Digital Scaling Panel Meter

A7000 Series

Features

- Mid-size 36 x 72 mm DIN size panel
- Dual-color LED (red/green) visually indicates the alarm status.
- The measurement range can be changed by switching the input range.
- Input, output, and power specifications selectable according to application
- Max. 1 ms high sampling rate (Approx. 1000 times/sec)
  *Depends on the input type

Ordering Code

A7 ① 1 ② - ③

Series	Power supply ①	Input ②	Output option ③	Description	
A7				A7000 series	
	1			100–240 V AC ±10%	
	2			12–48 V DC ±10%	
		1		DC voltage input	±99.99 mV / ±999.9 mV / ±9.999 V / ±99.99 V / ±700 V
		2		DC current input	±99.99 µA / ±999.9 µA / ±9.999 mA / ±99.99 mA
		3		DC large current input	±999.9 mA / ±2.000 A
		4		AC voltage input (True–RMS)	0–99.99 mV / 0–999.9 mV / 0–9.999 V / 0–99.99 V / 0–700.0 V
		5		AC current input (True–RMS)	0–99.99 µA / 0–999.9 µA / 0–9.999 mA / 0–99.99 mA
		6		AC large current input (True–RMS)	0–999.9 mA / 0–5 A
		7		Resistance input	0–99.99 Ω to 0–99.99 kΩ
		8		Temperature input	Thermocouple / RTD
		9		Frequency input	Open collector / Logic / Magnetic / AC voltage
		A		Load cell input	Strain gauge 350 Ω
		B		Process signal input	1–5 V / ±5 V / 4–20 mA / ±20 mA
			0	None	
			1	Comparator output (Relay contact) + External control	
			2	Comparator output (Photocoupler) + External control	
			3	BCD output (TTL) + External control	
			4	BCD output (Open collector) + External control	
			5	BCD output (TTL) + Comparator output (Photocoupler) + External control	
			6	BCD output (Open collector) + Comparator output (Photocoupler) + External control	
			7	Analog output (PWM) + External control	
			8	Analog output (PWM) + Comparator output (Photocoupler) + External control	
			9	RS-232C communication + External control	
			A	RS-485 communication + External control	
			B	RS-232C communication + Comparator output (Photocoupler) + External control	
			C	RS-485 communication + Comparator output (Photocoupler) + External control	

Input Specifications

■DC Measurement — Input code 1 2 3 B

Code	Range	Measurement range	Max. resolution	Input resistance	Max input	Accuracy
1	11	±99.99 mV	10 µV	Approx. 100 MΩ	±50 V	±(0.03% rdg + 1 digit)
	12	±999.9 mV	100 µV			
	13	±9.999 V	1 mV	Approx. 1 MΩ	±250 V	
	14	±99.99 V	10 mV	Approx. 10 MΩ		
	15	±700.0 V	100 mV		±700 V	±(0.1% rdg + 2 digit)
2	21	±99.99 µA	0.01 µA	Approx. 100 Ω	±10 mA	
	22	±999.9 µA	0.1 µA	Approx. 100 Ω		
	23	±9.999 mA	1 µA		±50 mA	
	24	±99.99 mA	10 µA	Approx. 1 Ω	±500 mA	
3	25	±999.9 mA	100 µA	Approx. 0.1 Ω	±3 A	
	26	±2.000 mA	1 mA			
B	1V	1–5 V	1 mV	Approx. 1 MΩ	±100 V	±(0.03% rdg + 2 digit)
	2V	±5 V				
	2A	4–20 mA	10 µA	Approx. 10 Ω	±50 mA	±(0.1% rdg + 3 digit)
	3A	±20 mA				

Power supply for sensor (Input Code B only)	24 V DC ±10% 25 mA

■AC Measurement — Input code 4 5 6

Code	Range	Measurement range	Max. resolution	Input resistance	Max. input	Accuracy
4	11	0–99.99 mV	10 µV	Approx. 100 MΩ	50 V	±(0.2% rdg + 20 digits)
	12	0–999.9 mV	100 µV			
	13	0–9.999 V	1 mV	Approx. 1 MΩ	250 V	
	14	0–99.99 V	10 mV	Approx. 10 MΩ		
	15	0–700.0 V	100 mV		700 V	±(0.3% rdg + 20 digits)
5	21	0–99.99 µA	0.01 µA	Approx. 100 Ω	10 mA	±(0.5% rdg + 20 digits)
	22	0–999.9 µA	0.1 µA	Approx. 10 Ω		
	23	0–9.999 mA	1 µA		50 mA	
	24	0–99.99 mA	10 µA	Approx. 1 Ω	500 mA	
6	25	0–999.9 mA	100 µA	Approx. 0.1 Ω	3 A	±(0.7% rdg + 20 digits)
	26	0–5 A	1 mA	(CT)	8 A	

Frequency range	40 Hz to 1 kHz (*50 / 60 Hz for 21, 22, 26 range)
Dead zone	0.5%fs or less (0 fixed display)
Response time	Approx. 1 s

*Accuracy applies to sine waves of 5% or more of full scale

■Resistance Measurement — Input code 7

Code	Range	Measurement range	Max. resolution	Measurement current	Accuracy
7	11	0–99.99 Ω	0.01 Ω	Approx. 9 mA	±(0.1% rdg + 4 digits)
	12	0–999.9 Ω	0.1 Ω	Approx. 900 µA	
	13	0–9.999 kΩ	1 Ω	Approx. 90 µA	
	14	0–99.99 kΩ	10 Ω	Approx. 9 µA	

Wiring system	4-wire

■Thermocouple Measurement — Input code 8

Code	Range	Input	Measurement range	Max. resolution	Accuracy
13	KA	K Thermocouple	-50.0 to +199.9°C	0.1°C	±0.5%fs
	KB	K Thermocouple	-50 to +1200°C	1°C	±0.2%fs
	J	J Thermocouple	-50 to +1000°C		
	T	T Thermocouple	-50 to +400°C		±0.6%fs
	S	S Thermocouple	0 to +1700°C		±0.4%fs
	R	R Thermocouple	-10 to +1700°C		
	B	B Thermocouple	+100 to +1800°C		
	PA	Pt100 Ω	-100.0 to +199.9°C	0.1°C	±0.15%fs
	JPA	JPt100 Ω			
	PB	Pt100 Ω	-100 to +600°C	1°C	±0.3%fs
	JPB	JPt100 Ω			

Cold junction compensation error (*In case Thermocouple input)	±2°C (10–40°C)
Burnout alarm	**Thermocouple :** B.OUT display **RTD :** OVER display when A or B is disconnected, B.OUT display when C is disconnected

■Frequency measurement (Open collector / Logic / Magnetic / AC Pulse)

Input code **9**

Code	Range	Measurement range	Max. resolution	Display refresh time	Accuracy
9	11	0.1–999.9 Hz	0.1Hz	1–10 s	±0.2%fs
	12	1–9999 Hz	1 Hz	1 s	
	13	0.01–99.99 kHz	10 Hz	100 ms	

Input voltage level	**Open collector** : L : 1 V or less (5 V, 5 kΩ pull-up) **Logic** : L : 1 V or less, H : 2.5–15 V **Magnetic** : 0.3–30 Vp-p **AC Voltage** : 50–500 Vrms
Prescale	0.001–10.00
Division	1–100
Sensor power supply	12 V DC ±10% 50 mA

■Load cell measurement (Strain gauge 350 Ω)

Input code **A**

Code	Sensor power	Zero adjustment range	Span adjustment range	Measurement range	Max. resolution	Accuracy
A	5V	-1.0– +1.0 mV/V	1.0–3.0 mV/V	-4.0–4.0 mV/V	0.5 μV / digit	±(0.1%fs +2 digit)
	10V				1.0 μV / digit	

Sensor power supply	5 V DC ±5% 30 mA, or 10 V DC ±5% 30 mA

Common Specifications

Display	**Main display :** Red/Green 7-segment LED (16 mm height) **Judgment display :** HH / HI / GO / LO / LL *Relay/Photocoupler output type only **Function display :** RE / PH / DZ / ME / PL
Polarity	'–' is displayed automatically at negative polarity
Display range	-9999 to 9999
Scaling	Offset : ±9999, Full scale : ±9999 (Setting range) ***Temperature input :** Fixed scaling (cannot change) ***Frequency input** : Scale by Preset & division setting ***Load cell input** : Scale adjust by calibration setting
Over range display	Displays OVER or -OVER
Decimal point	Configurable *Temperature input is fixed per range
Zero display	Leading zero suppression
Operating temperature and humidity range	0 to +50°C, 35–85% RH (Non-condensing)
Power supply	**1) AC power :** 100–240 V AC ±10% **2) DC power :** 12–48 V DC ±10%
Power consumption	**1) AC power :** 8 VA max. **2) DC power :** 7 W max.
Dimensions	36(H)×72(W)×118(D) mm, DIN size
Weight	Approx. 260 g
Dielectric strength	**AC Power** : Power to I/O terminal : 1500 V AC / 1 min **DC Power** : Power to I/O terminal : 500 V DC / 1 min **Common** : Input to Output terminal, between output terminal : 500 V DC / 1 min Case to Terminal : 1500 V AC / 1 min
Insulation resistance	100 MΩ or more at 500 V DC between the above terminals
Sampling rate	Approx. 1 ms to 5 s (Approx. 1000–0.2 times/s) ***AC input** : Approx. 400 ms to 5 s (2.5–0.2 times/s) ***RTD input :** Approx. 100 ms to 10 s (10–0.1 times/s) ***TC input** : Approx. 200 ms to 20 s (5–0.05 times/s)
Moving average count	Select from [None / 2 / 4 / 8 / 16 / 32]
Display update cycle	Approx. 50 ms (20 times/s) ***Frequency input :** Approx. 100 ms (10 times/s) or more
Sensor power supply	**Process input :** 24 V DC ±10% 25 mA **Frequency input :** 12 V DC ±10% 50 mA **Load cell input :** 5 V DC ±5% 30 mA, or 10 V DC ±5% 30 mA
Standard accessories	Unit sticker No.2, Terminal cover

Output Specifications

◆External Control Specifications

Start / Hold	Start / Hold the display at any time
Digital zero	Set the display to zero at any time
Peak hold	Hold the [Max.] / [Min.] / [Max. - Min.] value
Pattern selection	Store and set up to 8 patterns of scaling and comparator data

◆Comparator output

Number of outputs	5 points (HH / HI / GO / LO / LL)
Output method	Relay contact output or Photocoupler output
•Relay contact output specifications	**Contact rating** : 125 V AC 0.3 A (Resistance load), 30 V DC 1 A (Resistance load) **Mechanical life** : 50 million times or more **Electrical life** : 100 thousand times or more
•Photocoupler output specifications	**Output rating** : Sink current: 50 mA **Applied voltage** : 30 V DC **Output saturation voltage** : 1.2 V or less (At 50 mA)
Judgment value setting	-9999 to 9999
Hysteresis	Adjustable 1–999 digits per judgment value
Operation speed	**Relay contact :** Max. 10 ms, **Photocoupler :** Max. 200 μs (Resistance load)

Comparison conditions

Comparison conditions	Judgment result	Comparator output					Relay contact
		HI	GO	GO	GO	LO	
Display value > HH value > HI value	HH / HI	ON	ON	OFF	OFF	OFF	Normally open (a contact)
HH value ≥ **Display value** > HI value	HI	OFF	ON	OFF	OFF	OFF	
HI value ≥ **Display value** ≥ LO value	GO	OFF	OFF	ON	OFF	OFF	
LO value > **Display value** ≥ LL value	LO	OFF	OFF	OFF	ON	OFF	
LO value > LL value > **Display value**	LO / LL	OFF	OFF	OFF	ON	ON	

◆Analog Output

Output type	Load resistance	Accuracy	Ripple
0–1 V	10 kΩ or more	±0.5%fs	±50 mVp-p
0–10 V			
1–5 V			
4–20 mA	550 Ω or less		±25 mVp-p

Conversion method	PWM (Pulse Width Modulation)
Resolution	13 bit equivalent
Scaling	Digital scaling
Response time	Approx. 0.5 s (10 to 90%)

*4–20mA DC ripple with a 250 Ω load resistance (at 20 mA output)

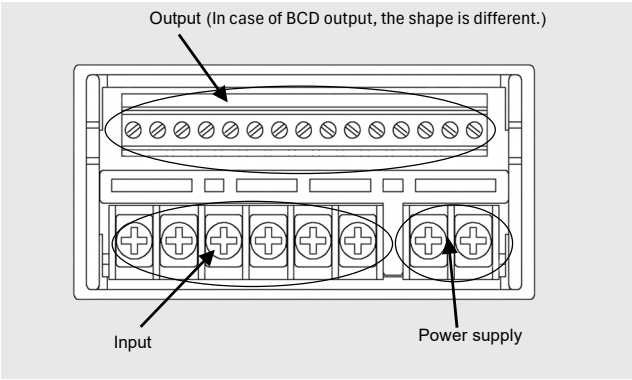
◆BCD Output

Output method	TTL or Open collector
•TTL specifications	**Polarity** : Switchable **Output signal** : TTL level fan-out = 2, CMOS compatible
•Open collector specifications	**Polarity** : Sink current: 20 mA **Transistor Output Capacity** : 30 V DC 10 mA **Output saturation voltage** : 1.2 V or less (At 10 mA)
•ENABLE Input specifications	**Function** : All BCD outputs are high impedance (TTL) or transistors are OFF with ENABLE terminal and DG terminal short-circuited **Control Signal HI Level** : 3.5–5 V relative to DG terminal **Control Signal LO Level** : 0–1.5 V relative to DG terminal **Input Current** : Input Current: -0.5 mA

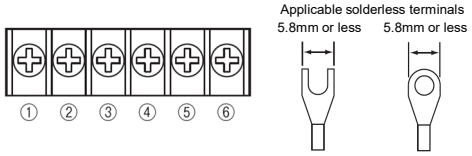
◆RS-232C, RS-485 Communication

	RS-232C	RS-485
Synchronization method	Start-stop synchronization	
Communication method	Full duplex	2-wire halt duplex (Polling selection)
Communication rate	38400 / 19200 / 9600 / 4800 / 2400 bps	
Start bit	1 bit	
Data length	7 bit / 8 bit	
Parity	Even parity (default) / Odd parity / No parity	
Error detection	–	BCC check sum
Stop bit	1 bit / 2 bit	
Character code	ASCII code	
Control procedure	No procedure	
Signal name	TXD, RXD, SG	Non-inverting (+), Inverting (-)
Number of connections	1 unit	Max. 31 units
Line length	15 m	Max. 500 m (Network total)
Delimiter	CR+LF / CR	

Terminal Connections



◆Input



■DC Voltage input — Input code 1

No.	Name	Description		
1	HI (15)	Input terminal	(+)	15 range
2	HI (14)			14 range
3	HI (13)			13 range
4	HI (12)			12 range
5	HI (11)			11 range
6	LO		(-)	

■DC Current input — Input code 2

No.	Name	Description		
1	HI (24)	Input terminal	(+)	24 range
2	HI (23)			23 range
3	HI (22)			22 range
4	HI (21)			21 range
5	LO		(-)	
6				

■DC Large Current input — Input code 3

No.	Name	Description		
1	HI (25)	Input terminal	(+)	25 range
2	LO (25)		(-)	
3	NC	No connection		
4	HI (26)	Input terminal	(+)	26 range
5	LO (26)		(-)	
6	NC	No connection		

■AC Voltage input — Input code 4

No.	Name	Description		
1	HI (15)	Input terminal	(+)	15 range
2	HI (14)			14 range
3	HI (13)			13 range
4	HI (12)			12 range
5	HI (11)			11 range
6	LO		(-)	

■AC Current input — Input code 5

No.	Name	Description		
1	HI (24)	Input terminal	(+)	24 range
2	HI (23)			23 range
3	HI (22)			22 range
4	HI (21)			21 range
5	LO		(-)	
6				

■AC Large Current input — Input code 6

No.	Name	Description		
1	HI (25)	Input terminal	(+)	25 range
2	LO (25)		(-)	
3	NC	No connection		
4	HI (26)	Input terminal	(+)	26 range
5	LO (26)		(-)	
6	NC	No connection		

■Resistance input — Input code 7

No.	Name	Description	
1	HI	Input terminal	(+)
2	LO		(-)
3	+SOURCE	4-wire constant current line input terminal	(+)
4	-SOURCE		(-)
5	NC	No connection	
6			

■Temperature input — Input code 8

No.	Name	Description		
1	HI (TC)	Input terminal	(+)	Thermocouple
2	LO (TC)		(-)	
3	NC	No connection		
4	RTD (A)	Input terminal	Resistance element conductor wire (RTD)	
5	RTD (B)			
6	RTC (C)		Conductor resistance removal wire (RTD)	

■Frequency input — Input code 9

No.	Name	Description		
1	HI (Vrms)	Input terminal	(+)	AC Voltage
2	HI		(+)	Open Collector / Logic / Magnetic
3	LO		(-)	
4	+EXC	Sensor power supply terminal		(+)
5	-EXC			(-)
6	LO (Vrms)	Input terminal	(-)	AC Voltage

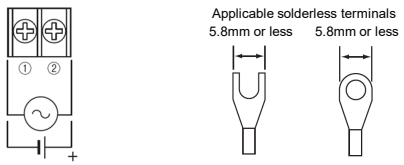
■Load cell input — Input code A

No.	Name	Description	
1	+SIG	Input terminal	(+)
2	-SIG		(-)
3	+EXC	Power supply excitation for sensor	(+)
4	-EXC		(-)
5	AG	Analog Ground (Ground for input circuit)	
6	NC	No connection	

■Process input — Input code B

No.	Name	Description		
1	HI (A)	Input terminal	(+)	Current range
2	LO (A)		(-)	
3	HI (V)		(+)	Voltage range
4	LO (V)		(-)	
5	+EXC	Power supply excitation for sensor		(+)
6	-EXC			(-)

◆Power supply



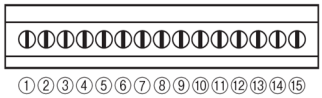
■AC Power supply — Code 1

No.	Name	Description
1	POWER	Power supply terminal (Non-polarity)
2		

■DC Power supply — Code 2

No.	Name	Description	
1	POWER	Power supply terminal	(+)
2			(-)

◆Output option



■Comparator output (Relay contact) Option code 1

Compatible wire : 24–12 AWG

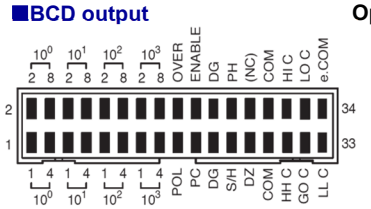
No.	Name	Description
1	P.SEL1	Pattern selection function control
2	P.SEL2	
3	P.SEL3	
4	S/H	Start / Hold function control
5	PH	Peak hold function control
6	DZ	Digital zero function control
7	COM	Common terminal for external control
8	HH-a	Normally open / a contact, of HH
9	HH / HI-c	Common terminal of HH / HI
10	HI-a	Normally open / a contact, of HI
11	GO-c	Common terminal of GO
12	GO-a	Normally open / a contact, of GO
13	LO-a	Normally open / a contact, of LO
14	LO / LL-c	Common terminal of LO / LL
15	LL-a	Normally open / a contact, of LL

■Comparator output (Photocoupler) Option code 2

Compatible wire : 24–12 AWG

No.	Name	Description
1	P.SEL1	Pattern selection function control
2	P.SEL2	
3	P.SEL3	
4	S/H	Start / Hold function control
5	PH	Peak hold function control
6	DZ	Digital zero function control
7	COM	Common terminal for external control
8	HH-c	Collector terminal of HH
9	HH / HI-e	Common emitter terminal of HH / HI
10	HI-c	Collector terminal of HI
11	GO-e	Common emitter terminal of GO
12	GO-c	Collector terminal of GO
13	LO-c	Collector terminal of LO
14	LO / LL-e	Common emitter terminal of LO / LL
15	LL-c	Collector terminal of LL

■BCD output Option code 3 4 5 6



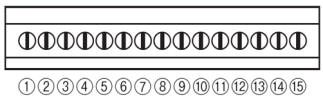
BCD Connector:
HIF-3BA-34PA-2.54DS (Hirose Electric)

Supplied Connector:
HIF-3BA-34D-2.54R (Hirose Electric)

No.	Name	Description
1-4	10^0 1, 2, 4, 8	BCD 10^0 digit, bit 1/2/4/8 output
5-8	10^1 1, 2, 4, 8	BCD 10^1 digit, bit 1/2/4/8 output
9-12	10^2 1, 2, 4, 8	BCD 10^2 digit, bit 1/2/4/8 output
13-16	10^3 1, 2, 4, 8	BCD 10^3 digit, bit 1/2/4/8 output
17	POL	BCD polarity output
18	OVER	BCD overflow output
19	P.C	BCD print command output
20	ENABLE	BCD enable terminal
21,22	DG	Digital common terminal for BCD output
23	S/H	Start / Hold function control
24	PH	Peak hold function control
25	DZ	Digital zero function control
26	NC	No connection
27,28	COM	Common terminal for external control
29	HH-c	Collector terminal of HH
30	HI-c	Collector terminal of HI
31	GO-c	Collector terminal of GO
32	LO-c	Collector terminal of LO
33	LL-c	Collector terminal of LL
34	e COM	Common emitter terminal

*** For BCD output only (Output codes 3 and 4), terminals 29~34 are NC (No Connection).**

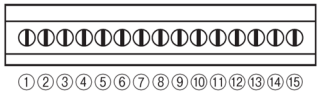
■Analog output Option code 7 8



No.	Name	Description		
1	A.OUT V (+)	Analog output terminal	(+)	Voltage output
2	A.OUT I (+)		(+)	Current output
3	A.OUT COM		Common	
4	S/H	Start / Hold function control		
5	PH	Peak hold function control		
6	DZ	Digital zero function control		
7	COM	Common terminal for external control		
8	HH-c	Collector terminal of HH		
9	e COM	Common emitter terminal of HH / HI		
10	HI-c	Collector terminal of HI		
11	e COM	Common emitter terminal of GO		
12	GO-c	Collector terminal of GO		
13	LO-c	Collector terminal of LO		
14	e COM	Common emitter terminal of LO / LL		
15	LL-c	Collector terminal of LL		

*** For analog output only (Output Code 7), terminals 8 to 15 are NC (No Connection).**

■RS-232C communication Option code 9 B

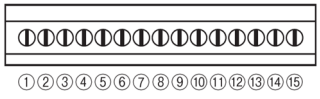


Compatible wire : 24–12 AWG

No.	Name	Description
1	RXD	Receive data terminal
2	TXD	Transmit data terminal
3	SG	Signal ground terminal (COM for communication)
4	NC	No connection
5		
6	S/H	Start / Hold function control
7	PH	Peak hold function control
8	NC	No connection
9	COM	Common terminal of External control
10	HH-c	Collector terminal of HH
11	HI-c	Collector terminal of HI
12	GO-c	Collector terminal of GO
13	LO-c	Collector terminal of LO
14	LL-c	Collector terminal of LL
15	e COM	Common emitter terminal

*** For RS-232C communication only (Output Code 9), terminals 10~15 are NC (No Connection).**

■RS-485 communication Option code A C

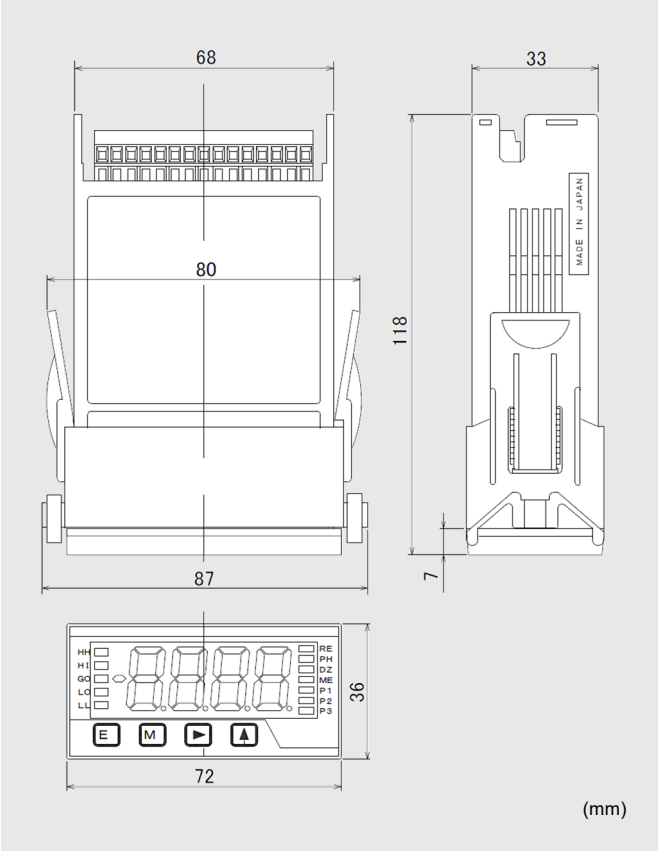


Compatible wire : 24–12 AWG

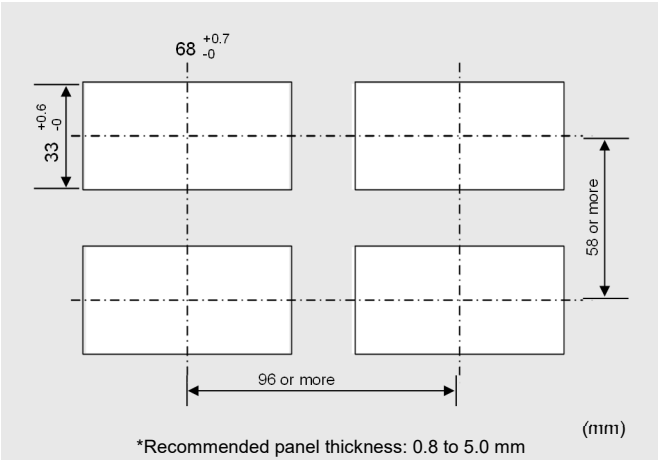
No.	Name	Description
1	(+)	Receive data terminal
2	(-)	Transmit data terminal
3	SG	Signal ground terminal (COM for communication)
4	TERM	Termination resistor (200Ω)
5		
6	S/H	Start / Hold function control
7	PH	Peak hold function control
8	NC	No connection
9	COM	Common terminal of External control
10	HH-c	Collector terminal of HH
11	HI-c	Collector terminal of HI
12	GO-c	Collector terminal of GO
13	LO-c	Collector terminal of LO
14	LL-c	Collector terminal of LL
15	e COM	Common emitter terminal

*** For RS-485 communication only (Output Code A), terminals 10~15 are NC (No Connection).**

Dimensions



Panel Cutout



*Recommended panel thickness: 0.8 to 5.0 mm