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HHD1C Motor Protector

Thank you very much for using the Xinling brand Motor Protector.
Please read the user manual before using the product!

07A115R0

I. Overview

The HHD1C Series Motor Protector (hereinafter referred to as "the Protector") is the latest low-voltage motor protector product in China currently. It is developed using internationally advanced integrated circuit and microcomputer technologies such as single-chip microcomputer and EEPROM storage. Therefore, it features high parameter measurement accuracy, accurate and reliable fault identification, complete protection functions, and intuitive parameter display. It is also equipped with an RS485 serial digital interface, which enables functions like computer communication, detection and control. It is the most ideal motor protection product at present, and is widely applicable to industries including petroleum, chemical industry, electric power, metallurgy, coal, light industry and textile.

This series of protectors complies with the requirements of the GB/T 14048.4 standard.

II. Normal Operating Conditions and Installation Conditions

1. Altitude: Not exceeding 2000m.
2. Ambient air temperature: $-5^{\circ}\text{C}\sim+40^{\circ}\text{C}$, and the 24-hour average temperature does not exceed $+35^{\circ}\text{C}$.
3. Atmospheric conditions: When the maximum temperature is $+40^{\circ}\text{C}$, the relative air humidity does not exceed 50%. Higher relative humidity is allowed at lower temperatures (e.g., the air humidity can reach 90% at $+20^{\circ}\text{C}$). Special measures should be taken for condensation occasionally caused by temperature changes.
4. Inclination of the mounting surface relative to the vertical plane: Not greater than $\pm 5^{\circ}$.
5. Pollution degree: 3.
6. Installed in a location free from significant shaking, impact and vibration.
7. Enclosure protection rating: IP40 (working surface).
8. Tripping class: Class 10A.
9. EMC environment: A.

III. Model Specifications

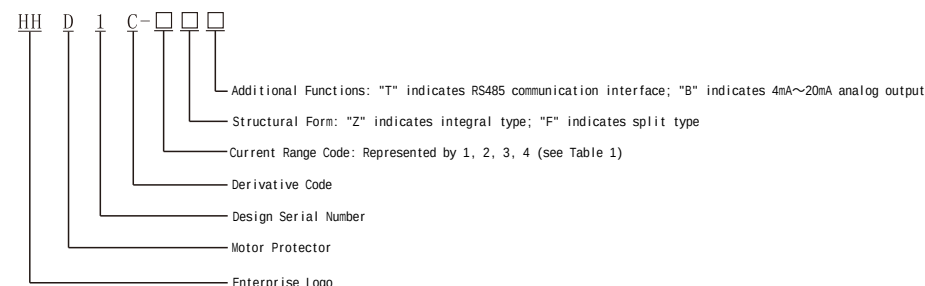


Table 1

Model Specification	Current Range (A)	Applicable Motor Power (kW)	Notes
HHD1C-1	2~100	1~50	1. When selecting the protector specification, it shall be determined based on the rated power of the motor. 2. The voltage specification (AC220V or AC380V, 50Hz) is selected according to the secondary circuit voltage of the control motor. 3. For HHD1C-3 and HHD1C-4 protectors, three current transformers with a transformation ratio of 5A must be installed.
HHD1C-2	40~200	20~100	
HHD1C-3	80~400	40~200	
HHD1C-4	160~800	80~400	

IV.Product Description

Table 2

Name	Description		Remarks
Display	High-definition LCD display (Chinese/English)		
Control Power Supply	AC220V、AC380V 、 50Hz		Allowable fluctuation range: 85%-110%
Power	<5VA		
Contact Capacity	AC220V 3A, AC380V 3A (resistive load)		
Operation Mode	Panel operation		
Measurement	Current: 0~9999A; Voltage: AC20V~500V		
Functions	Phase loss, three-phase current unbalance, overload, locked rotor, short circuit, underload, overvoltage, undervoltage, grounding, startup bypass		
Startup Interlock	0~99s adjustable		Only phase loss, locked rotor, unbalance, over/undervoltage, short circuit, grounding, and underload protection work during this period
Overload Inverse Time Limit	Trip class options: 1, 2, 5, 10, 15, 20, 25, 30, 35 (see Table 3 for characteristics); Class 1 is definite time limit (time configurable)		Overload time is not counted during the startup bypass period
Locked Rotor	Operating current reaches 3.0~9.9 times the set current (adjustable)	Action time ≤6s	
Short Circuit	Operating current reaches 10 times or more of the set current	Action time ≤2s	

Table 2 (Continued)

Name	Description		
Phase Loss	When the current of any phase in three-phase current is zero	Action time ≤6s	
Three-Phase Current Unbalance	When the current difference between any two phases reaches the unbalance set value (0~99% configurable; 0 disables this function)	Action time ≤10s	Phase difference between two phases: (Imax-Imin)/Imax × 100%Imax: Current maximum valueImin: Current minimum value
Overvoltage	When the measured voltage exceeds the set value (AC100V~AC500V configurable)	Action time ≤10s	Voltage can be set to 120%
Undervoltage	When the measured voltage is less than the set value (0~AC400V configurable; "0" disables this function)	Action time ≤20s	Voltage can be set to 80%
Grounding	When the grounding current reaches the set value (0mA, 30mA, 50mA...450mA configurable; 0mA disables this function)	Delay ≤2s; Action time ≤0.2s	A dedicated zero-sequence transformer (accessory of this product) must be purchased separately when using the grounding function
Underload	When the actual current is less than 0~99% of the rated current (configurable; 0 disables this function)	Time configurable	Time configurable; Rated current × Underload rate
Fault Record	Records and stores fault types		Not affected by power failure (records the last 10 faults)
Optional Functions	4mA~20mA analog output, RS485 communication		Please specify when ordering if this function is required

Table 3

Multiplier	Setting No. and Operation Time (seconds)							
	2	5	10	15	20	25	30	35
≥1.2	51	122	241	358	480	607	725	852
≥1.5	25	58	114	170	224	282	338	395
≥2.0	13	29	56	82	109	135	162	188
≥3.0	7	13	24	35	45	56	67	78
≥4.0	5	8	14	20	26	31	37	43
≥6.0	3.7	5.2	7.7	10	12.6	15	17.6	20.2
≥7.2	3.3	3.8	6.1	7.8	9.5	11.4	13	14.6

V.Current Output Formula (4mA~20mA)

$$I_o = \frac{I_{max}}{I_r} \times 16 + 4$$

I_o : Output current (4mA~20mA)

I_{max} : Maximum three-phase sampling current

I_r : Rated current

VI.Main Performance Parameters

1.Main circuit:Rated insulation voltage U: AC 400VRated frequency: 50Hz.Rated impulse withstand voltage U: 4kV.
2.Auxiliary circuit:Rated insulation voltage U: AC 400VRated frequency: 50Hz.Usage category: AC-15U: AC 380V/3A, AC 220V/3A.SCPD model for rated limited short-circuit current matching: RT28-32,Fuse core: 6A

VII.Main Functions

1.Protection Functions: Provides fault protection for overload, locked-rotor, three-phase current unbalance, phase loss, overvoltage, undervoltage, grounding, underload, short circuit, etc.
2.Setting Functions: Allows setting of rated current, undervoltage value, overvoltage value, trip class code, start-up avoidance time, three-phase current unbalance rate, locked-rotor current multiplier, grounding current value, reset mode code, current transformer ratio coefficient value (only valid for HHD1C-3, HHD1C-4), underload current percentage of rated current, underload operation time, and communication address number.
3.Display Functions:Shows standby state via Chinese/English character display when powered on; Displays A/B/C three-phase current values, voltage values, and grounding values in detection state;Memory-displays overcurrent, overvoltage, undervoltage, grounding values, etc. in protection state, with fault type and fault indication latched;Displays setting characters and set values in setting state. Auto-blanks after 3 minutes of standby.
4.Communication Functions: Equipped with 4mA~20mA current output interface and RS485 communication interface (supports Modbus-RTU communication protocol) for digital information transmission. One host computer (PC) can support up to 255 monitors at most, and parameters can be set for each motor to facilitate automated management.

VIII.Panel Operations

1.Reset Key: Press to exit the setting state (when in setting state); press to reset the monitor (after protection action).
2.Setting Key: Press in standby state to enter the setting state and confirm set values.
3.Shift/Data Key:In setting state: Press to select setting items or adjust parameters (increase/decrease); press and hold for 2 seconds to enable rapid parameter adjustment;In standby or operation state: Press the "Shift" and "Data" keys to view A/B/C three-phase currents, earth current, and operating voltage (over/under-voltage input terminal).

IX.Brief Introduction to Setting Items

Table 4

Name	Parameter Selection	Parameter Setting Range	Description	Default Value
Parameter Settings		2A~100A, 40A~200A, 80A~400A, 160A~800A	Set according to the motor nameplate	Mid value
	Overvoltage Setting	AC100V~AC500V	Usually set to 120% of the voltage	120% of voltage
	Undervoltage Setting	0~AC400V	Usually set to 80% of the voltage (0 disables this function)	0
	Trip Class	1、2、5、10、15、20、25、30、35	In the start-up avoidance time, overcurrent time is not counted; "1" = definite time limit (definite time is configurable); 5 corresponds to 10A class	2
	Definite Time	0~99s (configurable)	Operating current > 1× rated current	5s
	Avoidance Time	0~99s (configurable)	No overload protection during start-up time; other functions provide normal protection	10s
	Locked-Rotor Multiplier	3.0~9.9 (configurable multiplier)	When operating current exceeds this set multiplier, operation time ≤ 6s	6.5
	Unbalance Rate	0~99% (configurable)	When the current difference between any two phases reaches this set value, operation time ≤ 10s	50%
	Grounding Current	0mA, 30mA, 50mA...450mA (configurable)	When grounding current reaches this set value: delay ≤ 2s, operation time ≤ 0.2s; 0mA disables this function	0mA
	Transformer Ratio	0~200 (configurable)	For transformer 500:5, mutual inductance coefficient = 500/5 = 100 (set to 100); only configurable for HHD1C-3, 4	(Only configurable for HHD1C-3, 4)
	Underload Setting	0~99% (configurable)	Set the underload rate	0%

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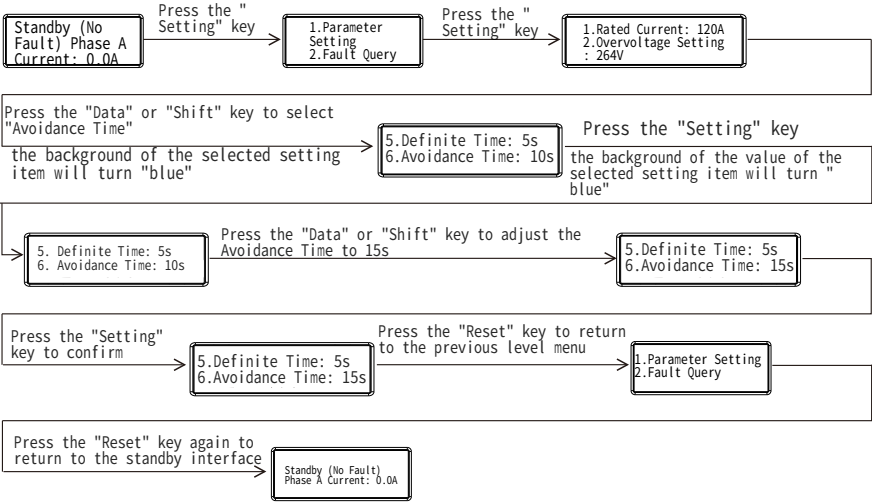
Table 4 (Continued)

Name	Parameter Selection	Parameter Setting Range	Description	Default Value
Parameter Settings	Underload Time	0~99s (configurable)	Set the delayed operation time for underload	10s
	Transmitter Output	Maximum, Phase A, Phase B, Phase C (selectable)	Formula: Maximum (optional) / Rated Current × 16 + 4	Maximum
	Transmitter Multiplier	1~3 times (configurable)	4~20mA corresponds to Rated Current Value × Multiplier	1
	Reset Mode	Manual, Automatic (selectable)	Automatic reset time: 10s	Manual
	Reset Time	1s~99s (configurable)	Reset unconditionally when the set time is reached	10s
	Communication Address	1~255 (configurable)	Local communication address	1
	Communication Baud Rate	0、1、2、3	0:19200, 1:9600, 2:4800, 3:2400	1
	Communication Parity	None, Odd, Even		Even
Fault Query	Current Fault	Display fault	Fault records are not affected by power outage	
	Historical Fault	Record the last 10 faults		
	Clear All Fault Records			

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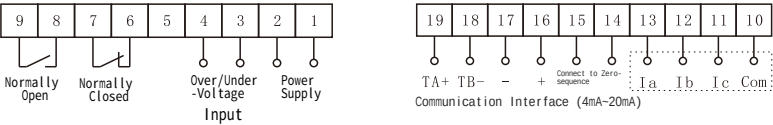
X.Brief Introduction to the Setting Process

Take setting the Avoidance Time to 15s in the parameter setting menu as an example:



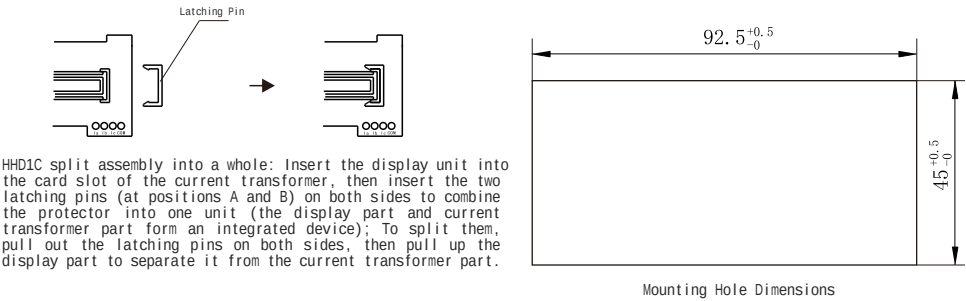
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XI.Wiring Diagram

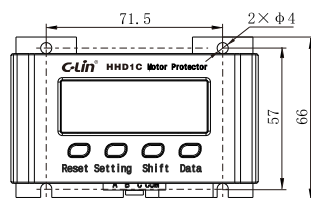
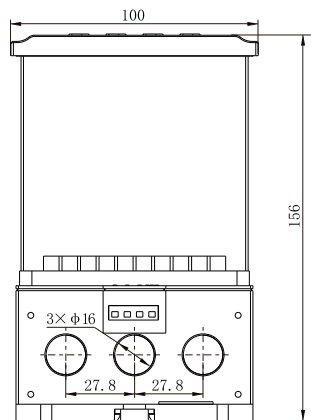


Notes:① When used as a split unit, aviation connectors are adopted; no wiring is required from the dashed area to the current transformer.
② When there is no voltage input (floating) at the over/under voltage input port, set the under-voltage value to 0.

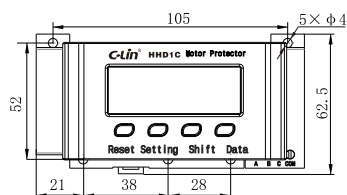
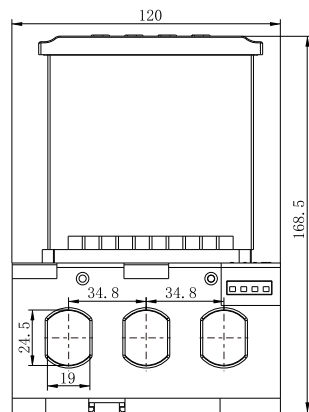
XII.Overall Dimensions(mm)



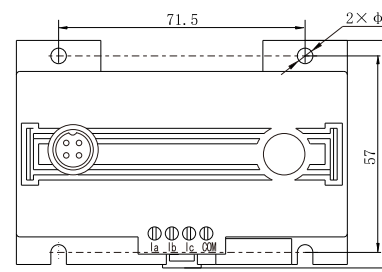
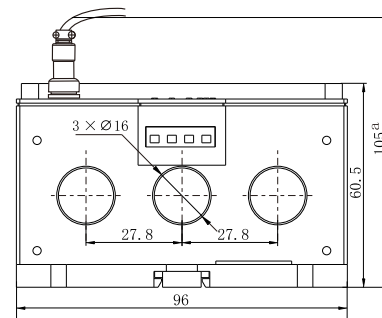
-10-



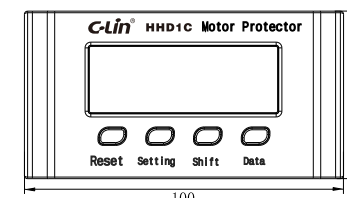
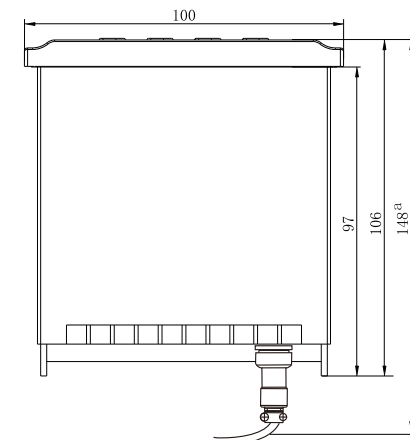
HHD1C-1, 3, 4 Integrated Unit



HHD1C-2 Integrated Unit



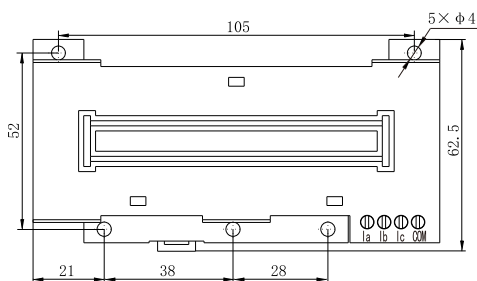
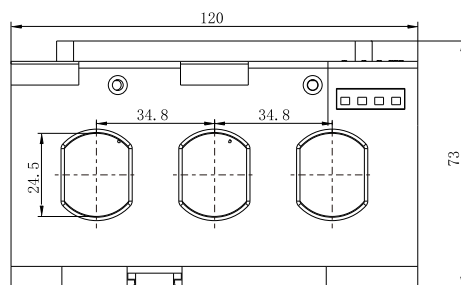
HHD1C-1, 3, 4 Split Unit



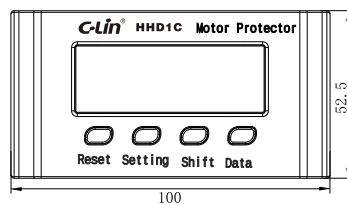
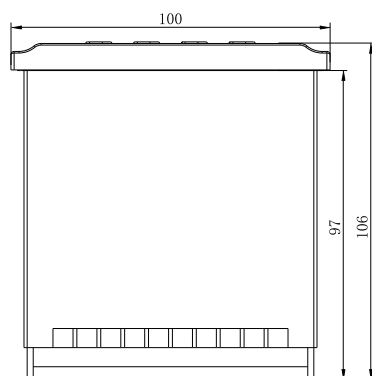
100

a: Measured with folded lines, there may be errors in the dimensions.

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HHD1C-2 Split Unit



100

XIII.Computer Remote Communication System for HHD1C Protector

Table 5

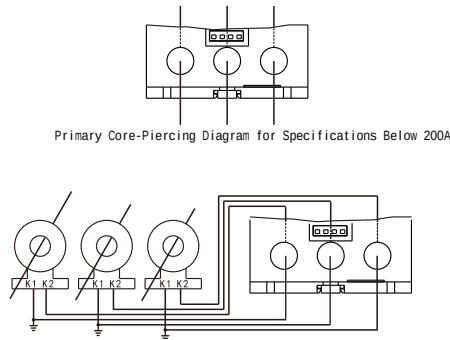
Schematic Diagram	
Main Functions	1.Adopts RS485 serial digital interface; the communication distance is ≤ 1200 meters (RS485 is converted to RS232 interface via the interface card). 2.Each host computer (PC) can communicate with up to 255 protectors. 3.Can modify the protection parameters of each motor. 4.Can detect the current, voltage, operating status, and faults of each motor.
	Note : A communication protocol manual (attached separately) is provided for the customer's installation and operation.

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XIV.Wiring Methods

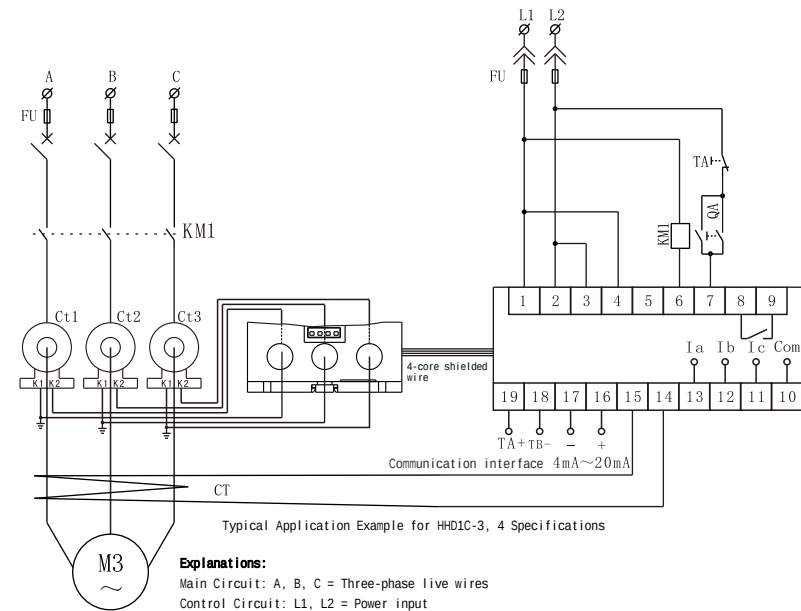
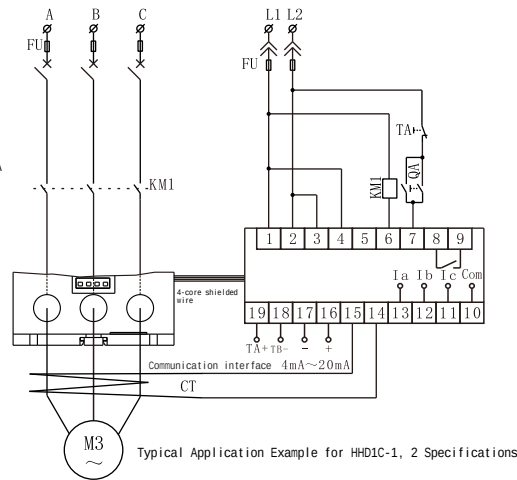
1. Primary Wiring



For HHD1C-3, 4 specification protectors used with current transformers (ratio: 400:5 or 800:5), the outgoing wires of the transformers shall be directly pierced, as shown in the above diagram.

Note: For the HHD1C-1 specification: When the protector is applied to motors with a protection power less than 1kW, the main circuit needs to be wound with turns to make the rated current exceed 2A (the number of turns is calculated based on the current).

2. Secondary Wiring



Explanations:

Main Circuit: A, B, C = Three-phase live wires

Control Circuit: L1, L2 = Power input

Component definitions: FU = Fuse KM1 = AC Contactor QA = Start Button CT = Zero-Sequence Current Transformer (Dedicated Transformer) TA = Stop Button Ct1, Ct2, Ct3 = Current Transformers

XV.Precautions

- 1.Select a protector with the corresponding current specification based on the rated current of the motor.
- 2.When installing and wiring the protector, connect the terminals correctly according to the intended use of each terminal on the actual product.
- 3.The working power supply of the protector should be connected to the control circuit; ensure that the nominal voltage matches the actual voltage.

XVI.Ordering Information

- 1.When selecting a protector, specify the model specification, quantity, power supply voltage, and structure type (integrated or split).
- 2.For split structure, specify the length of the cable between the upper and lower parts of the protector; the default length at factory is 2m.
- 3.If the customer needs the earth protection function, an additional dedicated zero-sequence current transformer for this product must be purchased.

Examples: a) HHD1C-1Z, 2A~100A, AC380V, 10 units: This refers to 10 protectors with the model HHD1C-1Z, a current specification of 2A~100A, an integrated structure, and an AC 380V power supply.

b) HHD1C-2F, 40A~200A, AC380V, 10 units: This refers to 10 protectors with the model HHD1C-2F, a current specification of 40A~200A, a split structure (with a 2m cable between the upper and lower parts), and an AC 380V power supply.

c) If RS485 communication function or 4mA~20mA transmission output function is required, please specify this when placing the order—these functions are not included in standard products.