

# HC10 Series Analog Module

## User Manual



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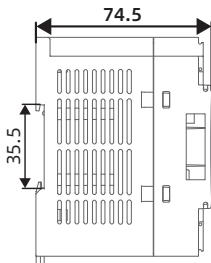
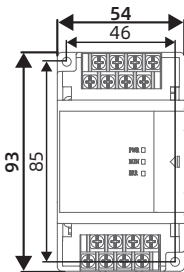
**Warning**

- **Be sure to check the terminal label carefully when wiring.**
- **Avoid installation in places exposed to direct sunlight, moisture, or water.**
- **Avoid installation in locations with flammable and explosive gases and liquids.**
- **Avoid installation in areas with oily dust, fibers and metal particles.**
- **Use rails or M3 screws for installation.**

## Size and Gross Weight

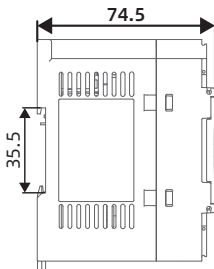
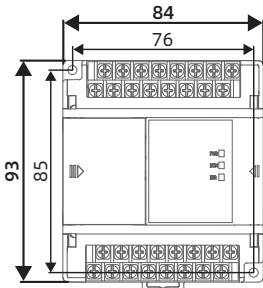
1

GW: 0.25kg



2

GW: 0.3kg

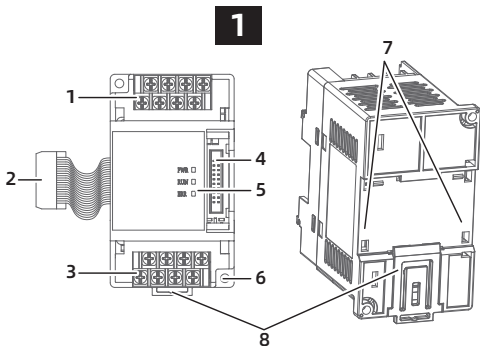


Unit: mm

## Structure Description

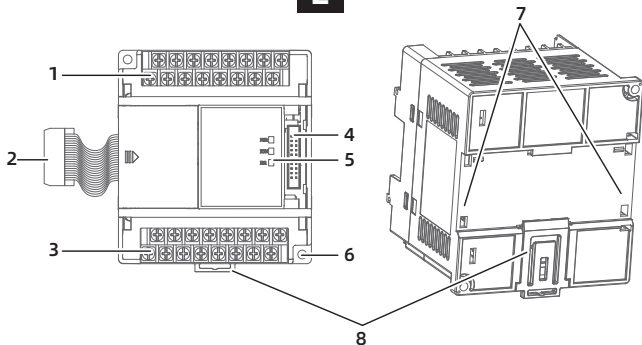
1/3	<b>Input and output terminal</b>
2	<b>Extension cable</b>
4	<b>Expansion port</b>
5	<b>Power/run/fault indicator LED</b>

6	<b>Mounting fixing hole (M3)</b>
7	<b>DIN guideway groove (35mm)</b>
8	<b>DIN rail fixing buckle</b>

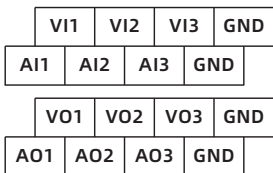


## Structure Description (Continued)

2



## L0303A Terminal Description



### Model

HC10-L0303A

### Analog Input

Voltage VI1 ~ VI3 (GND)

Current AI1 ~ AI3 (GND)

### Analog Output

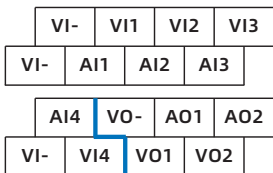
Voltage VO1 ~ VO3 (GND)

Current AO1 ~ AO3 (GND)

### Size and Structure

Size and structure Figure 1

## L0402A Terminal Description



### Model

HC10-L0402A

### Analog Input

Voltage VI1 ~ VI4 (VI-)

Current AI1 ~ AI4 (VI-)

### Analog Output

Voltage VO1, VO2 (VO-)

Current AO1, AO2 (VO-)

### Size and Structure

Size and structure Figure 1



## L0800A Terminal Description

VI1	.	VI2	.	VI3	.	VI4	.
AI1	GND	AI2	GND	AI3	GND	AI4	GND
AI5	GND	AI6	GND	AI7	GND	AI8	GND
.	VI5	.	VI6	.	VI7	.	VI8

### Model

HC10-L0800A

### Analog Input

Voltage VI1 ~ VI8 (GND)

Current AI1 ~ AI8 (GND)

### Size and Structure

Size and structure Figure 2

# Product Specifications

## General Specifications

<b>Environmental Temperature</b>	Run: -10 ~ +55°C Storage: -40 ~ +70°C
<b>Relative Humidity</b>	5 ~ 95%, no condensation
<b>Altitude</b>	Run: <2000m Storage: 0 ~ 3000m (not less than 70kPa)
<b>Pollution Level</b>	Pollution level 2

## Analog Input Specifications (L0303A/L0800A)

<b>Connection</b>	Barrier terminal block (end point distance: 7.62mm)	
<b>Form</b>	Voltage or current optional	
<b>Negative Common</b>	GND	
<b>Range</b>	Voltage: 0 ~ 10V	Current: 0 ~ 20mA
<b>Resistance</b>	Voltage: 31k $\Omega$	Current: 500 $\Omega$
<b>Resolution</b>	Voltage: 0.3125mV (10V / 32000)	Current: 0.625uA (20mA / 32000)
<b>Digital Input</b>	0 ~ 32000	
<b>Comprehensive Accuracy</b>	$\pm 1\%$ full range	

## Analog Input Specifications (L0402A)

<b>Connection</b>	Barrier terminal block (end point distance: 7.62mm)	
<b>Form</b>	Voltage or current optional	
<b>Negative Common</b>	VI-	
<b>Range</b>	Voltage: 0 ~ 5V, 0 ~ 10V -5 ~ +5V, -10 ~ +10V	Current: 0 ~ 20mA, 4 ~ 20mA -20 ~ +20mA
<b>Resistance</b>	Voltage: 1k $\Omega$	Current: 250 $\Omega$
<b>Resolution</b>	Voltage (V): Full range / 32000	Current (mA): Full range / 32000
<b>Digital Input</b>	-16000 ~ +16000, 0 ~ 32000	
<b>Comprehensive Accuracy</b>	$\pm 0.1\%$ full range	

## Analog Output Specifications (L0303A)

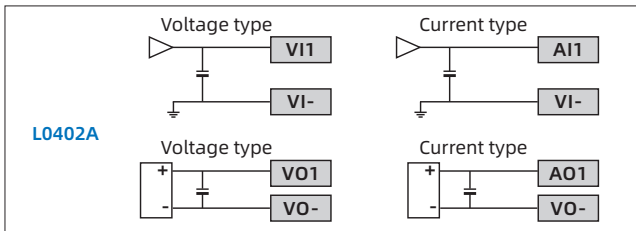
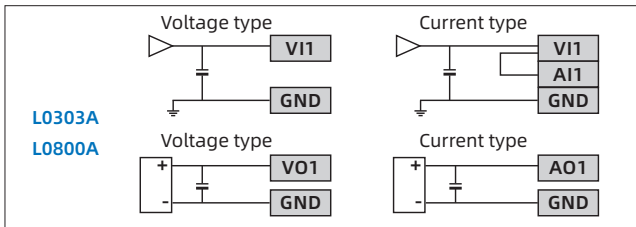
<b>Connection</b>	Barrier terminal block (end point distance: 7.62mm)	
<b>Form</b>	Voltage or current optional	
<b>Negative Common</b>	GND	
<b>Range</b>	Voltage: 0 ~ 10V	Current: 0 ~ 20mA
<b>Resistance</b>	Voltage: 2k $\Omega$ ~ 1M $\Omega$	Current: 0 ~ 500 $\Omega$
<b>Resolution</b>	Voltage: 0.3125mV (10V / 32000)	Current: 0.625uA (20mA / 32000)
<b>Digital Output</b>	0 ~ 32000	
<b>Comprehensive Accuracy</b>	$\pm 1\%$ full range	

## Analog Output Specifications (L0402A)

<b>Connection</b>	Barrier terminal block (end point distance: 7.62mm)	
<b>Form</b>	Voltage or current optional	
<b>Negative Common</b>	VO-	
<b>Range</b>	Voltage: 0 ~ 5V, 0 ~ 10V -5 ~ +5V, -10 ~ +10V	Current: 0 ~ 20mA, 4 ~ 20mA
<b>Resistance</b>	Voltage: 2k $\Omega$ ~ 1M $\Omega$	Current: <550 $\Omega$
<b>Resolution</b>	Voltage (V): Full range / 32000	Current (mA): Full range / 32000
<b>Digital Output</b>	-16000 ~ +16000, 0 ~ 32000	
<b>Comprehensive Accuracy</b>	$\pm 0.1\%$ full range	

## Instructions

1. Wiring the analog module and confirm that it is correct.



- Please isolate it from other power cables.
- If the analog input or output is disturbed by noise, it can be connected with 0.1 ~ 0.47uF/25V capacitor or a ferrite magnetic ring.

## Instructions (Continued)

2. After connecting all expansion modules with expansion module cables, the main module is powered up.
  - Connect up to 8.
  - According to the distance from the main module from near to far, the expansion modules are numbered 0, 1, 2, 3, 4, 5, 6, 7.
3. Write user instructions to achieve read and write functions.
  - See page 14 for instruction description.
  - See page 16 for the description of the module data address.
  - The configuration wizard function of HCStudio (programming software) can be used to configure the initial parameters of the module.



## Instruction Description (FROM, TO, RD3A)

### Read Input Data

#### FROM S1 S2 S3 S4

S1: Module number.

S2: Module data read starting address.

S3: Read the data storage register.

- When reading multiple data, the read data is stored sequentially from this address.

S4: Read data length.

### Write Output Data

#### TO S1 S2 S3 S4

S1: Module number.

S2: Module data write start address.

S3: Write the data register.

- When writing multiple data, write data sequentially from this address.

S4: Write data length.

## Instruction Description (FROM, TO, RD3A) (Continued)

### Read Analog Input Value

#### **RD3A S1 S2 S3**

S1: Module number.

S2: Analog input channel number.

- 0: AI1, VI1;
- 1: AI2, VI2;
- And so on.

S3: Store the analog input channel data set by S2.

*Note: The read value is the analog input value that refreshes the cache periodically. It is recommended to use this instruction to read the analog input.*

## Module Data Address Description (L0303A/L0800A)

HC10-L0303A		
Module Data Address	Data Content	Read/Write
0	Module type (0x20)	Read only
1	Software version (V100)	Read only
2 ~ 4	Reserved	/
5 ~ 7 <sup>1)</sup>	AI1 ~ AI3, VI1 ~ VI3	Read only
8 ~ 10 <sup>1)</sup>	AO1 ~ AO3, VO1 ~ VO3	Read and write
11 <sup>2)</sup>	Current and voltage selection	Read and write

HC10-L0800A		
Module Data Address	Data Content	Read/Write
0	Module type (0x21)	Read only
1	Software version (V100)	Read only
2 ~ 4	Reserved	/
5 ~ 12 <sup>1)</sup>	AI1 ~ AI8, VI1 ~ VI8	Read only
13 <sup>2)</sup>	Current and voltage selection	Read and write

1): 0.0 ~ 10.0V or 0.0 ~ 20.0mA, corresponding 0 ~ 32000.

2): 0 is voltage type (default), 1 is current type.

Set the channel in binary, starting from Bit0.

- Bit0 corresponds to AI1/VI1/AO1/VO1;
- Bit1 corresponds to AI2/VI2/AO2/VO2;
- And so on.

## Module Data Address Description (L0402A)

HC10-L0402A		
Module Data Address	Data Content	Read/Write
0	Module type (0x22)	Read only
1	Software version (V500)	Read only
2 ~ 4	Reserved	/
5 ~ 8	AI1 ~ AI4, VI1 ~ VI4	Read only
13, 14	AO1, AO2, VO1, VO2	Read and write
21, 22	Input filter coefficient	Read and write
25	Input range selection	Read and write
27	Output range selection	Read and write
29	Channel enable	Read and write

## Module Data Address Description (L0402A) (Continued)

### 21, 22: Input Filter Coefficient

Module Data Address	Bit15 ~ Bit8	Bit7 ~ Bit0
21	A12/VI2	A11/VI1
22	A14/VI4	A13/VI3

Can be set to 0 ~ 255.

- 0: No filtering (default);
- 1: The filtering effect is the weakest;
- 255: The filtering effect is the strongest and the data is the most stable, but it may cause data lag.

## Module Data Address Description (L0402A) (Continued)

### 25, 27: Input and Output Range

Module Data Address	Bit15 ~ Bit12	Bit11 ~ Bit8	Bit7 ~ Bit4	Bit3 ~ Bit0
25	AI4/VI4	AI3/VI3	AI2/VI2	AI1/VI1
27	/	/	AO2/VO2	AO1/VO1

The values set by each channel are shown in the table below.

Channel	Value	Range (Analog)	Range (Digital)
AI/VI AO/VO	0000	0 ~ 10V (default)	0 ~ 32000
	0001	0 ~ 5V	0 ~ 32000
	0100	-10 ~ +10V	-16000 ~ +16000
	0101	-5 ~ +5V	-16000 ~ +16000
	0010	0 ~ 20mA	0 ~ 32000
	0011	4 ~ 20mA	0 ~ 32000
AI/VI	0100	-20 ~ +20mA	-16000 ~ +16000

### 29: Channel Enable

Module Data Address	Bit15 ~ Bit12	Bit11	Bit10	Bit9	Bit8	Bit7 ~ Bit2	Bit1	Bit0
29	/	AI4/VI4	AI3/VI3	AI2/VI2	AI1/VI1	/	AO2/VO2	AO1/VO1

1 is enable (default), 0 is disable.

## Expansion Module Type

According to the distance from the main module from near to far, the expansion modules are numbered 0, 1, 2, 3, 4, 5, 6, 7.

<b>Number</b>	1st	2nd	3rd	4th
<b>Module Number</b>	0	1	2	3
<b>Mapped Address</b>	D8265	D8267	D8269	D8271
<b>Data</b>	0x20: L0303A, 0x21: L0808A, 0x22: L0402A			

<b>Number</b>	5th	6th	7th	8th
<b>Module Number</b>	4	5	6	7
<b>Mapped Address</b>	D8273	D8275	D8277	D8279
<b>Data</b>	0x20: L0303A, 0x21: L0808A			

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