

ARD2系列

ARD2 Series

智能电动机保护器

Intelligent Motor Protective Device

使用说明书V2.1

Operation Instruction V2.1

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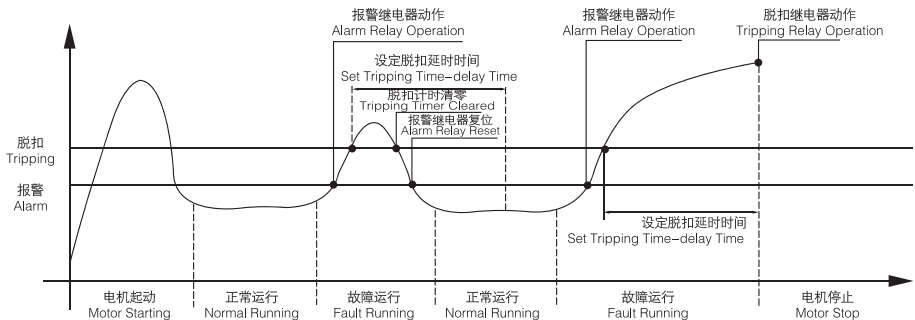
警告：用户在使用该保护器之前，请务必按所要保护电动机的实际情况对各项保护功能及保护参数进行设置。

Warning: Before using this protective device, the user must set all the protection functions and related protection parameters based on actuality of motors to be protected.

1 概述 Overview

ARD2系列智能电动机保护器(以下简称保护器),采用最新的单片机技术,具有抗干扰能力强、工作稳定可靠、数字化、智能化、网络化等特点。保护器能对电动机运行过程中出现的起动超时、过载、断相、不平衡、欠载、接地/漏电、阻塞、外部故障等多种情况进行保护,并设有SOE故障事件记录功能,方便现场维护人员查找故障原因。适用于煤矿、石化、冶炼、电力、船舶、以及民用建筑等领域。本保护器具有RS485远程通讯接口,DC4~20mA模拟量输出,方便与PLC、PC等控制机组成网络系统,实现电动机运行的远程监控。

ARD2 Series Intelligent Motor Protective Device (hereinafter referred to Protection), using the latest SingleChip technology, has the strong anti-interference capabilities, stable and reliable, digital, intelligent, network-based features. The protection can deal with many situations in the process of motor running such as overtime of starting, overload, phase failure, phase unbalance, underload, grounding/leakage, the blocking, external faults and others, and with the accident record of SOE (Sequence Of Event) to facilitate maintenance personnel at the scene to find cause of the malfunction. It is suitable to coal, petrochemical, metallurgical, power, shipping and civil buildings, and other fields. The protection has long-distance communications ports of RS485, DC4~20mA analog output, is convenient to build a network with PLC, PC and so on. The remote monitoring of motor running is implemented.



保护器动作示意图
Protection Operation Diagram

2 产品型号 Model

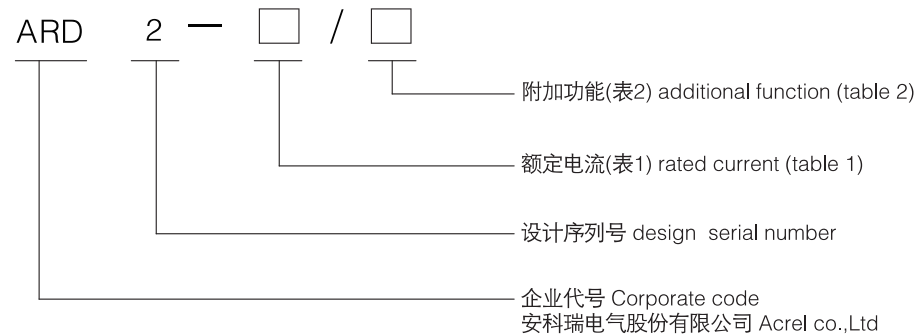


表 Table1

互感器额定电流 (A) Rated Current of Transformer (A)	互感器匝数(一次) Turns of Transformer (Primary)	整定电流Is范围(A) Range of Setting Current Is (A)	电动机功率 (kW) Motor Power (kW)
1.6	1	0.4 ~ 1.6	0.37 ~ 0.75
6.3	1	1.6 ~ 6.3	1.1 ~ 3
25	1	6.3 ~ 25	5.5 ~ 15
100	1	25 ~ 100	18.5 ~ 55
250	1	63 ~ 250	75 ~ 160
800	1	250 ~ 800	200 ~ 440

表 Table2

附加功能 Additional function	代号 Code	附加功能 Additional function	代号 Code
通讯接口 Communication port	C	2路开关量输入(外部故障保护) 2-channel switching input (External fault protection)	K
漏电保护 Leakage Protection	L	SOE事件记录 SOE event recording	SR
4~20mA模拟量输出 4~20mA switching output	M		

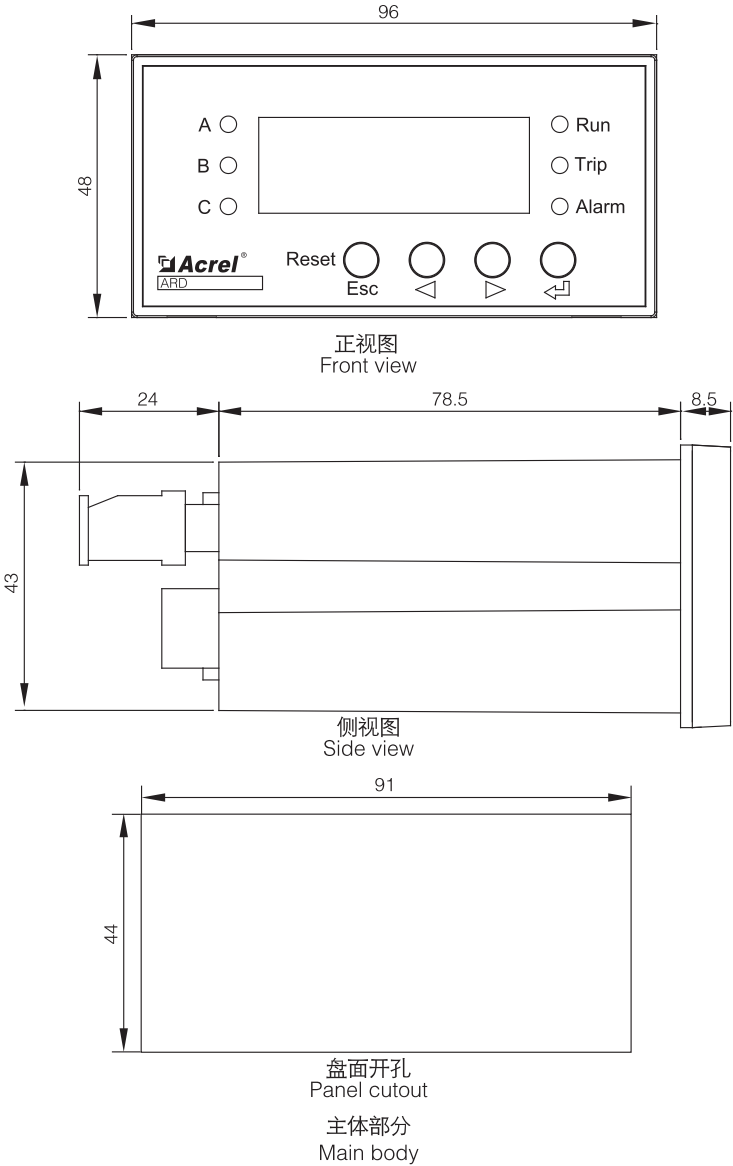
3通用技术指标 General Technical Specifications

表 Table 3

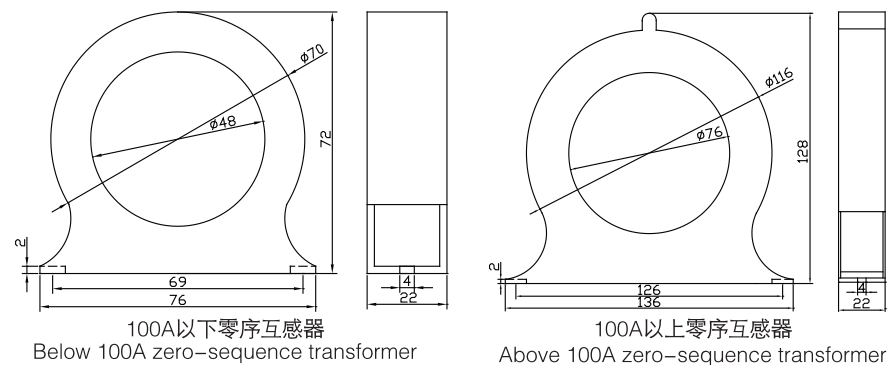
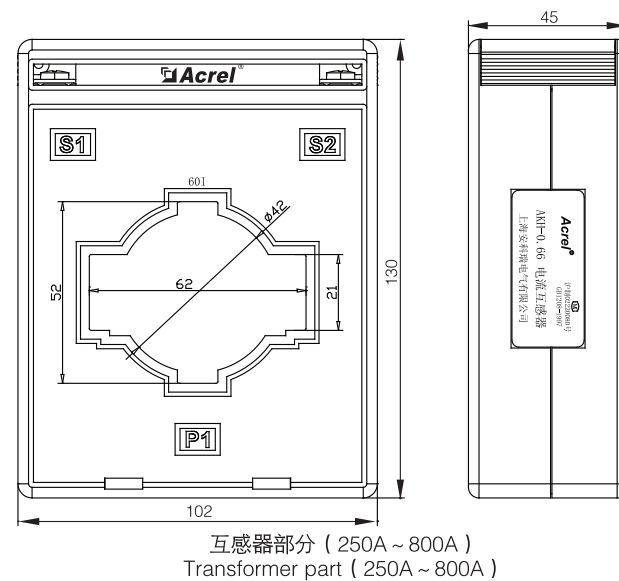
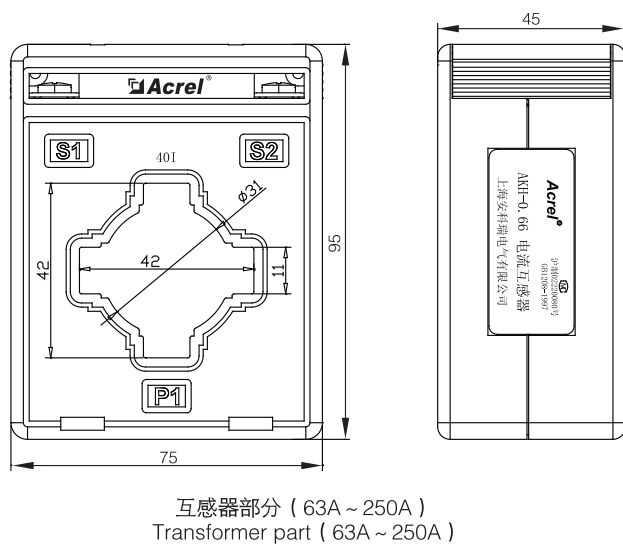
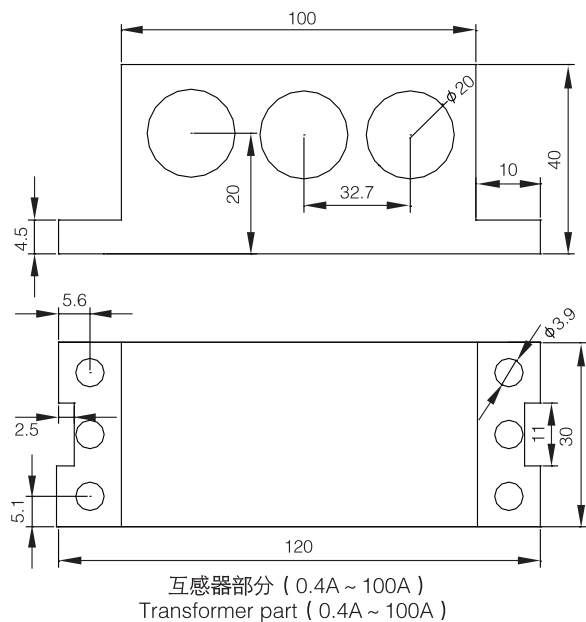
技术参数 Technical parameter	技术指标 Technical data	
保护器辅助电源 Auxiliary power for device	AC85V~265V / DC100V~350V 功耗Power 3VA	
电机额定工作电压 Motor rated opertional voltage	AC380V 50Hz	
电动机额定工作电流 Rated current of motor	1.6A (0.4A–1.6A)	采用小型专用 电流互感器 Adopt the small special current transformer
	6.3A (1.6A–6.3A)	
	25A (6.3A–25A)	
	100A (25A–100A)	
	250A (63A–250A)	采用专用电流互感器 Adopt the special current transformer
	800A (250A–800A)	
继电器输出触点，额定负载容量 Relay output contacts, rated load capacity	2路，2-channel AC250V, 3A; DC30V, 3A;	
开关量输入 Switching input	2路，光电隔离 2-channel optical isolation	
通讯 Communication	RS485 Modbus协议 RS485 Modbus protocol	
SOE事件记录容量 Capacity of SOE event records	8个事件记录 8 event records	
环境 Environment	工作温度 Operating temperature range	–10°C ~ 55°C
	贮存温度 Storage temperature range	–20°C ~ 65°C
	相对湿度 Relative Humidity range	5%~95%不结露 non–condensing
	海拔 Altitude	≤2000m
污染等级 Pollution degree	2	
防护等级 IP class	IP20	

4外形尺寸及安装 Dimension and Installation

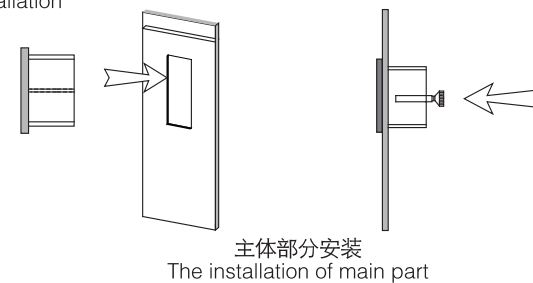
4.1 保护器安装尺寸图（图4.1） Protective device mounting size (figure 4.1)
单位Unit: mm



4.2 互感器安装尺寸 (图4.2) Transformer mounting size (figure 4.2)



4.3 安装方法 Installation



5显示与用户编程 Display and User Programming

5.1 显示说明

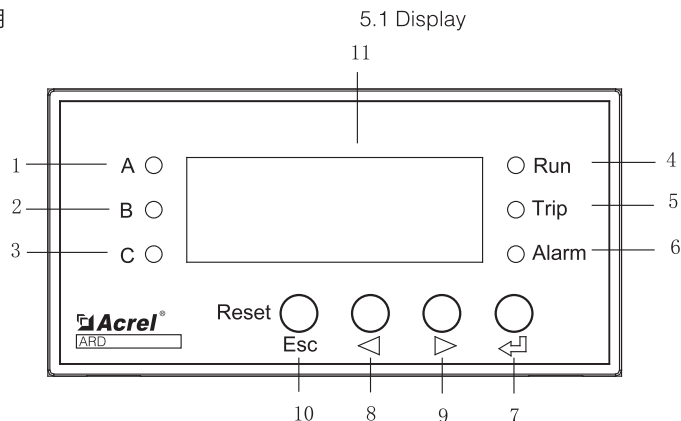


表 Table 4

序号 No.	名称 Name	状态 Status	功能说明 Function Description
1	A相LED指示灯 Phrase A LED	亮 ON	该指示灯亮则表明11显示的为A相电流 Part 11 is displaying current of phrase A when LED is on
2	B相LED指示灯 Phrase B LED	亮 ON	该指示灯则表明11显示的为B相电流 Part 11 is displaying current of phrase B when LED is on
3	C相LED指示灯 Phrase C LED	亮 ON	该指示灯亮则表明11显示的为C相电流 Part 11 is displaying current of phrase C when LED is on
4	Run LED指示灯 Running LED	亮 ON	该指示灯亮则表明电动机正在运行 Motor is running when LED is on
5	Trip LED指示灯 Tripping LED	亮 ON	该指示灯亮则表明保护器脱扣继电器已动作 Tripping relay of protection has operated when LED is on
6	Alarm LED指示灯 Alarm LED	亮 ON	该指示灯亮则表明保护器报警继电器已动作 Alarm relay of protection has operated when LED is on
7	↵ 按键 Enter	按下 Press	选择操作功能或返回上级菜单 Choose the function or back to previous menu
8	左方向键 Left arrow	按下 Press	察看事件或数字量减或移位 Look over event or decrease the number or shift
9	右方向键 Right arrow	按下 Press	察看显示数据或数字量增 Look over date or increase the number
10	ESC / Reset键 Cancel/reset	按下 Press	退出菜单或取消操作或将保护器复位 Quit the menu or cancel the operation or reset the protection
11	4位LED数码管 4 bits LED	0000 0000	显示测量数值 Display the value measured
注 Note	A、B、C相指示灯 Phrase A, B, C LED	全亮 All on	指示灯全亮则表明11显示的为三相平均电流 Part 11 is displaying the average current of the three-phase when all the LEDs are on

5.2 用户编程

按保护器上的“↵”键，至显示“P001”，按“⏮”键和“⏭”键用于菜单的选择，到相应的菜单序号后，按“↵”键，进入值域的设置，按“⏮”键进行数据位的选择，按“⏭”键用于数字的增加，所需参数设置完毕后，按“↵”键进行保存，再按“ESC”键退出菜单。其中，保护器的各种保护功能的打开与否则用“ON”“OFF”表示。参数设置见下表：

表 Table 5

面板参数 Display parameter	设定类别 Set type	默认值 Default	设定范围 Set range	单位/说明 Unit/note
P001	电动机额定电流 Fated current	1.6 6.3 25.0 100 250 800	0.4 ~ 1.6 1.6 ~ 6.3 6.3 ~ 25 25 ~ 100 63 ~ 250 250 ~ 800	安培 A
P002	脱扣等级设定 Tripping level set	5	5、10、15、20、 25、30、35、40	级 Level
P003	起动时间 Starting time	10	0.1 ~ 999.9	秒 s
P004	过载报警域值设定 Overload alarm range set	85	1 ~ 99%	%
P005	断相脱扣延时 Phrase failure tripping delay	1	0.1 ~ 25.0	秒 s
P006	接地/漏电故障电流设定 Grounding/leakage fault current set	300	30 ~ 1000	毫安 mA
P007	接地/漏电故障脱扣延时设定 Grounding/leakage fault tripping delay set	0.5	0.1 ~ 25.0	秒 s
P008	欠载脱扣域值设定 Underload tripping range set	50	10 ~ 99%	%
P009	欠载脱扣延时设定 Underload tripping delay set	5.0	0.1 ~ 25.0	秒 s
P010	不平衡脱扣域值设定 Unbalance tripping range set	30	10 ~ 99%	%
P011	不平衡脱扣延时设定 Unbalance tripping delay set	5.0	0.1 ~ 25.0	秒 s

5.2 User Programming

Press the "↵" key of the protection until the display shows that "P001". Press the "⏮" key or the "⏭" key to select the menu until the desired menu number is displayed. Press the "↵" key to set the corresponding value. Pressing the "⏮" key to choose bit of data, and press the "⏭" key to increase the value. When finished setting the necessary parameters, press the "↵" key to save, and press the "Cancel" key to quit the menu. The function of protection enables or disables corresponding with "ON" or "OFF". The set of parameters is referred to the following table:

P012	不平衡报警设定 Unbalance alarm set	20	10 ~ 99%	%
P013	报警允许位开/关 Alarm enable/disable	OFF	OFF/ ON	过载报警 Overload alarm
P014		OFF	OFF/ ON	不平衡报警 Unbalance alarm
P015	脱扣允许位开/关 Tripping enable/disable	ON	OFF/ ON	过载脱扣 Overload tripping
P016		OFF	OFF/ ON	接地/漏电脱扣 Grounding/ leakage tripping
P017		OFF	OFF/ ON	欠载脱扣 Underload tripping
P018		ON	OFF/ ON	断相脱扣 Phase failure tripping
P019		OFF	OFF/ ON	启动超时脱扣 Over time in starting tripping
P020		OFF	OFF/ ON	短路脱扣 Short circuit tripping
P021		OFF	OFF/ ON	阻塞脱扣 Blocking tripping
P022		OFF	OFF/ ON	不平衡脱扣 Unbalance tripping
P023		OFF	OFF/ ON	外部故障脱扣 External fault tripping
P024	外部故障脱扣延时设定 External fault tripping delay set	5.0	0.1 ~ 25.0	秒 s
P025	可编程输出设定 Editing output set	2	1报警 2脱扣 3过载 4短路 5接地/漏电 6断相 7外部故障 8远程启动 1 alarm 2 tripping 3 overload 4 short circuit 5 earthing/leakage 6 phase failure 7 external fault 8 remote starting	
P026	过载冷却时间 Overload cooling time	0	0手动复位1~30min 0 Manual reset 1~30min	分钟 min
P027	阻塞倍率设定 Blocking multiplying power set	250	100 ~ 700	%
P028	阻塞脱扣延时设定 Blocking tripping delay set	5.0	0.1 ~ 25.0	秒 s
P029	MODBUS波特率设定 MODBUS baudrate set	9600	2400、4800、 9600、19200、 38400	bps
P030	MODBUS地址设定 MODBUS address set	1	1 ~ 247	

5.3 查看数据

测量数据查看：用户可按住“⏻”键，切换显示三相平均电流、A相电流、B相电流、C相电流、零序电流值、开关量输入。

事件记录查看：用户可按住“⏻”键，至4位LED数码显示“Eut1”，表示事件1（此为最近一次保护器脱扣的事件记录），可按住“确定”键，数码管显示为“CAuS”，按住“确定”键，查看脱扣原因。按住“取消”返回上一层菜单，按住“⏻”键可依次查看脱扣动作的“onth”月、“day”日、“hour”时、“iunt”分、“sEc”秒。或用户在“Eut1”时，按住“⏻”键或“⏻”键，查看其他的事件。本保护器记录最近8次发生的脱扣事件。

5.3 Look over data

Press the "⏻"key to change to the display of the average current of three-phase, current of phrase A, B, C, and zero sequence current, Switching input.

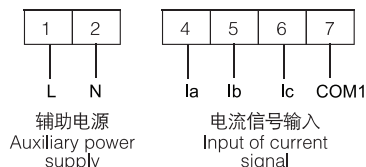
Look over event record:press the "⏻"key until the 4-bit LED displaying the "Eut1", refer to event 1(the last protection tripping), then press "enter" key, the LED will display "CAuS", then press "enter" key to check the reason of tripping. Press "cancel" key to return to the previous menu, press the "⏻"key to look over the month ("onth"), day("day"), hour("hour"), minute("iunt"), second("sEc") of the tripping, or press the "⏻"or "⏻"key to look over the other events. The protection can record the last 8 tripping events.

表 6 事件记录说明：Table 6 event record note

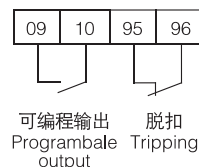
通讯故障代码 Communication fault code	显示 Display	故障原因 Reason of fault	备注 Remarks
1	Stot	启动超时 Motor starting overtime	
2	hEAt	热过负荷（过载） Overheat (overload)	
3	UdCU	电流过低（欠载） Under current (underload)	
4	CUIb	电流不平衡 Unbalance current	
5	LoPh	断相 Phrase failure	
8	JA	阻塞 Blocking	
9	oUdF	接地/漏电 Grounding/leakage	
10	shor	短路 Short circuit	
11	oUtE	外部故障 External fault	

6 接线方式 Wiring

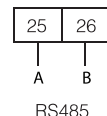
6.1 电流、电压接线 Current, voltage wiring



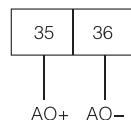
6.2 继电器输出 Relay output



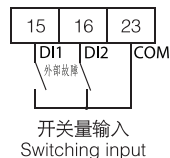
6.3 RS485通讯 RS485 communication



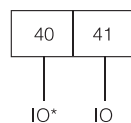
6.4 4~20mA模拟量输出 4~20mA analog output



6.5 开关量输入 Switching input



6.6 零序电流输入 Zero sequence current input



7 通讯协议 Communication Protocol

7.1 通讯协议概述

ARD2系列电动机保护器使用MODBUS-RTU通讯协议, MODBUS协议详细定义了校验码、数据序列等,这些都是特定数据交换的必要内容。MODBUS协议在一根通讯线上使用主从应答式连接(半双工),这意味着在一根单独的通讯线上信号沿着相反的两个方向传输。首先,主计算机的信号寻址到一台唯一的终端设备(从机),然后,终端设备发出的应答信号以相反的方向传输给主机。

MODBUS协议只允许在主机(PC, PLC等)和终端设备之间通讯,而不允许独立的终端设备之间的数据交换,这样各终端设备不会在它们初始化时占据通讯线路,而仅限于响应到达本机的查询信号。

7.1.1 传输方式

信息传输为异步方式,并以字节为单位,在主机和从机之间传递的通讯信息是11位字格式,包含1个起始位、8个数据位(最小的有效位先发送)、无奇偶校验位、1个停止位。

7.1.2 信息帧格式

地址码 Address code	功能码 Function code	数据区 Data area	CRC校验码 CRC
1字节 1 byte	1字节 1 byte	n字节 N bytes	2字节 2 bytes

地址码: 地址码在帧的开始部分, 由一个字节(8位二进制码)组成, 十进制为0~255, 在ARD2系列电动机保护器中只使用1~247, 其它地址保留。这些位标明了用户指定的终端设备的地址, 该设备将接收来自与之相连的主机数据。每个终端设备的地址必须是唯一的, 仅仅被寻址到的终端会响应包含了该地址的查询。当终端发送回一个响应, 响应中的从机地址数据便告诉了主机哪台终端正与之进行通信。

7.1 Overview

ADR2 series intelligent motor protective device implements the Modbus RTU communication protocol. The Modbus protocol defines the checking code, data sequence in detail. These are essential content of specific data exchange. The Modbus implements master/slave request/response (half duplex) mode, this means, the signal is transmitted bi-directional in a single wiring. First, an addressing signal of the master computer is sent to an only terminal (slave), and then the terminal sends the response signal in a reverse direction to master.

The Modbus protocol only allows the communication between the master (PC, PLC, etc) and terminals, the data exchanging amongst terminals is forbidden, so the terminals will not occupy the communication wire when they are initialized and only response the request to themselves.

7.1.1 Transmission mode

The information transmission is in asynchronous mode, and considers the byte as a unit. The data frame between master and slave is 11 bits format, consists of 1 start bit, 8 data bits (the Least Significant Bit (LSB) is sent first), no even-odd check bit, 1 stop bits.

7.1.2 Data frame format

Address code: Address code is at the head of a frame which consists of 1 byte (8 bits), between 0 and 255 in decimal. The 1~247 bits are used in ADR2 series intelligent motor protective device, others are reserved. These bits indicate the address of user-assigned terminal which receives the data from the master with which is connected. The address of every terminal is unique, only the terminal which is addressed will response the request which contains its address.

功能码：功能码告诉了被寻址到的终端执行何种功能。下表列出了该系列仪表用到的功能码，以及它们的意义和功能。

功能 Function	定义 Definition	操作 Operation
03H/04H	读数据寄存器 Read data register	获得一个或多个寄存器的当前二进制值 Obtain binary value of one or more registers
10H	预置多寄存器 Preset multiple register	设定二进制值到一系列多寄存器中 Set binary value to a series of multiple registers

数据区：数据区包含了终端执行特定功能所需要的数据或者终端响应查询时采集到的数据。这些数据的内容可能是数值、参考地址或者设置值。例如：功能码告诉终端读取一个寄存器，数据区则需要指明从哪个寄存器开始及读取多少个数据，内嵌的地址和数据依照类型和从机之间的不同内容而有所不同。

CRC校验码：错误校验（CRC）域占用两个字节，包含了一个16位的二进制值。CRC值由传输设备计算出来，然后附加到数据帧上，接收设备在接收数据时重新计算CRC值，然后与接收到的CRC域中的值进行比较，如果这两个值不相等，就发生了错误。

生成一个CRC的流程为：

1、预置一个16位寄存器为0FFFFH（全1），称之为CRC寄存器。

2、把数据帧中的第一个字节的8位与CRC寄存器中的低字节进行异或运算，结果存入CRC寄存器。

3、将CRC寄存器向右移一位，最高位填以0，最低位移出并检测。

4、如果最低位为0，重复第三步（下一次移位）；如果最低位为1，将CRC寄存器与一个预设的固定值（0A001H）进行异或运算。

Function code: Function code tells the addressed terminal what function to perform.

Data area: Data area contains the data with which the terminal implements certain function, or which the terminal collects when it responds the request. The data may be value, reference address or set value. For example, the function code tells the terminal to read a register, and then the data area will indicate from which register and how much data to read. The embedded address and data is different according to the different type and content between the different slaves.

CRC checking code: Error checking (CRC) domain occupies two bytes, including a 16 bit binary value. CRC value is calculated by the transmission equipment, and then is attached to the data frame, the receiving equipment calculates CRC value again when it is receiving data, then compares with the value in the CRC area, if the two values are not equal, error occurs.

CRC algorithm: 1 Preset a 16-bit register which is called CRC register to the value of 0xFFFF.

2 Compute the exclusive-or value between the first byte of the data frame and the low-byte of the CRC register, and save the result back to the CRC register.

3 Shift the CRC register 1 bit to right, fill the MSB with 0, and check the LSB which is shifted out.

4 If the LSB is 0. then repeat the step 3; if the LSB is 1, compute the exclusive-or value between the CRC register and the preset value of 0xA001.

5、重复第三步和第四步直到8次移位，这样处理完了一个完整的八位。

6、重复第2步到第5步来处理下一个八位，直到所有的字节处理结束。

7、最终CRC寄存器的值就是CRC的值。

此外还有一种利用预设的表格计算CRC的方法，它的主要特点是计算速度快，但是表格需要较大的存储空间，该方法此处不再赘述，请参阅相关资料。

7.2 功能码简介

7.2.1 功能码03H或04H：读寄存器

此功能允许用户获得设备采集与记录的数据及系统参数。主机一次请求的数据个数没有限制，但不能超出定义的地址范围。

下面的例子是从01号从机读3个采集到的基本数据（数据帧中每个地址占用2个字节）L1、L2、L3，其中L1的地址为0000H，L2的地址为0001H，L3的地址为0002H。

主机发送 Master transmitted		发送信息 Send value
地址码 Address code		01H
功能码 Function code		03H
起始地址 Start address	高字节 High byte	00H
	低字节 Low byte	00H
寄存器数量 Number of register	高字节 High byte	00H
	低字节 Low byte	03H
CRC 校验码 CRC checking code	低字节 Low byte	05H
	高字节 High byte	CBH

5 Repeat step 3 and step 4 until shifting 8 times, then the entire 8 bits are processed.

6 Process the next 8 bits by repeating from the step 2 to step 5 until all the bytes are processed.

7 The value of CRC register is the CRC value at last.

In additional, there is another method using preset form to compute CRC, its main advantage is speed, but the form needs large storage space. The method is not mentioned here, please refer to relevant material.

7.2 Function code brief

7.2.1 Function code 03H or 04H: read register

This feature allows users to access equipment acquisition and records of data and system parameters. The number of data which master request once is not limited, but can not beyond the definition of the address range.

The following example is reading 3 acquisitions (every address occupied 2 bytes in data frame) L1, L2, L3 from slave 01, the address of L1 is 0x0000, L2 is 0x0001, L3 is 0x0002.

从机返回 Slave response		返回信息 Return value
地址码 Address code		01H
功能码 Function code		03H
字节数 Number of byte		06H
寄存器 数据 Data of register	高字节 High byte	00H
	低字节 Low byte	00H
寄存器 数据 Data of register	高字节 High byte	00H
	低字节 Low byte	00H
寄存器 数据 Data of register	高字节 High byte	00H
	低字节 Low byte	00H
CRC校验码 CRC checking	低字节 Low byte	21H
	高字节 High byte	75H

7.2.2功能码10H：写寄存器

功能码10H允许用户改变多个寄存器的内容, 该仪表中系统参数、继电器输出状态等可用此功能号写入。主机一次最多可以写入8个(16字节)数据。

下面的例子是预置地址为01的仪表输出开关量DO2。开关量输入/输出状态指示寄存器地址为0003H, 第0-3位对应DI1-DI4, 第8-10位分别对应DO0-DO2。

主机发送 Master transmitted		发送信息 Send value
地址码 Address code		01H
功能码 Function code		10H
起始地址 Start address	高字节 High byte	00H
	低字节 Low byte	03H
寄存器数量 Number of register	高字节 High byte	00H
	低字节 Low byte	01H
字节数 Number of byte		02H
0022H 待写入数据 0022H Data will be written	高字节 High byte	04H
	低字节 Low byte	00H
CRC校验码 CRC checking	低字节 Low byte	A4H
	高字节 High byte	A3H

7.2.2 Function 10H: write register

Function code 10H allows user to change the content of many registers, the system parameters and status of relay output in the meter can write using this function code.

The following example is write digital output DO2. The register address of digital input/output status indicator is 0x0003. The bits 0-3 are corresponding with DI1-DI4, and the bits 8-10 are corresponding with DO0-DO2.

从机返回 Slave response		返回信息 Return value
地址码 Address code		01H
功能码 Function code		10H
起始地址 Start address	高字节 High byte	00H
	低字节 Low byte	03H
寄存器数量 Number of register	高字节 High byte	00H
	低字节 Low byte	01H
CRC校验码 CRC checking	低字节 Low byte	F1H
	高字节 High byte	C9H

7.3 地址参量 Address parameters

表 Table 7

地址 Address	地址 Address	参数 Parameters	读写属性 R/W	数值范围 Range	类型 Data type
1	0x00	L1相实际电流 单位0.1A Phrase L1 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
2	0x01	L2相实际电流 单位0.1 A Phrase L2 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
3	0x02	L3相实际电流 单位0.1 A Phrase L3 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
4	0x03	开关量输出 Switching output xxxxxxx bit7 ~ bit0	R/W	bit0 脱扣 bit0 tripping bit1 可编辑输出 bit1 Editing output	高字节 High byte BYTE
		开关量输入 Switching input xxxxxxx bit7 ~ bit0	R	bit0 输入1 bit0 input1 bit1 输入2 bit1 input2	低字节 Low byte BYTE
5	0x04	保留 Reserved	R	0	Word
6	0x05	保留 Reserved	R	0	Word
7	0x06	保留 Reserved	R	0	Word
8	0x07	断相脱扣延迟时间设定 Phrase failure tripping delay set 单位0.1 sunit 0.1s	R/W	1 ~ 250	Word
9	0x08	保留 Reserved	R	0	Word
10	0x09	平均实际电流 单位0.1A Average actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word

11	0x0A	接地/漏电电流 Grounding/leakage current 单位 mA Unit mA	R	100 ~ 1000	Word
12	0x0B	保留 Reserved	R	0	Word
13	0x0C	保留 Reserved	R	0	Word
14	0x0D	额定电流设定 Rated current setting 单位0.1 A unit 0.1A	R/W	4 ~ 8000	Word
15	0x0E	脱扣等级设定 Tripping level set	R/W	5, 10, 15, 20, 25, 30, 35, 40	Word
16	0x0F	起动时间 Starting time 单位0.1s Unit 0.1s	R/W	1 ~ 9999	Word
17	0x10	过载报警域值设定 Overload alarm range set 单位 % unit %	R/W	1 ~ 99	Word
18	0x11	保留 Reserved	R	0	Word
19	0x12	接地/漏电故障电流设定 Grounding/leakage fault current set 单位mA unit mA	R/W	30 ~ 1000	Word
20	0x13	接地/漏电故障脱扣延时设定 Grounding/leakage fault tripping delay set 单位0.1s unit 0.1s	R/W	1 ~ 250	Word
21	0x14	保留 Reserved	R	0	Word

22	0x15	欠载脱扣域值设定 Underload tripping range set 单位 % unit %	R/W	10 ~ 99	Word
23	0x16	欠载脱扣延时设定 Underload tripping delay set 单位0.1s unit 0.1s	R/W	1 ~ 250	Word
24	0x17	保留 reserved	R	0	Word
25	0x18	不平衡脱扣域值设定 Unbalance tripping range set 单位 % unit %	R/W	10 ~ 99	Word
26	0x19	不平衡脱扣延时设定 Unbalance tripping delay set 单位0.1s unit 0.1s	R/W	1 ~ 250	Word
27	0x1A	不平衡报警域值设定 Unbalance alarm range set 单位 % unit %	R/W	10 ~ 99	Word
28	0x1B	报警允许位开/关 Alarm enable/disable xxxxxxx bit7 ~ bit0	R/W	bit0过载报警 bit0 overload alarm bit1不平衡报警 bit1 unbalance alarm	Word
29	0x1C	脱扣允许位开/关 Tripping enable/disable xxxxxxx bit8 ~ bit0	R/W	bit0过载脱扣 bit0 overload tripping bit1漏电脱扣 bit1 leakage tripping bit2欠载脱扣 bit2 underload tripping bit3断相脱扣 bit3 phrase failure tripping bit4起动超时脱扣 bit4 Tripping for over time in starting tripping bit5短路脱扣 bit5 Short circuit tripping bit6阻塞脱扣 bit6 blocking tripping bit7不平衡脱扣 bit7 unbalance tripping bit8外部故障 bit8 External fault	Word

30	0x1D	保留 reserved	R	0	Word
31	0x1E	MODBUS波特率设定 2400、4800、9600、19200、38400 MODBUS baudrate set 2400, 4800, 9600, 19200, 38400	R/W	2400, 4800, 9600, 19200, 38400	Word
32	0x1F	MODBUS地址设定 MODBUS address set	R/W	1 ~ 247	Word
33	0x20	保留 Reserved	R	0	Word
34	0x21	保留 Reserved	R	0	Word
35	0x22	保留 Reserved	R	0	Word
36	0x23	保留 Reserved	R	0	Word
37	0x24	阻塞倍率设定 Blocking multiplying power set 单位% unit %	R/W	100 ~ 700	Word
38	0x25	阻塞脱扣延时设定 Blocking tripping delay set 单位0.1s unit 0.1s	R/W	1 ~ 250	Word

39	0x26	远程复位 Remote reset	R/W	0正常1复位	Word
40	0x27	外部故障脱扣延时 External fault tripping delay	R/W	1~250	Word
41	0x28	可编辑继电器设定 Editing relay set	R/W	1~8	Word
42	0x29	过载冷却时间 Overload cooling time manual reset	R/W	0手动复位1~30 0 Manual reset 1~30	Word
43	0x2A	保留 Reserved	R	0	Word
44	0x2B			0	Word
45	0x2C			0	Word
46	0x2D			0	Word
47	0x2E			0	Word
48	0x2F	事件控制参数 Event control parameter	R	下一个事件存放事件记录号 Next event record number	高字节 High byte BYTE
			R	事件开关0关1开 Event switch 0 OFF 1 ON	低字节 Low byte BYTE
49	0x30	事件 记录 1 Event record 1	STA1	R	动作方式 Operation mode 高字节 High byte BYTE
			Month1	R	动作时间-月 Operation time-month 低字节 Low byte BYTE
50	0x31		Day1	R	动作时间-日 Operation time-day 高字节 High byte BYTE
			Hour1	R	动作时间-时 Operation time- hour 低字节 Low byte BYTE
51	0x32		Minute1	R	动作时间-分 Operation time- minutes 高字节 High byte BYTE
			Second1	R	动作时间-秒 Operation time-second 低字节 Low byte BYTE
52	0x33	事件 记录 2 Event record 2	STA2	R	动作方式 Operation mode 高字节 High byte BYTE
			Month2	R	动作时间-月 Operation time-month 低字节 Low byte BYTE
53	0x34		Day2	R	动作时间-日 Operation time-day 高字节 High byte BYTE
			Hour2	R	动作时间-时 Operation time- hour 低字节 Low byte BYTE
54	0x35		Minute2	R	动作时间-分 Operation time- minutes 高字节 High byte BYTE
			Second2	R	动作时间-秒 Operation time-second 低字节 Low byte BYTE

55	0x36	事件记录3 Event record 3	STA3	R	动作方式 Operation mode	高字节 High byte BYTE
			Month3	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
56	0x37		Day3	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour3	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
57	0x38		Minute3	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
		事件记录4 Event record 4	Second3	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE
58	0x39		STA4	R	动作方式 Operation mode	高字节 High byte BYTE
			Month4	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
59	0x3A		Day4	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour4	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
60	0x3B		Minute4	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
		事件记录5 Event record 5	Second4	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE
61	0x3C		STA5	R	动作方式 Operation mode	高字节 High byte BYTE
			Month5	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
62	0x3D		Day5	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour5	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
63	0x3E		Minute5	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
			Second5	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE

64	0x3F	事件记录6 Event record 6	STA6	R	动作方式 Operation mode	高字节 High byte BYTE
			Month6	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
65	0x40		Day6	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour6	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
66	0x41		Minute6	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
		事件记录7 Event record 7	Second6	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE
67	0x42		STA7	R	动作方式 Operation mode	高字节 High byte BYTE
			Month7	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
68	0x43		Day7	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour7	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
69	0x44		Minute7	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
		事件记录8 Event record 8	Second7	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE
70	0x45		STA8	R	动作方式 Operation mode	高字节 High byte BYTE
			Month8	R	动作时间-月 Operation time-month	低字节 Low byte BYTE
71	0x46		Day8	R	动作时间-日 Operation time-day	高字节 High byte BYTE
			Hour8	R	动作时间-时 Operation time-hour	低字节 Low byte BYTE
72	0x47		Minute8	R	动作时间-分 Operation time-minutes	高字节 High byte BYTE
			Second8	R	动作时间-秒 Operation time-second	低字节 Low byte BYTE

事件记录中的时间定义 Time definition in event record:

Month月定义 Month definition:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
			M10	M08	M04	M02	M01

Day日定义 Day definition:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
		D20	D10	D08	D04	D02	D01

Hour时定义 Hour definition:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
		H20	H10	H08	H04	H02	H01

Minute分定义 Minute definition:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	M40	M20	M10	M08	M04	M02	M01

Second秒定义 Second definition:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	S40	S20	S10	S08	S04	S02	S01

例：读取事件8：

1、读到地址0x45高字节的数据为00000001，则时间8的动作原因为启动超时。

2、读到地址0x45低字节的数据为00010001，则实际的月份应为10+1=11月份。

3、读到地址0x46高字节的数据为00101001，则实际的日应为20+8+1=29号。

4、读到地址0x46低字节的数据为00100010，则实际的时应为20+2=22时。

5、读到地址0x47高字节的数据为01010010，则实际的分应为40+10+2=52分。

6、读到地址0x47低字节的数据为00110010，则实际的秒应为20+10+2=32秒。

则事件8的发生时间为11月29日22时52分32秒，动作原因为启动超时引起脱扣动作。

Example: read event record 8

1, The value of high byte of address 0x45 is 00000001, and then the reason of event 8 is starting overtime.

2, The value of address 0x45 low byte is 00010001, then the actual month is November (10+1).

3, The value of address 0x46 high byte is 00101001, then the actual day is 29th (20+8+1).

4, The value of address 0x46 low byte is 00100010, then the actual hour is 22(20+2).

5, The value of address 0x47 high byte is 01010010, then the actual minute is 52(40+10+2).

6, The value of address 0x47 low byte is 00110010, then the actual second is 32(20+10+2).

Then the event 8 acted at 22:52:32 on Nov. 29th.

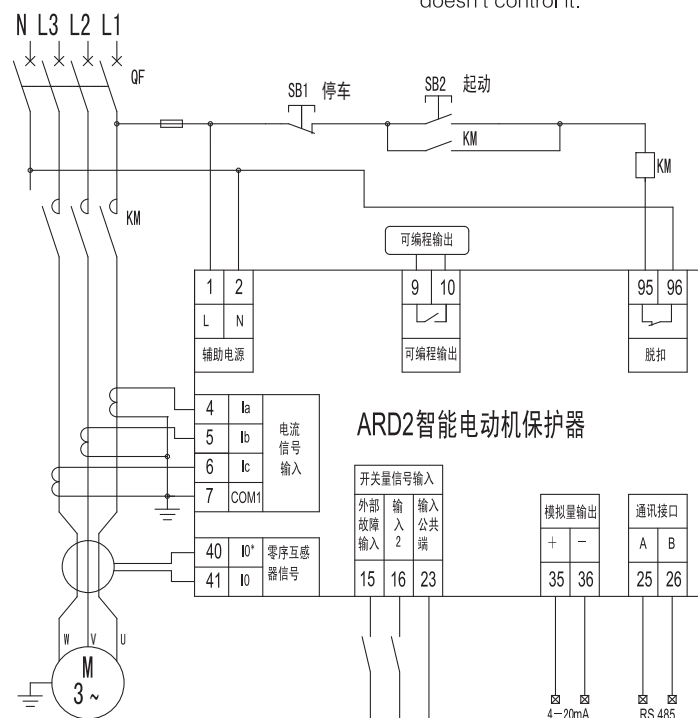
8典型应用方案 Typical Applications

直接起动模式：图中电动机的起动、停车是通过现场按钮来控制的(保护器本身不控制电动机起、停)。接触器KM的吸引线圈串进脱扣继电器的常闭触点中。通电后，按下SB2(起动按钮)时，KM吸引线圈得电，使KM的触头闭合，电动机开始工作；当按下SB1(停车按钮)时，KM吸引线圈失电，使KM触点释放，电动机停止工作。

注：远程起动必须要由上位机来控制，保护器本身不控制。

Direct starting mode: the starting or stopping of the motor shown in figure is controlled by button in field (the protection does not control the motor), the magnetizing coil of contactor KM connects with the normally closed contact of the tripping relay using series connection. When energizing, press the SB2 key(starting button), the magnetizing coil of KM is energized and closes the main contact, then the motor starts; when press SB1(stopping button) key, the magnetizing coil of KM is loss of power and releases the main contact, the motor stops.

Note: remote starting need to be controlled by host computer, the protection doesn't control it.



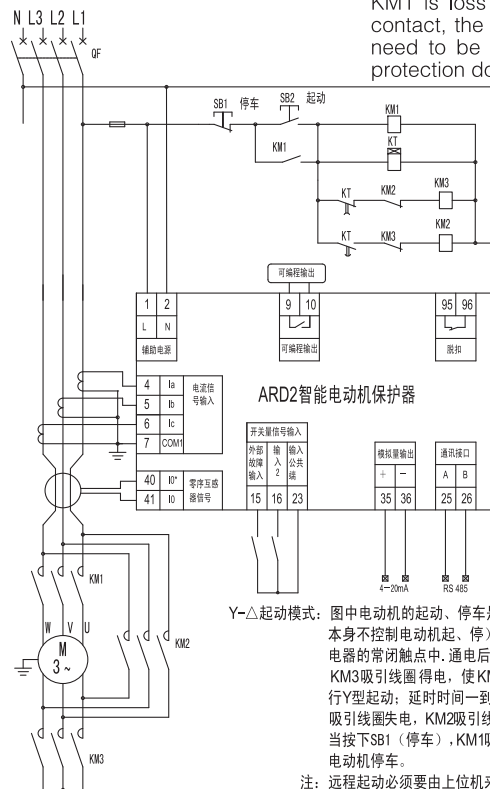
ARD2电动机保护器直接起动模式接线图
ARD2 motor protective device direct starting mode wiring diagram

直接起动模式：图中电动机的起动、停车是通过现场按钮来控制的(保护器本身不控制电动机起、停)，接触器KM的吸引线圈串进脱扣继电器的常闭触点中。通电后，按下SB2(起动按钮)，KM吸引线圈得电，使KM的自锁触点闭合，电动机开始工作；当按下SB1(停车按钮)，KM吸引线圈失电，使KM自锁触点释放，电动机停止工作。

注：远程起动必须要由上位机来控制，保护器本身不控制。

Y-△启动模式：图中电动机的启动、停车是通过现场按钮来控制的（保护器本身不控制电动机起、停），接触器KM1的吸引线圈串进脱扣继电器的常闭触点中。通电后，按下SB2（启动按钮）时，KM1、KM3吸引线圈得电，使KM1、KM3的主触点闭合，电动机进行Y型启动；延时时间一到则时间继电器KT动作，使KM3 吸引线圈失电，KM2吸引线圈得电，使电动机转入△正常运行模式。当按下SB1（停车按钮）时，KM1吸引线圈失电，使KM1触点释放，电动机停车。

注：远程启动必须要由上位机来控制，保护器本身不控制



Y-△启动模式：图中电动机的启动、停车是通过现场按钮来控制的（保护器本身不控制电动机起、停），接触器KM1的吸引线圈串进脱扣继电器的常闭触点中。通电后，按下SB2（启动按钮），KM1、KM3吸引线圈得电，使KM1、KM3的主触点闭合，电动机进行Y型启动；延时时间一到则时间继电器KT动作，使KM3吸引线圈失电，KM2吸引线圈得电，使电动机转入△正常运行模式。当按下SB1（停车按钮），KM1吸引线圈失电，使KM1自锁触点释放，电动机停车。

注：远程启动必须要由上位机来控制，保护器本身不控制。

ARD2电动机保护器Y-△启动模式接线图

ARD2 motor protective device Y-△ starting mode wiring diagram

9 保护功能设置及说明 Protective Function Set and Description

9.1 保护功能参数设置 Protective function parameters set
表 Table 8

功能 Function	项目 Item	内容 Content
启动超时保护 Starting overtime protection	启动时间范围 Starting time range	0.1s ~ 999.9s
	动作时间 Operation range	瞬动 Instantaneous operation
	保护动作方式 Protection operation mode	脱扣 tripping
过载保护 Overload protection	不动作特性 No operation feature	<105%I _e , 2h内不动作 <105%I _e , no operation in 2h
	动作特性 Operation feature	>120%I _e , 1h内延时动作 >120%I _e , operation delay in 1h
	脱扣级别 Tripping level	5, 10, 15, 20, 25, 30, 35, 40
	报警值域 Alarm range	1% ~ 99%
	过载保护方式 Overload protection mode	报警、脱扣 Alarm, tripping
阻塞保护 Blocking protection	动作值整定范围 Operation value set range	(100% ~ 700%)I _e
	延时时间整定范围 Delay time set range	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	脱扣 tripping
欠载保护 Underload protection	动作值整定范围 Operation value set range	(10% ~ 99%)I _e
	延时时间整定范围 Delay time set range	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	脱扣 Tripping
不平衡保护 Unbalance protection	动作值整定范围 Operation value set range	10% ~ 99%
	动作时间 Operation time	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	报警、脱扣 Alarm, tripping
保护接地/漏电 Grounding/leakage protection	整定值范围 Set value range	30 ~ 1000mA
	延时时间 Delay time	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	脱扣 Tripping
短路保护 Short circuit protection	短路整定值 Short circuit setting value	800% I _e
	动作时间 Operation time	0.1s
外部故障保护 External fault protection	动作时间 Operation time	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	脱扣 Tripping
断相保护 Phase failure protection	动作时间 Operation time	0.1s ~ 25.0s, 级差0.1s 0.1s ~ 25.0s, level difference 0.1s
	保护动作方式 Protection operation mode	脱扣 Tripping

9.2 保护功能说明

启动超时保护

当电动机启动时间达到用户设定的启动时间，电动机的三相平均电流还大于设定的额定电流1.1倍时，保护器按照内部设定的要求保护，发出脱扣命令，停止电机运行。

过载保护

当电动机在过负载情况下，长时间超过其额定电流运行时，会导致电动机过热，绝缘降低而烧毁，保护器根据电动机的发热特性，计算电动机的热容量，模拟电动机发热特性对电动机进行保护。

过载保护电流-时间对照表10，过载特征曲线图(K曲线图)如下图所示。

过载保护电流-时间对照表 Overload current protection-time comparison table
表 Table 9

可选的脱扣曲线等级K Optional tripping curves level K	5	10	15	20	25	30	35	40
脱扣延时 (S) 误差 Error of tripping delay(S) ± 10%	三相平衡的负载，自冷态始 Three-phase balance load, begin from the cold state							
额定值 Rated value I_n $\times 1.2$	125	250	375	500	625	750	875	1000
$\times 1.5$	80	160	240	320	400	480	560	640
$\times 2$	45	90	135	180	225	270	315	360
$\times 3$	20	40	60	80	100	120	140	160
$\times 4$	11.3	22.5	33.8	45	56.3	67.5	78.8	90
$\times 5$	7.2	14.4	21.6	28.8	36	43.2	50.4	57.6
$\times 6$	5	10	15	20	25	30	35	40
$\times 7.2$	3.5	6.9	10.4	13.9	17.4	20.8	24.3	27.8
$\times 8$	2.8	5.6	8.4	11.3	14.1	16.9	19.7	22.5

9.2 Protection function description

Starting overtime protection

While the motor starting time reaches to user's set value, the average current of three-phase is still more than set rated current 1.1 times, the protection will send a tripping command in accordance with internal set to stop the motor.

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 heat generation characteristics of motor, simulates heat generation characteristics of motor to protect the motor.

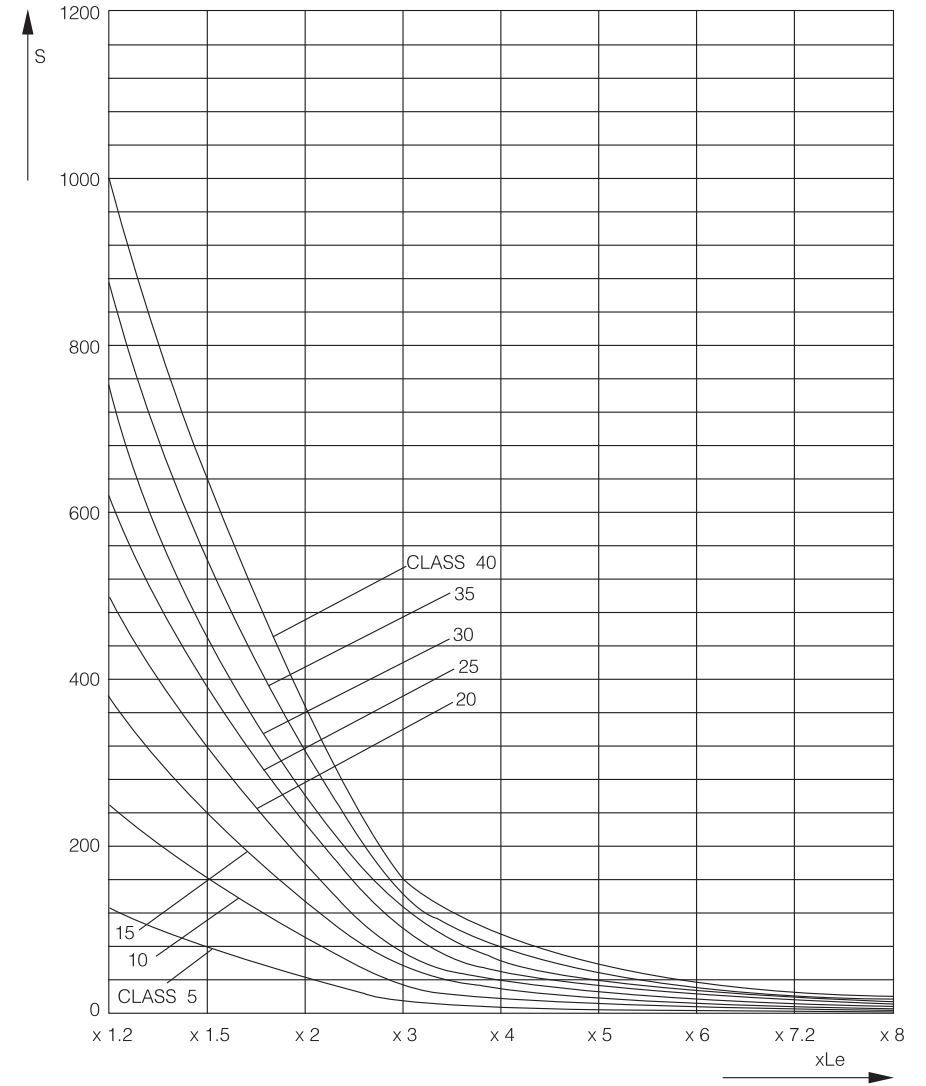
Overload current protection -time comparison table 10, overload characteristic curves (K curves) as the figure below.

当保护器监测到电动机过载运行了，保护器应在报警或脱扣（延时）设定时间内发出报警或脱扣信号。

When the protective device monitors the motor running in overload, it should send alarm or tripping signal in the alarm or tripping (delay) set time.

过载特征曲线图 (K曲线图)

Overload characteristic curves (K curves)



阻塞保护

电动机在运行过程中，如果由于负荷过大或自身机械原因，造成电动机轴被卡住，而未及时解除故障，将造成电机过热，绝缘降低而烧毁电机，阻塞保护适用于电动机运行过程中发生此类故障时进行保护；当电流达到动作设定电流时，保护器及时在脱扣（延时）设定时间内脱扣，避免电机烧毁。

Blocked protection

During the process of or running, 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 action set, Protection trips in tripping (delay) set time in a timely and avoids burning motor.

欠载保护

当电动机所带负载为泵式负载时，电动机空载或欠载运转会产生危害，保护器提供欠载保护，当三相的平均电流与额定电流的百分比低于设定值时，保护器应在脱扣（延时）设定时间内脱扣。

Underload 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 three-phase current and rated current is lower than set value, the protection should trip in tripping (delay) set time.

不平衡保护

电动机运行时，三相电流不平衡率达到保护设定值时，保护器按照设定的要求保护，发出报警或脱扣信号，使电动机的运行更加安全。三相不平衡率表示三相电流中最大电流和三相电流中最小电流的差值与三相电流中最大电流的比值。

Unbalance protection

When the motor is running and the ratio of three phrase current unbalance reaches the protective set value, the protection will send a alarm or tripping signal in accordance with internal set to make the motor running safely. The three phrase unbalance ratio is the difference between the max current and min current dividing the max current.

例如：

额定电流为100A，Ia85A、Ib70A、Ic100A，不平衡率为则为 $(100-70)/100=30\%$ 额定电流为100A，Ia110A、Ib70A、Ic100A，不平衡率为则为 $(110-70)/110=36.4\%$

Example:

The rated current is 100A, Ia is 85A, Ib is 70A, Ic is 100A, the three phrase unbalance ratio is $30\% (100-70)/100$ The rated current is 100A, Ia is 110A, Ib is 70A, Ic is 100A, the three phrase unbalance ratio is $36.4\% (110-70)/110$

动作时间误差：在动作时间定值 $\pm 10\%$ 范围内。

Error of operation time: in the value of $\pm 10\%$ operation time range

保护动作特性：当不平衡率>设定值时动作。

Protection operation feature: operate when unbalance ratio is more than set value.

接地/漏电保护

保护器具备接地保护和漏电保护功能（用户只能选择其中的一种）。保护器通过增加零序互感器，检测到大于设定的故障电流值，则保护器在脱扣（延时）设定时间内脱扣，以保证人身安全。

Protection of grounding/leakage

Protection has the function of grounding and leakage protection (user can only choose one kind). By increasing the zero-sequence transformer, Protection detected more than set fault current values, and tripped in the tripping (delay) set time to ensure personal safety.

断相保护

断相故障运行时对电动机的危害很大，当电动机发生断相时，保护器按照设定的要求保护，发出脱扣指令，使电动机的运行更加安全。

Phrase failure protection

Running in the condition of phrase failure fault make great harm to motor, when phrase failure occurs, the protection will execute protective operation in accordance with set requirement, send tripping command to ensure motor equipment running safely.

注：1、除断相保护和接地/漏电保护外，其余各项保护功能只有在保护器运行指示灯亮起来后才能对电动机进行保护。

Note: 1、Except phrase failure protection and grounding / leakage protection, the others protection functions only protect the motor when the protection running indicator is on.

2、4~20mA模拟量输出中20mA对应2倍电动机额定电流(P001)。

2、4~20 mA analog output of 20 mA is corresponding 2 times the rated current value(P001).

10 注意事项 Notice

1、用户在调试时，调试电流至少要达到所定购规格的15%，否则无电流显示。例：用户所定的保护器规格为ARD2-100，则调试电流需达到15A以上。

2、当保护器配有接地/漏电保护功能时，从零序电流互感器引入保护器的导线建议采用屏蔽导线，否则可能导致测量数据不准确。

3、应合理设定保护器的额定电流 (P001)，若此设定值低于电动机的正常额定工作电流值，则可能会导致电动机无法正常启动；高于电动机的正常额定工作电流值，则电动机出现故障时保护器可能无法进行正常保护。

4、保护器一旦发生脱扣动作，在故障排除后，重新启动电动机前，需对保护器进行复位，否则将无法启动电动机。

5、电机冷却时间：30分钟。电机过载保护动作后(故障显示为hEAt)由于热累积，冷却后方可复位。

6、在现场实际使用中，由于保护器的参数设置不合理，可能会导致电动机一起动就保护或无保护作用，此时，可将所有保护功能都关闭，根据保护器在电动机正常运行时测量得到的各种参数对保护器的各种保护参数进行重新设定。

1、When user is testing, the test current shall be at least up to 15% of specified specification, otherwise, the current is not displaying. Example: User specified protective device is ARD2-100, then test current must be above 15A.

2、When protection has the zero sequence current protection function, the wire from the residual current transformer to protection is recommended to be shielding, or may result in inaccurate measurement.

3、The rated current set of protection (P001) should be set properly, if this set is lower than the normal motor rated current value, it may lead to motor can't start normally; if higher than the rated current value, the protection may not be able to carry out normal protection, while the motor is in fault.

4、While the protection tripped once, after fault clearing, the protection should be reset before restarting motor, or the motor can't start.

5、Motor cooling time: 30 minutes. After operating overload protection (Fault display = hEAt), and cooling to normal condition, motor may be reset.

6、In field applications, the improperly set of parameters for protection may cause the motor protected at starting or no protected always. Then user can disable all the protection function and reset all the protective parameters of protection according to the parameters which measured at motor running normally.

7、若保护器设定的各种保护参数是合适的，但电动机一起动保护器就动作，则此时，可根据保护器显示的动作代码来查找故障原因。

8、保护器在出厂时的各种设置参数采用默认设置（用户特别要求除外），用户在实际使用中可根据实际需要各种保护功能打开，并对各种参数进行设置。

9、如用户无特别注明，则100A及以下互感器与保护器的连接线默认1m。

10、如用户有特殊要求的（如单相电动机保护器、抗晃电等）需在订单中注明。

7、If the parameters of protection is set appropriately, but the motor is protected at starting, then users can analysis the reason of fault according to the operation code which protection shows.

8、At the factory, the various parameters set of the protection is in default (unless the user request specifically); users can actually adjust the various parameters in accordance with actual needs and enable various protection features.

9、If no specified by users, the cable for transformer below 100A and protection is 1 m in default.

10、If there are special requirements of the users (such as single-phase motor protection, anti-flickering etc.), it should be marked in the order.

11 订货范例 Ordering Example

例：型 号：ARD2-25/CLMKSR

辅助电源：AC 220V

电机额定电流6.3A ~ 25A

应用场合：三相电机

测量参数：三相电流、三相平均电流

附加功能：RS485通讯、零序电流测量、4 ~ 20mA模拟量输出、2路开关量输入、8个事件记录

Example: Model: ARD2-25/CLMKSR

Auxiliary current: AC 220 V

Motor rated current 6.3A ~ 25A

Applications: three-phase motor

Measurement parameters: three-phase, current average three-phase current

Additional function: RS485 communication, zero sequence current measurement, 4~20mA analog output, 2-channel digital input, 8 event records

1 概述 General

ARD2F系列智能电动机保护器（以下简称保护器），采用最新的单片机技术，具有抗干扰能力强、工作稳定可靠、数字化、智能化、网络化等特点。保护器能对电动机运行过程中出现的启动超时、过载、堵转、断相、不平衡、欠载、接地/漏电、阻塞、过压、欠压、温度、 t_E 保护等多种情况进行保护，设有SOE故障事件记录功能，方便现场维护人员查找故障原因，并通过LCD中文液晶显示屏、状态指示灯等各种方式，将电机的运行状态清晰、直观地显示出来。适用于煤矿、石化、冶炼、电力、船舶、以及民用建筑等领域。该保护器具有RS485远程通讯接口，DC4~20mA模拟量输出，方便与PLC、PC等控制机组成网络系统，实现电动机运行的远程监控。

ARD2F Series Intelligent Motor Protective Device (hereinafter referred to Protection), using the latest SingleChip technology, has the strong anti-interference capabilities, stable and reliable, digital, intelligent, network-based features. The protection can deal with many situations in the process of motor running such as overtime of starting, overload, phase failure, phase unbalance, underload, the residual current (ground / leakage), the locked-rotor, overvoltage, undervoltage and others, and with the accident record of SOE (Sequence Of Event) to facilitate maintenance personnel at the scene to find cause of the malfunction. It is suitable to coal, petrochemical, metallurgical, power, shipping and civil buildings, and other fields. The protection has long-distance communications ports of RS485, 4~20mA analog output, is convenient to build a network with PLC, PC and so on. The remote monitoring of motor running is implemented.

2 产品型号 Model

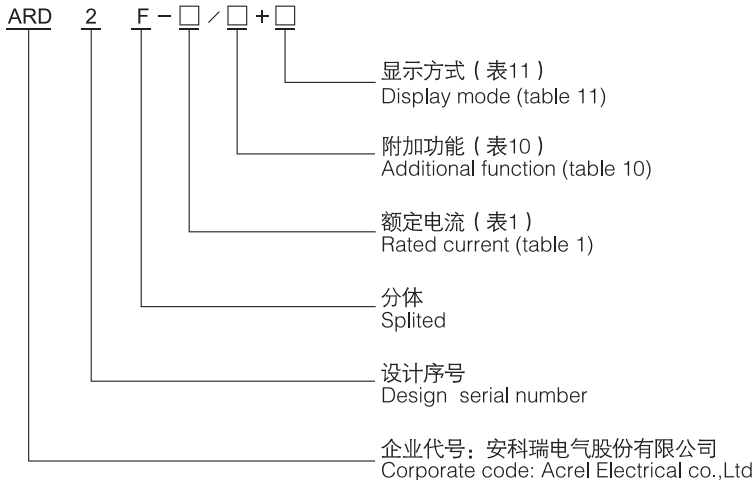


表 Table 10

附加功能 Additional function	代号 Code	附加功能 Additional function	代号 Code
起动控制 (包含K功能) Starting control (including K function)	Q	漏电保护 Leakage Protection	L
开关量输入 Switching input	K	4~20mA模拟量输出 4~20mA analog output	M
温度保护 Temperature protection	T	电压功能 Voltage function	U
报警 Alarm	J	SOE事件记录 SOE(Sequence Of Event) event record	SR
通讯接口/Modbus Communication port /Modbus	C	通讯接口/Profibus Communication port /Profibus	CP

表 Table 11

代号 Code	规格 Specification
90 L	LCD液晶显示模块尺寸为90×70，开孔86×66（单位mm） LCD module size is 90×70, cut out 86×66（unit mm）

3 通用技术指标 General Technical Specifications

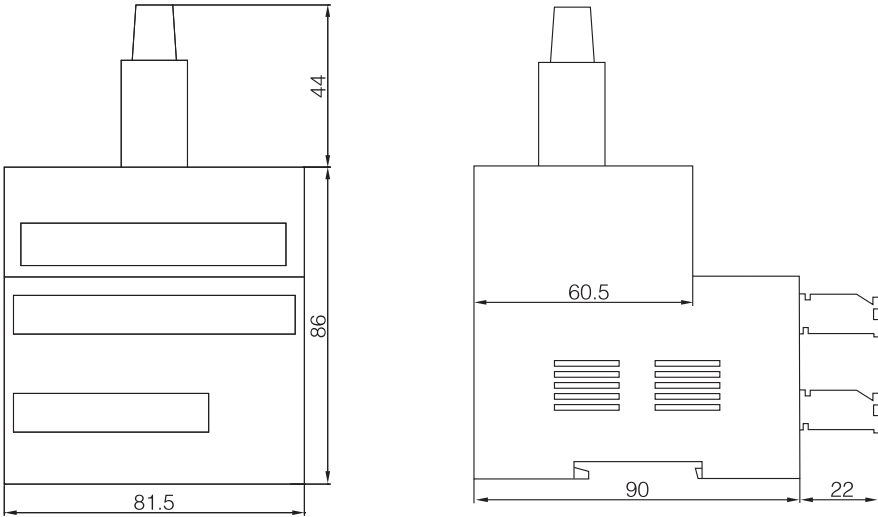
表 Table 12

技术参数 Technical parameter	技术指标 Technical specification	
保护器辅助电源 Auxiliary power for protection	AC85V~265V/DC100~350V, 功耗5VA AC85V~265V/DC100~350V, Consumption 5VA	
电机额定工作电压 Rated voltage of motor	AC380V/AC660V, 50H	
电动机额定工作电流 Rated current of motor	1.6A (0.4A~1.6A)	采用小型专用 电流互感器 Adopt the small special current transformer
	6.3A (1.6A~6.3A)	
	25A (6.3A~25A)	
	100A (25A~100A)	采用专用电流互感器 Using specific current transformer
	250A (63A~250A)	
	800A (250A~800A)	
继电器输出触点, 额定负载容量 Relay output contact, rated loading capacity	4路, AC250V、3A; DC30V、3A 4-channel AC250V、3A; DC30V、3A	
开关量输入 Switching input	12路, 光耦隔离 12-channel optical isolation	
通讯 Communication	RS485 Modbus协议 RS485 Modbus protocol	
环境 Environment	工作温度 Operating temperature range	-10℃~55℃
	贮存温度 Storage temperature range	-20℃~65℃
	相对湿度 Relative Humidity range	5%~95%不结露 5%~95%non-condensing
	海拔 Altitude	≤2500
污染等级 Pollution degree	2级 2 class	
防护等级 IP class	IP20	
安装类别 Installing category	III级 III class	

4 外形尺寸及安装(单位:mm) Dimension and Installation(unit: mm)

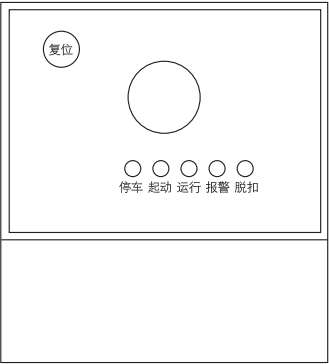
4.1 外形及安装开孔尺寸

4.1 Outline and installing cut out



主视图
Front view

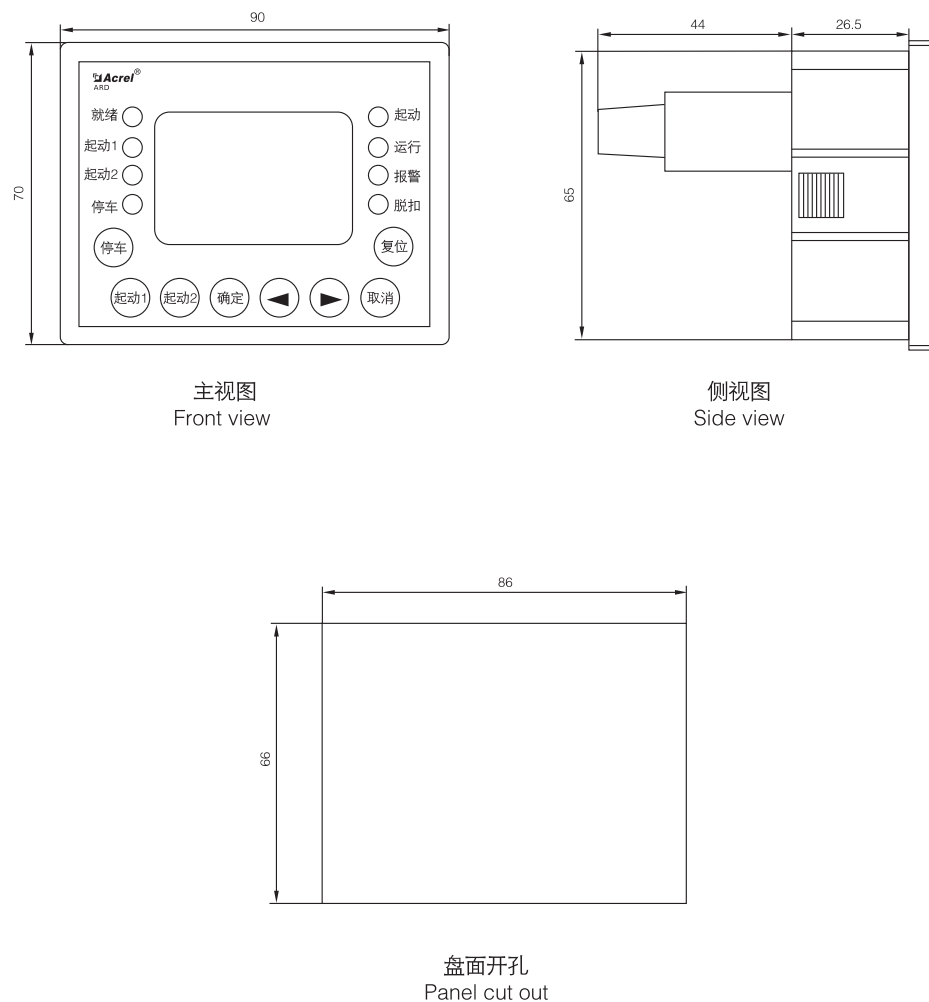
侧视图
Side view



俯视图
Top view

4.2 保护器显示单元安装尺寸

4.2 Installation size of protector display unit



4.3 互感器安装尺寸参照 (图4.2)

4.3 Installation size of transformer refer to figure 4.2

5 显示与参数设置 *Display and parameters setting*

5.1 操作面板说明

5.1 Operation panel illustration

用户可以通过显示单元上的LED指示灯和中文液晶显示屏观察电动机的运行状态, 并可通过按键来控制电动机启动、停止、复位、设置参数等。

Motor running condition may be observed by users through display unit LED indicators and the Chinese LCD screen. And pressing buttons can control: starting, stopping, reset, parameters setting etc. of motor .

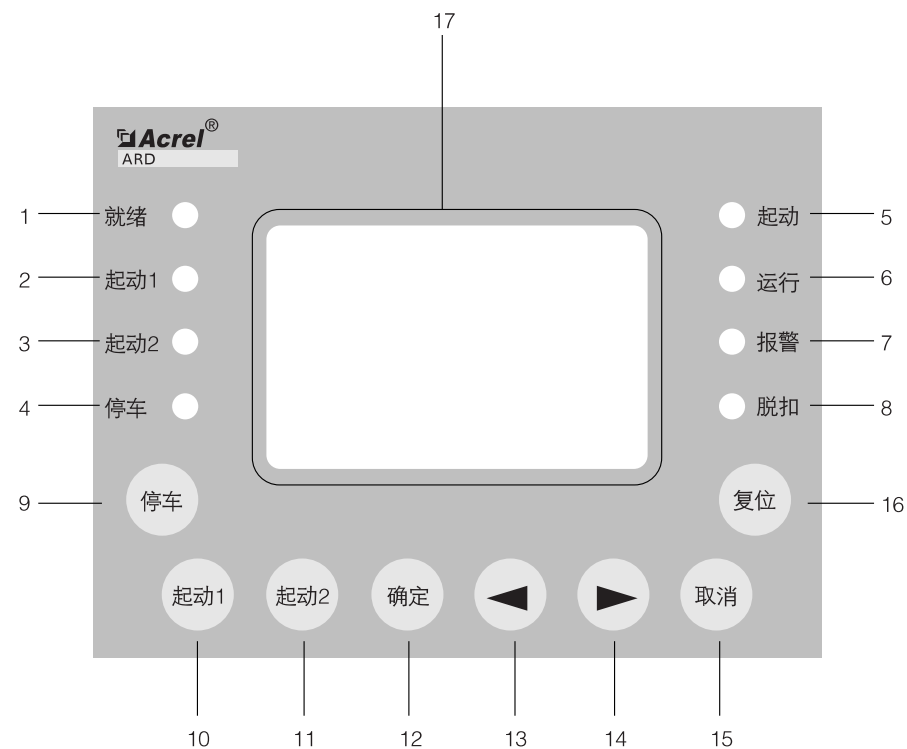


表13

Table 13

序号 No	名称 Name	状态 Status	功能说明 Function description
1	就绪LED指示灯 Ready LED indicator	亮 Lights	该指示灯亮则表明保护器处于正常状态，可以启动电动机 This indicator lights indicating protective device is in normal status, can start motor
2	启动1 LED指示灯 Starting 1 LED indicator	亮 Lights	该指示灯亮则保护器启动1继电器闭合 This indicator lights indicating protective device starting 1 relay is closed
3	启动2 LED指示灯 Starting 2 LED indicator	亮 Lights	该指示灯亮则保护器启动2继电器闭合 This indicator lights indicating protective device starting 2 relay is closed
4	停车LED指示灯 Stopped LED indicator	亮 Lights	该指示灯亮则表明电动机处于停止状态 This indicator lights indicating motor is in stopped status
5	启动LED指示灯 Starting LED indicator	亮 Lights	该指示灯亮则表明电动机处于启动阶段 This indicator lights indicating motor is in starting stage
6	运行LED指示灯 Running LED indicator	亮 Lights	该指示灯亮则表明电动机处于运行状态 This indicator lights indicating motor is in running status
7	报警LED指示灯 Alarm LED indicator	亮 Lights	该指示灯亮则表明保护器报警继电器已动作 This indicator lights indicating protective device Alarm relay is operated
8	脱扣LED指示灯 Tripping LED indicator	亮 Lights	该指示灯亮则表明保护器脱扣继电器已动作 This indicator lights indicating protective device tripping relay is operated
9	停车按键 Stopped button	按下 Press	释放启动1、启动2继电器 Release starting 1, starting 2 relay
10	启动1按键 Starting 1 button	按下 Press	操作启动1继电器，使其闭合 Operate starting 1 relay, enable it closing
11	启动2按键 Starting 2 button	按下 Press	操作启动2继电器，使其闭合 Operate starting 2 relay, enable it closing
12	确定按键 Enter button	按下 Press	进入菜单，修改参数 Enter menu, revise paramete
13	⬆️方向键 Direction key	按下 Press	上翻菜单；数据移位；查看事件记录 Upward scroll menu; data shifting; look over event record
14	⬇️方向键 Direction key	按下 Press	下翻菜单；修改数据； Downward scroll menu; revise data
15	取消按键 Cancel button	按下 Press	退出菜单；取消操作；点亮背光 Exit menu; Cancel Operation; lights backlight
16	复位按键 Reset button	按下 Press	将保护器复位 Protective device Reset
17	LCD显示屏 LCD screen		显示各种测量参数和设置参数 Display various measured parameters and setting parameters

5.2 参数设置

5.2.1 显示菜单内容

1. A、B、C三相电流
2. 工作电流与设定额定电流的百分比
3. Uab、Ubc、Uca线电压
4. Iav三相平均电流、Uav三相平均电压、Id漏电流
5. 热容量百分比
6. PTC热电阻阻值
7. 4路继电器输出，1--脱扣、2--报警、3--启动1、4--启动2
8. 12路DI状态

用户可通过按动显示单元上的“”键用于显示菜单界面的选择。按动显示单元上的“”键用于轮流显示各个事件记录（需带有事件记录SR功能）。

用户需要进入参数设置菜单，可在显示菜单界面时，按动“确定”按键，此时会出现密码输入界面，要求用户输入密码才能进入参数设置菜单（初始密码为0001，万能密码为0008），用户可按动“”和“”键输入正确的密码，按动“确定”按键进入参数设置菜单，此时可按动“”和“”键选择所需设置的项目，选定后按动“确定”按键进入该项目的设置界面，再次按动“”和“”键选择所需设置的子项目，按动“确定”按键进入值设定界面，按动“”和“”键进行值的设定，设定完毕后可按动“确定”按键进行保存，保存后按动“取消”按键退出，也可按动“取消”按键不保存退出。

5.2 Parameters setting up

5.2.1 Display menu content

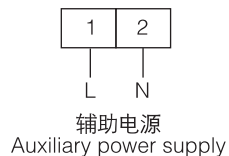
1. A, B, C three phase current
2. Percentage between operational current and setting rated current
3. Uab, Ubc, Uca line voltage
4. Iav three phase average current, Uav three phase average voltage, Id leakage current
5. Heat capacity percent
6. PTC thermal resistance value
7. 4-channel relay output, 1--Tripping, 2--Alarming, 3--Starting 1, 4-- Starting2
8. 12-channel DI status

Button "" is used for selecting display menu interface. Press display unit button "" can display each event record in turn (With event record SR function).

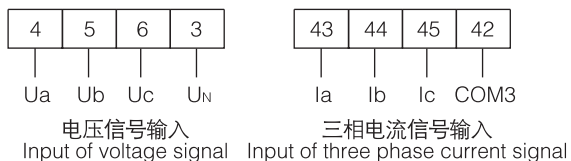
If user needs enter parameter set up menu, while displaying menu interface, pressing "ENTER" button, at this time, password input interface may be appearing, only when password is typed, the user can enter the parameter set up menu (Default password 0001, omnipotence password 0008). The user may press "" and "" to type correct password, press "Enter" to enter parameter set up menu, then press "" and "" to select the setting item, after selecting, press "Enter" to enter set up interface of this item, press "" and "" again to select the sub-item needed to set up, press "Enter" to enter the setting interface, press "" and "" to set concretely, after finishing to press "Enter" to save, after saving to press "Cancel" to exit, by pressing "Cancel" can exit without saving.

6 接线方式 Connection mode

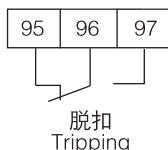
6.1 辅助电源 Auxiliary power supply



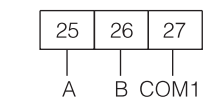
6.2 电流、电压信号输入 Input of current, voltage signal



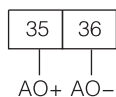
6.3 继电器输出 Relay output



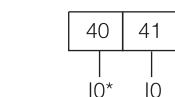
6.4 RS485通讯 Communication



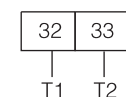
6.5 4~20mA模拟量输出 Analog output



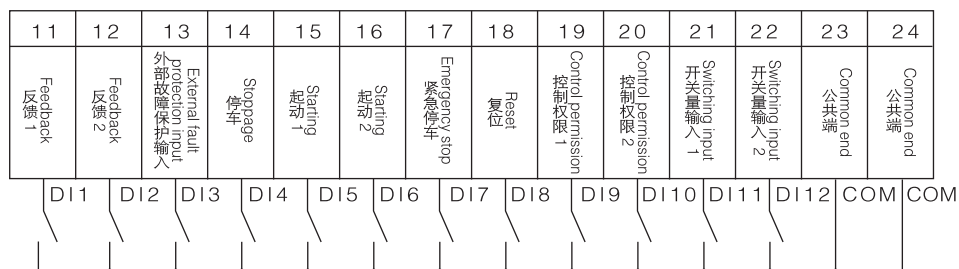
6.6 零序电流输入 Zero sequence current input



6.7 热电阻输入 Thermal resistance input



6.8 开关量输入 Switching input



注：12路DI在保护模式下，只作为开关量输入使用

Note: Under the protection mode, 12-channel DI is only used for switching input.

7 通讯协议 Communication protocol

7.1 通讯协议概述 General of Communication protocol

参照第12页ARD2通讯协议概述

7.2 功能码简介 Function code brief

7.3 地址参量 Address parameters表 Table 14

地址 Address	地址 Address	参数 Parameters	读写属性 R/W	数值范围 Range	类型 Data type
1	0x00	L1相实际电流 单位0.1A Phrase L1 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
2	0x01	L2相实际电流 单位0.1A Phrase L2 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
3	0x02	L3相实际电流 单位0.1A Phrase L3 actual current unit 0.1A 1.6A、6.3A规格时单位0.01A 1.6A、6.3A Spec. unit 0.01A	R	0 ~ 9999	Word
4	0x03	开关量输入 Switching input (Bit0~Bit11) 开关量输出 Switching output (Bit12~Bit15)	R/W	Bit0: DI1 反馈1 (常开) DI1 feedback1 (NO) Bit1: DI2 反馈2 (常开) DI2 feedback2 (NO) Bit2: DI3 外部故障保护输入 DI3 External fault protection input Bit3: DI4 紧急 停车 DI4 stop Emergency stop Bit4: DI5 起动1 DI5 Starting1 Bit5: DI6 起动2 DI6 Starting2 Bit6: DI7 停车 DI7 stop Bit7: DI8 复位 DI8 Reset Bit8: DI9控制权限1 DI9 control permission 1 Bit9: DI10控制权限2 DI10 control permission2 Bit10: DI11 开关量输入 DI11 Switching input Bit11: DI12 开关量输入 DI12 Switching input Bit12: DO1脱扣 DO1 Tripping Bit13: DO2 报警 DO2 Alarm Bit14: DO3 起动1 DO3 Starting1 Bit15: DO4 起动2 DO4 Starting2	Word
5	0x04	Uab 线电压 Uab Line voltage	R	0~9999	Word
6	0x05	Ubc 线电压 Ubc Line voltage	R	0~9999	Word
7	0x06	Uca 线电压 Uca Line voltage	R	0~9999	Word

8	0x07	报警故障指示 Alarm fault indicating	R	Bit0: 过载 报警 Over load alarm Bit1: 接地/漏电 报警 Earthing/leakage Alarm Bit2: 欠载 报警 Under load Alarm Bit3: 断相 报警 Phase loss Alarm Bit4: 欠压 报警 Under voltage Alarm Bit5: 过压 报警 Over voltage Alarm Bit6: 堵转 报警 Rotor locked Alarm Bit7: 阻塞 报警 Blocking Alarm Bit8: 不平衡 报警 Unbalanced Alarm Bit9: PTC 温度 报警 PTC Temperature Alarm Bit10: 外部故障 报警 External fault Alarm Bit11: 起动超时报警 Starting over time Alarm	Word
9	0x08	脱扣故障指示 Tripping fault indicating	R	1. 起动超时 Starting over time 2. 热过负荷 (过载) Thermal over load(over load) 3. 电流过低 (欠载) Current excessive low(under load) 4. 电流不平衡 Current unbalanced 5. 断相 Phase loss 6. 过压 Over voltage 7. 欠压 Under voltage 8. 阻塞 Blocking 9. 接地/漏电 Earthing/leakage 10. 短路 Short circuit 11. 堵转 Rotor locked 12. PTC温度 PTC Temperature 13. 外部故障 External fault 14. 控制失败 Control failed	Word

10	0x09	累计热容量百分比 Adding heat capacity percent	R	0~100%	Word
11	0x0A	接地/漏电电流 Earthing/leakage current	R	30~1000mA	Word
12	0x0B	温度值 Temperature value	R	1000~10000	Word
13	0x0C	电机状态 Motor status	R	电机热过载冷却剩余时间 Cooling residual time for motor heat over load Bit0: 就绪 Ready Bit1: 停车 stop Bit2: 起动 Starting Bit3: 运行 Running Bit4: 报警 Alarm Bit5: 脱扣 Tripping	高字节 High byte 低字节 Low byte
14	0x0D	电动机额定电流设定 Setting motor rated current	R/W	1.6~800.0	Word
15	0x0E	脱扣等级设定 Setting Tripping class	R/W	5、10、15、20、25、30、35、40	Word
		tE脱扣时间设定 Setting Tripping time	R/W	2、3、4、5、6、8、10、12、15	Word
16	0x0F	起动时间设定 Setting Starting time	R/W	0.1~999.9	Word
17	0x10	过载 报警域值设定 Setting Over load alarm range	R/W	1~99%	Word
18	0x11	接地/漏电 报警电流设定 Setting Earthing /leakage Alarm current	R/W	30~1000mA	Word
19	0x12	接地/漏电脱扣电流设定 Setting Earthing/leakage Tripping current	R/W	30~1000mA	Word
20	0x13	接地/漏电脱扣延时设定 Setting Earthing/leakage Tripping delay	R/W	0.1~25.0	Word
21	0x14	断相脱扣延时设定 Setting phase loss Tripping delay	R/W	0.1~25.0	Word
22	0x15	欠载 报警域值设定 Setting Under load Alarm range	R/W	10~99%	Word
23	0x16	欠载脱扣域值设定 Setting Under load Tripping range	R/W	10~99%	Word

24	0x17	欠载脱扣延时设定 Setting Under load Tripping delay	R/W	0.1~25.0	Word
25	0x18	不平衡报警域值设定 Setting unbalanced Alarm range	R/W	10~99%	Word
26	0x19	不平衡脱扣域值设定 Setting unbalanced Tripping range	R/W	10~99%	Word
27	0x1A	不平衡脱扣延时设定 Setting unbalanced Tripping delay	R/W	0.1~25.0	Word
28	0x1B	报警允许位开/关 Alarm permissible bit ON/OFF	R/W	Bit0: 过载 报警 Over load alarm Bit1: 接地/漏电 报警 Earthing/leakage Alarm Bit2: 欠载 报警 Under load Alarm Bit3: 断相 报警 Phase loss Alarm Bit4: 欠压 报警 Under voltage Alarm Bit5: 过压 报警 Over voltage Alarm Bit6: 堵转 报警 Rotor locked Alarm Bit7: 堵塞 报警 Blocking Alarm Bit8: 不平衡 报警 Unbalanced Alarm Bit9: PTC温度 报警 PTCTemperature Alarm Bit10: 外部故障 报警 External fault Alarm Bit11: 起动超时报警 Starting over time Alarm	Word
29	0x1C	脱扣允许位开/关 Tripping permissible bit ON/OFF	R/W	Bit0: 过载 脱扣 Over load tripping Bit1: 接地/漏电脱扣 Earthing/leakage Tripping Bit2: 欠载 脱扣 Under load Tripping Bit3: 断相 脱扣 Phase loss Tripping Bit4: 欠压 脱扣 Under voltage Tripping Bit5: 过压 脱扣 Over voltage Tripping Bit6: 堵转 脱扣 Rotor locked Tripping Bit7: 阻塞 脱扣 Blocking Tripping Bit8: 不平衡 脱扣 Unbalanced Tripping Bit9: PTC温度 脱扣 PTC Temperature Tripping Bit10: 外部故障 脱扣 External fault Tripping Bit11: 起动超时脱扣 Starting over time Tripping	Word

30	0x1D	保留 Reserved	R	0	Word
31	0x1E	MODBUS波特率设定 MODBUS Setting Baud rate	R/W	2400、4800、9600、19200、38400	Word
32	0x1F	MODBUS地址设定 MODBUS Setting address	R/W	1~247	Word
33	0x20	欠电压报警域值设定 Setting under voltage alarm range	R/W	50~90%	Word
34	0x21	欠电压脱扣域值设定 Setting under voltage Tripping range	R/W	50~90%	Word
35	0x22	欠电压脱扣延时设定 Under voltage tripping delay setting	R/W	0.1~25.0	Word
36	0x23	过电压报警域值设定 Setting over voltage Alarm range	R/W	110~150%	Word
37	0x24	过电压脱扣域值设定 Setting over voltage Tripping range	R/W	110~150%	Word
38	0x25	过电压脱扣延时设定 Setting over voltage Tripping delay	R/W	0.1~25.0	Word
39	0x26	堵转报警域值设定 Setting Rotor locked Alarm range	R/W	100~700%	Word
40	0x27	堵转脱扣域值设定 Setting Rotor locked Tripping range	R/W	100~700%	Word
41	0x28	堵转脱扣延时设定 Setting Rotor locked Tripping delay	R/W	0.1~25.0	Word
42	0x29	阻塞报警域值设定 Setting Blocking Alarm range	R/W	100~700%	Word
43	0x2A	阻塞脱扣域值设定 Setting Blocking tripping range	R/W	100~700%	Word
44	0x2B	阻塞脱扣延时设定 Setting Blocking tripping delay	R/W	0.1~25.0	Word
45	0x2C	PTC温度报警值设定 Setting PTC temperature alarm value	R/W	1000~10000	Word
46	0x2D	PTC温度脱扣值设定 Setting PTC temperature Tripping value	R/W	1000~10000	Word
47	0x2E	PTC温度脱扣延时设定 Setting PTC temperature Tripping delay	R/W	0.1~25.0	Word

48	0x2F	外部故障脱扣延时设定 Setting external fault Tripping delay	R/W	0.1~25.0	Word
49	0x30	电机类型 Type of motor	R/W	0: 普通电机 Common motor 1: 增安电机 Special safe motor	Word
50	0x31	接线方式 Connection mode	R/W	0: 单相模式 Single 1: 三相三线 3-phase-3-wire	Word
51	0x32	变送类型设定 Setting transmitting mode	R/W	0: Ia 1: Ib 2: Ic 3: Iav 4: Uab 5: Ubc 6: Uca 7: Uav 8: PTC 9: 热容量 heat capacity	高字节 High byte
		变送变比设定 Setting transmitting transformation ratio	R/W	1~8	低字节 Low byte
52	0x33	起动控制设定 Setting Starting control	R/W	0: 保护模式 Protection mode 1: 手动模式 Manual mode 2: 两步 起动 2-step starting mode	Word
53	0x34	控制权限设定 Setting control permission	R/W	0: 本地 Local 1: 就地 Spot 2: 远程 Remote 3: 三选一 Select one from three 4: 全控 Total control	Word
54	0x35	过载 复位方式' Over load Reset mode	R/W	0: 手动 Manual 1: 自动 Auto	Word
55	0x36	冷却时间 Cooling time	R/W	1~30min	Word
56	0x37	起动一延时设定 Setting Starting-delay	R/W	0.1~60.0	Word
57~60	0x38 0x3B	保留 Reserved	R/W	0	Word
61	0x3C	远程复位 Remote Reset	R/W	0: 正常 Normal 1: 远程复位 Remote Reset	Word

62	0x3D	自启动模式 Self-Starting mode	R/W	0: 启动1: 恢复 Starting Restore	Word	
63	0x3E	自启动延时设定 Self-Starting delay setting	R/W	0.1~60.0	Word	
64	0x3F	自启动控制 Self-Starting control	R/W	0: 关 1: 开 0: OFF 1: ON	Word	
65~73	0x40 ~0x48	保留 Reserved	R	0	Word	
74	0x49	系统参数 System parameters	R/W	0~65535	Word	
75	0x4A	系统参数 System parameters	R/W	0~65535	Word	
76	0x4B	系统参数 System parameters	R/W	0~65535	Word	
77	0x4C	系统参数 System parameters	R	0~65535	Word	
78	0x4D	系统参数 System parameters	R/W	0~65535	Word	
79	0x4E	系统参数 System parameters	R/W	0~65535	Word	
80	0x4F	系统参数 System parameters	R/W	0~65535	Word	
81	0x50	事件控制参数 Event control parameters	R	下一个事件存放事件记录号 Next event record number	高字节 High byte	
			R	事件开关0关1开 Event switch 0 OFF 1 ON	低字节 Low byte	
82	事件记录 1 Event record 1	0x51	STA1	R	保护1动作方式 对应地址9 脱扣故障指示 Acting of protection 1Address 9 Tripping fault indicating	高字节 High byte
			Month1	R	动作1时间的-月 Months in operation 1 time	低字节 Low byte
83		0x52	Day1	R	动作1时间的-日 Days in operation 1 time	高字节 High byte
			Hour1	R	动作1时间的-时 Hours in operation 1 time	低字节 Low byte
84		0x53	Minute1	R	动作1时间的-分 Minutes in operation 1 time	高字节 High byte
			Second1	R	动作1时间的-秒 Seconds in operation 1 time	低字节 Low byte

85	事件记录 2	0x54	STA2	R	保护2动作方式 对应地址9 脱扣故障指示 Acting of protection 2 Address 9 Tripping fault indicating	高字节 High byte
			Month2	R	动作2时间的-月 Months in operation 2 time	低字节 Low byte
86	Event record 2	0x55	Day2	R	动作2时间的-日 Days in operation 2 time	高字节 High byte
			Hour2	R	动作2时间的-时 Hours in operation 2 time	低字节 Low byte
87	Event record 2	0x56	Minute2	R	动作2时间的-分 Minutes in operation 2 time	高字节 High byte
			Second2	R	动作2时间的-秒 Seconds in operation 2 time	低字节 Low byte
88	事件记录 3	0x57	STA3	R	保护3动作方式 对应地址9 脱扣故障指示 Acting of protection 3 Address 9 Tripping fault indicating	高字节 High byte
			Month3	R	动作3时间的-月 Months in operation 3 time	低字节 Low byte
89	Event record 3	0x58	Day3	R	动作3时间的-日 Days in operation 3 time	高字节 High byte
			Hour3	R	动作3时间的-时 Hours in operation 3 time	低字节 Low byte
90	Event record 3	0x59	Minute3	R	动作3时间的-分 Minutes in operation 3 time	高字节 High byte
			Second3	R	动作3时间的-秒 Seconds in operation 3 time	低字节 Low byte
91	事件记录 4	0x5A	STA4	R	保护4动作方式 对应地址9 脱扣故障指示 Acting of protection 4 Address 9 Tripping fault indicating	高字节 High byte
			Month4	R	动作4时间的-月 Months in operation 4 time	低字节 Low byte
92	Event record 4	0x5B	Day4	R	动作4时间的-日 Days in operation 4 time	高字节 High byte
			Hour4	R	动作4时间的-时 Hours in operation 4 time	低字节 Low byte
93	Event record 4	0x5C	Minute4	R	动作4时间的-分 Minutes in operation 4 time	高字节 High byte
			Second4	R	动作4时间的-秒 Seconds in operation 4 time	低字节 Low byte

94	事件记录 5	0x5D	STA5	R	保护5动作方式 对应地址9 脱扣故障指示 Acting of protection 5 Address 9 Tripping fault indicating	高字节 High byte
			Month5	R	动作5时间的-月 Months in operation 5 time	低字节 Low byte
95	Event record 5	0x5E	Day5	R	动作5时间的-日 Days in operation 5 time	高字节 High byte
			Hour5	R	动作5时间的-时 Hours in operation 5 time	低字节 Low byte
96	Event record 5	0x5F	Minute5	R	动作5时间的-分 Minutes in operation 5 time	高字节 High byte
			Second5	R	动作5时间的-秒 Seconds in operation 5 time	低字节 Low byte
97	事件记录 6	0x60	STA6	R	保护6动作方式 对应地址9 脱扣故障指示 Acting of protection 6 Address 9 Tripping fault indicating	高字节 High byte
			Month6	R	动作6时间的-月 Months in operation 6 time	低字节 Low byte
98	Event record 6	0x61	Day6	R	动作6时间的-日 Days in operation 6 time	高字节 High byte
			Hour6	R	动作6时间的-时 Hours in operation 6 time	低字节 Low byte
99	Event record 6	0x62	Minute6	R	动作6时间的-分 Minutes in operation 6 time	高字节 High byte
			Second6	R	动作6时间的-秒 Seconds in operation 6 time	低字节 Low byte
100	事件记录 7	0x63	STA7	R	保护7动作方式 对应地址9 脱扣故障指示 Acting of protection 7 Address 9 Tripping fault indicating	高字节 High byte
			Month7	R	动作7时间的-月 Months in operation 7 time	低字节 Low byte
101	Event record 7	0x64	Day7	R	动作7时间的-日 Days in operation 7 time	高字节 High byte
			Hour7	R	动作7时间的-时 Hours in operation 4 time	低字节 Low byte
102	Event record 7	0x65	Minute7	R	动作7时间的-分 Minutes in operation 7 time	高字节 High byte
			Second7	R	动作7时间的-秒 Seconds in operation 7 time	低字节 Low byte

103	事件记录 8	0x66	STA8	R	保护8动作方式 对应地址9 脱扣故障指示 Acting of protection 8 Address 9 Tripping fault indicating	高字节 High byte
			Month8	R	动作8时间的一月 Months in operation 8 time	低字节 Low byte
		0x67	Day8	R	动作8时间的一日 Days in operation 8 time	高字节 High byte
104	Event record 8		Hour8	R	动作8时间的一时 Hours in operation 8 time	低字节 Low byte
		0x68	Minute8	R	动作8时间的一分 Minutes in operation 8 time	高字节 High byte
105	Event record 8		Second8	R	动作8时间的一秒 Seconds in operation 8 time	低字节 Low byte

控制权限选择（除保护模式外）：90FL显示单元按键本地控制、DI端就地控制、上位机通讯远程控制。DI9、DI10组合实现三位置权限选择。下表中“0”表示开关量输入未接通，“1”表示接通。

Selection of control permission (except for protection mode): 90FL display unit, pressing for local control, DI end spot control, supervisor computer communication Remote control. Combining DI9 and DI10 to implement selection of three position permission. "0" shown in below table represent non-turn on of switching input, "1" shown in below table represent turn on of switching input.

DI控制权限定义 DI control permission defined:

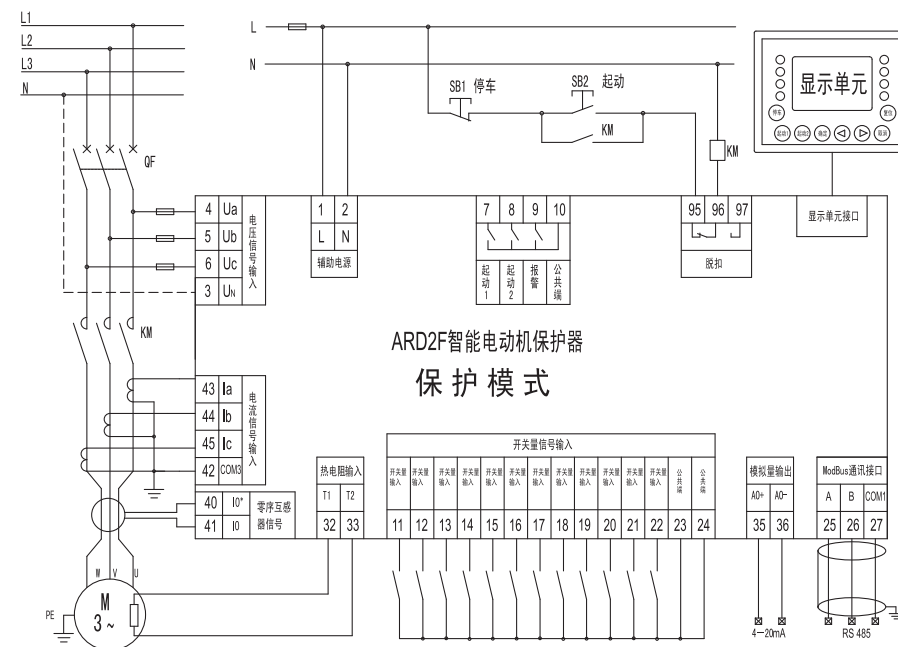
控制权限 Control permission	DI输入状态 DI input status	
	DI9控制权限1 DI9 control permission1	DI10控制权限2 DI10 control permission2
本地控制 Local control	1	0
远程控制 Remote control	0	0
就地控制 Spot control	0	1

事件记录中的时间定义 The defined time in event record:
参照23页事件记录中的时间定义

8 典型应用方案 Typical application scheme

ARD2F电动机保护器保护模式接线图

ARD2F motor protective device protective mode wiring diagram



保护模式：在保护模式下，电动机的起动、停车由外部按钮实现。接触器KM的吸引线圈串进脱扣继电器的常闭触点中。闭合QF，按下起动按钮SB2，KM吸引线圈得电，使KM的主触头闭合，电动机开始工作，当按下停车按钮SB1时，KM的吸引线圈失电，使KM的主触头断开，电动机停止工作。

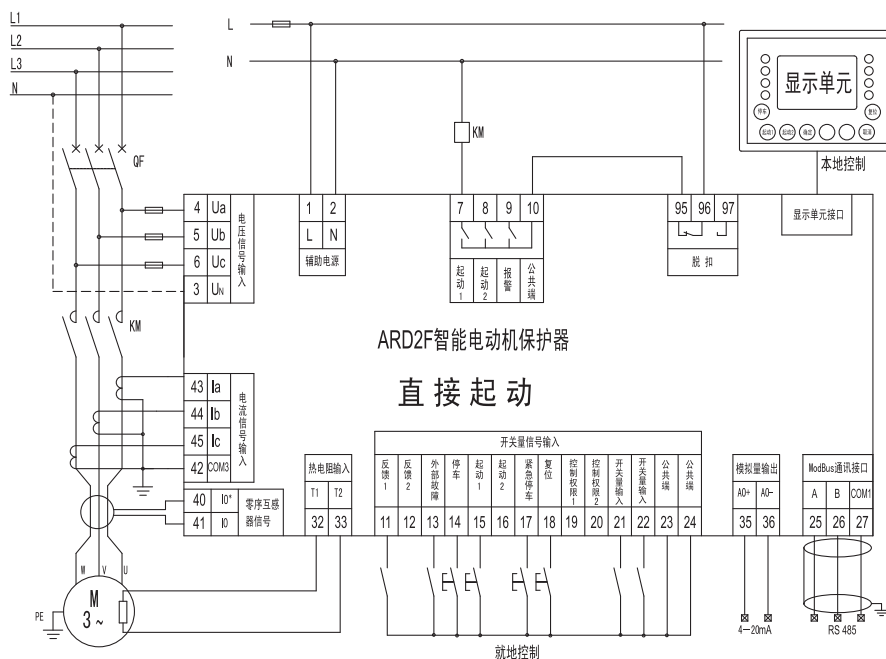
Protection mode: Under protection mode, starting, stopped of motor is implemented by external buttons. The attracting coil of contactor KM is connected in the normally closed contacts of tripping relay. Closing QF, press down starting button SB2, KM attracting coil is energized, to close main contact of KM, then motor is running, when pressing down the stopped button SB1, KM attracting coil is power fail, to break main contact of KM, then motor is stopping.

注：在保护模式下，12路DI只作为开关量输入使用。

Note: Under protection mode, 12-channel DI only used for switching input.

ARD2F电动机保护器直接起动模式接线图

ARD2F motor protective device Across the line starting mode wiring diagram



直接起动：在直接起动模式下，电动机的启动、停车由保护器控制，接触器KM的吸引线圈串进脱扣继电器的常闭触点和启动1继电器的常开触点，闭合QF，按下显示单元上的“启动1”按钮（启动控制设置为手动模式，使能本地控制），则使KM的主触头闭合，电动机开始工作，按下“停车”按钮，启动1继电器断开，KM的吸引线圈失电，使KM的主触头断开，电动机停止工作。

Across the line starting: Under the across the line starting, starting, stopped of motor is controlled by protector, the attracting coil of contactor KM is connected in the normally closed contacts of tripping relay and connected in the normally opening contacts of starting1 relay, Closing QF, press down the starting 1 button of display unit (starting control set up as manual mode, enable the local control), to close main contact of KM, then motor is running, when pressing down the stopped button, KM attracting coil is power fail, to break main contact of KM, then motor is stopping.

控制权限选择（除保护模式外）：90FL显

示单元按键本地控制、DI端就地控制、上位机通讯远程控制。DI9、DI10组合实现三位置权限选择。下表中“0”表示开关量输入未接通，“1”表示接通。

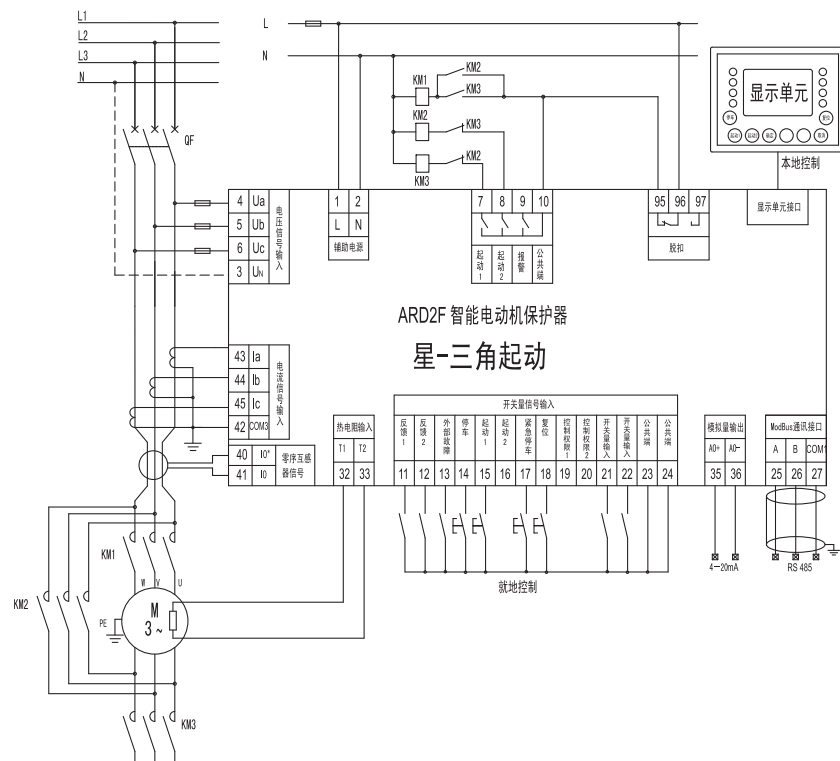
Selection of control permission (except for protection mode): 90FL display unit, pressing for local control, DI end spot control, supervisor computer communication Remote control. Combining DI9 and DI10 to implement selection of three position permission."0" shown in below table represent non-turn on of switching input, "1" shown in below table represent turn on of switching input.

DI控制权限定义 DI control permission defined:

控制权限 Control permission	DI输入状态 DI input status	
	DI9控制权限1 DI9 control permission1	DI10控制权限2 DI10 control permission2
本地控制 Local control	1	0
远程控制 Remote control	0	0
就地控制 Spot control	0	1

ARD2F电动机保护器Y-△起动模式接线图

ARD2F motor protective device Y-△ starting mode wiring diagram

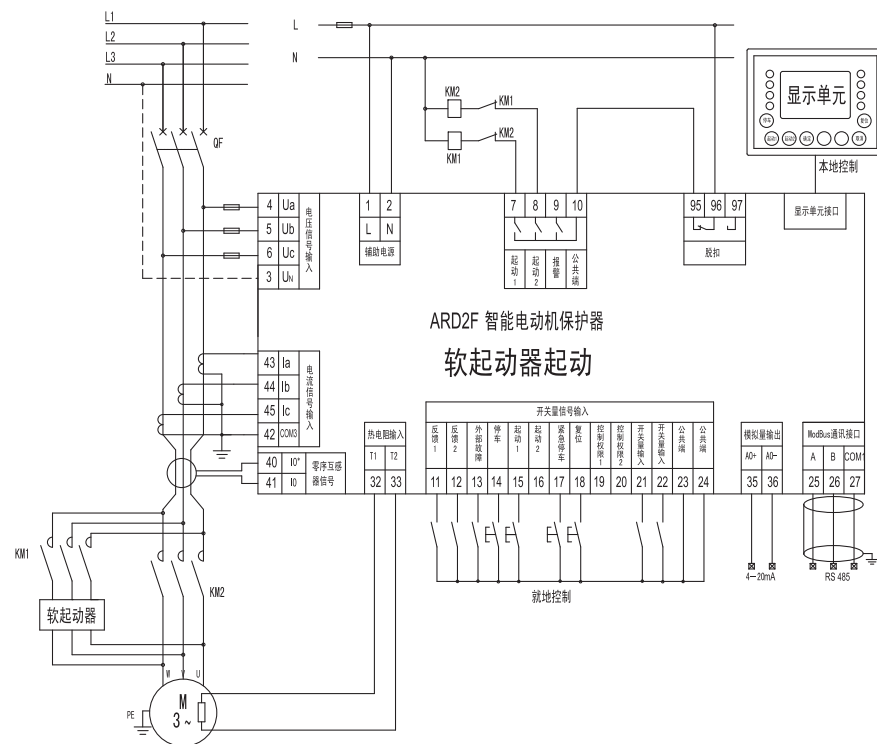


Y-△启动，在Y-△启动模式下，电动机的启动、停车由保护器控制。按图示方法将控制电路接好后，闭合QF，按下显示单元上的“启动1”按键（启动控制设置为两步启动，使能本地控制），启动1继电器闭合，KM1、KM3吸引线圈得电，使KM3的主触头闭合，电动机以Y方式启动，转换时间到保护器自动断开启动继电器1，同时闭合启动继电器2，KM2的吸引线圈得电，使KM2的主触头闭合，保护器转入△运行，按下“停车”按键，KM1断开，电动机停止工作。

Y-△ starting: Under Y-△ starting mode, starting, stopped of motor is controlled by protector. After connecting control circuit as per method shown in diagram, Closing QF, press down the starting 1 button of display unit (starting control set up as 2-step starting mode, enable the local control), closing starting 1 relay, KM1、KM3 attracting coil is energized, to close main contact of KM3, then motor is starting with Y mode, when switching time out, protector automatically cut off starting relay 1, and closing starting 2 relay, KM2 attracting coil is energized, to close main contact of KM2, then protector is switching to △ running, pressing down the stopped button, to break main contact of KM1, then motor is stopping.

ARD2F电动机保护器软启动器启动模式接线图

ARD2F motor protective device Soft starter starting mode wiring diagram

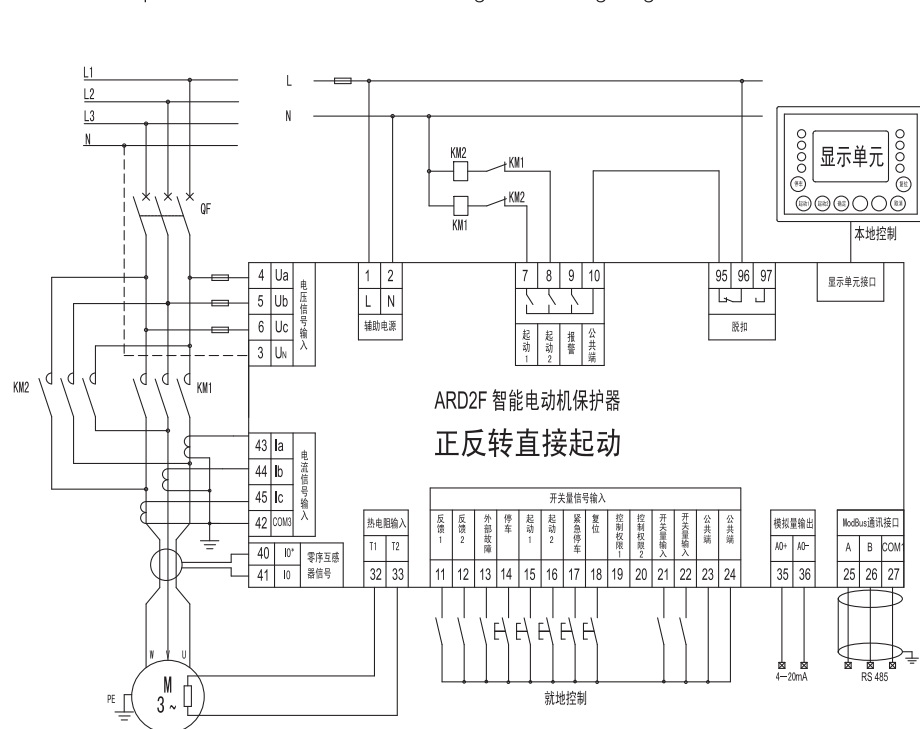


软启动器启动：在软启动器启动模式下，电动机的启动、停车由保护器控制，按图示方法将控制电路接好后，闭合QF，按下显示单元上的“启动1”按键（启动控制设置为两步启动，使能本地控制），启动1继电器闭合，KM1、KM3吸引线圈得电，使KM3的主触头闭合，电动机通过软启动器启动，转换时间到保护器自动断开启动继电器1，同时闭合启动继电器2，KM2的吸引线圈得电，使KM2的主触头闭合，电动机转入正常运行，按下“停车”按键，KM1断开，电动机停止工作。

Soft starter starting: Under Soft starter starting mode, starting, stopped of motor is controlled by protector. After connecting control circuit as per method shown in diagram, Closing QF, press down the starting 1 button of display unit (starting control set up as 2-step starting mode, enable the local control), closing starting 1 relay, KM1、KM3 attracting coil is energized, to close main contact of KM3, then motor is starting with Soft starter starting mode, when switching time out, protector automatically cut off and starting relay 1, and closing starting 2 relay, KM2 attracting coil is energized, to close main contact of KM2, then motor is switching to normal running, pressing down the stopped button, to break main contact of KM1, then motor is stopping.

ARD2F电动机保护器正反转起动模式接线图

ARD2F motor protective device Reversible starting mode wiring diagram

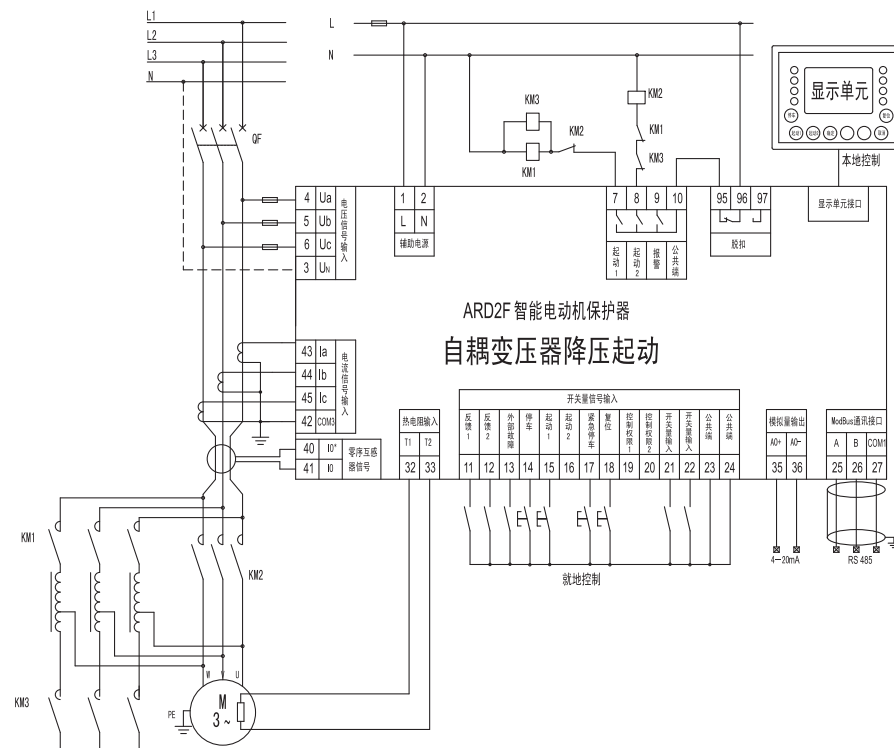


正反转起动：在正反转起动模式下，电动机的起动、停车由保护器控制。按图示方法将控制电路接好后，闭合QF，按下显示单元上的“起动1”按键（起动控制设置为手动模式，使能本地控制），KM1吸引线圈得电，使KM1的主触头闭合，电动机正转起动；按下“起动2”按键，KM2吸引线圈得电，使KM2的主触头闭合，电动机反转起动，按下“停车”按键，KM1、KM2断开，电动机停止工作

Reversible starting: Under Reversible starting mode, starting, stopped of motor is controlled by protector. After connecting control circuit as per method shown in diagram, Closing QF, press down the starting 1 button of display unit (starting control set up as manual starting mode, enable the local control), KM1 attracting coil is energized, to close main contact of KM1, then motor is starting with forward direction, press down the starting 2 button of display unit, KM2 attracting coil is energized, to close main contact of KM2, then motor is starting with backward direction, pressing down the stopped button, to break main contact of KM1, KM2, then motor is stopping.

ARD2F电动机保护器自耦降压起动模式接线图

ARD2F motor protective device Autotransformer voltage reduced starting mode wiring diagram



自耦降压起动模式：在自耦降压起动模式下，电动机的起动、停车由保护器控制。按图示方法将控制电路接好后，闭合QF，按下显示单元上的“起动1”按键（起动控制设置为两步起动，使能本地控制），起动1继电器闭合，KM1、KM3吸引线圈得电，使KM1、KM3的主触头闭合，电动机通过自耦变压器降压起动，转换时间到保护器自动断开起动继电器1，同时闭合起动继电器2，KM2的吸引线圈得电，使KM2的主触头闭合，电动机转入正常运行，按下“停车”按键，KM1断开，电动机停止工作。

Autotransformer voltage reduced starting: Under Autotransformer voltage reduced starting mode, starting, stopped of motor is controlled by protector. After connecting control circuit as per method shown in diagram, Closing QF, press down the starting 1 button of display unit (starting control set up as 2-step starting mode, enable the local control), closing starting 1 relay, KM1、KM3 attracting coil is energized, to close main contact of KM1、KM3, then motor is starting with Soft starter starting mode, when switching time out, protector automatically cut off and starting relay 1, and closing starting 2 relay, KM2 attracting coil is energized, to close main contact of KM2, then motor is switching to normal running, pressing down the stopped button, to break main contact of KM1, then motor is stopping.

9 参数设置及功能说明 Description of parameter setting and function

9.1 参数设置 Parameter setting

表 Table 15

序号 No	功能 Function	设定类别 Setting category	设定范围 Range	默认值 Default	单位 Unit
1	系统参数 system parameter	波特率 Baud rate	2400、4800、9600、 19200、38400	9600	bps
		通讯地址 Communication address	1~247	1	
		进入密码 Password	0~9999	1	
		电机类型 Type of motor	普通电机 Common motor 增安电机 Special safe motor	普通电机 Common motor	
		变送类型 Transmitting model	Ia、Ib、Ic、Iav、Uab、 Ubc、Uca、Uav、PTC、 热容量heat capacity Ia、Ib、Ic、Iav、Uab、 Ubc、Uca、Uav、PTC、 heat capacity	Iav	
		变送变比 Transmitting transformation ratio	1~8	2	
		背光常亮 Backlight lights	开/关 ON/OFF	关 OFF	
2	起动保护 Starting protection	系统电压 System voltage	190、380、660	380	
		起动时间 Starting time	0.1~999.9	10.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
3	过载保护 Over load protection	脱扣 Tripping	开/关 ON/OFF	开 ON	
		电动机额定电流 Rated current of motor	0.4~1.6、1.6~6.3、 6.3~25、25~100、 63~250、250~800	1.6、6.3、 25、100、 250、800	安培 A
		脱扣等级 Tripping grading	5、10、15、20、25、 30、35、40	5	级 Class
			2、3、4、5、6、8、 10、12、15	2	S
		报警域值 Alarm range	1~99%	85	%
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	开 ON	
		热过载复位方式 Heat over load mode	手动/自动 Manual/Auto	手动 Manual	
		冷却时间 Cooling time	1~30	30	分钟 Minute

4	欠载保护 Under load protection	报警域值 Alarm range	10~99%	70	%
		脱扣域值 Tripping range	10~99%	50	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
5	断相保护 Phase loss protection	脱扣延时 Tripping delay	0.1~25.0	1.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	开 ON	
6	不平衡保护 Unbalanced protection	报警域值 Alarm range	10~99%	20	%
		脱扣域值 Tripping range	10~99%	30	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
7	接地/漏电保护 Earthing/ leakage protection	接地/漏电报警电流 Earthing/leakage Alarm current	30~1000	200	毫安 mA
		接地/漏电脱扣电流 Earthing/leakage tripping current	30~1000	300	毫安 mA
		脱扣延时 Tripping delay	0.1~25.0	0.5	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
8	过压保护 Over voltage protection	报警域值 Alarm range	110~150%	110	%
		脱扣域值 Tripping range	110~150%	120	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	

9	欠压保护 Under voltage protection	报警域值 Alarm range	55~90%	90	%
		脱扣域值 Tripping range	55~90%	80	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
10	堵转保护 Rotor locked protection	堵转报警域值 Rotor locked Alarm range	100~700%	500	%
		堵转脱扣域值 Rotor locked Tripping range	100~700%	600	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
11	阻塞保护 Blocking protection	阻塞报警域值 Blocking Alarm range	100~700%	150	%
		阻塞脱扣域值 Blocking Tripping range	100~700%	250	%
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
12	温度保护 Temperature protection	报警阻值 Alarm resistance	1000~10000	1600	
		脱扣阻值 Tripping resistance	1000~10000	3600	
		脱扣延时 Tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	
13	外部故障保护 External fault protection	外部故障脱扣延时 External fault tripping delay	0.1~25.0	5.0	秒 Second
		报警 Alarm	开/关 ON/OFF	关 OFF	
		脱扣 Tripping	开/关 ON/OFF	关 OFF	

14	控制权限 Control permission	控制权限 Control permission	本地 Local 就地 Spot 远程 Remote 三选一 Selecting 1 from 3 全控 Total control	全控 Total control	
15	起动控制 Starting control	起动模式 Starting mode	保护模式 Protection mode 手动模式 Manual mode 两步起动 2-step starting	保护模式 Protection mode	
		起动一延时 Starting-delay	0.1~60.0	3.0	秒 Second
16	自起动 Self - Starting	自起动模式 Self - Starting mode	起动/恢复 Starting/Restore	起动 Starting	
		自起动延时 Self - Starting delay	0.1~60.0	5.0	秒 Second
		自起动控制 Self - Starting control	开/关 ON/OFF	关 OFF	

9.2 功能说明

- 起动超时保护
(请查阅ARD2 “9.2保护功能说明”)

- 过载保护
(请查阅ARD2 “9.2保护功能说明”)

9.2 Function description

- Starting over time protection
(Please refer to ARD2 "9.2 protective function description")

- Over load protection
(Please refer to ARD2 "9.2 protective function description")

■ t_f 时间保护 (适用于增安型电动机)

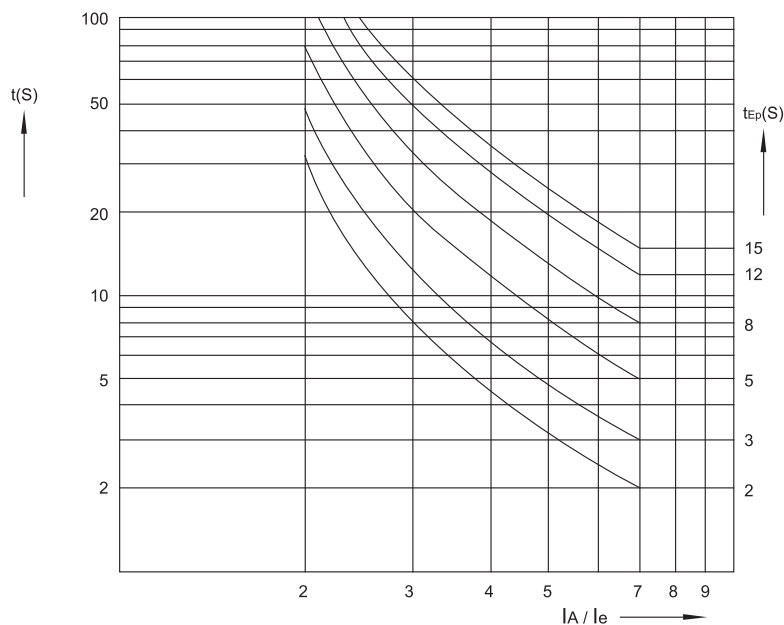
对于增安型电动机，交流绕组在最高环境温度下达到额定运行稳定温度后，从开始通过堵转电流时记起，直至上升到极限温度所需的时间即为 t_E 时间。增安型电机的 t_E 时间通常由电机制造商提供，用户可以在电机铭牌上找到该数据。

提供堵转时在 t_E 时间内断开电动机电源的热过载保护，仅在电动机起动完成后投入，带有独立的延时计时器。 t_E 保护特征曲线动作延时对照表如表9所示，曲线图如下图所示。

■ t_E Time protection (Applied to special safe motor)

For the special safe motor, after AC winding in the maximum environment temperature reached the rated stable running temperature, recording the process time t_E from passing rotor locked current to the limiting temperature. The t_E time is usually provided by motor makers, the user may found this data from motor nameplate.

The heat over load protection(breaking power supply of rotor locked motor in t_E time), act only after finishing motor starting, fitted with independent delay timer. The cross reference list for t_E protection characteristic operation delay is shown in table 9, the graph is shown as following:



t_E 保护延时与堵转电流比 I_A/I_e 的电流-时间特性曲线

Current–Time Characteristic of I_a/I_e ratio of t_F protection delay and rotor locked current

说明: t_{Ep} : 7倍额定电流时允许堵转时间;

 I_A : 堵转电流;

I_e : 电动机额定电流。

Explanation: t_{Ep} : Allowable rotor locked time at 7 times rated current;

I_A : rotor locked current;

I_e : Motor rated current.

动作延时特性表 Delay operation characteristic table
表 Table 17

[illegible]

注：(一) t_{EP} 保护的動作時間= t_{EP} 為 2 (S) 時的動作時間/ $2 \times t_{EP}$ 設定值

(二) t_{EP} 設定為 5(S) 時，按起動電流比 I_A / I_e 確定的 t_{EP} 值是按照 IEC79-7、GB3836.3-2000 標準，在用於增安型電動機 t_{EP} 保護時，其反時限過載保護可參照該特性曲線設定。為確保電動機堵轉時在 t_{EP} 時間前斷開電源，過載保護裝置的反時限曲線宜下移 15% 左右。

(三) t_{EP} 保護的動作時間是通過設定“電機類型”和“脫扣等級”來實現的，根據表 9 設定 t_{EP} (脫扣等級) 來選擇相應的脫扣曲線。(當電機類型選擇為“增安電機”時，脫扣等級自動變為 t_{EP} 設定；否則脫扣曲線是普通電機的反時限過載脫扣曲線。)

■ 欠載保護
(請查閱 ARD2 “9.2 保護功能說明”)

■ 斷相保護
(請查閱 ARD2 “9.2 保護功能說明”)

■ 不平衡保護
(請查閱 ARD2 “9.2 保護功能說明”)

■ 接地/漏電保護
(請查閱 ARD2 “9.2 保護功能說明”)

■ 過壓保護
電壓過高引起電動機絕緣程度損傷，當電動機運行電壓超過設定的保護電壓時保護器按設定的要求進行保護，在脫扣(延時)設定時間內脫扣，以保證電動機設備安全。

■ 欠壓保護
電壓過低會引起電動機轉速降低，甚至停止運行，當電動機運行電壓下降至設定的欠電壓保護範圍時，保護器按設定的要求進行保護，在脫扣(延時)設定時間內脫扣，以避免重要的生產工藝造成混亂，嚴重影響生產。

Note: (1) Operation time of t_{EP} protection= t_{EP} as 2 (S), operation time / $2 \times t_{EP}$ setting

(2) t_{EP} set as 5 (S), the t_{EP} value decided by starting current ratio I_A / I_e conform to IEC79-7, GB3836.3-2000 standard, when used in t_{EP} protection of special safe motor, its inverse time-delay over load protection may refer to its characteristic curve. If motor is in rotor locked condition, to ensure breaking power supply before t_{EP} time, the inverse time-delay curve of over load protective device should shift downward about 15%.

(3) Operation time of t_{EP} protection is implemented by setting "Motor model" and "Tripping class", based on table 9 set t_{EP} (Tripping class) to select corresponding tripping curve. (If selecting "Special safe motor", Tripping class change into t_{EP} setting automatically; otherwise, the Tripping curve is the inverse time-delay over load tripping curve used for common motor.)

■ Underload protection
Please refer to ARD2 "9.2 protective function description"

■ Phase failure protection
Please refer to ARD2 "9.2 protective function description"

■ Unbalanced protection
Please refer to ARD2 "9.2 protective function description"

■ Earthing/leakage protection
Please refer to ARD2 "9.2 protective function description"

■ Overvoltage protection
High-voltage damage the insulation of the motor, when the voltage is higher than the set range of overvoltage protection, the protection will execute protective operation in accordance with set requirement, trip in the tripping (delay) set time to ensure motor equipment safety.

■ Undervoltage protection
Low-voltage will cause motor to reduce speed, or even stop running, when the voltage drop to the set range of undervoltage protection, the protection will execute protective operation in accordance with set requirement, trip in the tripping (delay) set time to avoid causing confusion in an important production technological skill, which will affect production seriously.

■ 堵轉保護(起動過流保護)
(請查閱 ARD2 “9.2 保護功能說明”)

■ 阻塞保護
(請查閱 ARD2 “9.2 保護功能說明”)

■ PTC 溫度保護
電動機溫度保護是以預埋在電動機定子繞組或軸承上的 PTC 熱敏電阻檢測器送出的熱敏電阻值作為保護條件。當保護器檢測到 PTC 熱敏電阻的值大於預設的保護值後，則保護器在脫扣(延時)設定時間內脫扣。

■ 外部故障保護(工藝聯鎖保護)
當有外部故障出現時，外部故障開關閉合，則保護器檢測到有外部故障信號輸入，在脫扣(延時)設定時間內脫扣。

■ 控制權限
保護器具有多種控制權限，用戶可根據實際需要，設置不同的控制權限來對電動機進行控制。

全控：當用戶將控制權限設置為“全控”時，則用戶可以通過顯示單元上的按鍵實現本地控制、上位機實現遠程控制、DI 端實現就地控制電動機的起動和停止。

本地：只能通過顯示單元上的按鍵來控制保護器的起動、停止。

就地：只能通過保護器主體上的 DI 輸入端來控制保護器的起動、停止。

遠程：只能由上位機遠程通訊來控制保護器的起動、停止。

三選一：通過 DI 端來選擇控制位置(本地、就地、遠程選擇其一)。

■ Rotor locked protection (starting over current protection)
Please refer to ARD2 "9.2 protective function description"

■ Blocking protection
Please refer to ARD2 "9.2 protective function description"

■ PTC temperature protection
The motor temperature protection take thermistor value which is sent out by PTC thermistor detector to be pre-embedded in motor stator winding or bearing, as protection condition. When the protective device detected that the PTC thermistor value is greater than the pre-set protection, within set tripping (delay) time, the protective device is tripping.

■ External fault protection (Technology interlock protection)
When external fault occur, the external fault switching is closed, the protective device detected external fault signal input, within set tripping (delay) time, the protective device is tripping.

■ Control permission
The protective device have multiple control permissions, based on actual demand, set up different control permission to control motor.

Total control: When user set up control permission as "Total control" by pressing button of display unit, user can implement: Local control, supervisory computer's remote control, DI end's spot control starting and stopped of motor.

Local: The control of starting, stopped of protective device can be implemented only by pressing button of display unit.

Spot: The control of starting, stopped of protective device can be implemented only by protective device principal DI end.

Remote: The control of starting, stopped of protective device can be implemented only by supervisory computer's remote communication.

Select the best from three: By using DI end, selecting the best control position from three (Local, Spot, Remote).

■ 启动控制

本保护器带有不同的启动控制模式，用户根据实际情况选择不同的启动控制方式。

保护模式：在此模式下，本地、就地均不能对保护器进行控制。

手动模式：在此模式下，需手动单独对2个启动继电器进行控制。

两步启动：在此模式下，只需对启动1进行手动操作，经设定的延时时间后，启动1自动断开，并同时启动2动作。若打开了自启动功能，则保护器上电后，自动顺序动作启动1和启动2继电器。

■ 自启动

在上电过程中或电源恢复后，保护器将根据设置分时启动电动机。

若系统自启动控制为“开”，自启动模式设置为“恢复”，那么保护器将根据掉电前的状态，判断是否需要重新启动，若掉电前系统处于运行状态，则上电后按照设定的自启动延时时间启动运行；若自启动模式为“启动”，那么保护器一上电便可根据自启动延时时间实现电机群分时顺序启动。

注：1、除断相保护、接地/漏电保护、堵转保护外，其余各项保护功能只有在保护器运行指示灯亮起来后才能对电动机进行保护。

2、4~20模拟量输出：默认20mA对应2倍额定电流值。用户也可根据需要自行设置模拟量输出对应的参数和倍率（注意，倍率设置只对电流有效）。见下表。

■ Starting control

This protective device is fitted with different starting control mode, user can select different starting control mode based on actual condition.

Protection mode: Under this mode, Local, Spot can not control protective device.

Manual mode: Under this mode, use manual mode control 2 starting relay separately.

Two-step starting: Under this mode, manual operation of starting1, after set delay time, starting1 automatic breaking, at the same time, starting2 operate. If use self-starting function, after protective device power on, the starting1 and starting2 relay is operating automatically and orderly.

■ Self-starting

In power on process or after power restoring, this protective device is starting motor based on sharing-time setting.

If system self-starting control is "ON", the self-starting mode set as "RESTORE", the protective device as per the status before power off, to decide restarting or not, if the status before power off is running, then after power on, start and run motor as per the set self-starting delay time; if self-starting mode is "START", then just power on, implement the motor group sharing-time sequence starting, as per the set self-starting delay time.

Note: 1、Except for phase loss protection, earthing/leakage protection, Rotor locked protection, only when running indicator of protective device is lighting, other protection function can protect motor.

2、4~20 analog output: default 20mA corresponding to two-fold rated current value. User can set up parameter and Multiplying power corresponding to analog output based on actual requirements.(Note, Multiplying power setting is only effective for current).Refer to below table.

变送类型 Model	变送倍率 Multiplying power
0: A相电流Ia A phase currentIa	Ie整数倍 (1-8) Ie integral multiple (1-8)
1: B相电流Ib B phase currentIb	Ie整数倍 (1-8) Ie integral multiple (1-8)
2: C相电流Ic C phase currentIc	Ie整数倍 (1-8) Ie integral multiple (1-8)
3: 平均电流Iav Average current Iav	Ie整数倍 (1-8) Ie integral multiple (1-8)
4: AB线电压Uab AB line voltageUab	50%Uab - 150%Uab对应4~20 A 50%Uab - 150%Uab corresponding 4~20 A
5: BC线电压Ubc BC line voltageUbc	50%Ubc - 150%Ubc对应4~20 A 50%Ubc - 150%Ubc corresponding 4~20 A
6: CA线电压Uca CA line voltageUca	50%Uca - 150%Uca对应4~20 A 50%Uca - 150%Uca corresponding 4~20 A
7: 平均线电压Uav Average line voltageUav	50%Uav - 150%Uav对应4~20 A 50%Uav - 150%Uav corresponding 4~20 A
8: PTC	默认1000~10000对应4~20mA Default 1000~10000 corresponding 4~20mA
9: 热容量百分比 Heat capacity percent	默认0~100%对应4~20mA Default 0~100% corresponding 4~20mA

10 注意事项 Notice

1、用户在调试时，调试电流至少要达到所定购规格的15%，否则无电流显示。例：用户所定的保护器规格为ARD2F-100，则调试电流需达到15A以上。

2、当保护器启动控制设置为“两步启动”时，“启动一延时”时间应小于启动时间。

3、堵转保护脱扣延时时间应小于启动时间，否则将无法实现堵转保护功能。

4、当保护器配有接地/漏电保护功能时，从剩余电流互感器引入保护器的导线建议采用屏蔽导线，否则可能导致测量数据不准确。

1、When user is testing, the test current shall be at least up to 15% of specified specification, otherwise, the current is not displaying. Example: User specified protective device is ARD2F-100, then test current must be above 15A.

2、If protective device start control setting is "2-step-starting", then the "Start-delay" time shall be less than the starting time.

3、The tripping delay time of Rotor locked protection shall be less than the starting time, otherwise, Rotor locked protection function can not be implemented.

4、When protective device fitted with earthing/leakage protection function, the conductor from residual current transformer leading into protective device recommend shielded conductor, otherwise, the measured data is not correct.

5、保护器提供异步半双工RS485通讯接口，采用MODBUS-RTU协议，各种数据信息均可在通讯线路上传送。理论上在一条线路上可以同时连接多达128个保护器，每个保护器均可设定其通讯地址（Addr）。通讯连接建议使用屏蔽双绞线，线径不小于0.5mm²。布线时应使通讯线远离强电电缆或其他强电场环境。

6、保护器的额定电流设定应为电动机正常额定工作电流值，若此设定值低于电动机的正常额定工作电流值，则可能会导致电动机无法正常启动；高于电动机的正常额定工作电流值，则电动机出现故障时保护器可能无法进行正常保护。

7、保护器一旦发生脱扣动作，在故障排除后，重新启动电动机前，需对保护器进行复位，否则将无法启动电动机。

8、电机热过载保护后，由于热累积，冷却后方可复位。

9、在现场实际使用中，由于保护器的参数设置不合理，可能会导致电动机一起动就保护或无保护作用，此时，可将所有保护功能都关闭，根据保护器在电动机正常运行时测量得到的各种参数对保护器的各种保护参数进行重新设定。

5、The protective device provide asynchronous half duplex RS485 communication port, adopt MODBUS-RTU protocol, various data information can be transmitted on the communication line. Theoretically, the protective device connected on the same line may be up to 128, each protective device may set its communication address(Addr).The communication connection recommend using shielded twisted pair conductors, wire size is no less than 0.5mm². conductor configuration shall enable the communication line far away from strong electric cable or other strong electric field environment.

6、The setting of rated current of protective device shall be the motor normal rated operational current value, if this setting is lower than the motor normal rated operational current value, may result in motor can not be starting normally; if this setting is higher than the motor normal rated operational current value, when motor fault occur, protective device may not implement the normal protection.

7、Once protective device occur tripping operation, after eliminating fault, before starting motor again, reset protective device is needed, otherwise starting motor can not be done.

8、After motor heat over load protection, due to accumulated heat, only after cooling, reset can be done .

9、In actual site use, if parameter setting of protective device is not reasonable, may result in motor protection occur just on the starting or no protection occur, at this time close all protection functions, reset each protection parameter based on each correct protection parameter measured in normal running.

10、若保护器设定的各种保护参数是合适的，但电动机一起动保护器就动作，则此时，可根据保护器显示的动作代码来查找故障原因。

11、保护器出厂时的参数均为默认设置（用户特别要求除外），用户在实际使用中必须根据实际需要各种保护功能打开，并对各种参数进行设置。

12、用户如无特别注明，则100A及以下互感器与保护器主体的连接线默认 1 m，保护器主体与显示单元的连接线默认1.5m。

13、用户如有特殊要求的（如单相电动机保护器、连接线长度、抗晃电等）需在订单中注明。

10、If parameter setting of protective device is reasonable, but motor protection occur just on the starting, at this time, found fault cause as per the operating code displayed on the protective device.

11、The delivering parameter of protective device is the default setting (Unless user request special requirement), in actual use, user shall enable all needed functions, and set various parameters.

12、If user have no special statement, the connection conductor between transformer below 100A and protective device principal default as 1m, the connection conductor between protective device principal and display unit default as 1.5m.

13、If user have special requirement (such as single phase motor protective device, anti-flickering length of connection conductor etc), it shall be clearly specified in the ordering.

11 订货范例 Order example

例：

型 号：ARD2F-25/QTJCSR+90L

辅助电源：AC220V

电机额定电流：6.3A~25A

应用场合：三相电机

测量参数：三相电流、PTC电阻值

附加功能：启动控制、温度保护、报警输出、

RS485通讯、8个SOE事件记录

显示方式：90 L（中文液晶显示）

Example:

Type: ARD2F-25/QTJCSR+90L

Auxiliary power supply: AC 220V

Motor rated current: 6.3A~25A

Applications: three-phase motor

Measurement parameters: three-phase current; PTC resistance value

Additional functions: Starting control, temperature protection; alarm output, RS485 communication, 8 event records

Display mode: 90 L(Chinese LCD)