



**C-Lin**  
欣灵电气股份有限公司  
XINLING ELECTRICAL CO., LTD.  
地址: 浙江省乐清经济开发区纬十九路328号  
电话: 0577-62735555 传真: 0577-62722963  
官网: www.c-lin.cn E-mail: xl@xinling.com  
技术咨询: 400-8236-775



# HHD1B

## Motor Protector

We sincerely appreciate your use of C-Lin -brand motor protector. Please read the instruction manual before using the product!

07A118R0

### I. Overview

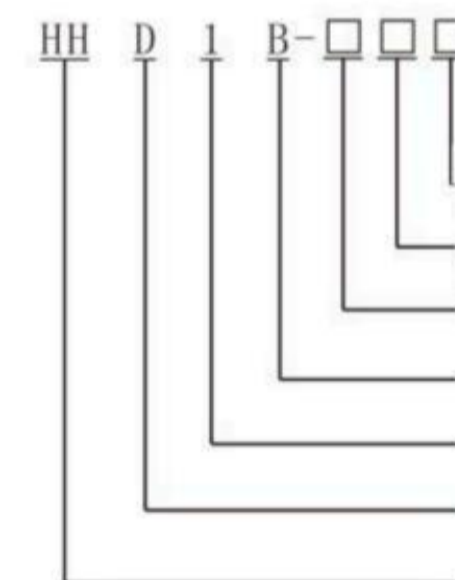
The HHD1B series motor protector (hereinafter referred to as the protector) is the latest product of domestic low - voltage motor protectors. This product is developed by adopting internationally advanced integrated circuits and microcomputer technologies such as single - chip microcomputer and EEPROM storage. Therefore, it features high - precision parameter measurement, accurate and reliable fault identification, complete protection functions, intuitive parameter display, and is equipped with an RS485 serial digital interface, enabling functions such as computer communication, detection, and control. It is currently the most ideal motor protection product, widely applicable to industries such as petroleum, chemical, 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 Working Conditions and Installation Conditions

1. Altitude: Not exceeding 2000m.
2. Ambient air temperature: - 5 ~ +40 , and the average value within 24h does not exceed +35 .
3. Atmospheric conditions: When the maximum temperature is +40 , the relative air humidity does not exceed 50%. At lower temperatures, higher relative humidity is permissible. For example, at +20 , the air humidity can reach 90%, and special measures should be taken for occasional condensation due to temperature changes.
4. Inclination of installation surface: The inclination of the installation surface to the vertical plane is not more than ±5°.
5. Pollution degree: 3.
6. Location requirements: In places without significant shaking, impact, and vibration.
7. Enclosure protection rating: IP40 (working surface).
8. Tripping class: 10A class.
9. EMC environment: A.

### III. Model Specifications



Additional functions: "T" indicates RS485 communication interface, "B" indicates 4mA - 20mA transmission output.

Structure form: "Z" indicates integral, "F" indicates split.

Current range code: represented by 1, 2, 3, 4 (see Table 1).

Derivative code.

Design serial number.

Motor protector.

Enterprise identification.

Table 1

Model specification	Setting current range Ie	Applicable motor power (kW)	Remarks
HHD1B-1	2~100A	1~50	1. When selecting the protector specification, it should be determined according to the rated power of the motor. 2. The voltage specification selects AC220V or AC380V 50Hz, which is determined according to the voltage of the secondary circuit of the control motor. 3. For the protectors of HHD1B - 3 and 4, three current transformers with a transformation ratio of 5A must be installed.
HHD1B-2	40~200A	20~100	
HHD1B-3	80~400A	40~200	
HHD1B-4	160~800A	80~400	

IV. Product Description

Table 2

Name	Description	Remarks
Display	High-definition digital LED display	
Control power supply	AC220V, AC380V, 50Hz	Allowable fluctuation range: 85% - 110%
Power	<5VA	
Contact capacity	AC 220V 3A, AC 380V 3A resistive	
Operation mode	Panel operation	
Function	Phase loss, three-phase current imbalance, overload, locked rotor, short circuit, underload, overvoltage, undervoltage, grounding, start avoidance	
Start avoidance	Adjustable from 0 to 99s	During the start avoidance time, it only provides protection against phase loss, locked rotor, imbalance, over-voltage and under-voltage, short-circuit, grounding, and under-load. During the start avoidance time, the overload time is not
Overload inverse time limit	The tripping level can be selected from 0, 1, 2, 3, 4, 5, 6, 7, 8 (see Table 3 for characteristics). 0 is a definite time limit (the time can be set).	Counted
Timing time	The operating current is more than 1 times the setting current	setting range 0~99s, default
Locked rotor	When the operating current is more than 1 - time the setting current, the operating current reaches the setting current (3.0 - 9.9 times).	Action time ≤6S
Short circuit	The operating current reaches 10 times the set current or more	Operating time ≤2S

Table 2 (Continued)

Name	Description	Remarks
Phase loss	When the current of any one of the three-phase currents is zero	Operating time ≤ 6s
Three-phase current imbalance	When the difference value between the currents of any two phases reaches the unbalance setting value (0 - 99% is settable), 0 means to disable this function.	Operating time ≤ 10s Difference value between two phases: (Imax - Imin)Imax×100% Imax: Current maximum current value; Imin: Current minimum current value
Overvoltage	The measured voltage exceeds the set value (AC100V - AC500V is settable)	Operating time ≤ 10s Acceptable voltage: 120%
Undervoltage	Measured voltage is less than the set value (0~AC400V is settable). "0" means to disable this function.	Operating time ≤ 20s Available voltage: 80%
Grounding	The grounding current value reaches the set values 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (see Table 4 for the set value serial numbers). 0 means to disable this function.	Delay 2s, operation time 0.2s When using the grounding function, a special zero - sequence mutual inductor for this product needs to be purchased separately
Underload	When the actual current is 0 - 99% (configurable) less than the set current Set to 0 to disable this function	Time is configurable Setting current × underload rate
Fault record	Record and latch the fault type	Unaffected by power outage (record the last ten fault)
Optional function	4mA~20mA transmission output, RS485 communication	Please indicate this function when placing an order

Table 3

Anti - time curve serial number	Operating time								
	1.05 times	1.2 times	1.5 times	2 times	3 times	4 times	5 times	6 times	7.2 times
1		≤51s	≤25s	≤13s	≤7s	≤5s	≤4s	≤3.7s	≤3.3s
2 (10A)	No tripping within 2 hours	≤122s	≤58s	≤29s	≤13s	≤8s	≤6.2s	≤5.2s	≤3.8s
3		≤241s	≤114s	≤56s	≤24s	≤14s	≤9.8s	≤7.7s	≤6.1s
4		≤358s	≤170s	≤82s	≤35s	≤20s	≤13.4s	≤10s	≤7.8s
5		≤480s	≤224s	≤109s	≤45s	≤26s	≤17s	≤12.6s	≤9.5s
6		≤607s	≤282s	≤135s	≤56s	≤31s	≤20.7s	≤15s	≤11.4s
7		≤725s	≤338s	≤162s	≤67s	≤37s	≤24.2s	≤17.6s	≤13s
8		≤852s	≤395s	≤188s	≤78s	≤43s	≤27.8s	≤20.2s	≤14.6s

Table 4

Set value serial number	0	1	2	3	4	5	6	7	8	9
≥Ground current value (mA)	Shielding function	30	50	100	150	200	250	300	350	400

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

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

$I_o$ : Output current of 4mA ~ 20mA

$I_{max}$ : Three - phase sampling maximum current

$I_r$ : Setting current

VI. Main Performance Parameters

1. Main Circuit: Rated insulation voltage  $U_i$ : AC400V, rated frequency 50Hz. Rated impulse withstand voltage  $U_{imp}$  4kV.

2. Auxiliary Circuit: Rated insulation voltage  $U_i$ : AC400V, rated frequency 50Hz. Usage category AC - 15,  $U_e / I_e$ : AC380V/3A, AC220V/3A. Rated restricted short - circuit current matching SCPD model: RT28 - 32, fuse core: 6A.

## VII. Main Functions

1. Protection function: Fault protection against overload, locked-rotor, three-phase current imbalance, phase loss, overvoltage, undervoltage, grounding, underload, short circuit, etc.

2. Setting function: Rated current, undervoltage value, overvoltage value, tripping level code, starting avoidance time, three-phase current imbalance rate, locked-rotor current multiplier, grounding current value, reset mode code, current transformer transformation ratio coefficient value (only valid for HHD1B - 3, HHD1B - 4), percentage of underload current to set current, underload action time, communication address number, etc. can be set.

3. Display function: When powered on, it shows the standby state; during the detection state, it displays the current values, voltage values, and grounding values of the three phases A, B, and C; during the protection state, it memorizes and displays overcurrent, overvoltage, undervoltage, grounding values, etc., and latches various fault categories and fault indicators; during the setting state, it displays each character and the set values. It automatically fades out after three minutes of standby.

4. Communication function: It has a 4mA - 20mA current output interface and an RS485 communication interface (supporting the Modbus - RTU communication protocol) to realize digital information transmission. One host computer (PC) can support the installation of up to 255 monitors at most and can set parameters for each motor, facilitating automated management.

5. Fault indication: When the protector detects a motor fault, the digital tube displays the corresponding fault name. After the action, it displays the corresponding motor fault value, and the running display characters go out.

## VIII. Panel Operation and Display

1. Reset key: Press the reset key in the setting state to exit the setting state;

press this key to reset the protector after a protection action.

2. Setting key: Press this key in the standby state to enter the setting state and confirm the set value.

3. Shift, Data: In the setting state, press this key to select the setting item or increase/decrease the parameter. Press and hold for 2s continuously, the numbers will add / subtract quickly; in operation or fault state, press "Shift" and "Data" keys to check three - phase currents of phase A, phase B and phase C (characters of phase A, phase B and phase C are always on), grounding current ("phase A" character flashes), voltage value (over - undervoltage input terminal, the character "Phase B" flashes).

-7-

## IX. Introduction to Setting Items

Table 5

Menu	Display Content	Code Definition	Setting range and remarks
1.5E7 (Parametersettingmenu) Press the "Settings" key to enter the sub-menu	A 100	Rated current value	the setting should be within the protection value specification range.
	U 456	Overvoltage value	Set at about 120% of the rated voltage.
	v 000	Undervoltage value	Factory default is 0, 0 means to disable this function.
	S - - 1	Overload inverse-time protection action code	Setting range 0 - 8, see Table 3
	c - 05	Timing time	Setting range 0 - 99s, default 5s
	t - 10	Starting avoidance time	Setting range 0 - 99s, default 10s
	d - 6.5	Locked-rotor multiple	Setting range 3.0 - 9.9, default 6.5 times
	i - 50	Three-phase current unbalance percentage value	Setting range 0 - 99%, default 50%
	L - - 5	Code for ground current value	Setting range 0 - 9, default 0, see Table 4
	F 001	Change coefficient value of current transformer	Setting range 1 - 200
	E - 50	Under-load current percentage value	Setting range 0 - 99%, default 10%
	r - 20	Under-load current protection time	Setting range 0 - 99s, default 10s
	4n - 0	4 - 20mA transmission output	Setting range 0 - 3: 0 for maximum phase current, 1 for phase A current, 2 for phase B current, 3 for phase C current, default 0
	t - - 0	Reset mode code	0 for manual, 1 for automatic, default 0
	L - 10	Automatic reset time	Setting range 0 - 99s, default 10s
r 001	Communication address number	Setting range 0 - 255	
b - - 1	Communication baud rate	Setting range 0 - 3 (default 1)	

-8-

Table 5 (continued)

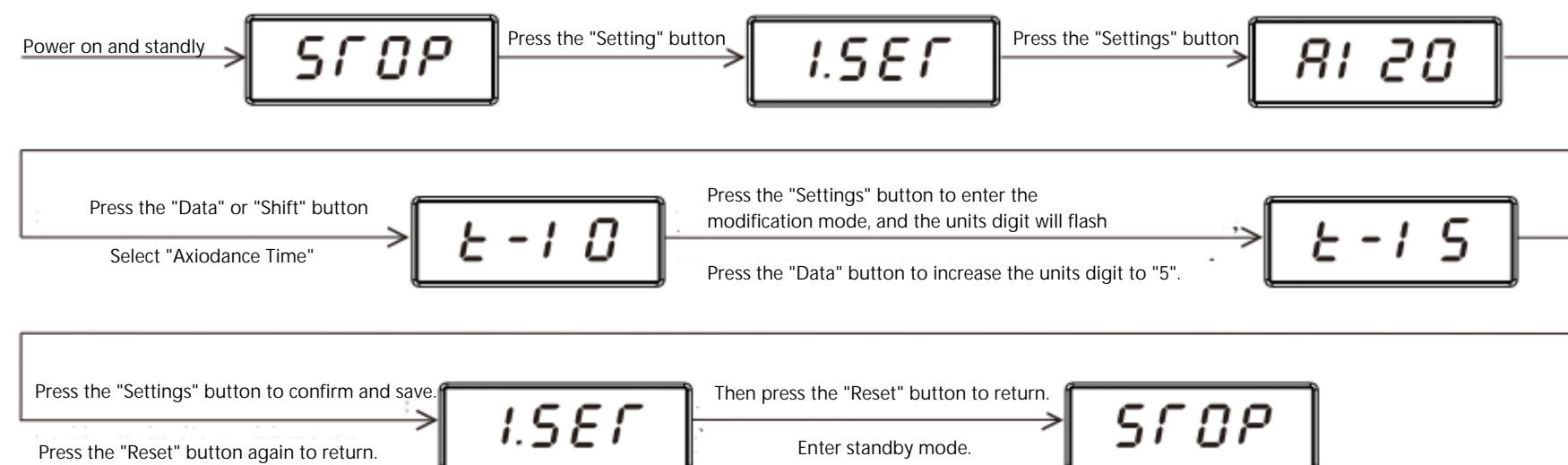
Menu	Display content	Code definition	Setting Range and Remarks
	J - - 1	Communication verification method	Setting range 0 - 2 (default 2)
2.8UG (Fault query menu) Press the "Settings" key to enter	iCUr	Current fault (n.U.L means no fault)	Press the "Settings" key to light up the corresponding fault characters
	2PrE	Historical faults	Press the "Settings" key to query the last ten fault records
	3CLr	Clear all fault records	Press the "Settings" key to clear all fault records

**Note:**

- When setting the "current transformer transformation ratio coefficient value", it is only valid for HHD1B - 3 and HHD1B - 4 specifications, and invalid for other specifications. For example, for a current transformer with a ratio of (400:5), set the value "F" to 80. After setting, press the reset key to return to the "2PrE" state.
- When setting the "communication baud rate", "0" represents 19200; "1" represents 9600; "2" represents 4800; "3" represents 2400.
- When setting the "communication verification mode", "0" represents no verification; "1" represents odd verification; "2" represents even verification.

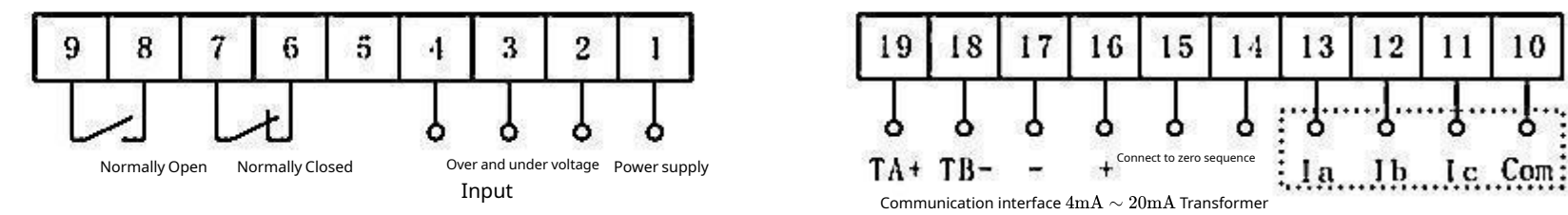
## X. Brief Introduction to Setting Process

Taking the "Avoidance Time" in the parameter - setting menu with a time of 15s as an example:



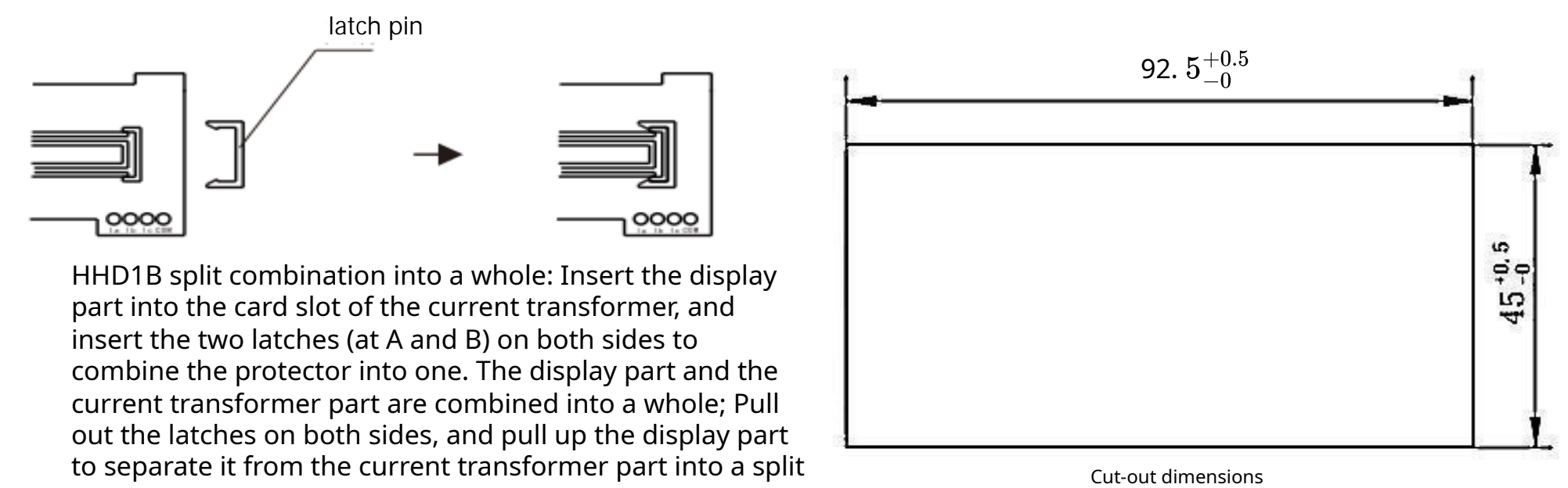
-9-

## XI. Wiring Diagram



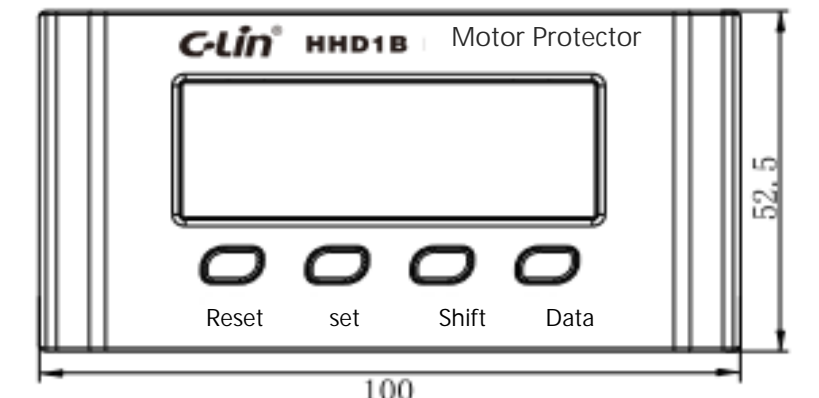
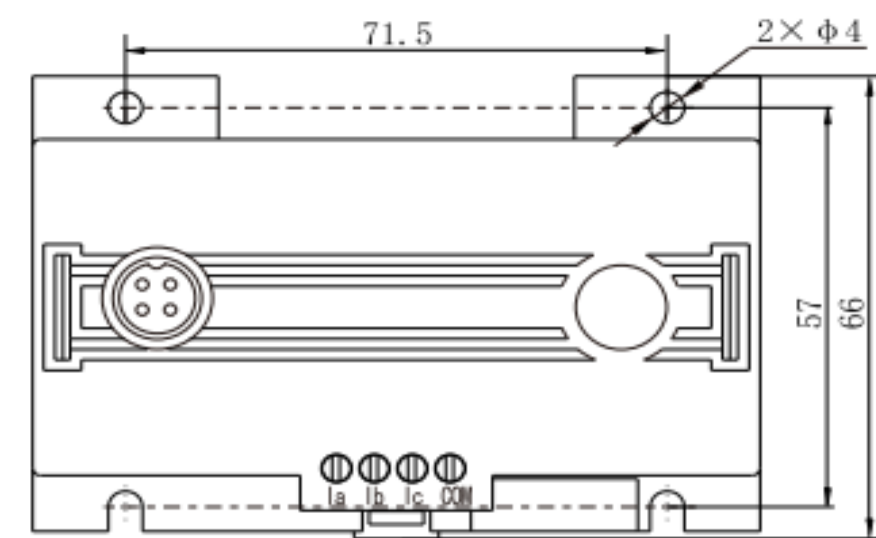
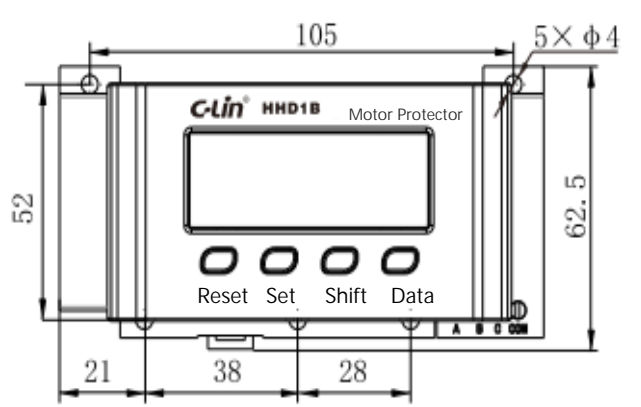
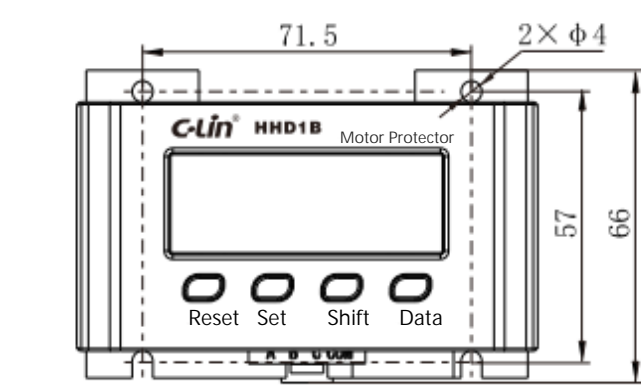
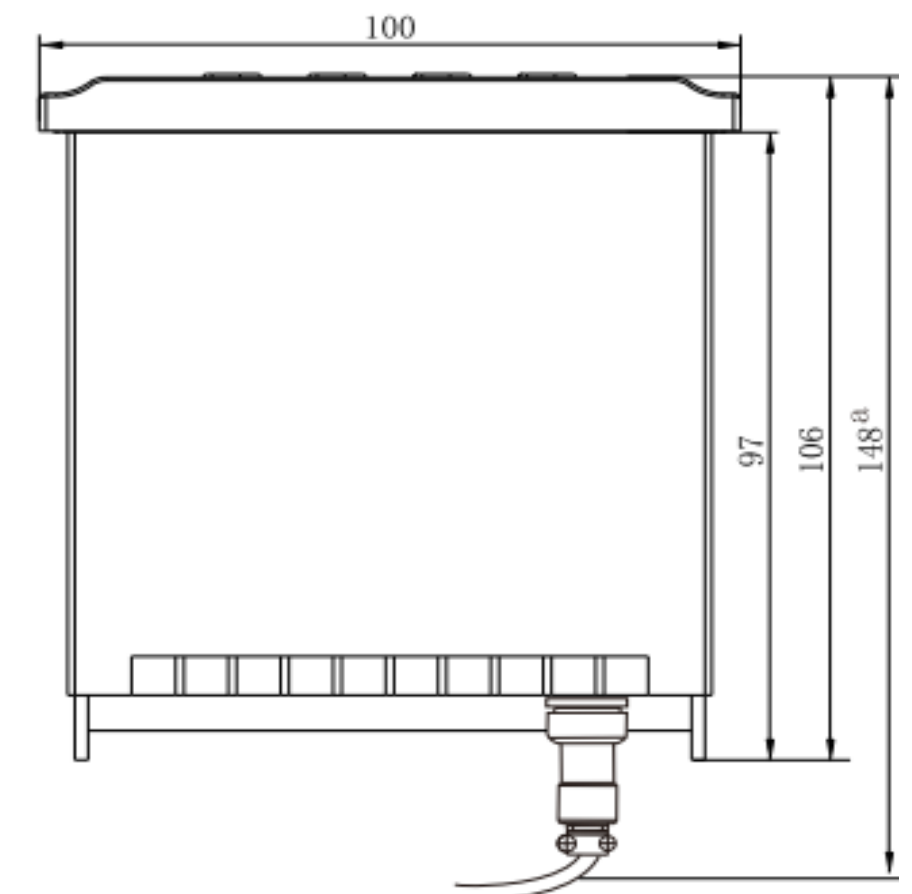
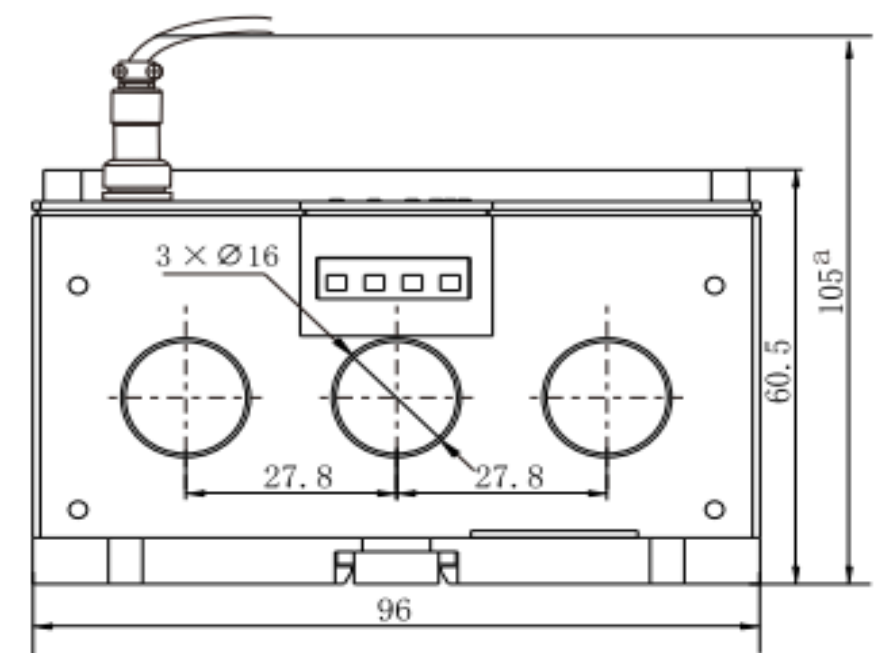
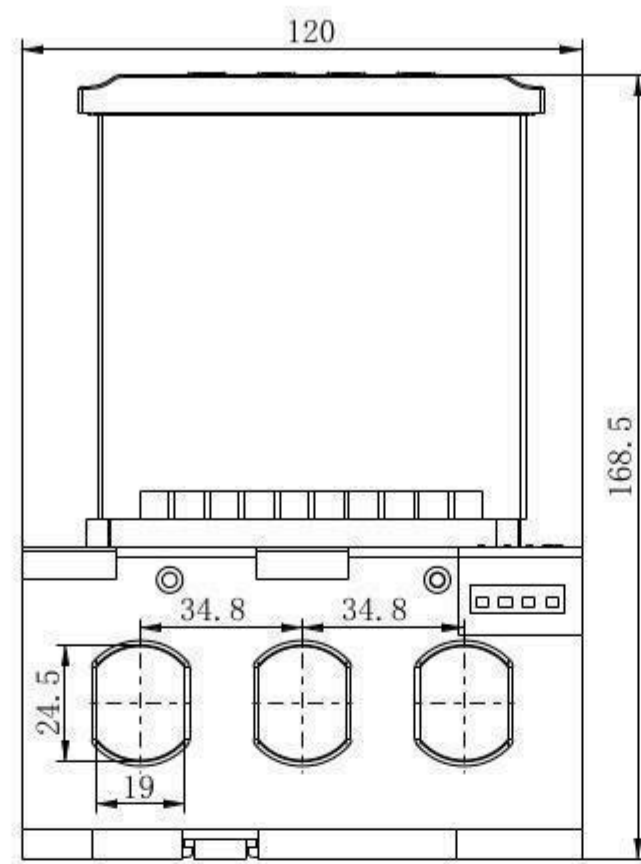
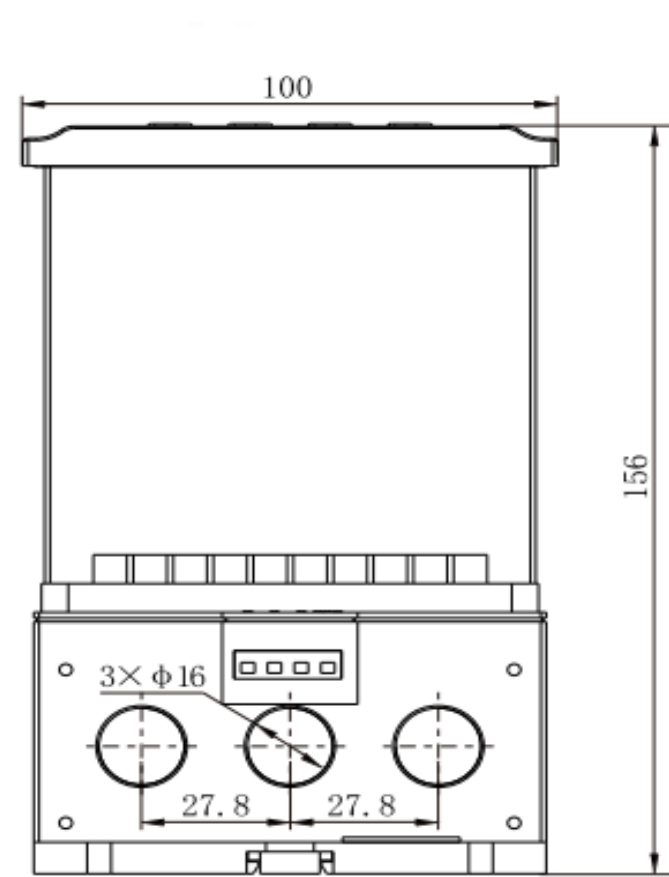
**Note:** When used in a split - type, aviation plugs are used, and there is no need to connect wires to the mutual inductor at the dotted line.

When there is no input (floating) at the over - undervoltage input port voltage, the undervoltage value should be set to 0.



Cut-out dimensions

-10-

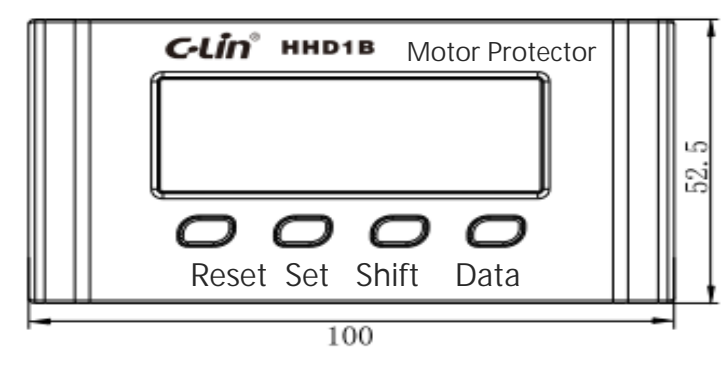
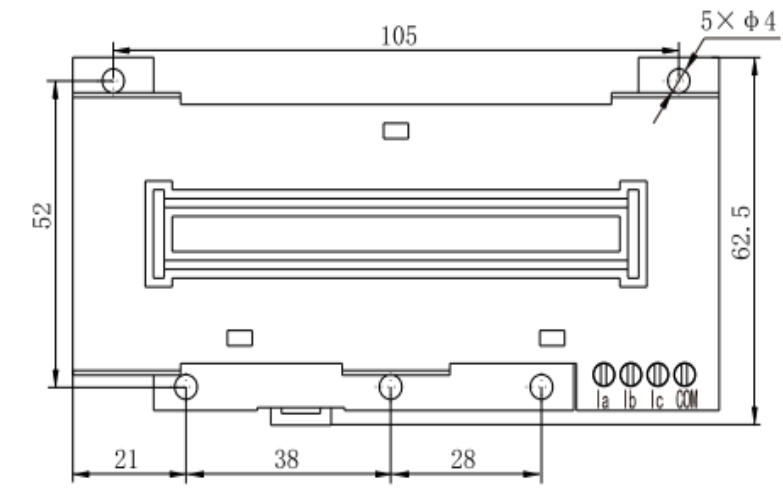
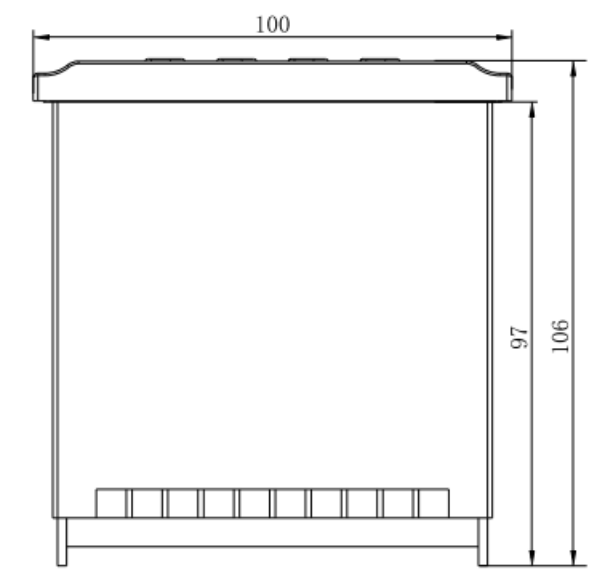
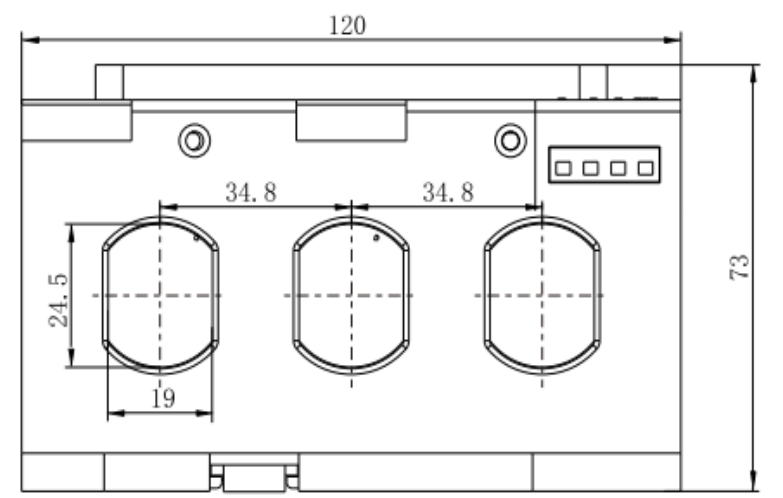


Overall of HHD1B-1, 3, 4

Overall of HHD1B-2

HHD1B - 1, 3, 4 split

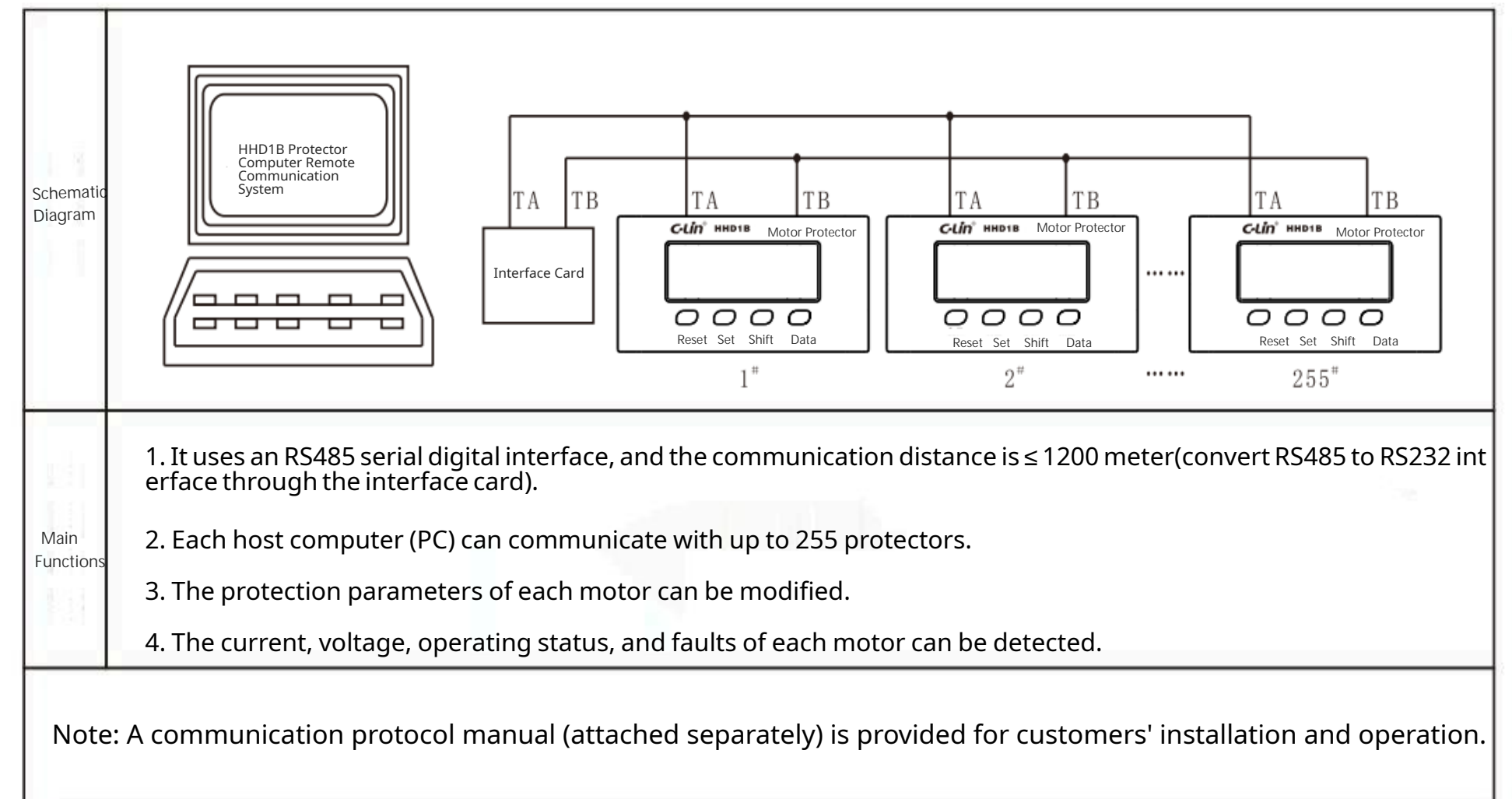
a: There may be errors in the dimensions due to line - fold measurement.



HHD1B-2 Split

### 13. Computer Remote Communication System of HHD1B Protector

Table 6

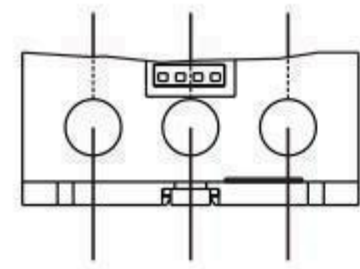


1. It uses an RS485 serial digital interface, and the communication distance is  $\leq 1200$  meter (convert RS485 to RS232 interface through the interface card).
2. Each host computer (PC) can communicate with up to 255 protectors.
3. The protection parameters of each motor can be modified.
4. The current, voltage, operating status, and faults of each motor can be detected.

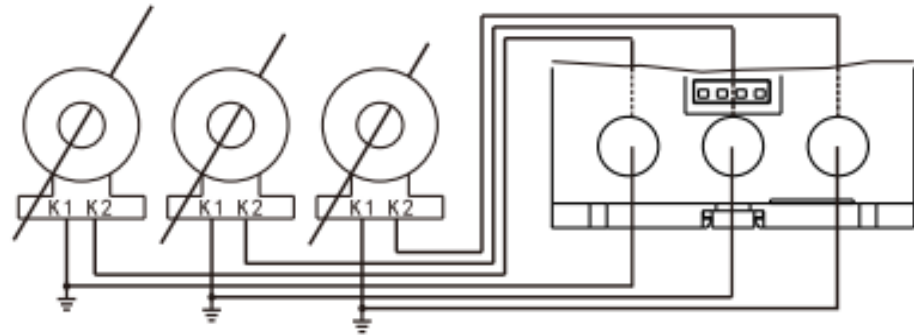
Note: A communication protocol manual (attached separately) is provided for customers' installation and operation.

## XIV. Wiring Methods

### 1. Primary wiring



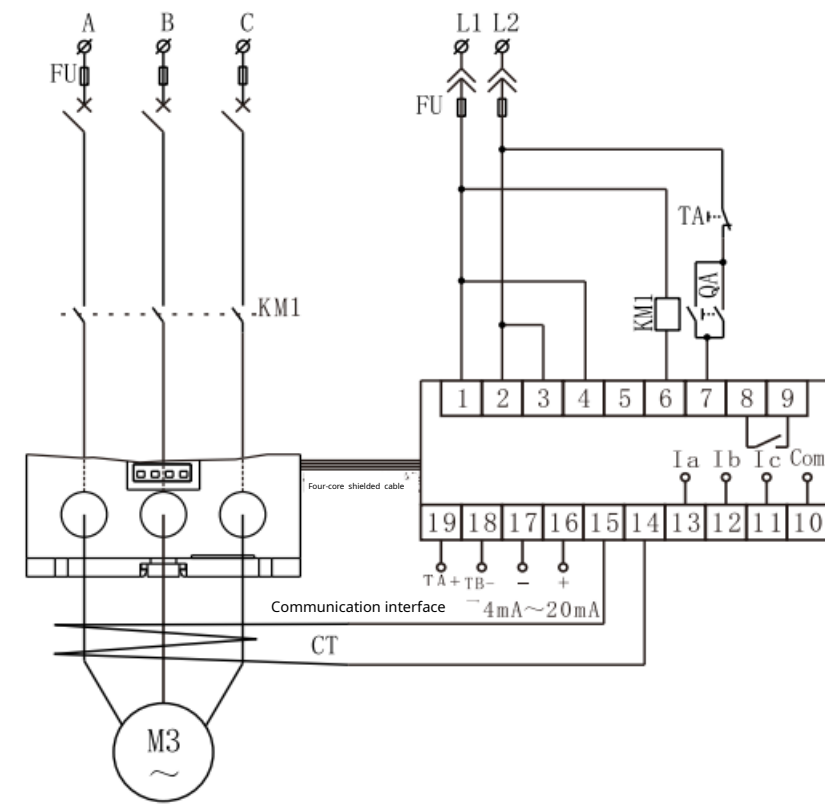
Schematic diagram of single core-penetrating for specifications below 200A



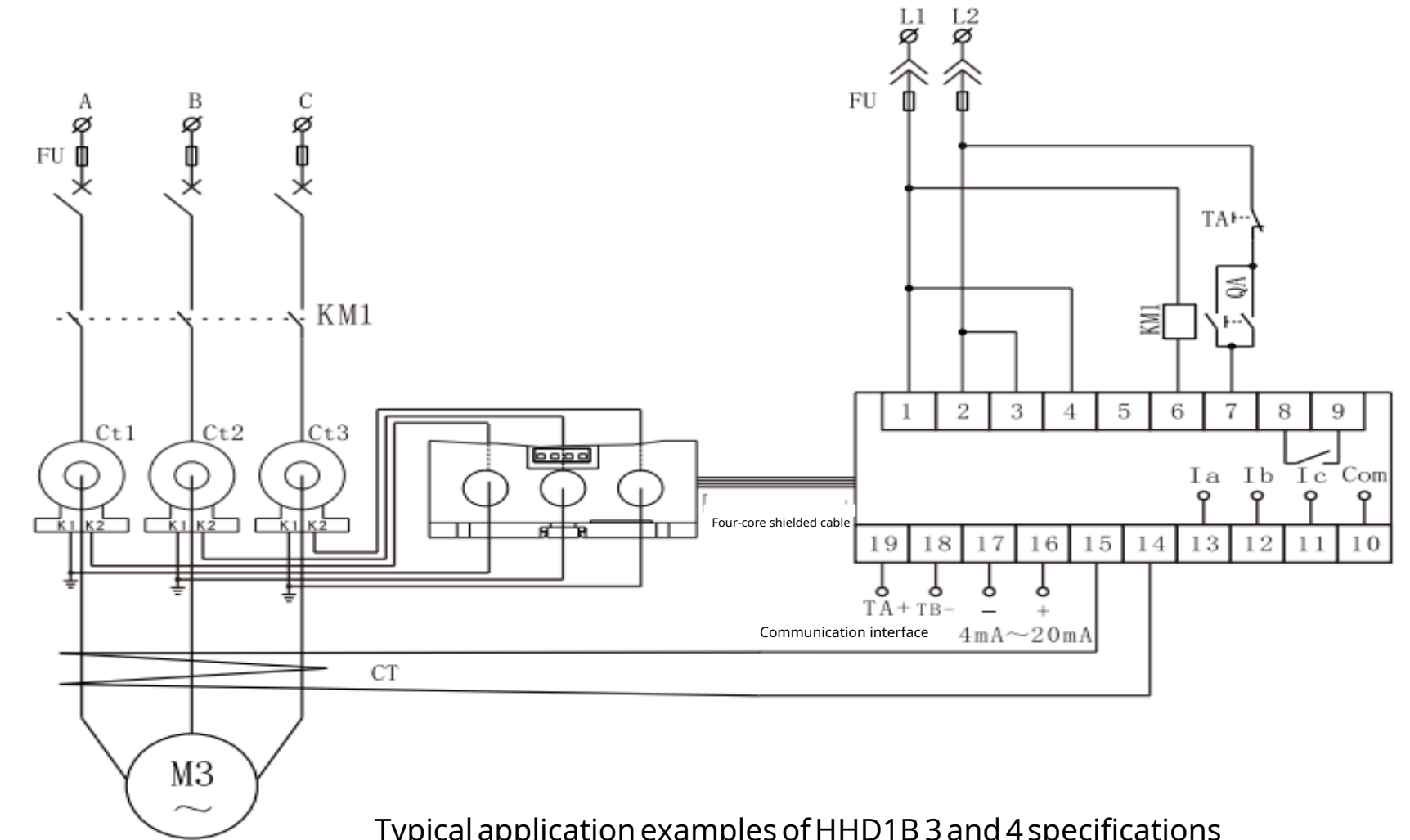
When the protectors of HHD1B - 3 and 4 specifications are used with current transformers having transformation ratios of 400:5 and 800:5, the lead - out wires of the transformers need to directly pass through, as shown in the above figure.

Note: For the HHD1B - 1 specification, when the protector protects a motor with a power less than 1KW, the main circuit needs to be wound with turns to make the rated current greater than 2A (the number of turns is calculated according to the current).

### 2. Secondary wiring



Typical application examples of HHD1B-1 and 2 specifications



Typical application examples of HHD1B 3 and 4 specifications

#### Explanation:

Main circuit: A, B, C: Three - phase live wires Control circuit: L1, L2: Power input FU: Fuse  
 KM1: AC contactor QA: Start button CT: Zero - sequence current transformer (special transformer)  
 TA: Stop button Ct1, Ct2, Ct3: Current transformers Four - core shielded wire  
 Communication interface 4mA - 20mA

## XV. Precautions

1. According to the rated current value of the motor, select the protector with the corresponding current specification. It should not be lower than the lower limit of the current specification or higher than the upper limit. It is recommended to choose as close to the middle as possible.
2. When installing and wiring the protector, it should be correctly connected according to the purpose of each wiring terminal of the actual product.
3. For the working power supply of the protector, pay attention that the nominal voltage should match the actual voltage.

## XVI. Ordering Information

1. When selecting a protector, specify the model, quantity, power supply voltage, and structural form (integral or split).
2. When selecting the split structure, the length of the connection line between the upper and lower bodies of the protector needs to be indicated. The default length at the factory is 2m.
3. When the customer needs the grounding protection function, they need to purchase the special zero - sequence current transformer for this product separately (the zero - sequence current transformer is available in four aperture sizes: 25mm, 45mm, 75mm, 100mm).

#### Example:

- a) HHD1B - 1Z, 2A - 100A, AC380V, 10 units, indicating a protector with model HHD1B - 1Z, current specification 2A - 100A, integral structure, power supply AC380V, and quantity 10 units.
- b) HHD1B - 2F, 40A - 200A, AC380V, 10 units, indicating a protector with model HHD1B - 2F, current specification 40A - 200A, split structure (the connection line between the upper and lower bodies is 2m), power supply AC380V, and quantity 10 units.
- c) If RS485 communication function and 4mA - 20mA transmission output function are required, it should be indicated in the order. These functions are not available in conventional products.