Analog I/O Modules

Analog input modules provide an interface to the CPU for sensing variable real world levels of voltage and current signals. These signals are converted into digital values by the modules for use in programs. This enables the CPU to process variable signals such as pressure, speed and flow. For modules able to sense temperature, please refer to the temperature input modules section.

Analog to Digital Converter Modules

Model Number		Q64AD	Q68ADV	Q68ADI
Stocked Item		S	S	S
Certification		UL • cUL • CE	UL • cUL • CE	UL • cUL • CE
Number of Analog Input Points		4 points (4 channels)	8 points (8 channels)	8 points (8 channels)
Analog Input	Voltage	-10 to 10VDC (input resistance value 1MΩ)		-
	Current	0 to 20mADC (input resistance value 250Ω)	-	0 to 20mADC (input resistance value 250Ω)
Digital Output		16-bit signed binary (Normal resolution mode: -4096 to 4095, high resolution mode: -12288 to 12287, -16384 to 16383		

I/O Characteristics Max. Resolution

Analog Input Range		Normal Resolution Mode		High Resolution Mode	
		Digital Output Value	Max. Resolution	Digital Output Value	Max. Resolution
Voltage	0 to 10V	0 to 4000	2.5mV	0 to 16000	0.625mV
	0 to 5V	0 to 4000	1.25mV	0 to 12000	0.416mV
	1 to 5V	0 to 4000	1.0mV	0 to 12000	0.333mV
	-10 to 10	-4000 to 4000	2.5mV	-16000 to 16000	0.625mV
	User Range Setting	-4000 to 4000	0.375mV	-12000 to 12000	0.333mV
Current	0 to 20mA	0 to 4000	5µA	0 to 12000	1.66µA
	4 to 20mA	0 to 4000	4µA	0 to 12000	1.33µA
	User Range Setting	-4000 to 4000	1.37µA	-12000 to 12000	1.33µA

Accuracy (Accuracy of Digital Output Value Relative to Maximum Value) (*1)

Analog Input Range		Normal Resolution Mode			High Resolution Mode		
		Ambient Temperature 0 to 55°C		Ambient Temperature 25±5°C	Ambient Temperature 0 to 55°C		Ambient Temperature 25±5°C
		With Temp. Drift Compensation	Without Temp. Drift Compensation		With Temp. Drift Compensation	Without Temp. Drift Compensation	
Voltage	0 to 10V	±0.3% (±12 digit)	±0.4% (±16 digit)	±0.1% (±48 digit)	±0.3% (±48 digit)	±0.4% (±64 digit)	±0.1% (±16 digit)
	-10 to 10						
	0 to 5V						
	1 to 5V				±0.3% (±36 digit)	±0.3% (±48 digit)	±0.1% (±12 digit)
	User Range Setting						
Current	0 to 20mA						
	4 to 20mA						
	User Range Setting						

Conversion Time	80 µs/channel (When temperature drift compensation is provided, time is 160 µs longer, regardless of the number of channels used)		
Absolute Max. Input	Voltage: ±15V, current: ±30mA		
Insulation System	Across I/O terminals and PLC power supply: Photocoupler insulation; Across channels: No insulation		
I/O Device Points Occupied	16 points (I/O allocation: 16 intelligent points)		
Connection Terminal	18-point terminal block		
Internal Current Consumption (5VDC) (A)	0.63	0.64	0.64
Weight (kg)	0.18	0.19	0.19
Base Unit Slots Occupied	1		

Note 1: "Digit" indicates a digital value. ±4 digit means that the digital value 1000 will vary between 996 and 1004.

High Speed Analog Input Module

Model Number		**Q64ADH**
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Inputs		4 points (4 channels)
Digital Output		-20480 to 20479 (-32768 to 32767 when using the scaling function)
Analog Input	**Voltage**	10 to 10VDC (Input resistance 1MΩ)
	Current	0 to 20mADC (Input resistance 250Ω)
I/O Characteristics Maximum Resolution (*1)		See table below
Accuracy (Accuracy Relative to Maximum Analog Output Value) (*2)	**Ambient Temperature 25 ±5°C**	Within ±0.1% (±20 digit)
	Ambient Temperature 0 to 55°C	Within ±0.2% (±40 digit)
Conversion Speed (*3, *4, *5)		High speed: 20µs/channel; Medium speed: 80µs/channel; Low speed: 1ms/channel
Absolute Maximum Input		Voltage: ±15V, Current: 30mA (*6)
Offset / Gain Setting Count (*7)		Up to 50000 times
Isolation Method		Between I/O terminals and programmable controller power supply: photocoupler isolation; Between input channels: no isolation
Dielectric Withstand Voltage		Between I/O terminals and programmable controller power supply: 500VACrms for 1 minute
Insulation Resistance		Between I/O terminals and programmable controller power supply: 500VDC 10MΩ or higher
Number of Occupied I/O Points		16 points (I/O assignment: Intelligent 16 points)
Connected Terminal		18-point terminal block
Applicable Wire Size		0.3 to 0.75mm²
Applicable Solderless Terminal		R1.25-3 (solderless terminals with sleeve are not usable)
Internal Current Consumption (5VDC)		0.52A
Weight (kg)		0.18
Base Unit Slots Occupied		1 slot

I/O Characteristics Maximum Resolution (*1)

Analog Input Range		**Digital Output Value**	**Maximum Resolution**
Voltage	0 to 10V	0 to 20000	500µV
	0 to 5V		250µV
	1 to 5V		200µV
	-10 to 10V	-20000 to 20000	500µV
	1 to 5V (Extended mode)	-5000 to 22500	200µV
	User Range Setting	-20000 to 20000	219µV
Current	0 to 20 mA	0 to 20000	1000nA
	4 to 20 mA		800nA
	4 to 20V (Extended Mode)	-5000 to 22500	800nA
	User Range Setting	-20000 to 20000	878nA

Notes:
1. For details on the I/O conversion characteristics, refer to the following. I/O conversion characteristic of A/D conversion in the User's Manual.
2. Except when receiving noise influence.
3. The default value is 20µs/channel.
4. The logging function can be used only in the middle speed (80µs/channel) or low speed (1ms/channel).
5. The flow amount integration function can be used only in the low speed (1ms/channel).
6. This is a momentary current value which does not cause damage to internal resistors of the module. The maximum input current value for constant application is 24mA.
7. If the number of offset/gain settings exceeds 50000 times, an error occurs.

Isolated Analog Modules

For some applications, it is essential that there is channel-to-channel isolation between analog inputs or outputs. These modules provide galvanic isolation between each channel so there is no common connection from one channel to any other.

8 CH Analog Module (Isolated Analog)

Model Number		**Q68AD-G**
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Inputs		8 points (8 channels)
Digital Output		16-bit signed binary (normal resolution mode: -4096 to 4095, high resolution mode: -12288 to 12287, -16384 to 16383)
Analog Input	**Voltage**	-10 to 10VDC (Input impedance 1ΩM or more)
	Current	0 to 20mADC (Input resistance 250Ω)

I/O Characteristics Maximum Resolution

Input	Analog Input Range	Normal Resolution Mode		High Resolution Mode	
		Digital Output Value	Max. Resolution	Digital Output Value	Max. Resolution
Voltage	0 to 5V	0 to 4000	2.5mV	0 to 1600	0.625mV
	0 to 5V		1.25mV	0 to 1200	0.416mV
	1 to 5V		1.0mV		0.333mV
	1 to 5V (Expanded Mode)	-1000 to 4500	1.0mV	-3000 to 13500	0.333mV
	-10 to 10V	-4000 to 4000	2.5mV	-16000 to 16000	0.625mV
	User Range Setting		0.375	-12000 to 12000	0.333mV
Current	0 to 20 mA	0 to 4000	5µA	0 to 12000	1.66µA
	4 to 20 mA		4µA		1.33µA
	4 to 20V (Expanded Mode)	-1000 to 45000	4µA	-3000 to 13500	1.33µA
	User Range Setting	-4000 to 4000	1.37µA	-12000 to 12000	1.33µA

Accuracy (Accuracy Relative to Maximum Analog Output Value)	**Reference Accuracy (*1)**	±0.1%; Normal resolution mode : ±4digit (*2); High resolution mode (0 to 10V, -10 to 10V): ±16digit (*2) High resolution mode (Other than the above ranges): ±12digit (*2)
	Temp. Coefficient	±71.4ppm/°C (0.00714%/°C) (*3)
Conversion Speed		10ms / channel
I/O Device Points Occupied		16 points

Isolation Specifications

Isolated Part	Isolation Method	Dielectric Strength	Insulation Resistance
Between I/O Terminal and Programmable Controller Power Supply	Transformer Isolation	500VAC rms, 1min.	500VDC 10MΩ or more
Between Analog Input Channels		1000VAC rms, 1min.	

Connector Type	A6CON1 or A6CON4
Internal Current Consumption (5VDC)	0.46A
Weight (kg)	0.16
Base Unit Slots Occupied	1

Notes:
1. Accuracy of offset/gain setting at ambient temperature.
2. "digit" indicates a digital value.
3. Accuracy per temperature change of 1°C Example: Accuracy when temperature changes from 25 to 30°C ±0.1% (reference accuracy) + 0.00714 %/°C (temperature coefficient) x 5°C (temperature change difference) = 0.1357%

High Resolution Analog Module (Isolated Analog Input Channels)

Model Number		**Q64AD-GH**
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Input Points		4 points (4 channels)
Analog Input	**Voltage**	-10 to 10VDC (Input resistance 1MΩ)
	Current	0 to 20 mADC (Input resistance 250Ω)
Digital Output		16-bit signed binary (-32768 to 32768); 32-bit signed binary (-65536 to 65536)
I/O Characteristics Maximum Resolution		See table below
Accuracy (Accuracy Relative to Full-Scale)	**Reference Accuracy (*1)**	±0.05%; Digital output value(32 bit): ±32 digit (*2); Digital output value (16 bit): ±16 digit (*2)
	Temp. Coefficient (*3)	±71.4 ppm / °C (0.00714% / °C)
Conversion Speed		10ms / 4 channels
Absolute Maximum Input		Voltage: ± 15V; Current: ± 30mA
Withstanding Voltage Isolation Method		Between I/O terminal and PLC power supply: Photocoupler insulation; Between analog input channels: transformer isolation
Dielectric Strength		1780VAC ms / 3 cycles (elevation 2000m)
Isolation Voltage		Between I/O terminal and PLC power supply: 500VDC 20MΩ more
I/O Device Points Occupied		16 points
Connected Terminal		18 points terminal block
Applicable Solderless Terminals		R1.25-3 (A solderless terminals with sleeves cannot be used)
Internal Current Consumption (5VDC)		0.89 A
Weight (kg)		0.20
Base Unit Slots Occupied		1

I/O Characteristics Maximum Resolution

Input	Analog Input Range	Maximum Resolution		Digital Output Value (32-Bit)	Digital Output Value (16-Bit)
		32-Bit	16-Bit		
Voltage	0 to 10V	156.3µV	312.6µV	0 to 64000	0 to 32000
	0 to 5V	78.2µV	156.4µV		
	1 to 5V	62.5µV	125.0µV		
	Users Input Range (Uni-Polar)	47.4µV	94.8µV		
	-10 to 10V	156.3µV	312.6µV	-64000 to 64000	-32000 to 32000
	Users Input Range (Bi-Polar)	47.4µV	94.8µV		
Current	0 to 20 mA	312.5nA	625.0µV	0 to 64000	0 to 32000
	4 to 20 mA	250.0nA	500.0µV		
	Users Input Range (Uni-Polar)	151.6nA	303.2µV		

Notes:
1. Accuracy when consistent at some temperature within the ambient temperature (to 55°C).
2. "Digit" indicates a digital output value.
3. Accuracy per temperature change of 1°C. Example: Accuracy when temperature change from 25 to 30°C. 0.05% (reference accuracy + 0.00714% / °C (temperature coefficient) x 5 °C (temperature change difference) = 0.0857%

Isolated Analog Input Module with Signal Conditioning Function

Model Number			**Q66AD-DG**
Stocked Item			S
Certification			UL • cUL • CE
Connecting Section with 2-Wire Transmitter	**Input Specification**	**Number of Analog Input**	6 points (6 channels)
		Analog Input	4 to 20 mADC (Input resistance 250Ω)
	Supply Power Specification	**Supply Voltage**	26 ±2VDC
		Maximum Supply Current	24mADC
		Short-Circuit Protection	Available; Limit current: 25 to 35mA
	Check Terminals		Available
Digital Output			16-bit signed binary (normal resolution mode: -96 to 4095, high resolution mode: -288 to 12287)

I/O Characteristics Maximum Resolution

Analog Input Range	Normal Resolution Mode		High Resolution Mode	
	Digital Output Value	Max. Resolution	Digital Output Value	Max. Resolution
0 to 20mA	0 to 4000	5µA	0 to 12000	1.66µA
4 to 20mA		4µA		1.33µA
4 to 20mA (Expanded Mode)	-1000 to 4500	4µA	-3000 to 13500	1.33µA
User Range Setting	0 to 4000	1.37µA	0 to 12000	1.33µA

Accuracy (Accuracy Relative to Full-Scale)	**Reference Accuracy (*1)**	±0.1% (Normal resolution mode: ±4 digit; High resolution mode: ±12 digit) (*2)
	Temp. Coefficient (*3)	±71.4 ppm / °C (0.00714% / °C)
Conversion Speed		10ms / channel

Insulation

Isolated Part	Insulation Method	Dielectric Withstand Voltage	Isolation Voltage
Between I/O Terminal and Programmable Controller Power Supply	Transformer Isolation	500VAC rms, 1min	500VDC 10MΩ or more
Between Analog Input Channels		1000VAC rms, 1min.	
Between External Power Supply and Analog Input		500VAC rms, 1min	

I/O Device Points Occupied	16 points
Connected Terminal	18 points terminal block
Connector Type	A6CON4
Internal Current Consumption (5VDC)	0.42 A
External Power Supply	24VDC +20%, -15%; Ripple, spike within 500mVp-p; Inrush current: 5.0A, within 400µs; 0.36A
Weight (kg)	0.22
Base Unit Slots Occupied	1

Notes:
1. Accuracy of offset/gain setting at ambient temperature.
2. "digit" indicates a digital value.
3. Accuracy per temperature change of 1°C. Example: Accuracy when temperature changes from 25 to 30°C 0.1% (reference accuracy) + 0.00714 % / °C (temperature coefficient) x 5°C (temperature change difference) = 0.1357%

High Resolution Isolated Analog Input Module with Signal Conditioning Function

Model Number			**Q62AD-DGH**
Stocked Item			S
Certification			CE
Connecting Section With 2-Wire Transmitter	**Input**	**Number of Analog Input**	2 points (2 channels)
		Analog Input	4 to 20 mADC (*1) (Input resistance 250Ω)
	Supply Power	**Supply Voltage**	26 ±2VDC
		Maximum Supply Current	24mADC
		Short-Circuit Protection	Available; Limit current: 25 to 35mA
	Check Terminals		Available
Digital Output			16-bit signed binary (-768 to 32767); 32-bit signed binary (-1538 to 65535)
I/O Characteristics Maximum Resolution			See table below
Accuracy (Accuracy Relative to Full-Scale)	**Reference Accuracy (*2)**		±0.05%; Digital output value(32 bit): ±32 digit; Digital output value (16 bit): ±16 digit (*3)
	Temp. Coefficient (*4)		±71.4 ppm / °C (0.00714% / °C)
Conversion Speed			10ms / 2 channels
Insulation			See table below
I/O Device Points Occupied			16 points
Connected Terminal			18 points terminal block
Applicable Solderless Terminals			R1.25-3 (A solderless terminals with sleeves cannot be used)
Internal Current Consumption (5VDC)			0.33 A
External Power Supply			24VDC +20%, -15%; Ripple, spike within 500mVp-p; Inrush current: 5.5A, within 200µs; 0.19A
Weight (kg)			0.19
Base Unit Slots Occupied			1

I/O Characteristics Maximum Resolution

Analog Input Range	Maximum Resolution		Digital Output Value (32-Bit)	Digital Output Value (16-Bit)
	32-Bit	16-Bit		
4 to 20mA	250.0nA	500.0nA	0 to 64000	0 to 32000
User range Setting	151.6nA	303.2nA		

Insulation

Isolated Part	Insulation Method	Dielectric Strength	Isolation Voltage
Between I/O Terminal and PLC Power Supply	Photocoupler Insulation	1780 VAC rms / 3 cycles (elevation 2000m)	500 VDC 10MΩ or more
Between Analog Input Channels	Transformer Isolation		
Between External Power Supply and Analog Input	Transformer Isolation		

Notes:
1. User range setting is 2 to 24mA.
2. Accuracy of offset/gain setting at ambient temperature. Q62AD-DGH needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).
3. "Digit" indicates a digital output value.
4. Accuracy per temperature change of 1°C.
   Example: Accuracy when temperature change from 25 to 30°C. 0.05% (reference accuracy + 0.00714% / °C (temperature coefficient) x 5 °C (temperature change difference) = 0.0857%

Combination Analog Module

Model Number		**Q64AD2DA**
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Input Points		4 points (4 channels)
Analog Input	**Voltage**	-10 to 10VDC (input resistance value 1MΩ)
	Current	0 to 20mADC (input resistance value 250Ω)
Digital Output		Normal resolution mode:-96 to 4095, -4096 to 4095, -1096 to 4595 High resolution mode:-384 to 16383, -288 to 12287, -16384 to 16383, -3288 to 13787

I/O Characteristics Maximum Resolution

Analog Input Range		Normal Resolution Mode		High Resolution Mode	
		Digital Output Value	Max. Resolution	Digital Output Value	Max. Resolution
Voltage	0 to 10V	0 to 4000	2.5mV	0 to 16000	0.625mV
	0 to 5V		1.25mV	0 to 12000	0.416mV
	1 to 5V		1.0mV	0 to 12000	0.333mV
	-10 to 10V	-4000 to 4000	2.5mV	-16000 to 16000	0.625mV
	1 to 5V (Extended Mode)	-1000 to 4500	1.0mV	-3000 to 13500	0.333mV
Current	0 to 20mA	0 to 4000	5μA	0 to 12000	1.66μA
	4 to 20mA		4μA		1.33μA
	4 to 20mA (Extended Mode)	-1000 to 4500	4μA	-3000 to 13500	1.33μA

Accuracy (Accuracy of Digital Output Value Relative to Maximum Value) (*1)

Analog Input Range		Normal Resolution Mode		High Resolution Mode	
		Ambient Temperature 0 to 55°C	Ambient Temperature 25 ±5°C	Ambient Temperature 0 to 55°C	Ambient Temperature 25 ±5°C
Voltage	0 to 10V	±0.4% (±16 digit)	±0.1% (±4 digit)	±0.4% (±64 digit)	±0.1% (±16 digit)
	-10 to 10				
	0 to 5V			±0.4% (±48 digit)	±0.1% (±12 digit)
	1 to 5V				
	1 to 5V (Extended Mode)				
Current	0 to 20mA				
	4 to 20mA				
	4 to 20mA (Extended Mode)				

Conversion Time		500 μs/channel
Absolute Maximum Input		Voltage: ±15V, current: ±30mA (*2)
Number Of Analog Output Points		2 points (2 channels)
Digital Input		Normal resolution mode: -96 to 4095, -4096 to 4095; High resolution mode: -288 to 12287, -16384 to 16383
Analog Output	**Voltage**	-10 to 10VDC (External load resistance: 1MΩ)
	Current	0 to 20mADC (External load resistance: 600Ω)

I/O Characteristics Maximum Resolution

Analog Output Range		Normal Resolution Mode		High Resolution Mode	
		Digital Input Value	Maximum Resolution	Digital Input Value	Maximum Resolution
Voltage	0 to 5V	0 to 4000	1.25 mV	0 to 12000	0.416 mV
	1 to 5V		1.0 mV		0.333 mV
	-10 to 10V	-4000 to 4000	2.5 mV	-16000 to 16000	0.625 mV
Current	0 to 20 mA	0 to 4000	5μA	0 to 12000	1.66μA
	4 to 20 mA		4μA		1.33μA

Accuracy (Accuracy With Respect To Maximum Analog Output Value)

Analog Output Range		Ambient Temperature	
		0 to 55°C	25 ±5°C
Voltage	0 to 5V	±0.3% (±30mV)	±0.1% (±10mV)
	1 to 5V		
	-10 to 10V		
Current	0 to 20 mA	±0.3% (±60 μA)	±0.1% (±20 μA)
	4 to 20 mA		

Conversion Speed	500 μs/channel
Absolute Maximum Output	Voltage: 12V Current: 21mA
Output Short Circuit Protection	Available
I/O Device Points Occupied	16 points (I/O assignment: Intelligent 16 points)
Connected Terminals	18 points terminal block
Applicable Solderless Terminal	A/D conversion part, D/A conversion part: R1.25-3 (Solderless terminals with sleeves are unavailable.) External power supply 24VDC, FG terminal connection: Not available
External Supply Power	24VDC 15%; Ripple, spike 500mVP-P or less; Inrush current: 2.5A 150μs or less; Current consumption: 0.19A
Internal Current Consumption (5VDC)	0.17A
Weight (kg)	0.23
Base Unit Slots Occupied	1

Notes:

1. A1: The selection ranges and accuracies have the following relationships.

Ambient Temperature	Temperature Range		
	Pt100 and JPt100 : -20 to 120°C	Pt100 : -200 to 850°C	JPt100 : -180 to 600°C
0 to 55°C	±0.3°C	±2.125°C	±1.5°C
25 ±5°C	±0.096°C	±0.68°C	±0.48°C

The conversion speed is a period from when a temperature is input and converted into a corresponding digital value until the value is stored into the buffer memory. When two or more channels are used, the conversion speed is "40ms number of conversion enabled channels".

2. For output in the case of disconnection detection, select any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range - 5% of measured temperature range)" or "Given value".

Analog Output Modules

Analog output modules allow the CPU to convert digital program values to real world analog current or voltage signals. These can then be used to control actuators whose properties vary between set limits, such as valve openings, speed control, extension distance, etc.

Model Name		Q62DAN	Q64DAN	Q68DAVN	Q68DAIN
Stocked Item		S	S	S	S
Number Of Analog Output Points		2 points (2 channels)	4 points (4 channels)	8 points (8 channels)	
Digital Input		16-bit signed binary (normal resolution mode: -4096 to 4095, High resolution mode: -12288 to 12287, -16384 to 16383)			
Analog Output	Voltage	-10 to 10VDC (External load resistance value: 1KΩ to 1MΩ)			-
	Current	0 to 20 mA DC (External load resistance value: 0Ω to 600Ω)		-	0 to 20 mA DC (External load resistance value: 0Ω to 600Ω)
I/O Characteristics, Maximum Resolution					
Accuracy (Accuracy With Respect To Maximum Analog Output Value)	Ambient Temp. 25 ±5°C	Within ± 0.1 % (Voltage: ±10 mV, Current: ± 20μA)			
	Ambient Temp. 0 to 55°C	Within ± 0.3 % (Voltage: ± 30 mV, Current: ± 60μA)			
Conversion Speed		80μs/channel			
Output Short Circuit Protection		Available			
I/O Device Points Occupied		16 points (I/O assignment: Intelligent 16 points)			
Connected Terminals		18-points terminal block			
Applicable Solderless Terminal		R1.25-3 (A solderless terminal with sleeve cannot be used)		FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A; Other terminals than FG: R1.25-3 (A solderless terminal with sleeve cannot be used)	
External Supply Power		24VDC + 20 %, -15 %			
		Ripple, spike 500 mV P-P or less			
		Inrush current: 2.5 A, within 250μs	Inrush current: 2.5 A, within 260μs	Inrush current: 2.5 A, within 230μs	Inrush current: 2.5 A, within 230μs
		0.15 A	0.24 A	0.20 A	0.27 A
Internal Current Consumption (5VDC)		0.33 A	0.34 A	0.38 A	0.38 A
Weight (kg)		0.19	0.20	0.20	0.20
Base Unit Slots Occupied		1			

Analog Output Range		Normal Resolution Mode		High Resolution Mode	
		Digital Input Value	Max. Resolution	Digital Input Value	Max. Resolution
Voltage	0 to 5V	0 to 4000	1.25 mV	0 to 12000	0.416 mV
	1 to 5V		1.0 mV		0.333 mV
	-10 to 10V	-4000 to 4000	2.5 mV	-16000 to 16000	0.625 mV
	User Range Setting		0.75 mV	-12000 to 12000	0.333 mV
Current	0 to 20 mA	0 to 4000	5μA	0 to 12000	1.66μA
	4 to 20 mA		4μA		1.33μA
	User Range Setting	-4000 to 4000	1.5μA	-12000 to 12000	0.83μA

D/A Converter Module

Model Number		Q64DAH
Stocked Item		-
Number of Analog Output Points		4 points (4 channels)
Digital Input	Input	-20480 to 20479
	Using the Scaling Function	-32768 to 32767
Analog Output	Voltage	-10 to 10VDC (external load resistance 1kΩ to 1MΩ)
	Current	0 to 20mADC (external load resistance 0Ω to 600Ω)
I/O Characteristics, Maximum Resolution (*1)		See nested table below
Accuracy (Accuracy for the Maximum Value of Analog Output Value) (*2)	Ambient Temperature 25 ±5°C	Within ±0.1% (voltage: ±10mV, current: ±20μA)
	Ambient Temperature 0 to 55°C	Within ±0.3% (voltage: ±30mV, current: ±60μA)
Conversion Speed	Normal Output Mode	20μs/channel
	Wave Output Mode	50μs/channel, 80μs/channel
Number of Offset/Gain Settings		Up to 50000 counts
Output Short Protection		Protected
Insulation Method		Between I/O terminals and programmable controller power supply: photocoupler isolation; Between output channels: no isolation; Between external power supply and analog output: transformer isolation
Dielectric Withstand Voltage		Between I/O terminals and programmable controller power supply: 500VAC rms for 1 minute; Between external power supply and analog output: 500VAC rms for 1 minute
Insulation Resistance		Between I/O terminals and programmable controller power supply: 500VDC 10MΩ or higher
Number of Occupied I/O Points		16 points (I/O assignment: 16 points for intelligent)
Connected Terminal		18-point terminal block
Applicable Wire Size		0.3 to 0.75mm²
Applicable Solderless Terminal		R1.25-3 (solderless terminals with sleeve are not usable)
External Power Supply	24VDC +20%, -15%	24VDC +20%, -15%
	Ripple, Spike 500mVP-P or Lower	Ripple, spike 500mVP-P or lower
	Inrush Current: 4.3A, 1000μs or Shorter	Inrush current: 4.3A, 1000μs or shorter
	Current Consumption: 0.18A	Current consumption: 0.18A
Internal Current Consumption (5VDC)		0.12A
Weight (kg)		0.19

I/O Characteristics, Maximum Resolution (*1)

Analog Output Range		Digital Value	Maximum Resolution
Voltage	0 to 5V	0 to 20000	250μV
	1 to 5V		200μV
	-10 to10V	-20000 to 20000	500μV
	User range setting		333μV
Current	0 to 20mA	0 to 20000	1000nA
	4 to 20mA		800nA
	User range setting	-20000 to 20000	700nA

Notes:
1. For details on the I/O conversion characteristics, refer to I/O conversion characteristic of D/A conversion in the User's Manual.
2. Except when receiving noise influence. Warm up (power on) the module for 30 minutes to satisfy the accuracy shown in the table.

Isolated Analog Output Modules with Output Monitor

Model Number		**Q62DA-FG**
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Outputs		2 points (2 channels)
Digital Input		16-bit signed binary (-12288 to 12287, -16384 to 16383)
Analog Output	**Voltage**	-12 to 12VDC (External load resistance 1k to 1MΩ)
	Current	0 to 20 mADC (External load resistance: 0 to 600Ω); 0 to 22 mADC
I/O Characteristics Maximum Resolution		See table below
Accuracy (Accuracy Relative to Maximum Analog Output Value)	**Reference Accuracy (*1)**	within ±0.1%; (Voltage: ±10mV, Current: ±20μA)
	Temp. Coefficient (*2)	±80 ppm / °C (0.008% / °C)
Conversion Speed		10ms / 2 channels
Output Monitor	**Resolution**	12 bit
	Reference Accuracy (*1)	±0.2%
	Temperature Coefficient (*2)	±160ppm / °C (0.016% / °C)
Output Short-Circuit Protection		Available
I/O Device Points Occupied		16 points
Isolation Specifications		See table below
Connected Terminal		18 points terminal block
Applicable Solderless Terminals		R1.25-3 (A solderless terminals with sleeves cannot be used)
Internal Current Consumption (5VDC)		0.37A
External Power Supply		24VDC +20%, -15%; Ripple, spike within 500mVp-p; Inrush current: 5.2A, within 300μs, 0.3A
Weight (kg)		0.20
Base Unit Slots Occupied		1

I/O Characteristics Maximum Resolution

	Analog Output Range	Digital Input Value	Maximum Resolution
Voltage	0 to 5V	0 to 12000	0.416mV
	1 to 5V		0.333mV
	-10 to 10V	-16000 to 16000	0.625mV
	User Range Setting 2	-12000 to 12000	0.366mV
	User Range Setting 3		0.183mV
Current	0 to 20 mA	0 to 12000	1.66μA
	4 to 20 mA		1.33μA
	User Range Setting 1	-12000 to 12000	0.671μA

Isolation Specifications

Isolated Part	Isolation Method	Dielectric Strength	Insulation Resistance
Between I/O Terminal and Controller Power Supply	Photocoupler Insulation	1780VAC rms / 3 cycles (elevation 2000m)	500VDC 10MΩ or more
Between Analog Output Channels	Transformer Isolation		
Between External Power Supply and Analog Output	Transformer Isolation		

Notes:
1. Accuracy of offset/gain setting at ambient temperature Q62AD-DGH needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).
2. Accuracy per temperature change of 1°C.
   Example: Accuracy when temperature change from 25 to 30°C. 0.1% (reference accuracy + 0.008% / °C (temperature coefficient) x 5 °C (temperature change difference) = 0.14%

Model Number		Q66DA-G
Stocked Item		S
Certification		UL • cUL • CE
Number of Analog Outputs		6 points (6 channels)
Digital Input		16-bit signed binary (normal resolution mode:-4096 to 4095; high resolution mode: -12288 to 12287, -16384 to 16383)
Analog Output	Voltage	-12 to 12VDC (External load resistance 1k to 1MΩ)
	Current	0 to 20 mADC (External load resistance: 0 to 600Ω); 0 to 22 mADC (*3)

I/O Characteristics Maximum Resolution

Input	Analog Input Range	Normal Resolution Mode		High Resolution Mode	
		Digital Input Value	Max. Resolution	Digital Input Value	Max. Resolution
Voltage	0 to 5V	0 to 4000	1.25mV	0 to 12000	0.416mV
	1 to 5V		1.0mV		0.333mV
	-10 to 10V	-4000 to 4000	2.5mV	-16000 to 16000	0.625mV
	User Range Setting 2		.075mV	-12000 to 12000	0.400mV
	User Range Setting 3		0.375mV		0.210mV
Current	0 to 20 mA	0 to 4000	5μA	0 to 12000	1.66μA
	4 to 20 mA		4μA		1.33μA
	User Range Setting 1	-4000 to 4000	1.5μA	-12000 to 12000	0.95μA

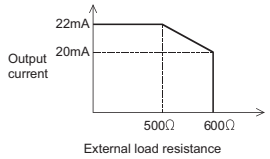
Accuracy (Accuracy Relative to Maximum Analog Output Value)	Reference Accuracy (*1)	within ±0.1%; (Voltage: ±10mV, Current: ±20μA)
	Temp. Coefficient (*2)	±80 ppm / °C (0.008% / °C)
Conversion Speed		6ms / channels
Output Monitor	Resolution	15-bit
	Reference Accuracy (*1)	±0.1%
	Temperature Coefficient (*2)	0.008% / °C
Output Short-Circuit Protection		Available
I/O Device Points Occupied		16 points

Isolation Specifications

Isolated Part	Isolation Method	Dielectric Strength	Insulation Resistance
Between Output Terminal and Controller Power Supply	Transformer Isolation	500VAC rms, 1 min.	500VDC 10MΩ or more
Between Analog Output Channels		1000VAC rms, 1 min.	
Between External Power Supply and Analog Output		500VAC rms, 1 min.	

Connected Terminal	40-pin connector
Applicable Solderless Terminals	R1.25-3 (A solderless terminals with sleeves cannot be used)
Internal Current Consumption (5VDC)	0.62A
External Power Supply	24VDC, +20%, -15%; Ripple, spike within 500 mV p-p; Inrush current: 4.8A, within 400μs; 0.22A
Weight (kg)	0.22
Base Unit Slots Occupied	1

Notes:
1. Accuracy of offset/gain setting at ambient temperature Q66DA-G needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).
2. Accuracy per temperature change of 1 °C
   Example: Accuracy when temperature changes from 25 to 30 °C
   0.1% (Reference accuracy) + 0.008%/ °C (temperature coefficient) x 5 °C (temperature change difference) = 0.14%
3. The following indicates the external load resistance when output current is 20mA or more.



HART Interface Module

The Q Series HART® Interface I/O Modules provide total access to process data and device diagnostics from over 1000 HART enabled field devices. The system is designed to use the 4-20mA (or 0-20mA) control signal from traditional analog devices as well as the 4-20mA and digital process data from HART devices, allowing up to 5 (1 analog, 4 digital process variables) control points on a single 2-wire connection.

Model Number		ME1AD8HAI-Q
Stocked Item		-
Number of Analog Input Points		8 points (8 channels)
Analog Input	Current	0 to 20 mA DC • 4 to 20 mA DC
	Absolute Maximum Input	± 30 mA
	Input Resistance	250Ω
	Short-Circuit Protection	Available
	Primary Filter	Hz (3 dB), HART signal is 1200 Hz with 1 mAP-P
Digital Output		16-bit signed binary (–768 to 32767)
I/O Characteristics, Maximum Resolution		<table><tr><th>Analog Input Range</th><th>Digital Output Value</th><th>Maximum Resolution</th></tr><tr><td>0 to 20 mA</td><td rowspan="2">0 to 32000</td><td>625.0 nA</td></tr><tr><td>4 to 20 mA</td><td>500.0 nA</td></tr></table>
Accuracy (Relative to Digital Output Value) (*1)		±0.15% (±48 digit) (*2)
Cycle Time		80 ms (Independent to the number of used channels)
Insulation Method	Between the I/O Terminals and PLC Power Supply	Photocoupler insulation
	Between Analog Input Channels	Non-insulated
HART Modem		FSK Physical Layer, multiplexed
HART Functions		Protocol Revision 6 support • 4 Process variables support (PV, SV, TV, QV) • FDT/DTM support
Number of I/O Occupied Points		32 points (I/O assignment: Intelligent 32 points)
External Wiring Connection System		18-points terminal block
Applicable Wire Size		Refer to the HART specification for more details. The external power supply voltage of the ME1AD8HAI-Q should be enough for correct operation of the analog transmitter. (*3, *4)
Applicable Solderless Terminals		R1.25-3 (Solderless terminals with sleeves cannot be used)
External Supply Power	Voltage	24VDC (+20%, -15%); ripple, spike within 500mVP-P
	Current (A)	0.3
	Inrush Current	5.5 A within 200 µs
Online Module Change		Not supported
Internal Current Consumption (5VDC) (A)		0.32
Weight (kg)		0.19
Base Unit Slots Occupied		1

Notes:
1. ME1AD8HAI-Q needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).
2. "digit" indicates a digital value.
3. Use case: For distances up to 800 m, the wire size of 0.51 mm diameter with 115 nF/km cable capacitance and 36.7 nF/km cable resistance can be applied.
4. Refer to the calculation example shown in User's Manual (External wiring).

Load Cell Input Module

Model Number	Q61LD
Stocked Item	S
Certification	UL • cUL • CE
Number of Analog Inputs	1 point (1 channel)
Digital Output	32-bit signed binary; 0 to 10000
Analog Input Range (Load Cell Rated Output)	0.0 to 1.0mV/V, 0.0 to 2.0mV/V, 0.0 to 3.0mV/V
I/O Characteristics Maximum Resolution	<table><tr><th colspan="2">Analog Input Range</th><th>Digital Output Value</th><th>Maximum Weighing Capacity Output Value</th><th>Maximum Resolution</th></tr><tr><td rowspan="3">Load Cell Rated Output</td><td>0 to 1.0mV/V</td><td rowspan="3">0 to 10000</td><td rowspan="3">-99999 to 99999</td><td>0.5µA</td></tr><tr><td>0 to 2.0mV/V</td><td>1.0µA</td></tr><tr><td>0 to 3.0mV/V</td><td>1.5µA</td></tr></table>
Accuracy (Accuracy Relative to Maximum Analog Output Value)	Nonlineality: Within ±0.01%/FS (Ambient temperature 25°C); Zero drift: Within ±0.25µV/°C RTI; Gain drift: Within ±15 ppm/°C
Conversion Speed	10ms
Accuracy (Accuracy Relative to Analog Input (Load Cell Rated Output) of a Module)	Nonlineality: Within ±0.01%/FS (Ambient temperature 25°C); Zero drift: Within ±0.25µV/°C RTI; Gain drift: Within ±15 ppm/°C
I/O Device Points Occupied	16 points
Connected Terminal	18 point terminal block
Applicable Solderless Terminals	R1.25-3 (A solderless terminal cannot be used)
Internal Current Consumption (5VDC)	0.48A
External Power Supply	24VDC +20%, -15%; Ripple, spike within 500mVp-p; Inrush current: 5.2A, within 300µs, 0.3A
Weight (kg)	0.17
Base Unit Slots Occupied	1