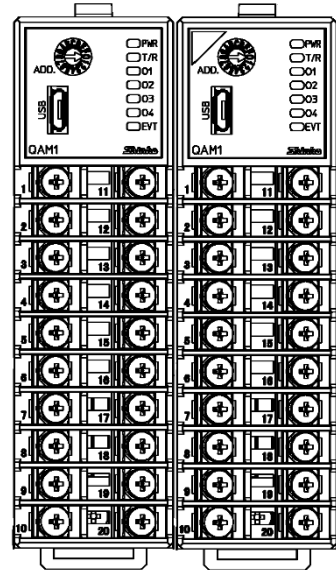# 4 points Analog I/O Module

Model: **QAM1-4**
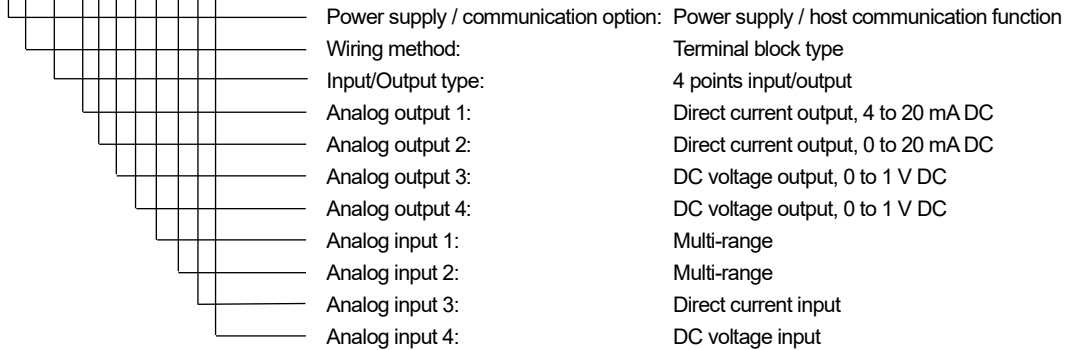
Features

● Analog input/output remote IO module with 4 points input or 4 points output
● Selectable from 4 points input, 4 points output or 4 points input/output
● Multi-range for analog input (excluding a part of Direct current and DC voltage)
● Insulation, Power – Analog input – Analog output
● Insulated between analog inputs
● Selectable from MODBUS/RTU or CUnet for Host communication
● Changeble input type and scaling with setting software
● When the dedicated setting software is used, power can be supplied to the QAM1-4 by PC via USB

■ Model

(e.g.) QAM1 - 4 P T - 2 - A 0 V V M M A V

Power supply / communication option:	Power supply / host communication function
Wiring method:	Terminal block type
Input/Output type:	4 points input/output
Analog output 1:	Direct current output, 4 to 20 mA DC
Analog output 2:	Direct current output, 0 to 20 mA DC
Analog output 3:	DC voltage output, 0 to 1 V DC
Analog output 4:	DC voltage output, 0 to 1 V DC
Analog input 1:	Multi-range
Analog input 2:	Multi-range
Analog input 3:	Direct current input
Analog input 4:	DC voltage input

QAM1 - 4	□	□	–□	–□	□	□	□	□	□	□	□	
Power supply / communication options	0											No options
	P											Power supply / host communication function
	C											Power supply / CUnet communication function
Wiring method		T										Terminal block type
Input/Output type (*)			–0									4 points input
			–1									4 points output
			–2									4 points input/output
Analog output 1				–□								See output code table
Analog output 2					□							
Analog output 3						□						
Analog output 4							□					
Analog input 1								□				See input code table
Analog input 2									□			
Analog input 3										□		
Analog input 4											□	

(*): If output (input) code is selected for model dedicated to input (output) type, it is invalid.

Output Codes

Code	Output Type
A	Direct current output, 4 to 20 mA DC
0	Direct current output, 0 to 20 mA DC
V	DC voltage output, 0 to 1 V DC
1	DC voltage output, 0 to 5 V DC
2	DC voltage output, 1 to 5 V DC
3	DC voltage output, 0 to 10 V DC
N (*)	No output

(*): Output code N is valid only when I/O type 0 (Input 4 points) is selected.

Input Codes

Code	Input Type		Range
M	Thermocouple	K	-200 to 1370℃
		K	-200.0 to 400.0℃
		J	-200 to 1000℃
		R	0 to 1760℃
		S	0 to 1760℃
		B	0 to 1820℃
		E	-200 to 800℃
		T	-200.0 to 400.0℃
		N	-200 to 1300℃
		PL-Ⅱ	0 to 1390℃
		C	0 to 2315℃
		K	-328 to 2498℉
		K	-328.0 to 752.0℉
		J	-328 to 1832℉
		R	32 to 3200℉
		S	32 to 3200℉
		B	32 to 3308℉
		E	-328 to 1472℉
		T	-328.0 to 752.0℉
		N	-328 to 2372℉
		PL-Ⅱ	32 to 2534℉
		C	32 to 4199℉
	RTD	Pt100	-200.0 to 850.0℃
		Pt100	-328.0 to 1562.0℉
	DC voltage	0 to 1 V DC	-2000 to 10000
	Direct current	4 to 20 mA DC (Externally mounted shunt resistor)	-2000 to 10000
		0 to 20 mA DC (Externally mounted shunt resistor)	-2000 to 10000
A	Direct current	4 to 20 mA DC (Built-in shunt resistor)	-2000 to 10000
		0 to 20 mA DC (Built-in shunt resistor)	-2000 to 10000
V	DC voltage	0 to 5 V DC	-2000 to 10000
		1 to 5 V DC	-2000 to 10000
		0 to 10 V DC	-2000 to 10000
N (*)	No input		

(*): Output code N is valid only when I/O type 0 (Input 4 points) is selected.

■ Accessories Sold Separately

Product Name	Model
50 Ω shunt resistor	RES-S01-050
Front terminal cover	TC-QTC
Termination resistor 100 Ω	RES-S07-100

■ Rating

Rated Scale

Input (TC)	Scale Range		Resolution	Input (RTD)	Scale Range		Resolution
K	-200 to 1370℃	-328 to 2498℉	1℃(℉)	Pt100	-200.0 to 850.0℃	-328.0 to 1562.0℉	0.1℃(℉)
K	-200.0 to 400.0℃	-328.0 to 752.0℉	0.1℃(℉)				
J	-200 to 1000℃	-328 to 1832℉	1℃(℉)				
R	0 to 1760℃	32 to 3200℉	1℃(℉)				
S	0 to 1760℃	32 to 3200℉	1℃(℉)	Input (DC)	Scale Range		Resolution
B	0 to 1820℃	32 to 3308℉	1℃(℉)	4 to 20 mA			
E	-200 to 800℃	-328 to 1472℉	1℃(℉)	0 to 20 mA			
T	-200.0 to 400.0℃	-328.0 to 752.0℉	0.1℃(℉)	0 to 1 V	-32768～32767 (*)		1
N	-200 to 1300℃	-328 to 2372℉	1℃(℉)	0 to 5 V			
PL-Ⅱ	0 to 1390℃	32 to 2534℉	1℃(℉)	1 to 5 V			
C	0 to 2315℃	32 to 4199℉	1℃(℉)	0 to 10 V			

(*) Scalable   (Scale with 16-bit code)

Input

|	
Thermocouple (TC)	K, J, R, S, B, E, T, N, C (JIS C1602-2015), PL-Ⅱ (ASTM E1751M-15) External resistance: 100 Ω or less (However, B input: 40 Ω or less)
RTD	Pt100, 3-wire type (JIS C1604-2013) Allowable input lead wire resistance: 10 Ω or less per wire
Direct current (mA DC)	0 to 20 mA DC, 4 to 20 mA DC Input impedance: 50 Ω (Shunt resistance) Allowable input current: 50 mA or less
DC voltage (V DC)	0 to 1 V DC Input impedance: 1 MΩ or more Allowable input voltage: 5 V DC or less Allowable signal source resistance: 2 kΩ or less 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC Input impedance: 100 kΩ or more Allowable input voltage: 15 V DC or less Allowable signal source resistance: 100 Ω or less

■ Performance

|		
Input basic accuracy		At ambient temperature of 23℃ and mounting angle of ±5 degrees
	Thermocouple	Within ±0.2% of each input span However, below 0℃ (32℉): Within ±0.4% of each input span R, S inputs, 0 to 200℃ (32 to 392℉): Within ±6℃ (12℉) B input, 0 to 300℃ (32 to 572℉): Accuracy is not guaranteed.
	RTD	Within ±0.1% of each input span
	Direct current	Within ±0.2% of each input span
	DC voltage	Within ±0.2% of each input span
Onput basic accuracy		At ambient temperature of 23℃ and mounting angle of ±5 degrees Within ±0.2% of each output span
Cold junction temperature compensation accuracy		Within ±1℃ at -10 to 50℃

Effect of ambient temperature		Thermocouple input (no decimal point): Within ±100 ppm/℃ of each input span
		                                Below 0℃ (32℉): Within ±200 ppm/℃ of each input span
		Thermocouple input (decimal point): Within ±200 ppm/℃ of each input span
		                                Below 0℃ (32℉): Within ±400 ppm/℃ of each input span
		Other: Within ±100 ppm/℃ of each input span
		Output: Within ±200 ppm/℃ of each output span

Effects of electromagnetic interference		Within ±1% of each input span / Within ±1% of each output span
Input sampling period		20 ms (with only DC voltage input and direct current input enabled) 50 ms (with only DC voltage input and direct current input enabled) 125 ms Note: Fixed to 125 ms regardless of settings for thermocouple input and RTD input
Collect cycle setting		20ms
Output circuit response time		100 ms or less (excluding 0 to 90% communication cycle time)

■ General Structure

Weight		Approx. 170 g
Dimensions		30 × 100 × 85 mm (W × H × D) (excl. protrusions)
		Depth with terminal cover attached: 95 mm
Mounting method		DIN rail mounting
Case		Flame-resistant resin, Color: Black
Panel		Polycarbonate sheet
Standards	EN	EN61010-1 (Pollution degree 2)
	EC (EMC directive)	EMI: EN61326
		Electric-field strength of radiated disturbance: EN55011 Group 1, Class A
		Terminal noise voltage: EN55011 Group 1, Class A
		EMS: EN61326

■ Terminal Arrangement
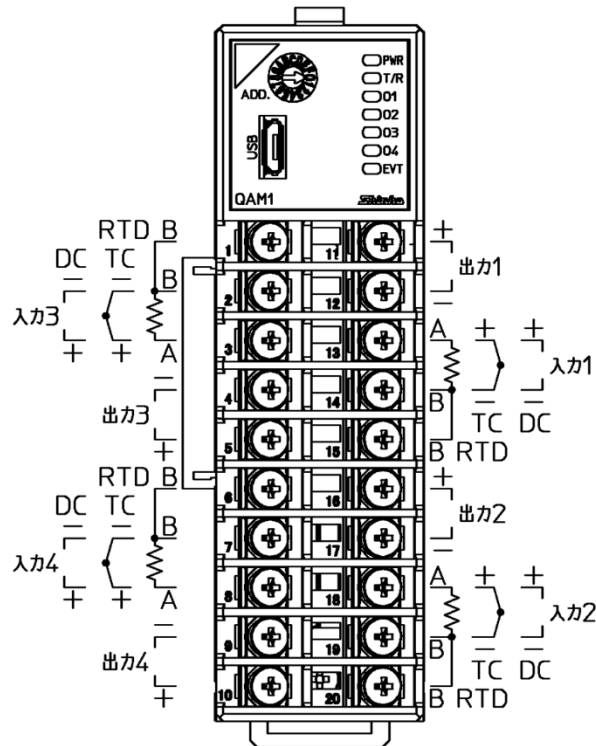
[Base] QAM1-4P
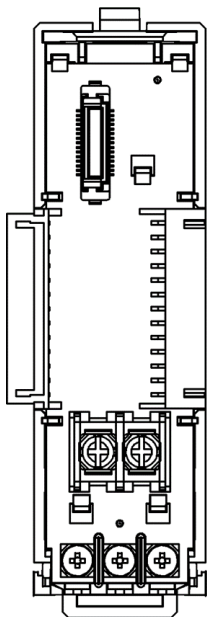
[Base] QAM1-4C
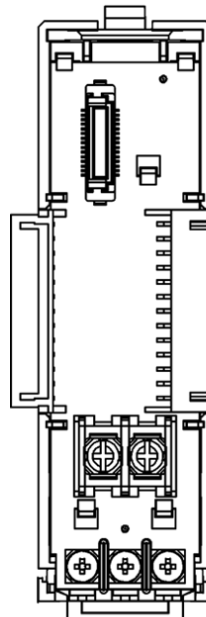
[Base] QAM1-40
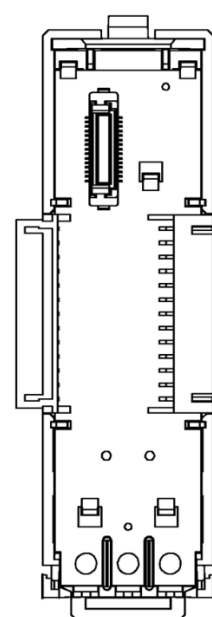
■ Indication Structure / Settings Structure

Action Indicator

Symbol (color)	Name, Task	Symbol (color)	Name, Task
PWR (green)	Power indicator Off: No power supplied to module On: Power supplied to module Flashing: Internal error during warm-up 　　　(Non-volatile memory, ADC input circuit)	O1 (green)	Analog output1 indicator 常時消灯
		O2 (green)	Analog output2 indicator 常時消灯
		O3 (green)	Analog output3 indicator 常時消灯
		O4 (green)	Analog output4 indicator 常時消灯
T/R (yellow)	Communication indicator Flashing: Normal communication, Communication error (reception error) Off: Communications error (no response), USB communication	EVT (red)	Event indicator Flashes in the event of a sensor error or overscale/underscale.

Switches, Connectors

	Symbol	Name, Task
	ADD.	Rotary switch for module address selection Use the rotary switch to select the module address from 0 to F (1 to 16).
	USB	Micro USB Type-B console communication connector
		DIP switches for selecting communications specification Use the DIP switches for selecting the communication speed, data bit, parity, stop bit, and communication protocol.
		Dip switch for CUnet communication specification setting Selectable station address, communication speed or master address and OWN item number by Dip switch mounted on base.

■ Standard Functions

Input scaling function (DC input only)

Responds PV in the range of -1 to 110% with the scale span that set the rated input (-2000 to 10000) for 0% of input scaling low limit to 100% of input scaling high limit.　However, if the value of -1 to 110% exceeds the range of -32768 to 32768, a value that is limited by -32768 or 32768 is responded. If the same value is set for high limit value and low limit value, it becomes a value on low limit value. Even if scaling is done, PV is limited within 16-bit code. When model dedicated to output type is selected in model selection, PV always becomes 0	
Setting range	-32768～32767

Output scaling function

The range of output amount (0 to 100%) can be set within the output scaling low limit and high limit. When the scaling high limit and scaling low limit are set to the same value, the output become 0% as low limit value. When the output amount is specified as any number outside the range, it is invalid and previous output amount is held. When model dedicated to input type is selected in model selection, analog output becomes OFF.	
Setting range	-32768～32767

Sensor Correction Coefficient

Setting the sensor input value slope is possible.	
Setting range	0.000～10.000 (Factory default: 1.000)

Sensor Correction

If the control location temperature and the sensor location temperature are different, shifting and correction of the PV is possible. (Valid whitin the rated input range regardless of the sensor correction value.)		
Setting range	Thermocouple, RTD input :	-100.0～100.0 ℃(-180.0～180.0 ℉)
	Direct current, DC voltage input	-1000～1000

■ Optional Functions

Power Supply / Host Communication Function (Power supply/communication option symbol: P)

Communication line	EIA RS-485 compliant
Communication method	Half-duplex communication
Communication speed	Selecting 9600, 19200, 38400, or 57600 bps is possible using the DIP switches. (Factory default: 57600 bps)
Synchronization method	Start-stop synchronization
Data bit/parity	Data bits: 8 Parity: Selecting even, odd, or no parity is possible using the communication specification selection DIP switch. (Factory default: 8 bits / Even)
Stop bit	Selecting 1 or 2 is possible using the communication specification selection DIP switch. (Factory default: 1)
Response delay time setting	0 to 1000 ms (Factory default: 0 ms) The response from the module after receiving a command from the host can be delayed.
Data structure	<table><tr><td>Communication protocol</td><td>MODBUS RTU</td></tr><tr><td>Start bit</td><td>1</td></tr><tr><td>Data bit</td><td>8</td></tr><tr><td>Parity</td><td>Enabled (even, odd), Disabled</td></tr><tr><td>Stop bit</td><td>1 or 2</td></tr></table>

Power Supply / CUnet Communication Function (Power supply / communication option symbol: C)

Connection form	Multidrop form	
Communication method	Half-duplex communication	
Synchronization method	Bit synchronization	
Error detection	CRC-16	
Exclusive slave address number	1	
Max connection node number	64 node	
Communication speed(※1) Communication distance	Communication speed	Network maximum length
	12Mbps	100m
	6Mbps	200m
	3Mbps	300m
Insulation method	Pulse transformder insulation	
Impedance	100Ω	
Termination resistor	End of wiring, set with Cunet slave No termination resistor is mounted in this instrument.	

■ Insulation / Dielectric Resistance

Circuit Insulation Configuration
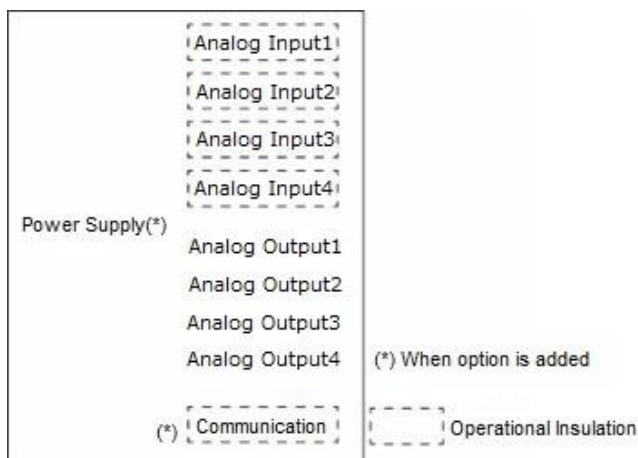
Insulation resistance	500 V DC, 10 MΩ or more
Dielectric resistance	Between input terminal and ground: 1.5 kV AC for 1 minute Between power terminal and ground: 1.5 kV AC for 1 minute Between power terminal and input terminal: 750 V AC for 1 minute

■ Environmental Conditions

Ambient temperature	-10 to 50℃ (Non-condensing, no icing)
Ambient humidity	35 to 85% RH (Non-condensing)
Altitude	2,000 m or less
Installation environment	Pollution Degree 2 (according to EN61010-1)
Memory protection	Non-volatile IC memory (write cycles: 1 million)
Environmental specifications	RoHS Directive Compliant

■ Attached Functions

Power failure countermeasures	Setting data is backed up to non-volatile IC memory.	
Self-diagnosis	The watchdog timer monitors runaway and halt of the program, and when an abnormality is detected, it resets the MCU and initializes the instrument.	
Automatic cold junction temperature Compensation	Detect the temperature at the connection terminal between the thermocouple and the instrument is detected and adjusted to be the same as if the reference contact were always at 0℃ (32℉). (Valid only for channels for which thermocouple input is selected)	
PV filter time constant setting	A digital first-order low-pass filter is used to reduce PV fluctuations caused by noise.	
Moving average count setting	Values that alter input values due to noise are averaged to stabilize the indicated values.	
Overscale	A status flag is set when overscale is detected. However, control continues during overscale.	
Underscale	A status flag is set when underscale is detected. However, control continues during underscale.	
Sensor error	A status flag is set when a sensor error is detected, and control output is turned OFF.	
Cold junction error	A cold junction error occurs when the internal cold junction temperature is below -10℃ (14℉) or above 50℃ (122℉). (Valid only for channels for which thermocouple input is selected)	
ADC error	If there is an error such as a failure in an internal circuit, the control output of the channel where the error occurred is turned OFF. When this occurs, the PV is 32767.	
Warm-up display	After the power is turned on, the power indicator flashes every 500 ms for about 3 seconds.	
Cumulative energization time measurement function	Checking the cumulative energization time is possible.	
Error history	In the event of an error, the bit ON/OFF status and energization time are saved. The 10 most recent errors are saved. Error history is available for each channel, and device common errors are saved in the all-channel error history.	
	Error details	Sensor error, Input error (overscale), Input error (underscale), Cold junction error, Non-volatile IC memory error, ADC error
Console communication	Connect a communication cable (commercially available) to the console communication connector to perform operation from an external computer using the console software.	
	Operations that can be performed	(1) Reading and configuration of various setting values (2) Reading of PV and operating statuses
	Communication protocol	MODBUS RTU
	Communication cable	USB to Micro USB Type-B (Commercially available)
	Software	Console software
Firmware update function	Connect the communication cable (commercial item) to the console communication connector, and use the console software to update the functions from an external computer.	

■ Other

Power supply voltage	24 V DC Allowable fluctuation range: 20 to 28 V DC
Power consumption	5 W or less
Rush current	Max. 10 A
Accessories included	Line cap (1), Power supply terminal cover (for devices with power supply / host communication function) (1), Mounting and wiring instruction manual (1)
Instruction manual	Please download the full Instruction Manual from the Shinko website. https://shinko-technos.co.jp/e/

■ Dimensions (Scale: mm)

Main Unit

QAM1-4PT-0-NNNN□□□□
QAM1-4PT-1-□□□□NNNN
QAM1-4PT-2-□□□□□□□□
QAM1-4CT-0-NNNN□□□□   QAM1-4OT-0-NNNN□□□□
QAM1-4CT-1-□□□□NNNN   QAM1-4OT-1-□□□□NNNN
QAM1-4CT-2-□□□□□□□□   QAM1-4OT-2-□□□□□□□□

Terminal cover (sold separately)   DIN rail

Line cap (included)