● Connecting to ADV151 (Voltage Input)

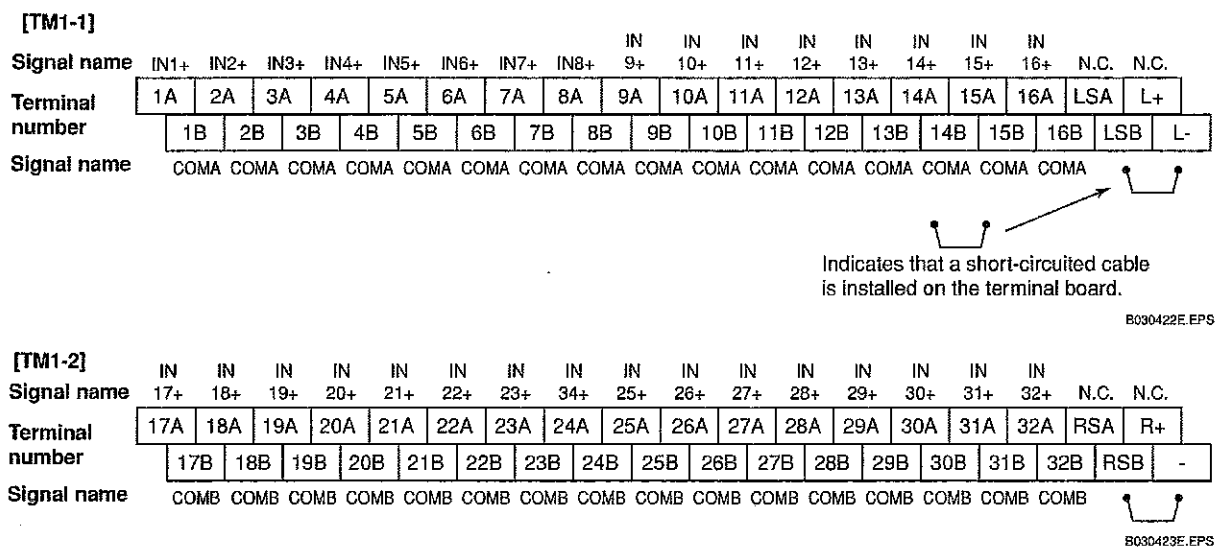


Figure ADV151 (Voltage Input) Signal Name and Terminal Number

● When Connecting ADV151 (Voltage-free Contact Input)

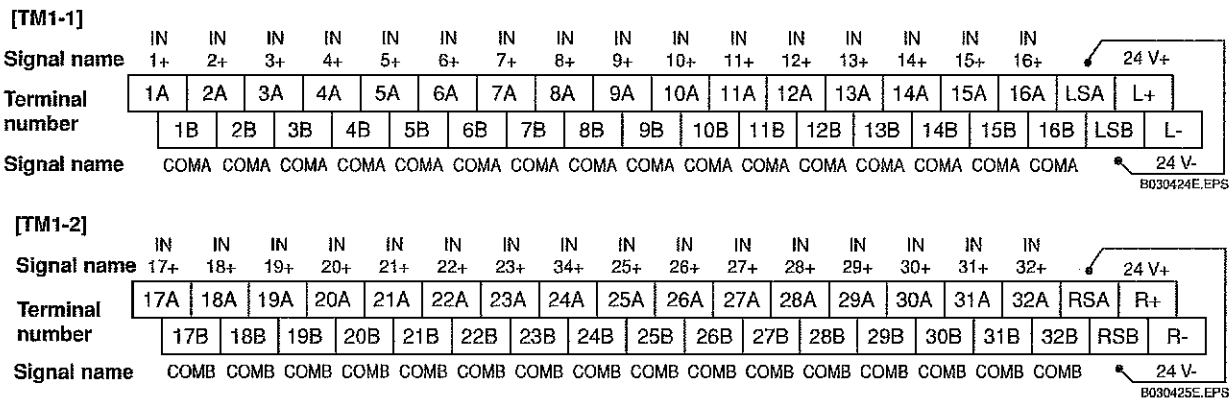
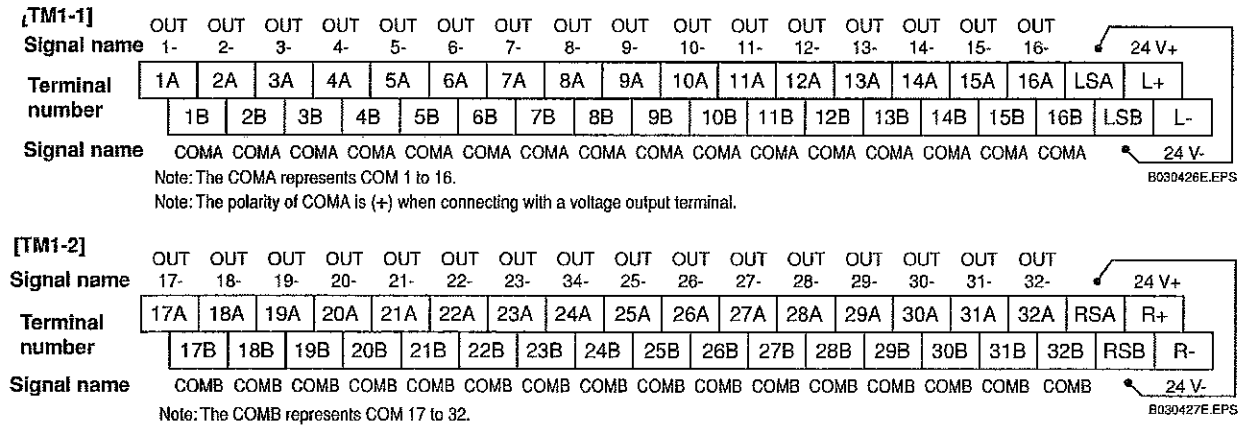


Figure ADV151 (Voltage-free Contact Input) Signal Name and Terminal Number

● When Connecting ADV551 (Voltage Output)

WARNING

When AED5D is used together with ADV551 or ADV561 in voltage mode, the terminals A and B of AED5D should be prevented from short-circuit including the short circuit caused by improper measuring methods. (For an example, use a multi-tester to check the resistance between the A and B terminals may cause short circuit between the two terminals.) The short circuit between the two terminals may damage the transistors in ADV551 or ADV561.



Note: The COMA represents COM 1 to 16.
Note: The polarity of COMA is (+) when connecting with a voltage output terminal.
Note: The COMB represents COM 17 to 32.
Note: The polarity of COMB is (+) when connecting with a voltage output terminal.

Figure ADV551 (Voltage Output) Signal Name and Terminal Number

● When Connecting ADV551 (Transistor Output)

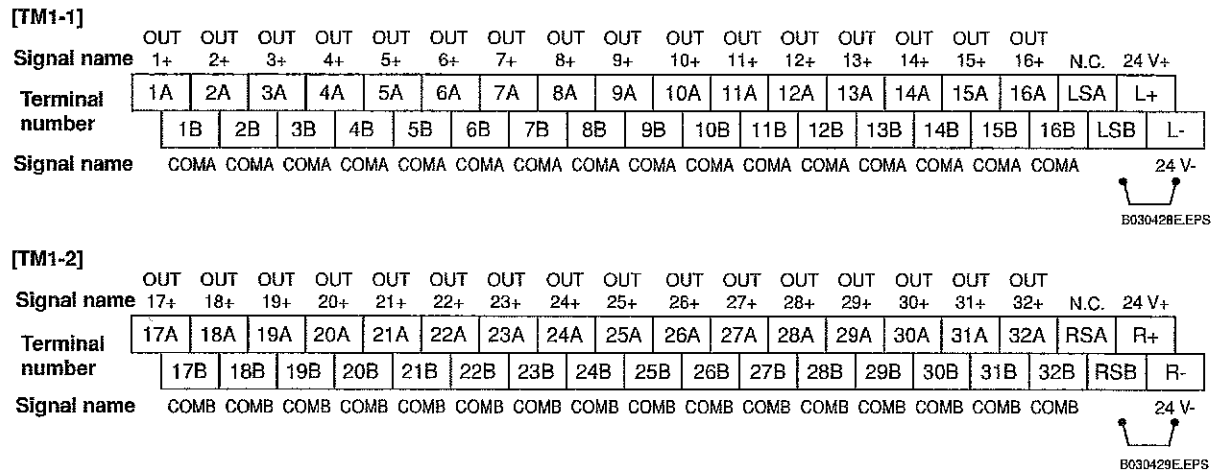
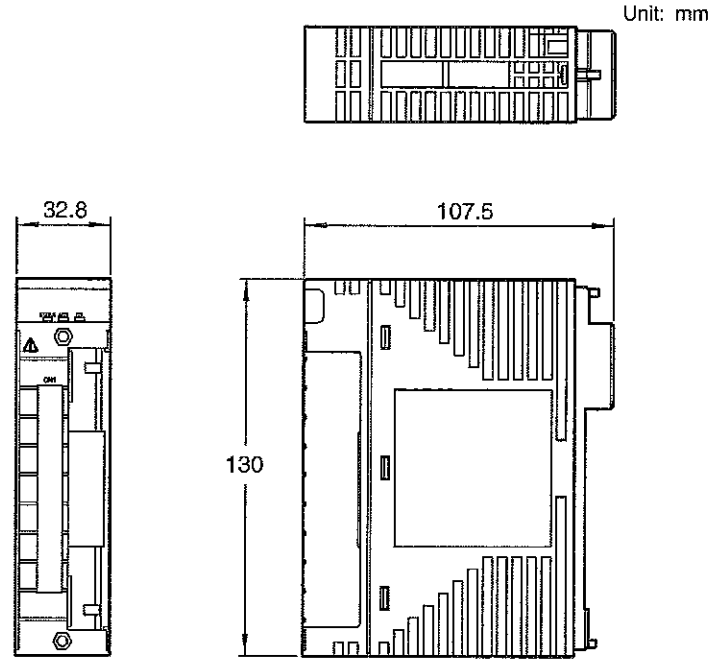


Figure ADV551 (Transistor Output) Signal Name and Terminal Number

■ EXTERNAL DIMENSIONS

● ADV151, ADV551 Digital I/O Module

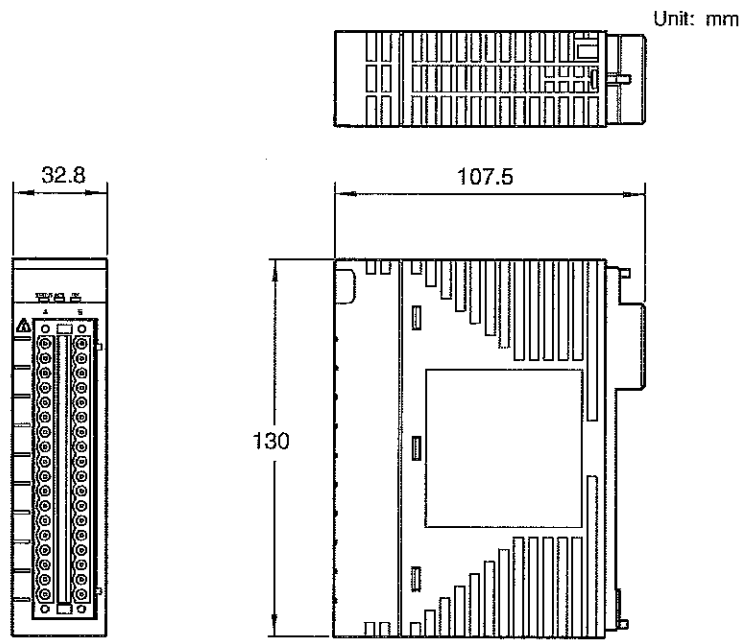
Unit: mm



F01E.EPS

● ADV141, ADV142, ADR541 Digital I/O Module

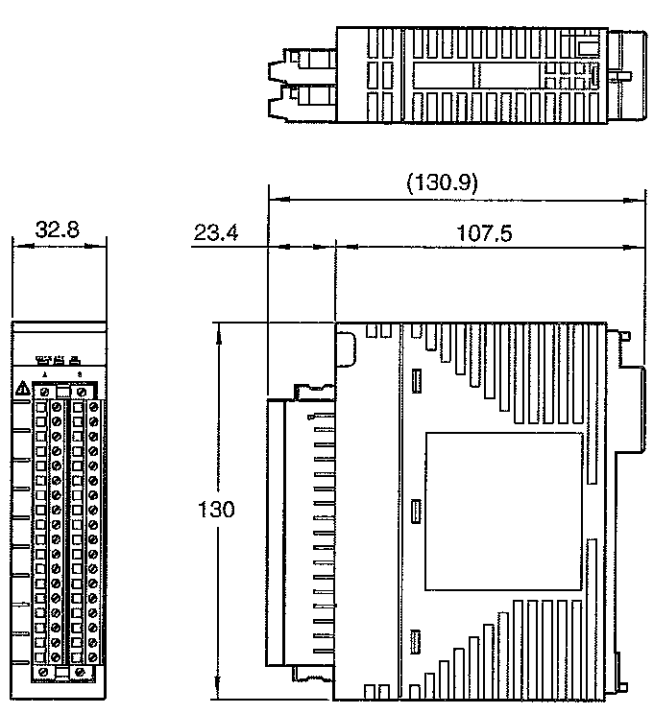
Unit: mm



F02E.EPS

● ADV157, ADV557 Digital I/O Module

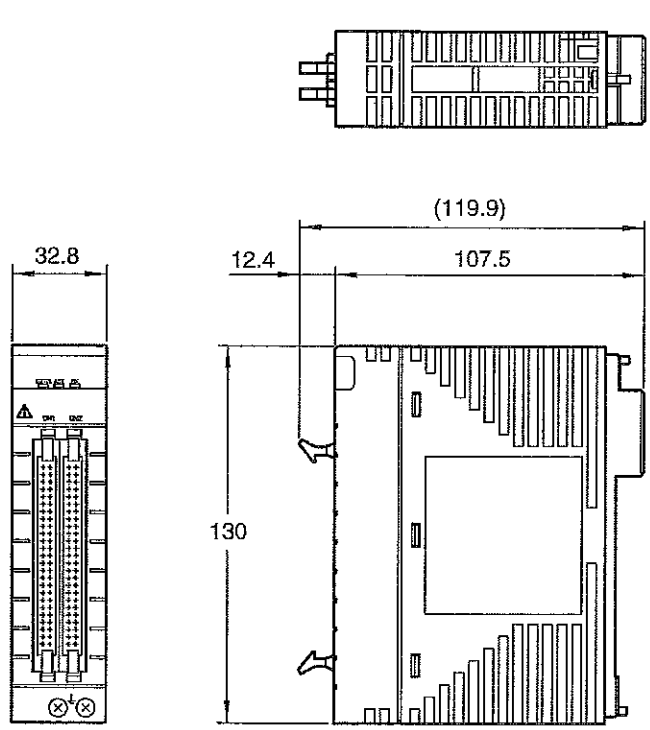
Unit: mm



F03E.EPS

● ADV161, ADV561 Digital I/O Module

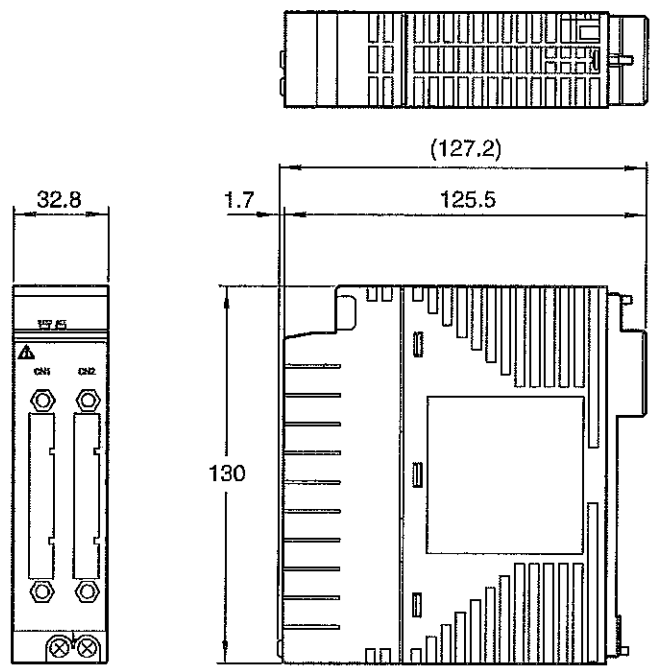
Unit: mm



F04E.EPS

● ADV859, ADV159, ADV559 Digital I/O Module for Compatible ST

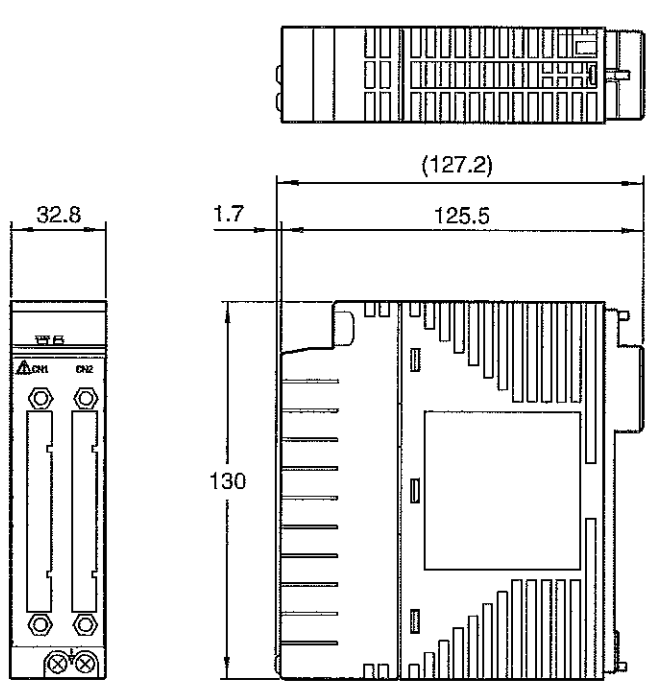
Unit: mm



F05E.EPS

● ADV869, ADV169, ADV569 Digital I/O Module for Compatible ST

Unit: mm



F06E.EPS

■ MODELS AND SUFFIX CODES

Digital Input Module

		Description
Model	ADV151	Digital Input Module (32-channel, 24 V DC, Isolated)
Suffix Codes	-P	With pulse count
	-E	With SOE capture (*1)
	0	General-purpose type
	1	With status display
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/D5A00	With KS Cable Interface Adapter for 32-channel digital [Model: ATD5A-00]
	/B5S00	With Pressure Clamp Terminal Block for Digital Input [Model: ATB5S-00]
	/B5S10	With Pressure Clamp Terminal Block for Digital Input (surge absorber) [Model: ATB5S-10]
	/B5D00	With Dual Pressure Clamp Terminal Block for Digital Input [Model: ATB5D-00]
	/B5D10	With Dual Pressure Clamp Terminal Block for Digital Input (surge absorber) [Model: ATB5D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T07E.EPS

*1: Please refer to GS 33P01B10-31E when using it with the Vnet/IP system, and GS 33Q02N80-31E when using it with the Vnet system.

		Description
Model	ADV141	Digital Input Module (16-channel, 100V - 120 V AC, Isolated)
Suffix Codes	-P	With pulse count
	0	General-purpose type
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 °C to 70 °C) option
Option Code	/C4S50	With Pressure Clamp Terminal Block for Digital [Model : ATC4S-50]

T08E.EPS

		Description
Model	ADV142	Digital Input Module (16-channel, 200 V - 240 V AC, Isolated)
Suffix Codes	-P	With pulse count
	0	General-purpose type
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 °C to 70 °C) option
Option Code	/C4S60	With Pressure Clamp Terminal Block for Digital [Model : ATC4S-60]

T09E.EPS

		Description
Model	ADV157	Digital Input Module (32-channel, 24V DC, Pressure Clamp Terminal support only, Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T10E.EPS

		Description
Model	ADV161	Digital Input Module (64-channel, 24V DC, Isolated)
Suffix Codes	-P	With pulse count
	0	Standard type
	0	Basic type
	1	With ISA Standard G3 option

T11E.EPS

Digital Output Module

		Description
Model	ADV551	Digital Output Module (32-channel, 24 V DC, Isolated)
Suffix Codes	-P	With pulse width output function/time-proportional output function
	0	General-purpose type
	1	With status display
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/D5A00	With KS Cable Interface Adapter for 32-channel Digital [Model : ATD5A-00]
	/D5S00	With Pressure Clamp Terminal Block for Digital Output [Model : ATD5S-00]
	/D5S10	With Pressure Clamp Terminal Block for Digital Output (surge absorber) [Model : ATD5S-10]
	/D5D00	With Dual Pressure Clamp Terminal Block for Digital Output [Model : ATD5D-00]
	/D5D10	With Dual Pressure Clamp Terminal Block for Digital Output (surge absorber) [Model : ATD5D-10]
	/CCC01	With Connector Cover for MIL Cable [Model : ACCC01]

T12E.EPS

		Description
Model	ADR541	Relay Output Module (16-channel, 24 to 110 V DC/100 to 240 V AC, Isolated)
Suffix Codes	-P	With pulse width output function/time-proportional output function
	0	Standard type
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 °C to 70 °C) option
Option Code	/C4S70	With Pressure Clamp Terminal Block for Digital Input [Model : ATC4S-70]

T13E.EPS

		Description
Model	ADV557	Digital Output Module (32-channel, 24V DC, Pressure Clamp Terminal support only, Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T14E.EPS

		Description
Model	ADV561	Digital Output Module (64-channel, 24V DC, Isolated)
Suffix Codes	-P	With pulse width output function/time-proportional output function
	0	Standard type
	0	Basic type
	1	With ISA Standard G3 option

T15E.EPS

Digital I/O Module

		Description
Model	ADV859	Digital I/O Module for Compatible ST2 (16-channel input/16-channel output, Isolated channels)
Suffix Codes	-P	With pulse count function (DI) and pulse width function/time-proportional output function (DO)
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T16E.EPS

		Description
Model	ADV159	Digital Input Module for Compatible ST3 (32-channel, Isolated channels)
Suffix Codes	-P	With pulse count function
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T17E.EPS

		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
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T18E.EPS

		Description
Model	ADV869	Digital I/O Module for Compatible ST5 (32-channel input/32-channel output, Isolated, Common Minus Side Every 16-channel)
Suffix Codes	-P	With pulse count function (DI) and pulse width function/time-proportional output function
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T19E.EPS

		Description
Model	ADV169	Digital Input Module for Compatible ST6 (64-channel, Isolated, Common Minus Side Every 16-channel)
Suffix Codes	-P	With pulse count function
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T20E.EPS

		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
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T21E.EPS

■ ORDERING INSTRUCTIONS

Specify the model and suffix codes.

■ TRADEMARK

- CENTUM is a registered trademark of Yokogawa Electric Corporation.
- Other company and product names appearing in this document are trademarks or registered trademarks of their respective holders.

B3.3.1 Analog Input Module, 16-Channel (AAI141, AAI143, AAV141, AAV142, AAV144)

● AAI141, AAI143 (4 to 20mA Input)

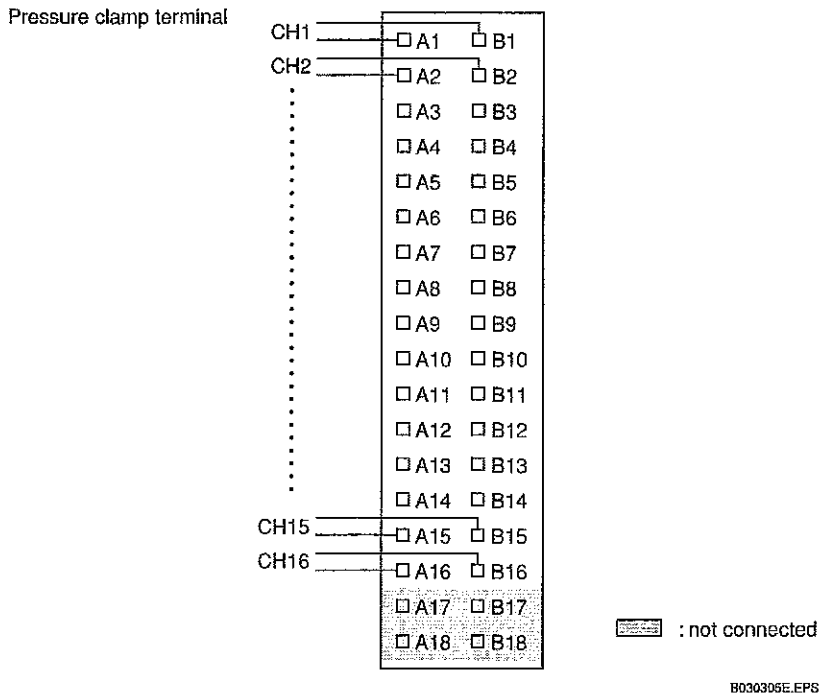


Figure AAI141, AAI143 External Connection

Table AAI141, AAI143 Pin Assign

CH No.	Pressure clamp terminal			
	Pin No.	Signal	Pin No.	Signal
CH1	A1	IN1A	B1	IN1B
CH2	A2	IN2A	B2	IN2B
CH3	A3	IN3A	B3	IN3B
CH4	A4	IN4A	B4	IN4B
CH5	A5	IN5A	B5	IN5B
CH6	A6	IN6A	B6	IN6B
CH7	A7	IN7A	B7	IN7B
CH8	A8	IN8A	B8	IN8B
CH9	A9	IN9A	B9	IN9B
CH10	A10	IN10A	B10	IN10B
CH11	A11	IN11A	B11	IN11B
CH12	A12	IN12A	B12	IN12B
CH13	A13	IN13A	B13	IN13B
CH14	A14	IN14A	B14	IN14B
CH15	A15	IN15A	B15	IN15B
CH16	A16	IN16A	B16	IN16B
-	A17	-	B17	-
-	A18	-	B18	-

B030306E.EPS

*1: Short circuit CBSE externally for MIL connectors in order to detect unconnected external cables.

General Specifications

Digital I/O Modules (for FIO)

CENTUM CS 3000 R3

GS 33Q06Q45-31E

■ GENERAL

*This GS covers the hardware specifications of the Digital I/O Modules (FIO) that can be installed in the Node Unit for ESB Bus (ANB10S, ANB10D), the Node Unit for ER Bus (ANR10S, ANR10D) and the Compact Field Control Unit (for FIO) (AFF50S, AFF50D, AFV10S, AFV10D) (*1).*

*1: AFF50S and AFF50D are supported by R3.04 or later, and AFV10S and AFV10D are supported by R3.05 or later.

■ STANDARD SPECIFICATIONS

● Digital Input Modules

The Digital Input Modules receive 32-channel or 64-channel 24 V DC ON/OFF signals.

The ADV151 and ADV161 can be used in dual redundant configuration.

Item	Specifications		
Model	**ADV151**	**ADV157**	**ADV161**
Number of input channels	32	32	64
Rated input voltage	24 V DC (sink/source)	24 V DC (sink/source)	24 V DC (sink/source)
Input ON voltage	18 to 26.4 V	18 to 26.4 V	20 to 26.4 V
Input OFF voltage	5.0 V or less	5.0 V or less	5.0 V or less
Input current (at rated input voltage)	4.1 mA±20 % / channel	4.1 mA±20 % / channel	2.5 mA±20 % / channel
Maximum allowable input voltage	30.0 V DC	30.0 V DC	30.0 V DC
Withstanding voltage	Between input signal and system: 2 kV AC, For 1 minute Between commons: 500 V AC, For 1 minute, common every 16-channel (*1)		
Functions **Status input** **Pushbutton input**	Function for detecting ON/OFF status Function for counting the pushbutton edges	Function for detecting ON/OFF status —	Function for detecting ON/OFF status Function for counting the pushbutton edges
Input response time	8 ms or less (for status input)		
Minimum ON detection time	20 ms (for pushbutton input)		
Maximum ON/OFF cycle	2.5 Hz (for pushbutton input)		
Maximum current consumption	500 mA (5 V DC)	350 mA (5 V DC)	550 mA (5 V DC)
Weight	0.3 kg	0.4 kg	0.3 kg
External connection	Pressure clamp terminal, Dedicated cable (AKB331), MIL connector cable	Pressure clamp terminal	Dedicated cable (AKB337), MIL connector cable

T01E.EPS

*1: The withstanding voltage for using a dedicated cable is 500 V AC (between input signal and system).
The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

YOKOGAWA

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GS 33Q06Q45-31E

8th Edition Sep.13,2004

General Specifications

Analog I/O Modules (for FIO)

CENTUM CS 3000 R3

GS 33Q06Q40-31E

■ GENERAL

This GS covers the hardware specifications of the Analog I/O Modules (FIO) that can be installed in the Node Unit for ESB Bus (ANB10S, ANB10D), the Node Unit for ER Bus (ANR10S, ANR10D) and Compact Field Control Unit (for FIO) (AFF50S, AFF50D, AFV10S, AFV10D).

■ STANDARD SPECIFICATIONS

● **Current/Voltage Input Modules (Non-isolated)**

These modules mainly receive 4 to 20 mA DC or 1 to 5 V DC standardized signal from 2-wire/4-wire transmitters. They can be used in dual redundant configuration.

Items		Specifications		
Model		AAI141 (*1)	AAV141	AAV142
Number of input channels		16, non-isolated	16, non-isolated (differential input)	16, non-isolated
Input signal		4 to 20 mA DC	1 to 5 V DC (allowable common mode voltage ± 1 V or less)	-10 to 10 V DC
Allowable input current/voltage		27 mA	±7.5 V	±13 V
Withstanding voltage		—	—	—
Input resistance	Power ON	400 Ω (at 20 mA) to 1000 Ω (at 4 mA) (*2)	1 MΩ or more	1 MΩ or more
	Power OFF	500 kΩ or more	340 kΩ or more	660 kΩ or more
Accuracy		±16 μA	±4 mV	±20 mV
Data update period		10 ms		
Step response time		100 ms		
Transmitter power supply		14.8 V or more (at 20 mA) (*3) 26.4 V or less (at 0 mA) (output current limit: 27 mA)	—	—
Setting of 2-wire or 4-wire transmitter		For each channel by setting pin	—	—
Drift due to ambient temperature change		±16 μA/10 °C	±4 mV/10 °C	±20 mV/10 °C
Maximum current consumption		310 mA (5 V DC), 450 mA (24 V DC)	350 mA (5 V DC)	350 mA (5 V DC)
Weight		0.2 kg	0.2 kg	0.2 kg
External connection		Pressure clamp terminal, KS cable, MIL connector cable		
HART communication (*4)		Available	—	—

T01E.EPS

*1: This module does not allow a Zener barrier to be connected. If the module is to be used in intrinsically safe applications, use an isolation barrier.

*2: Viewed from the terminals, module input resistance is, depending on the current flowing:

$$250\ \Omega + \frac{\text{voltage drop (3 V maximum) in the input protection circuit}}{\text{current value}}$$

F07E.EPS

*3: When calculating if transmitter minimum operating voltage requirement will be satisfied, remember to allow for voltage drop in external wiring.

*4: R3.02 or later version supports HART function. When installing the module with HART function to a remote node, the firmware of EB401 must be Rev 2 or later.
For HART function specifications, refer to GS 33Q03L70-31E HART Communication Package (for A□I□□□-H).

YOKOGAWA

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GS 33Q06Q40-31E

13th Edition Dec.1,2004

● **Current Input Modules (Isolated)**

This module inputs 4 to 20 mA.

It can be used in dual redundant configuration.

Items		Specifications
Model		**AAI143 (*1)**
Number of input channels		16, isolated
Input signal		4 to 20 mA
Allowable input current		24 mA
Withstanding voltage		Between input and system: 1500 V AC, For 1 minute (*4)
Input resistance	Power ON	270 Ω (20 mA) to 350 Ω (4 mA) (*2)
	Power OFF	500 kΩ or more
Accuracy		±16 μA
Data update period		10 ms
Transmitter power supply		24.0 to 25.5 V (output current limit: 25 mA)
Setting of 2-wire or 4-wire transmitter		For each channel by setting pin
Drift due to ambient temperature change		±16 μA/10°C
Maximum current consumption		230 mA (5 V DC), 540 mA (24 V DC)
Weight		0.3 kg
External communication		Pressure clamp terminal, MIL connector cable, Dedicated cable (KS1)
HART communication (*3)		Available

T27E.EPS

*1: This module does not allow a Zener barrier to be connected. If the module is to be used in intrinsically safe applications, use an isolation barrier.

*2: Viewed from the terminals, module input resistance is, depending on the current flowing:

$$250\ \Omega + \frac{\text{voltage drop (0.4 V maximum) in the input protection circuit}}{\text{current value}}$$

F09E.EPS

*3: When installing the module with HART function to a remote node, the firmware of EB401 must be Rev 2 or later. For HART function specifications, refer to GS 33Q03L70-31E HART Communication Package (for A□I□□□-H).

*4: The withstanding voltage for using the dedicated cable is 500 V AC (between the input signal and the system). The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

● **Current Output Modules (Isolated)**

This module outputs 4 to 20 mA.

It can be used in dual redundant configuration.

Items	Specifications
Model	**AAI543**
Number of output channels	16, isolated
Output signal	4 to 20 mA
Withstanding voltage	Between output and system: 1500 V AC, For 1 minute (*2)
Allowable load resistance	0 to 750Ω
Circuit-open detection	Less than 0.65 mA
Accuracy	±48 μA
Data update period	10 ms
Drift due to ambient temperature change	±16 μA/10°C
Maximum current consumption	230 mA (5 V DC), 540 mA (24 V DC)
Weight	0.4 kg
External communication	Pressure clamp terminal, MIL connector cable, Dedicated cable (KS1)
HART communication (*1)	Available

T28E.EPS

*1: When installing the module with HART function to a remote node, the firmware of EB401 must be Rev 2 or later. For HART function specifications, refer to GS 33Q03L70-31E HART Communication Package (for A□I□□□-H).

*2: The withstanding voltage for using the dedicated cable is 500 V AC (between the input signal and the system). The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

● TC Input/RTD Input Modules (Isolated)

These modules receive signals from mV, thermocouple (TC) and RTD.

They can be used in dual redundant configuration.

Items		Specifications	
Model		AAT141	AAR181
Number of input channels		16, isolated	12, isolated
Input signal		TC: JIS C1602:1995, IEC584:1995 Type J, K, E, B(*1), R, S, T, N mV: -100 to 150 mV, -20 to 80 mV	RTD: JIS C1604:1997, IEC751:1995 Pt100 (3-wire type)(*6)
Switching input signals		TC/mV can be set individually for CH1 to CH16.	CH1 to CH12 are RTD inputs.
Allowable input voltage		±5 V	±5 V
Withstanding voltage		Between input and system: 1500 V AC, For 1 minute	
Input resistance	Power ON	2 MΩ or more	
	Power OFF	2 MΩ or more	
Accuracy		TC: ±30 μV MV: ±80 μV for span (-100 to 150 mV) ±30 μV for span (-20 to 80 mV)	RTD: ±120 mΩ
Allowable total resistance of signal source plus wiring		1000 Ω or less	40 Ω or less (wiring resistance per wire)(*2)
Effect of allowable signal source resistance (1000 Ω)		±20 μV(*3)	—
Reference junction compensation accuracy		Within ±1°C (*4, *5)	—
Measurement current		—	RTD: 1 mA
Temperature drift		±80 μV/10 °C (-100 to 150 mV input) ±30 μV/10 °C (TC/-20 to 80 mV input)	±120 mΩ/10 °C (RTD input)
Data update period		1sec	
Burn-out		All channels can be set together. Setting: Not available/available (UP/DOWN) detection time: 60 seconds	
Maximum current consumption		450 mA (5 V DC)	450 mA (5 V DC)
Weight		0.2 kg	
External connection		Pressure clamp terminal	

T04E.EPS

*1: Type B dose not carry out temperature compensation and can not measure under 44°C

*2: Each wiring resistance should be equal.

*3: In dual redundant configuration, this effect is ±40μ V.

*4: This accuracy changes due to the installation condition.
If measured temperature is lower than 0°C, multiply the above value by the following coefficient (K):

$$K = \frac{\text{Thermoelectromotive force per degree at 0 °C}}{\text{Thermoelectromotive force per degree at measured temperature}}$$ F04E.EPS

*5: Reference junction compensation accuracy varies depending on the temperature environment of pressure clamp terminal.

Specifications for Node only

Temperature Environment	Reference Junction Compensation accuracy
-20 to 15 °C	± 2 °C
15 to 45 °C	± 1 °C
45 to 70 °C	± 2 °C

T21E.EPS

Specifications for installing in a standard cabinet

Temperature Environment	Reference Junction Compensation accuracy
0 to 50 °C	± 2 °C

T22E.EPS

*6: AAR181 also supports JPt100.

● Current Input Module and Current I/O Module (Isolated Channels)

The Current Input Module receives signals of 4 to 20 mA. The Current I/O Module receives and outputs signals of 4 to 20 mA. These two modules are isolated between the field and the system as well as between each channel.

These two modules can be used in dual redundant configuration.

Items		Specifications		
Model		AAI135 (*1)	AAI835 (*1)	
Number of I/O channels		8-channel input, isolated channels	4-channel input/4-channel output, isolated channels	
I/O signal		4 to 20 mA	Input: 4 to 20 mA	Output: 4 to 20 mA
Allowable input current		25 mA	25 mA	—
Withstanding voltage		Between input and system: 500 V AC, For 1 minute Between input channels: 500 V AC, For 1 minute (*2)	Between input/output and system: 500 V AC, For 1 minute Between input channels: 500 V AC, For 1 minute (*2)	
Input resistance	Power ON	260 Ω (at 20 mA) to 300 Ω (at 4 mA) (*3)		
	Power OFF	500 kΩ or more		
Allowable load resistance		—	—	0 to 750 Ω (*4)
Circuit-open detection		—	—	Less than 0.65mA
Accuracy		±16 μA	Input: ±16 μA	Output: ±48 μA
Data update period		10 ms		
Transmitter power supply		20.0 V or more (at 20 mA) 29.3 V or less (at 0 mA) (*5)	20.0 V or more (at 20 mA) 29.3 V or less (at 0 mA) (*5)	—
Temperature drift		±16 μA/10 °C		
Maximum current consumption		360 mA (5 V DC), 450 mA (24 V DC)	360 mA (5 V DC), 450 mA (24 V DC)	
Weight		0.3 kg		
External connection		Pressure clamp terminal, MIL connector cable, Dedicated cable (KS1)		
HART communication (*6)		Available	Available	

T05E.EPS

*1: This module does not allow a Zener barrier to be connected. If the module is to be used in intrinsically safe applications, use an isolation barrier.

*2: The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

*3: Viewed from the terminals, module input resistance is, depending on the current flowing:

$$250\ \Omega + \frac{\text{voltage drop (0.2 V maximum) in the input protection circuit}}{\text{current value}}$$

F08E.EPS

*4: When installing to a remote node that conforms to the temperature environment and using it under the temperature environment (60 to 70 °C), the allowable load resistance is 200 to 750 Ω.

*5: When calculating if transmitter minimum operating voltage requirement will be satisfied, remember to allow for voltage drop in external wiring.

*6: R3.02 or later version supports HART function. When installing the HART compliant module to a remote node, the firmware of EB401 must be Rev 2 or later.
For HART function specifications, refer to GS 33Q03L70-31E HART Communication Package (for A□I□□□□-H).

● TC Input/RTD Input Module (Isolated Channels)

These modules receive signals from mV, thermocouple (TC), RTD, and potentiometer (POT). These are isolated between the field and the system as well as between each channel.

They can be used in dual redundant configuration.

These two modules can be used in dual redundant configuration.

Items		Specifications	
Model		AAT145	AAR145
Number of input channels		16, isolated channels	16, isolated channels
Input signal		TC: JIS C1602:1995 (*1), IEC584:1995 Type J, K, E, B (*2), R, S, T, N mV: -100 to 150 mV, -20 to 80 mV	RTD: JIS C1604:1997 (*3), IEC751:1995 Pt100 (3-wire type) POT: Total resistance 100Ω to 10 kΩ Span resistance: 50% or more of total resistance
Switching input signals		TC/mV can be set individually for CH1 to CH16.	RTD/POT can be selected individually for CH1 to CH16.
Allowable input voltage		±5 V	±5 V
Withstanding voltage		Between input and system: 500 V AC (for single card: 1500 V AC), For 1 minute Between input channels: 200 V AC, For 1 minute	
Input resistance	Power ON	1 MΩ or more	
	Power OFF	1 MΩ or more	
Accuracy		±40 μV	RTD: ±150 mΩ POT: ±0.2 %/FS
Allowable total resistance of signal source plus wiring		1000 Ω or less	150 Ω or less (wiring resistance per wire)(*4)
Effect of allowable signal source resistance (1000 Ω)		±20 μV	—
Reference junction compensation accuracy		±1 °C (*5, 6)	—
Measurement current		—	RTD: 1 mA
Data update period		1 s	
Burn-out		All channels can be set together. Setting: not available/available (UP/DOWN) detection time: 60 seconds	
Temperature drift		±80 μV/10 °C	RTD: ±0.3 Ω/10 °C POT: ±0.4 %/10 °C
Maximum current consumption		350 mA (5 V DC)	350 mA (5 V DC)
Weight		0.3 kg	
External connection		Dedicated cable (KS1)	Dedicated cable (KS8/AKB335)

T06E.EPS

*1: Model AAT145 is also in compliance with JIS C1602:1981.
*2: Type B dose not carry out temperature compensation and can not measure under 44°C.
*3: Model AAR145 is also in compliance with JIS C1604:1989 (Pt100, JPt100).
*4: Each wiring resistance should be equal.
*5: This accuracy changes due to the installation condition.
If measured temperature is lower than 0°C, multiply the above value by the following coefficient (K):

$$K = \frac{\text{Thermoelectromotive force per degree at 0°C}}{\text{Thermoelectromotive force per degree at measured temperature}}$$

F05E.EPS

*6: Reference junction compensation accuracy varies depending on the temperature environment of terminal board (AET4D).

Specifications for Terminal board only

Temperature Environment	Reference Junction Compensation accuracy
-20 to 0 °C	± 1.5 °C
0 to 30 °C	± 1.0 °C
30 to 70 °C	± 1.5 °C

T23E.EPS

Specifications for installing in a standard cabinet

Temperature Environment	Reference Junction Compensation accuracy
0 to 30 °C	± 1.0 °C
30 to 50 °C	± 1.5 °C

T24E.EPS

● Pulse Input Module (Isolated Channels)

This module receives contact ON/OFF, voltage pulse and current pulse. This is isolated between the field and the system as well as between each channel.

It can be used in dual redundant configuration.

Items	Specifications
Model	**AAP135**
Number of input channels	8, isolated channels
Input signal (*3)	2-wire type: Contact ON/OFF, voltage pulse, current pulse (possible to supply transmitter power supply) 3-wire type: Power-supply-type voltage pulse
Input frequency	0 to 10 kHz (except contact input), 0 to 800 Hz (contact input)
Withstanding voltage	Between input and system: 500 V AC, For 1 minute Between channels: 500 V AC, For 1 minute (*1)
Minimum input pulse width	40 μs
Input signal level	Contact input Open/close levels of relay contact and transistor contact Open: 100 kΩ or more, Close: 200 Ω or less Contact capacity When supplying 12 V DC: 15 V DC 15 mA or more When supplying 24 V DC: 30 V DC 30 mA or more 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 value): 3 V or more Signal source resistance: 1 kΩ or less
Shunt resistance	Can be selected from none/200/500/1000 Ω. (Open when power is OFF and for the standby side in a dual-redundant configuration)
Pull-up resistance	68 kΩ (12 V DC or 24 V DC)
Filter	Filter for eliminating chattering can be set. (*2)
Data update period	2 ms
Transmitter power supply	Can select 24 V DC/12 V DC. Limiter value 12 V DC ±10 %: 40 mA, 24 V DC ±10 %: 30 mA
Maximum current consumption	300 mA (5 V DC), 400 mA (24 V DC)
Weight	0.3 kg
External connection	Pressure clamp terminal, KS cable, MIL connector cable

T07E.EPS

*1: The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

*2: When the pulse input signal is dry contact (such as from a mechanical relay) up to 10 Hz, it is possible to eliminate the chattering.

*3: The connection method of the field devices varies depending on the input signal.
For details, please refer to TI 33Q01J10-01E.

● Pulse Input Module for compatible PM1

This module receives 16-channel pulse train signals from pulse train input signal conditioner cards, and counts the pulses.

Items	Specifications
Model	**AAP149**
Number of input channels	16, non-isolated
Input signal	Transistor contact (open collector)
Input frequency	0 to 6 kHz
Withstanding voltage	–
Pulse detection edge	Trailing edge
Data update period	2 ms
Maximum current consumption	400 mA (5 V DC)
Weight	0.3 kg
External connection	Dedicated cable (KS2)

T25E.EPS

● Pulse Input Module / Analog Output Module for Compatible PAC

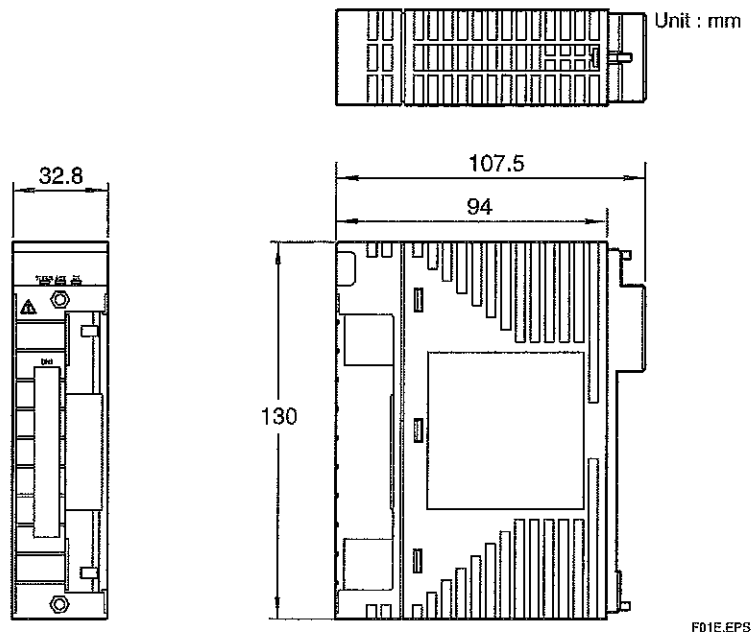
This module receives 8-channel pulse train signals, and outputs 4 to 20mA. It can be used in dual redundant configuration.

Items	Specifications	
Model	**AAP849**	
Number of I/O channels	8-channel input /8-channel output, not-isolated	
I/O signal	Input: transistor contact (Open collector)	Output: 4 to 20mA
Input frequency	0 to 12 kHz	–
Pulse detection edge	Trailing edge	–
Allowable load resistance	–	0 to 750 Ω
Circuit-open detection	–	Less than 0.65 mA
Accuracy	–	±48 μA
Data update period	1 ms	10 ms
Output step response time	–	40 mA
Temperature drift	–	±16 μA/10 °C
Maximum current consumption	310 mA (5V DC), 250 mA (24V DC)	–
Weight	0.3 kg	
External connection	Dedicated cable (KS1)	

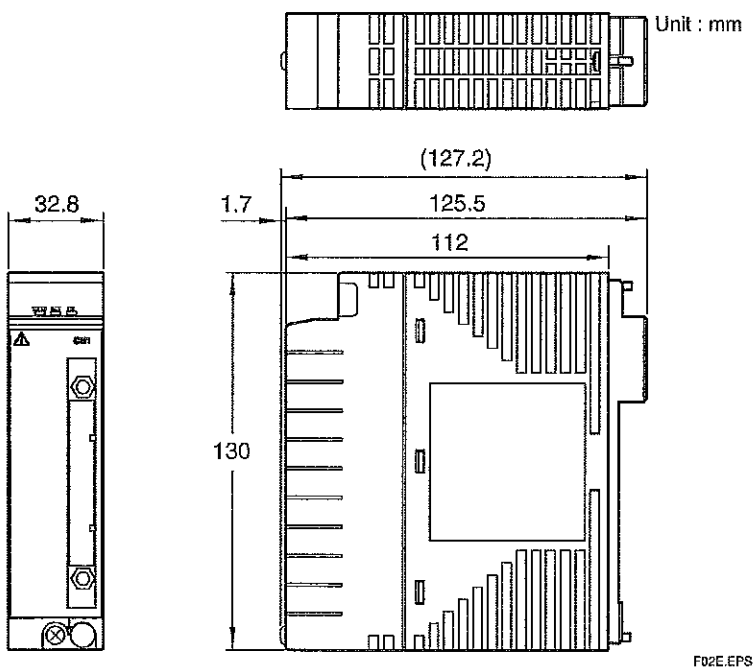
T35E.EPS

EXTERNAL DIMENSIONS

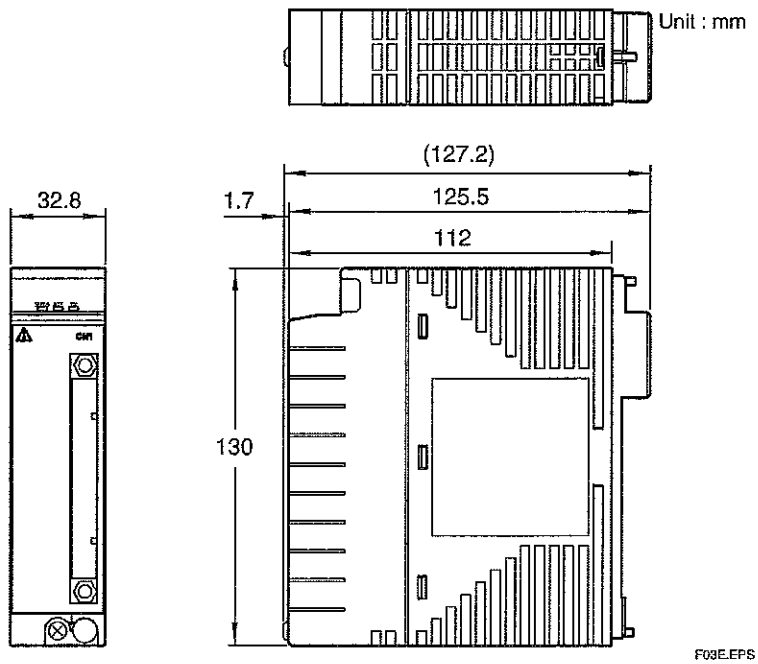
- **AAI141, AAV141, AAV142, AAV144, AAI841, AAB841, AAV542, AAV544, AAI143, AAI543, AAT141, AAR181, AAI135, AAI835, AAP135 Analog I/O Modules (for FIO)**



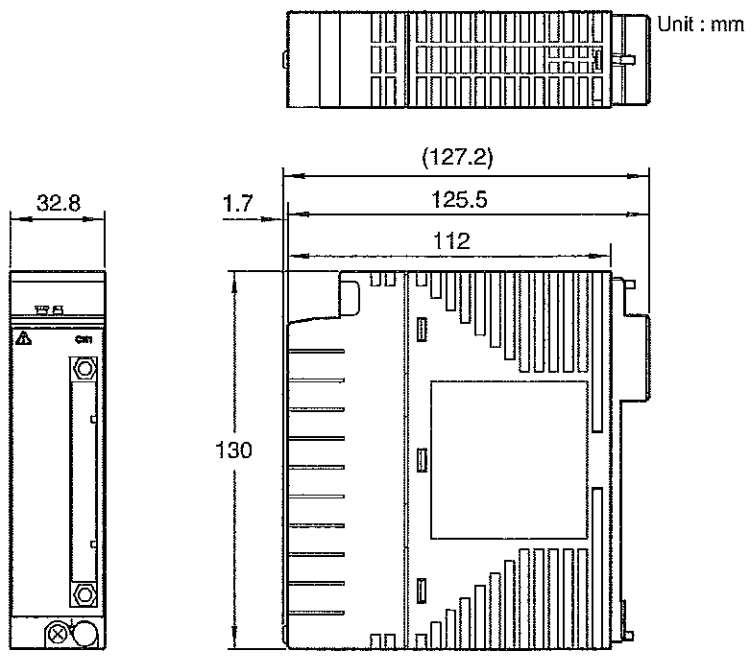
- **AAT145 Analog Input Module**



● **AAR145 Analog Input Module**



● **AAP149 Analog Input Module**



■ MODELS AND SUFFIX CODES

		Description
Model	AAI135	Analog Input Module (4 to 20mA, 8-channel, Isolated channels)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/13A00	With KS Cable Interface Adapter [Model: ATI3A-00]
	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/13S00	With Pressure Clamp Terminal Block for Isolated Analog [Model: ATI3S-00]
	/13S10	With Pressure Clamp Terminal Block for Isolated Analog (surge absorber) [Model: ATI3S-10]
	/13D00	With Dual Pressure Clamp Terminal Block for Isolated Analog [Model: ATI3D-00]
	/13D10	With Dual Pressure Clamp Terminal Block for Isolated Analog (surge absorber) [Model: ATI3D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T08E.EPS

		Description
Model	AAI835	Analog I/O Module (4 to 20mA, 4-channel input/4-channel output, Isolated channels)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/B3A00	With KS Cable Interface Adapter [Model: ATB3A-00]
	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/13S00	With Pressure Clamp Terminal Block for Isolated Analog [Model: ATI3S-00]
	/13S10	With Pressure Clamp Terminal Block for Isolated Analog (surge absorber) [Model: ATI3S-10]
	/13D00	With Dual Pressure Clamp Terminal Block for Isolated Analog [Model: ATI3D-00]
	/13D10	With Dual Pressure Clamp Terminal Block for Isolated Analog (surge absorber) [Model: ATI3D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T09E.EPS

		Description
Model	AAT145	TC/mV Input Module (16-channel, Isolated channels)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option

T10E.EPS

		Description
Model	AAR145	RTD/POT Input Module (16-channel, Isolated channels)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option

T11E.EPS

		Description
Model	AAP135	Pulse Input Module (8-channel, Pulse count, 0 to 10kHz, Isolated channels)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/13A00	With KS Cable Interface Adapter [Model: ATI3A-00]
	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/13S00	With Pressure Clamp Terminal Block for Pulse [Model: ATI3S-00]
	/13S10	With Pressure Clamp Terminal Block for Pulse (surge absorber) [Model: ATI3S-10]
	/13D00	With Dual Pressure Clamp Terminal Block for Pulse [Model: ATI3D-00]
	/13D10	With Dual Pressure Clamp Terminal Block for Pulse (surge absorber) [Model: ATI3D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T12E.EPS

		Description
Model	AAI143	Analog Input Module (4 to 20 mA, 16-channel, Isolated)
Suffix Codes	-S	Standard type
	-H	With HART Communication
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter (For connecting AEA4D Terminal Board) [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T29E.EPS

		Description
Model	AAI543	Analog Output Module (4 to 20 mA, 16-channel, Isolated)
Suffix Codes	-S	Standard type
	-H	With HART Communication
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter (For connecting AEA4D Terminal Board) [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T30E.EPS

		Description
Model	AAV144	Analog Input Module (-10 to +10V, 16-channel, Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T33E.EPS

		Description
Model	AAV544	Analog Output Module (-10 to +10V, 16-channel, Isolated)
Suffix Codes	-S	Standard Type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model : ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model : ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model : ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model : ACCC01]

T34E.EPS

		Description
Model	AAT141	TC/mV Input Module (16-channel, Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/T4S00	With Pressure Clamp Terminal Block for Thermocouple/mV [Model: ATT4S-00]
	/T4S10	With Pressure Clamp Terminal Block for Thermocouple/mV (surge absorber) [Model: ATT4S-10]
	/T4D00	With Dual Pressure Clamp Terminal Block for Thermocouple/mV [Model: ATT4D-00]
	/T4D10	With Dual Pressure Clamp Terminal Block for Thermocouple/mV (surge absorber) [Model: ATT4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T19E.EPS

		Description
Model	AAR181	RTD Input Module (12-channel, Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/R8S00	With Pressure Clamp Terminal Block for RTD [Model: ATR8S-00]
	/R8S10	With Pressure Clamp Terminal Block for RTD (surge absorber) [Model: ATR8S-10]
	/R8D00	With Dual Pressure Clamp Terminal Block for RTD [Model: ATR8D-00]
	/R8D10	With Dual Pressure Clamp Terminal Block for RTD (surge absorber) [Model: ATR8D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T20E.EPS

		Description
Model	AAI141	Analog Input Module (4 to 20mA, 16-channel, Non-Isolated)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T13E.EPS

		Description
Model	AAV141	Analog Input Module (1 to 5V, 16-channel, Non-Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T14E.EPS

		Description
Model	AAV142	Analog Input Module (-10 to +10V, 16-channel, Non-Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model: ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model: ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model: ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model: ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T15E.EPS

		Description
Model	AAV542	Analog Output Module (-10 to +10V, 16-channel, Non-Isolated)
Suffix Codes	-S	Standard Type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model : ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model : ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model : ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model : ACCC01]

T16E.EPS

		Description
Model	AAI841	Analog I/O Module (4 to 20mA input , 4 to 20mA output, 8-channel input/8-channel output, Non-Isolated)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model : ATK4A-00]
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model : ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model : ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber1) [Model : ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model : ACCC01]

T17E.EPS

		Description
Model	AAB841	Analog I/O Module (1 to 5V input, 4 to 20mA output, 8-channel input/8-channel output, Non-Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/K4A00	With KS Cable Interface Adapter [Model : ATK4A-00]
	/M4A00	With MAC2 Compatible Adapter [Model : ATM4A-00]
	/V4A00	With VM2 Compatible Adapter [Model : ATV4A-00] (*1)
	/A4S00	With Pressure Clamp Terminal Block for Analog [Model : ATA4S-00]
	/A4S10	With Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4S-10]
	/A4D00	With Dual Pressure Clamp Terminal Block for Analog [Model : ATA4D-00]
	/A4D10	With Dual Pressure Clamp Terminal Block for Analog (surge absorber) [Model : ATA4D-10]
	/CCC01	With Connector Cover for MIL Cable [Model : ACCC01]

T18E.EPS

*1: When using this adapter, 4 to 20 mA output (8-channel) of AAB841 varies to 1 to 5 V output.

		Description
Model	AAP149	Pulse Input Module PM1 compatible (16-channel, Pulse count, 0 to 6 kHz, Non-Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T26E.EPS

		Description
Model	AAP849	Pulse Input Module/ Analog Output Module for compatible PAC (Pulse count Input, 4 to 20mA output, 8-channel input / 8-channel output, Non-Isolated)
Suffix Codes	-S	Standard type
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

T36E.EPS

■ ORDERING INSTRUCTION

Specify models and suffis codes.

■ TRADEMARK

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● **Voltage Input Modules (Isolated)**

It can be used in dual redundant configuration.

Items		Specifications	
Model		**AAV144**	
Number of input channels		16, isolated	
Input signal		1 to 5 V	-10 to 10 V
Switching input signals		Input Signals can be set together for CH1 to CH16	
Allowable input voltage		±30 V	
Withstanding isolated voltage		Between input and system: 1500 V AC Withstanding voltage, For 1 minute (*1)	
Input resistance	Power ON	1 MΩ	
	Power OFF	200 kΩ	
Accuracy		±4 mV (*1)	±20 mV (*2)
Data update period		10 ms	
Drift due to ambient temperature change		±4 mV/10°C (*1)	±20 mV/10°C (*2)
Maximum current consumption		500 mA (5 V DC)	
Weight		0.2 kg	
External communication		Pressure clamp terminal, MIL connector cable, Dedicated cable (KS1)	

T31E.EPS

*1: The withstanding voltage for using the dedicated cable is 500 V AC (between the input signal and the system).
The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

● **Voltage Output Modules (Isolated)**

It can be used in dual redundant configuration.

Items	Specifications
Model	**AAV544**
Number of output channels	16, isolated
Output signal	-10 to 10V
Withstanding voltage	Between output and system: 1500 V AC Withstanding voltage, For 1 minute (*1)
Allowable load resistance	5 kΩ or more
Accuracy	The larger one among ±12mV or ±0.3%FS
Data update period	10 ms
Drift due to ambient temperature change	The larger one among ±0.1%/10°C or ±10mV/10°C
Maximum current consumption	860 mA (5 V DC)
Weight	0.2 kg
External communication	Pressure clamp terminal, MIL connector cable, Dedicated cable (KS1)

T32E.EPS

*1: The withstanding voltage for using the dedicated cable is 500 V AC (between the input signal and the system).
The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

● **Current/Voltage I/O Modules (Non-Isolated)**

These modules provide eight inputs and eight outputs to support up to eight loops.

They can be used in dual redundant configuration.

Items		Specifications			
Model		AAI841 (*1)		AAB841 (*6)	
Number of I/O channels		8-channel input/8-channel output, non-isolated		8-channel input/8-channel output, non-isolated (differential input)	
I/O signal		Input: 4 to 20 mA	Output: 4 to 20 mA	Input: 1 to 5 V (allowable common mode voltage ± 1 V or more)	Output: 4 to 20 mA
Allowable input current/voltage		25 mA	—	±7.5 V	—
Withstanding voltage		—		—	
Input resistance	Power ON	400 Ω (at 20 mA) to 1000 Ω (at 4 mA) (*2)	—	1 MΩ or more	—
	Power OFF	500 kΩ or more	—	340 kΩ or more	—
Allowable load resistance		—	0 to 750 Ω (*3)	—	0 to 750 Ω
Circuit-open detection		—	Less than 0.65mA	—	Less than 0.65mA
Accuracy		Input: ±16 μA,	output: ±48 μA	Input: ±4 mV	output: ±48 μA
Data update period		10 ms			
Input step response time		100 ms			
Output step response time		40 ms			
Transmitter power supply		14.8 V or more (at 20 mA) 26.4 V or less (at 0 mA) (*4)		—	
Setting of 2-wire or 4-wire transmitter		For each channel by setting pin		—	
Temperature drift		±0.1 %/10 °C			
Maximum current consumption		310 mA (5 V DC), 500 mA (24 V DC)		310 mA (5 V DC), 250 mA (24 V DC)	
Weight		0.3 kg			
External connection		Pressure clamp terminal, KS cable, MIL connector cable			
HART communication(*5)		Available		—	

T02E.EPS

*1: This module does not allow a Zener barrier to be connected. If the module is to be used in intrinsically safe applications, use an isolation barrier.

*2: Viewed from the terminals, module input resistance is, depending on the current flowing:

$$250\ \Omega + \frac{\text{voltage drop (3 V maximum) in the input protection circuit}}{\text{current value}}$$

F07E.EPS

*3: When installing to a remote node that conforms to the temperature environment and using it under the temperature environment (60 to 70 °C), the allowable load resistance is 200 to 750 Ω.

*4: When calculating if transmitter minimum operating voltage requirement will be satisfied, remember to allow for voltage drop in external wiring.

*5: R3.02 or later version supports HART function. When installing the module with HART function to a remote node, the firmware of EB401 must be Rev 2 or later.
For HART function specifications, refer to GS 33Q03L70-31E HART Communication Package (for A□I□□□-H).

*6: The module current output does not allow a Zener barrier to be connected. If the module is to be used in intrinsically safe applications, use an isolation barrier.

● **Voltage Output Module (Non-Isolated)**

This module outputs -10 V to +10 V DC.

It can be used in dual redundant configuration.

Items	Specifications
Model	**AAV542**
Number of output channels	16, non-isolated
Output signal	-10 to 10 V
Withstanding voltage	—
Allowable load resistance	More than 10 kΩ
Accuracy	Larger of ±0.3%/FS and ±12 mV
Data update period	10 ms
Output step response time	40 ms
Temperature drift	Larger of ±0.1%/10°C and ±10 mV/10°C
Maximum current consumption	450 mA (5 V DC)
Weight	0.2 kg
External connection	Pressure clamp terminal, KS cable, MIL connector cable

T03E.EPS

● AC Digital Input Modules

The AC Digital Input Modules receive 16-channel 100 V AC or 220 V AC ON/OFF signals.

They can be used in dual redundant configuration.

Item	Specifications	
Model	**ADV141**	**ADV142**
Number of input channels	16	16
Rated input voltage (*1)	100 to 120 V AC, 50/60 Hz	200 to 240 V AC, 50/60 Hz
Input ON voltage (peak value)	80 V AC (113 V) to 132 V AC (187 V)	160 V AC (226 V) to 264 V AC (373 V)
Input OFF voltage (peak value)	20 V AC (28 V) or less	40 V AC (56 V) or less
Input current (TYP)	4.7 mA (@120 V/60 Hz) / channel	6.2 mA (@240 V/60 Hz) / channel
Input current (MAX)	7 mA / channel	9.3 mA / channel
Withstanding voltage	Between input signal and system: 2 kV AC, For 1 minute Between commons: 1.35 kV AC, For 1 minute, common minus (–) side every 8-channel	
Functions **Status input** **Pushbutton input**	 Function for detecting ON/OFF status Function for counting the pushbutton edges	
Input response time	160 ms or less (for status input)	
Minimum ON detection time	200 ms (for pushbutton input)	
Maximum ON/OFF cycle	2.5 Hz (for pushbutton input)	
Maximum current consumption	500 mA (5 V DC)	500 mA (5 V DC)
Weight	0.3 kg	0.3 kg
External connection	Pressure clamp terminal, Dedicated cable (AKB332)	Pressure clamp terminal, Dedicated cable (AKB333)

T02E.EPS

*1: Input a sine wave, for AC signals.

Note: AC input signals to the same common should be the same phase.

● Digital Output Modules

The Digital Output Modules output 32-channel or 64-channel transistor contact signals.

The ADV551 and ADV561 can be used in dual redundant configuration.

Item	Specifications		
Model	**ADV551**	**ADV557**	**ADV561**
Number of output channels	32	32	64
Rated applied voltage	24 V DC	24 V DC	24 V DC
Load voltage	24 V DC, 50 mA	24 V DC, 50 mA	24 V DC, 100 mA
External power supply voltage range	20.4 to 26.4 V	20.4 to 26.4 V	20.4 to 26.4 V
Output ON voltage maximum value	2 V DC	2 V DC	2 V DC
Leak current maximum value when output OFF	0.1 mA	0.1 mA	0.1 mA
Output format	Current sink	Current sink	Current sink
Maximum load current (*1)	100 mA/channel, 26.4 V	100 mA/channel, 26.4 V	100 mA/channel, 26.4 V
Withstanding voltage	Between output signal and system: 2 kV AC, For 1 minute Between commons: 500 V AC, For 1 minute, common minus (–) side every 16-channel (*2)		
Functions **Status output** **Pulse width output** **Time-proportioning output**	ON/OFF status output function One-shot pulse width output function Time-proportioning ON/OFF	ON/OFF status output function — —	ON/OFF status output function One-shot pulse width output function Time-proportioning ON/OFF
Output response time	3 ms or less (for status output) 10 ms or less (for mixed status and pulse outputs)		
Pulse width	8 ms to 7200 s		
Pulse width resolution	8 ms, but ON/OFF delay of maximum 1 ms is added		
Maximum current consumption	700 mA (5 V DC) 60 mA (external power supply)	550 mA (5 V DC) 60 mA (external power supply)	700 mA (5 V DC) 120 mA (external power supply)
Weight	0.2 kg	0.3 kg	0.3 kg
External connection	Pressure clamp terminal, Dedicated cable (AKB331), MIL connector cable	Pressure clamp terminal	Dedicated cable (AKB337), MIL connector cable

T03E.EPS

*1: Connect a spark killer diode when driving DC relay.

*2: The withstanding voltage for using a dedicated cable is 500 V AC (between output signal and system).
The withstanding voltage for using MIL connector cable depends on the electrical specifications of its cable.

● Relay Output Module

The Relay Output Module outputs the 16-channel relay contact signals.

It can be used in dual redundant configuration.

Item	Specifications
Model	**ADR541**
Number of output channels	16
Rated applied voltage	24 to 110 DC, 100 to 240 V AC, 50/60Hz
Maximum load current (*1)	Resistive load: 24 V DC: 2.0 A/channel, 110 V DC: 0.4 A/channel 100 V AC: 2.0 A/channel, 220 V AC: 2.0 A/channel Inductive load: 24 V DC: 0.6 A/channel, 110 V DC: 0.1 A/channel 100 V AC: 1.0 A/channel, 220 V AC: 1.0 A/channel
Withstanding voltage	Between output signal and system: 2 kV AC, For 1 minute Between commons: 1.35 kV AC, For 1 minute, common minus (–) side every 8-channel
Functions **Status output** **Pulse width output** **Time-proportioning output**	 ON/OFF status output function One-shot pulse width output function Time-proportioning ON/OFF
Output response time	12 ms or less (for status output) 20 ms or less (for mixed status and pulse outputs)
Pulse width	40 ms to 7200 s
Pulse width resolution	8 ms, but ON/OFF delay added for maximum 10 ms
Maximum current consumption	780 mA (5 V DC)
Weight	0.3 kg
External connection	Pressure clamp terminal, Dedicated cable (AKB334)
Relay switching life	100,000 operations (*2)

T04E.EPS

*1: Maximum 8 A is allowed per common. Connect a spark killer diode when driving DC relay.
*2: The relay cannot be replaced with new one. If it comes to the end of its life, the module should be replaced.

Note: The signals connected the same common should be the same phase when applying AC voltage.

● Digital I/O Modules (CENTUM-ST Compatible)

The Digital I/O Modules (CENTUM-ST Compatible) receive contact or voltage status signals from the field, and/or output status signals to the field via transistor contacts.

Item	Specifications		
Model	**ADV859**	**ADV159**	**ADV559**
Number of I/O channels	16-channel input, 16-channel output	32-channel input	32-channel output
Signal isolation	Isolated channels	Isolated channels	Isolated channels
Input signal	Contact input: OFF signal 100 kΩ or more ON signal 200 Ω or less Minimum current value when contact is short-circuited: 1.25 mA Voltage input: OFF signal 4.5 to 25 V DC ON signal ±1 V DC, 200 Ω or less		—
Input contact rating	5 V DC, 20 mA or more		—
Pushbutton input function	Not supported	Supported	—
Input response time	8 ms (for status input)	8 ms (for status input)	—
Minimum ON detection time	—	20 ms (for pushbutton input)	—
Maximum ON/OFF cycle	—	2.5 Hz (for pushbutton input)	—
Output signal	Transistor contact	—	Transistor contact
Output contact rating	Inductive load, resistive load: 30 V DC, 100 mA (*1)	—	Inductive load, resistive load: 30 V DC, 100 mA (*1)
Output response time	16 ms or less	—	16 ms or less
Pulse width	8 ms to 7200 s	—	8 ms to 7200 s
Pulse width resolution	8 ms, add max. 1ms for ON/OFF delay time	—	8 ms, add max. 1ms for ON/OFF delay time
Maximum current consumption	450 mA (5 V DC)	330 mA (5 V DC)	570 mA (5 V DC)
Weight	0.3 kg	0.4 kg	0.3 kg
External connection	Dedicated cable (KS2)	Dedicated cable (KS2)	Dedicated cable (KS2)
Compatible card	ST2 compatible	ST3 compatible	ST4 compatible

T05E.EPS

*1: Connect a spark killer diode when driving DC relay.

Item	Specifications		
Model	**ADV869**	**ADV169**	**ADV569**
Number of I/O channels	32-channel input, 32-channel output	64-channel input	64-channel output
Signal isolation	Common every 16-channel	Common every 16-channel	Common every 16-channel
Input signal	Contact input: OFF signal 100 kΩ or more ON signal 200 Ω or less Minimum current value when contact is short-circuited: 1.25 mA Voltage input: OFF signal 4.5 to 25 V DC ON signal ±1 V DC, 200 Ω or less		—
Input contact rating	5 V DC, 20 mA or more		
Pushbutton input function	Not supported	Not supported	—
Input response time	8 ms (for status input)	8 ms (for status input)	—
Output signal	Transistor contact	—	Transistor contact
Output contact rating	Inductive load, resistive load: 30 V DC, 100 mA (*1)	—	Inductive load, resistive load: 30 V DC, 100 mA (*1)
Output response time	16 ms or less	—	16 ms or less
Pulse width	8 ms to 7200 s	—	8 ms to 7200 s
Pulse width resolution	8 ms, add max. 1 ms for ON/OFF delay time	—	8 ms, add max. 1 ms for ON/OFF delay time
Maximum current consumption	800 mA (5 V DC)	800 mA (5 V DC)	800 mA (5 V DC)
Weight	0.3 kg	0.3 kg	0.3 kg
External connection	Dedicated cable (KS9)	Dedicated cable (KS9)	Dedicated cable (KS9)
Compatible card	ST5 compatible	ST6 compatible	ST7 compatible

T06E.EPS

*1: Connect a spark killer diode when driving DC relay.

● Function Assignment in Digital Modules

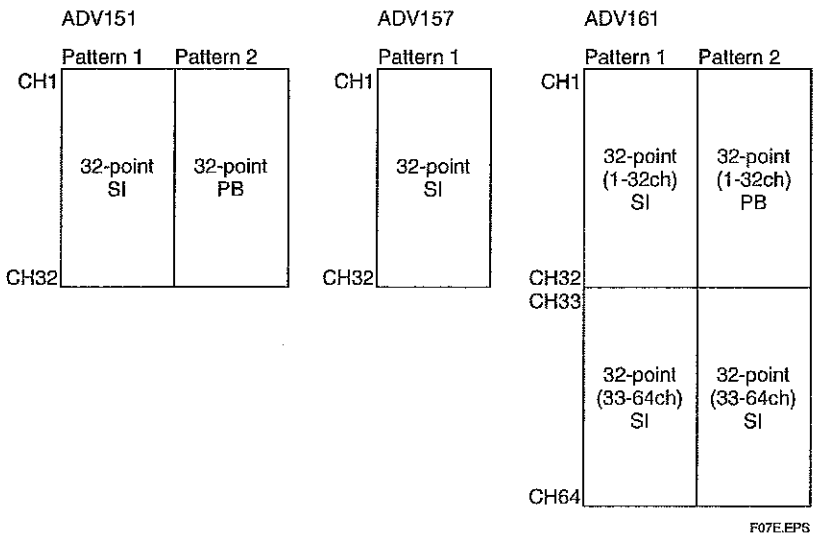
Select the patterns for assigning functions channel-by-channel in digital modules.

The following table lists the correspondence between the module types and point modes.

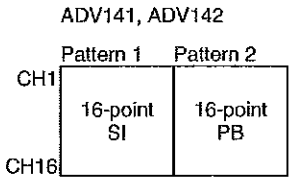
Table: Correspondence Between the Module Types and Point Modes

Point Mode	Module Type
SI	Status input
PB	Pushbutton input
SO	Status output
PW	Pulse width output
TP	Time-proportioning ON/OFF output

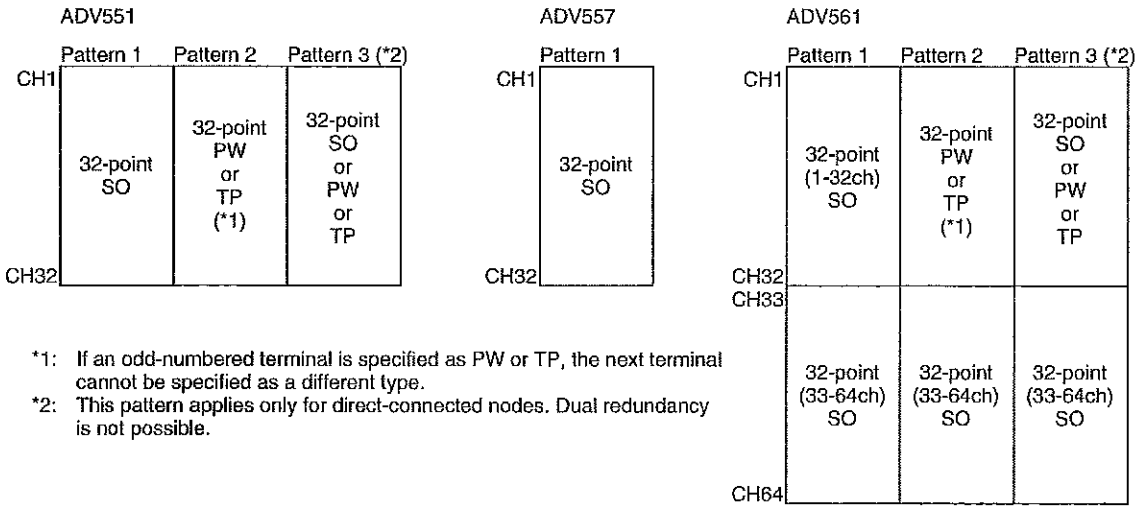
T22E.EPS



F07E.EPS



F08E.EPS

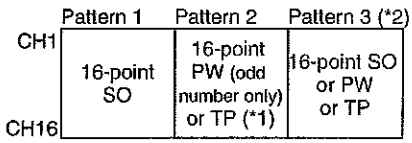


*1: If an odd-numbered terminal is specified as PW or TP, the next terminal cannot be specified as a different type.

*2: This pattern applies only for direct-connected nodes. Dual redundancy is not possible.

F09E.EPS

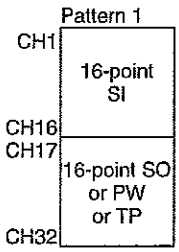
ADR541



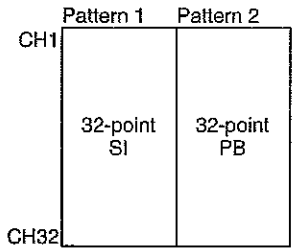
*1: If an odd-numbered terminal is specified as PW or TP, the next terminal cannot be specified as a different type.
*2: This pattern applies only for direct-connected nodes. Dual redundancy is not possible.

F10E.EPS

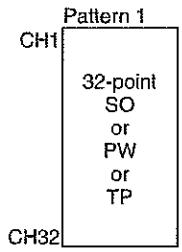
ADV859 (ST2)



ADV159 (ST3)

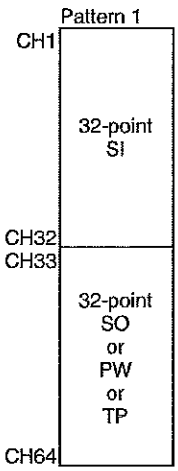


ADV559 (ST4)

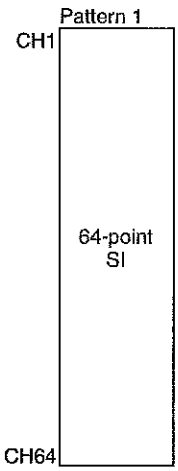


F11E.EPS

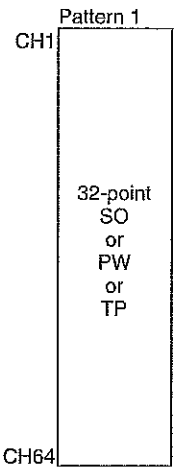
ADV869 (ST5)



ADV169 (ST6)



ADV569 (ST7)



F12E.EPS

For PW (pulse width output), use two contiguous terminal numbers; the first of these must be odd-numbered. If both PW and TP (time-proportioning ON/OFF output) are used together, successive pairs of terminals must be either PW or TP terminals, as shown in the example below.

Example:

Terminals 1 and 2	PW (one PW output, two contiguous terminal nos.)
Terminals 3 and 4	TP (two outputs, two contiguous terminal nos.)
Terminals 5 and 6	TP (two outputs, two contiguous terminal nos.)
⋮	⋮
Terminals 15 and 16	PW (one PW output, two contiguous terminal nos.)

T23E.EPS

For PW output, use two contiguous terminal numbers; the first of these must be odd-numbered. Also if SO and TP terminals are used together with PW, individual terminals that are not PW can be either SO or TP terminals.

Example:

Terminals 1 and 2	PW (one PW output, two contiguous terminal nos.)
Terminal 3	TP or SO
Terminal 4	TP or SO
⋮	⋮
Terminal 16	TP or SO

T24E.EPS