

ARD2F Intelligent motor Protector
Operating Manual V1.5

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Catalog

1 Overview.....	1
2 Product Features.....	1
3 Model Description.....	1
4 Main parameters.....	3
4.1 Technical indicators.....	3
4.2 Functional configuration.....	4
5 Overall dimensions and installation.....	5
5.1 The product composition of ARD2F is shown in Figure 1, Figure 2.....	5
5.2 Panel size and opening(Unit:mm).....	6
5.3 Size of main body module (unit: mm).....	6
5.4 The external dimensions of current transformers of 100A and the following specifications are shown in FIG. 5 (unit: mm) :.....	7
5.5 Terminal.....	9
6 Protection function description.....	11
6.1 Inverse time overload protection.....	11
6.2 Start timeout protection.....	14
6.3 Locked-rotor protection.....	15
6.4 Blocking protection.....	15
6.5 Underload protection.....	16
6.6.Underpower protection.....	17
6.7 Overload protection.....	17
6.8 Overpower protection.....	18
6.9 Ground fault protection.....	18
6.10 Leakage protection.....	19
6.11 I unbalance protection.....	19
6.12 U unbalance protection.....	19
6.13 Phase fail protection.....	20
6.14 Phase sequence protection.....	21
6.15 Overvoltage protection.....	21
6.16 Undervoltage protection.....	21
6.17 Short circuit protection.....	22
6.18 Temperature protection.....	22
6.19 External fault.....	23
6.20 Overflow protection.....	23
6.21 Number of starts protection.....	24
6.22 Running time alarm.....	24
6.23 Fault frequency alarm.....	24
7 Function setting and description.....	25
7.1 Key of main module and LED indicator light are shown in Table 11:.....	25
7.2 The 90L display module button and LED indicator light are shown in Table 12:.....	25
7.3 90L display module introduction.....	26
7.4 Menu description.....	27

8 Communication Settings and instructions.....	37
8.1 Modbus RTU Communication Protocol Overview.....	37
9 Typical applications.....	65
9.1 ARD2F Electrical Motor Protection Mode Wiring.....	65
9.2 ARD2F Electrical motor protector direct starting wiring diagram.....	66
9.3 ARD2F Electrical motor protector forward/reverse wiring diagram.....	67
9.4 ARD2F Electrical Protector Y- Δ Starting (Three Relay Mode) Wiring Diagram.....	68
9.5 ARD2F Electrical Motor Protector Double Speed Mode Connection.....	69
9.6 ARD2F Electrical Motor Protector 2PT(3P3L) Connection.....	70
10 Features and Functions.....	70
10.1 Permissions programmable.....	70
10.2 Logic programmable.....	71
10.3 Custom communication address.....	72
11 Examples of ordering.....	72

1 Overview

The ARD2F intelligent motor protector (hereinafter referred to as the protector) is suitable for low-voltage motor circuits with rated voltage up to 660V and integrates protection, measurement, control, communication, operation and maintenance. Its perfect protection function ensures the safe operation of the motor, with logic programmable function, can meet a variety of control methods.

The product adopts split structure, which is composed of main body, panel, mutual inductor and optional communication module, and can adapt to the installation of various cabinets.

Product Implementation standards:

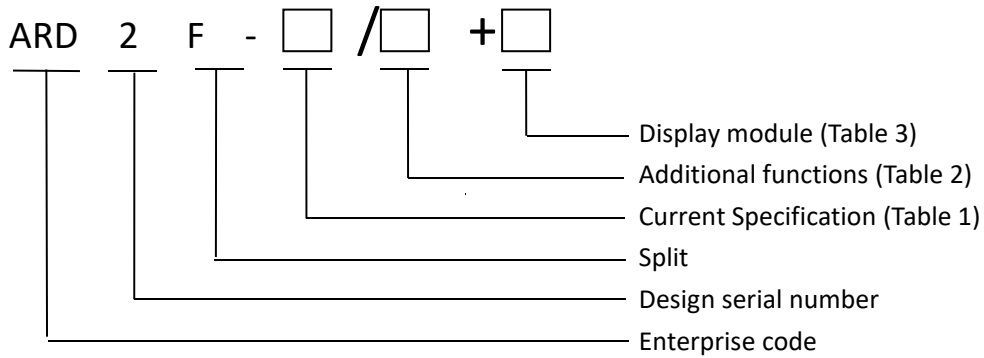
—GB 14048.4-2020 Low-voltage switchgear and control gear -- Part 4-1: Contactors and motor starters -- Electromechanical contactors and motor starters (including motor protectors);

—JB/T 10736-2007 Low voltage motor protector.

2 Product Features

- Support fundamental and full-wave power parameter measurement (U, I, P, Q, S, PF, F, EP, EQ), voltage and I unbalance degree, voltage and current positive sequence, negative sequence, zero sequence component, three-phase voltage phase Angle, residual current.
- Protection functions include overload inverse time, overload definite time, grounding, starting timeout, leakage, underload, locked-rotor, obstruction, short circuit, phase, overflow, imbalance (current, voltage, power, less power, overvoltage, undervoltage, phase sequence, temperature, external fault, tE time, running time alarm, fault alarm.
- 9 channels programmable DI input, the default use of DC24V power supply, or external active wet contact can be selected (see the selection table).
- 5 programmable DO output, to meet the direct starting, star - triangle starting, auto-transformer starting, and other starting modes, can be through the communication bus to achieve the master station to the motor remote control "start/stop".
- Optional anti-shaking function: support immediate restart of shaking power and restart of voltage loss.
- MODBUS_RTU and PROFIBUS DPV0 communication modules are available for selection.2 MODBUS_RTU communication channels or MODBUS_RTU+PROFIBUS DPV0 communication modules can be chosen.
- Optional 1 channels DC4-20MA analog output interface, connected with DCS system, can realize the monitoring of field equipment.
- With fault record, start record, stop record, DI displacement record, restart record and other records of various events, you can view a number of motor operation and maintenance information.
- The display interface supports Chinese/English LIQUID crystal display

3 Model Description



The corresponding relation between ARD2F current specification and the rated current and power of the applicable motor is shown in Table 1:

Table 1

Protector current specification (A)	Ratio setting	Primary side coil of transformer	Applicable scope of motor (kW)	Suitable for motor Rated current range (A)
1	Support	5circle	0.12-999	0.1-5000
5		1circle	0.12-999	0.5-5000
1.6	Does not support	1circle	0.12-0.55	0.4-1.6
6.3		1circle	0.75-2.2	1.6-6.3
25		1circle	3-11	6.3-25
100		1circle	15-45	25-100
250		1circle	55-132	63-250
800		1circle	160-250	250-800

Additional features of ARD2F are shown in Table 2:

Table 2

Additional function		Code	Additional function		Code
Starting control (including K function)		Q	Leakage protection		L
Switching input		K	4-20mA analog output		M
Temperature protection		T	Anti - electric shock function		SU
Alarm (Programmable output)		J	SOE event record		SR
1 channel communication	Modbus_RTU	C	2 channels communication	2 路 Modbus_RTU	2C
	Profibus_DP	CP		Modbus+Profibus	CCP
Voltage function (phase sequence, power, power factor)		U	tE time protection		tE
Energy metering		Ep			

See Table 3 for the ARD2F display module:

Table 3

Display module	code
90L	LCD display, module size 90×70, opening 86×66 (unit:mm)

Remarks:

(1).Current measuring and 2 channels of relay output DO4(97.98).DO5(94.96.95) are standard for ARD2F.

- (2).When equipped with starting control, the protector provides no more than 2 starting relay for the sequence control of the closing/opening of two external contactors to realize different starting ways of motor (such as Y-Δ transformation starting, positive and negative rotation control, and self-coupling reduced-voltage starting, etc.)
- (3).The additional function SU and Q should be chosen together. Additional function SU is including U(voltage function) and SR(SOE event record).
- (4).The current specifications of 100A and below shall be the same type of current transformer. The transformer is equipped with a secondary line of about 1m. If you need special line length, please contact the manufacturer. The 250A and 800A current specifications use two other types of transformers with no secondary wires. See "External Dimensions and Installation" for the dimensions of the transformer.
- (5).The standard display cable is a network cable with a length of 1.5m. 3 meters and 5 meters are available for optional configuration. You can place an order and remark the corresponding cable length.
- (6).For customers who do not need display modules, a batch of optional several display modules can be used as a programmer, or the configuration software provided by the manufacturer can be used to configure parameters through computer software.
- (7).The temperature measurement support sensor type is PTC or NTC.。
- (8).After selecting the leakage function (L), each protector shall be equipped with a leakage transformer. Please refer to the "External Dimensions and Installation" section for the dimensions of the leakage transformer. The leakage transformer is equipped with a secondary wire of 2m±10cm. If other lengths are needed, please contact the manufacturer.

4 Main parameters

4.1 Technical indicators

ARD2F technical indicators are shown in Table 4:

Table 4

Technical parameters	Technical indicators	
Protector auxiliary power supply	AC85-265V/DC100-350V	
Rated working voltage of the motor	AC220V / 380V / 660V,50Hz / 60Hz	
Rated operating current of the motor	1 (0.1A-5000A)	External current transformer
	5 (0.1A-5000A)	
	1.6A(0.4A-1.6A)	
	6.3A(1.6A-6.3A)	
	25(6.3A-25A)	
	100(25A-100A)	
	250(63A-250A)	
800(250A-800A)		
Relay output contact capacity	Impedance load	AC250V.10A
Switching input	9 channels of passive dry contact (active DC110V, DC220V, AC220V input can be optional)	
Communication	RS485 Modbus_RTU, Profobus_DP	

Environment	Working temperature	-10°C~55°C
	Storage temperature	-25°C~70°C
	Relative humidity	≤95% No condensation, no corrosive gas
	Altitude	≤2000m
Pollution levels	Class 2	
Protection grade	Main body IP20, split display module IP54 (installed on the cabinet panel)	
Installation category	Level III	

4.2 Functional configuration

The ARD2F functional configuration is shown in Table 5

Table 5

Function		Type	Functional configuration		
			Standard function	Optional function	
Protection function	Fixed time overload		√		
	Inverse time overload		√		
	Starting timeout		√		
	Phase loss		√		
	Voltage unbalance		√		
	Current unbalance		√		
	Locked-Rotor		√		
	short circuit		√		
	underload		√		
	External fault		√		
	Block		√		
	Temperature protection(PTC/NTC)		√		
	Residual current	grounding		√	
		leakage			√(leakage)
	Phase sequence		√		
	Under voltage		√		
	Over voltage		√		
	Under power		√		
	Over power		√		
	tE Time protect		√		
Overflow protection		√			
Alarm of starting times		√			
Running time alarm		√			
Fault frequency alarm		√			
Control mode	Protection mode		√		
	Direct start mode			√	
	Two-step mode				
	Two-speed mode				

	Y-Δ start mode		
	Voltage loss restart		√
Communication	1 channel Modbus-RTU communication		√
	2 channel Modbus-RTU communication		√
	1 channel Profibus-DP communication		√
	1 channel Modbus-RTU+1 channel Profibus-DP		√
Switching input	9 channel DI(programmable)		√
Relay output	2 channel DO(programmable)	√	
	5 channel DO(programmable)		√
Analog output	1 channel DC4-20mA		√
Event record	Start record, stop record, DI displacement record, restart record, (support communication transmission and U disk export)		√
Panel	Liquid crystal display (LCD)	Black and white dot matrix LCD display	√

5 Overall dimensions and installation

5.1 The product composition of ARD2F is shown in Figure 1, Figure 2

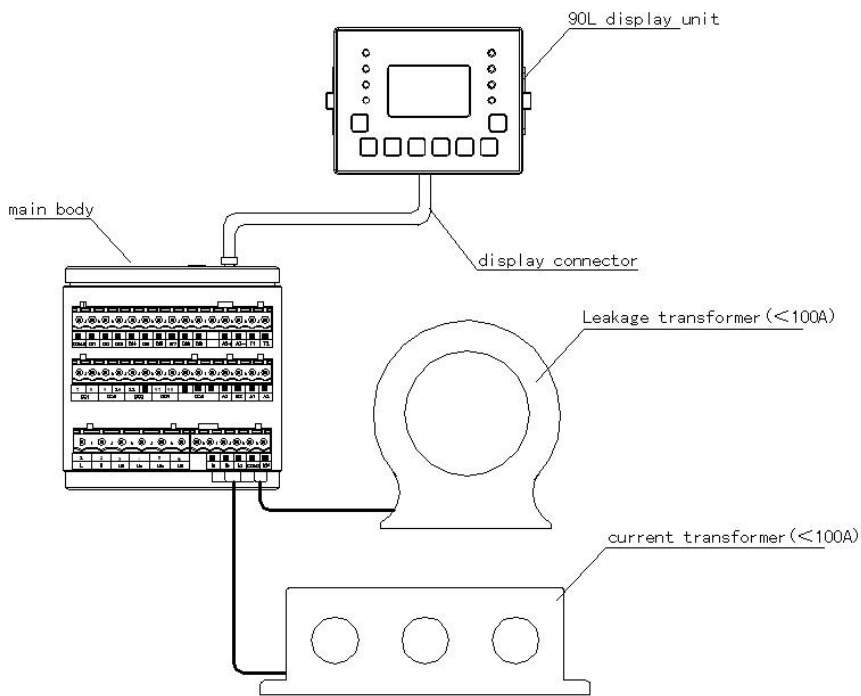


FIG. 1 Composition of products with 100A and below specifications

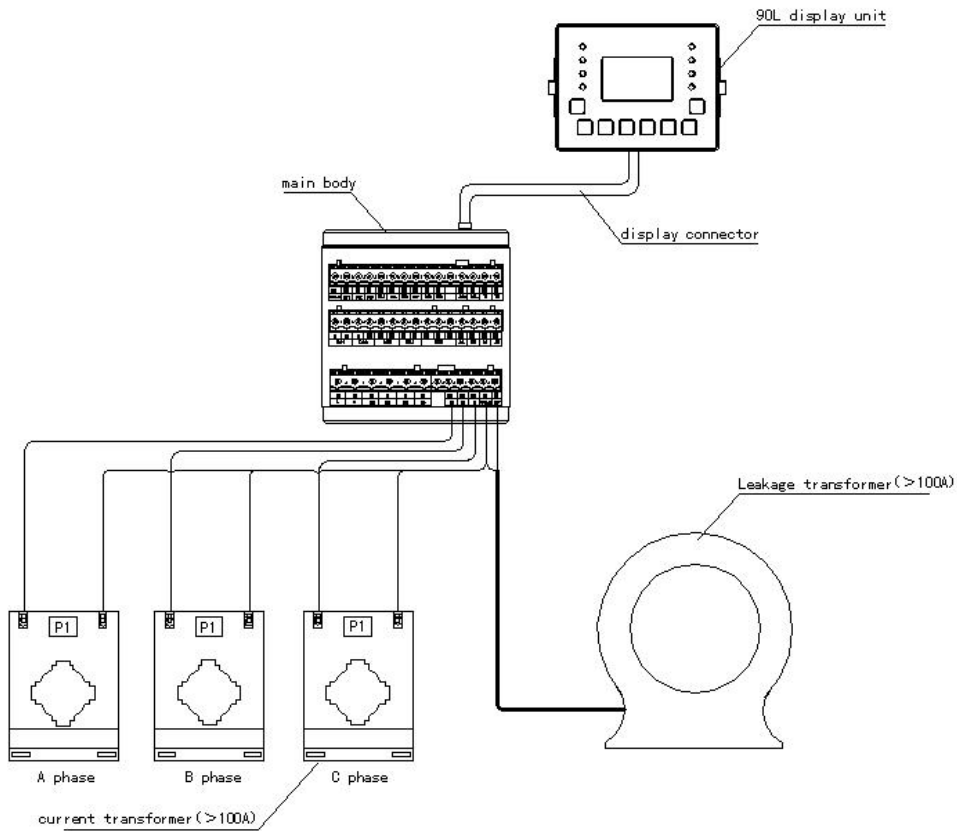


FIG. 2 Composition of 250A and 800A

5.2 Panel size and opening(Unit:mm)

The shape and opening size of the black and white liquid crystal panel are shown in Figure4:

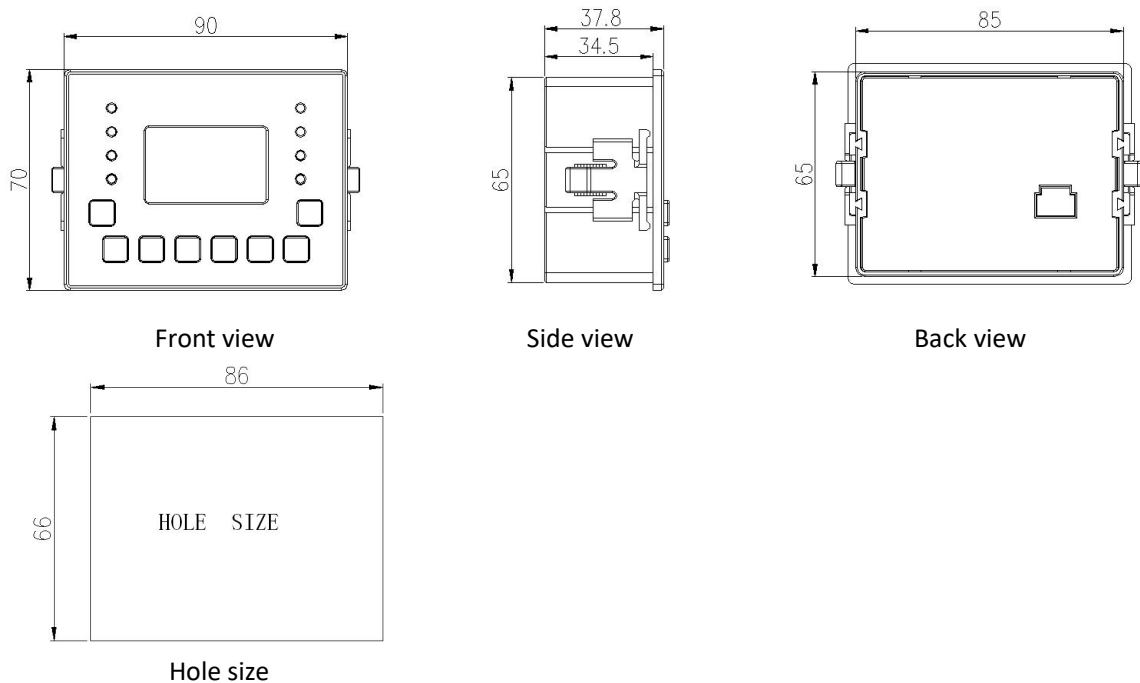


Fig.3 The shape and hole size of 90L panel

5.3 Size of main body module (unit: mm)

The ARD2F main body is installed with 35mm guide rail, and its external dimensions are shown in Figure 4:

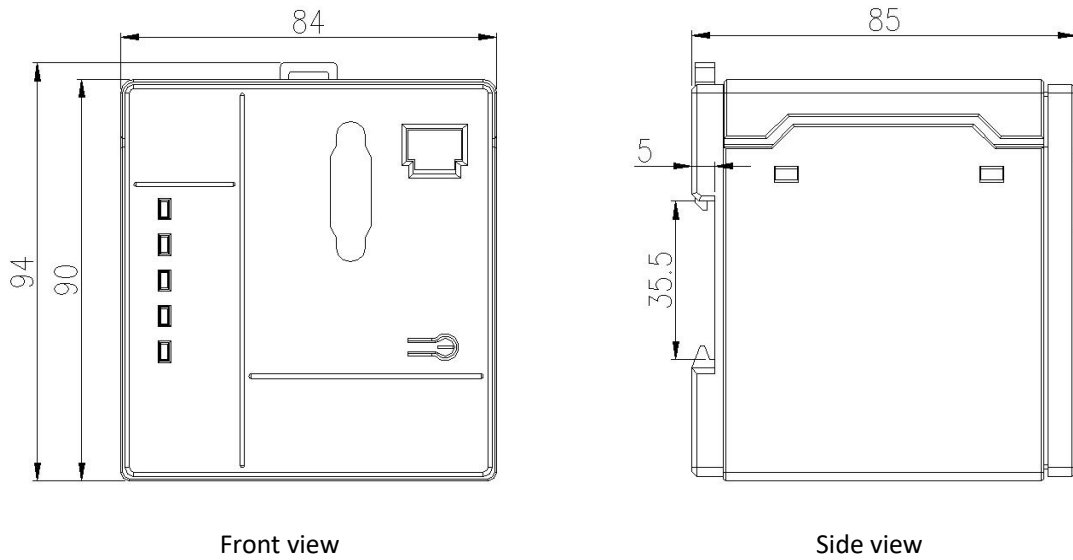


Fig.4 ARD2F main body dimensions

5.4 The external dimensions of current transformers of 100A and the following specifications are shown in FIG. 5 (unit: mm) :

5.4.1 The current transformer with the current specification of the protector is 100A, with the standard secondary connection line length of $1m \pm 10cm$. If other lengths are needed, please contact the manufacturer, for example, 3m and 5m lines are optional. The secondary lines of yellow, blue, red and black correspond to the correlation of current A, B, C and the common end of the transformer. A protector is equipped with a set of transformer.

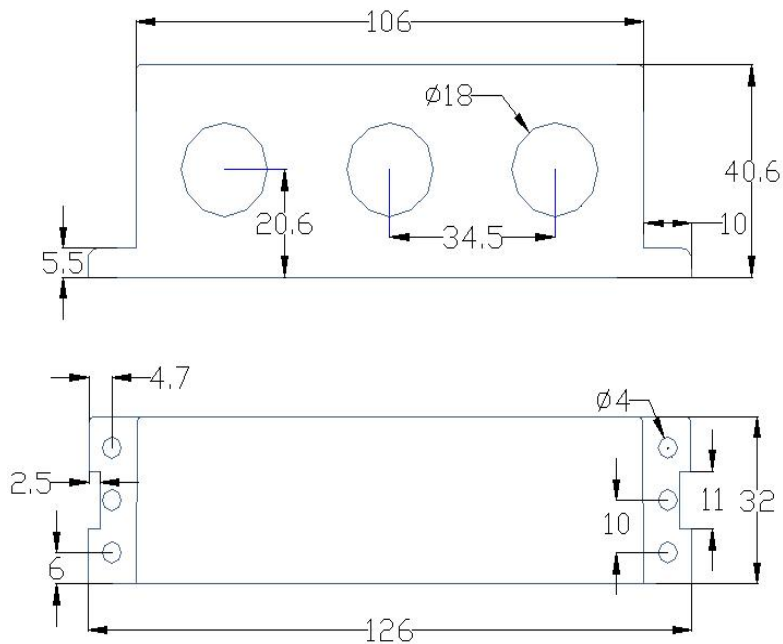


Fig. 5 External dimensions of current transformers with specifications below 100A

5.4.2 The external dimensions of the 250A current transformer are shown in FIG. 6 (unit: mm) :

The current specification of the protector is the current transformer matched at 250A. There is no secondary connection wire. One protector is equipped with three transformers.

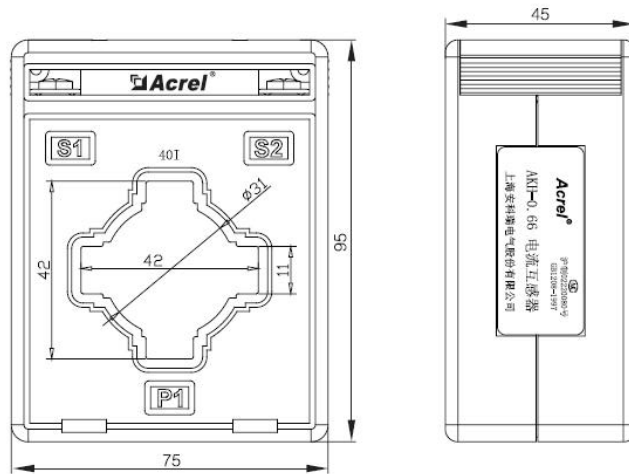


Fig. 6 External dimensions of current transformer 250A

5.4.3 The external dimensions of the current transformer (800A) are shown in FIG. 7 (unit: mm) :
The current specification of the protector is 800A and the current transformer is not equipped with secondary connection. One protector is equipped with three transformers.

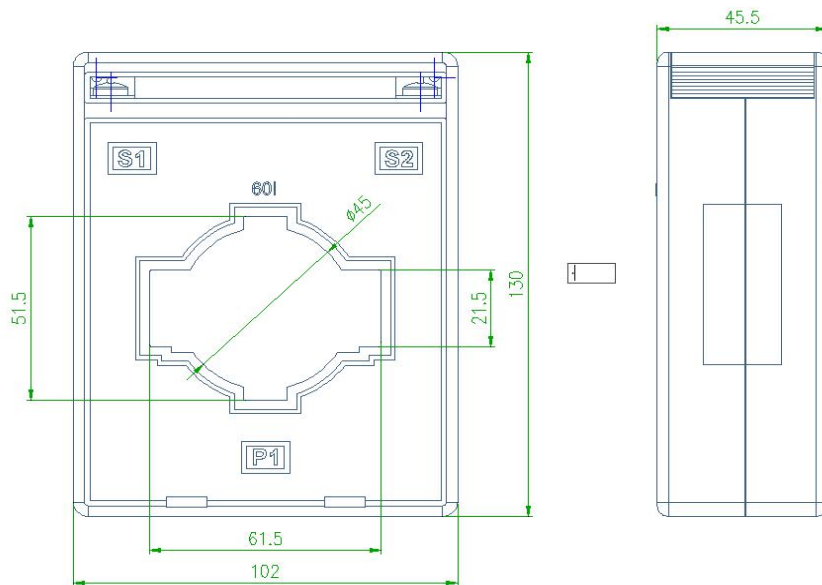


Fig. 7 External dimensions of current transformer 800A

5.4.4 The external dimensions of the leakage current transformer are shown in Figure 8 and Table 6 (unit: mm) :

The protectors with current specifications of 100A and below are equipped with leakage current transformers with specifications of L-45.250A and current protector with specifications L-80 leakage current transformer;800A and current specification protector with L-150 leakage current transformer.The leakage transformer is equipped with a secondary wire of 2m±10cm. If other lengths are needed, please contact the manufacturer.

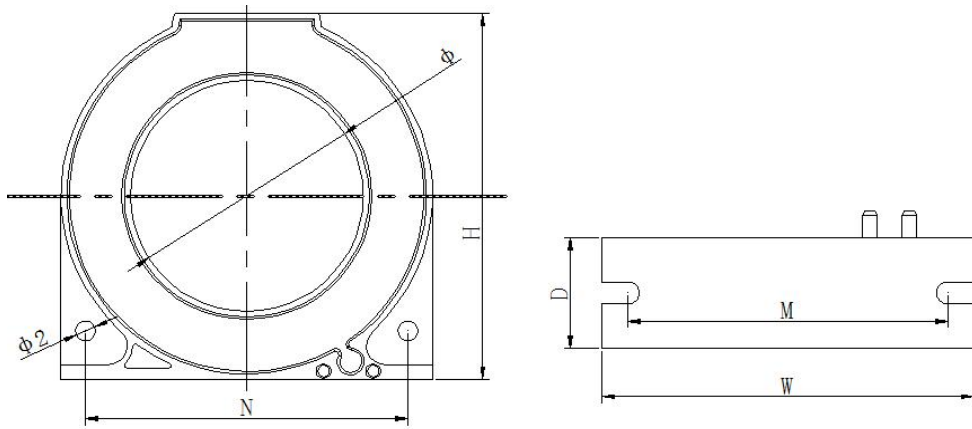


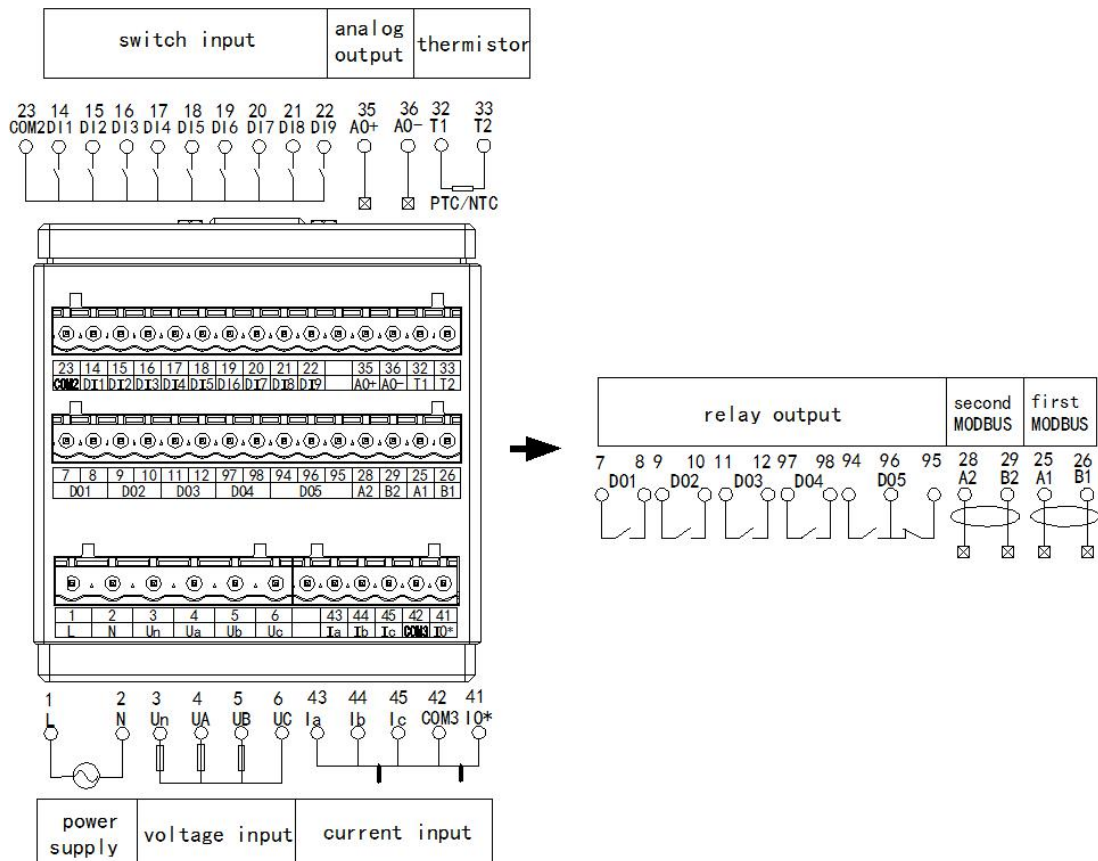
Fig. 8 External dimensions of leakage current transformer

Table 6

Spec.	Dimension			Go through size(mm)	Installation size(mm)			Tolerance (mm)	Weight (g)
	Overall size(mm)								
L-45	75	75	22	46	65	65	4	±1	200±10
L-80	120	120	23	81	105	105	4		380±20
L-150	196	205	24	150	175	180	6		850±50

5.5 Terminal

The wiring terminal arrangement of the ARD2F main body is shown in Figure 9:



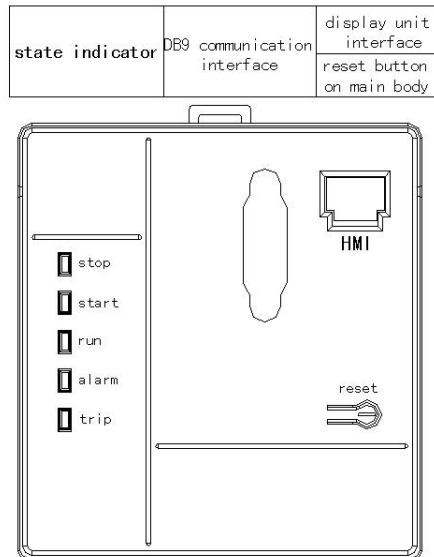


Fig. 9 ARD2F terminal arrangement

See Table 7 for the ARD2F terminal number and function definition:

Table 7

Terminals NO.	Function definition	Remark
1	Power input L (+ at DC time)	The auxiliary power supply is connected to the two terminals
2	Power input N (- at DC time)	
3	Un input	Three-phase voltage input
4	Ua Phase voltage input	
5	Ub Phase voltage input	
6	Uc Phase voltage input	
7,8	DO1,Start 1 output	5-channel programmable relay output (DO) (The function is defined as factory default setting, which can be set by users according to their needs)
9,10	DO2,Start 2 output	
11,12	DO3,Alarm output	
97,98	DO4,Trip output, normally open point signal	
94,96,95	DO5,Trip output, normally closed + normally open with common end	
14	DI1,Stop signal input	9-channel programmable Switching input (DI) (The function is defined as factory default setting, which can be set by users according to their needs)
15	DI2,Start 1 signal input	
16	DI3,Start 2 signal input	
17	DI4,Emergency stop signal input	
18	DI5,Reset signal input	
19	DI6,Control permission 1 input	
20	DI7,Control permission 2 input	
21	DI8,External fault signal input	
22	DI9,ordinary DI	
23	COM1,DI Input common terminal	
35	Analog output AO+	4-20mA analog output
36	Analog output common end AO-	
25	A1	First channel MODBUS communication
26	B1	
28	A2	Second channel MODBUS

29	B2	communication
32	T1(PTC input A)	Temperature protection (thermistor input)
33	T2(PTC input B)	
41	IL*(leakage current input)	Leakage current measurement
42	COM3(common terminal of current leakage current input)	Three phase current input
43	Ia Phase current input	
44	Ib Phase current input	
45	Ic Phase current input	

6 Protection function description

The default action stages of each protection are shown in Table 8:

Table 8

Protection type	Default active period
Overvoltage, undervoltage, U unbalance, phase sequence, external fault, overflow protection, starting times, fault times, running time, PTC/NTC temperature protection	whole course
Reverse time overload, locked rotor, phase break, leakage, grounding, starting timeout, short circuit, overflow protection, Overvoltage, undervoltage, U unbalance, phase sequence, external fault, number of starts, number of faults, running time, PTC/NTC temperature protection, fixed time overload	When starting
Reverse time-limit overload, blocking, phase break, I unbalance, leakage, grounding, constant time-limit overload, underload, short circuit, overflow protection, overvoltage, undervoltage, voltage unbalance, phase sequence, underpower, overpower, external fault, PTC/NTC temperature protection, number of starts, number of faults, running time	In operation

6.1 Inverse time overload protection

When the motor runs for a long time in excess of its rated current under excessive load, it will overheat the motor, reduce insulation and burn it out. The protector calculates the heat capacity of the motor according to its heating characteristics and simulates its heating characteristics to protect the motor.

The starting condition of reverse time-limit overload protection is that the maximum three-phase current reaches the set overload starting value, and the default overload starting value is 1.2 times the motor's rated current.

The current-time comparison table of overload protection is shown in Table 9, and the overload characteristic curve (K curve) is shown in Figure 10:

Table 9

Optional tripping curve grade K	1	2	3	5	10	15	20	25	30	35	40
Tripping delay(S)tolerance	Three - phase balanced load, starting from the cold state										

±10%											
Rated value $I_e \times 1.2$	25	50	75	125	250	375	500	625	750	875	1000
$\times 1.5$	16	32	48	80	160	240	320	400	480	560	640
$\times 2$	9	18	27	45	90	135	180	225	270	315	360
$\times 3$	4	8	12	20	40	60	80	100	120	140	160
$\times 4$	2.26	4.52	6.78	11.3	22.5	33.8	45	56.3	67.5	78.8	90
$\times 5$	1.44	2.88	4.32	7.2	14.4	21.6	28.8	36	43.2	50.4	57.6
$\times 6$	1	2	3	5	10	15	20	25	30	35	40
$\times 7.2$	0.7	1.4	2.1	3.5	6.9	10.4	13.9	17.4	20.8	24.3	27.8

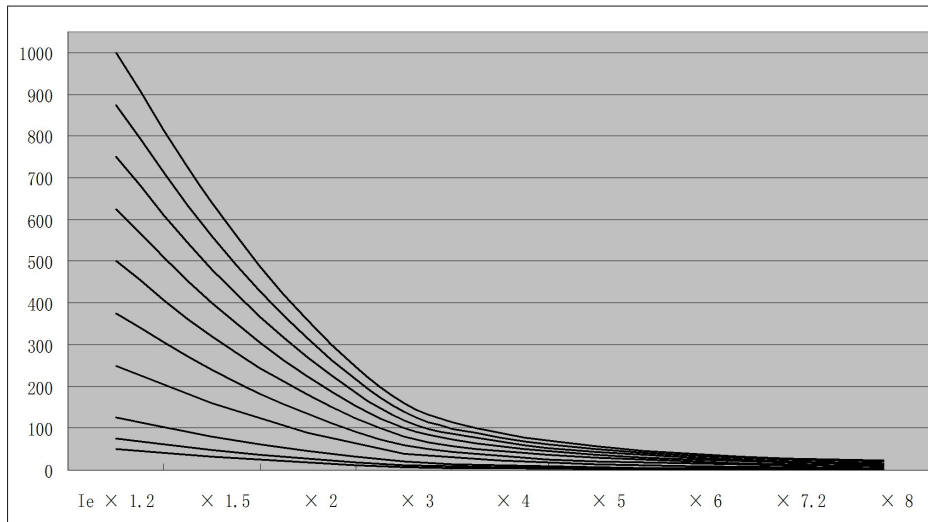
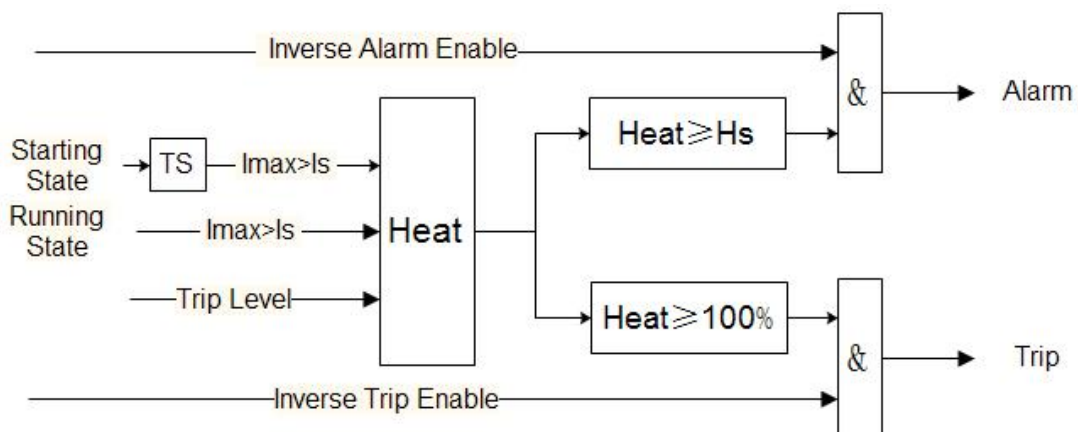


Fig. 10 Characteristic curve of overload (K curve)

Inverse time overload protection improves manual and automatic reset options. When "automatic" is selected, after the overload trip of the motor, the heat capacity will be automatically reset to less than 15%, and the restart operation can be allowed without the need for further reset operation; When "manual" is selected, after the motor overload trip, the heat capacity will be reduced to less than 15%. Manual manual reset is required, otherwise the restart operation is not allowed.



Note:

- I_{max} : Maximum three-phase current
- I_s : Overload starting fixed value
- Heat: Percentage heat capacity
- H_s : Heat capacity alarm value

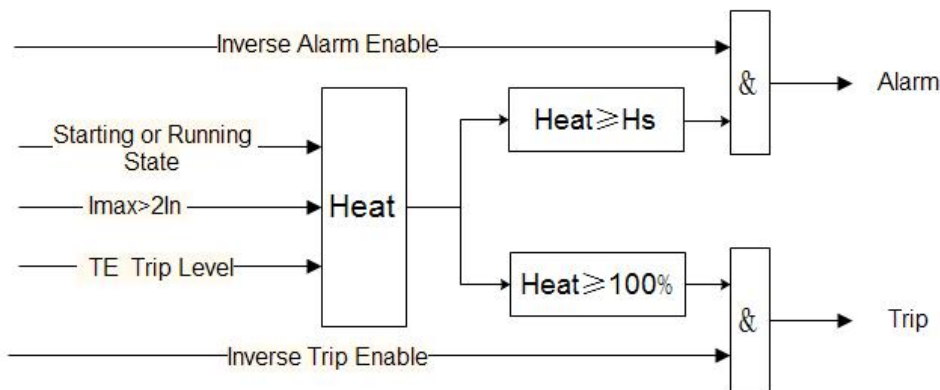
5.00	3.09	4.64	6.19	7.74	9.29	12.38	15.48	18.58	23.22
5.20	2.92	4.38	5.84	7.3	8.76	11.68	14.6	17.53	21.91
5.40	2.76	4.15	5.53	6.91	8.3	11.07	13.83	16.6	20.75
5.60	2.63	3.94	5.26	6.57	7.89	10.52	13.15	15.78	19.73
5.80	2.5	3.76	5.01	6.27	7.52	10.03	12.54	15.05	18.81
6.00	2.4	3.6	4.8	6	7.2	9.6	12	14.4	18
6.20	2.3	3.45	4.6	5.75	6.9	9.2	11.51	13.81	17.26
6.40	2.21	3.32	4.42	5.53	6.64	8.85	11.07	13.28	16.6
6.60	2.13	3.2	4.27	5.33	6.4	8.54	10.67	12.81	16.01
6.80	2.06	3.09	4.12	5.16	6.19	8.25	10.32	12.38	15.48
7.00	2	3	4	5	6	8	10	12	15
8.00	2	3	4	5	6	8	10	12	15
9.00	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Note:

(1)The action time of tE protection = the action time /2×t_{Ep} when t_{Ep} is 2 (S)

(2)When tE is set at 5 (S), the tE value determined according to the starting current ratio I_A/ I_e is in accordance with IEC79-7 and GB3836.3-2000 standards. When it is used for tE time protection of increased safety motor, its inverse time overload protection can be set according to this characteristic curve.In order to ensure that the power is disconnected before tE time during the motor's lock-in, the inverse time curve of the overload protection device should be lowered by about 15%.

(3)The action time of tE protection is achieved by setting "motor type" and "trip level", and the corresponding trip curve is selected by setting tEp (trip level) according to Table 9.(When the motor type is selected as "increased security motor", the tripping level will automatically change to tEp setting;Otherwise, the trip curve is the reverse time-limit overload trip curve of ordinary motor.



Note:

I_{max}:Maximum three-phase current

I_n:Rated current

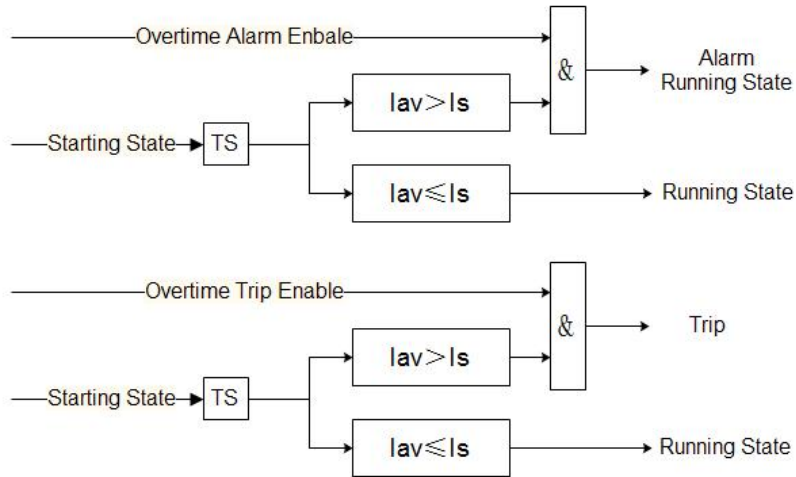
Heat:Percentage heat capacity

H_s:Heat capacity alarm value

6.2 Start timeout protection

When the starting time of the motor reaches the starting time set by the user, the average three-phase current does not drop below the set tripping threshold, trigger the starting timeout protection, issue tripping command, and stop the motor operation.For the increased safety motor,

the starting time setting shall not exceed 1.7 times tE time.



Note:

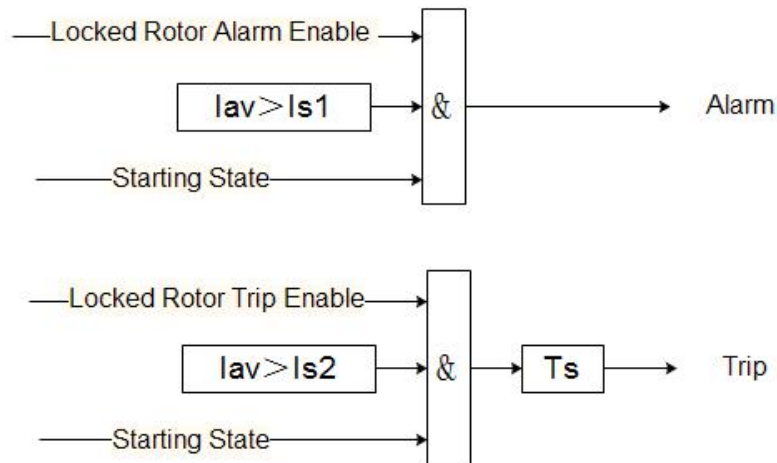
lav:Three-phase mean current

Is:Set trip threshold

Ts:Starting time

6.3 Locked-rotor protection

In the process of starting, if the motor shaft is stuck due to excessive load or mechanical reasons, and the fault is not removed in time, the motor will overheat and the insulation will be reduced and the motor will be burned out. The locked-rotor protection is applicable to the motor when such faults occur in the starting stage. When the average current percentage reaches the set threshold, the protector will trip or alarm within the set time in time to avoid the motor burning out.



Note:

lav:Three-phase mean current

Is1:Alarm action threshold

Is2:Tripping threshold

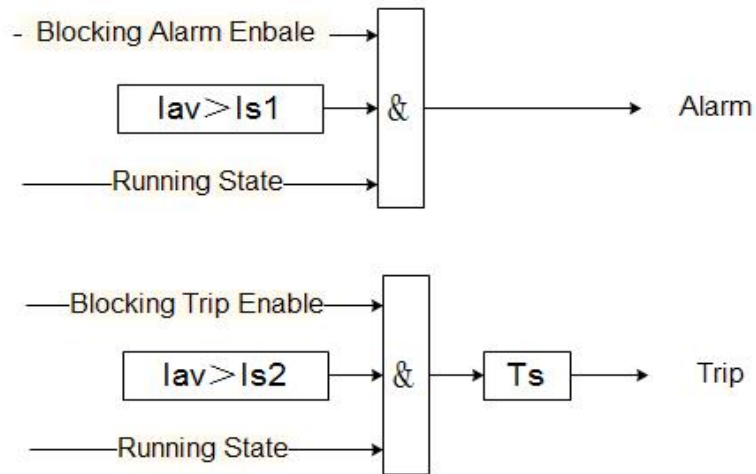
Ts1:Alarm action delay time

Ts2:Delay time of trip action

6.4 Blocking protection

During the operation of the motor, if the motor shaft is stuck due to excessive load or mechanical

reasons, and the fault is not removed in time, the motor will be overheated and the insulation will be reduced and the motor will be burned out. The blocking protection is applicable to protect the motor when such faults occur in the running stage. When the average current reaches the set threshold, the protector will trip or alarm within the set time in time to avoid the motor burning out.



Note:

lav: Three-phase mean current

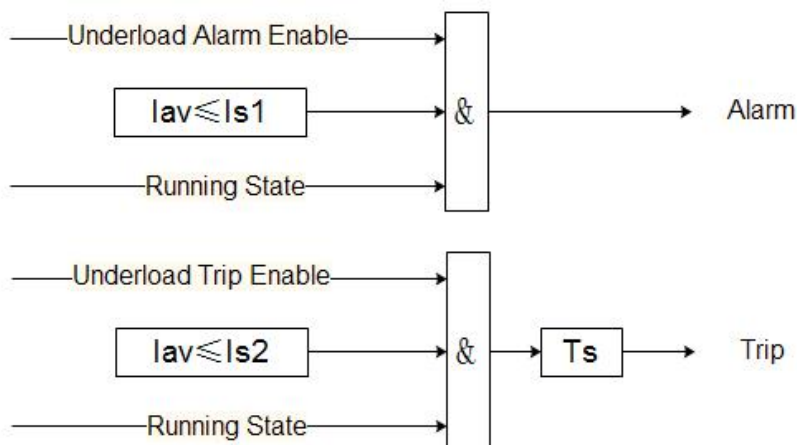
Is1: Alarm action threshold

Is2: Tripping threshold

Ts: Alarm action delay time

6.5 Underload protection

The protector provides underload protection when the motor is loaded with pumping load. When the average three-phase current is lower than the set value, the protector should trip or alarm within the set time.



Note:

lav: Three-phase mean current

Is1: Alarm action threshold

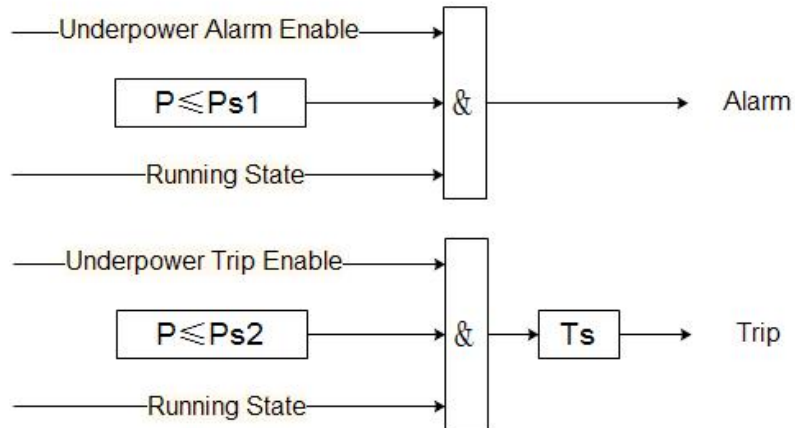
Is2: Tripping threshold

Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.6. Underpower protection

When the load power is lower than the set action value, the protector will trip or alarm during the set action time.



Note:

P: Total active power

Ps1: Alarm action threshold

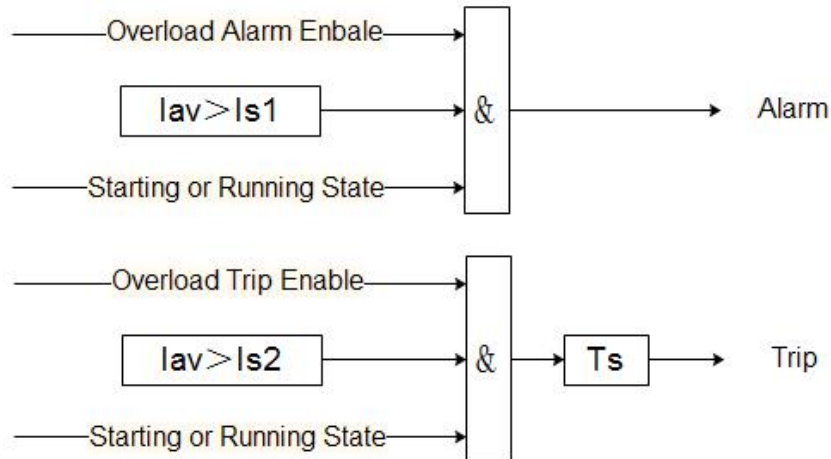
Ps2: Trip action threshold

Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.7 Overload protection

In addition to reverse Overload protection, the protector can also provide time-limit overload protection. When the percentage of three-phase average current and rated current is greater than the set value, the protector should trip or alarm within the set time.



Note:

Iav: Three-phase mean current

Is1: Alarm action threshold

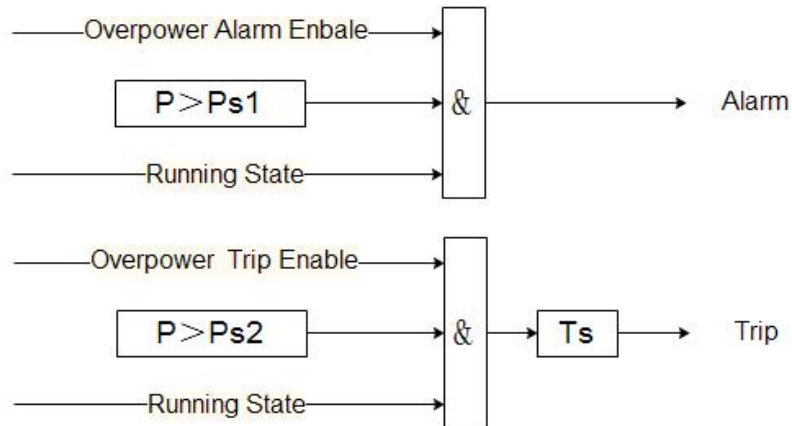
Is2: Tripping threshold

Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.8 Overpower protection

When the percentage of load power to rated power is greater than the set action value, the protector will trip or alarm during the set action time.



Note:

P: Total active power

Ps1: Alarm action threshold

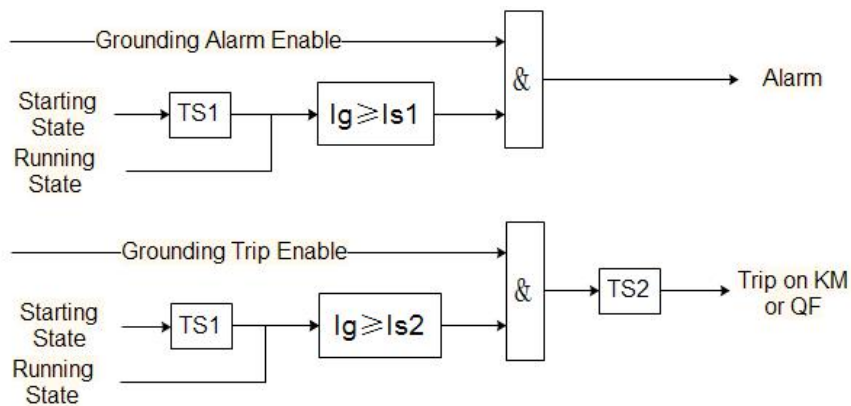
Ps2: Trip action threshold

Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.9 Ground fault protection

The protector is protected by the ground current according to the three-phase current vector and the calculation of the ground current. The grounding protection can set the starting shielding time. After the starting shielding time, when the grounding current is greater than the set value, the action logic can choose the breaker or breaker or alarm. When the breaker is chosen, the protector should first switch the breaker and then switch the contactor after 200ms



Note:

Ig: Ground current

Is1: Alarm action threshold

Is2: Tripping threshold

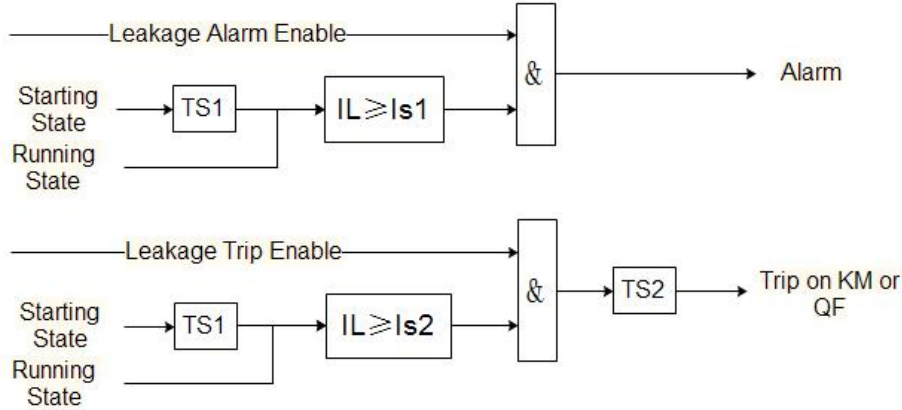
Ts1: grounding start shielding time

Ts2: Delay time of alarm action

Ts3: Delay time of trip action

6.10 Leakage protection

Leakage protection should be equipped with leakage current transformer, which can detect the leakage current through the zero-sequence transformer. The leakage protection can set the starting shielding time. After the starting shielding time, when the leakage current is greater than the set value, the operation logic can choose the breaker or breaker or alarm. When the breaker is chosen, the protector should first switch the breaker and then the breaker after 200ms.



Note:

IL: Leakage current

Is1: Alarm action threshold

Is2: Tripping threshold

Ts1: Shield time for leakage starting

Ts2: Delay time of alarm action

Ts3: Delay time of trip action

6.11 I unbalance protection

The protector calculates the I unbalance degree. When the three-phase I unbalance degree is greater than the set value, it will trip or alarm within the set time. The calculation formula of I unbalance degree is as follows:

$$I_{uf} = \left| \frac{I_{\max(\min)} - I_{av}}{I_{av}} \right| \times 100\%$$

Where, I_{uf} is the I unbalance, I_{\max} is the maximum current, I_{\min} is the minimum current, and I_{av} is the average current.

Note:

I_{uf} : Degree of I unbalance

Is1: Alarm action threshold

Is2: Tripping threshold

Ts1: Delay time of alarm action

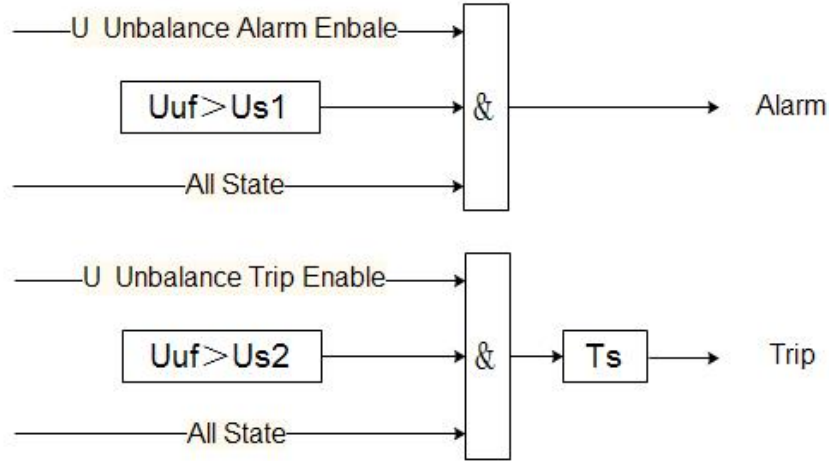
Ts2: Delay time of trip action

6.12 U unbalance protection

The protector calculates the voltage unbalance. When the voltage unbalance is greater than the set value, it will trip or alarm within the set time. The calculation formula of U unbalance is as follows:

$$U_{uf} = \left| \frac{U_{\max(\min)} - U_{av}}{U_{av}} \right| \times 100\%$$

U_{uf} is the U unbalance, U_{\max} is the maximum line voltage, U_{\min} is the minimum line voltage, and U_{av} is the average line voltage.



Note:

U_{uf} : U unbalance degree

U_{s1} : Alarm action threshold

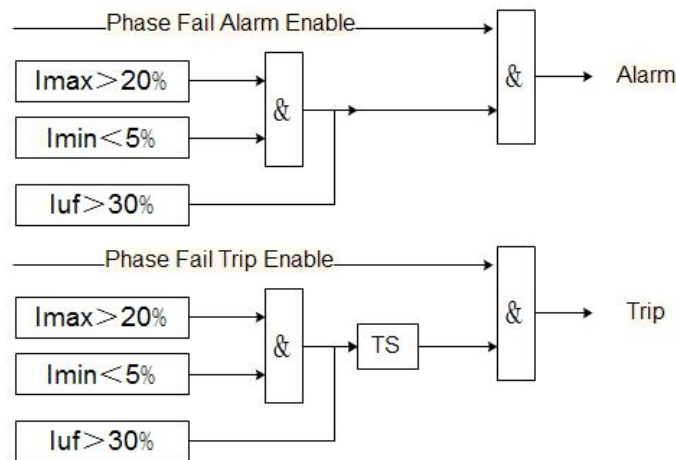
U_{s2} : Trip action threshold

T_{s1} : Delay time of alarm action

T_{s2} : Delay time of trip action

6.13 Phase fail protection

When the phase fault runs, it will do great harm to the motor. When the maximum current is greater than 20% rated current and the minimum current is less than 5% rated current, or when the imbalance degree of three-phase current is greater than 30%, the fault protection will trip or alarm within the set time.



Note:

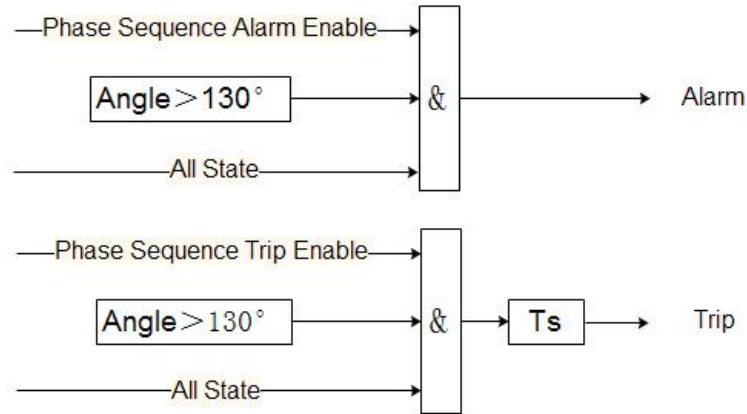
I_{\max} : Maximum current

I_{\min} : Minimum current

Iuf: Degree of I unbalance
 Ts1: Delay time of alarm action
 Ts2: Delay time of trip action

6.14 Phase sequence protection

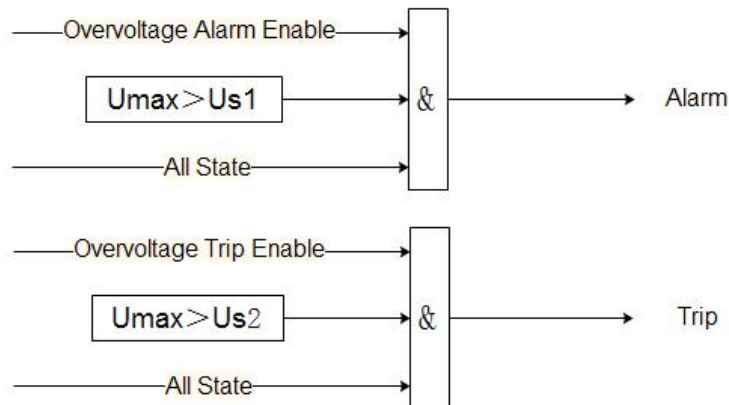
When the error of three-phase voltage phase sequence is detected, the protector will trip or alarm within the set time to protect the safety of the motor.



Note:
 Angle: The Angle between any two - phase voltage
 Ts1: Delay time of alarm action
 Ts2: Delay time of trip action

6.15 Overvoltage protection

Excessive voltage will cause damage to the insulation of the motor. When the maximum line voltage of the motor exceeds the set value, the protector will trip or alarm within the set time.

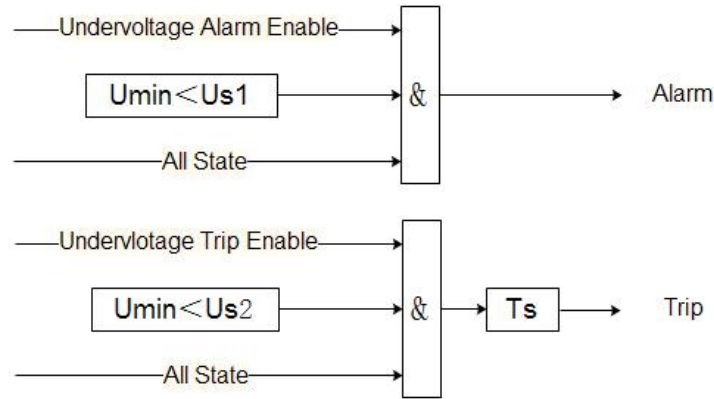


Note:
 Umax: Maximum line voltage
 Us1: Alarm action threshold
 Us2: Trip action threshold
 Ts1: Delay time of alarm action
 Ts2: Delay time of trip action

6.16 Undervoltage protection

Too low voltage will cause the motor to slow down, or even stop running. When the minimum line

voltage of the motor is lower than the set value, the protector will trip or alarm within the set time.



Note:

Umin: Minimum line voltage

Us1: Alarm action threshold

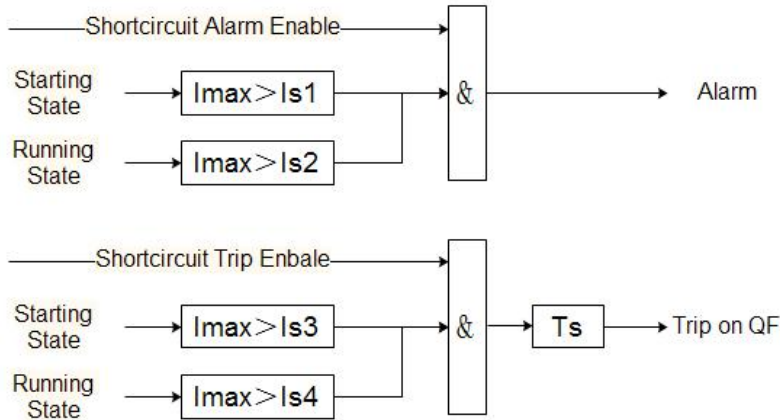
Us2: Trip action threshold

Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.17 Short circuit protection

When the motor current exceeds the set value, the protector will switch circuit breaker or alarm within the set time. The short circuit protection is divided into two stages: starting and running. The protection parameters of the two stages can be set independently.



Note:

Imax: Maximum current

Is1: Threshold of short circuit alarm during starting stage

Is2: Threshold of short circuit alarm during operation

Is3: Threshold of short-circuit trip during starting stage

Is4: Threshold of short-circuit trip during operation

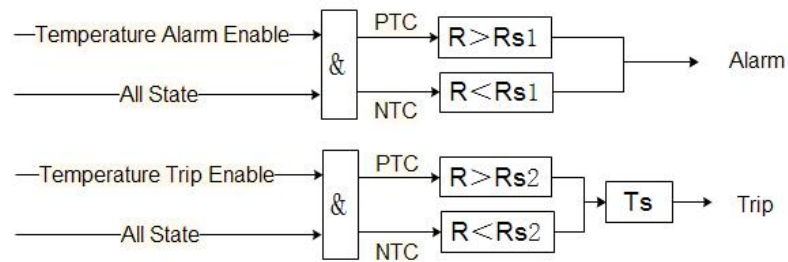
Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.18 Temperature protection

Temperature protection is based on the thermistor resistance embedded in the stator windings or bearings of the motor. According to the type of thermistor selected, the protection logic is different:

when the thermistor is PTC, when the detected resistance value is greater than the set value, the protector will trip or alarm within the set time; When the thermistor is NTC, when the detected resistance value is less than the set value, the protector will trip or alarm within the set time



Note:

R: Check the temperature resistance

Rs1: Alarm action temperature resistance value

Rs2: Resistance value of tripping action temperature

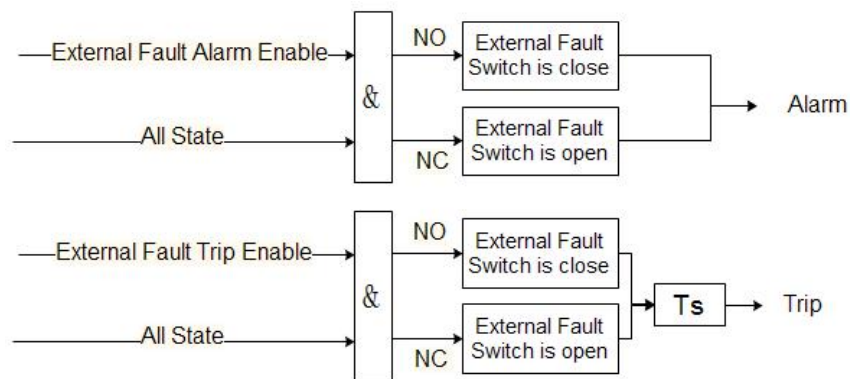
Ts1: Delay time of alarm action

Ts2: Delay time of trip action

The temperature protection can be reset manually or automatically. When "Automatic" is selected, the protector will reset automatically after the temperature protection trip when the resistance value is detected to be less than the set return resistance value. When "manual" is selected, after the temperature protection trip, if the resistance value is detected to be less than the set return resistance value, manual manual reset is required, otherwise it will not be allowed to start again.

6.19 External fault

When the input of switch quantity defined as external fault is set as "normally on", the closing signal is taken as the trigger condition of the fault. When the duration of the fault signal is longer than the set tripping/alarm delay time, tripping/alarm will be generated. When the input of switch quantity defined as external fault is set as "normally closed", the disconnect signal is used as the trigger condition of the fault. When the duration of the fault signal is longer than the set trip/alarm delay time, trip/alarm will be generated.



Note:

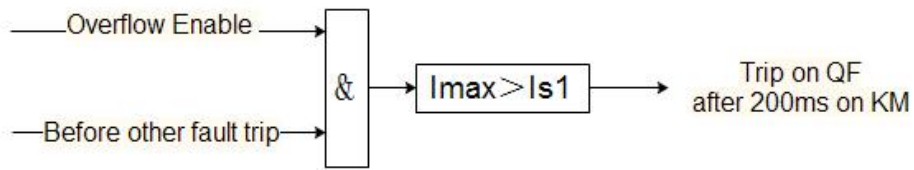
Ts1: Delay time of alarm action

Ts2: Delay time of trip action

6.20 Overflow protection

When the fault occurs, the current exceeds the breaking current of the contactor, and the contactor will be damaged if the contactor is forcibly disconnected. At this point, the breaker should be broken first, and then disconnect the contactor after the fault current is removed.

If the fault current of the protector is greater than the set overflow current before any other tripping fault action, the breaker should be first switched on, and then the contactor should be switched off after 200ms.



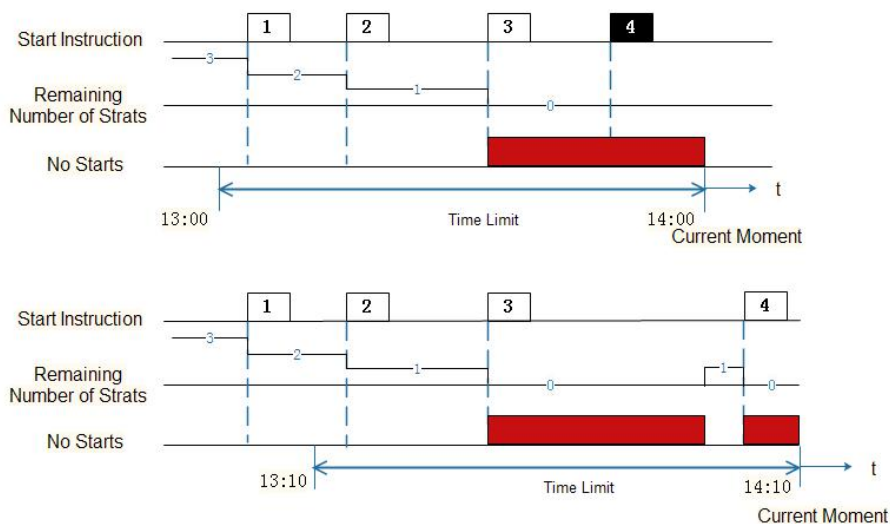
Note:

I_{max} : Maximum current

I_{s1} : Overflow current

6.21 Number of starts protection

The motor is easy to be damaged due to frequent starting and cutting in a short time. When the remaining starting number of the motor is 0 within the set time, the protector sends an alarm signal. If the starting command is issued again at this time, the protector will release and allow to start again after the cooling time.



Example: Set the time limit of 1 hour to allow 3 starts.

Figure above: It has been started for 3 times between 13:00 and 14:00, and there is no number of starts at the fourth time, so the fourth time fails.

Figure below: Before the fourth start, the remaining number of starts is restored to 1, so the fourth start is successful.

6.22 Running time alarm

When the accumulated running time of the motor exceeds the set value, the protector will send an alarm signal to remind the staff to overhaul and maintain the motor.

6.23 Fault frequency alarm

When the cumulative number of protection trips exceeds the set value, the protector will send an alarm signal.

7 Function setting and description

7.1 Key of main module and LED indicator light are shown in Table 11:

Table 11

Serial No.	Name	State	Function Description
1	Stop indicator light	bright	The indicator light indicates that the motor is in a stopped state
2	Start indicator light	bright	The indicator light indicates that the motor is in a starting state
3	Run indicator light	bright	The indicator light indicates that the motor is in a running state
4	Alarm LED indicator light	bright	The light indicates an alarm
5	Trip LED indicator light	bright	The indicator light indicates fault trip
6	Reset button	press	Use in fault state and restore the fault

7.2 The 90L display module button and LED indicator light are shown in Table 12:

Table 12

Serial No.	Name	State	Function Description
1	Start 1 button	press	Manual mode, two-part mode, two-speed mode, star triangle operation start 1 relay
2	Start 2 button	press	Operate and start the 2 relay in manual mode and two-speed mode
3	Stop button	press	Release starting relay
4	Reset button	press	Use in fault state and restore the fault
5	Cancel button	press	Exit menu;Cancel the operation
6	Left keys	press	Upside-down menu;Data is shifted when data is modified
7	Right key	press	Scroll down menu;Modify the data
8	Confirm button	press	Enter the Settings menu and write the modified data
9	Ready LED indicator	bright	The indicator light is always on to indicate that the motor is ready to start
10	Start 1 LED indicator	bright	When this indicator light is on,it indicate that the Start 1 relay output is closed
11	Start 2 LED indicator	bright	When this indicator light is on,it indicate that the Start 2 relay output is closed
12	Stop LED indicator light	bright	The indicator light is always on to indicate that the motor is stopped
13	Starting LED indicator light	bright	The indicator light is always on to indicate that the motor is in starting state
14	Running LED indicator light	bright	The indicator light is always on to indicate that the motor is in running state

15	Alarm LED indicator light	bright	The light indicates an alarm
16	Trip LED indicator light	bright	This indicator light indicates fault trip

7.3 90L display module introduction

7.3.1 Data display interface

After the protector is powered on, it enters the data display interface. Press '◀' and '▶' to scroll through the current, voltage, DI/DO state and other information. The specific display content is shown in Figure 16 (the figure below shows the display value in the stopped state)

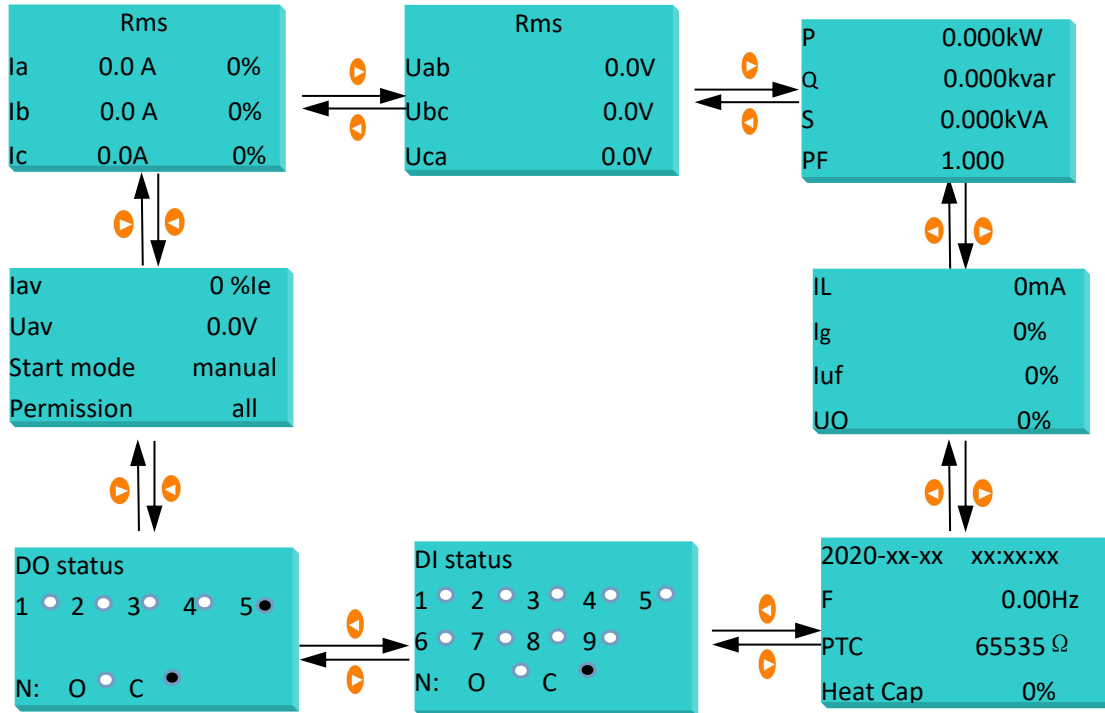


Fig.12 90L panel data display interface

7.3.2 Parameter viewing and setting

When you need to view or set a parameter, first press "OK" to enter the password interface and enter the correct password (default 0001) before entering the main menu. Press the arrow key to move the cursor to the corresponding option, press the "OK" key to enter, and select the corresponding sub-menu for viewing or modification. Figure 13 shows an example of how to modify the control authority:

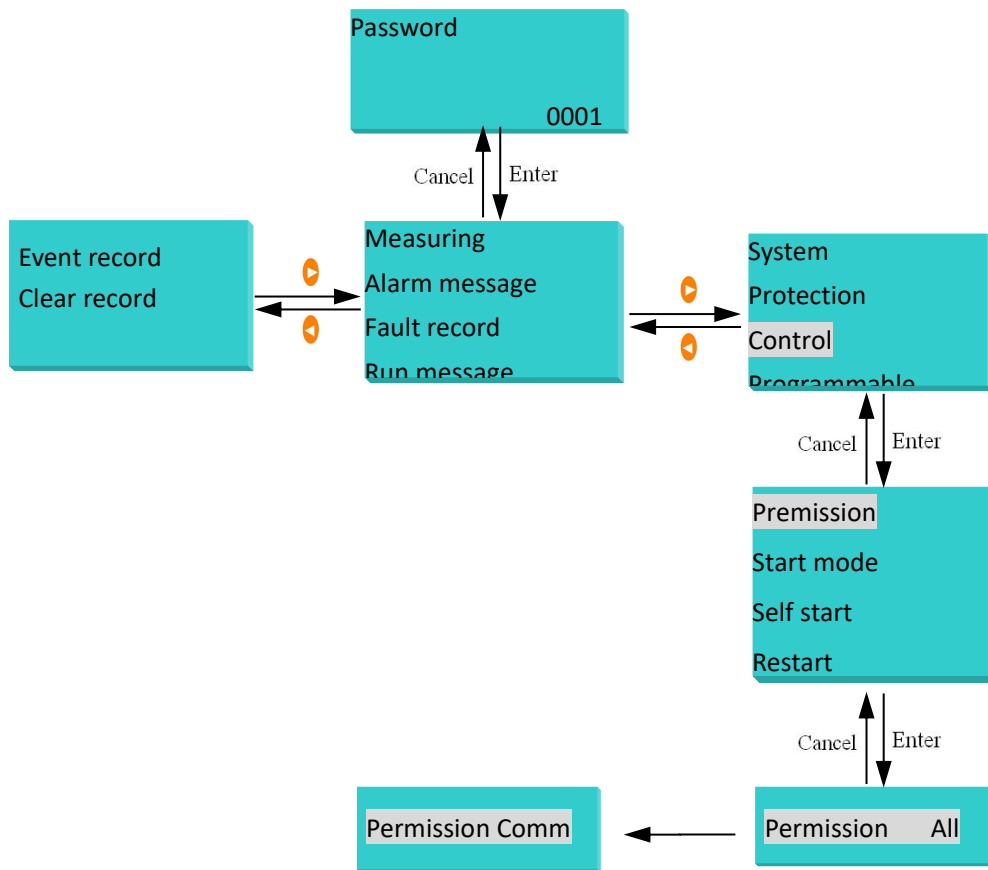


Fig.13 Shows the operation diagram of Ethernet communication parameters

7.4 Menu description

See Table 13 for the ARD2F menu:

Table 13

Serial No.	Main menu	Function	Type	Setting Range	Default value	Unit
1	Measured parameters	Fundamental wave current	---	---	---	A
		Effective current	---	---	---	A
		Fundamental wave voltage	---	---	---	V
		RMS voltage	---	---	---	V
		Voltage phase Angle	---	---	---	
		Other electrical parameters	---	---	---	
2	Alarm information	---	---	---	---	
3	Fault record	---	---	---	---	
4	Running information	Running time of this time	---	---	---	h
		Stop time of this time	---	---	---	h

		Total running time	---	---	---	h
		Total stop time	---	---	---	h
		Start qty	---	---	---	
		Trip qty	---	---	---	
		Maximum start current	---	---	---	A
		Maximum running current	---	---	---	A
5	System parameters	Rated current	---	0.1~5000	1	A
				0.1~5000	5	
				6.3~25	25	
				25-100	100	
				63~250	250	
				250~800	800	
		Rated voltage	---	57-1200V	380	V
		Rated power	---	0.12-999kW	---	
		Rated frequency	---	45-70	50	Hz
		Motor type	---	Common motor, increased safety motor	Common motor,	
		High speed motor setting	Rated current	0.1~5000	1	
				0.1~5000	5	
				6.3~25	25	
				25-100	100	
				63~250	250	
				250~800	800	
			Rated power	0.12-999kW	---	
		Connection mode	---	1P2L.3P3L.3P4L	3P4L	
		CT ratio	---	1A spec.:1-5000 5A spec.:1-1000	1	
		Protection selection	---	Fundamental wave value, full wave value	Full wave value	
Modbus RTU setting	ADD 1	1-247	1			
	Baud rate1	1200.2400.4800.9600.19200.38400	9600	bps		
	Check digit 1	None/2stop/Odd/Even	None			
	ADD 2	1-247	1			
	Baud rate2	2400.4800.9600.19200.38400	9600	bps		
	Check digit 2	None/2stop/Odd/Even	None			
Transmitting set	Type 1	a.Ib.Ic.Iav.Uab.Ubc.Uca.Uav.PTC.Heat capacity.P.F	Iav			

			Full value 1		2 times rated current	
			Type 2	a.Ib.Ic.Iav.Uab.Ubc.Uca.Uav.PTC.Heat capacity.P.F	Iav	
			Full value 2		2 times rated current	
		Language selection	---	Chinese, English	Chinese	
		backlight	---	1-30s,0 is normally on	0	
		Liquid crystal contrast	---	0-100	50	%
		password	---	0001-9999	0001	
		Time Setting	---	---	---	
		Main interface index	---	0-8	---	
		Software version	---	---	---	
		Factory reset	---	Yes, no	---	
6	Protection parameters (low speed)	Fixed time overload	Alarm delay	0.1-600.0s	0.1s	s
			Trip delay	0.1-600.0s	5.0s	s
			Alarm threshold	100-1000%	110%	%
			Trip threshold	100-1000%	120%	%
			Alarm, trip allowed	Alarm: Allowed/forbidden	Forbidden	
				Trip: Allowed/forbidden	Forbidden	
		Inverse time overload	Trip level	1.2.3.5.10.15.20.25.30.35.40	5	Class
			tE Trip level	2.3.4.5.6.8.10.12.15	2	Class
			Start setting	100~1000%	120	%
			Reset method	Off/on	Off	
			Cooling time	0-30min	1min	min
			Alarm threshold	1-99%	80%	%
			Starting screen time	0-25.0s	0.5s	s
			Alarm, trip allowed	Alarm:allowed/forbidden	Allow	
		Trip:allowed/forbidden		Allow		
		Under load protection	Alarm delay	0.1-600.0s	1.0s	s
			Trip delay	0.1-600.0s	5.0s	s
			Alarm threshold	10-99%	70%	%
			Trip threshold	10-99%	50%	%
			Alarm, trip	Alarm:allowed/forbidden	Forbidden	

			allowed	Trip:allowed/forbidden	Forbidden	
phase loss protection	Alarm time delay	0.1-600.0s		0.1s	s	
	Trip delay	0.1-600.0s		1.0s	s	
	Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden			
			Trip:allowed/forbidden	Allow		
I unbalance	Tripping delay	0.1~600		1.0	S	
	Alarm	on/off		on		
	Tripping	on/off		on		
	Alarm threshold	10-99%		20	%	
	Alarm threshold	10-99%		30	%	
	Tripping delay	0.1~600		5.0	S	
	Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden			
			Trip:allowed/forbidden	Allow		
Locked rotor Protection	Alarm delay	0.1-600.0s		0.1s	s	
	Tripping delay	0.1-600.0s		5.0s	s	
	AlarmThreshold	100-1000%		500%	%	
	Trip Threshold	100-1000%		600%	%	
	Return coefficient			5%		
	Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden			
			Trip:allowed/forbidden	Allow		
Ground fault protection	Alarm delay	0.1-600.0s		0.1s	s	
	Tripping delay	0.1-600.0s		0.1s	s	
	Alarm threshold	20-100%		20%	%	
	Trip Threshold	20-100%		50%	%	
	Trip mode	circuit breaker/contactor		circuit breaker		
	Starting screen time	0.0-600s		0.0	s	
	Alarm, Tripping allowed	Alarm:allowed/forbidden	Forbidden			
			Trip:allowed/forbidden	Allow		
Leakage protection	Alarm delay	0.1-600.0s		0.1s	s	
	Tripping delay	0.1-600.0s		0.5s	s	
	Alarm threshold	100-1000mA		200mA	mA	
	Trip Threshold	100-1000mA		300mA	mA	
	Trip mode	circuit breaker/contactor		circuit breaker		
	Starting screen time	0.0-600s		0.0	s	
	Alarm, Tripping allowed	Alarm:allowed/forbidden	Forbidden			
			Trip: allowed/forbidden	Allow		
Short circuit protection	Alarm delay	0.1-25.0s		0.1s	s	
	Tripping delay	0.1-25.0s		0.1s	s	

			Alarm threshold	100-1000%	Start Alarm400 %	%
					Run Alarm400 %	
			Trip Threshold	100-1000%	Start trip 500%	%
					Run trip 500%	
			Alarm, Tripping allowed	Alarm:allowed/forbidden	Forbidden	
				Trip: allowed/forbidden	Allow	
		Overflow protection	Protect threshold	100~700%	600	%
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip: allowed/forbidden		Allow		
		Blocking protection	Alarm delay	0.1-600.0s	0.1s	s
			Tripping delay	0.1-600.0s	5.0s	s
			Alarm threshold	100-1000%	150%	%
			Trip Threshold	100-1000%	250%	%
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
				Trip: allowed/forbidden	Allow	
				Start timeout	action threshold	100%-200%
Timeout time	0.1-600s				10.0s	s
Alarm, trip allowed	Alarm:allowed/forbidden				Forbidden	
	Trip: allowed/forbidden			Allow		
Start times	Timeout quantity			1-10	10	Times
	Time range			10-300min	30min	min
	Alarm, trip allowed			Alarm:allowed/forbidden	Forbidden	
				Trip: allowed/forbidden	Forbidden	
overvoltage	Alarm delay			0.1-600.0s	0.1s	s
	Tripping delay			0.1-600.0s	5.0s	s
	Alarm threshold			110-150%	110%	%
	Trip Threshold			110-150%	120%	%
	Alarm, trip allowed	Alarm:allowed/forbidden	Allow			
		Stop: allowed/forbidden	Forbidden			
Under voltage	Alarm delay	0.1-600.0s	0.1s	s		
	Tripping delay	0.1-600.0s	5.0s	s		
	Alarm threshold	50-90%	90%	%		
	Trip Threshold	50-90%	80%	%		
	Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden			
		Stop: allowed/forbidden	Forbidden			

		U unbalance	Alarm delay	0.1-600.0s	0.1s	s
			Tripping delay	0.1-600.0s	0.5s	s
			Alarm threshold	10-99%	15%	%
			Trip Threshold	10-99%	20%	%
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip: allowed/forbidden		Forbidden		
		Phase sequence	Alarm delay	0.1-25.0s	0.1s	s
			Tripping delay	0.1-25.0s	1.0s	s
			Alarm, trip allowed	Alarm: allowed/forbidden	Forbidden	
				Trip: allowed/forbidden	Forbidden	
		over power	Alarm delay	0.1-600.0s	0.1s	s
			Tripping delay	0.1-600.0s	5.0s	s
			Alarm threshold	100-700%	150%	%
			Trip Threshold	100-700%	250%	%
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip: allowed/forbidden		Forbidden		
		under-power	Alarm delay	0.1-600.0s	0.1s	s
			Tripping delay	0.1-600.0s	5.0s	s
			Alarm threshold	0-100%	80%	%
			Trip Threshold	0-100%	50%	%
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip: allowed/forbidden		Forbidden		
		Temperature protection	NTC/PTC	NTC/PTC	PTC	
			Alarm delay	0.1-600.0s	0.1s	s
Tripping delay	0.1-600.0s		5.0s	s		
Alarm threshold	100-30000 Ω		1600 Ω	Ω		
Trip Threshold	100-30000 Ω		3600 Ω	Ω		
Reset method	Manual and automatic		manual			
Return resistance value	100-30000 Ω		1500 Ω			
Alarm, trip allowed	Alarm: allowed/forbidden		Forbidden			
	Trip: allowed/forbidden	Forbidden				
external fault	Alarm delay	0.1-600.0s	0.1s	s		
	Tripping delay	0.1-600.0s	5.0s	s		
	Alarm, trip allowed	Alarm: allowed/forbidden	Forbidden			
		Trip: allowed/forbidden	Forbidden			
Insulation fault	Alarm time delay	0.1-600.0s	0.1s	s		
	Tripping delay	0.1-600.0s	5.0s	s		
	Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden			
		Trip: allowed/forbidden	Forbidden			

		Run timeout	Alarm threshold		10000h	h
			Alarm allowed	allowed/forbidden	Forbidden	
		Failure frequency	Alarm threshold	---	1000 times	times
			Alarm allowed	allowed/forbidden	Forbidden	
		Overpower protection	Alarm threshold	100~700%	150	%
			Trip Threshold	100~700%	250	%
			Tripping delay	0.1-600	5.0	S
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip:allowed/forbidden		Forbidden		
		Underpower protection	Alarm threshold	0~100%	80	%
			Trip Threshold	0~100%	50	%
			Tripping delay	0.1-600	5.0	S
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip:allowed/forbidden		Forbidden		
		Temperature protection	PTC type	on/off	On	
			Return resistance value	0(Shut down).100-30000	0	Ω
			Alarm resistance value	100~30000	1600	Ω
			Tripping resistance value	100~30000	3600	Ω
			Tripping delay	0.1~600	5.0	S
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
		Trip:allowed/forbidden		Forbidden		
		External fault	Tripping delay	0.1~600	5.0	S
			Alarm, trip allowed	Alarm:allowed/forbidden	Forbidden	
				Trip:allowed/forbidden	Forbidden	
			Protect the parameters (high speed)	Refer to the low speed protection setting sheet		
7	Control parameters	Control access	Control access	Panel, native, communication, remote, 1 in 3, 1 in 2 ¹ , all control	All control	
		Start method	Start mode	Protection mode, manual mode, two-step mode, two-speed mode, star triangle, auto-step-down	Protected mode	
			start1delay	0.1-600	3.0	S
		Self start	Self start mode	recover/start	start	

			Self start delay	0.1~600	5.0	S		
			Self start control	on/off	Off			
		Voltage loss restart	Recovery voltage	70-95%	80	%		
			Voltage drop	50-90%	50	%		
			Sway electric time	0.5-300.0	5.0	S		
			Restart delay	1.0-60.0s	30.0	S		
			Immediate restart time	0.1-10.0s	0.5	S		
			Restart function	on/start 1/start 2/restore	Start1			
		8	Programmable Settings	DI setting	DI1 type	Normally on/normally off	Normally on	
					DI1	1-Ordinary DI, 2-starting 1(in situ), 3-starting 1(remote), 4-starting 2(in situ), 5-starting 2(remote), 6-parking (in situ), 7-parking (remote), 8-reset, 9-emergency stop, 10-external fault, 11-single point 1 (in situ) start-stop, 12-single point 1 (remote) start-stop, 13-single point 2 (in situ) start-stop, 14-single point 2 (remote) start-stop, 15-single point 1 start/stop, 16-single point 2 start/stop, 17-control over 1, 18-control over 2	Stop	
DI2	Ditto				Start1			
DI3	Ditto				Start2			
DI4	Ditto				Emergency Stop			
DI5	Ditto				Reset			
DI6	Ditto				control right 1			
DI7	Ditto				control right 2			
DI8	Ditto				External fault			

			DI9	Ditto	Ordinary DI	
			DO1 type	Normally on/normally off	Normally on	
		DO setting	DO1 Definition	0-No input, 1-star 1, 2-start 2,3-start3, 4-parking,5-starting jumped contactor,6-circuit breakers,7-fault Alarm output,8-tripping fault output,9-the output state stopped,10-the starting state output,11-the output operation state,12-the communication control output,13-the output device self-checking,14-the device output power,15-nowhere electric process output chain,16-electric reset signal output,17-protected mode have nowhere electricity output 1,18-protected mode electricity output 2,19-logic diagram output 1,20-logic diagram output 2, 21-logic diagram output 3, 22-30 corresponding DI1-9 control the DO output	start1	
			Pulse time	0.3-25.0s	0.0s	s

			DO2	Ditto	start2	
			DO3	Ditto	alarm	
			DO4	Ditto	trip	
			DO5	Ditto	trip	
			DO6	Ditto	trip	
	Logic diagram setting	Input A	Input A definition	Close;DI1-19;DO1 - DO6;Starting 1;Starting 2;Starting 3;Stop,Emergency shutdown;Stop state;Starting state;Running state;Alarm status;Trip status;Trip type (choose one of 22 fault types);Alarm types (choose one of 24 Alarm types))	DI1	
			Input A logic	Positive logic/Reserve logic	Positive logic	
			Input A delay	0.0-60.0s	0.0s	
		Input B	Input B definition	Ditto	Off	
			Input B logic	Positive logic/Reserve logic	Positive logic	
			Input B delay	0.0-60.0s	0.0s	
		Input C	Input C definition	Ditto	Off	
			Input C logic	Positive logic/Reserve logic	Positive logic	
			Input C delay	0.0-60.0s	0.0s	
		Input D	Input D definition	Ditto	Off	
			Input D logic	Positive logic/Reserve logic	Positive logic	
			Input D delay	0.0-60.0s	0.0s	
		Input E	Input E definition	Ditto	Off	
			Input E logic	Positive logic/Reserve logic	Positive logic	

			Input E delay	0.0-60.0s	0.0s	
			Logic diagram1	$\begin{aligned} & \text{Off.}A.A*B.A+B.A*B* \\ & C.(A+B)*C.(A*B)+C. \\ & A+B+C.A*B*C*D.(A \\ & +B)*C*D.(A*B+C)*D \\ & .(A+B+C)*D.A*B*C+ \\ & D.(A+B)*C+D.A*B+C \\ & +D.A+B+C+D.A*B*C \\ & *D*E.(A+B)*C*D*E. \\ & (A*B+C)*D*E.(A+B+ \\ & C)*D*E.(A*B*C+D)* \\ & E.((A+B)*C+D)*E.(A \\ & *B+C+D)*E.(A+B+C+ \\ & D)*E.A*B*C*D+E.(A \\ & +B)*C*D+E.(A*B+C) \\ & *D+E.(A+B+C)*D+E. \\ & A*B*C+D+E.(A+B)* \\ & C+D+E.A*B+C+D+E. \\ & A+B+C+D+E \end{aligned}$	A	
			Logic diagram 2	Ditto	A	
			Logic diagram 3	Ditto	A	
		Test	DO1	Off/on	Off	
			DO2	Off/on	Off	
			DO3	Off/on	Off	
			DO4	Off/on	Off	
			DO5	Off/on	Off	
			DO6	Off/on	Off	
9	Event log	DI displace records	---	---	---	
		Start recording	---	---	---	
		Restart record	---	---	---	
		Restart record	---	---	---	
10	Clear record	Clear record password	---		0008	

Note:1. When control permission is set to "1 in 2" or "1 in 3", user should set control permission output type, the specific setting method is in "10.1 permission programmable" .

8 Communication Settings and instructions

8.1 Modbus RTU Communication Protocol Overview

Electrical interface: RS485 half duplex

Baud: 1200/2400/4800/9600/19200/38400

Address: Consists of one byte (8-bit binary), 0 to 255 in decimal, only 1 to 247 in the system, the rest reserved

Error detection:CRC

Data format:	Address code	Function code	Data area	CRC check
Data length:	1 byte	1 byte	N byte	2 byte

Each byte bit: 1 bit start, 8 bit data (least significant bit sent first), no parity, 1 bit stop

MODBUS function code supported by ARD2F:

01 (0x01) Function code: Read coil state (relay output DO, address 0 corresponds to DO1)

02 (0x02) Function code: Read switch input state (DI, address 0 corresponds to DI1)

03/04 (0x03, 0x04) Function code: read hold register

05 (0x05) Function code: write coil state (control relay output DO, address 0 corresponds to DO1)

06 (0x06) Function code: Write a single register

16 (0x10) function code: Write multiple registers

Note: The operation control bit and output control bit are written in 16 function codes.

Communications applications

The examples in this section use the following tabular format (in hexadecimal data) whenever possible

Addr	Fun	Data start		Data		CRC16	
		reg Hi	reg Lo	reg Hi	reg Lo	Lo	Hi
01H	03H	00H	00H	00H	06H	C5H	C8H
Add	Function code	Data starting address		Data read qty	Cyclic redundancy check code		

Read the data

Example 1: Read register using the 01 function: read the OUTPUT status of DO1-DO5 relay of the No.01 ARD2F protector

Send data frame	01 01 00 00 00 05 FC 09
Return data frame	01 01 01 0C 51 8D

Example 2: Register read using the 02 function: read the DI1-DI5 switch input status of the No.01 ARD2F protector

Send data frame	01 02 00 00 00 05 B8 09
Return data frame	01 02 01 10 A0 44

Example 3: Register read using the 03 or 04 function: read No.01 ARD2F and read 3 data from address 00

Send data frame	01 03 00 00 00 03 11 5D
Return data frame	01 03 06 00 00 00 00 00 0E D1

Write the data

Example 4: Use the 05 function to write registers

Close DO1 relay No. 01 ARD2F:

Send data frame	01 05 00 00 FF 00 8C 3A
-----------------	-------------------------

Return data frame	01 05 00 00 FF 00 8C 3A
-------------------	-------------------------

Disconnect DO1 relay of No. 01 ARD2F:

Send data frame	01 05 00 00 00 00 CD CA
Return data frame	01 05 00 00 00 00 CD CA

Example 5: Write register using 06 function: output DO2 of 01 ARD2F. The indicating register address of switch input/output state is 022D, bit 0-8 corresponds to Di1-9, and bit 11-15 corresponds to DO1-5.

Send data frame	01 06 02 2D 00 02 99 BA
Return data frame	01 06 02 2D 00 02 99 BA

Example 6: Write register with 16 function: output DO2 of 01 ARD2F. The indicating register address of switch input/output state is 022D, bit 0-8 corresponds to Di1-9, and bit 11-15 corresponds to DO1-5.

Check data frame	01 10 02 2D 00 01 02 00 02 02 2C
Send data frame	01 10 02 2D 00 01 90 78

The detailed MODBUS address of ARD2F is shown in table 14

Table 14

	Address	Address	Parameter	R/W	Value range	Type
Measure parameters	400	0190	A Phase effective value current percentage	R	0-1200%	word
	401	0191	B Phase effective value current percentage	R		word
	402	0192	C Phase effective value current percentage	R		word
	403	0193	Average effective value current percentage	R		word
	404	0194	Maximum RMS current Percentage	R		word
	405	0195	A Phase fundamental current percentage	R		word
	406	0196	B Phase fundamental current percentage	R		word
	407	0197	C Phase fundamental current percentage	R		word
	408	0198	Average fundamental current percentage	R		word
	409	0199	Maximum fundamental current percentage	R		word
	410	019A	Ground current percent	R		word
	411	019B	positive sequence current percentage	R		word

412	019C	Negative sequence current percentage	R		word
413	019D	A Phase fundamental current	R	0-65535/Current scaling factor is the actual value	word
414	019E	B Phase fundamental current	R		word
415	019F	C Phase fundamental current	R		word
416	01A0	Uab Fundamental line voltage	R	0~1999.9V	word
417	01A1	Ubc Fundamental line voltage	R	0~1999.9V	word
418	01A2	Uca Fundamental line voltage	R	0~1999.9V	
419	01A3	leakage current	R	30-3000mA	
420	01A4	A Phase effective current	R	0-65535/current scaling factor is the actual value	word
421	01A5	B Phase effective current	R		word
422	01A6	C Phase effective current	R		word
423	01A7	Uab RMS line voltage	R	0~1999.9V	word
424	01A8	Ubc RMS line voltage	R	0~1999.9V	word
425	01A9	Uca RMS line voltage	R	0~1999.9V	word
426	01AA	frequency	R	20.00-76.00Hz	word
427	01AB	Degree of I unbalance	R	0-100%	
428	01AC	Percentage of cumulative heat capacity	R	0-100%	word
429	01AD	Temperature resistance	R	0-65535 Ω	word
430	01AE	Zero sequence voltage percent	R	0-999%	High byte word
431	01AF	Percentage of positive sequence voltage	R	0-999%	Low byte word
432	01B0	Percentage of Negative sequence voltage	R	0-999%	signed short int
433	01B1	U unbalance	R	0-999%	
434	01B2	AB Phase voltage phase Angle difference	R	0-359.9°	word
435	01B3	BC Phase voltage phase Angle difference	R	0-359.9°	word
436	01B4	CA Phase voltage phase Angle difference	R	0-359.9°	word
437-439	01B5-01B7	Reserved	R		
440	01B8	fundamental wave Total active power	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word
441	01B9		R		Low

						byte word
442	01BA	fundamental wave Total reactive power	R	32 bit signed number, High byte before, low byte after Unit:var	high byte word	
443	01BB		R		Low byte word	
444	01BC	fundamental wave Total apparent power	R	32 bit unsigned number, High byte before, low byte after Unit:VA	high byte word	
445	01BD		R		Low byte word	
446	01BE	Fundamental wave total active energy	R	32 bit unsigned number, High byte before, low byte after Unit:kWh	high byte word	
447	01BF		R		Low byte word	
448	01C0	Fundamental wave total reactive energy	R	32 bit unsigned number, High byte before, low byte after Unit:kvarh	high byte word	
449	01C1		R		Low byte word	
450	01C2	fundamental wave A phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
451	01C3		R		Low byte word	
452	01C4	fundamental wave B phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
453	01C5		R		Low byte word	
454	01C6	fundamental wave C phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
455	01C7		R		Low byte word	
456	01C8	Fundamental wave A phase	R	32 bit signed number,	high	

			reactive		High byte before, low byte after Unit:var	byte word
457	01C9			R		Low byte word
458	01CA		Fundamental wave B phase reactive	R	32 bit signed number, High byte before, low byte after	high byte word
459	01CB			R	Unit:var	Low byte word
460	01CC		Fundamental wave C phase reactive	R	32 bit signed number, High byte before, low byte after	high byte word
461	01CD			R	Unit:var	Low byte word
462	01CE		fundamental wave A phase apparent	R	32 bit unsigned number, High byte before, low byte after	high byte word
463	01CF			R	Unit:VA	Low byte word
464	01D0		fundamental wave B phase apparent	R	32 bit unsigned number, High byte before, low byte after	high byte word
465	01D1			R	Unit:VA	Low byte word
466	01D2		fundamental wave C phase apparent	R	32 bit unsigned number, High byte before, low byte after	high byte word
467	01D3			R	Unit:VA	Low byte word
468	01D4		Total fundamental wave active power	R	32 bit signed number, High byte before, low byte after	high byte word
469	01D5			R	Unit:W	Low byte word
470	01D6		Total fundamental wave reactive power	R	32 bit signed number, High byte before, low byte after	high byte word
471	01D7			R	Unit:VA	Low

						byte word
472	01D8	Total fundamental wave apparent power	R	32 bit signed number, High byte before, low byte after Unit:VA	high byte word	
473	01D9		R		Low byte word	
474	01DA	Fundamental wave total active energy	R	32 bit unsigned number, High byte before, low byte after Unit:kWh	high byte word	
475	01DB		R		Low byte word	
476	01DC	Fundamental wave total reactive energy	R	32 bit unsigned number, High byte before, low byte after Unit:kvarh	high byte word	
477	01DD		R		Low byte word	
478	01DE	Full wave A phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
479	01DF		R		Low byte word	
480	01E0	Full wave B phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
481	01E1		R		Low byte word	
482	01E2	Full wave C phase active	R	32 bit signed number, High byte before, low byte after Unit:W	high byte word	
483	01E3		R		Low byte word	
484	01E4	Full wave A phase reactive	R	32 bit signed number, High byte before, low byte after Unit:var	high byte word	
485	01E5		R		Low byte word	
486	01E6	Full wave B phase reactive	R	32 bit signed number,	high	

					High byte before, low byte after Unit:var	byte word
487	01E7		R			Low byte word
488	01E8	Full wave C phase reactive	R	32 bit signed number, High byte before, low byte after Unit:var		high byte word
489	01E9		R			Low byte word
490	01EA	Full wave A phase apparent	R	32 bit unsigned number, High byte before, low byte after Unit:VA		high byte word
491	01EB		R			Low byte word
492	01EC	Full wave B phase apparent	R	32 bit unsigned number, High byte before, low byte after Unit:VA		high word
493	01ED		R			Low word
494	01EE	Full wave C phase apparent	R	32 bit unsigned number, High byte before, low byte after Unit:VA		high word
495	01EF		R			Low word
496	01F0	Fundamental wave power factor			-1.000~1.000	word
497	01F1	Fundamental wave A phase power factor			-1.000~1.000	word
498	01F2	Fundamental wave B phase power factor			-1.000~1.000	word
499	01F3	Fundamental wave C phase power factor			-1.000~1.000	word
500	01F4	Full wave power factor			-1.000~1.000	word
501	01F5	Full wave A phase power factor			-1.000~1.000	word
502	01F6	Full wave B phase power factor			-1.000~1.000	word
503	01F7	Full wave C phase power factor			-1.000~1.000	word
504	01F8	Year,month	R/W		High byte:00-99,low byte:0-12	word
505	01F9	Day,hour	R/W		High byte:0-31, low byte:0-23	word
506	01FA	Minute, second	R/W		High byte:0-59, low byte:0-59	word
507-549	01FB -0225	reserve	R			

Motor running information	550	0226	Motor running time by now	R	0-65535 h	word
	551	0227	Total motor stopping times	R	0-65535 h	word
	552	0228	Total running times	R	0-65535 h	word
	553	0229	Total Stopping times	R	0-65535 h	word
	554	022A	Total starting times	R	0-65535	word
	555	022B	Total tripping times	R	0-65535	word
	556	022C	DI STATE	R	Bit0-bit8 To Switch Input DI1-DI9	word
	557	022D	DO STATE	R/W	Bit0 relay 1, Bit1 relay 2, Bit2 relay 3, Bit3 relay 4, Bit4 relay 5, Bit5 relay 6	
	558	022E	DI/DO TYPE	R	Bit8: 0-DC type;1-AC type	
	559	022F	MOTOR STATE	R	bit0 readiness; bit1 Stopping; bit2 start; bit3 operation; bit4 alarm; bit5 tripping; bit7 0- Low speed 1- High speed	word
	560	0230	Trip Breakdown fault indication 1	R	Bit0 reverse time limit overload tripping; Bit1 grounding tripping; Bit2 underload tripping Bit3 disconnection; Bit4 underpressure release; Bit5 overpressure release; Bit6 blocking and tripping; Bit7 blocking tripping; Bit8 I unbalance tripping; Bit9 PTC temperature tripping; Bit10 external failure tripping; Bit11 start timeout release; Bit12 power tripping; Bit13 underpower tripping; Bit14 phase sequence tripping; Bit15 short circuit tripping. (0- No tripping, (1)	word
	561	0231	Trip Breakdown fault indication 2	R	Bit0 fixed time limit overload tripping; Bit1 voltage unbalanced tripping; Bit2 overflow protection tripping; Bit3 starting times tripping.	word
	562	0232	Alarm fault indication 1	R	Bit0 anti-time overload alarm; Bit1 ground alarm; Bit2 underload alarm; Bit3 fault phase alarm;	word

					Bit4 undervoltage alarm; Bit5 overvoltage alarm; Bit6 blocking alarm; Bit7 blocking alarm; Bit8 I unbalance alarm; Bit9 PTC temperature alarm; Bit10 external fault alarm; Bit11 start timeout alarm; Bit12 power alarm; Bit13 underpower alarm; Bit14 phase sequence alarm; Bit15 short circuit alarm. (0- No alarm, 1- Alarm)	
563	0233	Alarm fault indication 2	R	Bit0 fixed time limit overload alarm; Bit1 U unbalance alarm; Bit2 overflow protection alarm; Bit3 starting times alarm; Bit4 running time alarm; Bit5 fault times alarm	word	
564	0234	Overload remaining cooling time	R	0-3600s	word	
565	0235	Maximum starting current by now	R	0-65535	word	
566	0236	Maximum Historical starting current	R	0-65535/Current scaling factor is the actual value	word	
567	0237	Maximum current in operation by now	R	0-65535/Current scaling factor is the actual value	word	
568	0238	Maximum Historical operation current	R	0-65535/Current scaling factor is the actual value	word	
569	0239	Latest Fault Record Communication Address	R	2100.2150.2200.2250.2300.2350.2400.2450	word	
570	023A	Latest DI Change Record Communication Address	R	1100.1108.1116.1124.1132.1140.1148.1156	word	
571	023B	Latest Starting Record Communication Address	R	1300.1308.1316.1324.1332.1340.1348.1356	word	
572	023C	Latest Stopping Record Communication Address	R	1500.1508.1516.1524.1532.1540.1548.1556	word	
573	023D	Latest Restart Record Communication Address	R	1700.1708.1716.1724.1732.1740.1748.1756	word	
574	023E	Latest Parameter setting Communication Address	R	1900.1906.1912.1918.1924.1930.1936.1942	word	
575	023F	Latest installation to record correspondence communication address	R	2020.2024.2028.2032.2036.2040.2044.2048	word	

	576	0240	Latest device power off record communication address	R	2052.2056.2060.2064.2068.2072.2076.2080	word
	577	0241	Current recorded times of power on	R	0-60000	word
	578	0242	Current recorded times of power off	R	0-60000	word
	579	0243	Waiting time for next start	R	0-300min	word
	580	0244	Current Motor Control Authority	R	0-panel ;1-native ;2-communication ;3-remote ;4-stop ;5-All	word
	581-596	0245-0254	reserve	R		word
Clear the record	597	0255	Energy clear	W	Write data 0xa5b5	word
	598	0256	Clear motor operation information	W	Write data 0xa5b5	word
	599	0257	Event record clear	W	Write data 0xa5b5	word
	600	0258	Current	R	1.6.6.3.25.0.100.0.250.0.800.0.10.5.0	word
	601	0259	Current proportional factor	R	1.10.100	
	602	025A	Operational control bits	W	1-Stop.2-Start 1.3- Start 2.4-Emergency stop.5-resei	word
	603	025B	Restore factory setting	R/W	Write data 0xFFFF	word
	604	025C	Input Mark of Residual Current Transformer	R/W	0 not input,1 input	word
	605	025D	Base Wave Switch	R/W	0 Rms,1 Fundament	word
	606	025E	Motor type	R/W	0 Common motor, 1 Increased safety motor	word
	607	025F	CT Ratio	R/W	1A:1-5000 5A:1-1000 other specifications can not set CT ratio	word
	608	0260	Rated Frequency	R/W	45-70Hz	word
	609	0261	Motor rated current	R/W	1A:0.1-5000.0A 5A:0.5-5000.0A 1.6A:0.4-1.6A 6.3A:1.6-6.3A 25A:6.3-25.0A 100A:25.0-100.0A 250A:63.0-250.0A 800A:250.0-800.0A	word
	610	0262	Motor rated voltage	R/W	57-1200	word
	611	0263	Motor rated Power	R/W	High byte	word
	612	0264		R/W	Low byte	word
	613	0265	Wiring	R/W	0:1P,1:3P4L,2:3P3L	word
System parameter	614	0266	Back light	R/W	1-30s,0:Normally on	word
	615	0267	Liquid crystal contrast	R/W	0~100	word
	616	0268	Main interface index	R/W	1-8	word

	617	0269	Language	R/W	0-Chinese,1-English	word
	618	026A	Current mask value	R/W	0-30	word
	619	026B	Password	R/W	0000-9999	
	620	026C	Analog output setting	R/W	Type:0-Ia,1-Ib,2-Ic,3-Iav,4-Uab,5-Ubc,6-Uca,7-Uav,8-PTC,9-Heat capacity,10-P,11-F	word
	621	026D	Full value	R/W	2 times rated current	word
	622	026E		R/W		
	623-645	026F-0285	reserve	R		word
	646	0286	LCD version	R		word
	647	0287	LCD NO.	R		word
	648	0288	Main body version	R		word
	649	0289	Main body NO.	R		word
Low speed protection	650	028A	Trip allowed/forbidden 1	R	Bit0 reverse time limit overload tripping; Bit1 grounding tripping; Bit2 underload tripping Bit3 disconnection; Bit4 underpressure release; Bit5 overpressure release; Bit6 blocking and tripping; Bit7 blocking tripping; Bit8 I unbalance tripping; Bit9 PTC temperature tripping; Bit10 external failure tripping; Bit11 start timeout release; Bit12 power tripping; Bit13 underpower tripping; Bit14 phase sequence tripping; Bit15 short circuit tripping. (0-No tripping, 1-trippng)	word
	651	028B	Trip allowed/forbidden 2	R/W	Bit0 fixed time limit overload tripping; Bit1 voltage unbalanced tripping; Bit2 overflow protection tripping; Bit3 starting times tripping.	word
	652	028C	Alarm allowed/forbidden 1	R/W	Bit0 anti-time overload alarm; Bit1 ground alarm; Bit2 underload alarm; Bit3 fault phase alarm; Bit4 undervoltage alarm; Bit5 overvoltage alarm;	word

					Bit6 blocking alarm; Bit7 blocking alarm; Bit8 I unbalance alarm; Bit9 PTC temperature alarm; Bit10 external fault alarm; Bit11 start timeout alarm; Bit12 power alarm; Bit13 underpower alarm; Bit14 phase sequence alarm; Bit15 short circuit alarm. (0- No alarm, 1- Alarm)	
653	028D	Alarm allowed/forbidden 2	R/W	Bit0 fixed time limit overload alarm; Bit1 U unbalance alarm; Bit2 overflow protection alarm; Bit3 starting times alarm; Bit4 running time alarm; Bit5 fault times alarm	word	
654	028E	Trip level	R/W	1.2.3.5.10.15.20.25.30.35.40	word	
655	028F	tE Trip level	R/W	2.3.4.5.6.8.10.12.15	word	
656	0290	Start setting	R/W	100-1000%	word	
657	0291	Reset method	R/W	0-Off;1-On	word	
658	0292	Overload cooling time	R/W	0-30min	word	
659	0293	Overload alarm threshold	R/W	1-99%	word	
660	0294	Overload starting protection screen time	R/W	0-25.0	word	
661	0295	Ground fault alarm threshold	R/W	20%-100%		
662	0296	Ground fault trip threshold	R/W	20%-100%		
663	0297	Ground fault protection delay	R/W	0.1~600.0s	word	
664	0298	Trip mode	R/W	Bit(0- circuit breaker 1- contactor)	word	
665	0299	Ground fault starting screen time	R/W	0-25.0	word	
666	029A	Leakage alarm threshold	R/W	(100~1000)mA	word	
667	029B	Leakage trip threshold	R/W	(100~1000)mA	word	
668	029C	Leakage trip delay	R/W	0.1~600.0s		
669	029D	Leakage action choice	R/W	Bit0:Action choice(0-Circuit breaker 1-contactor)		
670	029E	Leakage fault starting screen time	R/W	0-25.0		
671	029F	Under power alarm threshold	R/W	10~99%		
672	02A0	Under power trip threshold	R/W	10~99%		
673	02A1	Under power trip delay	R/W	0.1~600.0s	word	

674	02A2	Phase loss trip delay	R/W	0.1~600.0s	word
675	02A3	Under voltage alarm threshold	R/W	50~90%	
676	02A4	Under voltage trip threshold	R/W	50~90%	word
677	02A5	Under voltage trip delay	R/W	0.1~600.0s	word
678	02A6	Over voltage alarm threshold	R/W	110~150%	
679	02A7	Over voltage trip threshold	R/W	110~150%	
680	02A8	Over voltage trip delay	R/W	0.1~600.0s	word
681	02A9	Locked-rotor alarm threshold	R/W	100~1000%	
682	02AA	Locked-rotor trip threshold	R/W	100~1000%	
683	02AB	Locked-rotor trip delay	R/W	0.1~600.0s	word
684	02AC	Blocking alarm threshold	R/W	100~1000%	
685	02AD	Blocking trip threshold	R/W	100~1000%	
686	02AE	Blocking trip delay	R/W	0.1~600.0s	word
687	02AF	Current unbalance alarm threshold	R/W	10~99%	
688	02B0	Current unbalance trip threshold	R/W	10~99%	
689	02B1	Current unbalance trip delay	R/W	0.1~600.0s	word
690	02B2	NTC /PTC	R/W	0 NTC,1PTC	
691	02B3	Temperature alarm threshold	R/W	100~30000	
692	02B4	Temperature trip threshold	R/W	100~30000	word
693	02B5	Temperature trip delay	R/W	0.1~600.0s	
694	02B6	Temperature fault reset mode	R/W	0-Manual;1-Automatic	
695	02B7	Temperature return resistance	R/W	100-30000	
696	02B8	External fault trip delay	R/W	0.1~600.0s	word
697	02B9	Start timeout trip threshold	R/W	100%~200%	word
698	02BA	Start time	R/W	0.1~600.0s	
699	02BB	Over power alarm threshold	R/W	100~700%	
700	02BC	Over power trip threshold	R/W	100~700%	word
701	02BD	Over power trip delay	R/W	0.1~600.0s	
702	02BE	Under power alarm threshold	R/W	0~100%	
703	02BF	Under power trip threshold	R/W	0~100%	word
704	02C0	Under power trip delay	R/W	0.1~600.0s	
705	02C1	Phase sequence trip delay	R/W	0.1~600.0s	
706	02C2	Short-circuit alarm threshold when starting	R/W	400%~1000%	
707	02C3	Short-circuit trip threshold when starting	R/W	400%~1000%	word
708	02C4	Short-circuit alarm threshold when running	R/W	400%~1000%	
709	02C5	Short-circuit trip threshold when running	R/W	400%~1000%	
710	02C6	Short-circuit trip delay	R/W	0.1~600.0s	word
711	02C7	Fixed time limit overload	R/W	100-1000%	word

			alarm threshold			
	712	02C8	Fixed time limit overload trip threshold	R/W	100-1000%	
	713	02C9	Fixed time limit overload trip delay	R/W	0.1~600.0s	word
	714	02CA	Voltage unbalance alarm threshold	R/W	10~99%	
	715	02CB	Voltage unbalance trip threshold	R/W	10~99%	
	716	02CC	Voltage unbalance trip delay	R/W	0.1~600.0s	
	717	02CD	overflow protection threshold	R/W	400%~1000%	
Other alarm	718	02CE	Start times alarm threshold	R/W	1-10 unti :time	
	719	02CF	Start times protection delay	R/W	10-300min	
	720	02D0	Running time alarm threshold	R/W	1000-60000 unit:hour	
	721	02D1	Fault times alarm threshold	R/W	20-10000 unti:time	
	722-799	02D2-03 1F	Reserve	R		
High speed protection	800	0320	High speed trip allowed/forbidden 1	R/W	Content is consistent with low speed,but the default value is different	
	801	0321	High speed trip allowed/forbidden 2	R/W		
	802	0322	High speed alarm allowed/forbidden 1	R/W		
	803	0323	High speed alarm allowed/forbidden 2	R/W		
	804	0324	High speed rated current	R/W		
	805	0325	High speed rated power	R/W		
	806	0326		R/W		
	807	0327	High speed trip level	R/W		
	808	0328	High speed tE trip level	R/W		
	809	0329	High speed inverse time protectin start setting	R/W		
	810	032A	High speed inverse time protectin seset method	R/W		
	811	032B	High speed inverse time protectin cooling time	R/W		
	812	032C	High speed inverse time protectin alarm threshold	R/W		
	813	032D	High speed starting screen time	R/W		
	814	032E	High speed underload alarm threshold	R/W		
815	032F	High speed underload trip threshold	R/W			

816	0330	High speed underload trip delay	R/W		
817	0331	High speed locked-rotor alarm threshold	R/W		
818	0332	High speed locked-rotor trip threshold	R/W		
819	0333	High speed locked-rotor trip delay	R/W		
820	0334	High speed blocking alarm threshold	R/W		
821	0335	High speed blocking trip threshold	R/W		
822	0336	High speed blocking trip delay	R/W		
823	0337	High speed current unbalance alarm threshold	R/W		
824	0338	High speed current unbalance trip threshold	R/W		
825	0339	High speed current unbalance trip delay	R/W		
826	033A	High speed start timeout threshold	R/W		
827	033B	High speed start timeout time	R/W		
828	033C	High speed over power alarm threshold	R/W		
829	033D	High speed over power trip threshold	R/W		
830	033E	High speed over power trip delay	R/W		
831	033F	High speed under power alarm threshold	R/W		
832	0340	High speed under power trip threshold	R/W		
833	0341	High speed under power trip delay	R/W		
834	0342	High speed short-circuit alarm threshold when starting	R/W		
835	0343	High speed short-circuit trip threshold when starting	R/W		
836	0344	High speed short-circuit alarm threshold when running	R/W		
837	0345	High speed short-circuit trip threshold when running	R/W		
838	0346	Short-circuit trip delay	R/W		
839	0347	High speed fixed time limit overload alarm threshold	R/W		
840	0348	High speed fixed time limit overload trip threshold	R/W		
841	0349	High speed fixed time limit overload trip delay	R/W		
842	034A	High speed phase loss trip delay	R/W		
843-899	034B-38 3	Reserve	R		

Start control	900	0384	Self-start mode	R/W	0-start,1-restore	word
	901	0385	Self-start delay	R/W	0.1~60.0s	word
	902	0386	Self-start control	R/W	0-Off.1-ON	word
	903	0387	Control access	R/W	0-Panel;1-Native;2-Comm;3-Remote;4-1 in 3;5- 1 in 2;6-all control	word
	904	0388	1 in 3 permission output1	R/W	0- Comm;1- Native;2-Panel;3-Stop;4-Remote the default is 0	word
	905	0389	1 in 3 permission output2	R/W	0- Comm;1- Native;2-Panel;3-Stop;4-Remote the default is 1	word
	906	038A	1 in 3 permission output3	R/W	0- Comm;1- Native;2-Panel;3-Stop;4-Remote the default is 2	word
	907	038B	1 in 3 permission output4	R/W	0- Comm;1- Native;2-Panel;3-Stop;4-Remote the default is 3	word
	908	038C	Start method	R/W	0-Protection mode,1-manual mode,2-two-step mode, 3-two-speed mode, 4-star triangle, 5-auto-step-down	word
	909	038D	Start1delay	R/W	0.1~60.0s	word
	910	038E	Recovery voltage	R/W	70~95%	word
	911	038F	Immediate restart time	R/W	0.1~10.0s	word
	912	0390	Restart delay	R/W	1.0~60.0s	word
	913	0391	Restart control	R/W	0=Off,1=operates on start 1,2=operates on start 2,3=restore	word
	914	0392	Sway electric time	R/W	0.5~300.0s	word
	915	0393	Voltage drop		50-90% ≤ Recovery voltage	
	916-949	0394-03B5	Reserve	R		word
	Programmable setting	950	03B6	DO initial state setting	R/W	0-Normally on,1- Normally off;bit0-bit4 correspond DO1-DO5
951		03B7	DO1 Definition	R/W	0-No input, 1-start 1, 2-start 2, 3-start 3, 4-parking, 5-starting jumped contactor, 6-circuit breakers, 7-fault Alarm output, 8-tripping fault output,9-the output state stopped, 10-the starting state output, 11-the output operation state, 12-the communication control output,13-the output device	

					self-checking, 14-the device output power, 15-nowhere electric process output chain, 16-electric reset signal output, 17-protected mode have nowhere electricity output 1, 18-protected mode electricity output 2,19- logic diagram output 1 output logic diagram,20- logic diagram output 2, 21- logic diagram output 3, 22-30 corresponding DI1-19 control the DO output	
952	03B8	DO1 action setting(time)	R/W	0-Level;(3-250)-pulse time,unit:0.1S	word	
953	03B9	DO1 trip setting1	R/W	As same as 650	word	
954	03BA	DO1 trip setting2	R/W	As same as 651	word	
955	03BB	DO1 alarm setting1	R/W	As same as 651	word	
956	03BC	DO1 alarm setting2	R/W	As same as 651	word	
957	03BD	DO2 progamable	R/W	As same as DO1(951-956)	word	
958	03BE	DO2 action setting(time)	R/W		word	
959	03BF	DO2 trip setting1	R/W		word	
960	03C0	DO2 trip setting2	R/W		word	
961	03C1	DO2 alarm setting1	R/W		word	
962	03C2	DO2 alarm setting2	R/W		word	
963	03C3	DO3 progamable	R/W	As same as DO1(951-956)	word	
964	03C4	DO3 action setting(time)	R/W		word	
965	03C5	DO3 trip setting1	R/W		word	
966	03C6	DO3 trip setting2	R/W		word	
967	03C7	DO3 alarm setting1	R/W		word	
968	03C8	DO3 alarm setting2	R/W		word	
969	03C9	DO4 programable	R/W	As same as DO1(951-956)	word	
970	03CA	DO4 action setting(time)	R/W		word	
971	03CB	DO4 trip setting1	R/W		word	
972	03CC	DO4 trip setting2	R/W		word	
973	03CD	DO4 alarm setting1	R/W		word	
974	03CE	DO4 alarm setting2	R/W		word	
975	03CF	DO5 programable	R/W	As same as DO1(951-956)	word	
976	03D0	DO5 action setting(time)	R/W		word	
977	03D1	DO5 trip setting1	R/W		word	
978	03D2	DO5 trip setting2	R/W		word	
979	03D3	DO5 alarm setting1	R/W		word	
980	03D4	DO5 alarm setting2	R/W		word	

981-986	03D5-03 DA	Reserve	R		
987	03DB	DI type	R/W	Bit0-Bit8 correspond DI1-9,0-Normally on;1- Normally off	
988	03DC	DI1 programmable setting	R/W	1-Ordinary DI, 2-starting 1(in situ), 3-starting 1(remote), 4-starting 2(in situ), 5-starting 2(remote), 6-parking (in situ), 7-parking (remote), 8-reset, 9-emergency stop, 10-external fault, 11-single point 1 (in situ) start-stop, 12-single point 1 (remote) start-stop, 13-single point 2 (in situ) start-stop, 14-single point 2 (remote) start-stop, 15-single point 1 start/stop, 16-single point 2 start/stop, 17-control over 1, 18-control over 2,21-KM1 status,22-KM2 status	word
989	03DD	DI2 programmable setting	R/W	ditto	word
990	03DE	DI3 programmable setting	R/W		word
991	03DF	DI4 programmable setting	R/W		word
992	03E0	DI5 programmable setting	R/W		word
993	03E1	DI6 programmable setting	R/W		word
994	03E2	DI7 programmable setting	R/W		word
995	03E3	DI8 programmable setting	R/W		word
996	03E4	DI9 programmable setting	R/W		word
997-1002	03E5-03 EA	Reserve	R		
1003	03EB	Logic diagram1	R/W	0-close;1-A;2-A*B;3-A+B;4-A*B* C;5-(A+B)*C;6-(A*B)+C;7-A+B+C; 8-A*B*C*D;9-(A+B)*C*D;10-(A* B+C)*D;11-(A+B+C)*D;12-A*B*C +D;13-(A+B)*C+D;14-A*B+C+D;1 5-A+B+C+D;16-A*B*C*D*E;17-(A+B)*C*D*E;18-(A*B+C)*D*E;1 9-(A+B+C)*D*E;20-(A*B*C+D)*E ;21-((A+B)*C+D)*E;22-(A*B+C+D)*E;23-(A+B+C+D)*E;24-A*B*C* D+E;25-(A+B)*C*D+E;26-(A*B+C)*D+E;27-(A+B+C)*D+E;28-A*B* C+D+E;29-(A+B)*C+D+E;30-A*B +C+D+E;31-A+B+C+D+E	word
1004	03EC	Input A	R/W	Low-byte:0-Close;1-9	word

					correspond to DI1-19;17-21 correspond to DO1 - DO6;27-Starting 1;28-Starting 2;29-Starting 3;30-Stop,31-Emergency shutdown;32-Stop state;33-Starting state;34-Running state;35-Alarm status;36-Trip status;49-80 correspond to trip typ;81-112 correspond to alarm types High byte:0- Logical,1-illogical	
1005	03ED	Input B	R/W	As same as 1004	word	
1006	03EE	Input C	R/W		word	
1007	03EF	Input D	R/W		word	
1008	03F0	Input E	R/W		word	
1009	03F1	Input A relay	R/W	0.0-60.0s	word	
1010	03F2	Input B relay	R/W	0.0-60.0s	word	
1011	03F3	Input C relay	R/W	0.0-60.0s	word	
1012	03F4	Input D relay	R/W	0.0-60.0s	word	
1013	03F5	Input E relay	R/W	0.0-60.0s	word	
1014	03F6	Logic diagram 2	R/W	As same as logic diagram 1 (data:1003~1013)	word	
1015	03F7	Input A	R/W		word	
1016	03F8	Input B	R/W		word	
1017	03F9	Input C	R/W		word	
1018	03FA	Input D	R/W		word	
1019	03FB	Input E	R/W		word	
1020	03FC	Input A relay	R/W		word	
1021	03FD	Input B relay	R/W		word	
1022	03FE	Input C relay	R/W		word	
1023	03FF	Input D relay	R/W		word	
1024	0400	Input E relay	R/W	word		
1025	0401	Logic diagram 2	R/W	As same as logic diagram 1 (data:1003~1013)	word	
1026	0402	Input A	R/W		word	
1027	0403	Input B	R/W		word	
1028	0404	Input C	R/W		word	
1029	0405	Input D	R/W		word	
1030	0406	Input E	R/W		word	
1031	0407	Input A relay	R/W		word	
1032	0408	Input B relay	R/W		word	
1033	0409	Input C relay	R/W		word	
1034	040A	Input D relay	R/W		word	

	1035	040B	Input E relay	R/W		word
	1036-1039	040C-040F	Reserve	R		word
Communication setting	1040	0410	ADD 1	R/W	1~247	word
	1041	0411	Baud rate1	R/W	0-38400,1-19200,2-9600,3-4800,4-2400,5-1200	word
	1042	0412	Check digit 1	R/W	0-No check,1-2stop bit,3-Odd,4-Even	word
	1043	0413	ADD 2		1~247	word
	1044	0414	Baud rate2	R/W	0-38400,1-19200,2-9600,3-4800,4-2400,5-1200,6-Profibus	word
	1045	0415	Check digit 2	R/W	0-No check,1-2stop bit,3-Odd,4-Even	word
	1047-1099	0416-044B	Reserve	R/W		
DI displacement record 1	1100	044C	DI NO.	R	1-9 correspond to DI1-9	
	1101	044D	DI status	R	0-open 1-closed	
	1102	044E	Action 1time-year month	R	High byt:year,low byte:month	
	1103	044F	Action 1time-day hour	R	High byt:day,low byte:hour	
	1104	0450	Action 1time-minute second	R	High byt:minute,low byte:second	
	1105-1107	0451-0453	Reserve	R		
DI displacement record 2-8	1108-1115	0454-045B	ditto	R	ditto	
	1116-1123	045C-0463		R		
	1124-1131	0464-0046B		R		
	1132-1139	046C-00473		R		
	1140-1147	0474-047B		R		
	1148-1155	047C-0483		R		
	1156-1163	0484-048B		R		
	1164-1259	048C-04EB	Reserve	R		
Start record 1	1300	0514	Start position	R	0-External start 1-Comm 2-Native 3-Panel 4-Remote 5-Self-start 6-Restart	
	1301	0515	Maximum current when starting	R	Unit:1%	

	1302	0516	Minimum voltage when starting	R	Unit:1%	
	1303	0517	Result of starting	R	1-stop when starting 2-go into running status 3-go into trip status	
	1304	0518	Action 1time-year month	R	High byt:year,low byte:month	
	1305	0519	Action 1time-day hour	R	High byt:day,low byte:hour	
	1306	051A	Action 1time-minute second	R	High byt:minute,low byte:second	
	1307	051B	Starting time	R	Unit:0.1S	
Start record 2-8	1308-1315	051C-0523	ditto	R	ditto	
	1316-1323	0524-052B		R		
	1324-1331	052C-0533		R		
	1332-1339	0534-053B		R		
	1340-1347	053C-0543		R		
	1348-1355	0544-054B		R		
	1356-1363	054C-0553		R		
	1364-1499	0554-05DB	reserve	R		
Stop record 1	1500	05DC	Stop position	R	0-External stop 1-Comm 2-Native 3-Panel 4-Remote 5-Emergency stop 6-Voltage loss stop	
	1501	05DD	Action 1time-year month	R	High byt:year,low byte:month	
	1502	05DE	Action 1time-day hour	R	High byt:day,low byte:hour	
	1503	05DF	Action 1time-minute second	R	High byt:minute,low byte:second	
	1504-1507	05E0-005E3	reserve	R		
Stop record 2-8	1508-1515	05E4-05EB	ditto	R	ditto	
	1516-1523	05EC-05F3		R		
	1524-1531	05F4-05FB		R		
	1532-1539	05FC-0603		R		
	1540-	0604-		R		

	1547	060B				
	1548-1555	060C-0613		R		
	1556-1563	0614-0061B		R		
	1564-1699	061C-06A3	reserve	R		
Restart record 1	1700	06A4	Cause of voltage shock	R	0-All three phase lost power 1-A phase 2-B phase 3-C phase	
	1701	06A5	Minimum voltage	R	Unit :1%	
	1702	06A6	Time of voltage shock		Unit :0.1S	
	1703	06A7	Action after voltage shock		1-keep 2-restart 1 3-restart 2	
	1704	06A8	Action 1time-year month	R	High byt:year,low byte:month	
	1705	06A9	Action 1time-day hour	R	High byt:day,low byte:hour	
	1706	06AA	Action 1time-minute second	R	High byt:minute,low byte:second	
	1707	06AB	reserve	R		
Restart record2-8	1708-1715	06AC-006B3	ditto	R	ditto	
	1716-1723	06B4-006BB		R		
	1724-1731	06BC-06C3		R		
	1732-1739	06C4-06CB		R		
	1740-1747	06CC-06D3		R		
	1748-1755	06D4-06DB		R		
	1756-1763	06DC-006E3		R		
	1804-1899	070C-076B	reserve	R		
Parameter change record 1	1900	076C	Change time-year month	R	High byt:year,low byte:month	
	1901	076D	Change time-day hour	R	High byt:day,low byte:hour	
	1902	076E	Change time-minute second	R	High byt:minute,low byte:second	
	1903	076F	First data	R		
	1904	0770	Length of comm data	R		
	1905	0771	Set position	R	0=lcd,1=rs485-1,2=rs485-2,	
Parameter change record 2-8	1906-1911	0772-0777	ditto	R	ditto	
	1912-1917	0778-077D		R		

	1918-1923	077E-0783		R		
	1924-1929	0784-0789		R		
	1930-1935	078A-078F		R		
	1936-1941	0790-0795		R		
	1942-1947	0796-079B		R		
	1948-2019	079C-07E3	reserve	R		
Power on record1	2020	07E4	Power on index	R	Record the number of power on	
	2021	07E5	Power on time-year month	R	High byt:year,low byte:month	
	2022	07E6	Power on time-day hour	R	High byt:day,low byte:hour	
	2023	07E7	Power on time-minute second	R	High byt:minute,low byte:second	
Power on record2-8	2024-2027	07E8-07EB	ditto		ditto	
	2028-2031	07EC-07EF				
	2032-2035	07F0-07F3				
	2036-2039	07F4-07F7				
	2040-2043	07F8-7FB				
	2044-2047	07FC-07FF				
	2048-2051	0800-0803				
Power off 1	2052	0804	Power off index	R	Record the number of power off	
	2053	0805	Power off time-year month	R	High byt:year,low byte:month	
	2054	0806	Power off time-day hour	R	High byt:day,low byte:hour	
	2055	0807	Power off time-minute second	R	High byt:minute,low byte:second	
Power off 2-8	2056-2059	0808-080B	ditto		ditto	
	2060-2063	080C-080F				
	2064-2067	0810-0813				
	2068-2071	0814-0817				

	2072-2075	0818-081B			
	2076-2079	081C-081F			
	2080-2083	0820-0823			
	2084-2089	0824-0829	reserve	R	
	2090-2095	082A-082F	ditto	R	
Fault record 1	2100	0834	Trip status 1	R	
	2101	0835	Trip status 2	R	
	2102	0836	Alarm status 1	R	
	2103	0837	Alarm status 2	R	
	2104	0838	Action 1time-year month	R	High byte:year,low byte:month
	2105	0839	Action 1time-day hour	R	High byte:day,low byte:hour
	2106	083A	Action 1time-minute second	R	High byte:minute,low byte:second
	2107	083B	Fundamental wave switch. sensor type	R	bit0: fundamental wave switch;bit1:PTC/NTC type
	2108	083C	A phase current	R	
	2109	083D	B phase current	R	
	2110	083E	C phase current	R	
	2111	083F	A phase voltage	R	
	2112	0840	B phase voltage	R	
	2113	0841	C phase voltage	R	
	2114	0842	Total apparent power	R	
	2115	0843		R	
	2116	0844	Total active power	R	
	2117	0845		R	
	2118	0846	Total reactive power	R	
	2119	0847		R	
	2120	0848	Total power factor	R	
	2121	0849	Frequence	R	
	2122	084A	Zero sequence current	R	
	2123	084B	Zero sequence voltage	R	
	2124	084C	PTC/NTC resistance	R	
	2125	084D	Leakage current	R	
	2126	084E	DI status	R	
	2127	084F	DO status	R	
2128	0850	Motor status	R	Bit1 stop;Bit2 start;Bit3 run;Bit4 alarm	

	2129-2149	0851-0865	Reserve	R		
Fault record 2-8	2150-2199	0866-0897	ditto	R	ditto	
	2200-2249	0898-08C9		R		
	2250-2299	08CA-08FB		R		
	2300-2349	08FC-092D		R		
	2350-2399	092E-095F		R		
	2400-2449	0960-0991		R		
	2450-2499	0992-09C3		R		
	Customize mailing address	2500		09C4		Correspond value of custom address 1
2501		09C5	Correspond value of custom address 2	R		
~		~	~	R		
2619		0A3B	Correspond value of custom address 120	R		
2620-2799		0A3C-0AEF	reserve	R		
2800		0AF0	Correspond address of custom address 1	R/W		
~		~	~	R/W		
2919		0B67	Correspond address of custom address 120	R/W		

8.2 Profibus_DP

Input data bit 31 characters (ARD-DP Master station)

Table 16

Address	Address	Parameters	R/W	Value range	Type
1	0x00	L1 phase actual current	R	0-65535	Word
		L1 phase fundamental wave current	R	0-65535	Word
2	0x01	L2 phase actual current	R	0-65535	Word
		L2 phase fundamental wave current	R	0-65535	Word
3	0x02	L3 phase fundamental wave current	R	0-65535	Word
		L3 phase fundamental wave current	R	0-65535	Word
4	0x03	Earth leakage current	R	30-1000mA	Word

					Word
5	0x04	Uab line-voltage	R	0-999.9	Word
6	0x05	Ubc line-voltage	R	0-999.9	Word
7	0x06	Uca line-voltage	R	0-999.9	Word
8	0x07	Apparent power	R	0-65535	High byte
9	0x08		R	0-65535	Low byte
10	0x09	Active power	R	0-65535	High byte
11	0x0A		R	0-65535	Low byte
12	0x0B	Electric energy	R	0-65535	High byte
13	0x0C		R	0-65535	Low byte
14	0x0D	Power factor	R	0-1 unit 0.001	Word
15	0x0E	Unbalance degree of current	R	0-100%	
16	0x0F	Accumulated thermal capacity	R	0-100%	Word
17	0x10	Temperature value	R	100-30000	Word
18	0x11	Motor running time of this time	R	0-65535 hours	Word
19	0x12	Motor stopping time of this time	R	0-65535 hours	Word
20	0x13	Switch output	R	Bit0-Bit8 corresponding switching input DI1-DI9, Bit11 relay 1, Bit12 relay 2, Bits 13 relay 3, Bit14 relay 4 Bit 15 relay 5	Word
21	0x14	Trip fault indicator1	R	Bit0 overload trip Bit1 earthing/earth leakage trip Bit2 under load trip Bit3 phase failure trip Bit4 under voltage trip Bit5 over voltage trip Bit6 locked-rotor trip Bit7 blocking trip Bit8 imbalance trip Bit9 PTC temperature trip Bit10 external fault trip Bit11 starting overtime trip Bit12 over power trip Bit13 under power trip Bit14 phase sequence trip Bit15 short circuit trip	Word

22	0x15	Trip fault indicator2	R	Bit0 constant time overload trip Bit1 U unbalance trip Bit2 overflow trip Bit3 insulation monitoring trip Bit4 trip number of starts Bit7 leakage current trip	Word
23	0x16	Alarm fault indicator1	R	Bit0 reverse time overload alarm Bit1 ground alarm Bit2 underload alarm Bit3 phase break alarm Bit4 undervoltage alarm Bit5 overpressure alarm Bit6 block turn alarm Bit7 blocking alarm Bit8 I unbalance alarm Bit9PTC temperature alarm Bit10 external fault alarm Bit11 start timeout alarm Bit12 overpower alarm Bit13 low power alarm Bit14 phase sequence alarm Bit15 short circuit alarm	Word
24	0x17	Alarm fault indicator2	R	Bit0 fixed time overload alarm Bit1 U unbalance alarm Bit2 overflow alarm Bit3 insulation monitoring alarm Start times of Bit4 alarm Bit5 running time alarm Bit6 failure times alarm Bit7 leakage current alarm	Word
25	0x18	Current specifications:	R	0-1. 6.1-6.3.2-25.3-100. 4-250.5-800.6-1.7-5	
		Current scaling factor	R	10.100	Word
26	0x19	A phase overload percentage	R		Word
27	0x1A	B phase overload percentage	R		Word
28	0x1B	C phase overload percentage	R		Word
29	0x1C	Overload percentage	R		Word
30	0x1D	Frequency	R	45.0-70.0	Word

31	0x1E	Motor status;	R	Motor thermal overload cooling remaining time	Word
				Bit0 ready; Bit1 stop; Bit2 start Bit3 running; Bit4 alarm; Bit5 trip	

Note: high byte ahead, low byte behind, such as [0][1], [0]is high 8-bit, and [1] is low 8-bit, other analogy. Output parameter 1 character CDP master station-ARD)

This can be displayed specifically as follows:

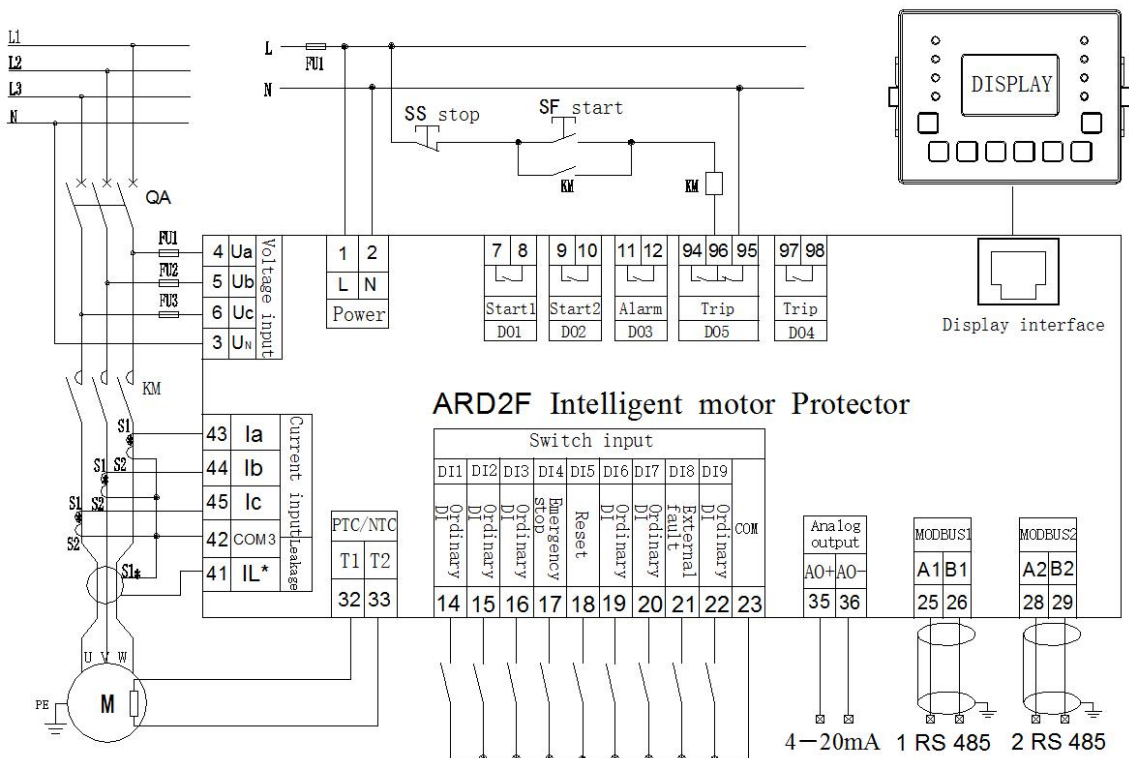
Table 17

Output	Parameters	Value range
[00][01]	Control word(word)	0X8001-stop,0X8002-start1,0X8003-start2,0X8004-emergency stop,0X8005-reset

Note:if using DP communication, customers need to enter system parameter——communication setting to set address 2, and set baud rate into profibus, then power on again to save the parameter.

9 Typical applications

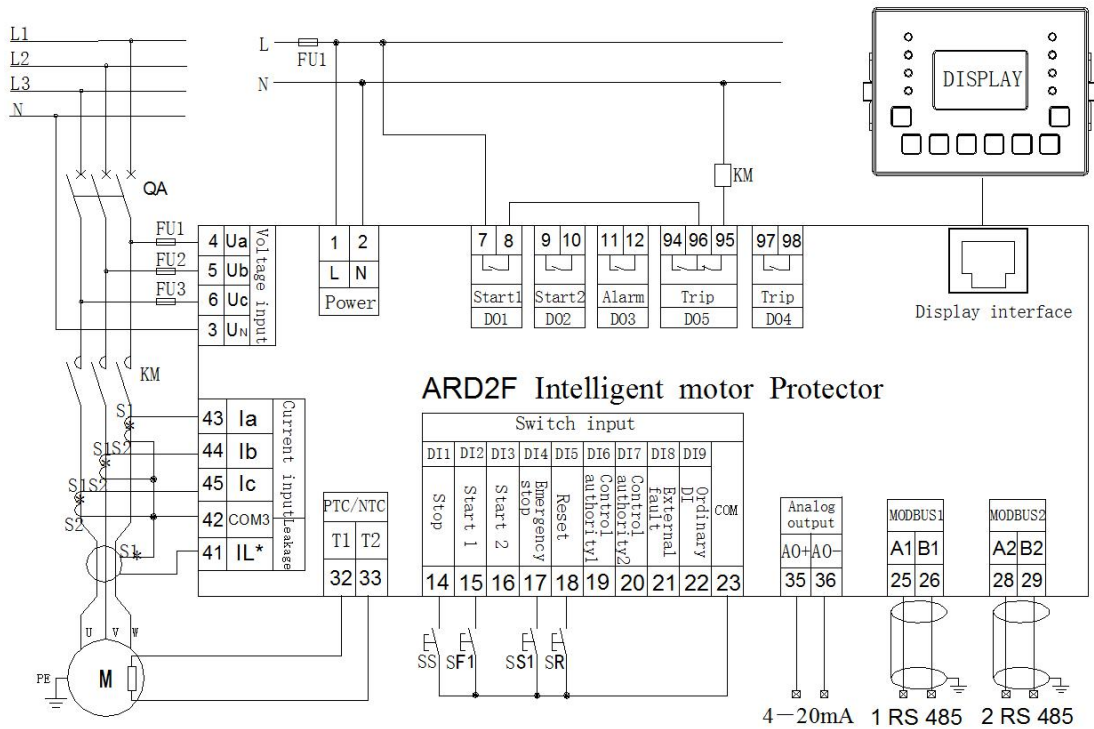
9.1 ARD2F Electrical Motor Protection Mode Wiring



Protection mode: the starting and stopping of the motor is realized by the external button. The closing QA, presses the starting button SF,KM attracts the coil to get electricity, makes the main contact of the KM close, and the motor starts to work. When the stop button is pressed, the KM

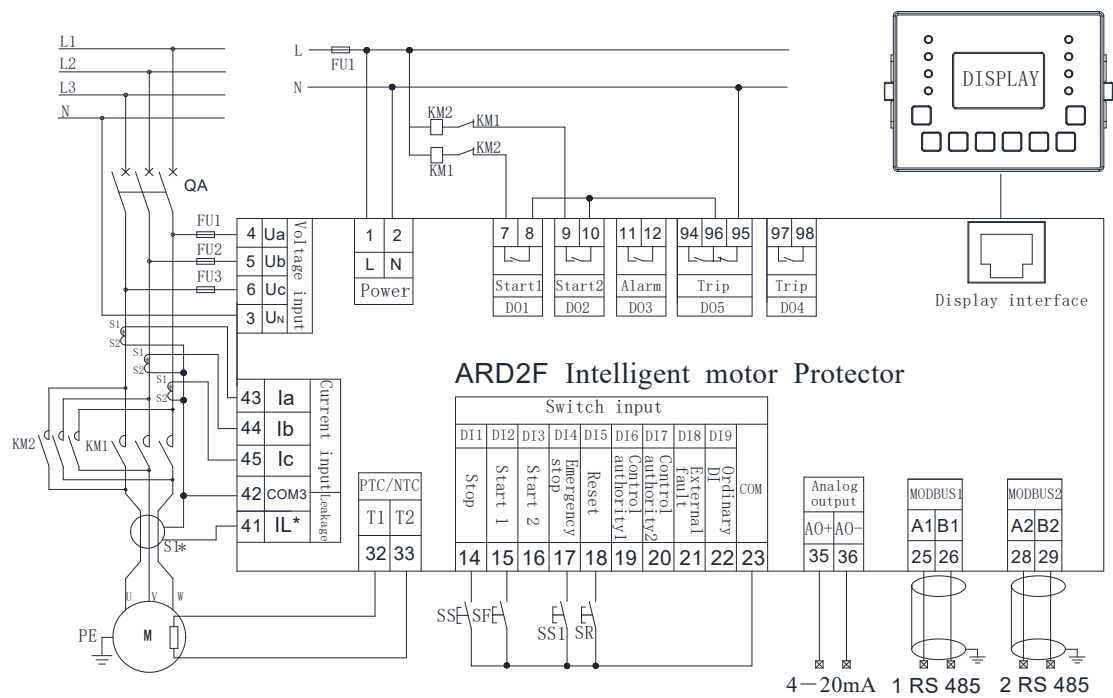
suction coil loses power, so that the main contact of the KM is released and the motor stops working.

9.2 ARD2F Electrical motor protector direct starting wiring diagram



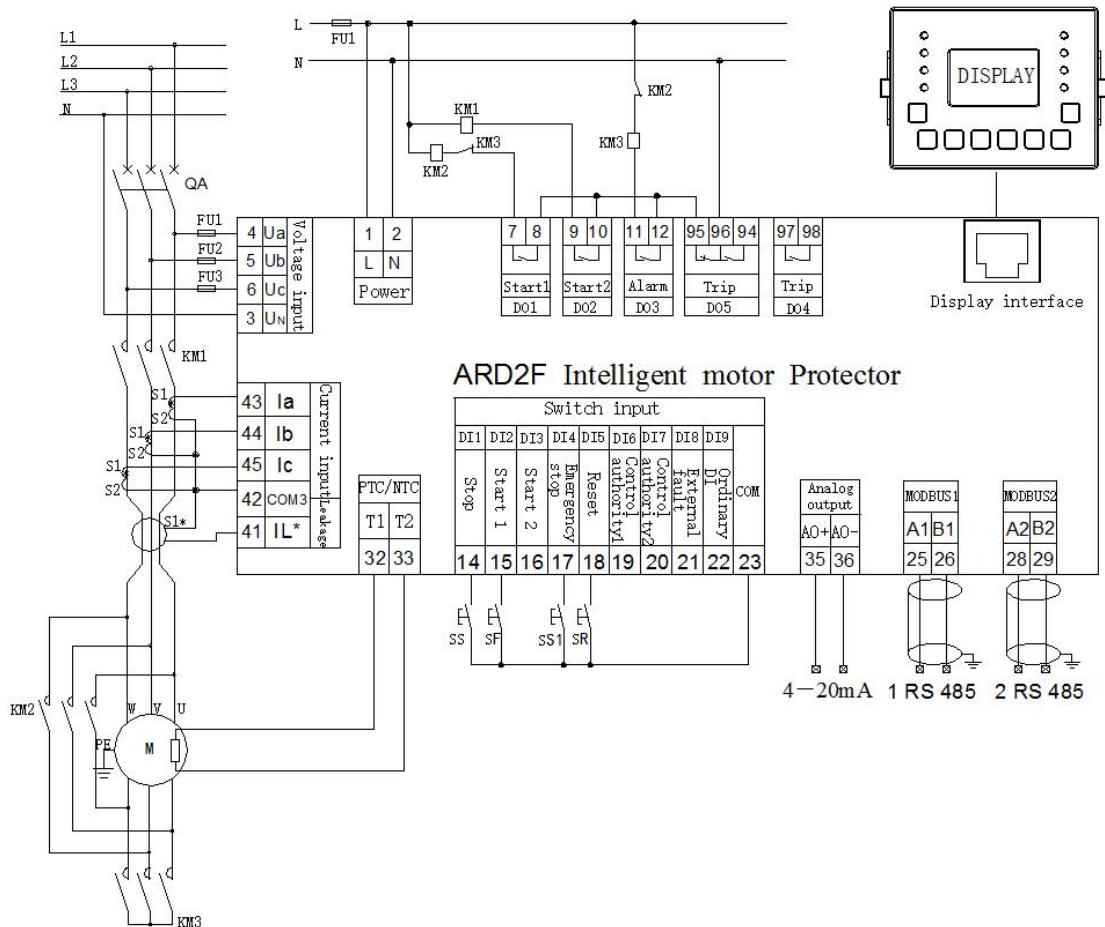
Direct starting: motor starting and stopping is controlled by protector, Press the Start 1 button on the panel, Panel control), DO1 relay (default start 1 function) closed, Close the KM's main contacts, The motor began to work. Press the "Stop" button on the panel, Local control), DO1 relay disconnected, with parking in this mode KM coil is out of power, The motor stopped working. Press switch input DI2(default start 1 function, start control set to manual mode, local control), DO1 relay (default start 1 function) closed, so that the main contact of the KM closed, the motor began to work. Press switch input DI1(default stop function, start control set to manual mode, local control), DO1 relay disconnected, KM coil power loss, motor stop work.

9.3 ARD2F Electrical motor protector forward/reverse wiring diagram



Forward and reverse starting: motor starting and stopping are controlled by protector, Press the Start 1 button on the panel, Panel control), DO1 relay (default start 1 function) closed, Close the KM1's main contacts, Motor starting; Press the "start 2" button on the panel, DO1 relay (default start 1 function) disconnected, DO2 relay (default start 2 function) closed, close the KM2's main contacts, Motor reverse start. Press the stop button on the panel, DO2 relay disconnected 3s, with stop function in pulse output mode KM1.KM2 coil is out of power, The motor stopped working. Click switch input DI2(default start 1 function, Start control set to manual mode, Local control), DO1 relay (default start 1 function) closed, Close the KM1's main contacts, Motor starting; Click switch input DI3(default start 2 function), DO1 relay (default start 1 function) disconnected, DO2 relay (default start 2 function) closed, close the KM2's main contacts, Motor reverse start. Click switch input DI1(default stop function), DO2 relay disconnected, KM1.KM2 coil is out of power, The motor stopped working.

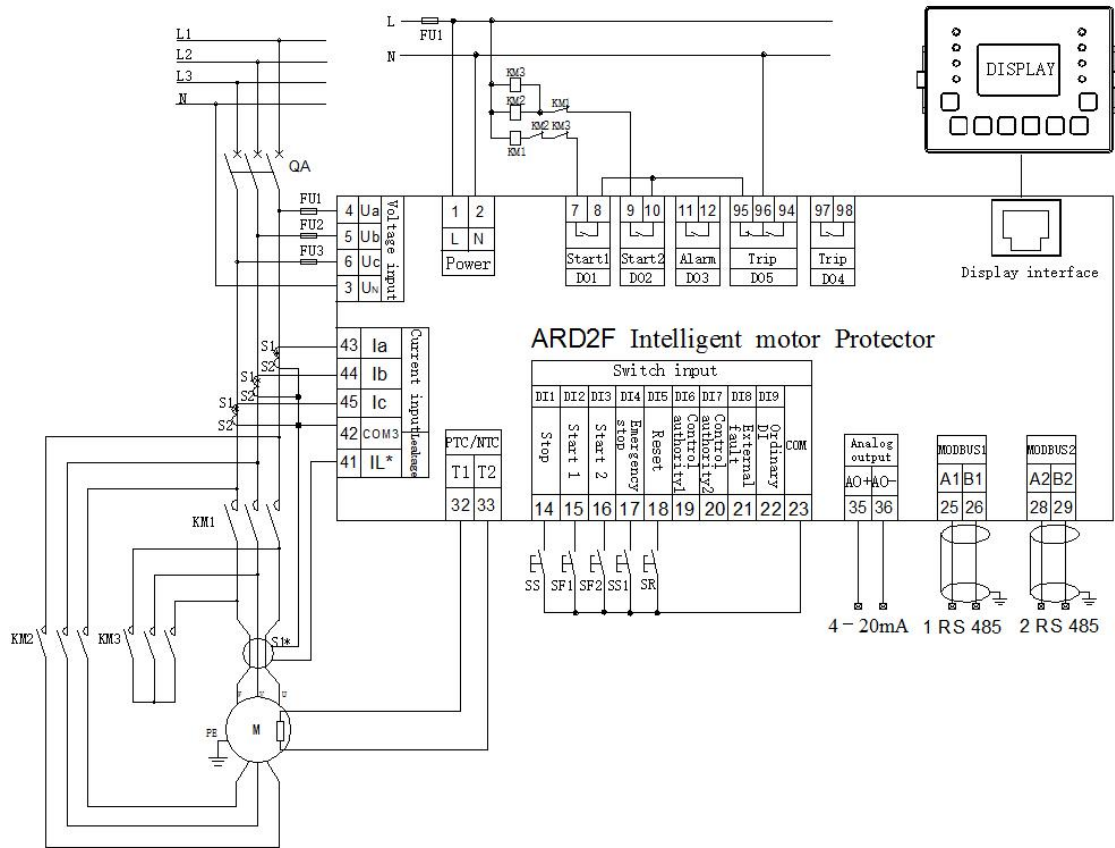
9.4 ARD2F Electrical Protector Y- Δ Starting (Three Relay Mode) Wiring Diagram



Y- Δ start (three relay mode): motor start, stop is controlled by protector, Press the "Start 1" button on the panel, Panel control), DO1 relay (default start 1 function), DO3 relay (default start 3 function) closed, close the KM1.KM3's main contacts, Motor Y starting, After the switch time DO1 relay is disconnected, DO2 relay closed (default start 2 function), Close the KM2.KM3's main contacts, Motor into Δ operation. Press the stop button on the panel, DO2 relay (default start 2 function), DO3 relay (default start 3 function) disconnected, KM1.KM2.KM3 coil is out of power, The motor stopped working.

Click switch input DI2(default start 1 function, Starting control is set to two-step mode, enabling local control), DO1 relay (default start 1 function), DO3 relay (default start 3 function) closed, close the KM1.KM3's main contacts, Y motor starts, After the switch time DO1 the relay is disconnected, DO2 relay closed (default start 2 function), Close the KM2.KM3's main contacts, Motor into Δ operation. Press the stop button, DO2 relay (default start 2 function), DO3 relay (default start 3 function) disconnected, KM1.KM2.KM3 coil is out of power, The motor stopped working.

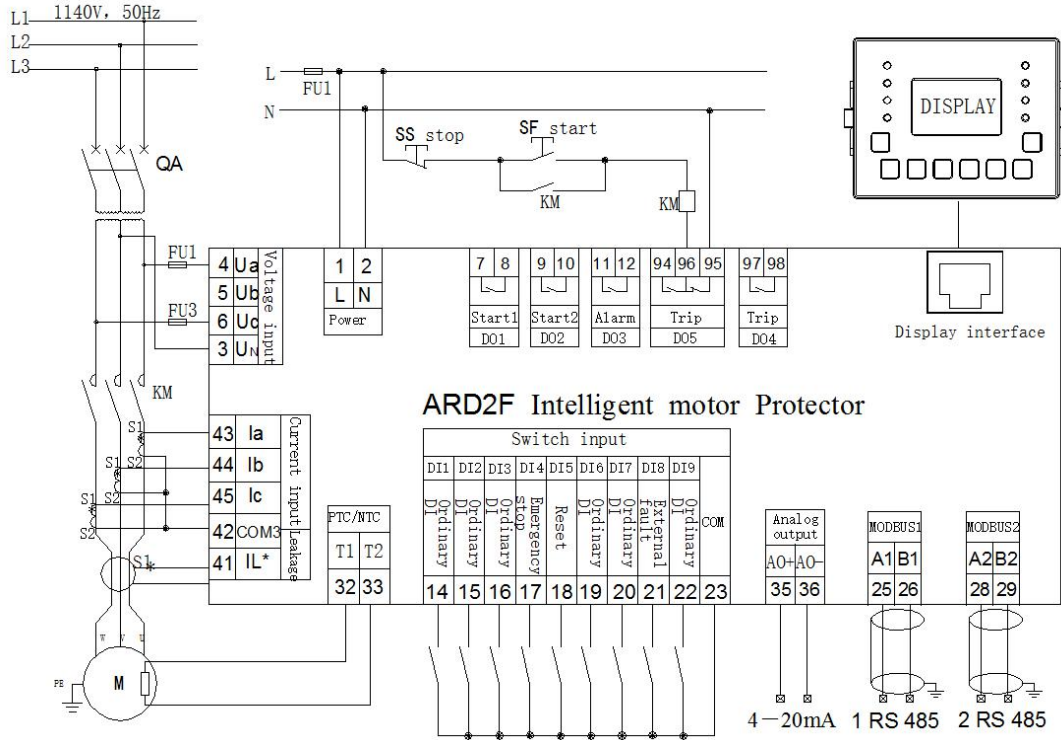
9.5 ARD2F Electrical Motor Protector Double Speed Mode Connection



Double speed starting: motor starting and stopping are controlled by protector, Press the "Start 1" button on the panel, Panel control), DO1 relay (default start 1 function) closed, Close the KM1's main contacts, Motor starting at low speed; Press the start 2 button, DO1 relay (default start 1 function) disconnected, DO2 relay (default start 2 function) closed, Close the KM2.KM3's main contacts, Motor starting at high speed. Press the stop button on the panel, DO2 relay (default start 2 function) disconnected, KM2.KM3 coil is out of power, The motor stopped working.

Click switch input DI2(default start 1 function, Starting control is set to double speed mode, Local control), DO1 relay (default start 1 function) closed, Close the KM1's main contacts, Motor starting at low speed; Click switch input DI3(default start 2 function), DO1 relay (default start 1 function) disconnected, DO2 relay closed (default start 2 function), close the KM2.KM3's main contacts, Motor starting at high speed. Click switch input DI1(default stop function), DO2 relay (default start 2 function) disconnected, KM2.KM3 coil is out of power, The motor stopped working.

9.6 ARD2F Electrical Motor Protector 2PT(3P3L) Connection



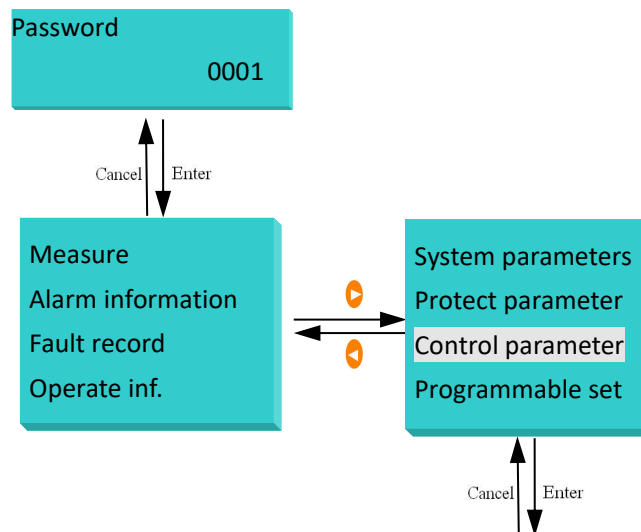
3P3L/2PT: if ARD2F protector is used in AC660V system , customers need to use 3P3L connection or 2PT connection . If ARD2F protector is used in AC1140V system , customers need to use 2PT connection. When using 2PT connection, customers need to provide PT ratio when placing an order.

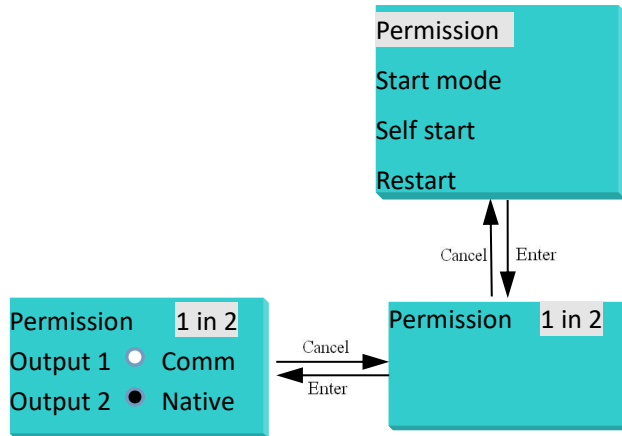
10 Features and Functions

10.1 Permissions programmable

Protector has perfect control authority programmable function, with permission for "1 in 2" or "1 in 3" use.

When the control permission is "1 in 2" , the user can define the control permission output 1 and output 2: either of the panel, communication, remote and native (both definitions are not repeatable). The specific steps are as follows:





For example, control permissions are defined as "1 in 2", control permission output type output 1 is defined as "communication control", output 2 is defined as "panel control". The DI6 is defined as (control permission 1). When DI6(control permission 1) is disconnected, the control mode corresponding to the control permission output 1 takes effect, and the control mode corresponding to the output 2 takes effect when the DI6(control permission 1) is connected. The control permissions are selected as shown in Table 18 below:

Table 18

Control Permission Type	DI6 Control Permission Input 1 State
Communication control	0
Panel control	1

When the control permissions are set to "1 in 3", The user can define control rights output 1, output 2, output 3, and output 4 as either of the panel, communication, remote, and native, stop (each output definition is not repeatable), The effective output is selected by DI6(control permission 1), DI7(control permission 2) on-off. If control permission output 1 is defined as communication control, Output 2 is defined as panel control, Output 3 is defined as native control, Output 4 is defined as remote control, The control permissions are selected as shown in Table 19 below:

Table 19

Control permissions	DI Input state	
	DI7 Control permission 1	DI8 Control permission 2
Communication control	0	0
Panel control	0	1
Native control	1	0
Remote control	1	1

Note : "0" means switch input disconnected , "1" means turn on

10.2 Logic programmable

The protector has perfect logic programmable function, and the user can program and define according to the required logic output function. Each logic function consists of five programmable input conditions A.B.C.D.E, freely combined by "with", " or " relations. The programmable content of each input condition and the combination of input conditions can be seen in Table 11 menu.

Suppose the user needs to output passive signal when any fault occurs in blocking, short circuit, time limit overload, phase break, I unbalance, can set DO3(or other DO) to logic diagram output 1, set the condition of logic output 1 to $A*B*C*D*E$, and set the condition input A.B.C.D.E to block,

short circuit, time limit overload, phase break, I unbalance fault, then block, short circuit, time limit overload, phase break, I unbalance fault any fault occurs, DO3—— logic diagram output 1 action, output passive signal.

Note : "+" representation and logic , " * " representation or logic.

10.3 Custom communication address

The protector has the function of customizing communication address, which makes communication reading more convenient and effective.

There are 120 communication addresses for user customization. Address 5000-5119 and 5300-5419, the corresponding data values can be customized. If the value of 5300 is written as 2010, the address 5000 is the same as the address 2010 data.

Example: Suppose the user needs to read and write the original address 2003, 2300,2307,2309,2335,2357,2758,2800 frequently. These addresses are not continuous addresses, each read an address data, need to send a MODBUS read command.

In this case, the efficiency can be improved by customizing the address function: the user can write the address 5300-5307 as 2003,2300,2307,2309,2335,2357,2758,2800 respectively, so that the definition of the address 5000-5007, read and write, value range and so on will correspond to the above address one by one. At this time, the user only needs to send a read command to achieve all data read and write.

11 Examples of ordering

Example: specific model: ARD2F-100/QJMCSU-90L

Technical requirements: motor power 37 KW, 4-20 mA analog output ,alarm output, voltage loss restart

Communication protocol : RS485 protocol, MODBUS RTU protocol

Auxiliary power: AC 220V

Display mode :90L

Note: main body and transformer connection length 1 m; main body and panel connection length 1.5 m.

Headquarters: Acrel Co., LTD.

Trade Company: Acrel E-Business(Shanghai)Co.,Ltd

Address: No.253 Yulv Road, Jiading District, Shanghai , China

TEL.: +86-21-69156352

Web-site: www.acrel-electric.com

E-mail: sales@acrel-electric.com

Postcode: 201801

Manufacturer: Jiangsu Acrel Electrical Manufacturing Co., LTD.

Address: No.5 Dongmeng Road,Dongmeng industrial Park, Nanzha Street,Jiangyin

City,Jiangsu Province,China

TEL./Fax: 0086-510-86179970

Web-site: www.jsacrel.com

Postcode: 214405

E-mail: sales@email.acrel.cn