

ATA 奥托科技

长沙奥托自动化技术有限公司
CHANGSHA ATA AUTOMATION CO.,LTD.

ATA QB-7系列
ATA QB-7 Series

交流电机软起动器

Soft-starter of AC Motors

操作手册
Operation Manual



技术优秀 | 产品优质 | 管理优化 | 服务优良

产品技术标准: Q/ADYS001-2019 质量体系标准: ISO9001/GB19001

安全注意事项

感谢您选择奥托ATA QB-7系列智能化软起动产品，我们将以优异的产品性能回报您的厚爱！您在进行安装、操作、维护之前，请务必熟读此守则，并正确使用。熟练掌握设备的知识、安全信息及注意事项后再使用。在本使用说明书中，安全注意事项分为“危险”和“注意”两个等级。

Thanks for your choice of the ATA QB-7 intelligent Soft-starter of ATA, we will respond your choice with excellence product performance, and we suggest strongly to read this manual before installation, operation and maintenance.

-  安装前请务必详细阅读本操作守则。
Please read this operation manual before installation.
-  只有专业技术人员允许安装本软起动器。
Only professional technical staff allowed to install this soft-starter.
-  必须让电动机的规格与本软起动器相匹配。
Make sure this soft-starter matches the specification(U,V,W)of the soft-starter.
-  严禁在软起动器输出端(U、V、W)接电容器。
Capacitor can't be connected to output terminal(U,V,W).
-  严禁将输入端(R、S、T)接到输出端(U、V、W)。
The input terminal(R、S、T)can't be connected to output terminal(U,V,W).
-  软起动器安装后将输入和输出端的裸露部分用绝缘胶带包好。
The bareness part of input and output terminal must be enwrapped by insulating tape after the soft-starter installation.
-  软起动器应牢固接地。
The soft-starter must be earthed hard.
-  设备维修时必须切断输入电源。
The input power must be shut when the equipment be maintained.
-  不得私自拆装、改装、维修本产品。
Prohibit to install, modify or repair the soft-starter without our permission.
-  产品报废时，请作为工业废弃物进行处理。
When the soft-starter is discard as useless, please handle as industrial castoff.
-  严禁用兆欧表测试软起动器主回路和控制回路。
Prohibit to test the main circuit and control circuit of the soft-starter with meg-ohmmeter.

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1. ATA QB-7软起动器概述 Summarize

ATA QB-7系列智能型电机软起动器是融合了电力电子技术、双CPU技术和最新的电机控制理论的新型设备。可广泛应用于风机、水泵、压缩机及球磨机等负载，是早期用于电动机起动的星/三角转换、自耦降压、磁控降压等降压起动设备的理想替代产品。其性能不是其它普通软起动器能比拟的。

ATA QB-7 series intelligent soft-starter is a new generation equipment with electric power technology, double-CPU technology and new motor control theory, which can be widely applied to different loads such as fans, water pumps, compressors, ball mills and etc. This soft-starter is a ideal alternative for the traditional start equipment such as Y- Δ , step-down autotransformer, magnetron soft-starter and etc.

1.1 ATA QB-7软起动器的主要作用 Main purpose

- 第一：有效降低了电动机的起动电流；可减少配电容量，避免电网增容投资。
- 第二：减小了电动机及负载设备的起动应力；延长了电动机及相关设备的使用寿命。
- 第三：软停机功能有效地解决了惯性系统的停车喘振问题；在水泵方面，大大缓解泵的水锤效应。
- 第四：自适用的起动模式；自动调节起动曲线以适用复杂的电机和负载情况，达到完美的起动效果。
- 第五：具有完善可靠的保护功能；有效地保护了电动机及相关生产设备的使用安全。
- 第六：先进的电子技术使该产品完全智能化，网络化，经济化。

- I. Efficiently reduce the start current of the motor, can reduce the distribution capacity and the investment for additional capacity of power grid.
- II. Reduce the start-up stress of the motor, prolong the life of the motor and related equipment.
- III. The soft-stop function can effectively settle the stopping surge problem of the inertia system and the water hammer effect of the water pump.
- IV. Self-adapting start mode: can self adjust the start curve for different motors and loads.
- V. Reliable protection: can efficiently protect the motor and related product equipment.
- VI. Advanced electronic technology to make the product fully intelligent, network-based, economy-based.

1.2 ATA QB-7软起动器的主要特点 Main characteristics

- 第一：双CPU结构，相互冗余的可靠性设计，是传统的单CPU结构所无法比拟的。
- 第二：起动和软停过程采用自适用智能化控制，避免了烦琐的曲线选择，自动控制电机达到最佳起动和软停性能。
- 第三：两种停车方式：软停车和自由停车可任选一种，灵活方便。
- 第四：对输入电源无相序要求。

第五：完善可靠的保护功能：过热、缺相、欠压、起动过流、运行过载、三相不平衡等保护。

第六：独特的紧凑内部结构设计，特别方便用户集成到已有系统中，为用户节约了旁路接触器的费用（内置旁路型）。

- I. Double-CPU configuration, with reliable redundancy design, must better than traditional single-CPU configuration.
- II. Adopt self-adapting intelligent control in start and stop process, avoid complete selection of curves, to make the motor achieve the perfect start and stop performance.
- III. Tow stop mode: soft-stop or natural stop is optional.
- IV. There is no phase request for input power.
- V. Perfect and reliable protection: overheat, phase lack, under voltage, overload, 3-phase imbalance and etc.
- VI. The unique compact internal structure is designed to facilitate user integration into existing systems, The cost of bypass contactor is saved (P Type).

2. 产品型号说明和开箱检查

Information of product model and unpacking steps

每台ATA QB-7软起动器在出厂前均进行了严格的检验和性能测试。用户在收到产品并拆封后，请按下列步骤检查，如发现有问题，请及时与供货商联系。

All the soft-starter have been tested strictly before leaving factory. When users receive the product, please follow the steps to check it after unpacking, if find any problem, please contact us immediately.

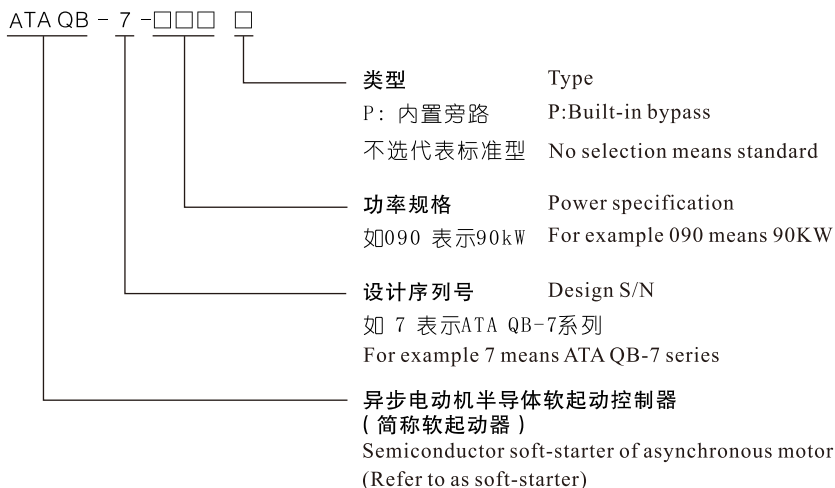
2.1 开箱检查步骤

2.1.1 检查产品型号 Check the product model:

核对产品外壳上的规格标牌，确认您收到的货物与您订购的产品相符。

Identify the specification label in curst, make sure that the product is what you have order.

型号MODEL	ATA QB****
输入电压INPUT VOLTAGE	三相50HZ/AC380V 3-phase AC380V/50Hz
输出功率OUTPUT VOLTAGE	***KW
生产日期PRODUCTION DARE	20**年**月
产品编号SERIAL NUMBER	*****



2.1.2 检查产品是否在运输过程中受到损伤，如：内部零件脱落有异常响动、外壳开裂、变形等。

Check if it is damaged in transport, for example: internal accessory falling off, with abnormality sound, craze or distortion in curst and etc.

2.1.3 检查其他物品：每台软起动器包装箱内除了产品本身外，还应有配套的产品检验合格证及操作说明各一份。

Check for the other goods: in all the soft-starter packs, there is a copy of the product inspection certificate and operation manual except the product.

3.使用条件及安装 Use condition and installation

3.1 使用环境 Use condition

使用条件对软起动器的正常使用及寿命有显著影响，因此请将软起动器安装在符合下列使用条件的场所。

The use condition have the marked infection for the natural using. please install the soft-starter in the adapted location for the follow conditions.

(1)本产品的使用条件Use environment

主回路电源：三相AC 380V ±15%，50Hz/60Hz

适配电机：鼠笼式异步电动机（其他电机请标明）

控制回路电源：标准型无需外接控制电压，P型控制电源AC220V。

工作方式：短时工作制

冷却方式：自然冷却

防护等级：IP20

环境条件：环境温度：-25~+40°C

相对湿度：90%RH以下，不结露

海拔高度：≤2000m（大于2000米可降容选型）

安装场所：柜内安装（无导电尘埃、无易燃、易爆、易腐蚀性气体，震动小于0.5G的场所）。

Power for main circuit power: 3 phase AC380V±15%, 50Hz or 60Hz

Adapt motor: Squirrel-cage asynchronous motor (please note for other motors)

Power for control circuit: Standard can work without control power connecting, P type need power AC 220V.

Work mode: Short-term work system

Cooling method: natural cooling

Protection level: IP20

Environmental conditions: Ambient temperature: -25~+40°C

Relative humidity: ≤90%RH, Non-condensing.

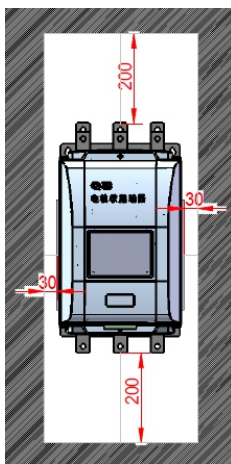
Altitude: Suitable for operating at an altitude of less than 2000m; otherwise, the power grade of its adapted motor should be degraded.

Installation sites: Install in cabinet (without conductive, flammability, explosive, causticity dust, shaking under 0.5G)

3.2 安装要求 Installation requirements

ATA QB-7系列软起动器的安装方式为壁挂式。冷却方式为自然冷却方式，为了有利于设备的通风及散热，软起动器应垂直安装，并在设备上留有足够的散热空间。如下图，图中为允许的最小距离。

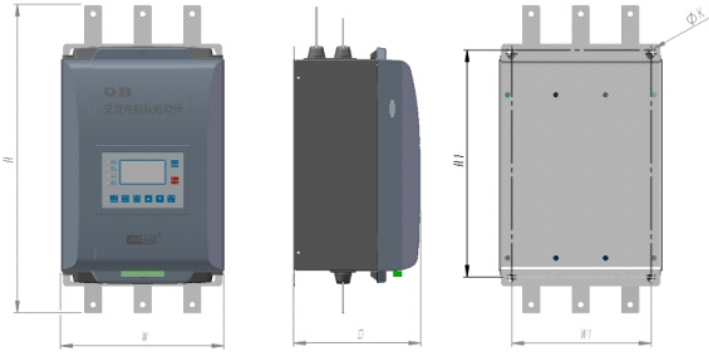
ATA QB-7 series soft-starter is wall-mounted. Cause of the natural cooling method, it should be installed perpendicularly for aeration and cooling. the figure for the minimum allowed distance.



单位：mm
unit: mm

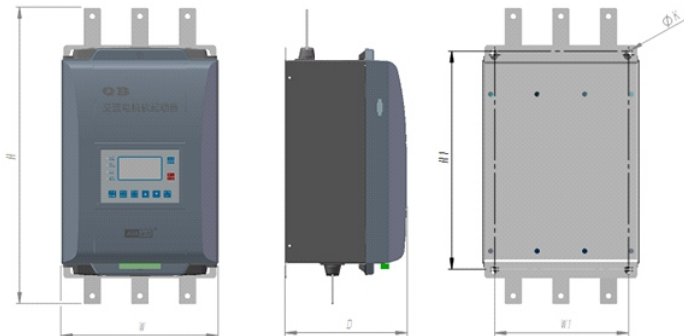
3.3 软起动器的外型与安装尺寸

The outline and installation dimension of the soft-starters



标准型 standard

ATA QB-7系列软起动器 ATA QB-7 series soft-starter		安装尺寸 Installation dimension		外形尺寸 Outline size			安装孔 Mounting hole
外型 Appearance	功率 Power	H1	W1	H	W	D	K
A	8-55	380	200	460	242	190	9
B	75-110	397	230	509	270	210	9
C	132-200	427	260	549	300	220	9
D	250-320	457	270	579	315	220	9
E	400	449	446	631	470	288	9
F	500	537	644	734	668	356	11
G	600-800	483	893	1045	915	490	11



内置旁路型 Built-in bypass type

ATA QB-7系列软起动器 ATA QB-7 series soft-starter		安装尺寸 Installation dimension		外形尺寸 Outline size			安装孔 Mounting hole
外型 Appearance	功率 Power	H1	W1	H	W	D	K
A	8-55	380	200	460	242	190	9
B	75-110	400	230	493	270	247	9
C	132-200	430	260	552	300	260	9
D	250-320	460	270	582	315	260	9

软起动器电气规格 The electric specification of ATA QB-7 soft-starter

项目 Item	技术指标 Technical Parameter	
主回路 Main Circuit	功率器件 Power component	可控硅模块/普通可控硅 SCR module/SCR
	主回路电源 Main circuit power	三相380V+10%-15%, 50/60Hz 3-phase AC380V +10%~-15%, 50/60Hz
	主回路功耗 Main circuit consume Power	<每相每安培2W <2W/A in single phase
	功率器件电压 Voltage of Power component	≥1400V
	dv/dt保护 dv/dt protection	阻容滤波回路, 压敏电阻 RC filter circuit, varistor
控制回路 Control circuit	控制回路电压 Control voltage	AC 220V (+10%□ -15%), 50/60Hz
	控制回路功耗 Consume power of control circuit	5W
	起动指令 Start indication	无源触点, 键盘, 计算机指令 Passive contact, keyboard, PC indication
起动参数 Start parameter	起动方式 Start mode	电流斜坡, 限流起动, 电压斜坡 Current slope, current-limit, voltage slope
	起始电压 Initial voltage	30%~90%(系统电压) 30%~90%(system voltage)
	起动时间 Start time	5~120s
	突跳时间 Snap-jump time	0~3s
停车 Stop	自由停车 Natural stop	
	软停车 Soft-stop	0~30 s

项 目 Item		技 术 指 标 Technical Parameter
故障保护 Protection	电源故障保护 Protection for power supply	缺相、欠压、过压 Phase lack, under voltage, over voltage
	设备故障保护 Protection for equipment	过热、电机过载、电机缺相、起动超时、PTC保护、 欠载、三相不平衡、可控硅短路、过流，对地漏电 保护等。 Overheat, overload, over current, overtime of starting、 PTC, underload, three-phase unbalance, SCR short circuit, overcurrent, earth leakage protection, etc.
在线监测 Online monitoring	显示 Display	起动、运行状态和起动、运行电流及电压，有功功率 及功率因数 Start, run status and start, running current and voltage, Active power and power factor
辅助输出 Assistant output terminal	继电器输出1 Relay output 1	常开继电器触点，AC250V/10A NO contact
	标准型 standard	旁路输出 Bypass output
	内置旁路型 built-in bypass	继电器输出2 Relay output 2
	故障继电器输出 Fault Relay output	继电器触点，AC250V/10A Relay contact, AC250V/10A
	逻辑输出1 Logical output 1	集电极开路输出 (+12V、+24V) ,50mA open-collector output(+12V、+24V),50mA
	逻辑输出2 Logical output 2	集电极开路输出 (+12V、+24V) ,50mA open-collector output(+12V、+24V),50mA
	模拟输出 Analog output	4~20mA或0~20mA 标准信号 4~20mA or 0~20mA ,standard signal
数字通讯 Communication	通讯接口 Communication terminal	无通讯接口（默认）、RS-485接口（可选）和Profibus 接口（可选）。通讯协议请登录 www.atawindow.com 网站下载 Non (default) , RS-485 (Optional) or Profibus (Optional) , Communication protocol please log in. www.atawindow.com Website download
环境条件 Enviroment condition	运行温度 Running temperature	-5~+40℃
	储存温度 Memory temperature	-25~+55℃
	相对湿度 Relative humidity	20~90%，不结露 Non condensation
	海拔高度 Height above sea level	<2 000m, 额定值不变 <2 000m, rated value >2 000m, 额定值-5%/100m >2 000m, increase capacity 5% per 100m
其他 Others	产品技术标准 Technical standard	GB 14048.6-2016

4.工作原理及接线 Working principle and connecting

4.1 ATA QB-7软起动器的工作原理

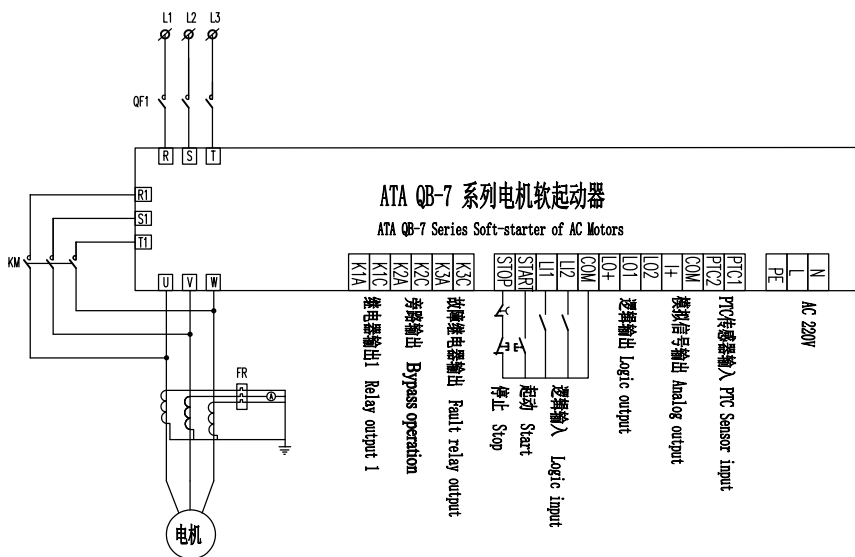
The working principle of the ATA QB-7 soft-starter

ATA QB-7电动机软起动器采用三对反并联的晶闸管串接于交流电动机的定子回路上。利用晶闸管的电子开关作用，通过微处理器控制其触发角的变化来改变晶闸管的开通程度，由此来改变电动机输入电压大小，以达到控制电动机软起动目的。当起动完成后，软起动输出达到额定电压。这时将自动控制旁路继电器吸合，将电动机投入电网运行。

The ATA QB-7 soft-starter has 3 pairs of inverted shunt-wound SCR which connected to the stator circuit of the AC motors. By controlling the switching on of SCR trigger gate changes the input voltage of motors. When soft-starter finished soft starting, its output voltage is reaching its rated value, and bypass contactor automatically closed, then motor is running.

4.2 ATA QB7软起动器的基本接线图

The connection diagram of ATA QB-7 soft-starter



标准型 Sandardtype

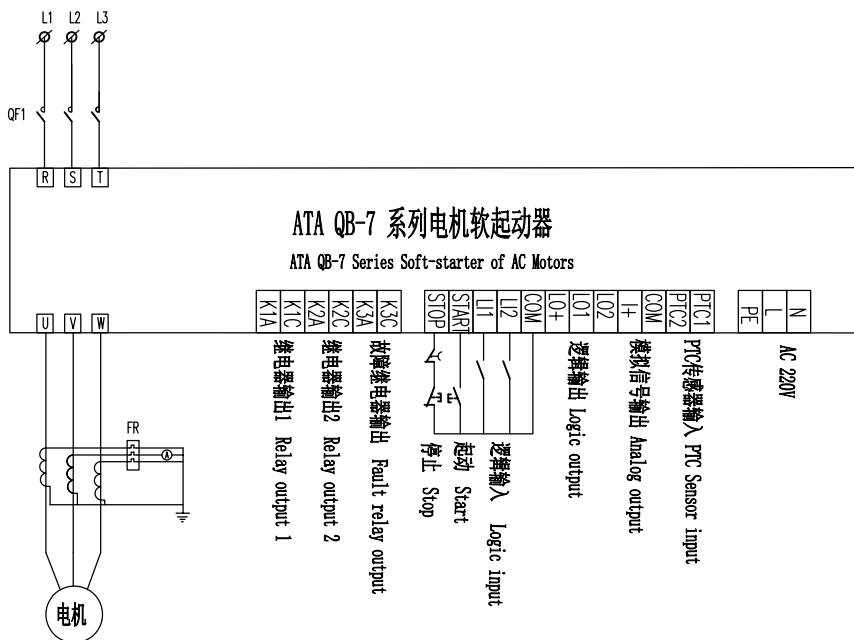
端子说明External terminal information

端子编号 Terminal No		端子名称 Terminal Name		说明 Explanation	
主回路 Main circuit	R、S、T		交流电源输入 AC Power input	由断路器(QF)接三相交流电源。 Connect Breaker with 3 Phase AC Power	
	R1、S1、T1		交流电源输出 AC Power output	接至三相交流接触器。(内置旁路型无此端子) Connect to 3. Phase AC contactor, (Built-in bypass type without this terminal)	
	U、V、W		交流电源输出 AC Power output	接至三相交流异步电动机。 Connect to 3. Phase AC asynchronous motor	
控制回路 Control circuit	继电器输出1 relay output 1	K1A	常开触点 NO contact	可根据需要定义不同状态 Can be defined with different requirement 触点容量为: 10A/250V AC Terminal Power: 10A/250V AC.	
		K1C			
	运行输出 Running state output	K2A	常开触点 NO contact	运行时, K2A、K2C触点闭合 触点容量为: 10A/250V AC Terminal Power:10A/250V AC.	
		K2C			
	故障继电器输出 Fault relay output	K3A	无源触点 Passive contact	故障继电器输出有两种工作方式。 即故障时闭合和故障时断开。 There are two modes of operation for the fault relay output. That is, when the fault is closed and when the fault is broken.	
		K3C			
	逻辑输入 (有源触点) Logic input (active contact)	COM	公共端子 COM		无源触点接入或短接, 不能直接引入外部电源。 Connect to external potential-free contact or short connect, can't direct connected to external power.
		L11	逻辑输入1 L11		
		L12	逻辑输入2 L12		
		START	起动端子START		
		STOP	停止端子STOP		
	可编程逻辑输出 Programmable logical output	LO+	电源逻辑输出 Power logic output		可根据需要定义不同状态 Can be defined with different requirement.
LO1		可编程逻辑输出1 Programmable logic output 1			
LO2		可编程逻辑输出2 Programmable logic output 2			
模拟信号输出 Analog signal output	51	信号输出IOUT		0~20mA或4~20mA模拟信号输出 0~20mA or 4~20mA Analog signal output	
	52	地线GND			
PTC输入 PTC input	PTC1	PTC1		PTC传感器达到保护值时, 两种保护可以同时 使用。 1.PTC传感器报警(继电器输出或逻辑输出设定 为“PTC传感器报警”) 2.故障输出PTC报警(PTC保护投入) When the PTC sensor reaches the protection value, two kinds of protection can be used simultaneously 1.PTC sensor alarm (relay output or logical output is set as "PTC sensor alarm") 2. Fault output PTC alarm (PTC protection input)	
	PTC2	PTC2			

端子编号 Terminal No		端子名称 Terminal Name	说明 Explanation
控制回路 Control circuit	通信接口(RS-485) Communication interface (RS-485)	通信接口 Communication terminal	无通讯接口（默认）、RS-485接口（可选）和Profibus接口（可选）。通讯协议请登录 www.atawindow.com 网站下载 Non(default) , RS-485 (Optional) or Profibus (Optional) , Communication protocol please log in. www.atawindow.com Website download
	控制电源	L	AC 220V(+10%、-15%) , 50/60Hz
		N	
		PE	
	RJ45	扩展显示屏 Extended display	外接扩展显示屏 External extension display

4.3 ATA QB7软起动器的基本接线图

The connection diagram of ATA QB-7 soft-starter



内置旁路型 Built-in bypass type

端子说明External terminal information

端子编号 Terminal No		端子名称 Terminal Name		说明 Explanation
主回路 Main circuit	R、S、T		交流电源输入 AC Power input	由断路器(QF)接三相交流电源。 Connect Breaker with 3 Phase AC Power
	U、V、W		交流电源输出 AC Power output	接至三相交流异步电动机。 Connect to 3. Phase AC asynchronous motor
控制回路 Control circuit	继电器输出1 relay output 1	K1A	常开触点 NO contact	可根据需要定义不同状态 Can be defined with different requirement 触点容量为: 2A/250V AC Terminal Power:2A/250V AC.
		K1C		
	继电器输出2 relay output 2	K2A	常开触点 NO contact	可根据需要定义不同状态 Can be defined with different requirement 触点容量为: 2A/250V AC Terminal Power:2A/250V AC.
		K2C		
	故障继电器输出 Fault relay output	K3A	无源触点 Passive contact	故障继电器输出有两种工作方式。 即故障时闭合和故障时断开。 There are two modes of operation for the fault relay output. That is, when the fault is closed and when the fault is broken.
		K3C		
	逻辑输入 (有源触点) Logic input (active contact)	COM	公共端子 COM	
		LI1	逻辑输入1 LI1	
		LI2	逻辑输入2 LI2	
		START	起动端子START	
		STOP	停止端子STOP	
	可编程逻辑输出 Programmable logical output	LO+	电源逻辑输出 Power logic output	
		LO1	可编程逻辑输出1 Programmable logic output 1	
		LO2	可编程逻辑输出2 Programmable logic output 2	
模拟信号输出 Analog signal output	51	信号输出IOUT		
	52	地线GND		
PTC输入 PTC input	PTC1	PTC1		
	PTC2	PTC2		

端子编号 Terminal No		端子名称 Terminal Name	说明 Explanation
控制回路 Control circuit	通信接口(RS-485) Communication interface (RS-485)	通信接口 Communication terminal	无通讯接口（默认）、RS-485接口（可选）和Profibus接口（可选）。通讯协议请登录 www.atawindow.com 网站下载 Non(default), RS-485 (Optional) or Profibus (Optional), Communication protocol please log in. www.atawindow.com Website download
	控制电源	L	AC 220V(+10%、-15%) , 50/60Hz
		N	
		PE	
	RJ45	扩展显示屏 Extended display	外接扩展显示屏 External extension display

5.操作与显示 Operation and display

5.1 液晶屏 LCD screen



表5-1指示灯 Indicator

名称 Name	颜色 Color	说明 Explanation
起动 Start	黄 Yellow	ATA QB-7软起动器处于起动状态 ATA QB-7 soft-starter is starting
运行 Run	绿 Green	ATA QB-7软起动器处于运行状态 ATA QB-7 soft-starter is running
故障 Fault	红 Red	ATA QB-7软起动器处于故障保护状态 ATA QB-7 soft-starter is in the status of fault protection

表5-2操作按键 Operation panel









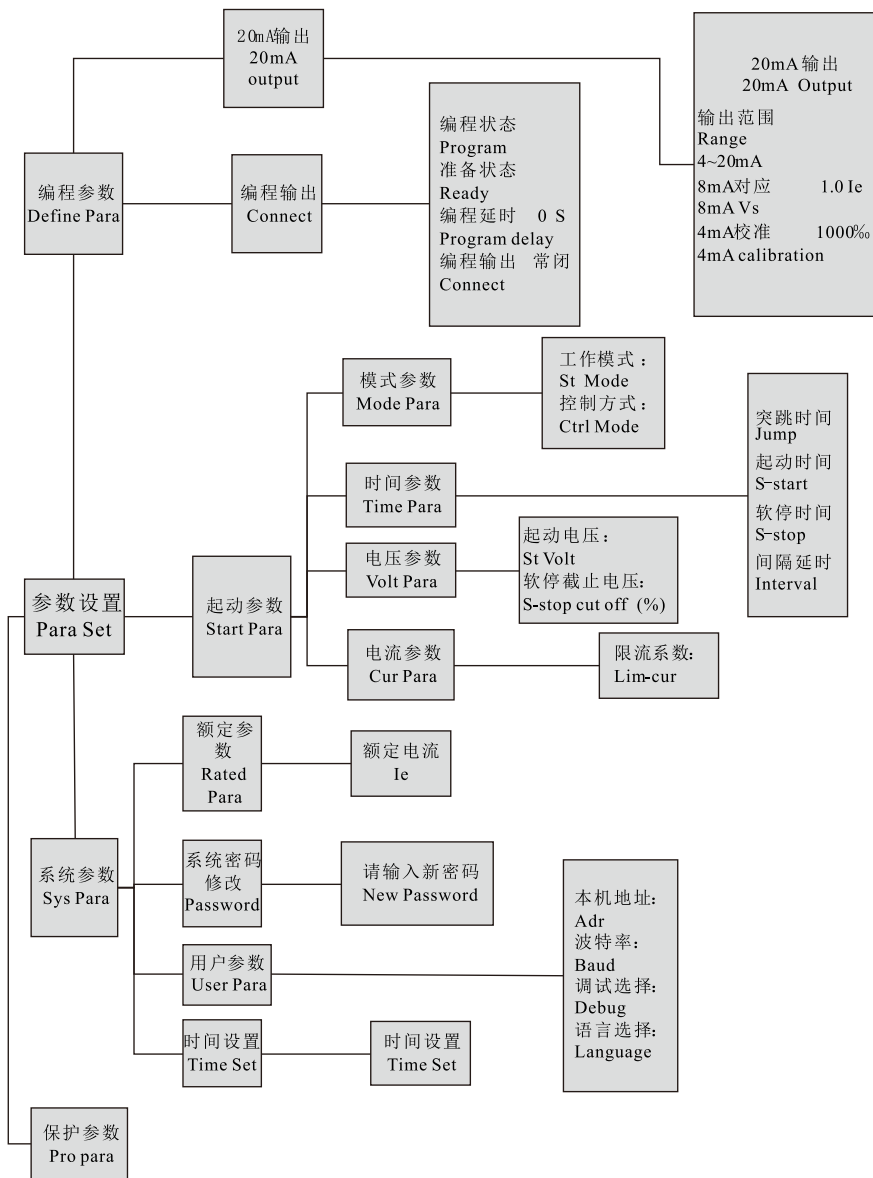
按键名称 Key	说明 Information
	软起动器就绪时，按此键进入起动状态 Press this key to start a motor in panel control mode
	软起动器停车 Soft-start stop
	进入操作菜单 Enter into operating menu
	保存参数后返回上级菜单 Save the parameters and then return to the previous menu
	进入上级菜单或不保存参数返回上级菜单 Go to previous menu or return to previous menu without saving parameters
	转上一参数或增加参数值 Go to pervious parameter or increase the parameter value
	转下一参数或减少参数值 Go to the next parameter or decrease the parameter value
	选择参数的某一位 Function Key

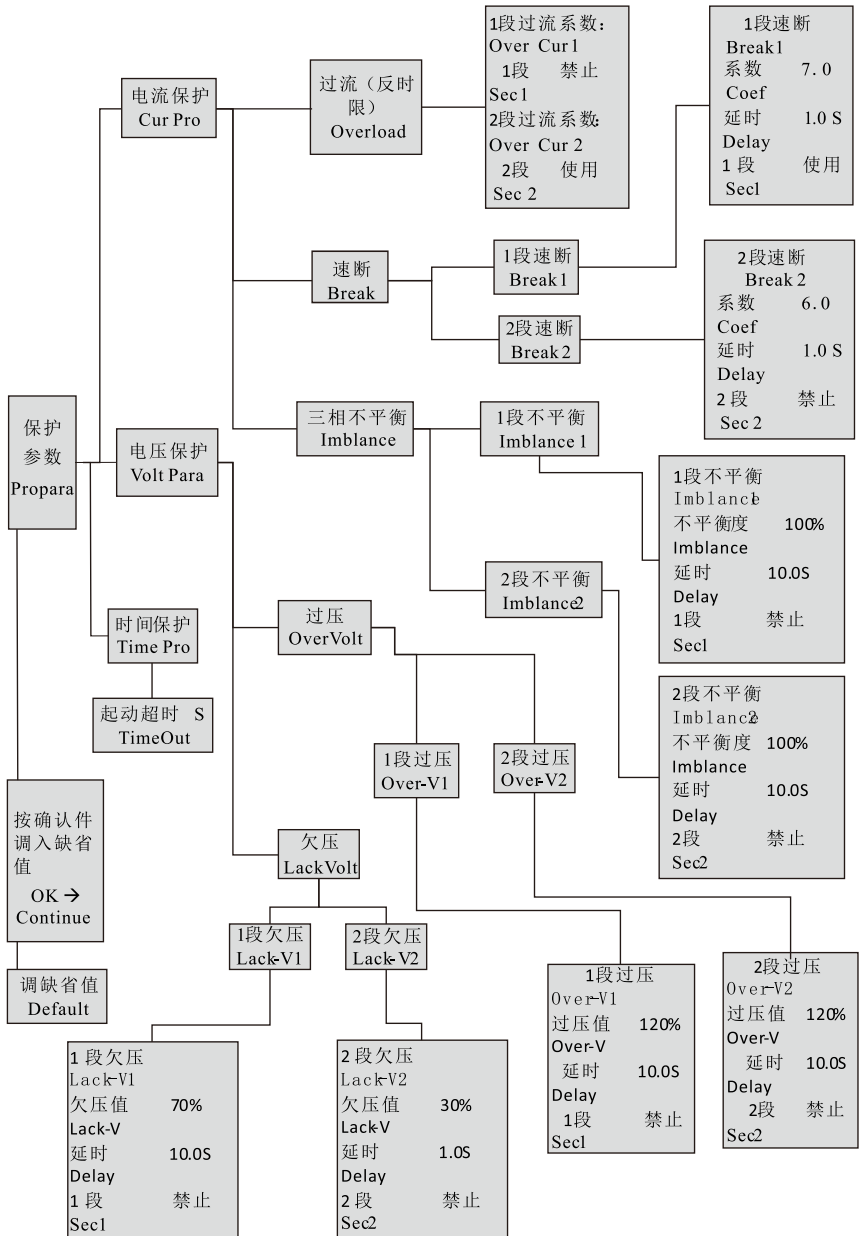
表5-3 ATA QB-7软起动器工作时将自动显示工作状态。

ATA QB-7 soft-starter can display its working status automatically during running

状态 Status	显示 Display	说明 Explanation
初始化 Initialization	欢迎使用 交流软起动器 Welcome to using ATA ATA QB-7 motor soft starter	上电自检，参数初始化 The power of soft-starter is switched on and self-checking, initializing the parameter
待机 Ready	待机状态 ×××× The soft-starter is ready 系统电压 ×××V System voltage 系统电流 ×××A System current XX-XX-XXXX XX:XX	待机状态 The soft-starter is ready
起动 Starting	正在软起 ×××S The soft-starter is starting 系统电压 ×××V System voltage 系统电流 ×××A System current XX-XX-XXXX XX:XX	正在起动 The soft-starter is starting
运行 Running	正在运行 ××:××:××S The soft-starter is running 系统电压 ×××V System voltage 系统电流 ×××A System current XX-XX-XXXX XX:XX	正在运行 The soft-starter is running
软停 Soft-stop	正在软停 ×××S The soft-starter is soft-stopping 系统电压 ×××V System voltage 系统电流 ×××A System current XX-XX-XXXX XX:XX	正在软停 The soft-starter is soft-stopping

5.2 参数设置 Parameters setup

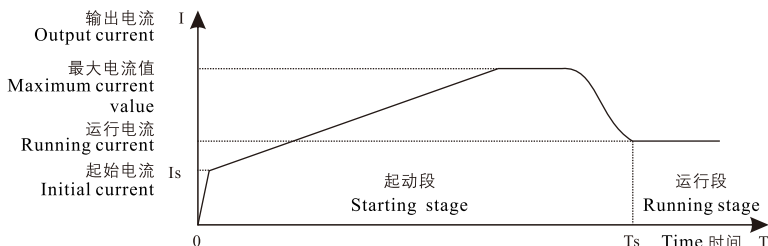




说明 Description	设定范围 Setting ranges	出厂值 Factory defaults
工作模式 Working mode		斜坡 Slope

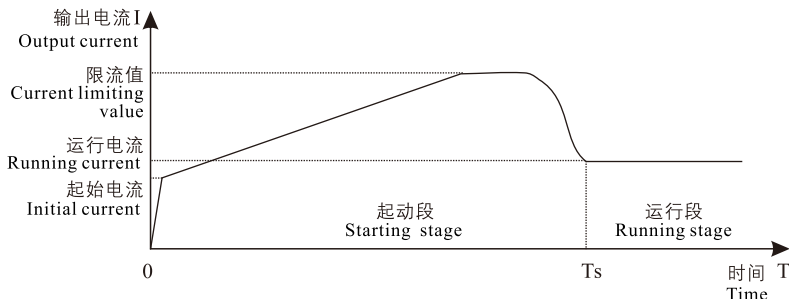
● 斜坡：电流斜坡控制由二个基本参数起始电压 U_s 和起动时间 T_s 组成，当电机起动时，软起动器开始输出起始电压 U_s ，电机获得起始电流 I_s ，此后电流沿给定斜率，经过给定的起动时间 T_s （根据负载大小，自动调节起动过程），到达电机运行电流。

● Slope: The current slope control consists of the two basic parameters such as the initial voltage U_s and the starting time T_s , when the motor starting, the soft starter starts to output the starting voltage U_s , the starting current I_s is obtained by the motor, and then the current along the given slope reaches at the motor running current after a given starting time T_s (based on the load size, automatically adjust the starting process).

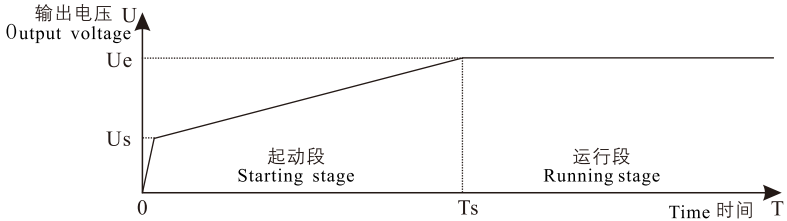


● 限流：电流斜坡控制由二个基本参数起始电压 U_s 和起动时间 T_s 组成，当电机起动时，软起动器开始输出起始电压 U_s ，电机获得起始电流 I_s ，此后电流沿给定斜率，到达限流值后，不再上升，经过给定的起动时间 T_s （根据负载大小，自动调节起动过程），电机达速，进入运行状态。

● Current limiting: The current slope control consists of the two basic parameters such as the initial voltage U_s and the starting time T_s , when the motor starting, the soft starter starts to output the starting voltage U_s , the starting current I_s is obtained by the motor, and then after the current along the given slope reaches at the current limiting value, doesn't rise no longer, after a given starting time T_s (based on the load size, automatically adjust the starting process), the motor reaches at the speed, and enters the running state.



- 电压：电压斜坡控制由二个基本参数起始电压 U_s 和起动时间 T_s 组成，当电机起动时，软起动器开始输出起始电压 U_s ，此后电压沿给定斜率，经过给定的起动时间 T_s （根据负载大小，自动调节起动过程），到达额定电压 U_e 。
- Voltage: The voltage slope control consists of the two basic parameters such as the initial voltage U_s and the starting time T_s , when the motor starting, the soft starter starts to output the starting voltage U_s , and then the voltage along the given slope reaches at the rated voltage U_e after a given starting time T_s (based on the load size, automatically adjust the starting process).



控制方式 Control mode		端子 Terminal
端子：外接端子控制 Terminal: external terminal control 面板：面板按键控制 Panel: panel key control 远程：通讯控制 Remote: communication control		
停车模式 Parking mode		瞬停 Instantaneous stop
瞬停：自由停车 Instantaneous stop: Free parking 软停：当电机停止时，软起动器开始输出额定电压 U_e ，按照给定斜率，经过给定的软停时间 T_t ，到达软停截止电压 U_s ，软停结束。 rated voltage Soft stop: when the motor stops, the soft starter starts to output the rated voltage U_e . According to the given slope, after the given soft stop time T_t , it reaches the soft stop cut-off voltage U_s , and the soft stop ends.		
<p>The graph shows the output voltage U on the vertical axis and time T on the horizontal axis. The curve starts at a point $(0, U_e)$ and decreases linearly to a point (T_s, U_s), then drops vertically to zero. The linear portion is labeled '软停段 Soft-stopping stage'. The rated voltage U_e and soft stop cut-off voltage U_s are indicated on the vertical axis, and the soft stop time T_s is indicated on the horizontal axis.</p>		

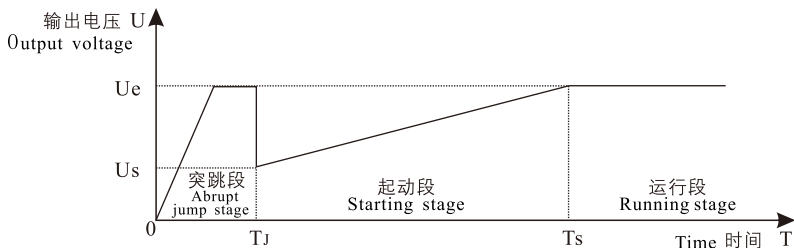
突跳时间 Jump time	0.0~3.0 S	0.0S
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软起动器在初始起动阶段提供一个时间为 T_J 的全导通阶段，输出额定电压，不建议使用。

The soft starter provides a full conduction stage with the time of T_J in the initial starting stage, and outputs the rated voltage, it is not recommended to use.

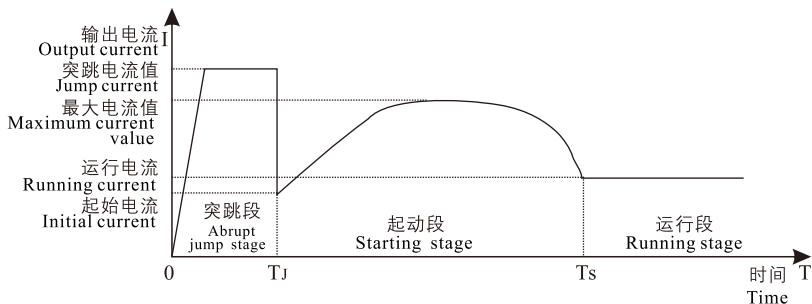
●突跳+电压斜坡模式：对于高转矩负载，软起动器在初始起动阶段提供一个时间为 T_J 的全导通阶段，再输出起始电压 U_s ，此后电压沿给定斜率，经过给定的起动时间 T_s （根据负载大小，自动调节起动过程），到达额定电压。

●Sudden jump + voltage slope mode: for high torque load, the soft starter provides a full conduction stage with the time of T_J in the initial starting stage, and then outputs the initial voltage U_s , after that, the voltage reaches the rated voltage along a given slope and after a given starting time T_s (automatically adjust the starting process according to the load size).



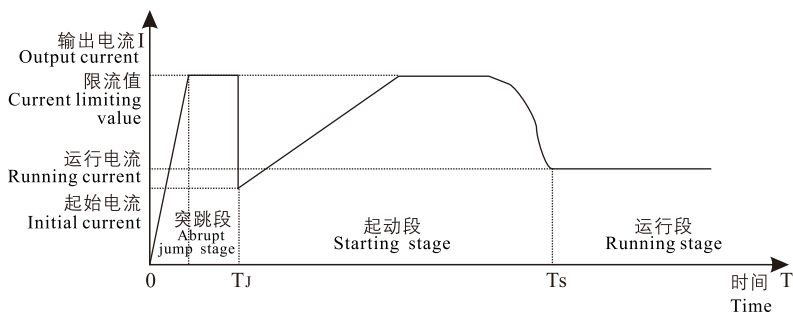
●突跳+电流斜坡模式：对于高转矩负载，软起动器在初始起动阶段提供一个时间为 T_J 的全导通阶段，再输出起始电压 U_s ，获得起始电流 I_s ，此后电压沿给定斜率，经过给定的起动时间 T_s ，根据负载大小，自动调节起动过程，到达电机运行电流。

●Sudden jump + voltage slope mode: for high torque load, the soft starter provides a full conduction stage with the time of T_J in the initial starting stage, and then outputs the initial voltage U_s , after that, the voltage reaches the rated voltage along a given slope and after a given starting time T_s (automatically adjust the starting process according to the load size).



●突跳+限流斜坡模式：对于高转矩负载，又要限制电流的严格场所，软起动器在初始起动阶段提供一个时间为 T_J 的电流值，给电机一个允许的电流最大值，再输出起始电压 U_S ，获得起始电流 I_S ，此后电流沿给定斜率，到达限流值后，不再上升，经过给定的起动时间 T_s （根据负载大小，自动调节起动过程），电机达速，进入运行状态。

●Kick + current slope mode: For high torque load, the soft starter provides a full conduction stage with the time of T_J in the initial starting stage, and then outputs the starting voltage U_S , the starting current I_S is obtained, after that, the voltage reaches the running current of motor along a given slope and after a given starting time T_s (automatically adjust the starting process according to the load size)..



起动时间 Starting time	5~120 S	30S
起动电压升至额定电压的时间 Time from the starting voltage to be increased to the rated voltage		
软停时间 Soft stop time	0~30 S	5S
软停时输出电压从额定电压降至软停截止电压的时间 The time at which the output voltage drops from the rated voltage to the soft stop cut-off voltage when the soft stop		
间隔时间 Interval time	0~30 min	0 min
上次停车到下次起动的间隔时间 interval time between the last stop and the next start		
起动电压 Starting voltage	30~90%	45%
初始阶段软起动对电机所加电压，额定电压的百分比 The voltage are applied to the motor by the soft start during the initial stage, the percentage of rated voltage		
软停截止电压 Soft stop cut-off voltage	30~90%	50%
软停截止时的电压，额定电压的百分比 The voltage at the soft stop cut-off, the percentage of rated voltage		

限流系数 Current limiting factor	3.0~5.0 I _e	4.5 I _e
起动过程中限定的最大起动电流，额定电流I _e 的倍数 The maximum starting current limited in the starting process, the multiple of the rated current I _e		

说明 Description	设定范围 Setting range	出厂值 Factory default
1段过流系数 1 Segment overcurrent coefficient	2.0~6.0	5.0
软起过程中过流保护系数，额定电流倍数 the multiple of the rated current, overcurrent protection factor in the soft starting process		
1段过流投入 1 Segment overcurrent input	禁止/使用 Prohibition / use	禁止 Prohibition
1段过流禁止/使用 1 Segment overcurrent prohibition / use		
2段过流系数 2 Segment overcurrent coefficient	1.2~2.0	1.5
运行过程中电流保护系数，额定电流倍数 The multiple of rated current, current protection factor in the running process		
2段过流投入 2 Segment overcurrent input	禁止/使用 Prohibition / use	使用 use
运行过流禁止/使用 Running overcurrent is not allowed/used		
1段速断系数 1 Segment quick break coefficient	2.0~8.0	7.0
软起过程中速断保护系数，额定电流倍数 the rated current multiple, protection factor of quick break in the soft starting process		
1段速断延时 1 segment quick break delay	0.0~10.0 S	0.5 S
软起过程中电流达到速断值至速断故障报出的维持时间 The holding time from the current reaching the quick break value to the quick break fault report in the soft start process		
1段速断投入 1 segment quick break input	禁止/使用 Prohibition / use	使用 Prohibition
软起过程中速断保护禁止/使用 Quick break protection during the soft start process is prohibited/used		
2段速断系数 2 segment quick break coefficient	2.0~8.0	6.0
运行过程中速断保护系数，额定电流倍数 Rated current multiple, quick break protection factor during the running process		
2段速断延时 2 segment quick break delay	0.0~10.0 S	1.0 S
运行过程中电流达到速断值至速断故障报出的维持时间 The holding time from the current reaching the quick break value to the quick break fault report		

2段速断投入 2 segment quick break input	禁止/使用 Prohibition / use	禁止 Prohibition
运行过程中速断保护禁止/使用 Quick break protection is not allowed/used during operation		
1段三相不平衡度 1segment three-phase unbalanceness	15~100%	100%
起动过程中三相电流不平衡度 Three-phase current unbalanceness during starting		
1段三相不平衡延时 1 segment three-phase unbalanced delay	0.0~10.0 S	1.0 S
起动过程中三相电流不平衡度达到故障值维持时间 the holding time of which the three-phase current unbalanceness reaches the fault value in the starting process		
1段三相不平衡投入 1 segment three-phase unbalanced input	禁止/使用 Prohibition / use	禁止 Prohibition
起动过程中三相电流不平衡故障禁止/使用 Disequilibrium fault of three-phase current during starting is prohibited/used		
2段三相不平衡度 2segmentthree-phase unbalancedness	15~100%	100%
运行过程中三相电流不平衡度 Unbalance degree of three-phase current during operation		
2段三相不平衡延时 2 segment three-phase unbalanced delay	0.0~10.0 S	1.0 S
起动过程中三相电流不平衡度达到故障值维持时间 the holding time of which the three-phase current unbalanceness reaches the fault value in the starting process		
2段三相不平衡投入 2 segment three-phase unbalanced input	禁止/使用 Prohibition / use	禁止 Prohibition
起动过程中三相电流不平衡故障禁止/使用 Disequilibrium fault of three-phase current during starting is prohibited/used		
1段欠载系数 1 Segment underload coefficient	0.0~1.0	0.0
软起过程中欠载保护系数，额定电流倍数 ratedcurrentmultiple, underload protection factor during soft start		
1段欠载投入 2 segment underload input	禁止/使用 Prohibition / use	禁止 Prohibition
起动过程中欠载禁止/使用 Underload during starting is prohibited/used		
2段欠载系数 2 segment underload coefficient	0.0~1.0	0.0
运行过程中欠载保护系数，额定电流倍数 Ratedcurrentmultiple, underload protection factorduring operation		
2段欠载投入 2 segment underload input	禁止/使用 Prohibition / use	禁止 Prohibition

运行中欠载禁止/使用 Under load is prohibited/used during running		
1段过压值 1 segment overvoltage value	105~140%	120%
起动过程中过压保护对应的电压值相对额定电压百分比 Percentage of the voltage value corresponding to the overvoltage protection relative to the rated voltage during starting		
1段过压延时 1 segment overvoltage delay	0.0~10.0 S	1.0 S
起动过程中电压达到过压值至过压故障报出的维持时间 The holding time from the voltage reaching the overvoltage value to the overvoltage fault reporting during starting		
1段过压投入 1 segment overvoltage input	禁止/使用 Prohibition / use	禁止 Prohibition
起动过程中过压故障禁止/使用 Overvoltage fault during starting is prohibited/used		
2段过压值 2 segment overvoltage value	105~140%	120%
运行过程中过压保护对应的电压值相对额定电压百分比 The percentage of voltage value corresponding to the overvoltage protection relative to the rated voltage during operation		
2段过压延时 2 segment overvoltage delay	0.0~10.0 S	1.0 S
运行过程中电压达到过压值至过压故障报出的维持时间 The holding time from the voltage reaching over voltage value to the overvoltage fault reporting during operation		
2段过压投入 2 segment overvoltage input	禁止/使用 Prohibition / use	禁止 Prohibition
运行过程中过压故障禁止/使用 Overvoltage fault during operation is prohibited/used		
1段欠压值 1 segment under voltage value	30~90%	70%
起动过程中欠压保护对应的电压值相对额定电压百分比 Percentage of the voltage value corresponding to the undervoltage protection relative to the rated voltage during starting		
1段欠压延时 1 segment under voltage delay	0.0~10.0 S	1.0 S
起动过程中电压低于欠压值至过压故障报出的维持时间 During the starting process, the holding time in which the voltage is lower than the undervoltage value until the overvoltage fault is reported		
1段欠压投入 1 segment under voltage input	禁止/使用 Prohibition / use	使用 use
起动过程中欠压故障禁止/使用 Undervoltage fault during starting is prohibited/used		
2段欠压值 2 segment under voltage value	30~90%	30%
运行过程中过压保护对应的电压值相对额定电压百分比 The percentage of the voltage value corresponding to the overvoltage protection relative to the rated voltage during operation		

2段欠压延时 2 segment under voltage delay	0.0~10.0 S	1.0 S
运行过程中电压低于欠压值至过压故障报出的维持时间 During operation, the holding time in which the voltage is lower than the undervoltage until the overvoltage fault is reported		
2段欠压投入 2 segment under voltage input	禁止/使用 Prohibition / use	使用 use
运行过程中欠压故障禁止/使用 Undervoltage fault during operation is prohibited/used		
起动超时 Starting overtime	5~120 S	90 S
起动过程超过设定时间报起动超时故障 Failure of starting timeout if the starting process exceeds the set time		
PTC保护 PTC protection	禁止/使用 Prohibition / use	禁止 Prohibition

集成在电机中用以测量其温度的 PTC 传感器可以连接到控制卡端口上，这个模拟值由起动器进行管理。

The PTC sensor integrated into the motor to measure its temperature can be connected to the control card port, this analog value is managed by the starter.

“PTC probe thermal overshoot” (PTC 传感器热过冲) 参数值可通过两种方式进行处理和

使用:
The parameter value of "PTC probe thermal overshoot" can be processed and used in two ways:

使用- 如果该信号有效，出现故障时停机

Use - if the signal is valid, stop in case of failure

禁止- 如果该信号有效，给出报警。该报警可以显示在起动器状态字(串口)中或可配置逻辑输出

Forbidden - if the signal is valid, give an alarm. The alarm can be displayed in the starter status word (serial port) or the logic output can be allocated

说明 Description	设定范围 Setting range	出厂值 Factory default
20mA输出范围 20mA output range	4~20mA(0~20mA)	4~20mA
模拟输出4~20mA(0~20mA) 输出端子 (+,I-) 所带最大负载能力为500欧姆，最大能输出20mA。跟随A相电流变化而变化。 Analog output 4-20ma (0-20ma) output terminal (+,I-) with a maximum load capacity of 500 ohms and a maximum output capacity of 20mA. It changes with the change of A-phase current.		
8mA对应 Corresponding to 8mA	0.1~3.0 Ie	1.0 Ie

8mA对应额定电流(Ie)的倍数(k)
The rated current (Ie) multiple (k) corresponding to 8mA

A) 当选择为0~20mA时
A) when the 0~20mA is selected

输出电流 (mA) = (8/k) * (I/Ie);
Output current (mA) = (8/k) * (I/Ie);

B) 当选择为4~20mA时
B) when the 4~20mA is chosen

输出电流 (mA) = (4/k) * (I/Ie) + 4;
Output current (mA) = (4/k) * (I/Ie) + 4;

k-为设定的8mA对应额定电流(Ie)的倍数; I为A相实际电流 Ie为额定电流(单位A)
K - is the multiple of the rated current (Ie) corresponding to the set 8mA; I is the actual current of phase A, Ie is rated current (unit A)

继电器输出1
Relay output 1

电机已通电
Motor energized

继电器输出1 (继电器K1) 可以编程为以下输出状态:
Relay output 1 (relay K1) can be programmed as the following output state:
未分配

Unassigned

电机热报警: 电机过流保护时相应的逻辑输出端口动作。

Motor thermal alarm: the corresponding logic output port action when the motor over current protection.

电机已通电: 电机中可能有电流。

Motor energized: there may be current in the motor.

电机电流报警: 电机电流速断保护时相应的逻辑输出端口动作。

Motor current alarm: the corresponding logic output port action in the case of the motor current quick break protection.

PTC传感器报警: 电机温度通过PTC传感器传到软起动器控制板, 如果温度超过保护值, 相应的逻辑输出端口动作, 与PTC报警禁止与否无关。

PTC sensor alarm: the motor temperature is transmitted to the control panel of the soft starter through the PTC sensor, if the temperature exceeds the protection value, the corresponding logical output port action has nothing to do with whether the PTC alarm is forbidden or not.

电机参数2激活: 电机使用第二套参数时此端口动作。

Motor parameter 2 activation: this port action when the motor uses the second set of parameters.

旁路输出: 软起动器运行状态时此端口动作。

Bypass output: This port operates while the soft starter is running.

	内置旁路型 Built-in bypass type	继电器输出 2 Relay output 2		电机已通电 Motor energized
	标准型 Sandardtype	运行输出 Running output		
K2A K2C	<p>继电器输出2（继电器K2）可以编程为以下输出状态： Relay output 2 (relay K2) can be programmed as the following output state:</p> <p>未分配 Unassigned</p> <p>电机热报警：电机过流保护时相应的逻辑输出端口动作。 Motor thermal alarm: the corresponding logic output port action when the motor over current protection.</p> <p>电机已通电：电机中可能有电流。 Motor energized: there may be current in the motor.</p> <p>电机电流报警：电机电流速断保护时相应的逻辑输出端口动作。 Motor current alarm: the corresponding logic output port action in the case of the motor current quick break protection.</p> <p>PTC传感器报警:电机温度通过PTC传感器传到软起动器控制板,如果温度超过保护值,相应的逻辑输出端口动作,与PTC报警禁止与否无关。 PTC sensor alarm: the motor temperature is transmitted to the control panel of the soft starter through the PTC sensor, if the temperature exceeds the protection value, the corresponding logical output port action has nothing to do with whether the PTC alarm is forbidden or not.</p> <p>电机参数3激活：电机使用第三套参数时此端口动作。 Motor parameter 3 activation: this port action when the motor uses the third set of parameters.</p> <p>旁路输出:软起动器运行状态时此端口动作。 Bypass output: This port operates while the soft starter is running.</p>			
	<p>运行输出 Running output 运行时，K2A、K2C触点闭合 触点容量为：2A/250V AC Terminal K2A、K2C close during running. Terminal Power : 2A/250V AC.</p>			
	故障继电器输出 Fault relay output			电机已通电 Motor energized
	<p>故障继电器输出：有两种工作方式，即常开和常闭。 Fault relay output: there are two working modes, namely normally open and normally closed</p> <p>闭合:当软起动器检测至任何故障时，继电器动作（闭合，故障时闭合）。 Close: when the soft starter detects any fault, the relay acts (close, close in case of fault).</p> <p>断开:当软起动器检测至任何故障时，继电器动作（断开，故障时断开）。 Off: when the soft starter detects any fault, the relay acts (off, off in case of fault).</p>			
	逻辑输入1 Logical input 1			强制自由停车 Forced free parking
	<p>逻辑输入可以定义为以下功能： Logical input can be defined as:</p> <p>无定义 No definition</p>			

强制自由停车：一旦接收到一个 STOP 命令即进行强制自由停车。它将强制使用自由停车，但不会对停车进行控制。

Forced free parking: In case a STOP command is received, namely, to force the free parking. It will enforce the use of free parking, but will not control the parking.

外部故障：允许起动器检测外部用户故障(水位、压力等)。电机进行自动停车且起动器显示外部故障。

External faults: Allow the starter to detect the external user faults (water level, pressure, etc.). The motor stops automatically and the starter displays the external faults.

强制本地控制：软起动器转为端子控制。

Forced local control: The soft starter is transferred to the terminal control.

复位电机热故障：当选择此功能时，软起过热故障复位。

Reset motor thermal fault: when this function is selected, reset the soft start overheating fault.

复位故障：复位可以被复位的故障。

Reset failure: a failure where the reset can be reset.

电机参数2激活：第二组电机参数激活。用于对两台不同的电机逐个进行起动和减速，或用单个起动器对一台电机进行两种不同配置的起动或减速。

Motor parameters 2 activation: the second set of motor parameters activation. It is used to start and slow down the two different motors one by one, or to start or slow down one motor in the two different configurations with a single starter.

逻辑输入2 Logical input 2	强制本地控制 Forced local control
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逻辑输入2可以定义为以下功能：

Logical input 2 can be defined as the following functions:

无定义

No definition

强制自由停车：一旦接收到一个 STOP 命令即进行强制自由停车。它将强制使用自由停车，但不会对停车进行控制。

Forced free parking: Once a STOP command is received to enforce the free parking. It will enforce the use of free parking, but will not control the parking.

外部故障：允许起动器检测外部用户故障(水位、压力等)。电机进行自动停车且起动器显示外部故障。

External faults: Allow the starter to detect the external user faults (water level, pressure, etc.). The motor stops automatically and the starter displays the external faults.

强制本地控制：软起动器转为端子控制。

Forced local control: The soft starter is changed to the terminal control.

复位电机热故障：当选择此功能时，软起过热故障复位。

Reset motor thermal fault: when this function is selected, reset the soft start overheating fault.

复位故障：复位可以被复位的故障。

Reset failure: Reset a failure which can be reset.

电机参数3激活：第三组电机参数激活。用于对两台不同的电机逐个进行起动和减速，或用单个起动器对一台电机进行两种不同配置的起动或减速。

Motor parameter 3 activation: the third group of motor parameters activation. It is used to start and slow down the two different motors one by one, or to start or slow down one motor in the two different configurations with a single starter.

逻辑输出1 Logical output 1		强制本地控制 Forced local control
同继电器输出1 Same as relay output 1		
逻辑输出2 Logical output 2		电机已通电 Motor energized
同继电器输出2 Same as relay output 2		

4 ~ 20mA模拟信号输出 4 ~ 20mA analog signal output

输出端子 (I+,I-) 所带最大负载能力为500欧姆, 最大能输出20mA。

The output terminal (I+,I-) has a maximum load capacity of 500 ohm and a maximum output capacity of 20mA.

1) 参数 Parameter

输出范围选择: 0~20mA 和4~20mA

Selection of output range: 0~20mA and 4~20mA

8mA对应额定电流 (Ie) 的倍数 (k) : 0.1~3

Multiple (k) of 8mA corresponding to rated current (Ie) : 0.1~3

2) 输出特性 Output characteristics

A) 当选择为0~20mA时

When 0~20mA is selected

输出电流 (mA) = (8/k)*(I/Ie); k-为设定的8mA对应额定电流 (Ie) 的倍数;

I为A相实际电流 Ie为额定电流 (单位A)

Output current (mA) = (8/k)*(I/Ie); K is a multiple of the set 8mA corresponding rated current (Ie); I is the A phase actual current Ie is the rated current (unit A)

B) 当选择为4~20mA时

When 4~20mA is selected

输出电流 (mA) = (4/k)*(I/Ie)+4; k-为设定的8mA对应额定电流 (Ie) 的倍数;

I为A相实际电流 Ie为额定电流 (单位A)

Output current (mA) = (4/k)*(I/Ie)+4; K is a multiple of the set 8mA corresponding rated current (Ie); I is the A phase actual current Ie is the rated current (unit A)

6. 试运行与应用 Trial run and application

- 通电运行前应按下列条款仔细检查
Make sure the conditions meet following lists before soft-starting running.
- 软起动器额定功率是否与电机相匹配。
Make sure the rated power of soft-starter matches the motor's.
- 电动机绝缘性能是否符合要求
Make sure the insulating property of motor meets requirements.
- 输入输出主回路接线是否正确
Make sure the output connection of main circuit is proper.
- 所有接线端子的螺丝是否拧紧
Make sure the screws of connection terminal are fast.

6.1 通电试运行 Trial Run

- 上电时显示待机状态，且准备状态指示灯亮，此时按起动键可起动电机。
If the power of soft-starter switches on, soft-starter displays Ready and ready indicator light is working, then starts motor after pressing start key.
- 按电机标牌上的额定电流数值输入设置项额定电流。
Setting current is in line with the rated current on the motor signs.
- 启动后检查电机转动方向是否正确，运转是否正常，若不正常，可按停止键停机或必要时切断电源。
Make sure the direction of motor rotation is proper, and running is normal. Otherwise, presses stop key to stop motor or cut off power in need.
- 若电机起动力矩不够，可改变起始电压，提高电动机起动转矩。
Initial voltage can be changed in case of short motor start torque of.
- 软起动器通电后，请勿打开上盖，一免触电。
Because of being electric shock hazard, prohibit to opening the soft-starter's crust when soft-starter switches on.
- 在通电试运行过程中，如发现异常现象，如异常声音、冒烟或异味等，应迅速切断电源并查清原因。
During trial run process, some abnormal status occur, such as abnormal noise, smoking or abnormal smell and etc,
- 同时按▲和▼按钮可复位故障状态。
Fault can be reset by pressing ▲ and ▼.

- 注意：当软起动器起动电机成功时，面板中间的运行状态指示灯点亮，表示已处于旁路运行状态。若此时旁路接触器未吸合导致电机停止运行时，应检查旁路接触器及相关接线是否有误或接触不良。

Note: When the motor is started successfully by soft-starter, the running indicator light is working, and soft-starter is in bypass running status. At the moment, make sure the connection of bypass contactor is proper or well contact in case of motor stops running which is caused by bypass contactor failed to close.

- 注意：当环境温度低于-10°C或高于40°C时，应采取措施待环境温度达到正常范围后再起动。

Note: The condition temperature is abnormal, the soft-starter shall not start until temperature keeps the range of -25°C~40°C.

6.2 应用举例 Applications

各种不同负载情况下的参数设置举例如表，表中数据仅供参考，应根据实际情况作相应调整。

Please refer to following table for parameters setup with different load. All data within this table are for illustration purpose only.

负载类型 Load	起动时间 (秒) Start time	起始电压 Initial voltage	突跳时间 (秒) Snap jump time
水泵 Water pump	30	40%	0
风机 Fan	35	30%	0
皮带机Belt machine	50	40%	0
压缩机Compressor	50	40%	0
搅拌机Stirring mill	60	50%	0
破碎机Crusher	60	50%	0
球磨机 Ball mill	60	60%	0
轻载电机light-load motor	30	30%	0

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