

General Specifications

Analog I/O Modules (for FIO)



GS 33K50F60-50E

[Release 5]

■ GENERAL

*This document describes about hardware specifications of Analog I/O Modules (for FIO) to be installed in the ESB bus node units (ANB10S and ANB10D), Optical ESB bus node units (ANB11S and ANB11D), ER bus node units (ANR10S and ANR10D) (*1), and field control units (for FIO) (AFV30S, AFV30D, AFV40S, AFV40D, AFV10S, AFV10D, AFF50S, and AFF50D).*

These analog I/O modules function as signal converters; by inputting field analog signals into these modules, it converts them to internal data for field control stations (FCS), or the FCS's internal data to analog signals for outputs.

*1: Field control units (AFV30□ and AFV40□) do not support ER bus node unit (ANR10□).

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

The current input module receives signal of 4 to 20 mA, and the current I/O module sends and receives signals of 4 to 20 mA. These modules are isolated between the field and the system as well as in between each channel. They 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/output channels: 500 V AC, for 1 minute (*2)
Input resistance	Power ON	290 Ω (at 20 mA) to 450 Ω (at 4 mA) (*3)	
	Power OFF	500 kΩ or larger	
Allowable load resistance		—	— 0 to 750 Ω (*4)
Circuit-open detection		—	— Less than 0.65 mA
Accuracy		±16 μA	Input: ±16 μA Output: ±48 μA
Data update period		10 ms	
Transmitter power supply		15.0 V or higher (at 20 mA) 29.3 V or less (at 0 mA) (*5)	15.0 V or higher (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

*1: A Zener barrier is not allowed to be connected with this module. Use an isolation barrier when the module is used in intrinsically safe applications.

*2: When the ML connector cable is used, the withstanding voltage depends on the electrical specifications of the cable.

*3: The module input resistance viewed from the terminals depends on the current strength as calculated as below:

$$250 \Omega + \frac{\text{voltage drop in the input protection circuit}}{\text{current value}}$$

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*4: When this module is used in the ambient temperature of 60 to 70 °C by being installed in a ER bus node unit that conforms to the temperature environment, the allowable load resistance is 200 to 750 Ω.

*5: This voltage is generated between the connecting terminals for 2-wire transmitters for this module. When calculating the minimum operating voltage for transmitters, consider to allow margins for voltage drop in external wiring.

*6: When this module is installed to a ER bus node unit with HART function, the EB401 firmware must be rev. 2 or later.

■ ANALOG I/O MODULE (WITH HART COMMUNICATION)

The analog I/O module (with 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 – 20 mA signal with field control stations (FCS). There are 8 types of analog I/O modules (with HART communication function).

*1: HART variable can be read by HART Command #3.

There are 8 types of analog I/O modules (with HART communication function).

Model	Model Name	Function
AAI141-H	Analog Input Module (Current Input)	16-channel, 4 to 20 mA, non-isolated
AAB141-H	Analog Input Module (Voltage/current Input)	16-channel, 1 to 5 V/4 to 20 mA, non-isolated
AAI841-H	Analog I/O Module (Current I/O)	8-channel input/8-channel output, 4 to 20 mA, non-isolated
AAB842-H	Analog I/O Module (Voltage/current Input, Current Output)	8-channel input/8-channel output, 1 to 5 V/4 to 20 mA input, 4 to 20 mA output, non-isolated
AAI135-H	Analog Input Module (Current Input)	8-channel, 4 to 20 mA, isolated channels
AAI835-H	Analog I/O Module (Current I/O)	4-channel input/4-channel output, 4 to 20 mA, isolated channels
AAI143-H	Analog Input Module (Current Input)	16-channel, 4 to 20 mA, isolated
AAI543-H	Analog Output Module (Current Output)	16-channel, 4 to 20 mA, isolated

● Communication with HART Devices

The analog I/O modules (with HART communication function) communicate with field devices and store analog data and HART variables in the Input/Output image area in the communication module. An FCS refers to and sets the Input/Output image by accessing the analog I/O modules (with HART communication function). The FCS utilizes the field device data via I/O terminals of the function block in the same way as other analog/digital I/O signals.

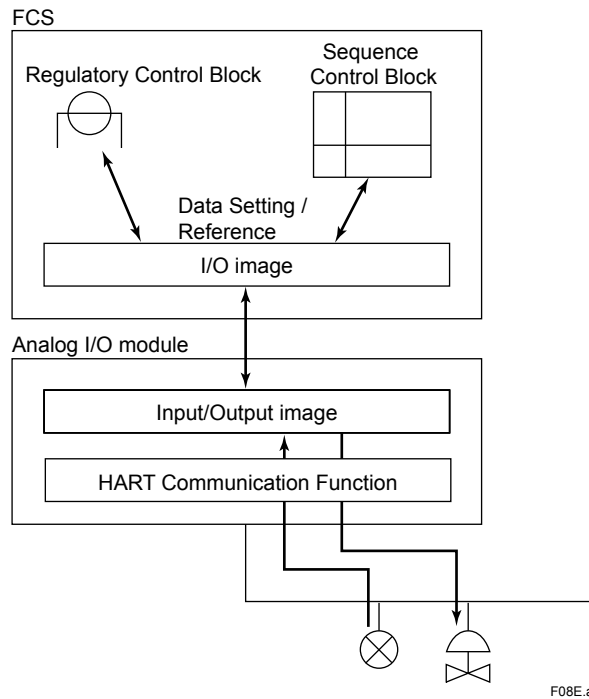
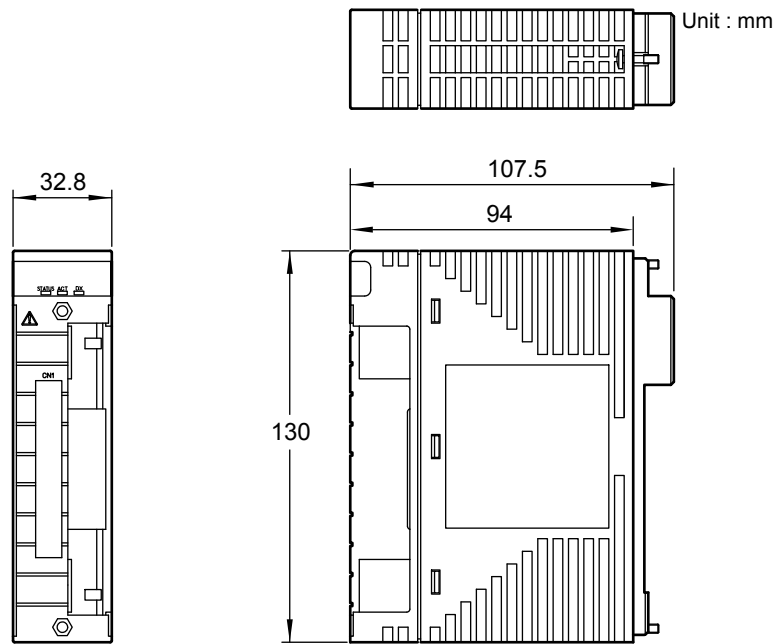


Figure Process Data Flow of HART Communications

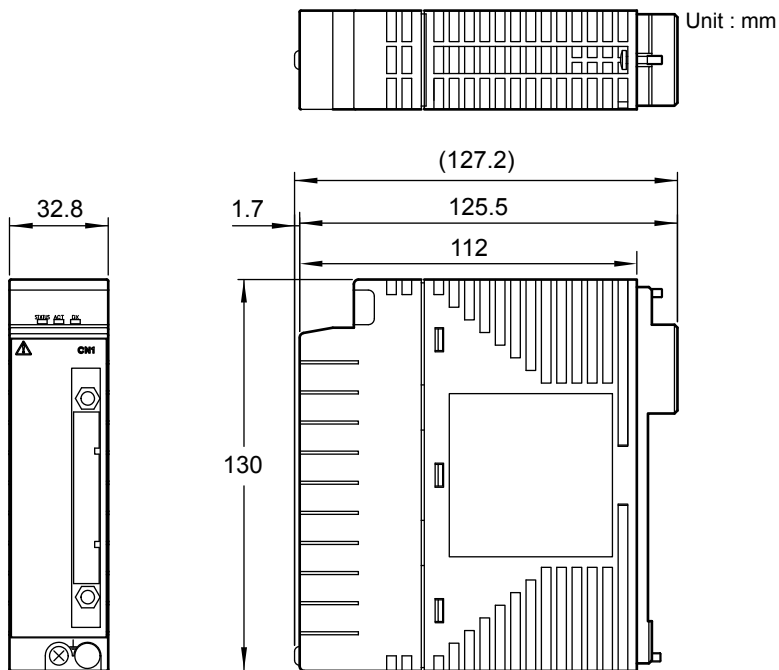
EXTERNAL DIMENSIONS

- AAI141, AAV141, AAV142, AAV144, AAI841, AAB841, AAV542, AAV544, AAI143, AAI543, AAT141, AAR181, AAI135, AAI835, AAP135, AAB141, AAB842



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- AAT145, AAP849



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		Description
Model	AAI835	Analog I/O Module (4 to 20 mA, 4-channel input/4-channel output, Isolated channels)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
Option Codes	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option
	/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]	

		Description
Model	AAT145	TC/mV Input Module (16-channel, Isolated channels)
Suffix Codes	-S	Standard type
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

		Description
Model	AAR145	RTD/POT Input Module (16-channel, Isolated channels)
Suffix Codes	-S	Standard type
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

		Description
Model	AAP135	Pulse Input Module (8-channel, Pulse count, 0 to 10 kHz, Isolated channels)
Suffix Codes	-S	Standard type
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20 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]	

		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