

# ARD2F Smart Motor Protector

## Overview



ARD2F smart motor protectors can protect motors from many faults during the motor running and display the running state clearly and intuitively through LCD. The protector has RS485 remote communication interface and DC4-20mA analog output, which is convenient to form a network system together with control machines like PLC and PC.

## Model Description

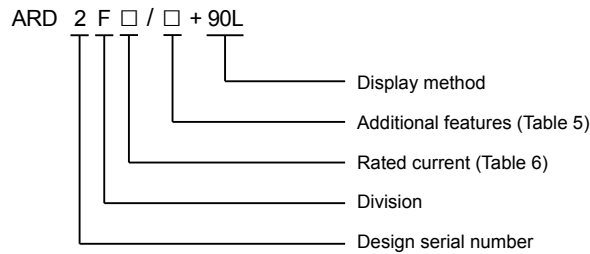


Table 5 Additional features

| Additional Features           |              | Code | Additional Features                                    | Code   |
|-------------------------------|--------------|------|--|--|
| Start control (including 'K') |              | Q    | Leakage Protection                                     | L  |
| Switch input                  |              | K    | 4~20mA analog output                                   | M  |
| Temperature protection        |              | T    | Loss of pressure (anti-shake)                          | SU (Including voltage and fault recording functions) |
| Alarm (programmable output)   |              | J    | SOE event record                                       | SR   |
| Communication Interface       | Modbus-RTU   | C    | Voltage function (phase sequence, power, power factor) | U  |
|                               | 2 Modbus-RTU | 2C   | tE time protection                                     | tE   |

- Note:
1. We recommend one 90L for one ARD2F.
  2. 'T' and '2C' cannot be selected at the same time.
  3. 'Q' is necessary when 'SU' is selected, 'SU' includes 'SR' and 'U'.

Table 6 Rated current

| Rated Current (A) | Ratio Setting | Transformer Primary Side Turns | Setting Current Range (A) | Motor Power (kW) |
|-------------------|---------------|--------------------------------|---------------------------|------------------|
| 1                 | Need          | 5                              | 0.1~999.9                 | 0.12~440         |
| 5                 |               | 1                              | 0.1~999.9                 | 0.12~440         |
| 1.6               | No need       | 1                              | 0.4~1.6                   | 0.12~0.55        |
| 6.3               |               | 1                              | 1.6~6.3                   | 0.75~2.2         |
| 25                |               | 1                              | 6.3~25                    | 3~11             |
| 100               |               | 1                              | 25~100                    | 15~45            |
| 250               |               | 1                              | 63~250                    | 55~132           |
| 800               |               | 1                              | 250~800                   | 160~440          |

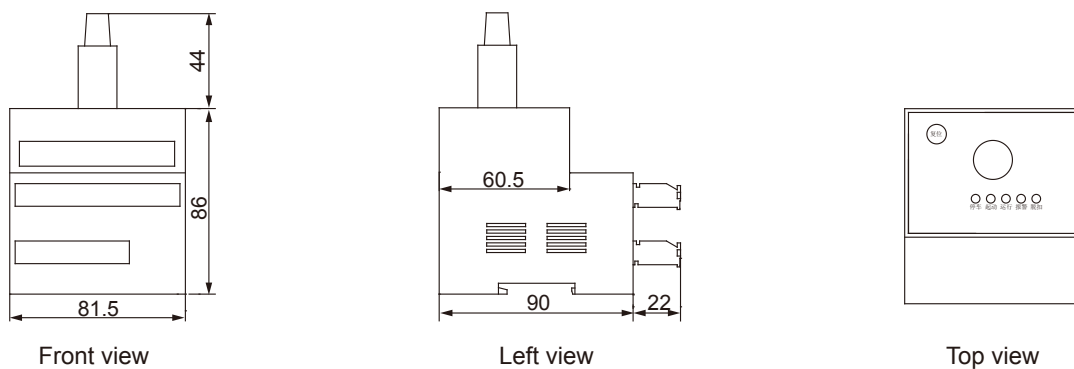
## Technical parameter

Table 7

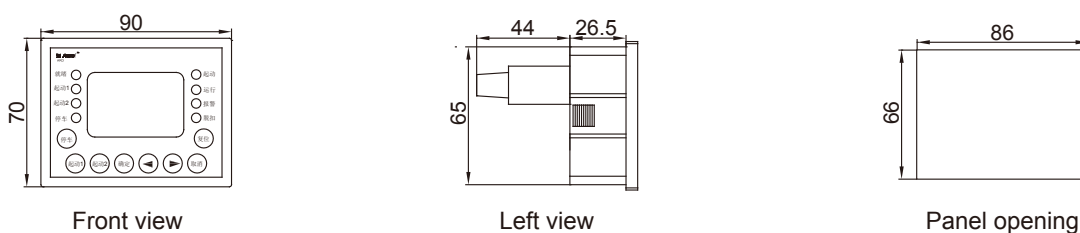
| Technical parameter                                | Value                                       |                                    |
|--|---|------------------------------------|
| Auxiliary power supply                             | AC85~265V/DC100~350V,power consumption 15VA |                                    |
| Rated voltage                                      | AC380V/AC660V,50Hz/60Hz                     |                                    |
| Rated current                                      | 1A(0.1A-999.9A)                             | Small special current transformers |
|  | 5A(0.1A-999.9A)                             |                                    |
|  | 1.6A(0.4A-1.6A)                             |                                    |
|  | 6.3A(1.6A-6.3A)                             |                                    |
|  | 25A (6.3A-25A)                              |                                    |
|  | 100A (25A-100A)                             |                                    |
|  | 250A (63A-250A)                             | Special current transformers       |
|  | 800A (250A-800A)                            |                                    |
| Relay output contactor,<br>rated negative capacity | 5 channels,AC 250V 6A                       |                                    |
| Switching input                                    | 9 channels,opto-coupler isolation           |                                    |
| Communication                                      | RS485(Modbus-RTU)                           |                                    |
| Environment  | Operation temperature                       | -10℃~55℃                           |
|  | Storage temperature                         | -20℃~65℃                           |
|  | Relative humidity                           | 5%~95% (No condensation)           |
|  | Altitude                                    | ≤2000m                             |
| Class of pollution                                 | Level 2                                     |                                    |
| Protection level                                   | Main module IP20,display unit IP45          |                                    |
| Installation category                              | Class III                                   |                                    |

## Dimensions and Installation (unit: mm)

## ■ Appearance and size of mounting hole



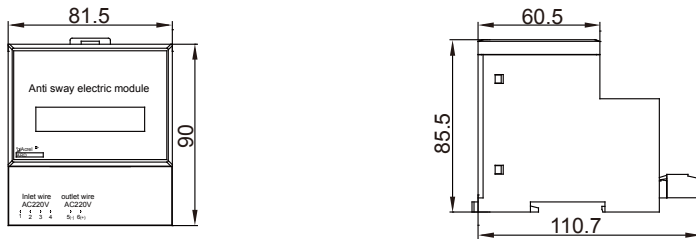
## ■ Installation dimension of protector display unit



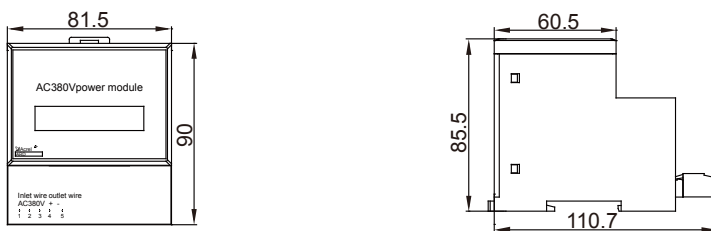
## ■ Installation dimensions of transformer

See the ARD2 Transformer Installation Dimension

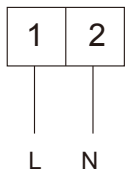
## ■ Anti sway electric module



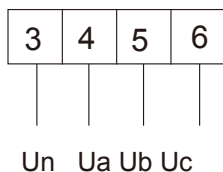
## ■ AC380 power module



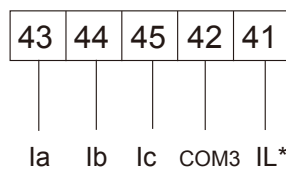
## Wiring



Auxiliary power supply

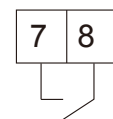


Voltage signal input

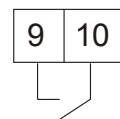


Current signal input

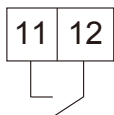
Leakage current input



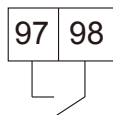
Starting 1



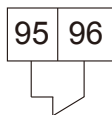
Starting 2



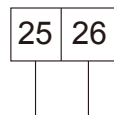
Alarm  
(DO3 programmable)



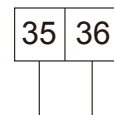
Trip  
(DO4 programmable)



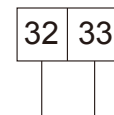
Trip



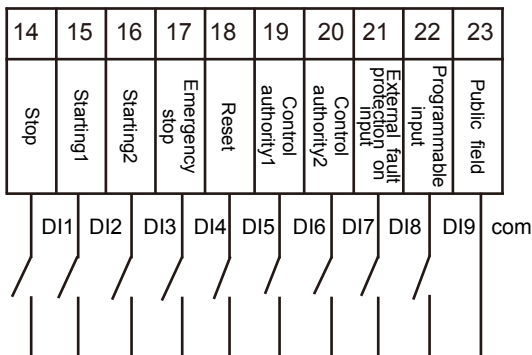
A B  
RS485



AO+ AO-  
Analog output



T1 T2  
PTC/NTC resistance input

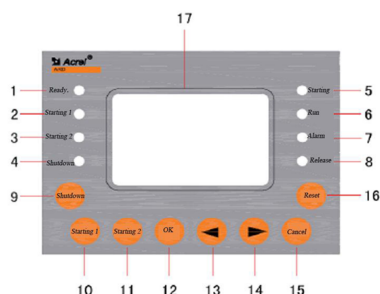




Switching input

## Display and Parameters Setting

### ■ Operation panel instruction

Users can observe the running status of motor through the LED indicating lamp and Chinese LCD on display unit and start, stop, reset and set parameters through the buttons.



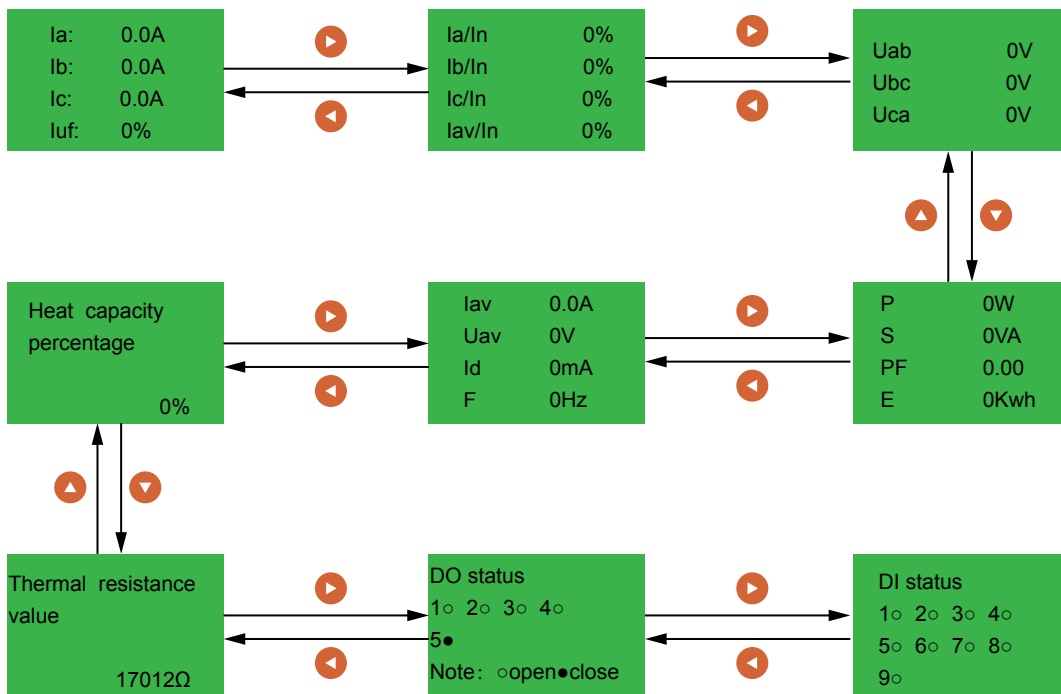
| No. | Name   | Status    | Function Description  |
|-----|--|-----------|---|
| 1   | Ready LED  | On        | When it is on, it indicates that the protector is in normal state and the motor can be started. |
| 2   | Starting 1 LED   | On        | When it is on, it indicates that the protector starting 1 relay closed                          |
| 3   | Starting 2 LED   | On        | When it is on, it indicates that the protector starting 2 relay closed                          |
| 4   | Stopping LED   | On        | When it is on, it indicates that the motor is in stopping status.                               |
| 5   | Starting LED   | On        | When it is on, it indicates that the motor is in starting status.                               |
| 6   | Running LED  | On        | When it is on, it indicates that the motor is in running status.                                |
| 7   | Alarm LED  | On        | When it is on, it indicates that the protector alarm relay has taken action.                    |
| 8   | Trip LED   | On        | When it is on, it indicates that the protector trip relay has taken action.                     |
| 9   | Stop button  | Hold down | Trip starting 1, starting 2 relays  |
| 10  | Starting 1 button  | Hold down | Operate starting 1 relay to make it closed  |
| 11  | Starting 2 button  | Hold down | Operate starting 2 relay to make it closed  |
| 12  | Confirm button   | Hold down | Enter the menu and modify the parameters  |
| 13  |  key(left)  | Hold down | Turn on the menu; data transfer; view event log   |
| 14  |  key(right) | Hold down | Turn down menu; modify data;  |
| 15  | Cancel button  | Hold down | Exit the menu; cancel operation; lighten backlight  |
| 16  | Reset button   | Press     | Reset the protector   |
| 17  | LCD display screen   |           | Display various measured parameters and setting parameters                                      |

## Parameter setting

### Display menu contents

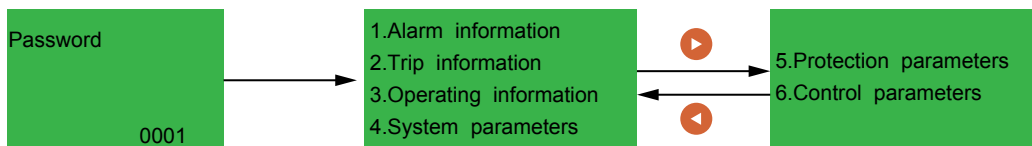
1. A, B, C three-phase current and unbalance percentage
2. Three-phase current and the percentage of three-phase average current to the set rated current
3. Uab, Ubc, Uca line voltage
4. Active power P, apparent power S, power factor PF;
5. Iav three-phase average current, Uav three-phase average voltage, Id earth leakage current, frequency F;
6. Heat capacity percentage
7. Thermal resistance value:
8. Route 5 relay input: 1-Starting, 2; 3-Alarm (programmable) ;  
4- Trip (Programmable); 5- Trip
9. Route 9 DI status.

Users can press the “” key(right) on the display unit to display the selection of menu interface.



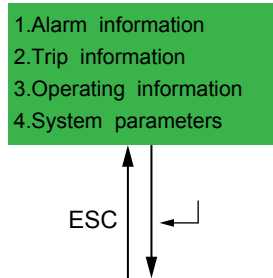
### Overview of menu

Press the “Confirm” button, then password input interface comes out. users can enter the parameter setting menu after inputting the password (initial password is 0001, universal password is 0008)



◆ Overview of submenus

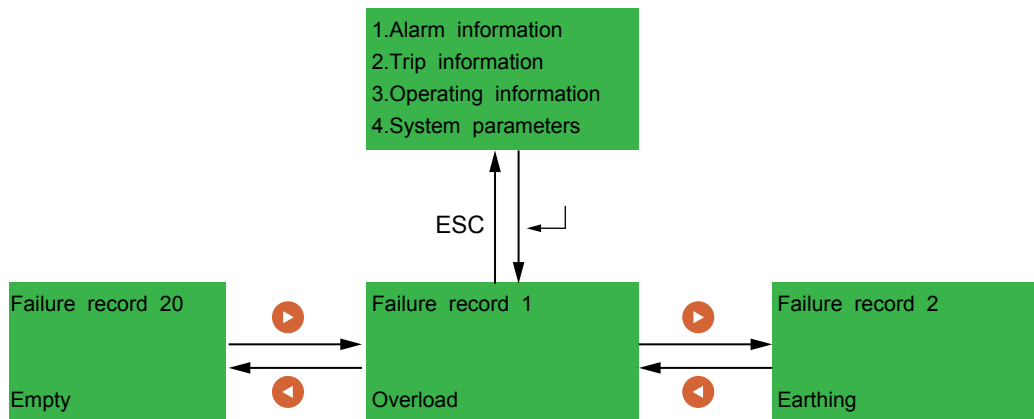
① Alarm information



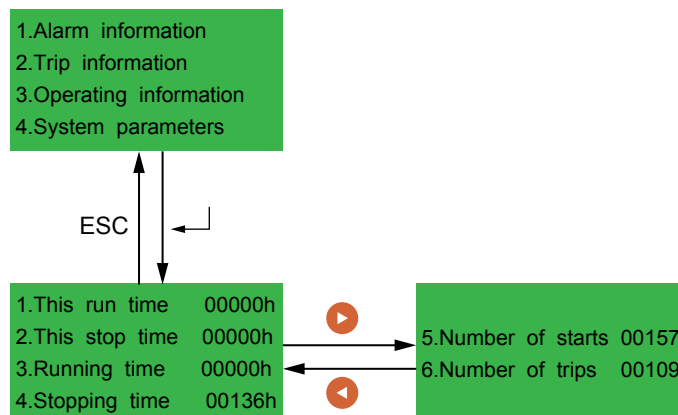
|                                |   |
|--------------------------------|---|
| 1.Overload alarm               | N |
| 2.Phase failure alarm          | N |
| 3.Under load alarm             | N |
| 4.Temperature alarm            | N |
| 5.Unbalance alarm              | N |
| 6.Earthing/Earth leakage alarm | N |
| 7.External alarm               | N |
| 8.Starting alarm               | N |

|                         |   |
|-------------------------|---|
| 9.Under voltage alarm   | N |
| 10.Over voltage alarm   | N |
| 11.Pei-rotor alarm      | N |
| 12.Blocking alarm       | N |
| 13.Overpower alarm      | N |
| 14.Under power alarm    | N |
| 15.Phase sequence alarm | N |
| 16.Short-Circuit alarm  | N |

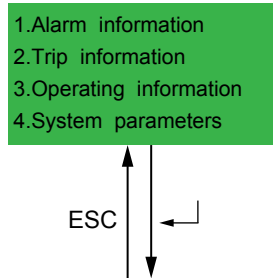
② Trip information



③ Operation information

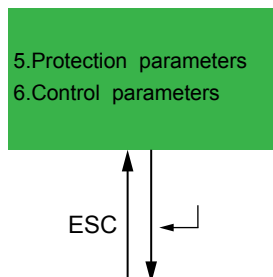


④ System parameters



|                            |   |   |     |
|----------------------------|---|---|-----|
| 1.Baud rate                | 2400、4800、9600、19200、38400                                    | 9600  | bps |
| 2.Postal address           | 1-247   | 1   |     |
| 3.Password                 | 0-9999  | 1   |     |
| 4.Motor Type               | General motor, safety-increased motor                         | Common motor  |     |
| 5.Transmission Type        | Ia, Ib, Ie, Iay, Uab, Ubc, Uca, Uay, PTC, heat Capacity, P, F | Iay   |     |
| 6.transmission ratio       | 1-8   | 2   |     |
| 7.backlight lit            | On/off  | OFF   |     |
| 8.System voltage           | 380、660   | 380   | V   |
| 9.Rated frequency          | 45-65   | 50  |     |
| 10.Rated power             | 0.4-1.6<br>1.6-6.3<br>6.3-25<br>25-100<br>63-250<br>250-800   | 1056、<br>4158、<br>16500、<br>66000、<br>165000、<br>480000 | w   |
| 11.CT ratio                | 1-1000  | 1   |     |
| 12.Local speed switch      | On/off  | OFF   |     |
| 13.fundamental wave switch | On/off  | OFF   |     |
| 14.Software Version        |   |   |     |

⑤ Protection parameters



|                       |               |           |      |   |
|-----------------------|---------------|-----------|------|---|
| 1.Starting protection | Starting time | 0.1-999.9 | 10.0 | s |
|                       | Alarm         | On/off    | OFF  |   |
|                       | Trip          | On/off    | ON   |   |

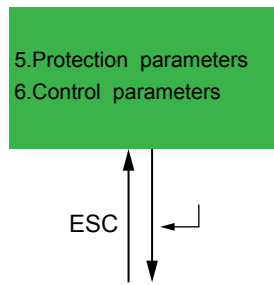
|                              |                                |  |      |       |
|------------------------------|--------------------------------|--|------|-------|
| 2. Overload protection       | Rated current of motor         | 0.4-1.6                                | 1.6  | A     |
|                              |                                | 1.6-6.3                                | 6.3  |       |
|                              |                                | 6.3-25                                 | 25.0 |       |
|                              |                                | 25-100                                 | 100  |       |
|                              |                                | 63-250                                 | 250  |       |
|                              |                                | 250-800                                | 800  |       |
|                              | Trip class                     | 1、 2、 3、 5、 10、 15、 20、 25、 30、 35、 40 | 5    | Level |
|                              | Alarm threshold value          | 1-99%                                  | 85   | %     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | ON   |       |
| Overload automatic reset     | On/off                         | OFF                                    |      |       |
| 3. Under load protection     | Cooling time                   | 1-30                                   | 30   | min   |
|                              | Alarm threshold value          | 10-99%                                 | 70   | %     |
|                              | Trip threshold value           | 10-99%                                 | 50   | %     |
|                              | Trip delay                     | 0.1-600                                | 5.0  | s     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | OFF  |       |
| 4. Phase failure protection  | Trip delay                     | 0.1-600                                | 1.0  | s     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | ON   |       |
| 5. Phase sequence protection | Trip delay                     | 0.1-600                                | 1.0  | s     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | ON   |       |
| 6. Unbalance protection      | Alarm threshold value          | 10-80%                                 | 20   | %     |
|                              | Trip threshold value           | 10-80%                                 | 30   | %     |
|                              | Trip delay                     | 0.1-600                                | 5.0  | s     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | OFF  |       |
| 7. Earthing / Earth leakage  | Transformer input              | On/off                                 | OFF  |       |
|                              | Earthing alarm threshold value | 20-100%                                | 20   | %     |
|                              | Earthing trip threshold value  | 20-100%                                | 50   | %     |
|                              | Trip delay                     | 0.1-600                                | 0.1  | s     |
|                              | Earth leakage alarm current    | 100-1000                               | 200  | mA    |
|                              | Earth leakage trip current     | 100-1000                               | 300  | mA    |
|                              | Trip delay                     | 0.1-600                                | 0.5  | s     |
|                              | Alarm                          | On/off                                 | OFF  |       |
|                              | Trip                           | On/off                                 | OFF  |       |



|                             |                       |   |     |   |
|-----------------------------|-----------------------|---|-----|---|
| 8.Short-Circuit Protection  | Alarm threshold value | 400-700% max. measurable overload times | 400 | % |
|                             | Trip threshold value  | 400-700% max. measurable overload times | 500 | % |
|                             | Trip delay            | 0.1-600                                 | 0.1 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 9.Over voltage protection   | Alarm threshold value | 110-150%                                | 110 | % |
|                             | Trip threshold value  | 110-150%                                | 120 | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 10.Under voltage protection | Alarm threshold value | 55-90%                                  | 90  | % |
|                             | Trip threshold value  | 55-90%                                  | 80  | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 11.Pei-rotor protection     | Alarm threshold value | 100-700%                                | 500 | % |
|                             | Trip threshold value  | 100-700%                                | 600 | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 12.Blocking protection      | Alarm threshold value | 100-700%                                | 150 | % |
|                             | Trip threshold value  | 100-700%                                | 250 | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 13.Overpower protection     | Alarm threshold value | 100-700%                                | 150 | % |
|                             | Trip threshold value  | 100-700%                                | 250 | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |
| 14.Under power protection   | Alarm threshold value | 0-100%                                  | 80  | % |
|                             | Trip threshold value  | 0-100%                                  | 50  | % |
|                             | Trip delay            | 0.1-600                                 | 5.0 | s |
|                             | Alarm                 | On/off                                  | OFF |   |
|                             | Trip                  | On/off                                  | OFF |   |

|                           |                         |                     |      |   |
|---------------------------|-------------------------|---------------------|------|---|
| 15.Temperature protection | PTC type                | On/off              | ON   |   |
|                           | Return resistance value | 0 closed 1000-30000 | 0    | Ω |
|                           | Alarm resistance value  | 100-30000           | 1600 | Ω |
|                           | Trip resistance value   | 100-30000           | 3600 | Ω |
|                           | Trip delay              | 0.1-600             | 5.0  | s |
|                           | Alarm                   | On/off              | OFF  |   |
|                           | Trip                    | On/off              | OFF  |   |
| 16.External fault         | Trip delay              | 0.1-600             | 5.0  | s |
|                           | Alarm                   | On/off              | OFF  |   |
|                           | Trip                    | On/off              | OFF  |   |

### ⑥ Alarm information



|                            |   |  |                 |   |
|----------------------------|---|--|-----------------|---|
| 1.Control authority        | Switching input                           | Local, on-site, remote I. full-controlled  | Full-controlled |   |
| 2.Starting Contro          | Starting Mode                             | Protection mode, manual mode, two-step mode, two-speed mode  | protection mode |   |
| 3.Self-start               | Starting - delay                          | 0.1-600  | 3.0             | s |
|                            | Self-start Mode                           | Reset/ start   | Starting        |   |
|                            | Self-start delay                          | 0.1-600  | 5.0             | s |
|                            | Self-start control                        | On/off   | OFF             |   |
| 4.Loss voltage restarting  | voltage setting                           | 75-95%   | 80              | % |
|                            | Immediately restarting power failure time | 0.1-0.5  | 0.1             | s |
|                            | Allowable time (min)                      | 0.5-10.0   | 5.0             | s |
|                            | Restarting delay                          | 1.0-60.08  | 30.0            | s |
| 5.Reflow inspection        | Controls                                  | 0 OFF, 1 start 1, 2 start2   | OFF             |   |
|                            | Delay setting                             | 0.1-600  |                 | s |
| 6.D03 programmable Setting | Controls                                  | On/off   | OFF             |   |
|                            | Programmable setting                      | 1-Start 1,<br>2-Start<br>3-Alarm fault output,<br>4-Trip fault output,<br>5-Device self-checking output<br>6-Device power output,<br>7-Stopping state ready<br>8-Running state output,<br>9-DI control output,<br>10-Bus control | 3               |   |

|                            |                          |   |       |   |
|----------------------------|--------------------------|---|-------|---|
| 7.D04 programmable Setting | Action time setting      | 0-250   | 0.1   | s |
|                            | Programmable setting     | 1-Starting1,<br>2-Start 2,<br>3-Alarm fault output,<br>4-Trip fault output,<br>5-Device self-checking output<br>6-Device power output,<br>7-Stopping state ready<br>8-Running state output,<br>9-DI control output,<br>10-Bus control                                     | 3     |   |
|                            | Action time setting      | 0-250   | 0.1   | s |
|                            | Trip fault setting       | 0-65535   | 65535 |   |
| 8.DI9 programmable Setting | DI9 programmable setting | 1.Common DI<br>2.Start 1(direct start, turn left, low speed)<br>3.Start 2(turn right,high speed),<br>4.Shutdown<br>5.Resetting,<br>6.Emergency shutdown<br>7.External fault<br>8.Start/stop,<br>9.Control authority 1<br>10.Control authority 2<br>11.Two-wire start-stop |       |   |
| 9.TEST                     | D02                      | On/off  | OFF   |   |
|                            | D03                      | On/off  | OFF   |   |
|                            | D04                      | On/off  | OFF   |   |
|                            | D05                      | On/off  | OFF   |   |