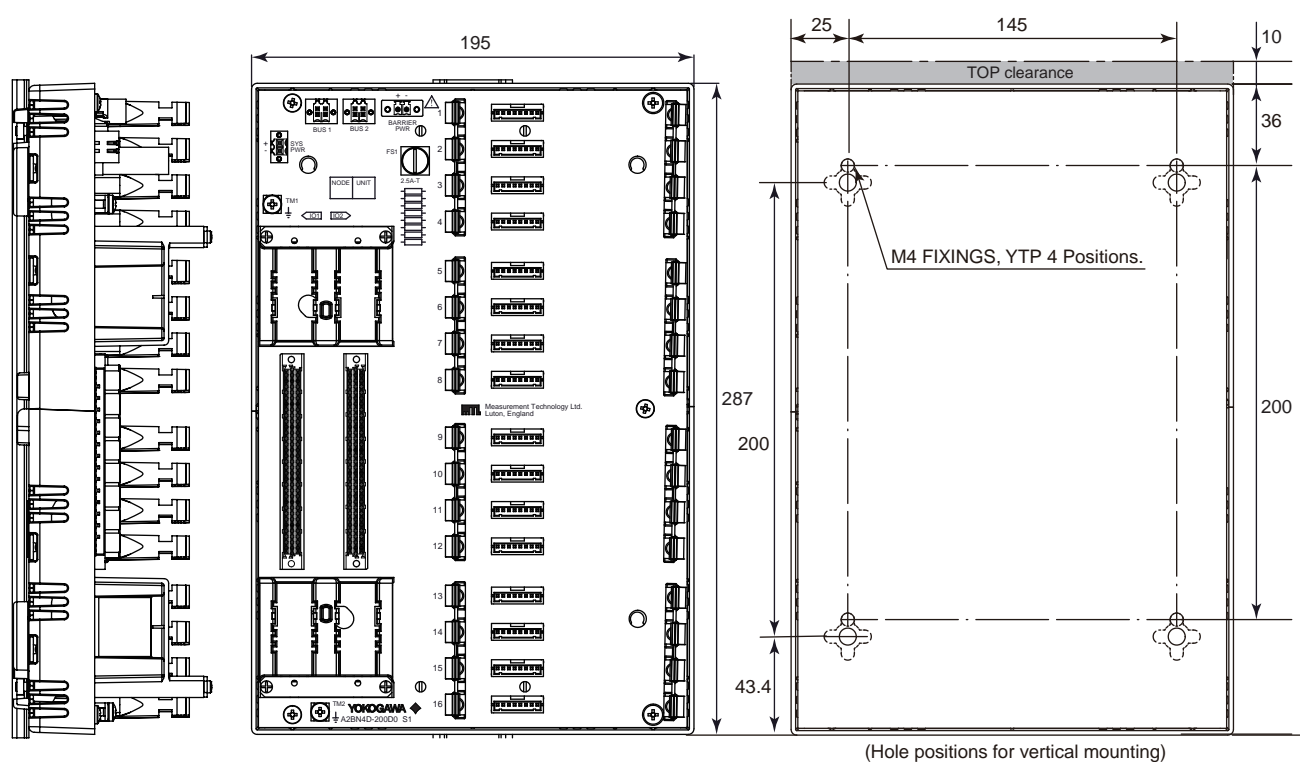
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

With I.S. wiring on the right side of the base plate (A2BN4D-200D0)

Unit: mm



F040304E.ai

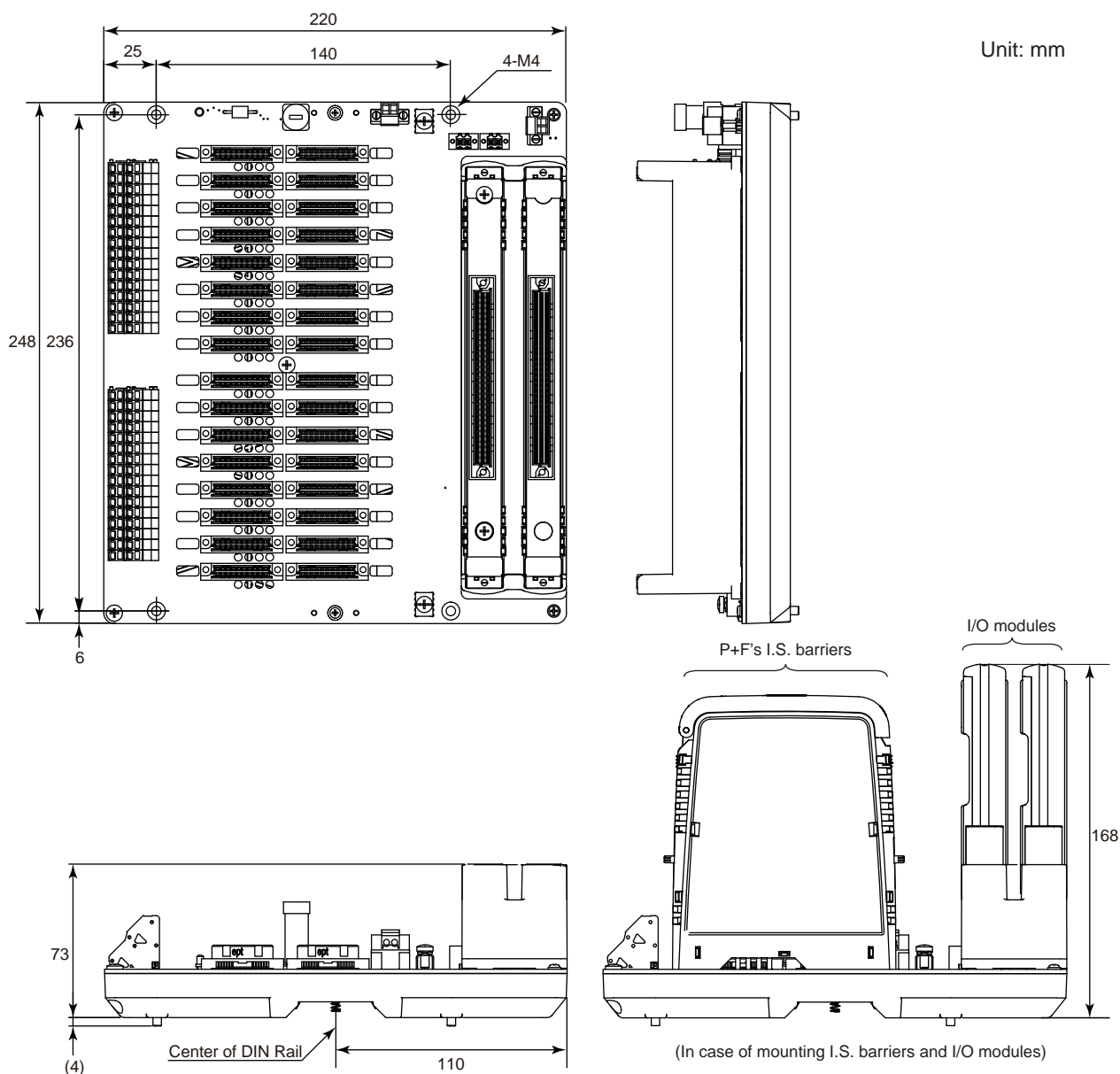
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

4.3.4.2 Base Plate for Barrier (A2BN5D)

With I.S. wiring on the left side of the base plate (A2BN5D-221C0)



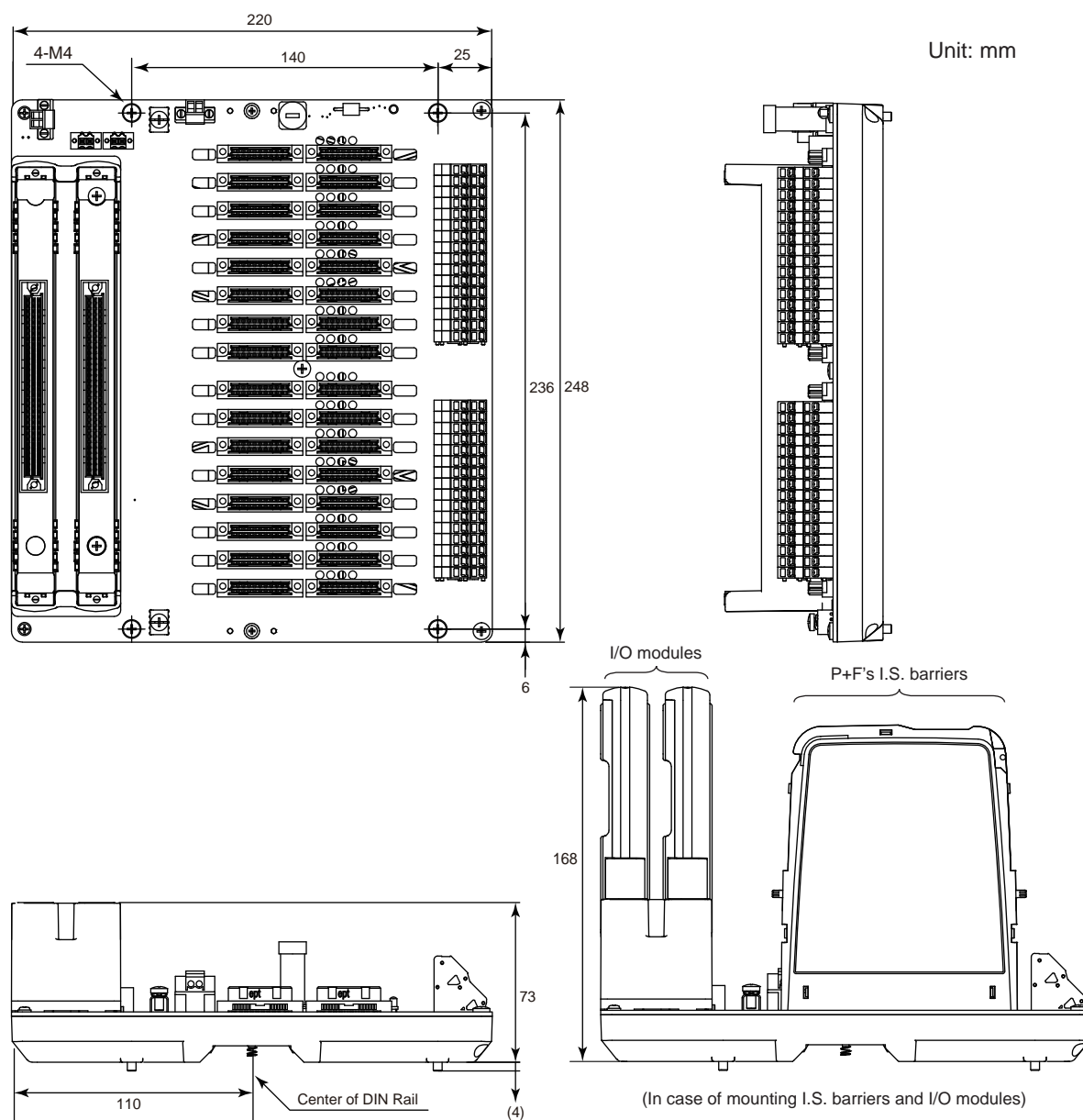
Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

F040305E.ai

With I.S. wiring on the right side of the base plate (A2BN5D-221D0)



F040306E.ai

Nominal tolerance:

Nominal tolerance is ± 0.8 mm for the dimensions of 0.5 mm or more and 120 mm or less, and the combined nominal tolerance is ± 1.5 mm.

The nominal tolerance is in accordance with JEM 1459 for the dimensions over 120 mm.

4.3.5 Model and Suffix Codes

Base Plate for Barrier (for N-IO, MTL Barrier)

		Description
Model	A2BN4D	Base Plate for Barrier (for N-IO, MTL Barrier)
Suffix Codes	-2	For both DIN rail and wall mount type
	0	Always 0
	1	With explosion protection (*1) (*2)
	C	I.S. wiring (Left) (*3)
	D	I.S. wiring (Right) (*3)
	0	Always 0

Note: With ISA Standard G3 by default.

*1: In Korea, A2BN4D is used only for intrinsic safety of Explosion-Protection, but it cannot be installed in the hazardous area.

*2: In EEU (Eurasian Economic Union), A2BN4D is used only for intrinsic safety of Explosion-Protection, but it cannot be installed in the hazardous area.

*3: The MTL I.S. barrier can be mounted. A2BN4D-200C0 has the I.S. circuit on the left side of the base plate, and A2BN4D-200D0 has it on the right side (for details, refer to the external dimensions).

Base Plate for Barrier (for N-IO, P+F Barrier)

		Description
Model	A2BN5D	Base Plate for Barrier (for N-IO, P+F Barrier)
Suffix Codes	-2	For both DIN rail and wall mount type
	2	Spring clamp terminal for field wiring
	1	With explosion protection (*1) (*2) (*3)
	C	I.S. wiring (Left) (*4)
	D	I.S. wiring (Right) (*4)
	0	Always 0

Note: With ISA Standard G3 by default.

Note: In Korea, purchase the DOCIM33J01J3008KO to follow the KCs IS for intrinsic safety of Explosion-Protection.

Note: When the final destination is Eurasian Economic Union, provide IM33J01J30-09RU together to comply with the EAC Ex IS for intrinsic safety of explosion-protection.

Note: The maximum ambient temperature specifications for A2BN5D depend on Style code and compliance criteria. For details, refer to GS 33J01A10-01EN "Integrated Production Control System CENTUM VP System Overview".

*1: A2BN5D style S1 cannot be installed in the hazardous area.

*2: In Korea, A2BN5D is used only for intrinsic safety of Explosion-Protection, but it cannot be installed in the hazardous area.

*3: In EEU (Eurasian Economic Union), A2BN5D is used only for intrinsic safety of Explosion-Protection, but it cannot be installed in the hazardous area.

*4: The P+F I.S. barrier can be mounted. A2BN5D-221C0 has the I.S. circuit on the left side of the base plate, and A2BN5D-221D0 has it on the right side (for details, refer to the external dimensions).

4.3.6 Standard Accessories

The following accessory is supplied with the product.

Parts Name	Part No.	Quantity	Remarks
FG Cable	S9906UV	1	for A2BN4D
	S9907UV	1	for A2BN5D

4.4 Cables (for N-IO)

4.4.1 General

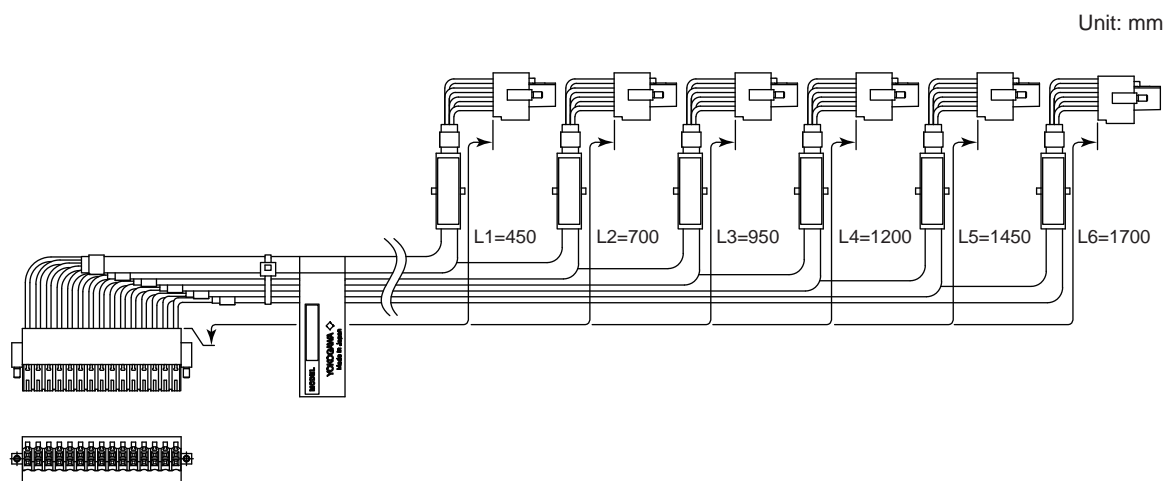
This section covers the specifications of a bus cable and a power supply cable used in the N-IO system.

4.4.2 External Dimensions, Models and Suffix Codes

4.4.2.1 Bus Cable

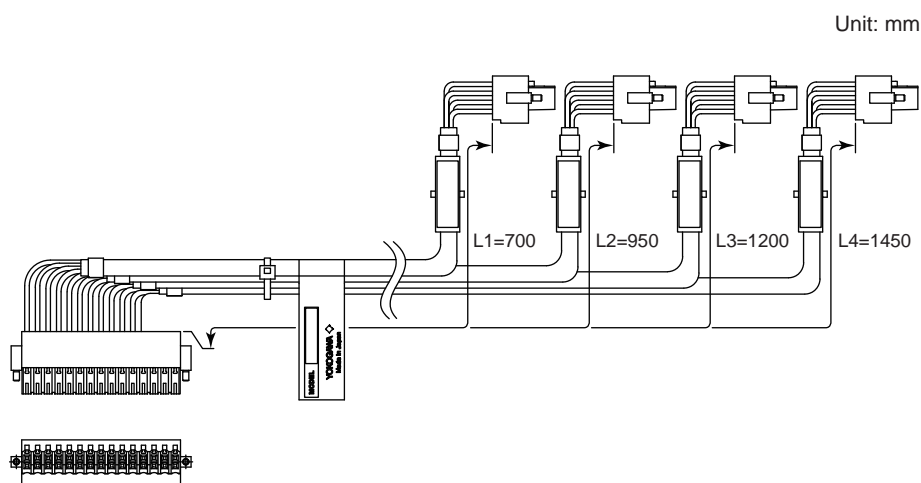
A2KLF00 F-SB Bus Cable

Example of A2KLF00-1A6□



Nominal tolerances of cable length: +5%, -0%

Example of A2KLF00-1S4□ /1-070 /2-095 /3-120 /4-145



Nominal tolerances of cable length:

When the reference dimension is less than or equal to 3000 mm, its nominal tolerance is +5%, -0%.

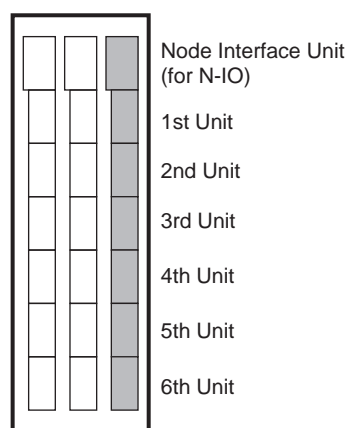
When the reference dimension is over 3000 mm, its nominal tolerance is +3% or +1m(whichever is smaller), -0%.

Standard length

		Description
Model	A2KLF00	F-SB Bus Cable
Suffix Codes	-1	Always 1
	B	Standard length for Barrier Base Plate (A2BN4D) (*1)
	C	Standard length for Barrier Base Plate (A2BN5D) (*1)
	1	For 1st Unit
	2	For 1st to 2nd Unit
	3	For 1st to 3rd Unit
	4	For 1st to 4th Unit
	5	For 1st to 5th Unit
	6	For 1st to 6th Unit (*2)
	0	Basic type
	2	With temperature (-40 to 70 °C) option

*1: If the base plates are placed vertically under the node interface unit in a Rittal TS8 cabinet, the suffix code for this standard length can be used. For the cable length, refer to the following table.

Connection	For A2BN4D	For A2BN5D
1st Unit	L1 : 0.45 m	L1 : 0.45 m
2nd Unit	L2 : 0.75 m	L2 : 0.70 m
3rd Unit	L3 : 1.05 m	L3 : 0.95 m
4th Unit	L4 : 1.35 m	L4 : 1.20 m
5th Unit	L5 : 1.65 m	L5 : 1.45 m
6th Unit	—	L6 : 1.70 m



F040403E.ai

*2: When -□B□□ is specified, -□□6□ is not selectable.

Cable length designation

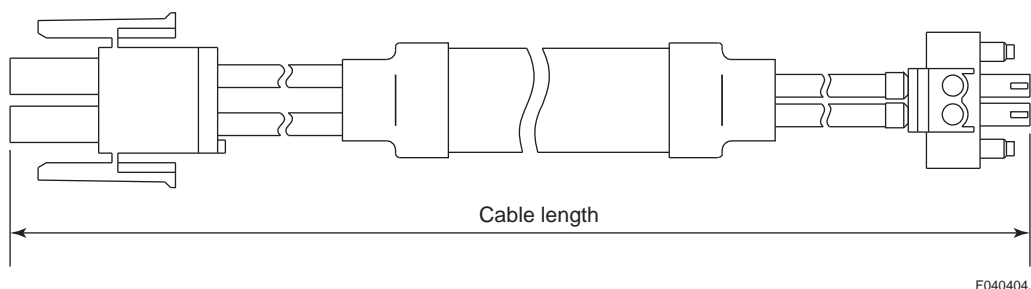
		Description
Model	A2KLF00	F-SB Bus Cable
Suffix Codes	-1	Always 1
	S	Cable length designation
	1	For 1st Unit
	2	For 1st to 2nd Unit
	3	For 1st to 3rd Unit
	4	For 1st to 4th Unit
	5	For 1st to 5th Unit
	6	For 1st to 6th Unit
	0	Basic type
	2	With temperature (-40 to 70 °C) option
Option Codes	/1-□□□	For 1st Unit Cable length designation (*1)
	/2-□□□	For 2nd Unit Cable length designation (*1)
	/3-□□□	For 3rd Unit Cable length designation (*1)
	/4-□□□	For 4th Unit Cable length designation (*1)
	/5-□□□	For 5th Unit Cable length designation (*1)
	/6-□□□	For 6th Unit Cable length designation (*1)

*1 : Select from F-SB Bus Cable length designation list.
F-SB Bus Cable length designation list

Number of □□□	Cable length (m)
045	0.45
070	0.70
095	0.95
120	1.20
145	1.45
170	1.70
195	1.95

4.4.2.2 Power Supply Cable

A2KPB00 Power Supply Cable for Base plate



Nominal tolerances of cable length: +5%, -0%

Standard length

		Description
Model	A2KPB00	Power Supply Cable for Base plate
Suffix Codes	-1	Always 1
	B	Standard length for Barrier Base Plate (A2BN4D) (*1)
	C	Standard length for Barrier Base Plate (A2BN5D) (*1)
	1	1pc for 1st Unit
	2	2pcs for 1st to 2nd Unit
	3	3pcs for 1st to 3rd Unit
	4	4pcs for 1st to 4th Unit
	5	5pcs for 1st to 5th Unit
	6	6pcs for 1st to 6th Unit (*2)
	2	With temperature (-40 to 70 °C) option

*1: If the base plates are placed vertically under the node interface unit in a Rittal TS8 cabinet, the suffix code for this standard length can be used. For the cable length, refer to the following table.

Connection	For A2BN4D	For A2BN5D
1st Unit	L1 : 0.60 m	L1 : 0.60 m
2nd Unit	L2 : 1.20 m	L2 : 0.60 m
3rd Unit	L3 : 1.20 m	L3 : 1.20 m
4th Unit	L4 : 1.60 m	L4 : 1.20 m
5th Unit	L5 : 1.60 m	L5 : 1.60 m
6th Unit	—	L6 : 1.60 m

*2: When -□B□□ is specified, -□□6□ is not selectable.

Cable length designation

		Description
Model	A2KPB00	Power Supply Cable for Base plate
Suffix Codes	-1	Always 1
	S	Cable length designation
	1	1pc for 1st Unit
	2	2pcs for 1st to 2nd Unit
	3	3pcs for 1st to 3rd Unit
	4	4pcs for 1st to 4th Unit
	5	5pcs for 1st to 5th Unit
	6	6pcs for 1st to 6th Unit
Option Codes	2	With temperature (-40 to 70 °C) option
	/1-□□□	For 1st Unit Cable length designation (*1)
	/2-□□□	For 2nd Unit Cable length designation (*1)
	/3-□□□	For 3rd Unit Cable length designation (*1)
	/4-□□□	For 4th Unit Cable length designation (*1)
	/5-□□□	For 5th Unit Cable length designation (*1)
	/6-□□□	For 6th Unit Cable length designation (*1)

*1 : Select from Power Supply Cable length designation list.
Power Supply Cable length designation list

Number of □□□	Cable length (m)
060	0.60
120	1.20
160	1.60
200	2.00

5 APPLICABLE STANDARDS

Refer to “Integrated Production Control System CENTUM VP System Overview” (GS 33J01A10-01EN). The following shows the conformity models for CE Marking and UKCA Marking including for each of the base plates. The system models do not have suffix n or option codes.

Table Conformity Models for CE Marking and UKCA Marking

System model	Components
A2ZN4DC	A2BN4D, A2MMM843, A2MDV843
A2ZN5DC	A2BN5D, A2MMM843, A2MDV843

6 ORDERING INFORMATION

- Specify models, suffix codes, and option codes when ordering.
- For selecting the right products for explosion protection, please refer to TI 33Q01J30-01E without fail.
- When ordering A2BN4D or A2BN5D for regions where the CE marking apply at least one copy of explosion protection manual (IM 33K01J30-50E) is required to follow the ATEX Directive. This IM can be delivered by specifying option code “/ATDOC” on the upper product, node interface unit (A2NN30D). When ordering this model, select an option code of “/ATDOC” for one of NIU adopted for the project.
- When ordering A2BN4D or A2BN5D for regions where the UKCA marking apply at least one copy of explosion protection manual (IM 33K01J30-50E) is required to follow the UKEX Regulation. This IM can be delivered by specifying option code “/ATDOC” on the upper product, node interface unit (A2NN30D). When ordering this model, select an option code of “/ATDOC” for one of NIU adopted for the project.

7 TRADEMARK ACKNOWLEDGMENT

The names of corporations, organizations, products and logos herein are either registered trademarks or trademarks of Yokogawa Electric Corporation and their respective holders.