● 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 ºC 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.

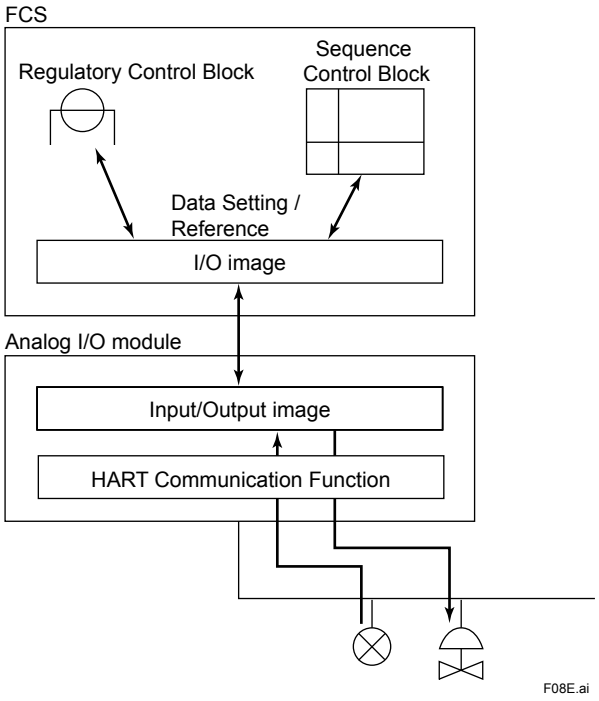
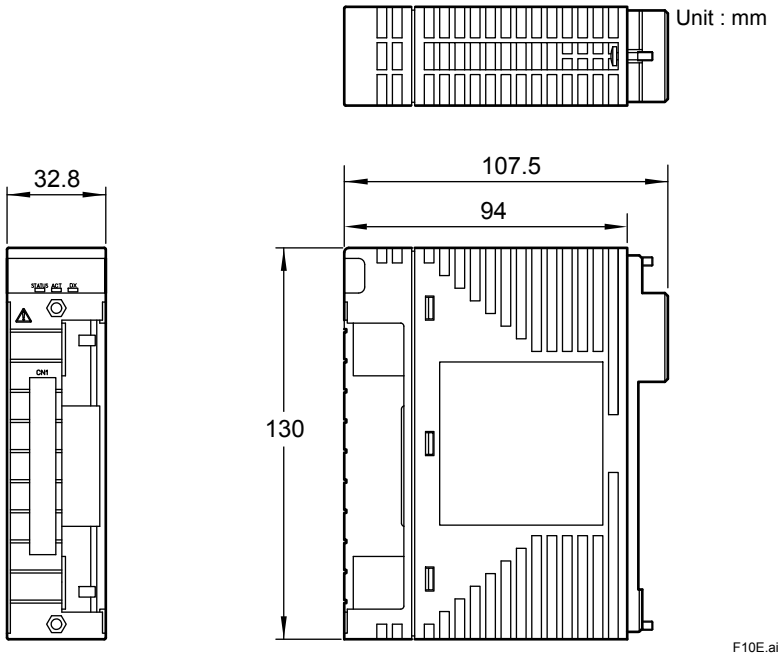


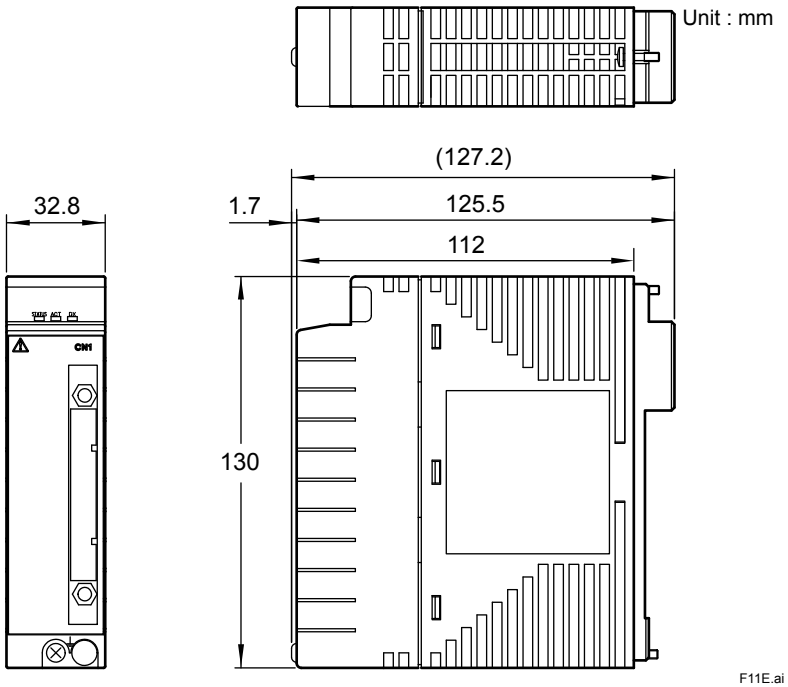
Figure Process Data Flow of HART Communications

■ EXTERNAL DIMENSIONS

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



● **AAT145, AAP849**



		Description
Model	AAV544	Analog Output Module (-10 to +10 V, 16-channel, 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]

		Description
Model	AAT141	TC/mV Input Module (16-channel, 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	/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]

		Description
Model	AAR181	RTD Input Module (12-channel, 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	/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]

		Description
Model	AAI135	Analog Input Module (4 to 20 mA, 8-channel, 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
	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 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]