General Specifications

Analog I/O Modules (for FIO)

CENTUM VP

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☐).

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

These modules provide 8 inputs and 8 outputs to support up to 8 loops. They can be used in dual-redundant configuration.

Items		Specifications					
Model		**AAI841 (*1)**		**AAB841 (*5)**		**AAB842 (*5) (*6)**	
Number of I/O channels		8-channel input/8-channel output, non-isolated		8-channel input/8-channel output, non-isolated (differential input)		8-channel input/8-channel output, non-isolated When the voltage input is selected the differential input is applied.	
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 less)	Output: 4 to 20 mA	Input (*7) Voltage input: 1 to 5 V DC (allowable common mode voltage ±1 V or less) Current input: 4 to 20 mA DC	Output: 4 to 20 mA
Allowable input current/ voltage		25 mA	—	±7.5 V	—	Voltage input : ±7.5 V Current input : 25 mA	—
Withstanding voltage		—					
Input resistance	**Power ON**	400 Ω (at 20 mA) to 1000 Ω (at 4 mA) (*2)	—	1 MΩ or larger	—	Voltage input: 1 MΩ or larger Current input: 290 Ω (at 20 mA) to 450 Ω (at 4 mA) (*2)	—
	Power OFF	500 kΩ or larger	—	340 kΩ or larger	—	Voltage input: 340 kΩ or larger Current input: 500 kΩ or larger	—
Allowable load resistance		—	0 to 750 Ω (*3)	—	0 to 750 Ω	—	0 to 750 Ω (*4)
Circuit-open detection		—	Less than 0.65 mA	—	Less than 0.65 mA	—	Less than 0.65 mA
Accuracy		Input: ±16 μA	output: ±48 μA	Input: ±4 mV	output: ±48 μA	Voltage input : ±4 mV Current input : ±16 μA	±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 higher (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)		410 mA (5 V DC), 290 mA (24 V DC)	
Weight		0.3 kg					
External connection		Pressure clamp terminal, KS cable, MIL connector cable				KS cable	
HART communication (*8)		Available		—		Available (at Current input and output)	

*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 application.

*2: 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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*3: When this module is used in the ambient temperature of 60 to 70 ºC by being installed in a node unit that conforms to the temperature environment, the allowable load resistance is 200 to 750 Ω.

*4: 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.

*5: A Zener barrier is not allowed to be connected with this module for current output. Use an isolation barrier when the module is used in intrinsically safe application.

*6: A Zener barrier is not allowed to be connected with this module for current input. Use an isolation barrier when the module is used in intrinsically safe application. And this module can be used only with the following FCSs – AFG30□, AFG40□, AFG8□□, AFF50□, AFV10□, AFV30□, or AFV40□.

*7: Input mode for each channel is selectable by software.

*8: 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.

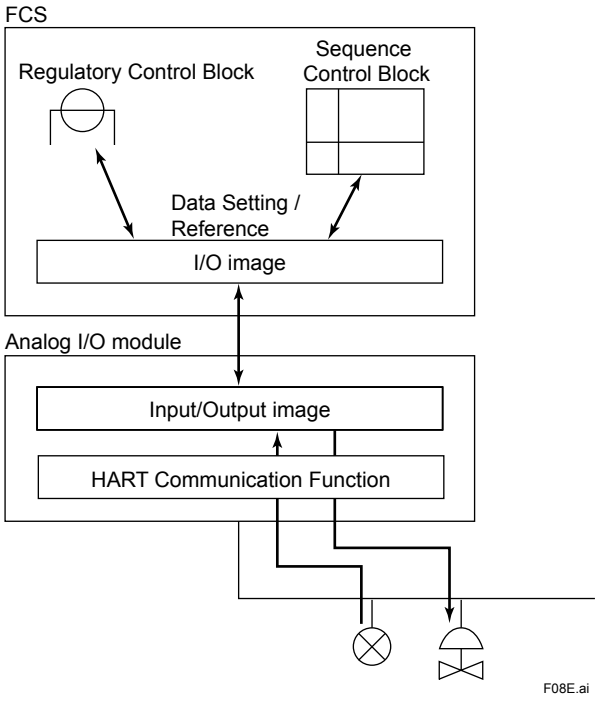
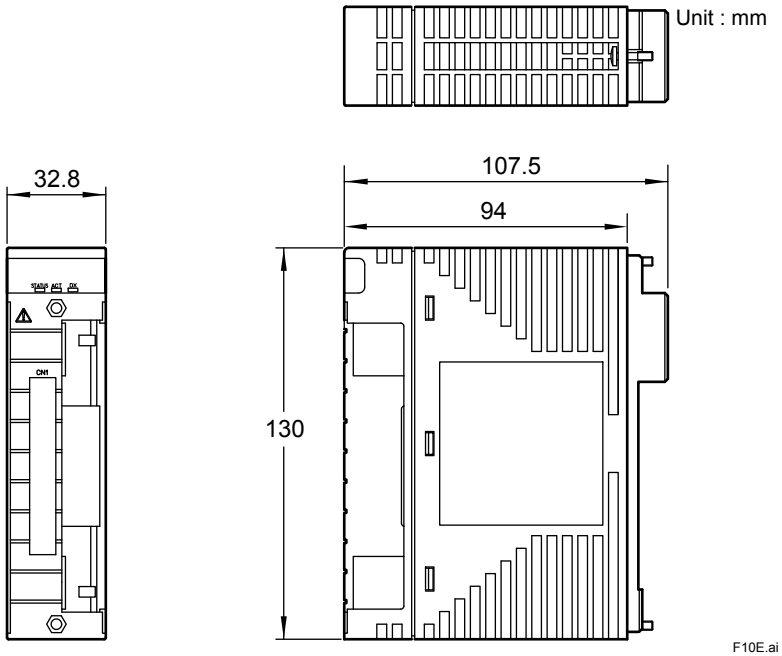


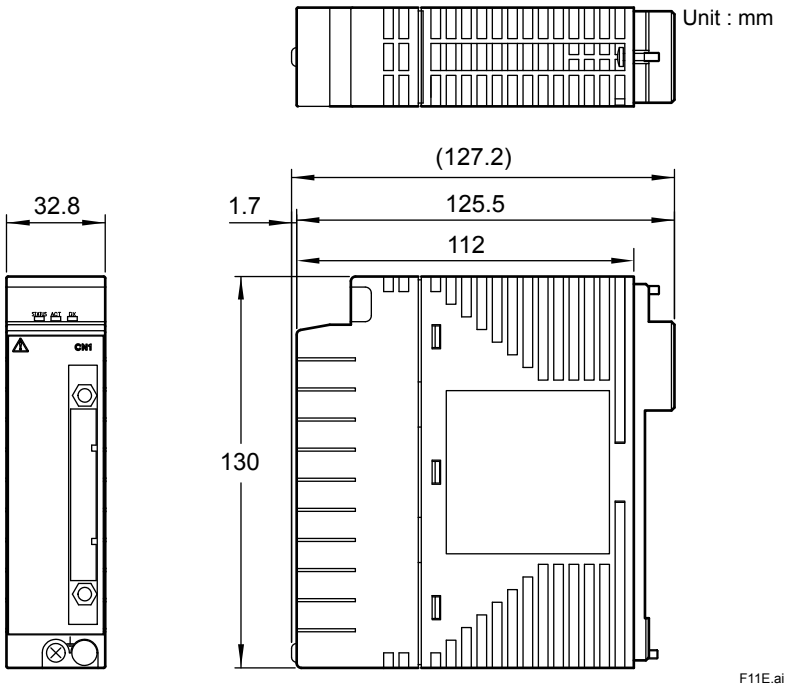
Figure Process Data Flow of HART Communications

■ EXTERNAL DIMENSIONS

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



● **AAT145, AAP849**



		Description
Model	AAI841	Analog I/O Module (4 to 20 mA input , 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated)
Suffix Codes	-S	Standard type
	-H	With digital communication (HART protocol)
	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	/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]

		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
	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	/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]

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

		Description
Model	AAB842	Analog I/O Module (1 to 5 V/4 to 20 mA input, 4 to 20 mA output, 8-channel input/8-channel output, Non-Isolated)
Suffix Codes	-H	With digital communication (HART protocol)
	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	/M4A00	With MAC2 Compatible Adapter [Model : ATM4A-00]
	/V4A00	With VM2 Compatible Adapter [Model : ATV4A-00] (*1)

*1: When using this adapter, 4 to 20 mA output (8-channel) of AAB842 varies to 1 to 5 V output.

		Description
Model	AAV542	Analog Output Module (-10 to +10 V, 16-channel, Non-Isolated)
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	/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]