

General Specifications

Terminal Boards (for FIO)



GS 33J60H51-01EN

[Release 6]

■ GENERAL

This document describes the specifications of terminal boards with DIN rail type used for FIOs of CENTUM VP systems.

■ STANDARD SPECIFICATIONS

About the installation and environmental conditions of the Terminal board, refer to "Safety Precautions" of "CENTUM VP installation Guidance (TI 33J01J10-01EN)," which is common with the Terminal board.

Model	Description	Points	Terminals	Modules Connected	Connection Adapter	Connection Cable	Weight	Specifications
A1BA4D	For analog signals (single and dual-redundant modules)	8 pts x 1	Pressure clamp	AAI135 (*1) AAI835 (*1) AAP135 (*1)	ATK4A	KS1	Approx. 0.30 kg	Insulation resistance: 10 MΩ or greater at 500 V DC Withstanding voltage: 500 V AC for 1 minute (*4)
		16 pts x 1	Pressure clamp	AAI141 AAV141 AAV144 AAB841 AAI841 AAV544 AAI143 AAI543				
A1BT4D	For thermocouple (single and dual-redundant modules)	16 pts x 1	Pressure clamp	AAT145	— (*3)	KS1	Approx. 0.30 kg	Insulation resistance: 10 MΩ or greater at 200 V DC Withstanding voltage: 200 V AC for 1 minute (*4)
A1BR4D	For resistance temperature detectors (single and dual-redundant modules)	16 pts x 1	Pressure clamp	AAR145	— (*3)	AKB335	Approx. 0.30 kg	Insulation resistance: 10 MΩ or greater at 200 V DC Withstanding voltage: 200 V AC for 1 minute (*4)
A1BD5D (*6) (*7)	For digital signals (single and dual-redundant modules)	32 pts x 1	Pressure clamp	ADV151 ADV551	ATD5A	AKB331	Approx. 0.70 kg	Insulation resistance: 10 MΩ or greater at 500 V DC Withstanding voltage: 2.0 k V AC for 1 minute (*5)
				ADV161 (*2) ADV561 (*2)	— (*3)	AKB337		

Note: Be sure to leave the connector caps on connectors that are not used, in order to protect the connector pins and prevent dust from accumulating on them.

- *1: For the combination of AAI135/AAI835/AAP135; ATK4A; A1BA4D, either 2-Wire Transmitter 2-Wire Input (transmitter power supply type) or 4-Wire Transmitter 2-Wire Input (without transmitter power supply) can be selected for each input channel.
- *2: Two units of A1BD5D and two units of AKB337 are required for ADV161 or ADV561.
- *3: A cable can be connected directly to the I/O module without using an adapter.
- *4: Between channels
- *5: Between power terminal and READY terminal
- *6: The READY contact rating shows below.
125 V AC or less and 0.3 A or less
60 V DC or less and 1 A or less
- *7: External supply voltage shows below.
24 V DC ±10 %

■ CABLES

● A1BA4D, A1BD5D, A1BR4D

Applicable Cables

Refer to the TI "CENTUM VP Installation Guidance" (TI 33J01J10-01EN), and use the proper cable appropriate for its installation environment.

Temperature rating of Cables

Models	Cables	Temperature rating of Cables
A1BA4D, A1BR4D	Signal Cables	An ambient temperature plus 10 °C or more
A1BD5D	Signal Cables (including READY terminal)	An ambient temperature plus 10 °C or more
	Input Power Cables	An ambient temperature plus 20 °C or more

Recommended Wire nominal cross sectional area

- Pressure clamp terminals

Without a sleeve: 0.5 to 2 mm² (AWG20 to 14)

Cable Termination Process when Pressure Clamp Terminals are Used

- Without a Sleeve

Wire nominal cross sectional area (mm ²)	Peel-off length (mm)
0.5 to 2.5 (AWG20 to 14)	7

- With a Sleeve

It is recommended to use any one of the following sleeves.

Sleeve without insulating cover (DIN 46 228/1) Sleeve with insulating cover (DIN 46 228/4)

Cable nominal cross sectional area (mm ²)	When using a sleeve with insulating cover			When using a sleeve without insulating cover	
	Peel-off length (mm)	Sleeve dimensions (mm)		Peel-off length (mm)	Sleeve dimensions (mm)
		Total length	Contact section length		Total length
0.5	10	14	8	6	6
0.75	10	14	8	6	6
1.0	10	14	8	6	6
1.5	10	14	8	7	7
2.5	10	14	8	7	7

● A1BT4D

Applicable Cables

Refer to the TI "CENTUM VP Installation Guidance" (TI 33J01J10-01EN), and use the proper cable appropriate for its installation environment.

Temperature rating of Cables

Models	Cables	Temperature rating of Cables
A1BT4D	Signal Cables	An ambient temperature plus 10 °C or more

Recommended Wire nominal cross sectional area

- Pressure clamp terminals

Without a sleeve: 0.5 to 2 mm² (AWG20 to 14)

With a sleeve: 0.5 to 1.5 mm² (AWG20 to 16)

Cable Termination Process when Pressure Clamp Terminals are Used

• Without a Sleeve

Wire nominal cross sectional area (mm ²)	Peel-off length (mm)
0.5 to 2 (AWG20 to 14)	11

• With a Sleeve

It is recommended to use any one of the following sleeves.

Sleeve without insulating cover (DIN 46 228/1) Sleeve with insulating cover (DIN 46 228/4)

Cable nominal cross sectional area (mm ²)	When using a sleeve with insulating cover			When using a sleeve without insulating cover	
	Peel-off length (mm)	Sleeve dimensions (mm)		Peel-off length (mm)	Sleeve dimensions (mm)
		Total length	Contact section length		Total length
0.5	12	16	10	10	10
0.75	12	16	10	10	10
1.0	12	16	10	10	10
1.25 to 1.5	12	16	10	10	10

■ TERMINAL BLOCK AND CONNECTOR CONNECTION SPECIFICATIONS

Please refer to the specifications shown below to connect signal cables with a proper terminal since some Analog I/O modules require to select a proper terminal dependent on the devices to be connected.

Models	Cable Connection Pris	Input Type		
AAI141 AAI143 AAI841 (*1)	IN□A	2-wire transmitter input +	Current input -	—
	IN□B	2-wire transmitter input - (setting pin: 2-wire input)	Current input + (setting pin: 4-wire input)	
AAI135 AAI835	IN□A	2-wire transmitter input +	—	—
	IN□B	2-wire transmitter input -	Current input +	
	IN□C	—	Current input -	
AAR145 (*2)	IN□A	RTD input A	POT input, 100 %	—
	IN□B	RTD input B	POT input, 0 %	
	IN□C	RTD input B	POT input, variable	
AAP135	IN□A	2-wire power supply (power)	—	3-wire power supply power supply
	IN□B	2-wire power supply (signal)	2-wire (voltage, contact) +	3-wire power supply +
	IN□C	—	2-wire (voltage, contact) -	3-wire power supply -

□ is channel number.

*1: When power of models AAI141, AAI143, AAI841, AAI135 and AAI835 is off or abnormal, current input loop is in the open state.

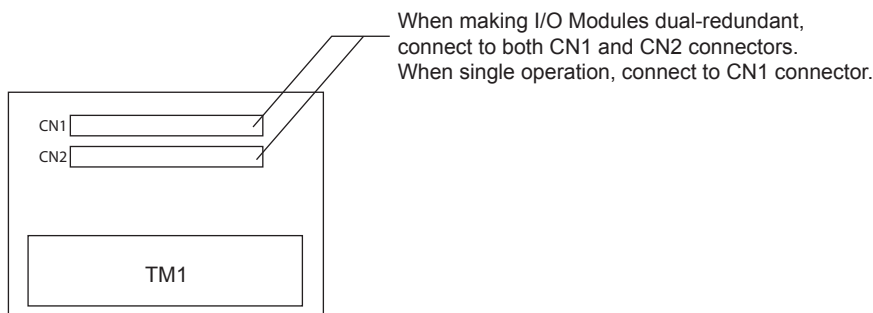
Do not use current signals with other receiving devices. When in use, also use an external receiver resistance, in the voltage mode (Shunt resistant module part no.: A1080RZ 250 ohm).

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

■ TERMINAL BOARDS

The terminal N.C. in the figure is an unused terminal; wiring is not required.

● A1BA4D



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When connecting AAI141 or AAI143

TM1

Signal name	IN1A	IN2A	IN3A	IN4A	IN5A	IN6A	IN7A	IN8A	IN9A	IN10A	IN11A	IN12A	IN13A	IN14A	IN15A	IN16A
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	IN1B	IN2B	IN3B	IN4B	IN5B	IN6B	IN7B	IN8B	IN9B	IN10B	IN11B	IN12B	IN13B	IN14B	IN15B	IN16B

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When connecting AAV141 or AAV144

TM1

Signal name	IN1+	IN2+	IN3+	IN4+	IN5+	IN6+	IN7+	IN8+	IN9+	IN10+	IN11+	IN12+	IN13+	IN14+	IN15+	IN16+
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	IN1-	IN2-	IN3-	IN4-	IN5-	IN6-	IN7-	IN8-	IN9-	IN10-	IN11-	IN12-	IN13-	IN14-	IN15-	IN16-

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When connecting AAI543 or AAV544

TM1

Signal name	OUT1+	OUT2+	OUT3+	OUT4+	OUT5+	OUT6+	OUT7+	OUT8+	OUT9+	OUT10+	OUT11+	OUT12+	OUT13+	OUT14+	OUT15+	OUT16+
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	OUT1-	OUT2-	OUT3-	OUT4-	OUT5-	OUT6-	OUT7-	OUT8-	OUT9-	OUT10-	OUT11-	OUT12-	OUT13-	OUT14-	OUT15-	OUT16-

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When connecting AAI841

TM1

Signal name	IN1A	IN2A	IN3A	IN4A	IN5A	IN6A	IN7A	IN8A	OUT1+	OUT2+	OUT3+	OUT4+	OUT5+	OUT6+	OUT7+	OUT8+
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	IN1B	IN2B	IN3B	IN4B	IN5B	IN6B	IN7B	IN8B	OUT1-	OUT2-	OUT3-	OUT4-	OUT5-	OUT6-	OUT7-	OUT8-

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When connecting AAB841

TM1

Signal name	IN1+	IN2+	IN3+	IN4+	IN5+	IN6+	IN7+	IN8+	OUT1+	OUT2+	OUT3+	OUT4+	OUT5+	OUT6+	OUT7+	OUT8+
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	IN1-	IN2-	IN3-	IN4-	IN5-	IN6-	IN7-	IN8-	OUT1-	OUT2-	OUT3-	OUT4-	OUT5-	OUT6-	OUT7-	OUT8-

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When connecting AAI135 or AAP135

TM1

Signal name	IN1A	IN1B	IN2A	IN2B	IN3A	IN3B	IN4A	IN4B	IN5A	IN5B	IN6A	IN6B	IN7A	IN7B	IN8A	IN8B
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	N.C.	IN1C	N.C.	IN2C	N.C.	IN3C	N.C.	IN4C	N.C.	IN5C	N.C.	IN6C	N.C.	IN7C	N.C.	IN8C

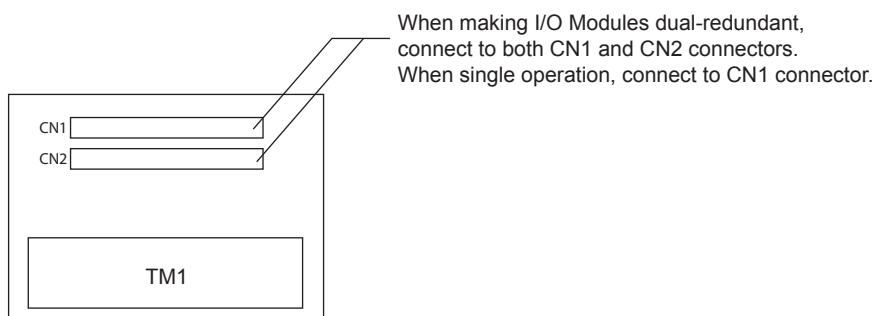
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When connecting AAI835

TM1

Signal name	IN1A	IN1B	IN2A	IN2B	IN3A	IN3B	IN4A	IN4B	N.C.	OUT1+	N.C.	OUT2+	N.C.	OUT3+	N.C.	OUT4+
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
Signal name	N.C.	IN1C	N.C.	IN2C	N.C.	IN3C	N.C.	IN4C	N.C.	OUT1-	N.C.	OUT2-	N.C.	OUT3-	N.C.	OUT4-

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● A1BT4D

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When connecting AAT145

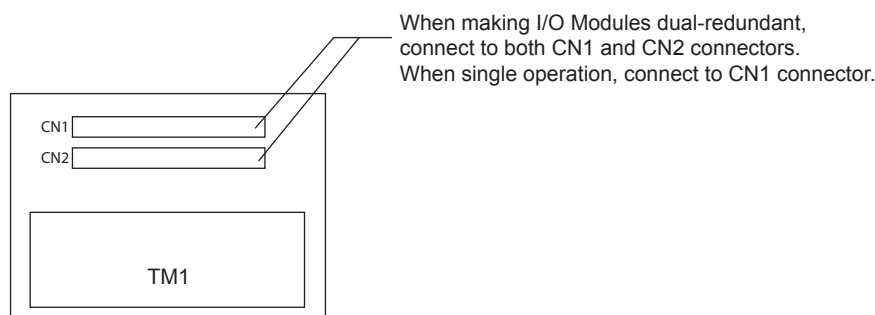
TM1

Signal name	IN1+	IN2+	IN3+	IN4+	IN5+	IN6+	IN7+	IN8+	IN9+	IN10+	IN11+	IN12+	IN13+	IN14+	IN15+	IN16+	N.C.	N.C.
Terminal No.	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A
	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B	17B	18B
Signal name	IN1-	IN2-	IN3-	IN4-	IN5-	IN6-	IN7-	IN8-	IN9-	IN10-	IN11-	IN12-	IN13-	IN14-	IN15-	IN16-	N.C.	N.C.

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Note: The A1BT4D has built-in RJC1 to RJC4.

● A1BR4D



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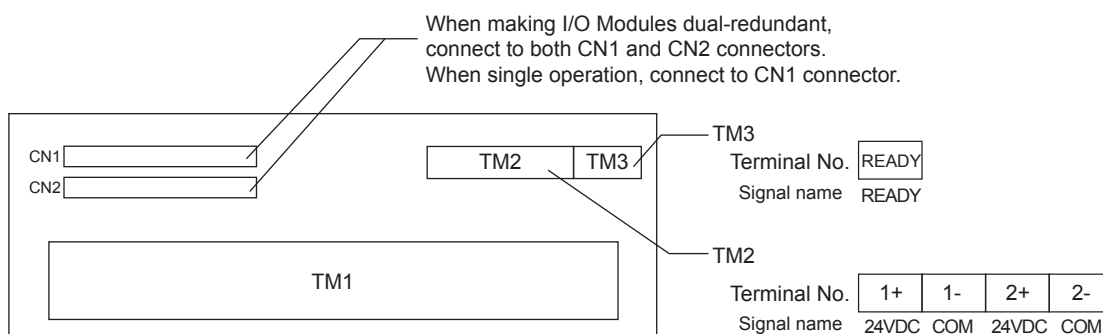
When connecting AAR145

TM1

Signal name	IN1A	IN2A	IN3A	IN4A	IN5A	IN6A	IN7A	IN8A	IN9A	IN10A	IN11A	IN12A	IN13A	IN14A	IN15A	IN16A
	1A	2A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A
Terminal No.	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B	15B	16B
	1C	2C	3C	4C	5C	6C	7C	8C	9C	10C	11C	12C	13C	14C	15C	16C
Signal name	IN1C	IN2C	IN3C	IN4C	IN5C	IN6C	IN7C	IN8C	IN9C	IN10C	IN11C	IN12C	IN13C	IN14C	IN15C	IN16C
Signal name	IN1B	IN2B	IN3B	IN4B	IN5B	IN6B	IN7B	IN8B	IN9B	IN10B	IN11B	IN12B	IN13B	IN14B	IN15B	IN16B

F12E.ai

● A1BD5D



F13E.ai

Input type of Digital Input Module

Model name	Signal name	Input Type	
ADV151	VP24□	Dry contact input connection+	—
ADV161	IN□	Dry contact input connection-	voltage input connection+
	COM□	—	voltage input connection-

□ is channel number

Output type of Digital Input Module

Model name	Signal name	Output Type	
ADV551	VP24□	voltage output connection+	—
ADV561	OUT□	voltage output connection-	transistor output connection+
	COM□	—	transistor output connection-

□ is channel number

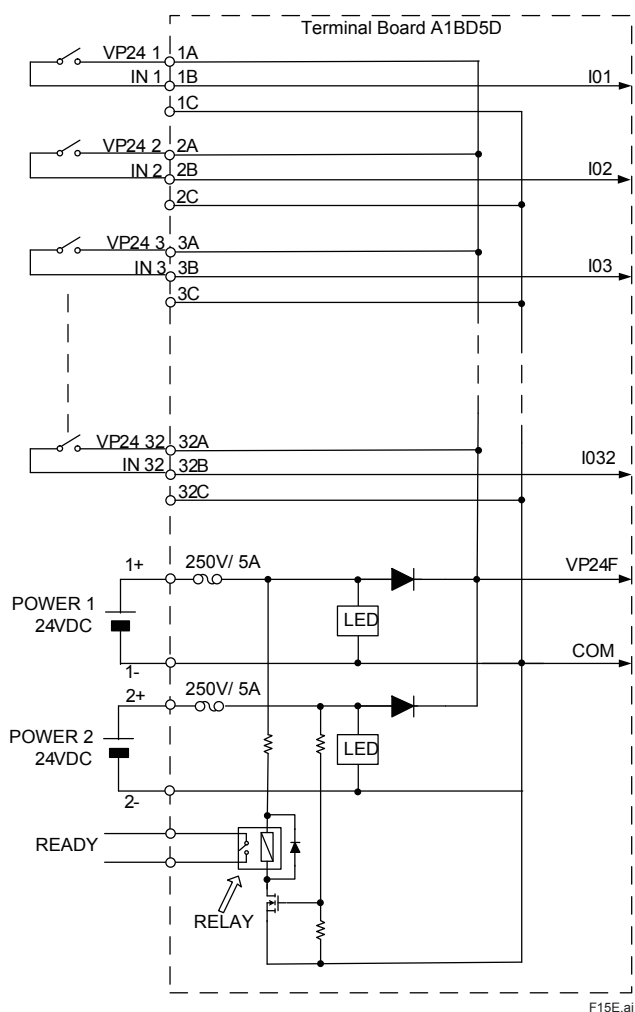
When connecting ADV151

TM1

Signal name	VP24 1	VP24 2	VP24 3	VP24 4	VP24 5	VP24 6		VP24 25	VP24 26	VP24 27	VP24 28	VP24 29	VP24 30	VP24 31	VP24 32
	1A	2A	3A	4A	5A	6A		25A	26A	27A	28A	29A	30A	31A	32A
Terminal No.	1B	2B	3B	4B	5B	6B	7C		26B	27B	28B	29B	30B	31B	32B
	1C	2C	3C	4C	5C	6C		25C	26C	27C	28C	29C	30C	31C	32C
Signal name	COM1	COM2	COM3	COM4	COM5	COM6		COM25	COM26	COM27	COM28	COM29	COM30	COM31	COM32
Signal name	IN1	IN2	IN3	IN4	IN5	IN6	IN7		IN26	IN27	IN28	IN29	IN30	IN31	IN32

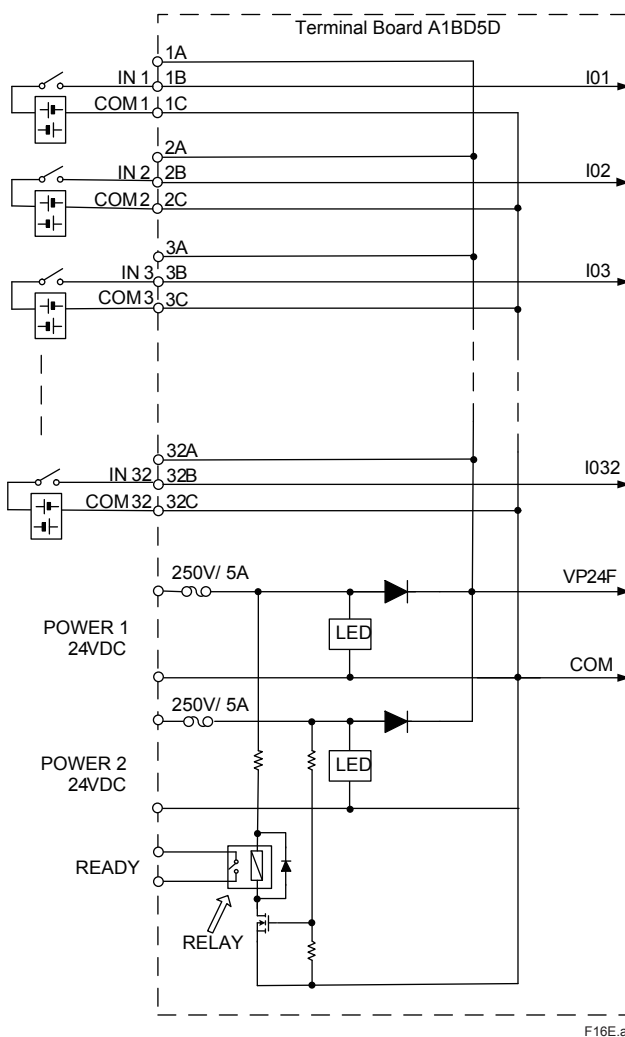
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Dry contact input connection



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Voltage input connection

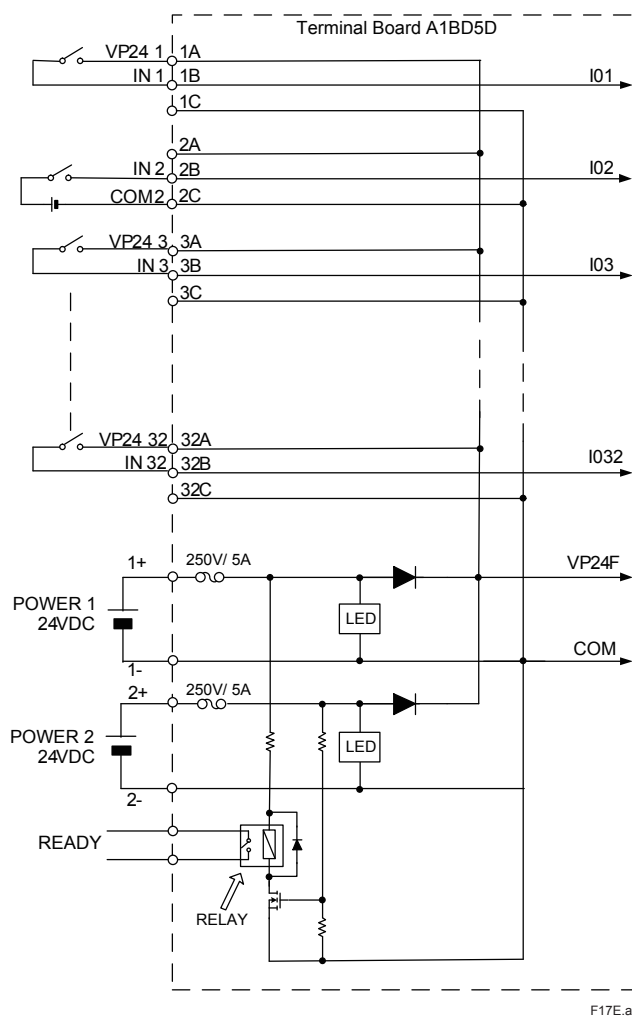


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Note: All voltage input connect signals must be the same polarity.

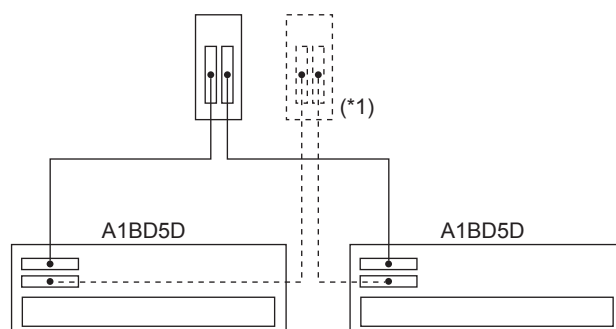
Note: External power supply Power 1 and Power 2 are not need for connection.

Mixture of dry contact input connection and voltage input connection



Note: When a dry contact input connection and voltage input connection are intermingled, please unify the polarity of the voltage input signals with an external power supply (Power 1, Power 2).

When connecting ADV161



Note: When connecting ADV161 with a terminal board, two units of A1BD5D are required.

*1: The dashed line indicates for dual-redundant configuration.

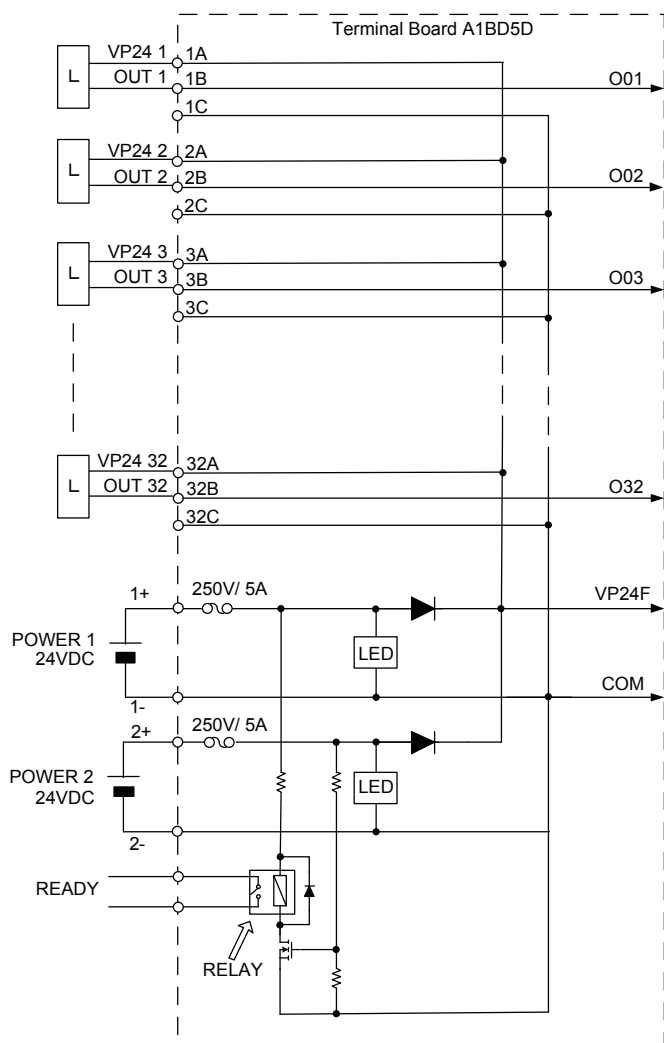
When connecting ADV551

TM1

Signal name	VP24 1	VP24 2	VP24 3	VP24 4	VP24 5	VP24 6							VP24 25	VP24 26	VP24 27	VP24 28	VP24 29	VP24 30	VP24 31	VP24 32
	1A	2A	3A	4A	5A	6A							25A	26A	27A	28A	29A	30A	31A	32A
Terminal No.	1B	2B	3B	4B	5B	6B	7C							26B	27B	28B	29B	30B	31B	32B
	1C	2C	3C	4C	5C	6C							25C	26C	27C	28C	29C	30C	31C	32C
Signal name	COM1	COM2	COM3	COM4	COM5	COM6							COM25	COM26	COM27	COM28	COM29	COM30	COM31	COM32
Signal name	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7							OUT26	OUT27	OUT28	OUT29	OUT30	OUT31	OUT32

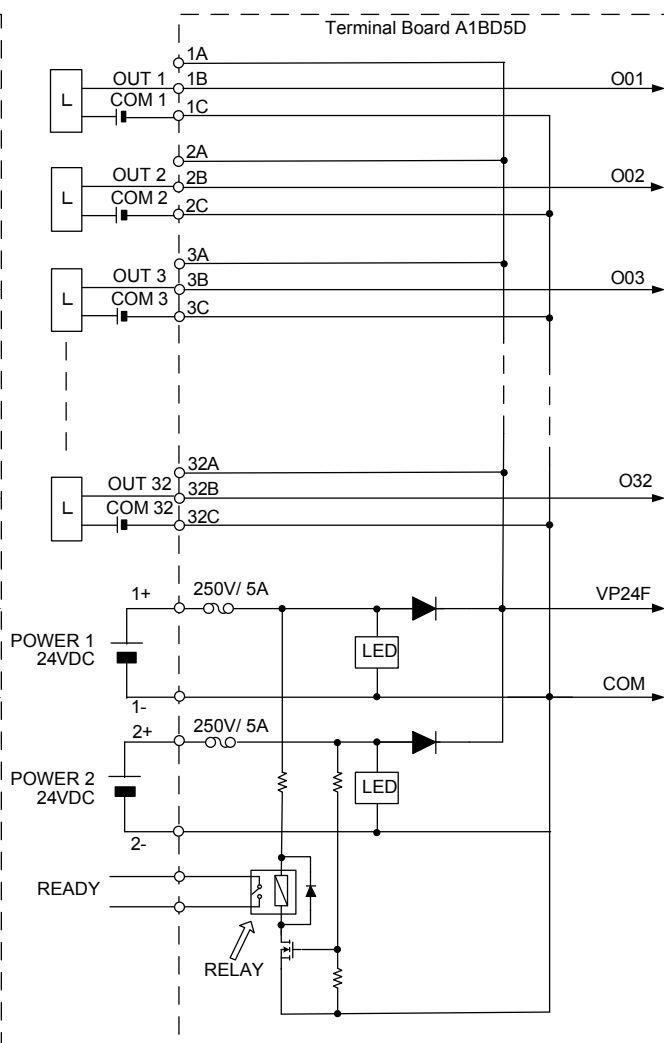
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Voltage output connection



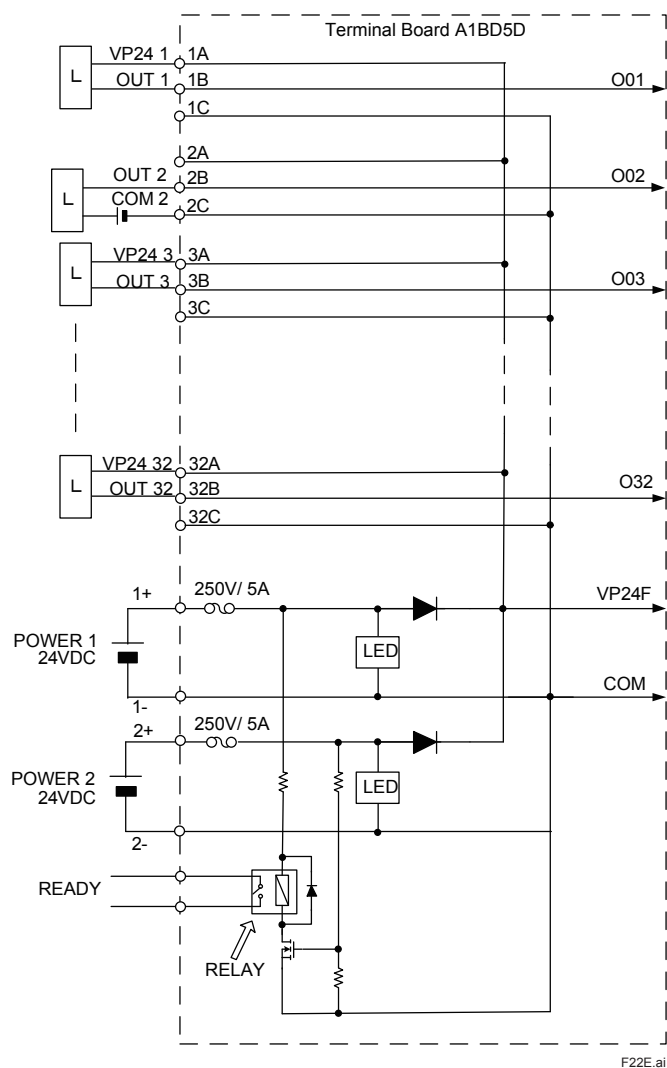
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Transistor output connection

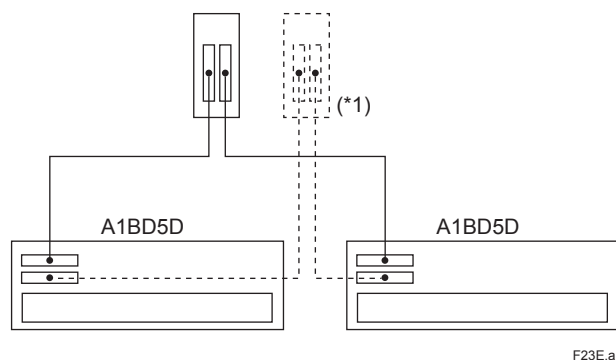


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Mixture of voltage output connection and transistor output connection



When connecting ADV561



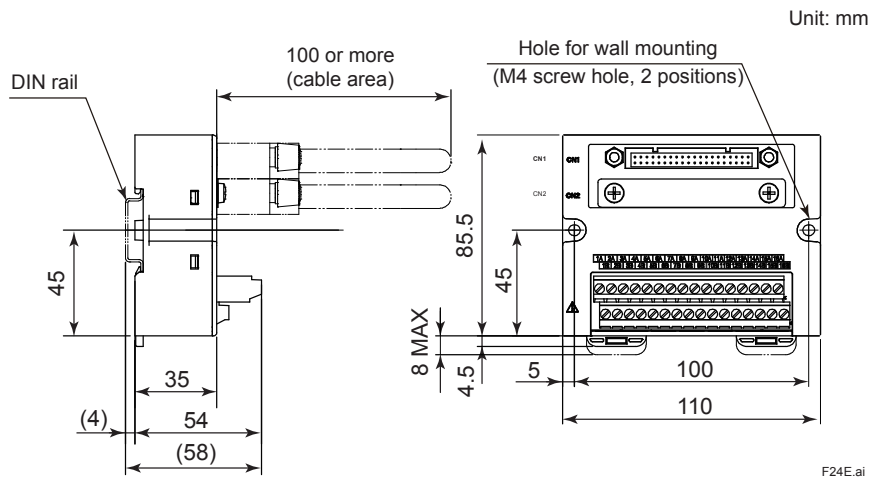
Note: When connecting ADV561 with a terminal board, two units of A1BD5D are required.

*1: The dashed line indicates for dual-redundant configuration.

EXTERNAL DIMENSIONS

Terminal Boards

A1BA4D

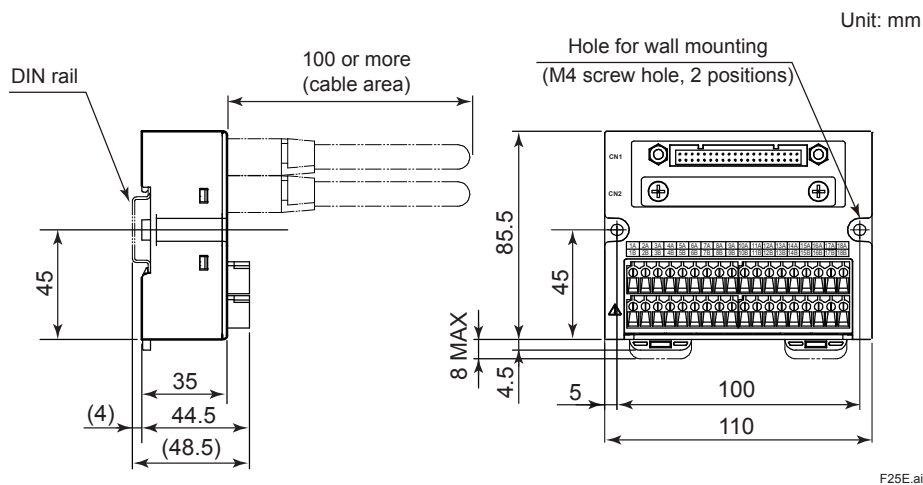


Nominal Tolerances :

When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.

When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

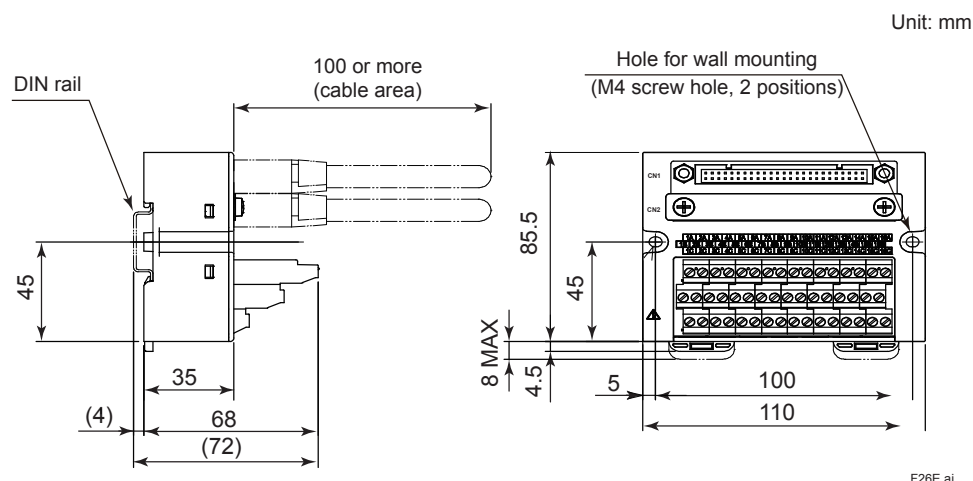
A1BT4D



Nominal Tolerances :

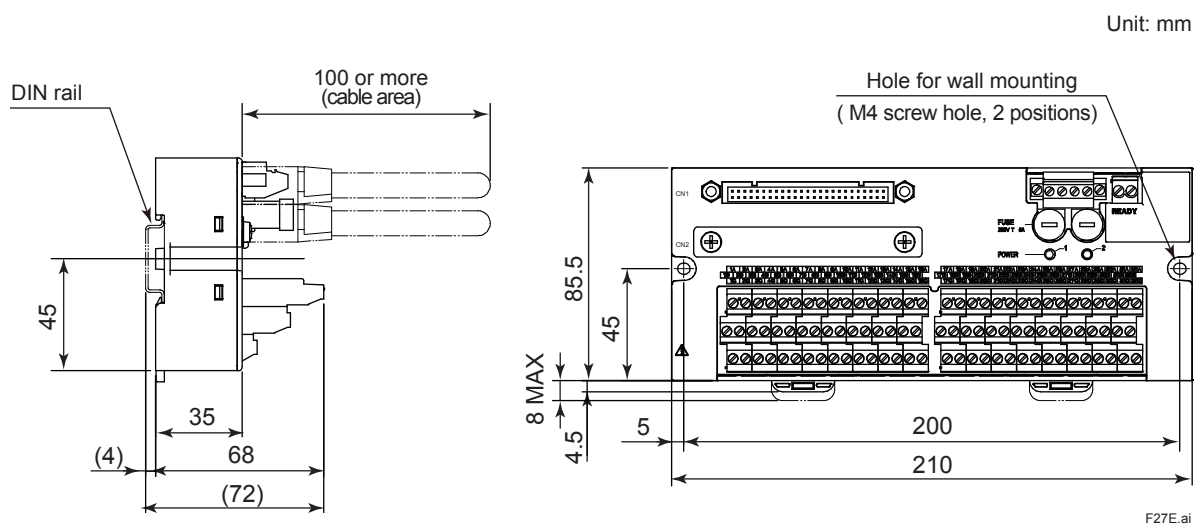
When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.

When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

A1BR4D**Nominal Tolerances :**

When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.

When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

A1BD5D**Nominal Tolerances :**

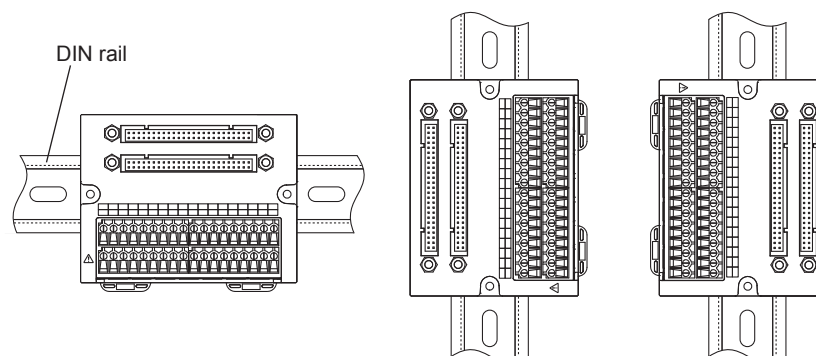
When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.

When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

■ PRECAUTIONS DURING INSTALLATION

● Terminal board installation direction

Install the terminal board in the direction shown in the following figure.



F28E.ai

● Cautions for mounting

Prevent the terminal board from being influenced by the ambient temperature in order to keep the reference junction compensation accuracy, as detailed conditions are shown below.

The reference junction compensation accuracy is specified when the ambient temperature is stable.

When the temperature fluctuates, the accuracy may vary until it becomes stable.

Mounting a terminal board by itself

Install all the heat sources above the terminal board or terminal board wiring.

Provide a heat shield in case installation of the heat sources below or sideways of the terminal board is unavoidable.

Installing terminal board in a cabinet

Install all the heat sources above the terminal board or terminal board wiring when those are mounted in a cabinet.

Provide a heat shield in case installation of the heat sources below or sideways of the terminal board is unavoidable.

■ REPLACEMENT PARTS ON TERMINAL BOARD

The following table shows the replacement parts on terminal board.

Model	Part Name	Part Number (*1)	Remark
A1BD5D	Fuse	A1513EF	250 V/5 A

*1: Parts must be purchased and replaced in accordance with the laws and regulations of each country or region.

■ MODELS AND SUFFIX CODES

Terminal Board for Analog (single and dual-redundant)

		Description
Model	A1BA4D	Terminal Board for Analog (single and dual-redundant, 16-channel x 1 or 8-channel x 1, DIN rail mount type)
Suffix Codes	-0	Always 0
	5	Basic type with no explosion protection
	6	With ISA Standard G3 option and no explosion protection
	E	Basic type with explosion protection
	F	With ISA Standard G3 option and explosion protection

Terminal Board for Thermocouple (single and dual-redundant)

		Description
Model	A1BT4D	Terminal Board for Thermocouple (single and dual-redundant, 16-channel x 1, DIN rail mount type)
Suffix Codes	-0	Always 0
	5	Basic type with no explosion protection
	6	With ISA Standard G3 option and no explosion protection
	E	Basic type with explosion protection
	F	With ISA Standard G3 option and explosion protection

Terminal Board for Resistance Temperature Detectors (single and dual-redundant)

		Description
Model	A1BR4D	Terminal Board for RTD input (single and dual-redundant, 16-channel x 1, DIN rail mount type)
Suffix Codes	-0	Always 0
	5	Basic type with no explosion protection
	6	With ISA Standard G3 option and no explosion protection
	E	Basic type with explosion protection
	F	With ISA Standard G3 option and explosion protection

Terminal Board for Digital (single and dual-redundant)

		Description
Model	A1BD5D	Terminal Board for Digital (single and dual-redundant, 32-channel x 1, DIN rail mount type)
Suffix Codes	-0	Always 0
	5	Basic type with no explosion protection
	6	With ISA Standard G3 option and no explosion protection
	E	Basic type with explosion protection
	F	With ISA Standard G3 option and explosion protection

■ APPLICABLE STANDARDS

Refer to the GS "Integrated Production Control System CENTUM VP System Overview" (GS 33J01A10-01EN).

■ ORDERING INFORMATION

Specify model and suffix codes.

For selecting the right products for explosion protection, please refer to TI 33Q01J30-01E without fail.

■ TRADEMARK ACKNOWLEDGMENT

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