

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-6系列
ATA QB-6 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-6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-6 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-6软起动器概述 Summarize

ATA QB-6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-6 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-6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-6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，其中内置旁路型为用户节约了旁路接触器的费用。

- 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 P type saves the cost of the bypass contactor for users.

2. 产品型号说明和开箱检查

Information of product model and unpacking steps

该系列软起动器可选功率范围为：8KW-800KW。每台ATA QB-6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，如发现问题，请及时与供货商联系。

The optional power range of this series soft-starter is:8KW-800KW.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.

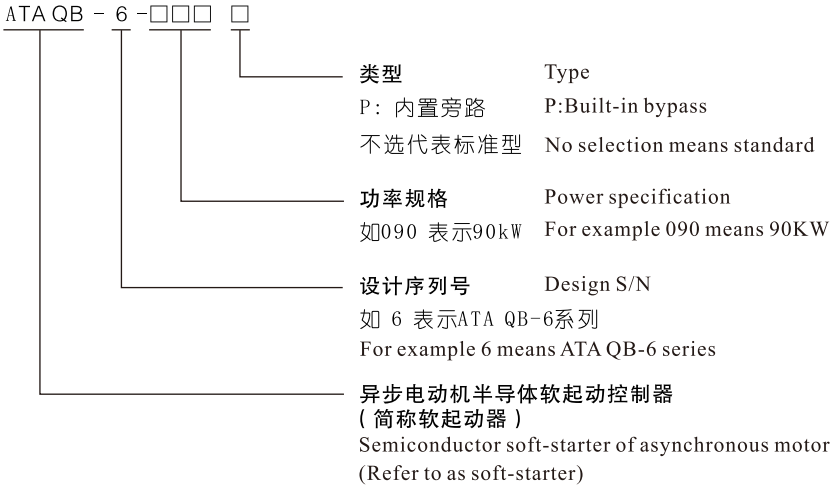
2.1 开箱检查步骤 Unpacking inspection steps

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℃

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℃

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

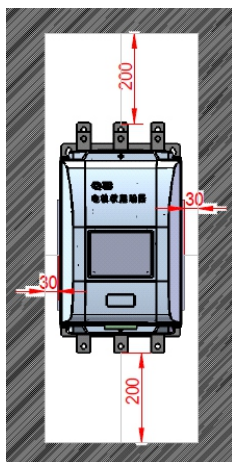
Altitude: Suitable for operating at an altitude of less than 2000m; otherwise, the power grade of its adapted motor should be degraded.

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-6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。

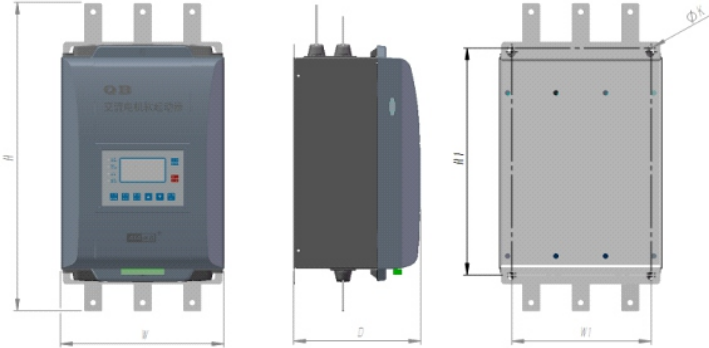
ATA QB-6 series soft-starter is wall-mounted. Cause of the natural cooling method, it should be installed perpendicularly for aeration and cooling. the figure for the minimum allowed distance.



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



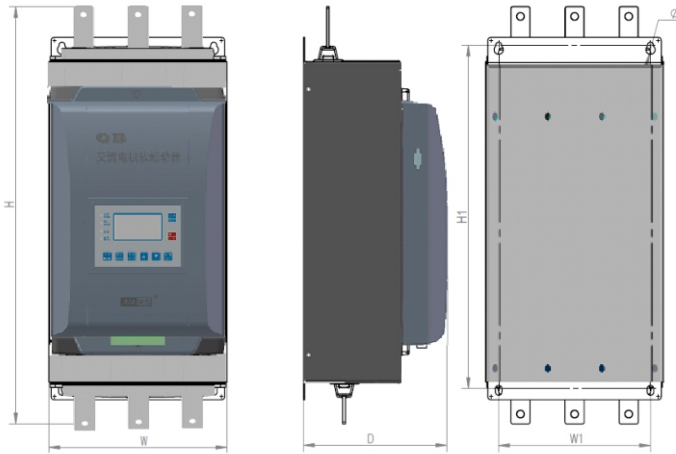
ATA QB-6系列软起动器 ATA QB-6 series soft-starter		安装尺寸 Installation dimension		外形尺寸 Outline size			安装孔 Mounting hole	重量 Weight
外型 Appearance	功率 Power	H1	W1	H	W	D	K	单位(Kg) Unit(Kg)
A	8-55	380	200	460	242	190	9	10
B	75-110	397	230	509	270	210	9	20
C	132-200	427	260	549	300	220	9	28
D	250-320	457	270	579	315	220	9	30
E	400	449	446	631	470	288	9	47
F	500	537	644	734	668	356	11	50
G	600-800	483	893	1045	915	490	11	130

图3.1 标准型 Figure 3.1 Standard

软起动器电气规格 The electric specification of ATA QB-6 soft-starter

项目 Item	技术指标 Technical Parameter
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

项目 Item		技术指标 Technical Parameter
控制回路 Control circuit	控制回路电压 Control voltage	内置 (标准型) Internal(Standard)
	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	斜坡, 限流, 电压 Current slope, current-limit, voltage slope
	起始电压 Initial voltage	主回路电源的 (30%~90%) Main circuit power(30%~90%)
	起动时间 Start time	5~60s
	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
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、起动超时等 Overheat, overload, over current, overtime of starting and 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 Start, run status and start, running current and voltage
辅助输出 Assistant output terminal	运行输出 Running output	常开继电器触点, AC250V/2A NO contact
	故障输出 Fault output	常开继电器触点, AC250V/2A NO contact
	电流输出 Current signal 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 login. www.atawindow.com Website download.
环境条件 Enviroment condition	运行温度 Running temperature	-25~+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	外壳防护等级 Defend level of crust	IP20
	工作方式 Work mode	短时工作制 Short-time work mode
	产品技术标准 Technical standard	GB 14048.6-2008, Q/OKRR 001-1999



ATA QB-6系列软起动器 ATA QB-6 series soft-starter		安装尺寸 Installation dimension		外形尺寸 Outline size			安装孔 Mounting hole	重量 Weight
外型 Appearance	功率 Power	H1	W1	H	W	D	K	单位(Kg) Unit(Kg)
A	8-55	380	200	460	242	190	9	11
B	75-110	523	230	633	270	217	9	22
C	132-200	568	260	699	300	230	9	28
D	250-320	638	270	784	315	250	9	36

图3.2 P型 (P Type)

软起动器电气规格 The electric specification of ATA QB-6 soft-starter

项目 Item	技术指标 Technical Parameter
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

项目 Item		技术指标 Technical Parameter
控制回路 Control circuit	控制回路电压 Control voltage	电源 AC220V Power AC220V
	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	斜坡, 限流, 电压 Current slope, current-limit, voltage slope
	起始电压 Initial voltage	主回路电源的 (30%~90%) Main circuit power(30%~90%)
	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
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、起动超时等 Overheat, overload, over current, overtime of starting and 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 Start, run status and start, running current and voltage
辅助输出 Assistant output terminal	运行输出 Running output	常开继电器触点, AC250V/2A NO contact
	故障输出 Fault output	常开继电器触点, AC250V/2A NO contact
	电流输出 Current signal 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 (可选RS485或PROFIBUS) Without communication terminal(RS485 or PROFIBUS is optional)
环境条件 Environment condition	运行温度 Running temperature	-25~+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	外壳防护等级 Defend level of crust	IP20
	工作方式 Work mode	短时工作制 Short-time work mode
	产品技术标准 Technical standard	GB 14048.6-2008, Q/OKRR 001-1999

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

4.1 ATA QB-6软起动器的工作原理

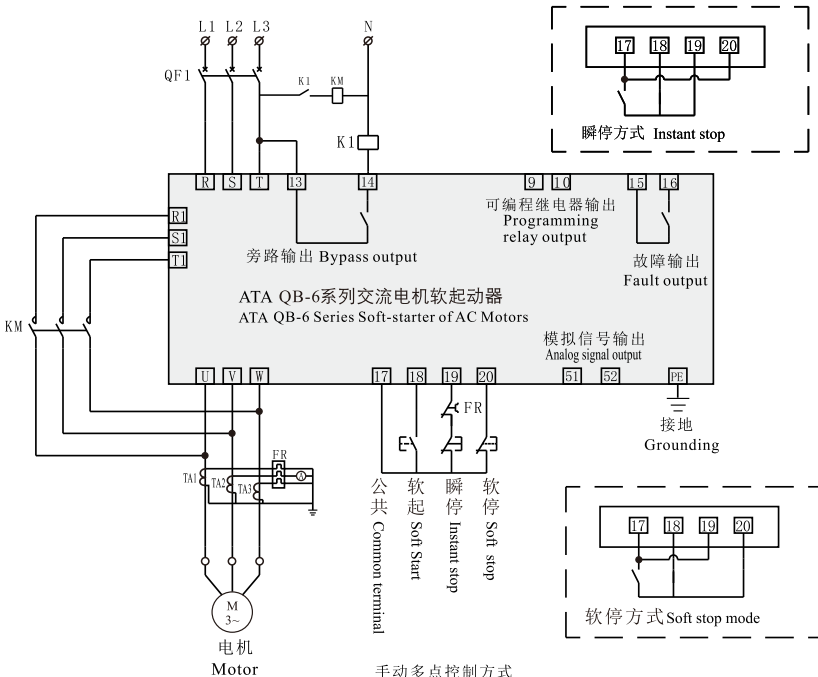
The working principle of the ATA QB-6 soft-starter

ATA QB-6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-6 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 QB-6软起动器的基本接线图

The connection diagram of ATA QB-6 soft-starter



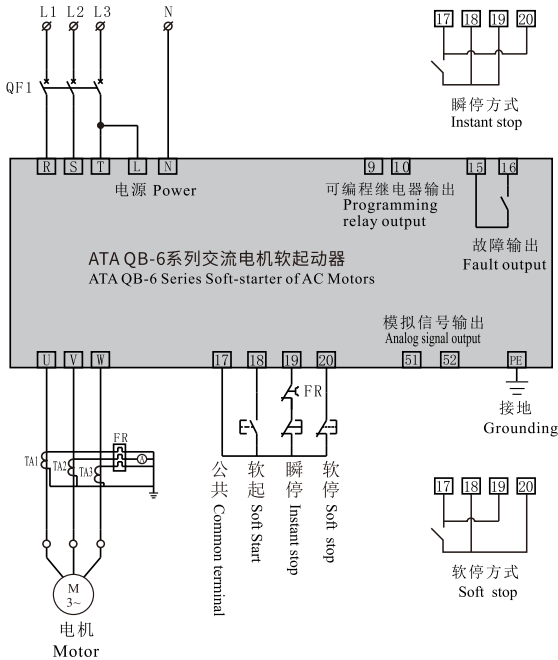
手动多点控制方式
Manual multi-point control mode

标准型 Standard

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。 Connect to 3. Phase AC contactor.	
	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	可编程继电器输出 Programming relay output	9	无源触点 Passive contact	可根据需要定义不同状态 Can be defined with different requirement
		10		
	运行输出 (无源触点) Running state output (potential-free contact)	13	常开触点 NO contact	运行时, 13、14触点闭合 触点容量为: 2A/250V AC Terminal 13, 14 close during running. Terminal Power: 2A/250V AC.
		14		
	故障输出 (无源触点) Failure state output (potential-free contact)	15	常开触点 NO contact	故障时, 15、16触点闭合 触点容量为: 2A/250V AC Terminal 15, 16 close during fault. Terminal Power: 2A/250V AC.
		16		
	起停控制 (无源触点) Starting/Stopping control (active contact)	17	公共端子 VSS	17、18触点 起动 Terminal 17,18 Start
		18	起动端子 START	17、19触点 瞬停 Terminal 17,19 Instant-stop
		19	停止端子 STOP	17、20触点 软停 Terminal 17,20 Soft-stop
		20	软停端子 SFST	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.
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	
	52	地线 GND	0~20mA or 4~20mA Analog signal output	
通信接口 (RS-485) Communication interface(RS-485)		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。 Non (default, RS-485, Optional) or Profibus, Optional)	

注: 运行、可编程及故障输出端口需外扩中间继电器。 Note: the bypass, programmable and fault output ports need to expand intermediate relays.



内置旁路型(P 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	控制电源 Control Power	L 控制电源输入 Control Power input AC 220V N
	可编程继电器输出 Programming relay output	9 无源触点 Passive contact 10 可根据需要定义不同状态 Can be defined with different requirement

控制回路 Control circuit	故障输出 (无源触点) Failure state output (potential-free contact)	15	常开触点 NO contact	故障时, 15、16触点闭合 触点容量为: 2A/250V AC Terminal 15, 16 close during fault. Terminal Power: 2A/250V AC.
		16		
	起停控制 (无源触点) Starting/Stopping control (active contact)	17	公共端子 VSS	17、18触点 启动 Terminal 17,18 Start
		18	起动端子 START	17、19触点 瞬停 Terminal 17,19 Instant-stop
		19	停止端子 STOP	17、20触点 软停 Terminal 17,20 Soft-stop
		20	软停端子 SFST	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.
	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	
	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。 Non (default, RS-485, Optional, or Profibus, Optional.)

注: 可编程及故障输出端口需外扩中间继电器。 Note: the programmable and fault output ports need to expand intermediate relays.

4.3 输出特性 Output characteristic

起始电压 U_s Initial voltage U_s

初始阶段软起动对电机所加电压。在起动过程中, 电机的输出力矩随电压增加。当软起动器的输出电压较小时, 电机力矩小于负载的静摩擦力矩, 不能使负载转动。随着输出电压的不断增大, 电机力矩克服了负载的静摩擦力矩和惯量, 使负载开始转动。

The voltage is added to motor by soft-starter during initial status. During the process of starting, the output torque of the motor become bigger and bigger as the input voltage rises. The torque of the motor is smaller than the load's static friction moment and cannot drive the load running when the output voltage of the soft starter is small at the beginning. With the increasing of the output voltage of the starter, the output torque of the motor overcomes the static friction moment and inertia, and then the load begins to running.

ATA QB-6软起动器在起动时提供一个起始电压 U_s , 将 U_s 调节到合适的值, 可在起动时使负载立即开始转动。

起始电压 U_s 由参数设置。

The ATA QB-6 soft-start provides a initial voltage U_s . The load can run immediately at the start time if the setup of U_s is suitable.

The initial voltage U_s can be set by parameters.

达速电压 U_R Speed achieving voltage

输出电压从 U_s 开始按一定的斜率上升，电机不断加速。当输出电压达到 U_R 时，电机也基本达到额定转速， U_R 就称为达速电压。

ATA QB-6软起动器在起动过程中自动监测达速电压，当电机达到额定转速时切换到运行状态。对于不同的负载，达速电压的数值可能不同。

The output voltage of the soft-starter with a certain slope from U_s , and the motor accelerates continuously. When the output voltage of the soft-starter reaches U_R , the rotational speed of the motor almost reaches its rated value. U_R is called accelerating voltage. During the process of starting, the ATA QB-6 soft-starter monitors the accelerating speed voltage automatically. As soon as the output voltage reaches U_R , the starter switches to the running status. U_R probably has different values according to different loads.

起动时间 T_s Start time

起动时间 T_s 指输出电压从0V上升到380V所需的时间，也即输出电压在 U_s 与 U_R 之间的斜率。电机的实际起动时间与负载大小有关，正常情况下应小于起动时间 T_s 。

起动时间 T_s 由键盘设置。

The start time denotes the required time that output voltage rises from 0V to 380V, and also means the output voltage slope between U_s and U_R . The actual start time of the motor is decided on load, while commonly shorter than the T_s .

Starting time is set by keyboard.

突跳时间 T_J Snap jump time

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，输出额定电压，使电机能迅速克服负载的静摩擦力矩和惯量开始转动，称为突跳起动。

突跳时间 T_J 由键盘设置。

For large-torque load, the soft-starter provides an all-conduct connecting stage what needs time T_J . In the stage, the soft-starter outputs a rated voltage. Thus the motor can overcome the static friction moment and inertia of the load easily, and begins to running quickly. This start status is called snap jump start.

The snap jump time T_J can be by keyboard.

软停时间 T_t Soft-stop time

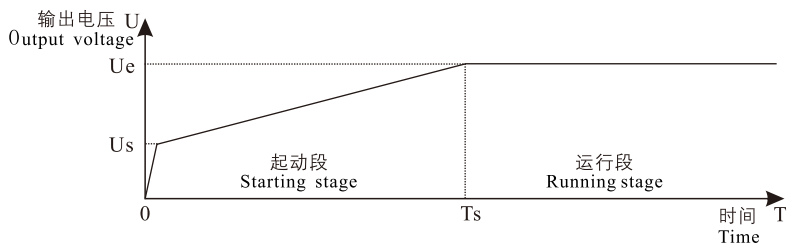
停车时，软起动器立即开通三相可控硅，然后断开旁路接触器， T_t 指在停车时输出电压从380V下降到0V所需要的时间，软停车时间 T_t 由键盘设置。

When the soft-start stop, the three phases SCR is switched on instantly and the bypass contactor should be switched off, it denotes the required time when output voltage reduces from 380V to 0V during soft status. The soft-stop time T_t can be set keyboard.

控制方式 Work mode

电压斜坡模式：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 ，此后电压沿一给定斜率，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 。

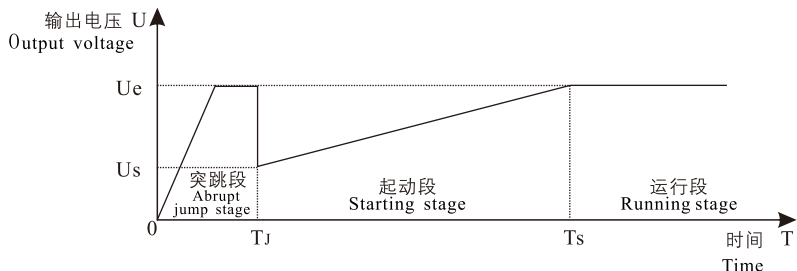
The voltage slope is composed of two parameters: initial voltage U_s and Start time T_s ; When the motor starts working, soft-starter outputs initial voltage U_s , according to the load power, and along with a set slope, initial voltage U_s adjusts the starting process automatically, the reaches a rated voltage U_e via a set Start time T_s .



突跳+电压斜坡模式 Snap jump with voltage slop mode

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 ，此后电压沿一给定斜率，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。

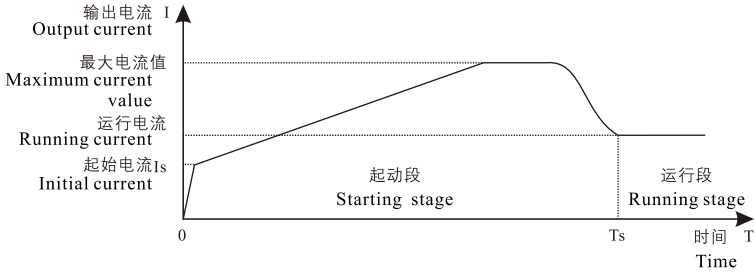
For large-torque load, the soft-starter outputs initial voltage U_s after provides an all-conduct connecting stage what needs time T_J , according to the load the load power, and along with a set slope, initial voltage U_s adjusts the starting process automatically, then reaches a rated voltage U_e via a set Starting time T_s .



电流斜坡模式 Current slope mode

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 ，此后电流沿一给定斜率，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。

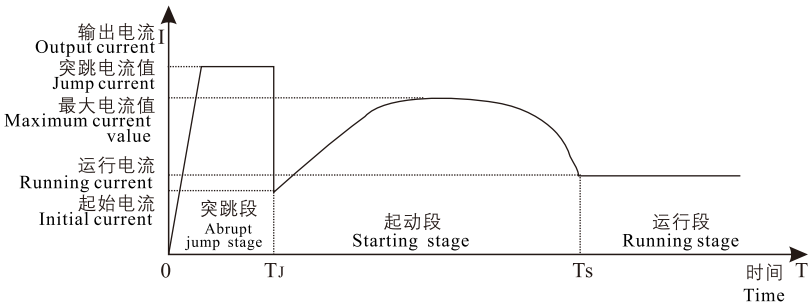
The current slope is composed of two parameters: initial voltage U_s and Start time T_s : When the motor starts working, soft-starter outputs initial voltage U_s , and motor is provided with initial current I_s . According to the load power, and along with a set slop, initial current adjusts the starting process automatically, and then reaches running current of motor via a set Start time T_s .



突跳+电流斜坡模式 Snap jump with current slope mode

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 ，此后电压沿一给定斜率，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。

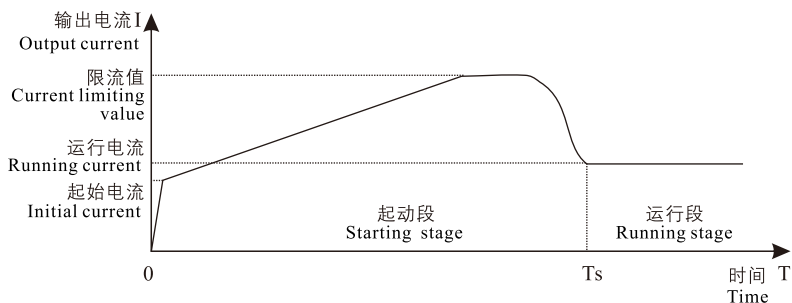
For large-torque load, the soft-starter output initial voltage U_s after provides an all-conduct connecting stage what needs time T_J , and motor is provided with initial current I_s . According to the load power, and along with a set slop, initial current adjusts the starting process automatically, and then reaches running current of motor via a set Start time T_s .



限流斜坡模式 Current-limit slope mode

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 ，此后电流沿一给定斜率，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。

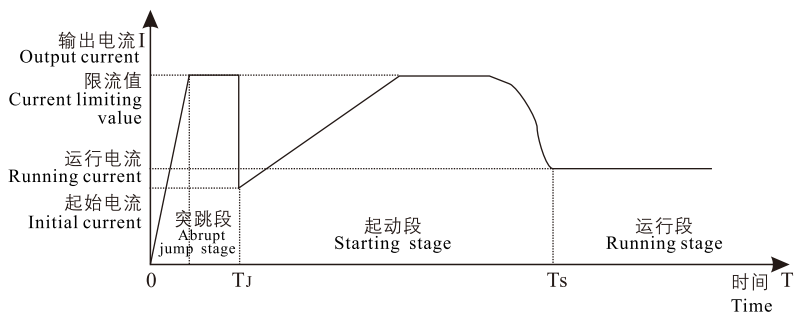
The current-limit slope is composed of two parameters: initial voltage U_s and Start time T_s ; When the motor starts working, soft-starter outputs initial voltage U_s , and motor is provided with initial current I_s . The initial current rises with a set slop until it reaches a current-limited value. According to the load power, initial current adjusts the starting process automatically, and then motor accelerates speed and begins to running via a set Start time T_s .



突跳+限流斜坡模式 Snap jump with current-limit slope mode

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 ，此后电流沿一给定斜率，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。

For large-torque load and current-limit site, the soft-starter provides a current value what needs time T_J during initial start status, and gives motor the max current value. The soft-starter outputs initial voltage U_s , and motor is provided with initial current I_s . The initial current rises with a set slope until it reaches a current-limited value. According to the load power, initial current adjusts the starting process automatically, and then motor accelerates speed and begins to running via a set Start time T_s .



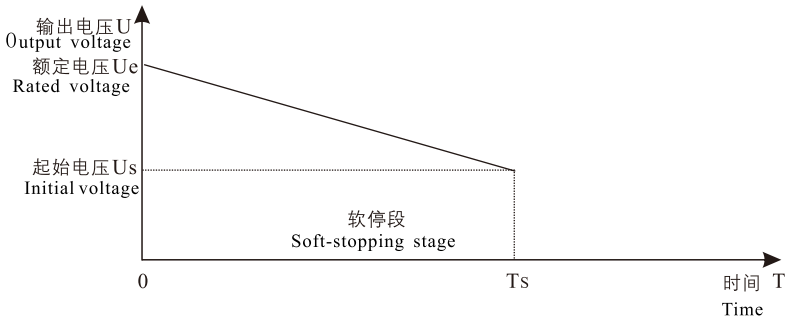
注意 需要指出的是，电动机的电磁转矩与其绕阻所加电压的平方成正比，当起始电压 U_s 降低时，其电磁转矩也会降低，起始电压 U_s 设置需要提供克服静摩擦转矩的起始起动转矩。

Note What needs to be pointed out is that The electromagnetic torque of a motor is proportional to the square of the voltage applied to it, When the initial voltage U_s decreases, the electromagnetic torque will also decrease, starting voltage U_s setting needs to provide the starting torque to overcome the static friction torque.

软停模式 Soft-stop mode

当电机停止时，软起动器开始输出额定电压 U_e ，按照一给定斜率，经过给定的软停时间 T_t ，到达起始压 U_s ，软停结束。

When motor stops, the soft-starter outputs rated voltage U_e , With a set slop, this rated voltage decreases to initial voltage U_s via a set soft-stop time T_t , then finishes soft-stop.



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-6软起动器处于起动状态 ATA QB-6 soft-starter is starting
运行 Run	绿 Green	ATA QB-6软起动器处于运行状态 ATA QB-6 soft-starter is running
故障 Fault	红 Red	ATA QB-6软起动器处于故障保护状态 ATA QB-6 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
起动	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
停止	软起动器停车 Soft-start stop
设置	进入操作菜单 Enter into operating menu
确定	保存参数后返回上级菜单 Save the parameters and then return to the previous menu





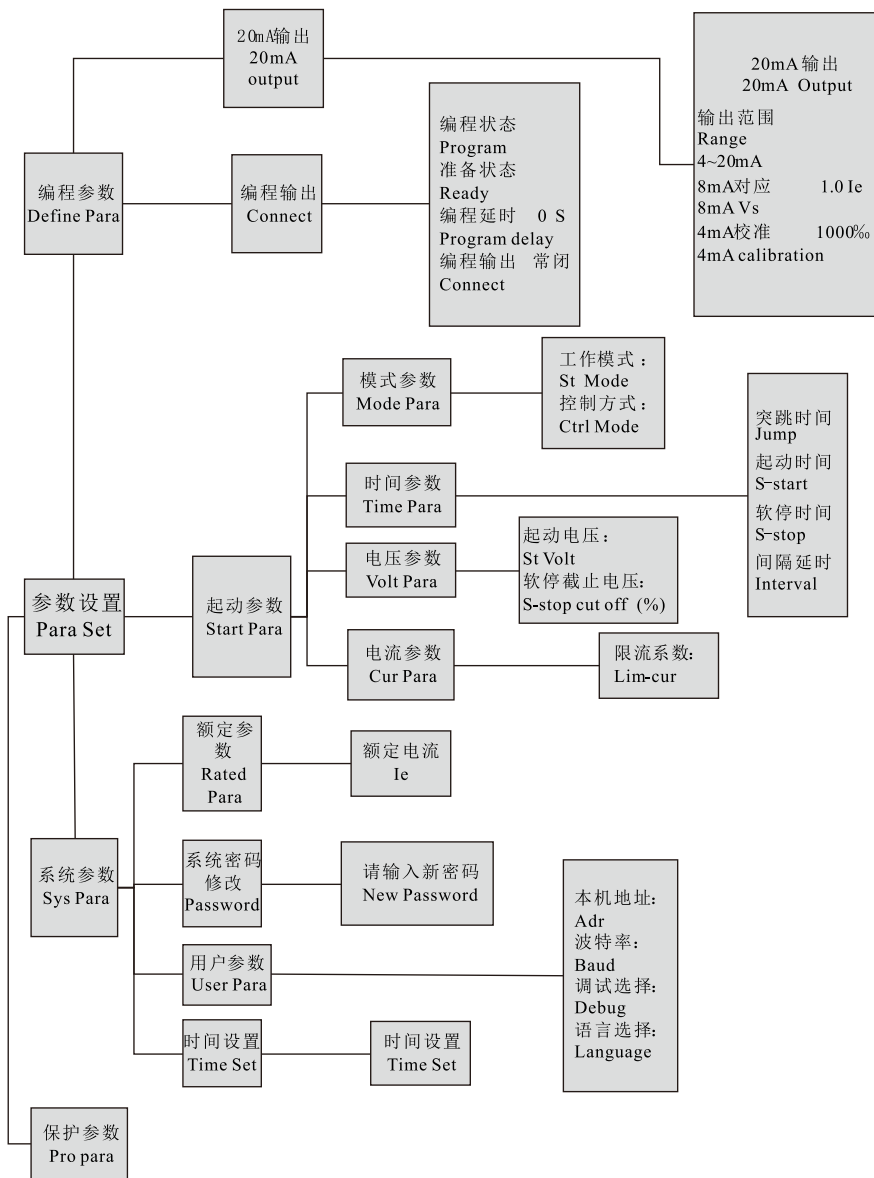
按键名称 Key	说明 Information
	进入上级菜单或不保存参数返回上级菜单 Go to previous menu or return to previous menu without saving parameters
	转上一参数或增加参数值 Go to pervious parameter or increase the parameter value
	转下一参数或减少参数值 Go to the next parameter or decrease the parameter value
	选择参数的某一位 Function Key

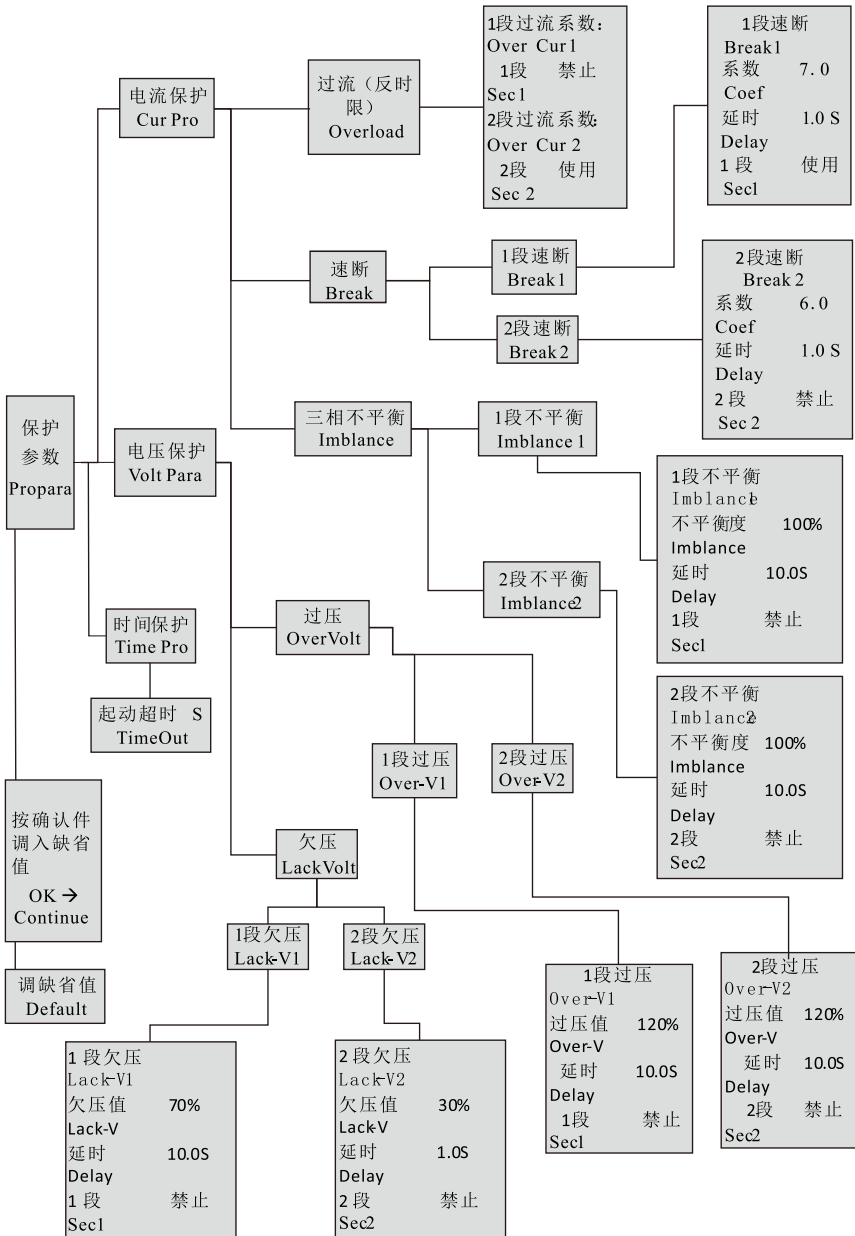
表5-3 ATA QB-6软起动器工作时将自动显示工作状态。

ATA QB-6 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-6 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





5.3可编程继电器输出功能 The output function of programming relay

可编程继电器输出功能有两种工作方式，即可编程时序输出方式和可编程状态输出方式。

The output function of programming relay can be classified two working mode, programming time sequence output mode and programming status output mode.

编程输出时候 Programming output	发启动命令时 Send a start command	开始启动时 Starting	旁路运行时 Bypass running	发停止命令时 Send a stop command	停机完成时 Motor stop
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此工作方式包含一个240秒定时器，按设定的起始时候开始计时，计时到则输出改变状态，若设置项为0则立即改变输出状态。该输出的复位时候是在按设置时间延时结束且在该状态下维持1秒钟的时间。

The mode includes a 240s timer. timekeeping begins from initial to output status changing. Otherwise, then changes output status immediately. When finished its setting delay time and maintained status time and maintained status within 1s, the output reset.

可编程时序输出方式是以一次起动过程为控制周期的，如果再次起动电机则自动中断上次编程输出过程并重新起动该过程。

The programming time sequence output mode is based on a start process for the control cycle. In case of the motor is re-start, then automatically interrupts the process of the previous programming output and re-starts the process.

可编程输出工作于状态输出方式，设定的工作状态输出如下表：

Programming output works as status mode, its job status is set as follows:

编程输出时候 Programming output	故障状态 Fault	运行状态 Running	准备状态 Ready	启动状态 Start	旁路状态 Bypass
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可编程状态输出方式用于指示软起动器的工作状态，此方式下设置的时间无效。设置出厂值为准备状态，即指示软起动器的准备工作状态，此状态下可起动电机；可编程输出为故障状态时，是指无三相电故障之外的故障；运行状态是指非准备或故障状态，它包括起动、旁路、软停三个过程。

Programming status output mode is used for indicating soft starter job status; time which is set is invalid. Means soft-starter is ready, motor can be started under task states. When programming output stays fault status which is the fault except without 3 phase electricity. Running status is a status without ready and fault, includes soft-start, bypass and soft-stop.

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 dived 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-25℃或高于40℃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℃~40℃.

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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