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Acrel

Smart Motor Protector ARD3

User's   Manual

V1.6

Acrel Electric Co., Ltd.

Declaration

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Contents

Warning. User must set protective functions and parameters in accordance with conditions of your motor before using the protector.

1.Overview

ARD3 series intelligent motor protectors (hereinafter referred to as the protector), adopt the latest single-chip microcomputer technology which has many features like strong anti-interference capability, stable and reliable performance, digital, intelligent and networked, etc. Protector can protect motors from many faults during the motor running such as starting timeout, overload, locked rotor/block, phase failure, unbalance, under load, grounding, earth leakage, over voltage, under voltage, phase sequence, overpower, under power, temperature, external faults, etc. and is equipped with SOE fault event log function which is convenient for maintenance stuff to find the causes of the problems, and display the running state clearly and intuitively through LCD in Chinese in four lines, status indicators and other ways. It is suitable for coal mine, petrochemical, metallurgy, electric power, shipbuilding, civil construction and other fields. The protector has RS485 remote communication interface and DC4-20mA analog output, which is convenient to form a network system together with control machines like PLC and PC to realize the remote control of motor running.
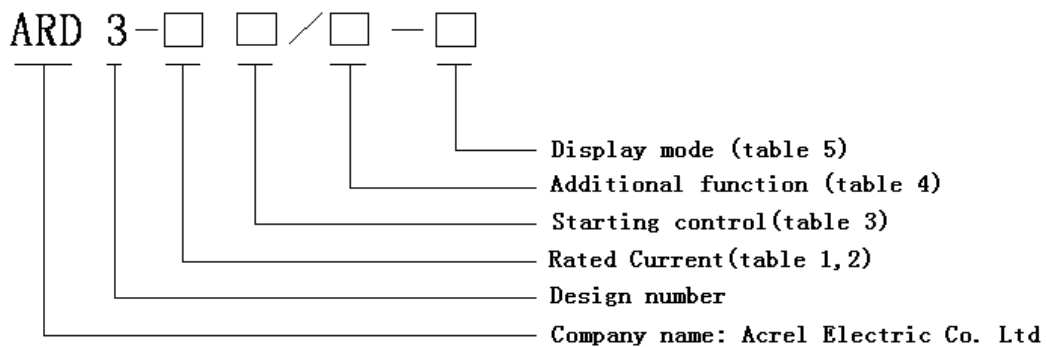
2.Product type

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ARD 3-□ □/□ —□
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- Display mode (table 5)
- Additional function (table 4)
- Starting control(table 3)
- Rated Current(table 1,2)
- Design number
- Company name: Acrel Electric Co. Ltd

Table 1 Rated current

Rated current for protector	CT tansformer ratio	Turns of Transformer(Primary)	Rated power of motor（kW）	Range of setting current (A)
1	Yes	5	0.12-250	0.1-999
5		1	0.12-250	0.1-999
1.6	No	1	0.12-0.55	0.4-1.6
6.3		1	0.75-2.2	1.6-6.3
25		1	3-11	6.3-25
100		1	15-45	25-100
250		1	55-132	63-250
800		1	160-250	250-800

Table 2 Rated current additional explain

Rated power of motor（kW）	Rated current of motor(A)	Rated current for matching protector	Range of setting current	Rated power of motor（kW）	Rated current of motor(A)	Rated current for matching protector	Range of setting current
0.12	0.42	1.6	0.40-1.6	30	57	100	25-100
0.37	1	1.6	0.40-1.6	37	69	100	25-100
0.55	1.5	1.6	0.40-1.6	45	81	100	25-100
0.75	2	6.3	1.6-6.3	55	100	100	25-100
1.1	2.5	6.3	1.6-6.3	75	135	250	63-250
2.2	5	6.3	1.6-6.3	90	165	250	63-250
3	6.5	25	6.3-25	110	200	250	63-250
5.5	11	25	6.3-25	132	240	250	63-250
7.5	14.8	25	6.3-25	160	285	800	250-800
11	21	25	6.3-25	200	352	800	250-800
15	28.5	100	25-100	220	388	800	250-800
18.5	35	100	25-100	250	437	800	250-800
22	42	100	25-100	/	/	/	/

Note: Data in table 1 are suitable to AC400V, 50Hz, 1500r/m four phase squirrel cage motor

Table 3 Starting control

Starting control	Code
Manual mode 1	A

Two-step Z mode 2	H
Two speed mode	F
Protect mode	J

Table 4 Additional function

Additional function		Code
Communication port	Modbus-RTU	C
	Profibus-DPV0	CP
Residual current protection (leakage)		L
Voltage function (power, power factor)		U
Temperature protection		T
4-20mA analog output		M
tE time protection		tE
electric energy		EP
Anti-interference electricity protection		SU（include U and SR function）
fault record		SR

Table 5 Display mode

Display mode	Code
The size of LCD liquid display module is 90*70, hole of 86*66 (unit: mm)	90L

Note:

1.The protecter provides more than one Additional function,and provides only one Rated current and one starting control,for example,a motor rated current is 45A, Manual mode control the starting,and the protecter need Communication function, Residual current protection,Temperature protection and Display mode,so the ARD3 protecter type is ARD3-100T/LTC-90L.

2.Residual current includes grounding current and leakage current,only one can be chosen.The grounding current is the superposition of three phase current vector sum,and leakage current can be detected by zero sequence tranformer.Leakage current signal rang should be marked when ordering for easy production setting.

3.4-20mA analog output factory default is 2 times the rated current value,that is to say 2 times the rated current value correspond to 20mA,0 to 4mA. The customer can choose corresponding analog electrical parameters, such as phase A current, phase B current, phase C current, line AB voltage, line BC voltage, line AC voltage, active power and so on.DC 4mA is corresponding to the minimum of seleted variable,DC 20mA is corresponding to the maximum of seleted variable. Mark the specific requirements before ordering, otherwise set in default.

4.Overload protection is tE time protection or inverse-time overload protection,inverse-time overload protection in default,mark in the order if tE time protection is needed, otherwise set in default.

5.Motor protector can be used with current tranformer and residual current tranformer which consistent with the same product number.

6. Modbus-RTU(C) and Profibus-DPV0(CP)only one can be chosen.

3 General technical index

Technology specifications are as shown in table 6.

Table 6 Technology specifications

Technical parameters	Technical index
Auxiliary power supply of the protector	AC 85V~220V ,DC I00V~350V, power dissipation 15VA
Motor rated operating voltage	AC 220V/380V/AC660V, 50Hz/60Hz

Motor rated operating current	lA(0.IA-9999A)	Small special current transformers are used.
	5A(0.IA-9999A)	
	1.6A(0A-1.6A)	
	6.3A(1.6A-6.3A)	
	25A (6.3A-25A)	
	I00A (25A-100A)	
	250A (63A-250A)	Special current transformers are used.
	800A (250A-800A)	
Relay output contactor Capacity negative	5 DO,resistive load	AC250V,6A
On-off input	9 DI, opto-coupler insolation	
Telecommunication	RS485 Modbus RTU,Profibus DP protocol	
Environment	Working Temperature	-10℃~55℃
	Storage temperature:	-20℃~70℃
	Relative humidity	5%~95% no condensation
	Altitude	≤2000m
Classes of pollution	Level 2	
Degree of protection	Main part IP20, display unit IP45	
Installation category	Class III	

4 Outline dimensions and installation (unit: mm)

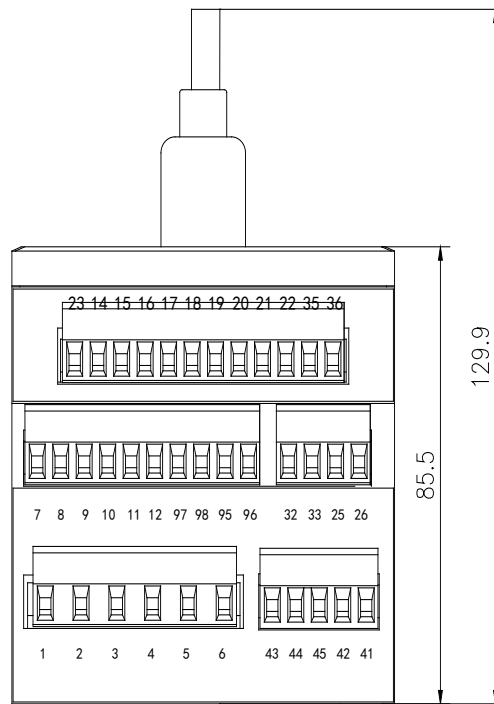4.1 Appearance of main part control module, as shown in figure 1
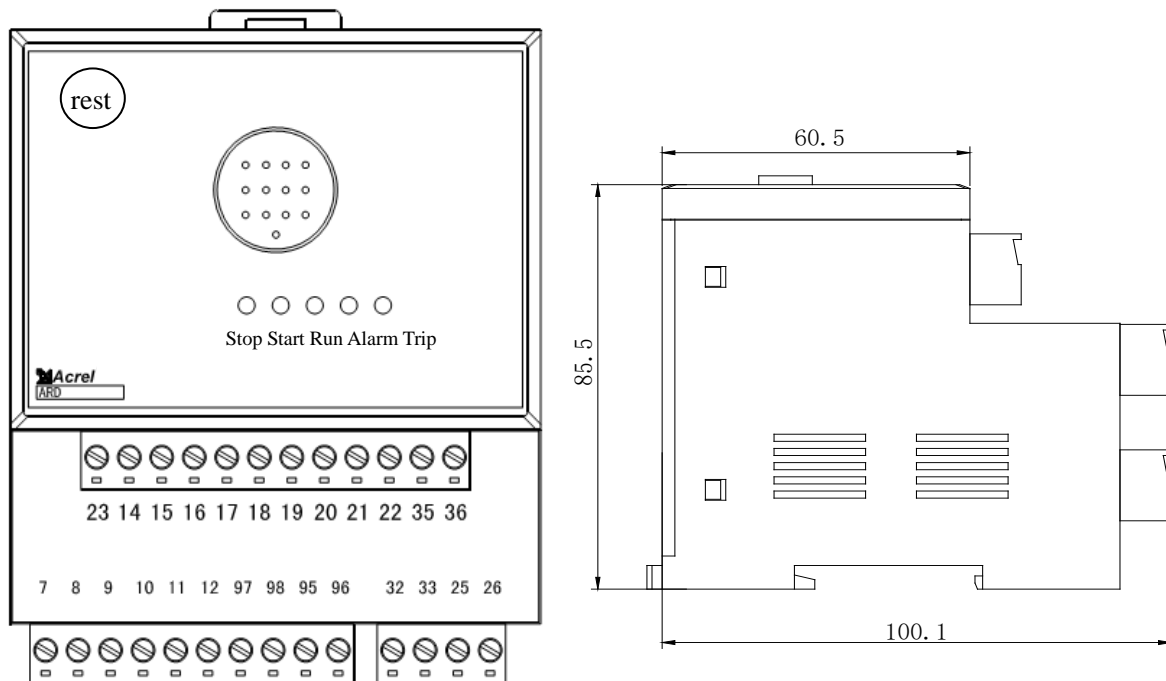
Figure 1 ARD3 Main part control module dimension
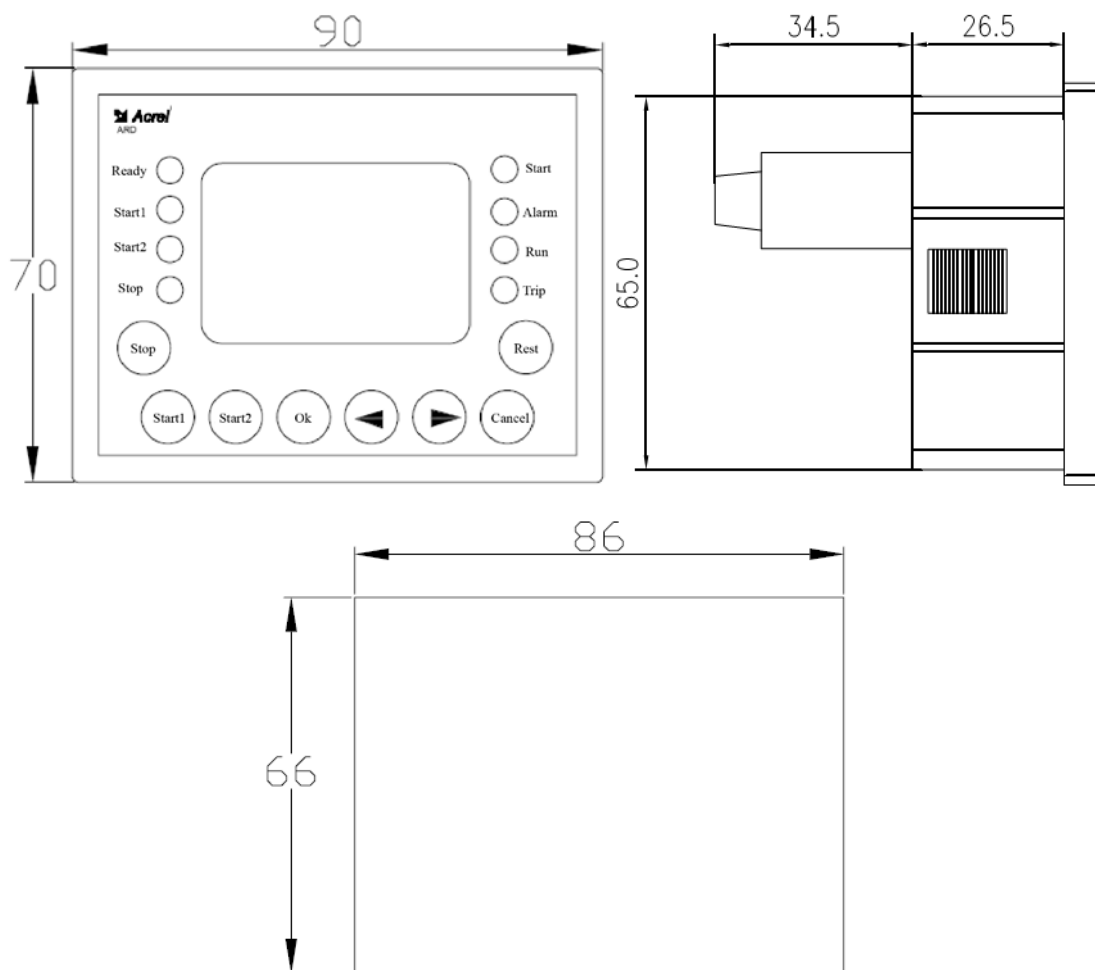
4.2 Mounting dimension of protector display unit

Figure 2 Mounting dimension of protector display unit

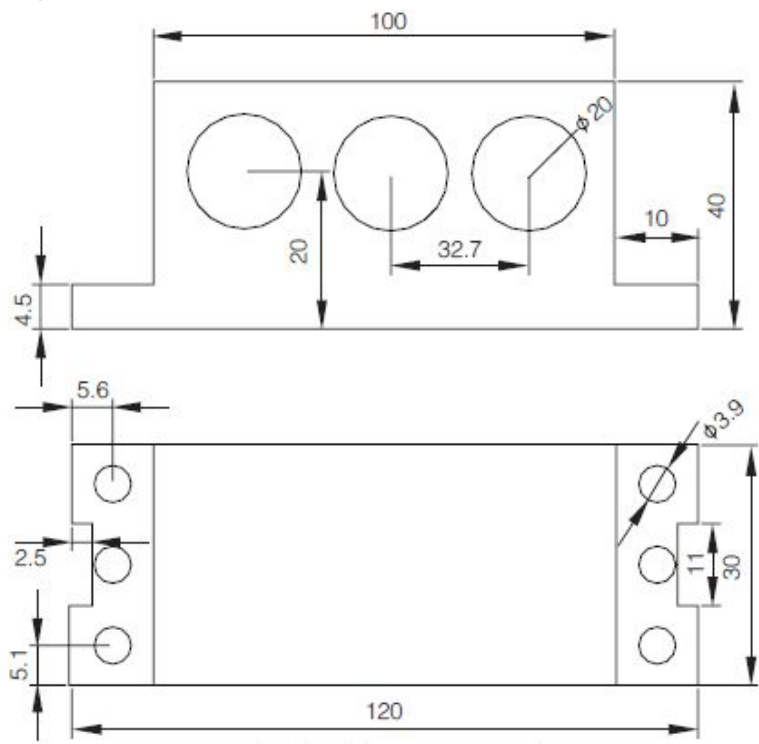## 4.3 Transformer mounting dimension of less than 100A

Figure 3 Transformer mounting dimension of less than 100A

4.4 Outline dimensions of 250A outlay current transformer
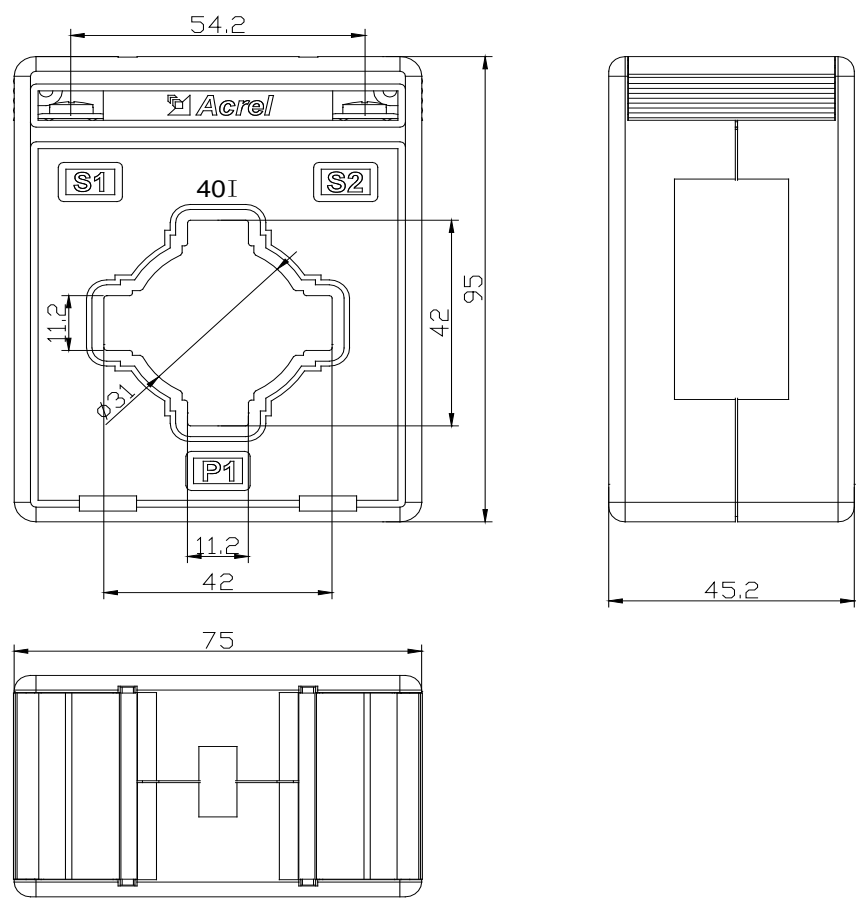
Figure 4 Outline dimensions of outlay current transformer

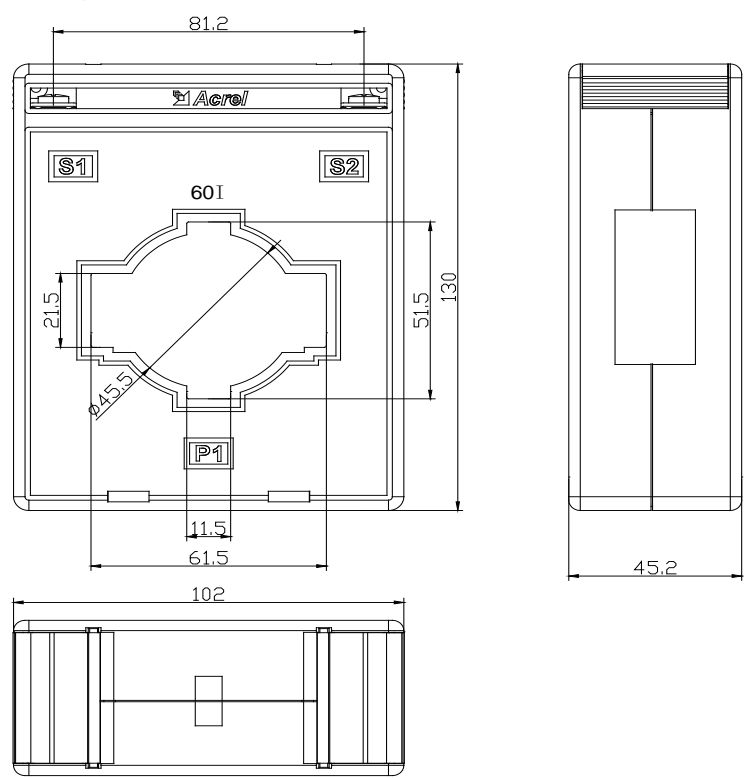## 4.5 Outline dimensions of 800A outlay current transformer

Figure 5 outline dimensions of outlay current transformer

4.6 Outline dimensions of residual current transformer
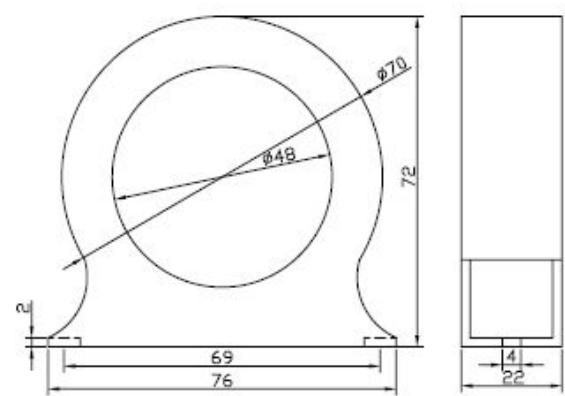
Figure 6 residual current transformer mounting dimension of less than 100A
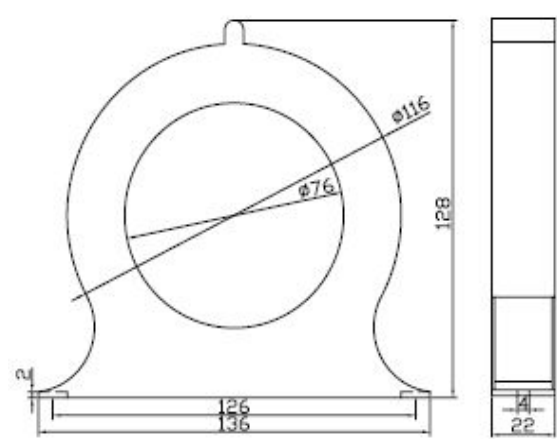
Figure 7 residual current transformer mounting dimension of 250A or 800A

4.7 Outline dimensions of Anti sway electric module

81.5

90

Anti sway electric module

Incoming line Outgoing line
AC220V   AC220V
1 2   3 4   5(-) 6(+)
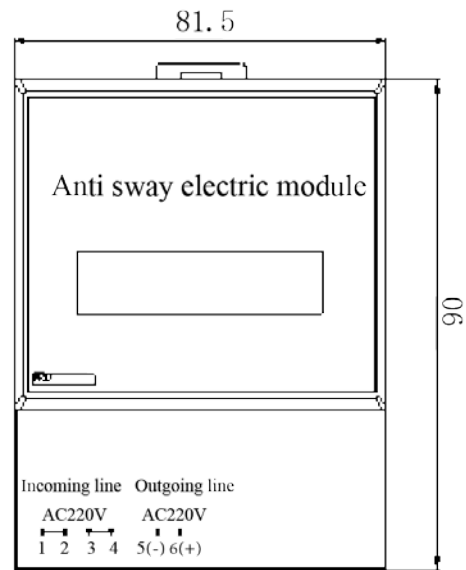
Figure 8 Outline dimensions of Anti sway electric module

5 Display and parameter setting

5.1 Operation Panel Instruction

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

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1 — Ready
2 — Start1
3 — Start2
4 — Stop

5 — Start
6 — Alarm
7 — Run
8 — Trip

9 — Stop
16 — Reset

10 — Start1
11 — Start2
12 — Ok
13 — ◀
14 — ▶
15 — Cancel

Figure 9   panel board of display module

Table 7 operation instruction

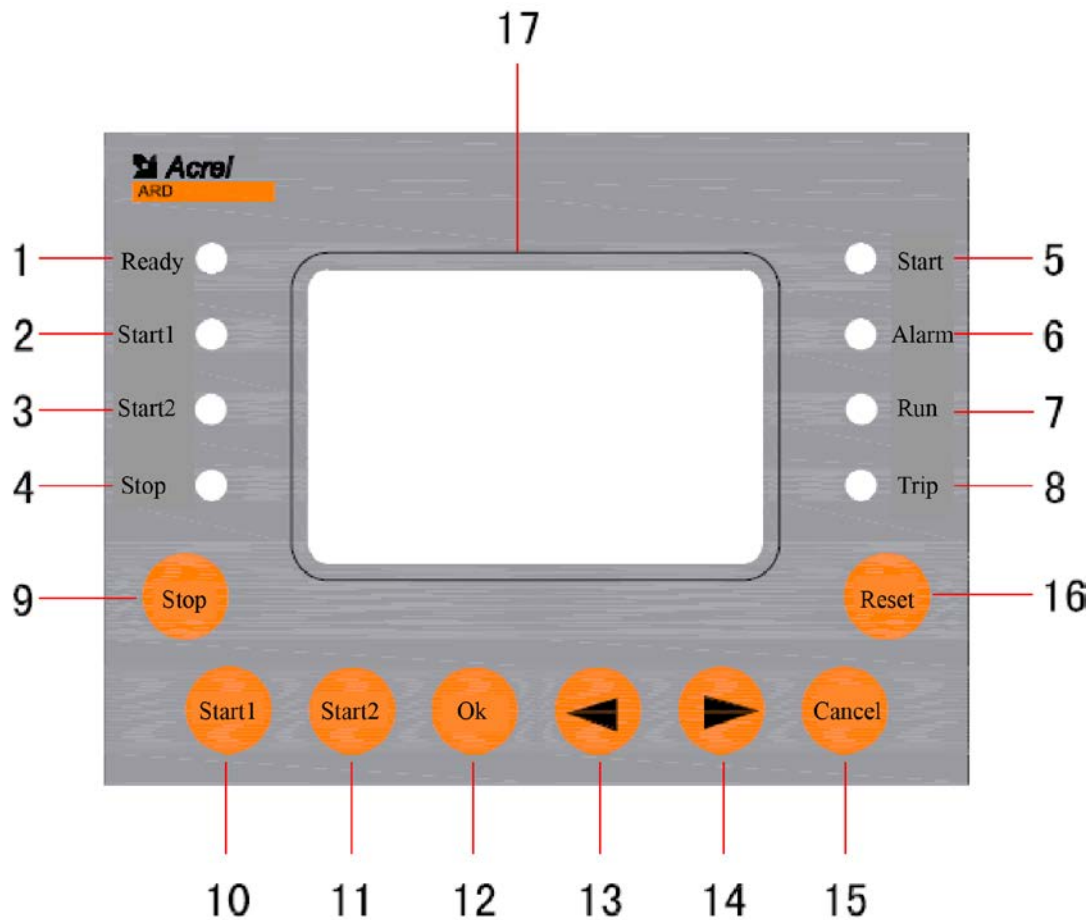| No.	Name	Status	Function Description
1	Ready LED indicating lamp	On	This indicator is on, meaning the protector is in normal state and the motor can be started.
2	Start 1 LED indicating lamp	On	This indicating lamp is on, meaning the protector starting 1 relay closed
3	Start 2 LED indicating lamp	On	This indicating lamp is on, meaning the protector starting 2 relay closed
4	Stop LED indicating lamp	On	This indicating lamp is on, meaning the motor is in stopping status.
5	Start LED indicating lamp	On	This indicating lamp is on, meaning the motor is in starting status.
6	Run LED indicating Lamp	On	This indicating lamp is on, meaning the motor is in running status.
7	Alarm LED indicating lamp	On	This indicating lamp is on, meaning the protector alarm relay has taken action.
8	Trip LED indicating lamp	On	This indicating lamp is on, meaning the protector Trip relay has taken action.
9	Stop button	Hold down	Trip starting 1, starting 2 relays
10	Start 1 button	Hold down	Operate starting 1 relay to make it closed
11	Start 2 button	Hold down	Operate starting 2 relay to make it closed
12	Confirm button	Hold down	Enter the menu and modify the parameters
13	◀ arrow key	Hold down	Turn on the menu; data transfer; view event log
14	▶ arrow key	Hold down	Turn down menu; modify data;
15	cancel button	Hold down	Exit the menu; cancel operation; lighten backlight
16	rst button	Hold down	Reset the protector
17	LCD display screen		Display various measured parameters and setting parameters

5.2 Parameter setting

5.2.1 Display menu contents

1. A, B, C three-phase current and imbalance percentage

2. Three-phase current and the percentage of three-phase average current to the set rated current

3. Uab, Ubc, Uca line voltage

4. Active power P, apparent power S, power factor PF;

5. lav three-phase average current, Uav three-phase average voltage, ld earth leakage current,frequency F;

6. Heat capacity percentage;

7.Thermal resistance value;

8.Route 5 relay input: 1-Starting 1, 2-Starting, 2, 3-Alarm (programmable) ,4-Trip (Programmable), 5-Trip

9. Route 9 DI status.

Users can press the " ▶ " button on the display unit to display the selection of menu interface.

If users want to enter parameter setup menu, they can press the "Confirm" button when displaying the menu interface and then password input interface comes out, and users can enter the parameter setup menu after inputting the password (initial password is 0001, universal password is 0008), and users can press " ◀ "and " ▶ " button to input the correct password and then press "Confirm" button to enter parameter setup menu; and at this moment users can press " ◀ "and " ▶ " buttons to select the needed items and then press "Confirm" button to enter the setting

interface and again press "◀"and "▶" buttons to select the needed sub-items , press "Confirm" key to enter the value setting interface, and then press "◀"and "▶" to set the value, after finishing setting, press "Confirm" key for save, after that, press "Cancel" button to exit or press "Cancel" button to exit without saving.

6 Wiring Mode

6.1Auxiliary power
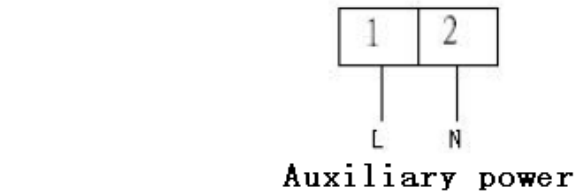
6.2 Voltage, current, zero sequence current signal input
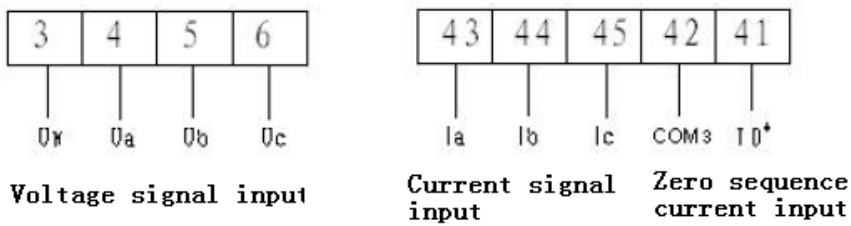
6.3 Relay output
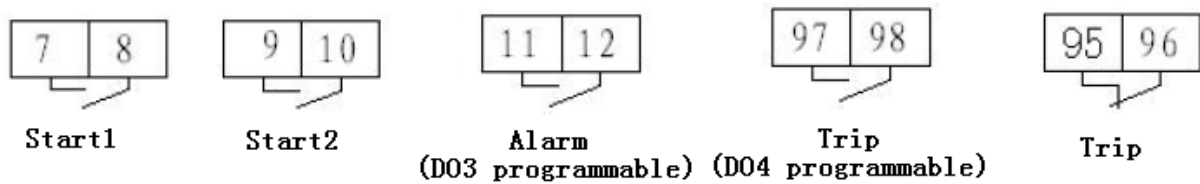
6.4 RS485 communication, DC4-20mA analog output, thermal resistance input

6.5 On-off input

14	15	16	17	18	19	20	21	22	23
Control authority 1	Control authority 2	Starting1	External fault protection input	Emergency Stop	Starting2	Stop	Reset	Programmable input	Public field
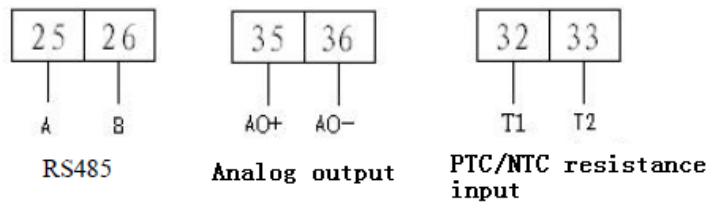
On-off input
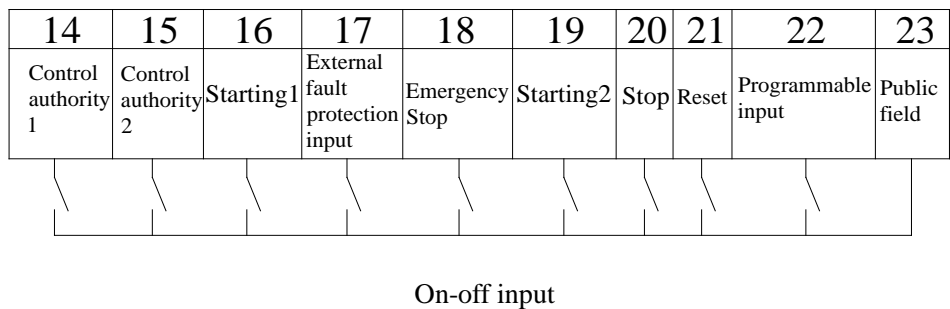
7 Communication protocol

7.1 Address parameter

table 8 Address parameter

Addr.	Addr.	Parameters	R/W property	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
			R.	0-65535	Word
		L2 phase fundamental wave current	R.	0-65535	Word
3	0x02	L3 phase actual current	R.	0-65535	Word
		L3 phase fundamental wave current	R.	0-65535	Word
4	0x03	Earth leakage current	R.	30-100mA	Word
		Grounding current percentage	R.	1-100%	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/W		High byte
13	0x0C		R/W		Low byte
14	0x0D	Power factor	R.	0-1 unit 0.001	Word
15	0x0E	Imbalance degree of current	R.	0-100%	Word
16	0x0F	Accumulated thermal capacity percentage	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	On-off output	R/W	Bit0-bit8 corresponding On-off input DI1-DI9, Bit11 relay1, Bit12 relay2, Bit13 relay3, Bit14 relay4, Bit15 relay5	Word
21	0x14	Trip fault indicator	R.	Bit0 overload Trip	Word
22	0x15	Hold	R/W		Word
23	0x16	Alarm fault indicator	R.	Bit0 overload alarm	Word
24	0x17	Hold	R/W		Word
25	0x18	Current specifications:	R.	0-1.6,1-6.3,2-25,3-100,4-250,5-800, 6-1,7-5	Word
		Current scaling factor	R.	10,100	
26	0x19	A phase overload percentage	R.		Word
27	0xlA	B phase overload percentage	R.		Word
28	0xlB	C phase overload percentage	R.		Word

29	0x1C	Overload percentage	R.		Word
30	0xlD	Frequency	R.	45.0-70.0	Word
31	0xlE	Motor status;	R.	Motor thermal overload cooling remaining time	Word
				Bit0 ready; Bit1 stop; Bit2 start ,Bit3 running; Bit4 alarm; Bit5 Trip	
32-41	0xlF-0x28	Hold	R/W		Word
42	0x29	Operational control position	R/W	1 stop, 2 start1, 3 start 2	Word
43	0x2A	Hold	R/W		Word
44	0x2B	Factory Reset	R/W	0xFFFF	Word
45	0x2C	Total operation time	R/W	0-65535 hours	Word
46	0x2D	Total stopping time	R/W	0-65535 hours	Word
47	0x2E	Total number of starts	R/W	0-65535	Word
48	0x2F	Total Trip times	R/W	0-65535	Word
49	0x30	Year	R/W	2012-2099	Word
50	0x31	Month	R/W	1-12	Word
51	0x32	Day	R/W	1-31	
52	0x33	Hour	R/W	0-24	Word
53	0x34	Minute	R/W	0-59	Word
54	0x35	Second	R/W	0-59	Word
55-93	0x36-0x5C	Hold	R/W		Word
94	0x5D	high-speed switch	R/W	0 low speed,1 high speed	Word
95	0x5E	Transmission type set	R/W	0-Ia,l-Ib,2-Ic,3-Iav,4-Uab,5-Ubc,6-Uca,7-Uav,8-PTC,9-thermal capacity,10-P,11-F	Word
		Transmission ratio set	R/W	1-8	
96	0x5F	Residual current transformer input symbol	R/W	0 not input,1 input	Word
97	0x60	Fundamental wave switch	R/W	1 fundamental wave,0 valid value	Word
98	0x61	Motor Type	R/W	0 general motor,1 increased safety motor	Word
99	0x62	CT ratio	R/W	1-2000	Word
100	0x63	Rated frequency	R/W	45-70	Word
101	0x64	Rated current of motor	R/W	1.6-800.0	Word
102	0x65	Rated voltage of motor	R/W	190,380,690	Word
103	0x66	Rated power of motor	R/W	High level	Word
104	0x67		R/W	Low level	Word
105	0x68	Start time setting	R/W	0.1-999.9	Word
106	0x69	Connection Mode	R/W	0 single-phase mode	Word
107	0x6A	Trip level setting	R/W	1,2,3,5,10,15,20,25,30,35,40	Word
		tE Trip time setting	R/W	2,3,4,5,6,8,10,12,15	
108	0x6B	Overload automatic reset	R/W	1 open,0 closed	

		Overload cooling time		1-255min	Word
109	0x6C	Hold	R/W		Word
110	0x6D	Trip allowable bit open/closed	R/W	Bit0 overload Trip Bit1 grounding/earth leakage Trip	Word
111	0x6E	Hold	R/W		Word
112	0x6F	Hold	R/W		Word
113	0x70	Alarm allowable bit open/closed	R/W	Bit 0 overload alarm Bit1 grounding/earth leakage alarm	Word
114	0x71	Hold	R/W		Word
115	0x72	Hold	R/W		Word
116	0x73	Overload alarm threshold setting	R/W	1-99%	Word
117	0x74	Phase failure Trip delay setting	R/W	0.1-600	Word
118	0x75	Grounding/earth leakage alarm current setting	R/W	100-1000mA	Word
119	0x76	Grounding/earth leakage Trip current setting	R/W	100-1000mA	Word
120	0x77	Grounding/earth leakage Trip delay setting	R/W	0.1-600	Word
121	0x78	Locked-rotor alarm threshold setting	R/W	100-700%	Word
122	0x79	Locked-rotor Trip threshold setting	R/W	100-700%	Word
123	0x7A	Locked-rotor Trip delay setting	R/W	0.1-600	Word
124	0x7B	Blocking alarm threshold setting	R/W	100-700%	Word
125	0x7C	Blocking Trip threshold setting	R/W	100-700%	Word
126	0x7D	Blocking Trip delay setting	R/W	0.1-600	Word
127	0x7E	Under load alarm threshold setting	R/W	10-99%	Word
128	0x7F	Under load Trip threshold setting	R/W	10-99%	Word
129	0x80	Under load Trip delay setting	R/W	0.1-600	Word
130	0x81	Imbalance alarm threshold setting	R/W	10-80%	Word
131	0x82	Imbalance Trip threshold setting	R/W	10-80%	Word
132	0x83	Imbalance Trip delay setting	R/W	0.1-600	Word
133	0x84	NEC/PTC setting	R/W	0-NTC; 1-PTC	Word
134	0x85	Temperature alarm value setting	R/W	100-30000	Word

135	0x86	Temperature Trip value setting	R/W	100-30000	Word
136	0x87	Temperature Trip delay setting	R/W	0.1-600	Word
137	0x88	Temperature returning resistance value setting	R/W	0 closed ,1000-30000	Word
138	0x89	Under voltage alarm threshold setting	R/W	50-90%	Word
139	0x8A	Under voltage Trip threshold setting	R/W	50-90%	Word
140	0x8B	Under voltage Trip delay setting	R/W	0.1-600	Word
141	0x8C	Over voltage alarm threshold setting	R/W	110-150%	Word
142	0x8D	Over voltage Trip threshold setting	R/W	110-150%	Word
143	0x8E	Over voltage Trip delay setting	R/W	0.1-600	Word
144	0x8F	Over power alarm threshold setting	R/W	100-700%	Word
145	0x90	Over power Trip threshold setting	R/W	100-700%	Word
146	0x91	Over power Trip delay	R/W	0.1-600	Word
147	0x92	Under power alarm threshold setting	R/W	0-100%	Word
148	0x93	Under power Trip threshold setting	R/W	0-100%	Word
149	0x94	Under power Trip delay	R/W	0.1-600	Word
150	0x95	Short circuit alarm threshold setting	R/W	400%-700% maximum measurable overload times	Word
151	0x96	Short circuit Trip threshold setting	R/W	400%-700% maximum measurable overload times	Word
152	0x97	Short circuit Trip delay	R/W	0.1-600	Word
153	0x98	Phase sequence fault delay setting	R/W	0.1-600	Word
154	0x99	External fault Trip delay setting	R/W	0.1-600	Word
155	0x9A	Grounding alarm percentage setting	R/W	20-100%	Word
156	0x9B	Grounding Trip percentage setting	R/W	20-100%	Word
157	0x9C	Grounding Trip delay setting	R/W	0.1-600	Word
158	0x9D	Reflux detection delay setting	R/W	0.1-600	Word
159	0x9E	Reflux detection control	R/W	0 closed	Word

160	0x9F	Remote resetting	R/W	Normal 0; remote reset 1	Word
161	0xA0	Contactor allowed breaking current	R/W	0,0FF,600-1000%	Word
162	0xAl	Self-start Mode	R/W	0 start; 1 recover	Word
163	0xA2	Self-starting delay setting	R/W	0.1-600	Word
164	0xA3	Self-start control	R/W	0 closed 1 open	Word
165	0xA4	Restarting voltage setting	R/W	75-95%	Word
166	0xA5	Immediate restarting allowed power failure time	R/W	0.1-0.5	Word
167	0xA6	Delay restarting allowed power failure time	R/W	0.5-10.0	Word
168	0xA7	Restarting delay setting	R/W	1.0-6008	Word
169	0xA8	Loss voltage restarting control	R/W	0 closed, 1=starting 1 after restarting, 2= starting 2 after starting	Word
170	0xA9	Parity bit	R/W	0 no parity check 1 odd parity check 2 even parity check	Word
171	0xAA	MODBUS baud rate setting	R/W	1200,2400,4800,9600,19200,38400	Word
172	0xAB	MODBUS address setting	R/W	1-247	Word
173-178	0xAC-0xB1	Hold	R/W		Word
179	0xB2	Starting control setting	R/W	0=protection mode, 1=manual mode ,2=two-step starting, 3=two-speed mode	Word
180	0xB3	Control authority setting	R/W	0 local, 1 on-site, 2 remote,	Word
181	0xB4	Starting delay setting	R/W	0.1-600	Word
182-190	0xB5-0xBD	Hold	R/W		Word
191	0xBE	Relay initial status setting	R/W	0 open 1 closed, bit0-4: relay 1-5	Word
192	0xBF	Relay 1 operation setting	R/W	0 electrical level 3-250 unit 0.1s	Word
193	0xC0	Relay 2 operation setting	R/W	0 electrical level 3-250 unit 0.1s	Word
194	0xC1	Relay 3 operation setting	R/W	0 electrical level 3-250 unit 0.1s	Word
195	0xC2	Relay 4 operation setting	R/W	0 electrical level 3-250 unit 0.1s	Word
196	0xC3	Relay 5 operation setting	R/W	0 electrical level 3-250 unit 0.1s	Word
197	0xC4		R/W	Alarm fault: corresponding to alarm allowable position	Word
198	0xC5		R/W	Trip fault: corresponding Trip allowable position	Word
199	0xC6	Definition of programmable output 1	R/W	Other functions: 2-starting2 ,3-alarm fault outputt, 4-Trip fault output, 5-device self-checking output, 6-device power output, 7-stopping status ready, 8-running status output, 9-controlling output, 10-bus control	Word

200	0xC7		R/W	Alarm fault: corresponding alarm allowable position	Word
201	0xC8		R/W	Trip fault: corresponding Trip allowable position	Word
202	0xC9	Definition of programmable output 2	R/W	Other functions: 1-start1,2-start2,3-alarm fault output, 4-Trip fault output, 5-device self-checking output, 6-device power output, 7-stopping status ready, 8-running status output, 9-DI controlling output, 10-bus control	Word
203	0xCA		R/W	Alarm fault: corresponding alarm allowable position	Word
204	0xCB		R/W	Trip fault: corresponding Trip allowable position	Word
205	0xCC	Definition of programmable output 3	R/W	Other functions: 1-starting 1,2-staring 2,3-alarm fault output, 4-Trip fault output, 5-device self-checking output, 6-device power output, 7-stopping status ready, 8-running status output, 9-DI controlling output, 10-bus control	Word
206	0xCD	D11 programmable definition	R/W	1 normal DI,2 starting 1 (direct starting, turn left, low speed), 3 Starting 2 (turn right, high speed), 4 stopping, 5 reset, 6 emergency stop, 7 external fault, 8 starting/stopping, 9 control authority 1, 10 control authority 11 DO control	Word
207	0xCE	D12 programmable definition	R/W	-Ditto-	Word
208	0xCF	D13 programmable definition	R/W	-Ditto-	Word
209	0xD0	D14 programmable definition	R/W	-Ditto-	Word
210	0xD1	D15 programmable definition	R/W	-Ditto-	Word
211	0xD2	D16 programmable definition	RIW	-Ditto-	Word
212	0xD3	D17 programmable definition	RIW	-Ditto-	Word
213	0xD4	D18 programmable definition	RIW	-Ditto-	Word
214	0xD5	D19 programmable definition	RIW	-Ditto-	Word
215-253	0xD6-0XFC	Hold	RIW		Word

254	0xFD	Software version number		RIW	1.0-9.9	Word
255	0xFE	Hold				Word
256	0xFF	Hold				Word
257	0x0l00	Event control parameter		R.	Event switch 0 closed 1 open	Word
258	0x0101	Incident record	STA1	R.	Protection 1 action pattern	High byte
			Month1	R.	Operation 1 time-month	Low byte
259	0x0l02		Dayl	R.	Operation 1 time-date	High byte
			Hour1	R.	Operation 1 time-hour	Low byte
260	0x0l03		Minute1	R.	Operation 1 time-minute	High byte
			Second1	R.	Operation 1 time-second	Low byte
261-317	0x0104-0x013C	Incident record 2-20				57Word

7.2 Profibus_DP

table 9 Input data bit 31 characters (ARD-DP Master station)

Addr.	Addr.	Parameters	R/W property	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	
		Grounding current percentage	R.	0-100%	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	Imbalance degree of current	R.	0-100%	
16	0x0F	Accumulated thermal capacity percentage	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	On-off output	R.	Bit0-Bit8 corresponding on-off 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 indicator	R.	Bi0 overload Trip Bitl grounding/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	Hold	R/W		Word
23	0x16	Alarm fault indicator	R.	Bit0 overload alarm Bit1 grounding/earth leakage alarm Bit2 under load alarm Bit3 phase failure alarm Bit4 under voltage alarm Bit5 over voltage alarm Bit6 locked-rotor alarm Bit7 block alarm Bit8 imbalance alarm Bit9 PTC temperature alarm Bit10 external fault alarm Bit11 starting overtime alarm Bit12 over power alarm Bit13 under power alarm Bit14 phase sequence alarm Bit15 short circuit alarm	Word
24	0x17	Hold	R/W		Word
25	0x18	Current pecifications:	R.	0-1.6,1-6.3,2-25,3-100,4-250,5-800, 6-1,7-5	Word
		Current scaling factor	R.	10,100	
26	0x19	A phase overload percentage	R.		Word
27	0x1A	B phase overload percentage	R.		Word
28	0xlB	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 DP master station-ARD).

This can be displayed specifically as follows:

Output	Parameters	Value range	Remarks
[00][01]	Control Word	Bit0: stopping Bit1: starting 1 Bit2: starting 2 Bit3:remote resetting Bit4: relay 3	0: closed 1: breakover
		Bit15: output data enable bit	When this bit is 1, all operations of Bit0-Bit4 are valid, When it is 0, operations are invalid.

Profibus output data (control data), for example, if motor is remotely started, starting mode is selected as "Starting 1", and output data: Ox8002 (hexadecimal number).

8 Typical application solutions

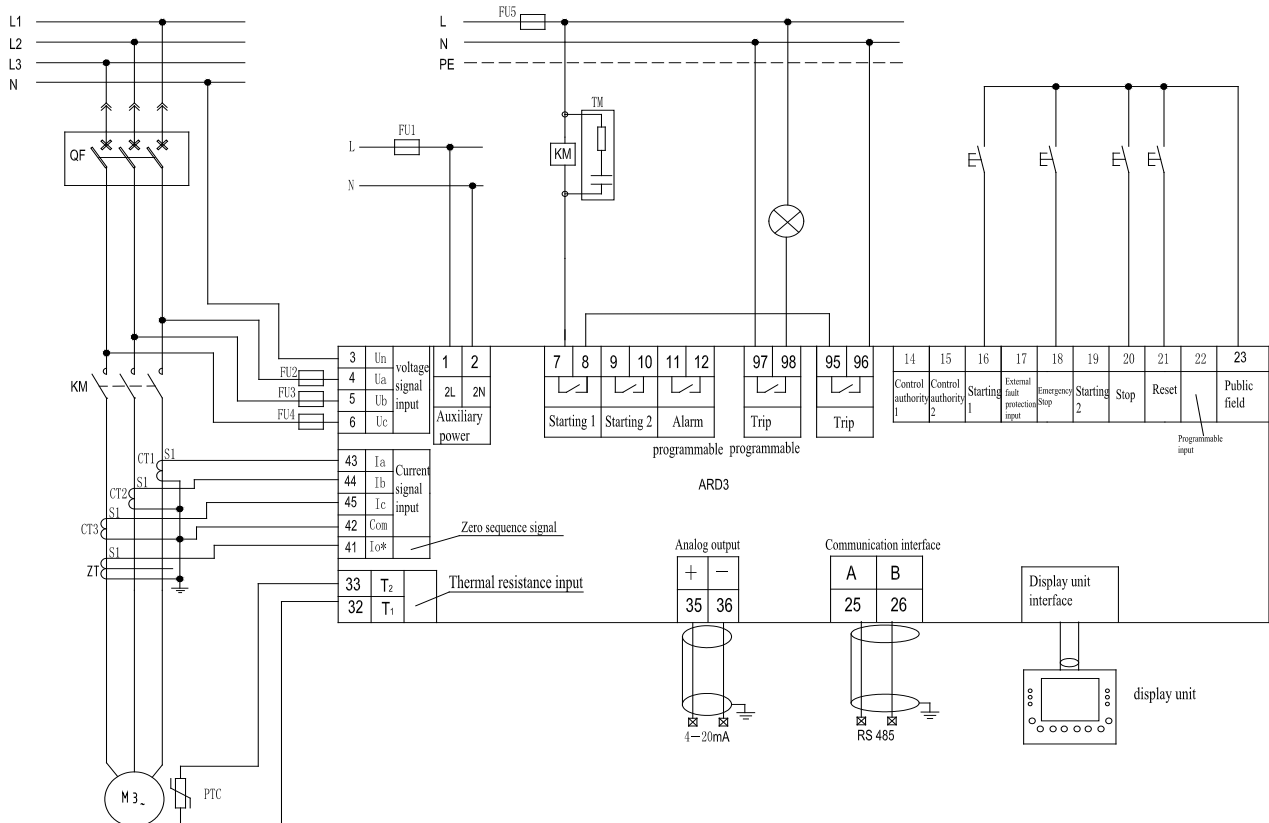ARD3 motor protector protected mode wiring diagram
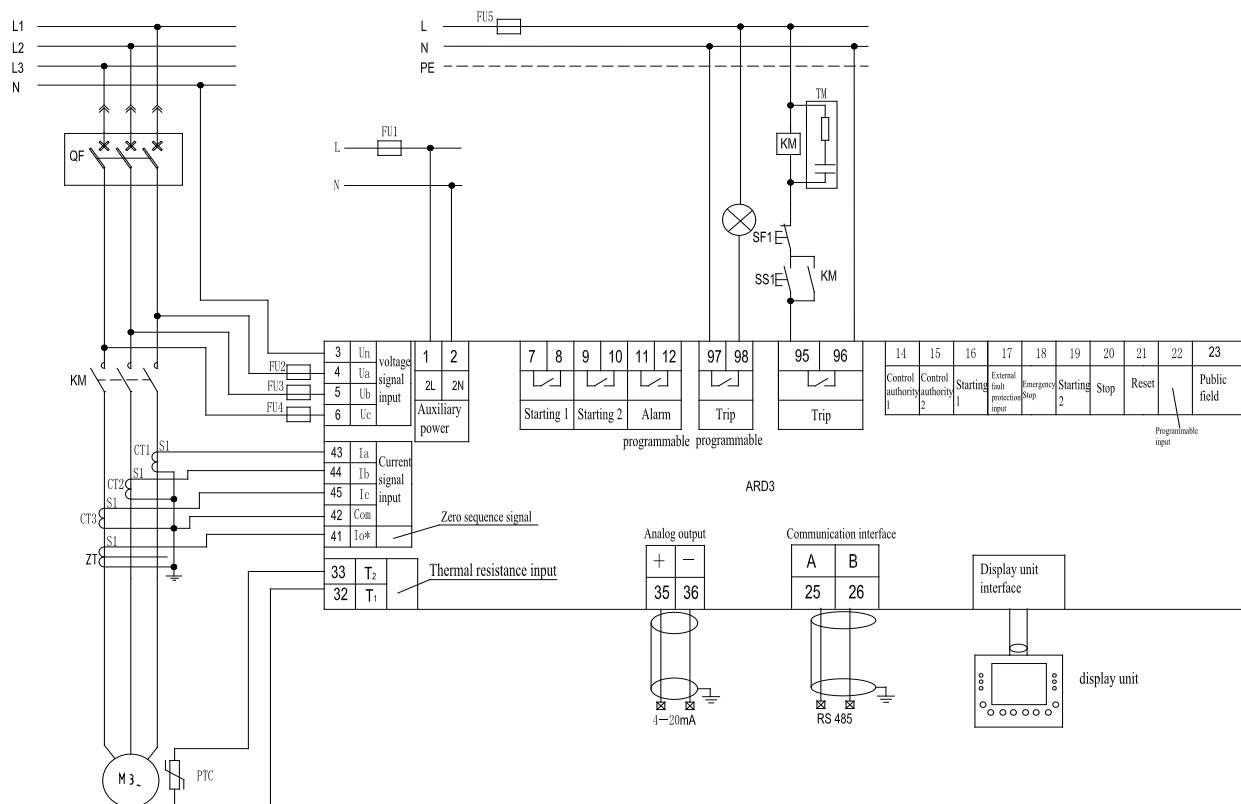
Protected mode: the starting or stopping of motor is controlled by external button, the magnetizing coil of contactor KM connects with the normally closed contact of the Trip relay using series connection. Close QA, press starting button SF, the magnetizing coil of KM is energized and close the main contactor, then the motor starts; when press

stopping button SS, the magnetizing coil of KM is loss of power and Trips the main contact, the motor stops.

Notes:

1. Trip (DO4 programmable) relay can be used for output to realize the quick-break function of moulded case circuit breaker.

2. Programmable relay can be defined as starting 1, starting 2, alarm fault output, Trip fault output, device self-checking output, device power output, stopping status ready, running status output, DI controlling output, bus control.

ARD3 motor protector direct starting mode wiring diagram

Direct starting :the starting or stopping of motor is controlled by protector, the magnetizing coil of contactor KM connects with the normally closed contact of the Trip relay and normally open contact of starting 1 relay using series connection, close QA, press "Starting I"button on the display unit (staring control is set to manual mode, enable On-site control) to close the main contactor of KM, then the motor starts; when pressing "stopping" button, the magnetizing coil of KM is loss of power and Trips the main contactor, the motor stops.

Control authority selection (except protection mode): 90FL display unit button On-site control, DI terminal on-site control, PC communication remote control. DI6 and DI7 are combined to achieve three-position authority selection. In the table below, "0"means the contol authority is not connected,

"1" means connected.

Table 10 DI control authority definition

On-off input	DI input status	
	DI1 control authority 1	DI2 control authority 2
On-site control	1	0
Remote control	0	0
On-sit control	0	1

ARD3 motor protector Y-△ starting mode wiring diagram
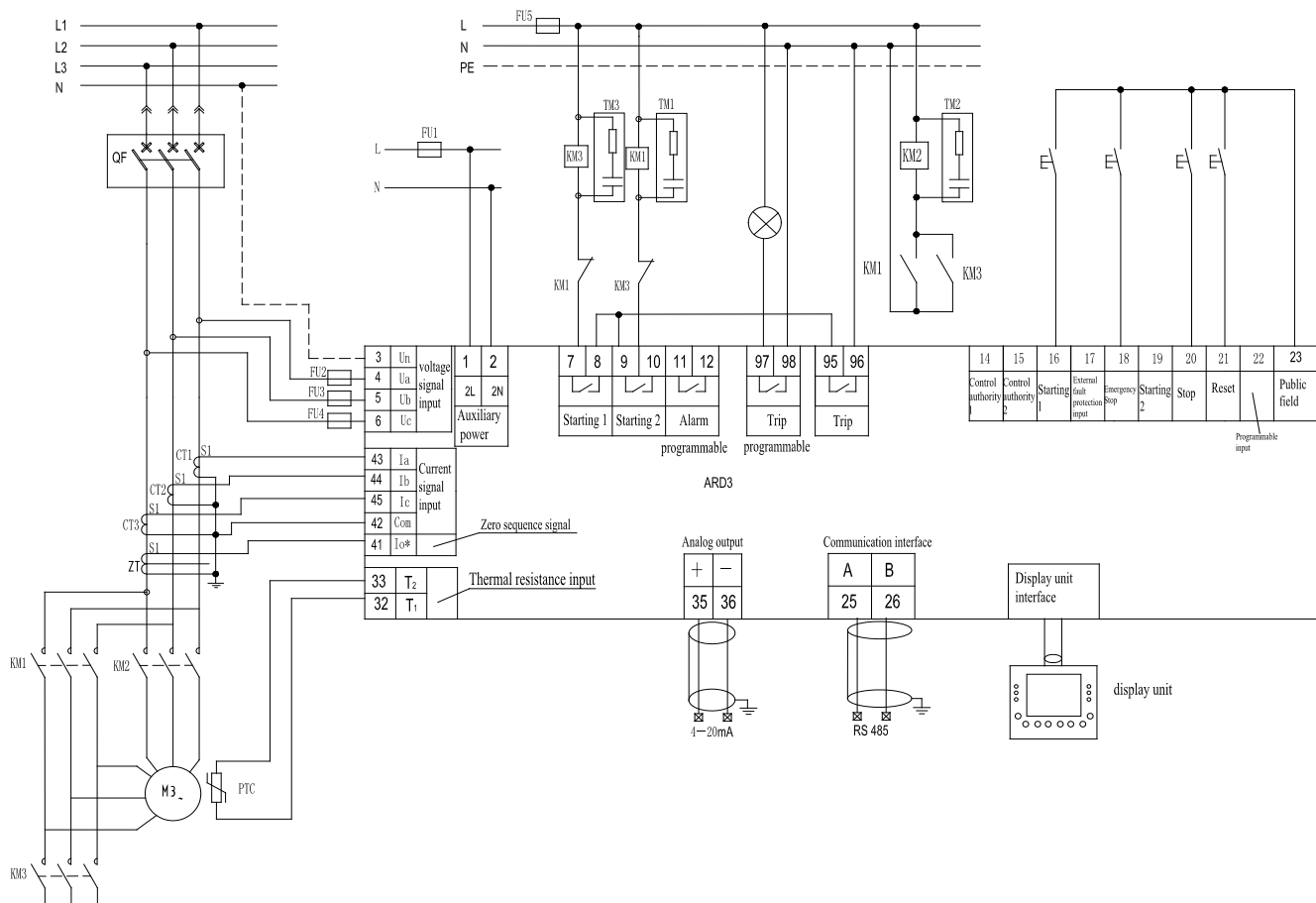
Y-△starting: motor starting and stopping are controlled by the protector. "According to the method illustrated, after the control circuit is connected, and then close QA, press the "start I" " button on display unit, (starting control is set to start in two steps to enable On-site control), enable the starter relay l to close, KML KM3 attract coil to energize, and main contactor of KML KM3 to close. The motor is started by Y way, when reaches conversion time, the protector will automatically disconnect starter relay 1, while close the starter relay 2. KM2, KM3 attract coil is energized, and close main contactor of KM2, KM3; the protector turns into A running, press the "" stop "" button, and the motor will stop working."

9 settings and instructions of protection function

Parameter setting :

table 11 Parameter setting

No.	Main menu	Function	Sort	Setting ranges	Default value	Unit
1	Alarm infromation					
2	Trip Information					
3	Operation Information	1 this run				h
		2 this stopping				h
		3 Running Time				h
		4 stopping time				h
		5 number of starts				
		6 Number of Trips				

4	system parameter	1 Baud rate		2400,4800,9600, 19200,38400	9600	bps
		2 Postal address		1-247		
		3 password		0-9999		
		4 Motor Type		General motor, safety-increased motor	Common motor	
		5 Transmission Type		la, Ib, Ie, lay, Uab, Ubc, Uca, Uay, PTC, heat Capacity, P, F	lay	
		6 transmission ratio		1-8	2	
		7 backlight lit		On/off	OFF	
		8 System voltage		380,660	380	V
		9 Rated frequency		45-65	50	
		10 Rated power		0.4-1.6	1056,	w
				1.6-6.3	4158,	
				6.3-25	16500,	
				25-100	66000,	
				63-250	165000,	
				250-800	480000	
		11 CT ratio		1-1000	1	
		12 local speed		On/off	OFF	
		13 fundamental wave switch		On/off	OFF	
		14 Software Version No.				
5	Protection parameter	1 starting protection	Starting time	0.1-999.9	10.0	s
			Alarm	On/off	OFF	
			Trip	On/off	ON	
		2 overload protection	Rated current of motor	0.1-1.6,1.6-6.3, 6.3-25,25-100, 63-250,250-800	1.6,6.3 25,100 250,800	A
			Trip class	l, 2,3,5,10,15,20 25,30,35,40	5	Level
				2,3,4,5,6,8,10,12,15	2	
			Alarm threshold value	1-99%	85	%
			Alarm	On/off	OFF	
			Trip	On/off	ON	
			Overload automatic reset	On/off	OFF	
			Cooling time	1-30	30	min

		3 under load protection	Alarm threshold value	10-99%	70	%
			Trip threshold value	10-99%	50	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		4 Phase failure protection	Trip delay	0.1-600	1.0	s
			Alarm	On/off	OFF	
			Trip	On/off	ON	
		5 phase sequence protection	Trip delay	0.1-600	1.0	s
			Alarm	On/off	OFF	
			Trip	On/off	ON	
		6 imbalance protection	Alarm threshold value	10-80%	20	%
			Trip threshold value	10-80%	30	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		7 Grounding / Earth leakage	Transformer input	On/off	OFF	
			Grounding alarm threshold value	20-100%	20	%
			Grounding Trip threshold value	20-100%	50	%
			Trip delay	0.1-600	0.1	s
			Earth leakage alarm current	100-1000	200	rnA
			Earth leakage Trip current	100-1000	300	rnA
			Trip delay	0.1-600	0.5	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		8 Short-Circuit Protection	Alarm threshold value	400-700% max. measurable overload times	400	%
			Trip threshold value	400-700% max. measurable overload times	500	%
			Trip delay	0.1-600	0.1	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	

		9 Over voltage protection	Alarm threshold value	110-150%	110	%
			Trip threshold value	110-150%	120	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		10 Under voltage protection	Alarm threshold value	55-90%	90	%
			Trip threshold value	55-90%	80	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		11 lock-rotor protection	Alarm threshold value	100-700%	500	%
			Trip threshold value	100-700%	600	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		12 blocking protection	Alarm threshold value	100-700%	150	%
			Trip threshold value	100-700%	250	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		13 overpower protection	Alarm threshold value	100-700%	150	%
			Trip threshold value	100-700%	250	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		14 under power protection	Alarm threshold value	0-100%	80	%
			Trip threshold value	0-100%	50	%
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		15 temperature	PTC type	On/off	ON	

		protection	Return resistance value	0 closed 1000-30000	0	Ω
			Alarm	100-30000	1600	Ω
			Trip resistance	100-30000	3600	Ω
			Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
		16 External fault	Trip delay	0.1-600	5.0	s
			Alarm	On/off	OFF	
			Trip	On/off	OFF	
6	Control parameter	1 control authority	On-off input	local, on-site, remote, Full-controlled	Full-controlled	
		2 Starting Control	Starting Mode	Protection mode, manual mode, two-step Mode, two-speed mode	protection mode	
		3 self-start	Starting - delay	0.1-600	3.0	s
			Self-start Mode	reset/ start	Starting	
			Self-start delay	0.1-600	5.0	s
			Self-start control	On/off	OFF	
		4 Loss voltage restarting	voltage setting	75-95%	80	%
			Immediately restarting power failure time	0.1-0.5	0.1	s
			Allowable time (min)	0.5-10.0	5.0	s
			Restarting	1.0-60.08	30.0	s
			Controls	0 OFF,1 start 1, 2 start2	OFF	
		5 reflow inspection	Delay setting	0.1-600		s
			Controls	On/off	OFF	
		6 DO3 Programmable Setting	Programmable setting	1 Start 1,2 Start, 3 alarm fault output, 4 Trip fault output, 5 device self-checking output 6 device power output, 7 stopping state ready, 8 running state output, 9-DI control output, 10 - Bus control	3	

		Action time setting	0-250	0.1	s
		7 DO4 programmable Programmable Setting	Programmable setting	1 Start ing1, 2 Start 2, 3 alarm fault output, 4 Trip fault output, 5 device self-checking output, 6 device power output, 7 stopping state ready, 8 running state output, 9 DI control output, 10 Bus control	3	
		Action time	0-250	0.1	s
		Trip setting	0-65535	65535	
		8 DI9 programmable Setting	DI9 programmable setting	1 common DI 2 Start 1 (direct start, turn left, low speed) 3 start 2 (turn right, high speed), 4 Stop 5 Resetting, 6 Emergency Stop 7 external fault 8 start / stop, 9 control authority 1 10 control authority 2 11 two-wire start-stop	1	
		9 TEST	DO2	On/off	OFF	
			DO3	On/off	OFF	
			DO4	On/off	OFF	
			DO5	On/off	OFF	

9.2 Function instructions

Table 12 Each type of protection work periods :

Protection class:	Work periods
Phase sequence, external fault, over voltage, under-voltage	Stop
Phase sequence, external fault, over voltage, under-voltage, phase failure, earth leakage/grounding, locked- rotor, starting overtime	Starting
Phase sequence, external fault, over voltage, under-voltage, phase failure, earth leakage and grounding, overload, unbalance, blocking, under load, under power, over power, temperature, short circuit	Run

■Starting overtime protection

While the motor starting time reaches, and the motor round current detected by protection still more than

110%Ie, the protection will start.Refers to increased safety motor, the starting time do not set more than tr 1.7 times.

▋Overload Protection

When the motor is running in the situation of overload, its current is over rated for a long time. The motor will overheat and burn down, as the insulation property decreased. The protection computes the heat capacity of motor according to the heart generation characteristics of motor, simulates heat generation characteristics of motor to protect the motor.

■ Overload protection current-time comparison show in table 10, overload characteristic curves (K curves) show in picture 11.

Table 13 overload protection current-time table

| Optional tripping curves level K	5	10	15	20	25	30	35	40
Error of tripping delay(S) ±10%	Three-phase balance load, begin from the cold state							
×1.2 Rated value Ie	125	250	375	500	625	750	875	1000
×1.5	80	160	240	320	400	480	560	640
×2	45	90	135	180	225	270	315	360
×3	20	40	60	80	100	120	140	160
×4	11.3	22.5	33.8	45	56.3	67.5	78.8	90
×5	7.2	14.4	21.6	28.8	36	43.2	50.4	57.6
×6	5	10	15	20	25	30	35	40
×7.2	3.5	6.9	10.4	13.9	17.4	20.8	24.3	27.8
×8	2.8	5.6	8.4	11.3	14.1	16.9	19.7	22.5
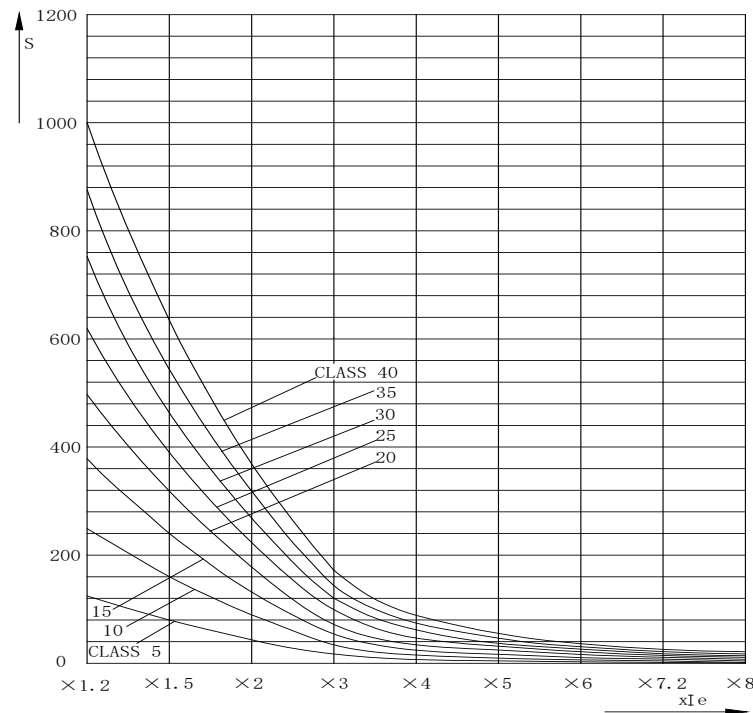
Figure 11 overload characteristic curves graph

▋Under load Protection

When the load carried by motor is the pump-load, no load or underload will damage the motor, the protection provides underload protection. When the ratio of the average 3 phase current and rated current is lower than set value, the protection should trip or alarm in tripping(delay) set time.

▋Phase failure protection or imbalance protection

Running in the condition of phrase failure or 3 phase current unbalance make great harm to motor, when phase failure occurs or 3 phase current unbalance, the imbalance ratio reaches the protective set value, the protection will send a alarm or tripping signal in accordance with internal set to make the motor safely.

■t_E time protection (suitable for safety-increased motor)

After the AC winding reaches the rated operation stable temperature at maximum ambient temperature for safety-increased motors, the desired time from the beginning of locked-rotor current to the time rising to limiting temperature is tE. The tE time of safety-increased motors is usually provided by the motor manufacturers, and users can find the data on the motor nameplate.

When providing locked-rotor and within the tE time, disconnect the thermal overload protection of electric motor, only after the motor starting is completed, the independent delay timer can be applied.

Delay timer with independence.tE protection characteristic curve action delay table shown in Table 22, and curve diagram as shown below.

t_E protection delay and locked-rotor current ratio IAII.'s current-time characteristic curve

t_{Ep}: Allow locked-rotor time when under 7 times rated current; IA: locked-rotor current; Ie: rated current of motor.

Table 14 Action Delay Characteristics Table

tEp set Set IAlIe	2	3	4	5	6	8	10	12	15
2.0	32	48	64	80	96	128	160	192	240
2.2	20.27	30.4	40.54	50.67	60.81	81.08	101.35	121.62	152.02
2.4	14.75	22.12	29.5	36.87	44.25	59	73.75	88.5	110.63
2.6	11.54	17.32	23.09	28.87	34.64	46.19	57.74	69.29	86.62
2.8	9.46	14.19	18.92	23.65	28.39	37.85	43.31	56.78	70.97
3.00	8	12	16	20	24	32	40	48	60
3.20	6.91	10.37	13.83	17.29	20.75	27.67	34.59	41.51	51.88
3.40	6.08	9.13	12.17	15.22	18.26	24.35	30.44	36.52	45.66
3.60	5.43	8.14	10.86	13.58	16.29	21.72	27.16	32.59	40.74
3.80	4.9	7.35	9.8	12.25	14.7	19.6	24.5	29.41	36.76
4.00	4.46	6.69	8.93	11.16	13.39	17.86	22.32	26.79	33.48
4.20	4.09	6.14	8.19	10.24	12.29	16.39	20.49	24.59	30.74
4.40	3.79	5.68	7.58	9.47	11.37	15.06	18.95	22.74	28.42
4.60	3.52	5.28	7.05	8.81	10.57	14.1	17.62	21.15	26.43
4.80	3.29	4.94	6.59	8.24	9.88	13.08	16.48	19.77	24.72

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:

(a) t_E protection time = operation time 12xtEp setting when Ep is 2 (S)

(b)when tE is set to 5 (S), tE value by starting current ratio IAI Ie is determined according to IEC79-7, GB3836.3-2000 standard, when apply to safety-increased motor tE protection, its inverse time overload may refer to characteristic curve settings. To ensure that the power is turned off before the time when the motor companying rotating, the inverse time curve of overload protection should be down about 15%.

(c)The action time of "tE protection is achieved by setting ""Motor Type"" and "" Trip class"" according to Table 9 ". t_{Ep} (Trip class) selects the appropriate Trip curves. "(When the motor type is selected to ""safety-increased motors", the "Trip class will automatically become tEp setting: Otherwise, the Trip curve is inverse time overload Trip curve of normal motor."

▌phase sequence protection

When the protector detects the error of voltage phase sequence of the motor, the locking motor will start to protect the motor safety.

▌Grounding/ Earth leakage Protection

ARD3 has the function of grounding and leakage protection, but user can only choose one kind. Grounding protection calculate residual current automatically, do not need external transformer, used for short-circuit protection about motor metal case. By increasing the leakage transformer, leakage protection detected 30mA-900mA fault current values, mainly used for indirect grounding protection to ensure personal safety.

▌Over voltage protection

Too high voltage will result in extent damage of motor insulation, and when the operating voltage of motor exceeds the protection voltage, the protector will protect according to the set requirements, and Trip within the Trip (delay) setting time.

▌Under voltage protection

Too low voltage will cause the motor speed to reduce, or even stop, when the operating voltage of motor drops to the under voltage protection set, the protector will protect according to the set requirements, and Trip within the Trip (delay) setting time.

▌Locked-rotor protection (starting over current protection)

During the process of motor starting, because of the load is too large or their own mechanical reasons, motor shaft may be stuck. Without the timely lifting of failure, the motor will overheat and burn down because of decreasing insulation property. When the current reaches the current operation set, protection trips in tripping(delay) set timely and avoids burning motor.

■Blocking protection

Blocking protection used for motor shaft stuck during the process of motor running. When the current reaches the current operation set, protection trips in tripping(delay)set timely and avoids burning motor.

■Over power protection

When the percentage of load power and rated power is higher than the preset action value, the protector will act or alarm within the action time set.

■Under power protection

When the percentage of load power and rated power is lower than the preset action value, the protector will act or alarm within the action time set.

■Temperature protection

Motor temperature protection regards the thermistor values sent by thermistor detector embedded in the motor's stator windings or bearings as the protection conditions. When the protector detects that the value of the thermistor is larger than the preset protection value, the protector will Trip Within Trip(delay) set time.

External fault protection (technology interlock protection)

■Control authority

Protector has a variety of control authority, and users can set different control authority to control the motor according to the actual needs.

"Full-controlled: when the users set the control authority to ""full-controlled"", then the users can press a button on the display unit to achieve On-site control."

System, PC remote control, DI termination to achieve On-site control starting and stopping of motor.

The starting and stopping of protector can only be controlled by local via using the keys on the display unit.

The starting and stopping of protector can only be controlled by on-site via DI input terminal on the protector. Remote: the starting and stopping of protector can only be controlled via remote communication of PC.

One in three by using DI end to select the control position (select one from local, on-site, and remote).

Starting control

The protector has different start control mode, and the users can select different start control way according to the actual situation.

Protection mode 2, under this mode, the protector can not be controlled by local and on-site. Manual mode: under this mode, it is need to manually control 2 starter relay separately.

Two-step mode, under this mode, only need to adopt manual operation for start 1, after the set delay time, start 1 will automatically disconnect and simultaneously start 2 action. If the self-start function is opened up, when the protector is power on, it will start 1 and start 2 relays in automatic sequence of actions.

" Two-speed mode: under this mode, ""start I"" is low-speed operation, and ""start 2"" is high-speed operation." self-start. During power up or power restoration process, the protector will start the motor according to setting sharing.

"If the self-start control of system is ""open", and "self-start mode is set to ""restore"", then the protector will determine whether there is need to re-start based on the state before power off, if the system is running before power off, then it will start to run according to the set self-start delay time after power on; if the self-start mode is ""start"", then the protector can achieve motor group delay time sequence starting once power on."

Loss voltage restart

"This function is only valid when with voltage function and loss voltage restart function must be set to ""start 1"" or ""start 2"" state, while there is need to close the under voltage Trip function."

When the motor is running and zero current is detected, then begin timing under loss of pressure; within immediate time of loss voltage, if the voltage can be restored to voltage setting set under the loss of pressure starting, the starter relay is not Tripd; when after the greater immediate time of loss of pressure, the starter relay will be Tripd.

If the voltage can be restored to voltage setting set under the loss voltage restarting within the time, the protector will start the motor under delay after delay restart. When power failure time is greater than the loss voltage restarting time allowed, this eliminates relevant information, no re-start any more.

Notes:

1. two-speed motor starting time, overload, under load, locked-rotor, blocking, over power, under power, short circuit in two sets, when carry out setting, there is need to select low-speed switch in system parameters firstly"; "OFF"" is the low-speed parameter setting"; "ON"" is the high-speed parameter setting."

2. 4 to 20 analog output: Default 2 gal lA corresponding 2 times the rated current value. Users can also set their own required corresponding parameters and magnification of analog output (note: magnification setting is only valid for the current). See the below table:

Table 15 Transmission setting instructions

Transmission type	Transmission magnification
0. A-phase current	Ie integral multiples (1-8)
1. B-phase current	Ie integral multiples (1-8)
2. C-phase current	Ie integral multiples (1-8)
3.mean current	Ie integral multiples (1-8)
4. AB line voltage	95-190,330-990,190-570 (50% -150% system voltage) corresponds to 4-20mA
5. BC line voltage	95-190,330-990,190-570 (50% -150% system voltage) corresponds to 4-20mA
6. CA line voltage	95-190,330-990,190-570 (50% -150% system voltage) corresponds to 4-20mA
7. Average line voltage	95-190,330-990,190-570 (50% -150% system voltage) corresponds to 4-20mA
8. PTC (l00-30K)	Default 100-30000 corresponds to 4-20mA
9.Thermal capacity percentage	Default 0-100% corresponds to 4-2 gamma lA
10. Power	Rated power integral multiple -8)
11. Frequency	30-70Hz corresponds to 4-20mA

10 Cautions

1. The Trip relay (terminal no.95, 96) is normally open, and closed after power on.

2.The protector can not display real-time ""alarm information, which can only display alarm condition when enter the query menu." Customers are advised to view when the fault alarm is stable.

3.The protector can measure 7.2 times overload current of specifications ordered in maximum, namely, 100A protector can measure 720A current in maximum.

When set the short-circuit protection, customers need to set reasonable parameters according to specifications set by the protector.

4. when the start control of protector is set to "" two-step start"", "" starting – delay" time should be less than the start time." 5. Pei-rotating protection Trip delay time should be less than the starting time, otherwise the locked-rotor protection function will not be achieved.

6. When the protector is equipped with grounding / earth leakage protection, the conducting wire of \ protector introduced from zero sequence current transformer is recommended to use shield wire, otherwise this may lead to inaccurate measurements.

7.Protector provides asynchronous half-duplex RS485 communication interface, adopt MODBUS-R 'four protocol,

and a variety of data can be transmitted on the communication line. Theoretically, a single line can simultaneously connect up to 128 protectors, and each protector can set their own address (Addr). Communication connection is recommended to use shielded twisted pair wire whose diameter should be not less than 0.5mm20. When wiring, make communication lines away from power cable or other strong electric field environment.

8. The rated current of protector should be proper rated operational current value of the motor; if this setting value is lower than the normal value of the motor's rated operational current, it may cause that the motor can not be started normally: higher than normal rated operation current value of motor, the protector may not carry out normal protection when the motor appears fault.

9. Once the protector occurs Trip, the protector should be reset after debugging and before re-start the motor, otherwise it will not start the motor.

10. After the thermal overload protection of motor, due to the heat accumulation, it can be reset after cooled.

11. In the actual use on-site, the unreasonable protection parameters settings may cause the motor to has protection action once the motor started or no protection action; at this time, all protection functions can be turned off, various protection parameters can be reset in accordance with various parameters obtained from normal operation of the motor.

12. if the various protection parameters set by protection are appropriate, but the protector has action once the motor started, at this time, the cause of fault can be found according to the action code displayed by protector.

13. The protector's parameters are default settings when made(unless users have special requirements); In actual use, various protection functions must be opened by users based on the actual needs, and various parameters can be set.

14. Unless otherwise specified by users, the connecting line of transformer and protector body is 1m in default, and the connecting line of protector body and display unit is 1.5m in default.

15. Special requirements should be specified in the order if users have special requirements(such as single-phase motor protector, length of connection line, etc.)。

11 Order sample

Example:

Type: ARD3-25A/TCSR+90FL Auxiliary power: AC220V

Rated current of motor: 6.3A ~ 25A applies z three-phase motor

Measurement parameters: three-phase current, temperature resistance

Additional function : Additional functions: start control, thermal protection, alarm output, RS485 communication, 20 display methods of SOE event records: 90FL (LCD)