

# 目 录

## Table of Contents

序言 .....	1
<b>PREFACE .....</b>	<b>2</b>
<b>1 安全及注意事项 .....</b>	<b>5</b>
<b>1. NOTES ON SAFETY .....</b>	<b>6</b>
1.1 安全事项.....	6
1.1. Notes on Safety .....	6
1.2 注意事项.....	8
1.2. Caution: .....	8
<b>2 产品规格 .....</b>	<b>13</b>
<b>2. PRODUCT SPECIFICATION.....</b>	<b>14</b>
2.1 SB200 系列变频器通用技术规范 .....	14
2.1. Universal Technical Specification of SB200 Inverter Series.....	14
2.2 产品系列规格.....	16
2.2. Specification of the Inverter Series .....	16
<b>3 安装及配线 .....</b>	<b>22</b>
<b>3. INSTALLATION AND WIRING .....</b>	<b>23</b>
3.1 变频器的安装.....	23
3.1. Inverter Installation .....	23
3.2 变频器部件的拆卸和安装.....	25
3.2. Uninstallation/Installation of Inverter Components .....	25
3.3 变频器的配线.....	28
3.3. Wiring of Inverter .....	28
3.4 变频器电磁干扰的抑制方法.....	40
3.4. Electromagnetic Interference Control Methods .....	40
<b>4 变频器操作与试运行 .....</b>	<b>45</b>
<b>4. INVERTER OPERATION AND TRIAL OPERATION .....</b>	<b>46</b>
4.1 变频器操作与显示.....	46

4.1. Inverter Operation and Display .....	46
4.2 首次通电.....	54
4.2. Initial Energization.....	54
4.3 快速调试指南.....	55
4.3. Guide to Quick Debugging .....	55
<b>5 功能参数一览表 .....</b>	<b>58</b>
<b>5. LISTS OF FUNCTION PARAMETERS .....</b>	<b>59</b>
F0 基本参数 .....	59
F0: Basic Parameters.....	59
F1 加减速、起动、停机和点动参数.....	61
F1: Acceleration/Deceleration, Startup, Shutdown and Jog Parameters .....	61
F2 V/F 控制参数 .....	64
F2: V/F Control Parameters .....	64
F3 电机参数 .....	65
F3. Motor Parameters.....	65
F4: 数字输入端子及多段速.....	66
F4: Digital Input Terminals and Multi-Speed.....	66
F5 数字输出和继电器输出设置.....	69
F5: Settings of Digital Output and Relay Output.....	69
F6 模拟量及脉冲频率端子设置.....	73
F6: Terminals Settings for Analog Quantities and Pulse Frequency .....	73
F7 过程 PID 参数.....	77
F7: PID Parameters .....	77
F8 供水专用功能 .....	79
F8: Dedicated Water Supply Functions .....	79
F9 时间管理(仅适用于 LCD 操作面板).....	85
F9: Time Management (Applicable to LCD Control Panel Only) .....	85
Fb 保护功能及变频器高级设置.....	86
Fb: Protection Functions and Advanced Inverter Settings .....	86
FC 键盘操作及显示设置.....	91
FC: Keyboard Operation and Display Settings .....	91
FF 通讯参数 .....	94
FF: Communcation Parameters.....	94
Fn 厂家参数 .....	95
Fn: Factory Settings .....	95
FP 故障记录 .....	96

FP: Fault Logs.....	96
FU 数据监视.....	99
FU: Data Monitoring.....	99
<b>6 功能参数详解 .....</b>	<b>105</b>
<b>6. DETAILS ABOUT FUNCTION PARAMETERS.....</b>	<b>106</b>
6.1 F0 基本参数.....	106
6.1. F0: Basic Parameters.....	106
6.2 F1 加减速、起动、停机和点动参数.....	113
6.2. F1: Acceleration/Deceleration, Startup, Shutdown and Jog Parameters....	113
6.3 F2 V/F 控制参数 .....	121
6.3. F2: V/F Control Parameters .....	121
6.4 F3 电机参数.....	128
6.4. F3: Motor Parameters.....	128
6.5 F4 数字输入端子及多段速.....	130
6.5. F4: Digital Input Terminals and Multi-Speed.....	130
6.6 F5 数字输出和继电器输出设置.....	145
6.6. F5: Digital Output and Relay Output Settings .....	145
6.7 F6 模拟量及脉冲频率端子设置.....	156
6.7. F6: Settings of Analog Quantities and Pulse Frequency Terminals.....	156
6.8 F7 过程 PID 参数 .....	171
6.8. F7: PID Parameters .....	171
6.9 F8 供水专用功能.....	180
6.9. F8: Dedicated Water Supply Functions .....	180
6.10 F9 时间管理(仅适用于 LCD 操作面板).....	198
6.10. F9: Time Management (Applicable to LCD Control Panel Only) .....	198
6.11 Fb 保护功能及变频器高级设置.....	202
6.11. Fb: Protection Functions and Advanced Inverter Settings.....	202
6.12 FC 键盘操作及显示设置 .....	218
6.12. FC: Keyboard Operation and Display Settings .....	218
6.13 FF 通讯参数 .....	222
6.13. FF: Communication Parameters.....	222
6.18 FU 数据监视.....	239
6.18. FU: Data Monitoring.....	239
<b>7 故障对策及异常处理 .....</b>	<b>246</b>
<b>7 SOLUTIONS TO FAULTS AND ABNORMALITIES .....</b>	<b>247</b>

7.1 变频器故障及处理.....	247
7.1 Inverter Faults and Solutions.....	247
7.2 变频器报警及处理.....	261
7.2 Inverter Alarms and Solutions.....	261
7.3 变频器操作异常及对策.....	266
7.3. Inverter Operation Abnormalities and Solutions.....	266
<b>8 保养、维护及售后服务 .....</b>	<b>273</b>
<b>8. UPKEEP, MAINTENANCE AND AFTER-SALES SERVICE .....</b>	<b>274</b>
8.1 日常保养及维护.....	275
8.1. Daily Upkeep and Maintenance .....	275
8.2 定期维护.....	277
8.2. Regular Maintenance .....	277
8.3 变频器易损件更换.....	279
8.3. Replacement of Inverter Wearing Parts.....	279
8.4 变频器的存储.....	281
8.4. Storage of Inverters .....	281
8.5 售后服务.....	282
8.5. After-Sales Service.....	282
<b>9 选配件 .....</b>	<b>284</b>
<b>9. OPTIONAL FITTINGS .....</b>	<b>285</b>
9.1 制动组件.....	285
9.1 Braking Units .....	285
9.2 通信组件.....	286
9.2 Communication Components.....	286
9.3 输入侧交流电抗器.....	287
9.3 AC Reactor on the Input Side.....	287
9.4 EMI 滤波器和铁氧体共模滤波器.....	287
9.4 EMI Filter and Ferrite Chip Common Mode Filter .....	287
9.5 数字 I/O 扩展板 .....	287
9.5. Digital I/O Extension Board.....	287
9.6 继电器扩展单元 (SL-5X6T) .....	289
9.6 Relay Extension Unit (SL-5X6T) .....	289
9.7 带参数复制功能的操作面板 (SB-PU70E) .....	292
9.7 Control Panel Complete with Parameter Copying (SB-PU70E) .....	292
9.8 带参数复制功能的中文液晶操作面板 (SB-PU200) .....	292

9.8 LCD Control Panel Complete with Parameter Copying (SB-PU 200; Simplified Chinese Version).....	292
9.9 操作面板安装盒.....	300
9.9. Control Panel Mounting Box .....	300
<b>10 应用举例 .....</b>	<b>301</b>
<b>10. APPLICATION EXAMPLES .....</b>	<b>302</b>
10.1 变频循环投切一控二和一台辅助泵的应用 .....	302
10.1. Example 1: Two Variable-Frequency Cyclic Switchover Pumps (under Common Control) plus One Auxiliary Pump.....	302
10.2 变频器加软启动器恒压供水应用 .....	305
10.2. Example 2: Constant Pressure Water Supply by Inverter plus Soft Starter .....	305
<b>11 版本信息.....</b>	<b>307</b>
<b>11 VERSION INFORMATION .....</b>	<b>308</b>

# 序言

## Preface

感谢您购买森兰SB200系列变频器。SB200集成了森兰高性能优化空间矢量变压变频算法，具有自动转矩提升、滑差补偿、振荡抑制、跟踪启动、失速防止、精确死区补偿、自动稳压、过程PID、自动载频调整等高级功能，内置恒压供水功能和时钟模块等。可以适用于大多数工业控制场合。

Thank you for selecting Senlan SB200 frequency inverter series. SB200 series integrate the optimized high-performance space vector control VVVF algorithm which supports numerous advanced functions, e.g. auto torque boost, slip compensation, oscillation suppression, tracking startup, stall prevention, precise deadband compensation, auto voltage stabilization, process identification and auto carrier frequency adjustment. With inbuilt constant pressure water supply and clock modules, the series are suitable for most industrial control applications.

本手册为用户提供安装配线、参数设定、日常维护、故障诊断和排除方法等内容。在安装、设置、运行和维护变频器之前，请务必详细阅读本产品用户手册的全部内容，熟记变频器的有关知识、安全注意事项，确保正确使用并充分发挥其优越性能。

This manual provides the user with a guide on installation & wiring, parameter setting, daily maintenance, fault diagnosis and troubleshooting. The user is required to peruse the whole content of the manual carefully and be familiarized with the relevant know-how and notes on inverter safety before any attempts of installation, setting, operation and maintenance.

本产品采用的产品技术规范可能发生变化，内容如有改动，恕不另行通知。

The technical specifications applied to this product or the content of this manual may be subject to any change without prior notifying.

本产品用户手册应妥善保存至变频器报废为止。

This manual is required to be kept properly until the inverter is out of its service life.

### 开箱检查注意事项

#### Items to Be Checked on Opening the Packing Case

在开箱时，请认真确认以下项目，如有问题，请直接与本公司或供货商联系解决。

The user is required to carefully check and confirm the following items on opening the packing case. If you have any problem, don't hesitate to contact us or your supplier for a solution.

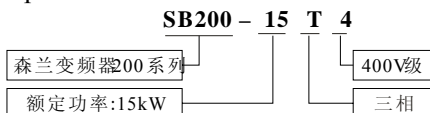
确认项目	确认方法
与您定购的商品是否一致？	确认变频器侧面的铭牌内容与您的定货要求是否一致
产品是否有破损地方？	查看产品整体外观，确认是否在运输中受伤

What to Confirm	How to Confirm
Is the inverter identical with the	Check if the nameplate inscriptions on the side of the inverter

product you've ordered?	comply with the requirements in your order
If there is any damages on the product?	Check the overall appearance of the product to see if there are any damages arising from transportation

## 变频器型号说明

## Inverter Model Description



森兰变频器SB200系列 Senlan SB200 Inverter Series

400V级 Rating: 400V

额定功率: 15kW Rated Capacity: 15kW

三相 Three-phase

变频器铭牌说明: (以SB200-15T4为例)

Inverter Nameplate Inscriptions (Instance: SB200-15T4)



森兰变频器Senlan Frequency Inverter

中国名牌China Top Brand

产品型号Model No.:

执行标准Applicable Standard:

额定输入Rated Input:

额定输出Rated Output

3相: Three-phase

额定电流 Rated Current

额定功率 Rated Power

森兰变频Senlan Frequency Inverter

希望森兰科技股份有限公司

Hope Senlan Science &amp; Technology Holding Corp., Ltd.



## 安全标识定义

### Definition of Safety ID Markings

本手册与安全相关的内容，使用下列标记，附有安全标记的内容，请务必遵守。

Any safety-specific content of this manual may use the following markings for identification. The user is required to follow the instructions of the content identified with safety markings.



**危险：** 错误使用或不按要求操作，有可能造成变频器损坏或人身伤亡。

**CAUTION: Any wrong operation or against the instructions may cause inverter damage or personal injury/fatality.**



**注意：** 不按要求操作，可能造成系统工作不正常，严重时会引起变频器或机械损坏。

**CAUTION: Any noncompliant operation may cause abnormal system operation which, in serious cases, may induce inverter damage or mechanical damage.**

## 1 安全及注意事项

# 1. Notes on Safety

## 1.1 安全事项

### 1.1. Notes on Safety

#### 一、 安装

##### (1) Installation

- 不能将变频器安装在有易燃物或靠近易燃物的地方，否则会有发生火灾的危险。
- The inverter must not be installed at places with combustibles or in the vicinity of combustibles; otherwise there may cause fire.
- 不要安装在含有可燃性气体的环境里，否则有引发爆炸的危险。
- The inverter must not be installed in an environment exposed to flammable gases; otherwise There may cause explosion.

#### 二、 配线

##### (2) Wiring

- 确认高压指示灯彻底熄灭且正负母线电压在36V以下，否则有触电的危险。
- Confirm that the HV indicator lamp is thoroughly extinguished and the positive/negative busbar voltage is below 36V; otherwise there may be a risk of electric shock.
- 确认输入电源处于完全断开的情况下，才能进行配线作业，否则有触电的危险。
- Confirm that no wiring operation is permitted unless the power supply is thoroughly disconnected; otherwise there may be an electric shock hazard.
- 不要在直流端子P+、N-之间直接连接制动电阻，否则有发生火灾的危险。
- Don't try to connect the DC terminals ( P+/N-) directly with a dynamic braking resistor; otherwise there may be a fire hazard.
- 输入电源端子电压不能超出额定电压范围，否则将导致变频器损坏。
- The terminal voltage of the power supply must not exceed the rated voltage; otherwise there may be an inverter damage.
- 必须将变频器的接地端子可靠正确接地(满足国家相关技术规范要求)，否则有触电的危险。
- The earth terminal of the inverter must be properly and reliably earthed in compliance with the applicable national technical specifications; otherwise there may be an electric shock hazard;

#### 三、 上电前检查

##### (3) Inspection Prior to Connection to Power Supply

- 上电前必须检查外围电器设备的正确接线，特别是关系到安全的空气开关、故障报警等电路。
- Prior to connection to the power supply, remember to check that proper wiring is provided for the electrical peripherals, especially electrical circuits related to the safety of air circuit breakers and fault alarm devices.

- 上电前必须将变频器盖板盖好，否则有触电和爆炸的危险。
- Prior to connection to the power supply, remember to close the cover of the inverter; otherwise there may be an electrical shock or explosion.
- 变频器可控制电机高速运行，要运行于电机额定频率以上时，必须先确认电机和机械装置是否能承受高速运转。
- The inverter provides control for high-speed operation of electric motors. If you intend to apply the inverter to a frequency above the rated motor frequency, you must confirm that the motor and the electrical parts can support high-speed operation.

### 四、上电及运行注意

#### (4) Notes on Connection to Power Supply and Operation

- 试运行之前检查参数设置是否正确。
- Prior to a trial operation, check that all parameters are correctly set.
- 当输入电源接通时不能打开前端盖板，因为内部有高压，有触电的危险。
- The front cover must not be opened when the power supply is available, for the high voltage within may cause an electrical shock.
- 不要用潮湿的手操作变频器，否则有触电的危险。
- Do not try to operate a inverter with wet hands; otherwise there may be an electrical shock.
- 变频器出厂时上电自启动设置为允许，如果端子控制且运行信号有效时，上电将自动启动。
- Factory settings for inverter self-start must be configured as “ALLOWED”. If terminal control is available and operation signals are effective, the inverter will self-start upon connection to the power supply.
- 不要通过通断输入电源的方式来控制变频器的运行和停止。
- Do not try to start up or shut down the inverter by direct disconnection from the power supply.
- 当执行参数初始化后，有关参数应重新设置。
- Reconfigure the relevant parameters after the execution parameters are initialized.
- 当选择重启动功能（如故障自复位或瞬时停电再启动）时，在变频器等待启动期间，不要靠近电机和机械负载。
- After the restart function is selected (as in the event of a fault self-reset or a restart after instantaneous power failure), do not approach the electric motor or mechanical load while the inverter is ready for a startup.

### 五、运输和包装注意事项

#### (5) Notes on Transportation and Packaging

- 不要堆叠超过包装箱规定的变频器数目。
- Do not pile more inverters than allowed by the packing cases.
- 变频器上面不要放置重物。
- Do not put weights on inverters.
- 当变频器运输时不要打开盖板。
- Do not leave the cover open while the inverters are in transit.

- 搬运时，不要让操作面板和盖板受力，否则有人员受伤或财物损失的危险。
- Do not apply forces to the control panel or the cover while the inverters are being handled; otherwise personal injuries or property damage may occur.

### 六、 报废

#### (6) Disposal on Expiration of Service Life

- 按工业垃圾进行处理。
- Dispose of the inverter as industrial waste.
- 变频器内部的电解电容焚烧时可能发生爆炸。
- Explosions may occur if the electrolytic capacitor within the inverter is being burnt.
- 变频器的塑胶件焚烧时会产生有毒气体。
- Toxic gases may be emitted when the plastic parts of the inverter are burnt.

## 1.2 注意事项

### 1.2. Caution:

#### 一、 关于环境

##### (1) Ambient Conditions

- SB200应安装在符合产品规格表规定的环境下使用，否则有发生故障和缩短寿命的可能。
- An SB200 inverter must be used in an environment conforming to the product specification; otherwise there may be a fault or shortened product life.

#### 二、 关于电动机及机械负载

##### (2) Motor and Electrical Load

- 与工频运行比较
- Comparison with Line Frequency Operation

SB200系列变频器为PWM电压型变频器，输出电压含有一定的谐波，与工频电源相比，驱动电机时产生的损耗和电机的温升、噪声都有所增加。

The SB200 series are PWM voltage inverters with a certain level of harmonics in output voltage. Compared with a line frequency power supply, the voltage loss, temperature rise and noise generated by a working motor are slightly higher.

输入电压较高或电机接线距离较长时务必考虑电缆和电机的绝缘耐压。

If the voltage of the power supply is relatively high or the wiring of the motor extends a long distance, insulation strength of the cables and the motor must be taken into consideration.

- 恒转矩低速运行
- Constant-Torque Low-Speed Operation

变频器驱动普通电机长期低速运行时，由于电机的散热效果变差，电机温度升高。如果需要以低速恒转矩长期运行，必须选用变频电机，或采用强制风冷。

When a conventional motor driven by a inverter is in prolonged low-speed operation, the motor temperature will rise because the heat dissipation effect of the motor becomes poorer. If a prolonged constant-torque low-speed operation is required, a variable-frequency motor must be selected, or forced air cooling be provided.

- 电机的过载保护
- Motor Overload Protection

当选用适配电机时，变频器能对电机实施过载保护。若电机与变频器额定容量不匹配，务必调整保护值或采取其它保护措施，以保证电机的安全运行。

When an adapted motor is used, the inverter can provide overload protection for the motor. If the motor does not match the rated inverter capacity, adjust the parameters for protection, or take any other protection measure to ensure safe motor operation.

- 在电机额定频率以上的频率运行
- Operation at a Frequency above the Rated Motor Frequency

若超过电机额定频率运行，除了考虑电机的振动、噪音增大外，还必须确认电机轴承及机械装置的使用速度范围是否允许。

If the motor runs at a frequency above the rated frequency, the user must confirm that the speed range of the motor bearing and mechanical parts supports the operation, in addition to motor vibration and noise increase.

- 机械装置的润滑
- Lubrication of Mechanical Devices

减速箱及齿轮等需要润滑的机械装置在长期低速运行时，由于润滑效果变差，可能会造成损坏，务必事先确认。

Mechanical devices requiring lubrication, such as the gearbox and gears, may be damaged by deteriorating lubrication caused by prolonged low-speed operation. Confirm that prior to lubrication.

- 再生转矩负载
- Regenerated Torque Load

对于提升负载之类的场合，常常会有再生转矩发生，变频器常会因过压保护而停机，此时应该考虑选配适当规格的制动组件。

On such occasions as load elevation, there are frequent cases of regenerative torque, which may cause inverter shutdowns for overvoltage protection. Therefore, the user must consider selecting specific braking units of a proper specification.

- 负载装置的机械共振点
- Mechanical Resonance Points of Load-Carrying Devices

变频器在一定的输出频率范围内，可能会遇到负载装置的机械共振点，可在电机的基板下设置防振橡胶或通过设置变频器的回避频率来避免。

Load-carrying devices may have mechanical resonance points that respond to the inverter in a specified output frequency range. The resonance effect may be dampened by installing vibration-resistant rubber pads under the base plate of the motor or avoided by configuring the avoidance frequency of the inverter.

- 接入变频器之前的电机绝缘检查
- Motor Insulation Check Prior to Connection to the Inverter

电机在首次使用或长时间放置后再使用之前，应做电机绝缘检查，防止因电机绕组的绝缘失效而损坏变频器。测试时请采用500V电压型兆欧表，应保证测得绝缘电阻不小于5MΩ。应避免使用绝缘等级较差的电机，因变频器是以PWM方式供电给电机，绝缘等级差易发生电机绝缘损坏。

The motor must be checked for insulation before a commissioning or operation after a longtime shutdown to prevent a inverter damage caused by deteriorated winding insulation. The insulation test must be aided with a 500V voltage-type megger. The measured insulation resistance must be at least 5MΩ. Do not use motors with poor insulation ratings. As the inverter provides power supply to the motor in a PWM mode, a poor insulation rating motor is susceptible to insulation damage.

### 三、关于变频器

#### (3) Inverter

- 改善功率因数的电容或压敏器件
- Capacitors or Pressure-Sensitive Elements to Improve Power Factor

由于变频器输出是PWM电压，输出侧如安装有改善功率因数的电容或防雷用压敏电阻等，都会造成变频器故障跳闸或器件的损坏，请务必拆除。

As the output voltage of the inverter is PWM voltage, any installation of power factor-improving capacitors or lightning protection pressure-sensitive resistors at the output terminal may induce a inverter trip or element damage. Uninstall any such capacitor or resistor.

- 变频器输出端安装接触器等开关器件
- Contactor, etc. Installed at the Output Terminal of the Inverter

如果需要在变频器输出和电机之间安装接触器等开关器件，请确保在变频器无输出时进行通断操作，否则可能会损坏变频器。

If installation of contactors, etc. is required between the output terminal and the motor, please ensure that make-break operations are conducted when the inverter has no power output; otherwise the inverter may be damaged.

- 频繁起停的场合
- Frequent Startup/Shutdown Operations

宜通过控制端子对变频器进行起停控制。严禁在变频器电源输入侧使用接触器等开关器件进行直接频繁起停，否则会造成设备损坏。

Control terminals are recommended for the startup/shutdown of the inverter. The user is absolutely not permitted to directly shut down or start up the inverter via such circuit-breakers as a contactor on the input terminal of the inverter.

- 额定电压值以外的使用
- Application beyond the Rated Voltage

不适合在允许输入电压范围之外使用SB200系列变频器，如有需要，请使用升压或降压装置进行变压处理。

It is inadvisable to apply the SB200 inverter series to ranges beyond the permitted input voltage. If the user needs to apply the inverter to ranges beyond the rated voltage, please use a step-up or step-down transformer for transformation.

- 三相输入改成单相输入
- Switching from 3-Phase Input to Single Phase Input

三相输入改成单相输入后，母线的电压纹波和电流纹波增大，不仅影响主电路电容寿命，而且会导致变频器工作性能变差。

The change from 3-phase input to single phase input will augment the voltage/current ripples of the busbar. Ripples affect the service life of capacitors in the main circuit and deteriorate the performance of the inverter as well.

建议用户不要改成单相输入使用，如确有必要使用单相电源，应取消输入缺相保护功能，并降额使用，最大不超过额定值的60%。30kW及以上机型改为单相输入时，应确保单相输入接在R、S端子上，否则变频器无法工作。

It is not recommended to switch to single-phase input. If a single-phase power supply is necessitated, the user must cancel phase-failure protection and reduce the ratings to a max of 60%. If a 30kW inverter or above requires to be changed to single phase input, ensure that the single-phase input terminal is connected to Terminals R and S, otherwise the inverter will fail to work.

- 雷电冲击保护
- Lightning Surge Protection

变频器内装有雷击过电压保护装置，对于感应雷有一定的自我保护能力。

The inverter has an inbuilt lightning overvoltage protector capable of self-protection against induced lightning shocks.

- 漏电保护器
- Leakage Protector

变频器运行时有高速开关动作，必然有高频漏电流产生，有时会导致漏电保护电路误动作。遇到上述问题时，除适当降低载波频率，缩短引线外，还应正确安装漏电保护器。



Quick startups or shutdowns during inverter operation necessarily induce high-frequency leakage currents, which may sometimes cause misoperations of the leakage protection circuit. In the event of the aforesaid problems, reduce the carrier frequency and the length of the lead-in wire appropriately; besides, the leakage protector must be correctly installed.

当安装漏电保护器时，应注意以下几点：

Keep the following points in mind when installing a leakage protector:

- 1) 漏电保护器应设于变频器的输入侧，置于空气开关（无熔丝断路器）之后较为合适。  
1) It is more proper to install the protector at the input terminal of the inverter and behind the air circuit-breaker (not a fuse circuit-breaker).
- 2) 漏电保护器应选择对高次谐波不敏感的型号或变频器专用漏电保护器（灵敏度 30mA 以上）。  
若采用普通漏电保护器，应选择灵敏度 200mA 以上，动作时间 0.1s 以上的型号。  
2) The selected leakage protector must be insensitive to higher harmonics (sensitivity: Above 30mA) or specially suited for inverter applications. If a common leakage protector is selected, it must have a sensitivity above 200mA and an action time above 0.1s.

### ■ 变频器的降额

#### ■ Inverter Derating

- 1) 环境温度超过 40℃时，变频器应按每升高 1℃降额 5%使用，且必须加外部强制散热；  
1) When the ambient temperature exceeds 40℃, the inverter must be derated by 5% for every increment of one degree Celsius. Also, forced external heat dissipation must be provided.
- 2) 海拔超过 1000m 的地区，空气稀薄将造成变频器的散热效果变差，需要按每超过 100m，降额 1%使用；  
2) At 1,000m above sea level, the thinner air will deteriorate the heat dissipation effect of the inverter. Therefore, the inverter must be derated by 1% for every increment of 100m.
- 3) 当设定的载波频率在出厂值以上时，每升高 1kHz，变频器需降额 5%使用。  
3) When the set carrier frequency exceeds the factory settings, the inverter must be derated by 5% for every increment of 1kHz.

## 2 产品规格

## 2. Product Specification

### 2.1 SB200系列变频器通用技术规范

#### 2.1. Universal Technical Specification of SB200 Inverter Series

项目	项目描述	
输入	额定电压, 频率	3 相: 380V, 50/60Hz
	允许范围	电压: 320~420V; 电压不平衡度: <3%; 频率: 47~63 Hz
输出	输出电压	3 相, 0V~输入电压, 误差小于 5%
	输出频率范围	0.00~650.00Hz
	过载能力	110%额定电流 1 分钟
	频率分辨率	数字给定: 0.01Hz; 模拟给定: 0.1%最大频率
	输出频率精度	模拟给定: $\pm 0.2\%$ 最大频率 (25 $\pm 10^{\circ}\text{C}$ ); 数字给定: 0.01Hz (-10~+40 $^{\circ}\text{C}$ )
	运行命令通道	操作面板给定、控制端子给定、通讯给定, 可通过端子切换
	频率给定通道	操作面板、通讯、UP/DOWN 调节值、AI1、AI2、AI3、PFI
	辅助频率给定	实现灵活的辅助频率微调、给定频率合成
	转矩提升	自动转矩提升、手动转矩提升
	V/F 曲线	用户自定义 V/F 曲线、线性 V/F 曲线和 5 种降转矩特性曲线
	点动	点动频率范围: 0.10~50.00Hz; 点动加减速时间: 0.1~60.0s
	自动节能运行	根据负载情况, 自动优化 V/F 曲线, 实现自动节能运行
	自动电压调整 (AVR)	当电网电压在一定范围内变化时, 能自动保持输出电压恒定
	自动载波调整	可根据负载特性和环境温度, 自动调整载波频率
	随机 PWM	调节电机运行时的音色
	瞬停处理	瞬时掉电时, 通过母线电压控制, 实现不间断运行
	直流制动能力	制动时间: 0.0~60.0s, 制动电流: 0.0~100.0%额定电流
	PFI	最高输入频率: 50kHz
	PFO	0~50kHz 的集电极开路型脉冲方波信号输出, 可编程
	模拟输入	3 路模拟信号输入, 电压型电流型均可选, 可正负输入
	模拟输出	2 路模拟信号输出, 分别可选 0/4~20mA 或 0/2~10V, 可编程
	数字输入	8 路多功能数字输入
	数字输出	2 路多功能集电极开路输出、5 路多功能继电器输出
通讯	内置 RS485 通讯接口, 支持 Modbus 协议、USS 指令	
特色功能	过程 PID	两套 PID 参数、多种修正模式
	供水功能	多种供水模式: 消防控制、注水控制、清水池检测、污水池检测及排污泵控制、休眠运行、定时换泵、水泵检修等
	用户自定义菜单	可定义 30 个用户参数
	更改参数显示	支持与出厂值不同的参数显示
	计时电度表功能	便于调整最佳节能方案
保护功能		过流、过压、欠压、输入和输出缺相、输出短路、过热、电机过载、外部故障、模拟输入掉线、失速防止等
选配件		制动组件、操作面板延长线、远程控制盒、数字 I/O 扩展板、继电器扩展板、带参数复制功能的操作面板 (SB-PU70E)、中文液晶显示操作面板 (SB-PU200) 等
环境	使用场所	海拔低于 1000 米, 室内, 不受阳光直晒, 无尘埃、腐蚀性气体、可燃性气体、油雾、水蒸汽、滴水、盐雾等场合
	工作环境温度/湿度	-10~+40 $^{\circ}\text{C}$ / $<90\%$ RH, 无水珠凝结
	存储温度	-20~+60 $^{\circ}\text{C}$
	振动	小于 5.9m/s <sup>2</sup> (0.6g)

项目		项目描述
结构	防护等级	IP20
	冷却方式	强制风冷，带风扇控制

Item		Description
Input	Rated Voltage/Frequency	3-phase, 380V; 50/60Hz
	Range	Voltage: 320-420V; voltage unbalance:<3%; frequency: 47-63Hz
Output	Output Voltage	3-phase; 0v-input voltage; error: below 5%
	Output Frequency	0.00-650.00Hz
	Overload Capacity	110% of rated current; 1 minute
	Frequency Resolution	Digital setting: 0.01Hz; analog setting: 0.1% of max frequency
	Output Frequency Accuracy	Analog setting: $\pm 0.2\%$ of max frequency (25 $\pm 10^{\circ}\text{C}$ ); digital setting: 0.01Hz (-10—+40 $^{\circ}\text{C}$ )
	Command Execution Channel	Settings may be configured via the control panel, control terminal or communication port. Switching is enabled via the terminal
	Frequency Setting Channel	Control panel, communication port, UP/DOWN adjustment, AI1, AI2, AI3 or PFI
	Auxiliary Frequency Setting	Flexible auxiliary frequency micro-adjustment and frequency setting synthesis
	Torque Elevation	Auto/manual torque elevation
	V/F Curve	Customizable V/F curves, linear V/F curves and 5 torque reduction characteristic curves
	Jogging	Jogging frequency range: 0.10-50.00Hz; jogging acceleration/deceleration time: 0.1-60.0s
	Auto Energy Saving	Load-based auto V/F optimization, capable of auto energy saving
	AVR	When the grid voltage fluctuates within a specified range, the inverter can automatically maintain a constant output voltage
	Auto Carrier Regulation	Auto carrier regulation based on load characteristics and ambient temperature
	Random PWM	Tone adjustment for an operating motor
	Instantaneous Power Failure Solution	Uninterrupted operation via busbar voltage regulation in the event of an instantaneous power failure
	DC Braking	Braking time: 0.0-60.0s; braking current: 0.0-100.0% of rated current
	PFI	Max input frequency: 50kHz
	PFO	Connector open circuit-type pulse square wave signal output; programmable
	Analog Input	3-channel analog signal input; options for voltage/current modes; capable of positive/negative input
	Analog Output	2-channel analog signal output; options for 0/4-20mA or 0/2-10V; programmable
	Digital Input	8-channel multifunctional digital input
	Digital Output	2-channel multifunctional collector open-circuit output; 5-channel multifunctional relay output
Communication	Inbuilt RS48S communication interface supporting Modbus protocol and USS commands	
Feature	Process Identification	Two PID parameter systems and multiple correction modes
	Water Supply Mode	Multiple water supply modes: fire water control, water injection control, clean water pool inspection, wastewater pool inspection, drainage pump control, sleeping, pump change at regular intervals and pump overhaul
	Custom Menu	30 user parameters can be customized

Item		Description
	Change of Parameter Display	Parameter display different from the factory settings is supported
	KWH Meter	Convenient for adjustment of the optimized energy saving schemes
Protection		Protection is available for overcurrent, overvoltage, undervoltage, input/output phase lack, output short-circuit, overheat, motor overload, external fault, analog input disconnection, stall prevention, etc.
Fittings		Braking units, extension cords for control panel, remote control box, digital I/O extension boards, relay extension boards, control panel capable of parameter copying (SB-PU70E) and LCD- display control panel (SB-PU200)
Environment	Application	Indoors; an elevation below 1,000m; away from exposure to direct sunlight, dust, corrosive gases, combustible gases, oil mist, water vapor, drippings and saline mist
	Ambient Temperature/Humidity	-10 – +40℃ / <90%RH; no condensate or dew
	Storage Temperature	-20 – +60℃
	Vibration	Below 5.9m/s <sup>2</sup> (0.6g)
Structure	IP Rating	IP20
	Cooling Mode	Force air cooling with fan control

## 2.2 产品系列规格

### 2.2. Specification of the Inverter Series

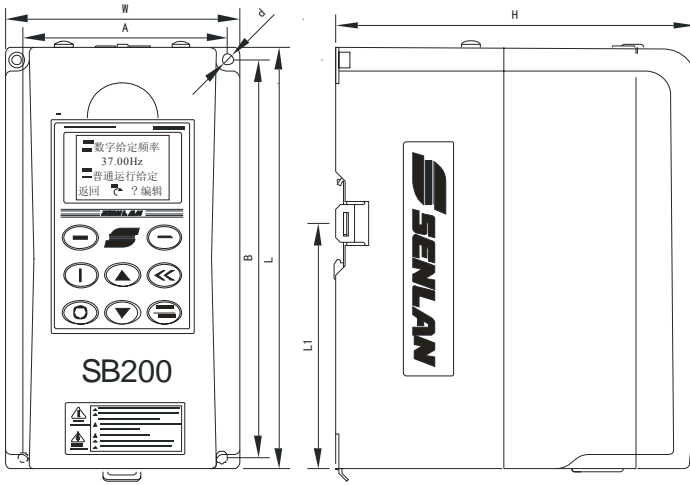
SB200系列变频器额定值如下表:

Refer to the following table for the ratings of the SB200 inverter series:

变频器型号	额定容量 (kVA)	一般应用 (110%I <sub>N</sub> 1分钟每10分钟)		重载应用 (150%I <sub>hd</sub> 1分钟每10分钟)	
		额定输出 电流 (A)	适配电机 (kW)	额定输出 电流 (A)	适配电机 (kW)
SB200-1.5T4	2.4	3.7	1.5	3	1.1
SB200-2.2T4	3.6	5.5	2.2	3.7	1.5
SB200-4T4	6.4	9.7	4	5.5	2.2
SB200-5.5T4	8.5	13	5.5	9.7	4
SB200-7.5T4	12	18	7.5	13	5.5
SB200-11T4	16	24	11	18	7.5
SB200-15T4	20	30	15	24	11
SB200-18.5T4	25	38	18.5	30	15
SB200-22T4	30	45	22	38	18.5
SB200-30T4	40	60	30	45	22
SB200-37T4	49	75	37	60	30
SB200-45T4	60	91	45	75	37
SB200-55T4	74	112	55	91	45
SB200-75T4	99	150	75	112	55
SB200-90T4	116	176	90	150	75
SB200-110T4	138	210	110	176	90
SB200-132T4	167	253	132	210	110
SB200-160T4	200	304	160	253	132
SB200-200T4	248	377	200	304	160
SB200-220T4	273	415	220	377	200
SB200-250T4	310	475	250	415	220

SB200-280T4	342	520	280	475	250
SB200-315T4	389	590	315	520	280
SB200-375T4	460	705	375	590	315
SB200-400T4	490	760	400	705	375

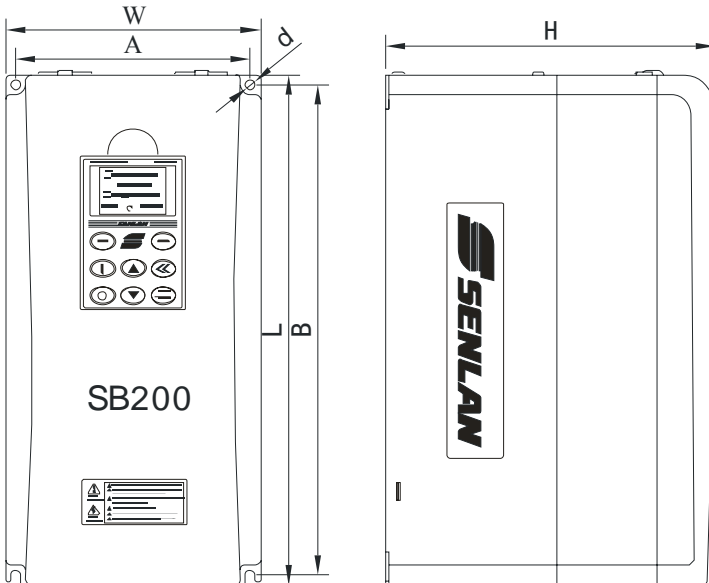
Model No.	Rated Capacity (kVA)	Common Application (110%I <sub>N</sub> every 10 minutes on every minute)		Heavy Load Application (150%I <sub>hd</sub> every 10 minutes on every minute)	
		Rated Output Current (A)	Adapted Motor (kW)	Rated Output Current (A)	Adapted Motor (kW)
SB200-1.5T4	2.4	3.7	1.5	3	1.1
SB200-2.2T4	3.6	5.5	2.2	3.7	1.5
SB200-4T4	6.4	9.7	4	5.5	2.2
SB200-5.5T4	8.5	13	5.5	9.7	4
SB200-7.5T4	12	18	7.5	13	5.5
SB200-11T4	16	24	11	18	7.5
SB200-15T4	20	30	15	24	11
SB200-18.5T4	25	38	18.5	30	15
SB200-22T4	30	45	22	38	18.5
SB200-30T4	40	60	30	45	22
SB200-37T4	49	75	37	60	30
SB200-45T4	60	91	45	75	37
SB200-55T4	74	112	55	91	45
SB200-75T4	99	150	75	112	55
SB200-90T4	116	176	90	150	75
SB200-110T4	138	210	110	176	90
SB200-132T4	167	253	132	210	110
SB200-160T4	200	304	160	253	132
SB200-200T4	248	377	200	304	160
SB200-220T4	273	415	220	377	200
SB200-250T4	310	475	250	415	220
SB200-280T4	342	520	280	475	250
SB200-315T4	389	590	315	520	280
SB200-375T4	460	705	375	590	315
SB200-400T4	490	760	400	705	375



SB200-1.5T4~5.5T4机型外形图（可用标准DIN导轨安装）

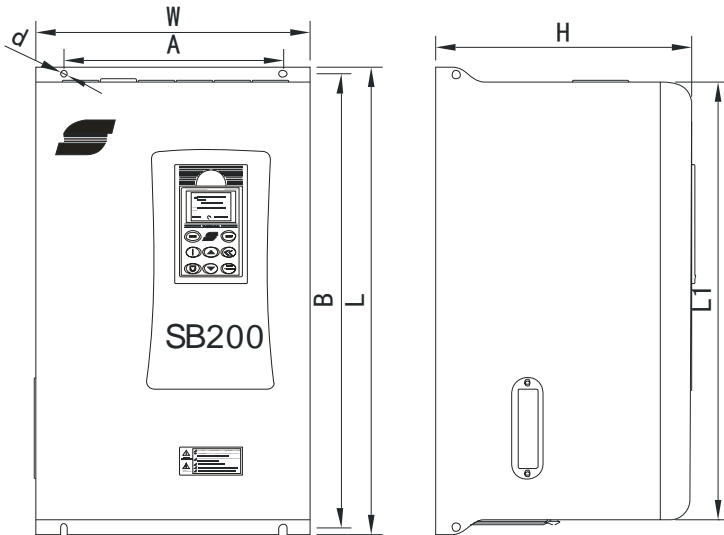
An Outline Drawing of the Inverter Series (SB200-1.5T4—5.5T4) (Installable with a standard DIN Guide Rail)

数字给定频率 Digital Frequency Settings  
 普通运行给定 Normal Operation Settings  
 返回 Return  
 编辑 Edit



SB200-7.5T4~22T4机型外形图

An Outline Drawing of the Inverter Series (SB200-7.5T4—22T4)



SB200-30T4及以上机型外形图

An Outline Drawing of the Inverter Series (SB200-30T4 and above)



SB200系列变频器的外形尺寸及重量如下表：

Refer to the following table for the overall dimension and weight of the SB200 inverter series:

变频器 型号	W (mm)	L (mm)	L1 (mm)	H (mm)	A (mm)	B (mm)	D (mm)	重量 (kg)
SB200-1.5T4	100	180	105	157	87.5	170	Φ4.5	2
SB200-2.2T4								
SB200-4T4	135	240	140	170	125	230	Φ4.5	3
SB200-5.5T4								
SB200-7.5T4	150	300	—	195	138	288	Φ5.5	7
SB200-11T4								
SB200-15T4	200	380	—	225	185	367	Φ7	10
SB200-18.5T4								
SB200-22T4								
SB200-30T4	275	470	440	256	200	455	Φ8	
SB200-37T4								
SB200-45T4	280	570	520	290	200	550	Φ10	
SB200-55T4								
SB200-75T4	310	680	630	330	220	660	Φ10	
SB200-90T4								
SB200-110T4	350	800	750	330	220	780	Φ12	
SB200-132T4								
SB200-160T4	410	940	884	318	300	920	Φ12	
SB200-200T4								
SB200-220T4	500	1060	1000	355	320	1038	Φ12	
SB200-250T4								
SB200-280T4								
SB200-315T4	650	1180	1110	360	540	1152	Φ13	
SB200-375T4	650	1250	1180	360	540	1222	Φ13	
SB200-400T4								

Model No.	W (mm)	L (mm)	L1 (mm)	H (mm)	A (mm)	B (mm)	D (mm)	Weight (kg)
SB200-1.5T4	100	180	105	157	87.5	170	Φ4.5	2
SB200-2.2T4								
SB200-4T4	135	240	140	170	125	230	Φ4.5	3
SB200-5.5T4								
SB200-7.5T4	150	300	—	195	138	288	Φ5.5	7
SB200-11T4								
SB200-15T4	200	380	—	225	185	367	Φ7	10
SB200-18.5T4								


Model No.	W (mm)	L (mm)	L1 (mm)	H (mm)	A (mm)	B (mm)	D (mm)	Weight (kg)
SB200-22T4								
SB200-30T4	275	470	440	256	200	455	Φ8	
SB200-37T4								
SB200-45T4	280	570	520	290	200	550	Φ10	
SB200-55T4								
SB200-75T4	310	680	630	330	220	660	Φ10	
SB200-90T4								
SB200-110T4	350	800	750	330	220	780	Φ12	
SB200-132T4								
SB200-160T4	410	940	884	318	300	920	Φ12	
SB200-200T4								
SB200-220T4	500	1060	1000	355	320	1038	Φ12	
SB200-250T4								
SB200-280T4								
SB200-315T4	650	1180	1110	360	540	1152	Φ13	
SB200-375T4	650	1250	1180	360	540	1222	Φ13	
SB200-400T4								

### 3 安装及配线

### 3. Installation and Wiring

#### 3.1 变频器的安装

##### 3.1. Inverter Installation

 危险	<ol style="list-style-type: none"> <li>1、变频器的安装工作只能由经过培训的专业人员进行。</li> <li>2、如果变频器有损伤或部件不全时，请不要安装运行，否则有发生火灾、受伤的危险。</li> <li>3、安装时，应在能够承受变频器重量的地方进行安装，否则掉落时有受伤或损坏财物的危险。</li> <li>4、搬运时，不要让操作面板和盖板受力，否则掉落有受伤或损坏财物的危险。</li> </ol>
--	---

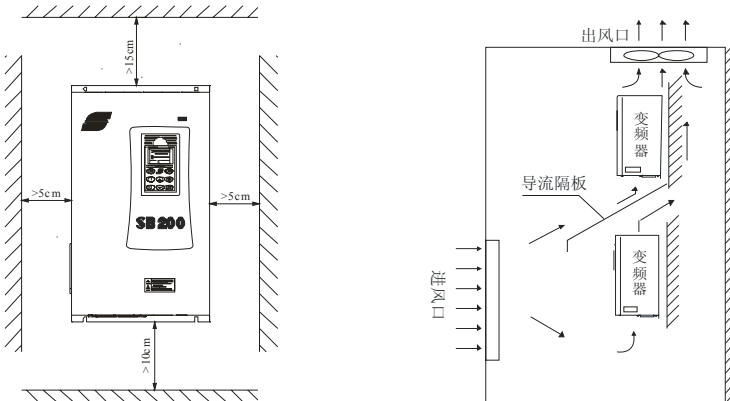
CAUTION	<ol style="list-style-type: none"> <li>1. The installation of the inverter may only be carried out by trained professionals.</li> <li>2. Do not try to install a inverter if it is damaged or incomplete with any part; otherwise there may be hazards of fire or personal injuries.</li> <li>3. Install the inverter where there is sufficient support for the inverter weight; otherwise there may be hazards of personal injuries or property damage in the event of a fall.</li> <li>4. Do not apply forces to the control panel or the cover when handling the inverter; otherwise there may be hazards of personal injuries or property damage.</li> </ol>
---------	--

变频器应安装在通风条件良好的室内场所，选择安装环境时，应注意以下事项：

The inverter must be installed in a room with sound ventilation. Keep the following points in mind when choosing a place of installation:

1. 环境温度要求在一10~40℃的范围内。变频器的寿命受周围环境温度的影响很大，要保证周围环境的温度不要超过允许范围。如温度超过40℃时，变频器应按每升高1℃降额5%使用，且必须加外部强制散热。
  - (1) The ambient temperature must be controlled between -10℃ and 40℃. As the inverter life is affected by the ambient temperature to a great extent, the user must ensure that the ambient temperature is within the tolerable range. When the temperature exceeds 40℃, the inverter must be derated by 5% for every increment of 1 degree Celsius. Besides, forced external heat dissipation must be provided.
  2. 海拔高度超过1000m的地区，空气稀薄将造成变频器的散热效果变差，有必要降额使用，每超过100m，降额1%使用。
  - (2) At 1,000m above sea level, the thinner air will deteriorate the heat dissipation effect of the inverter. Therefore, it is necessary to derate the inverter by 1% for every increment of 100m.

3. 湿度要求低于90%RH，无水珠凝结。
- (3) The humidity must be lower than 90%RH and there must not be condensates or dews.
4. 安装在振动小于 $5.9\text{m/s}^2$  (0.6g) 的场所。
- (4) The inverter must be installed at a place where the vibration is less than  $5.9\text{m/s}^2$  (0.6g).
5. 避免安装在阳光直射的场所。
- (5) The inverter must be installed at a place away from exposure to direct sunlight.
6. 避免安装在多尘埃、金属粉末的场所。
- (6) The inverter must not be installed at a very dusty place or a place fraught with metal dust.
7. 严禁安装在有腐蚀性、可燃性气体场所。
- (7) The user must not install the inverter at a place exposed to corrosive or combustible gases.
8. 变频器应垂直安装，请勿倒装，斜装或水平安装。使用合适的螺钉安装在牢固的结构上。安装间隔及距离要求（当两台变频器采用上下安装时，中间应加装导流隔板）如下图所示：
- (8) The inverter must be installed in a vertical way. Do not install it in an upside-down, slanted or horizontal way. Use proper screws to fix it onto a firm structure. Please refer to the following drawings for the requirements on the spacing and distance (if two inverters are installed in an vertically aligned way, a baffle plate must be installed in between to keep them apart).



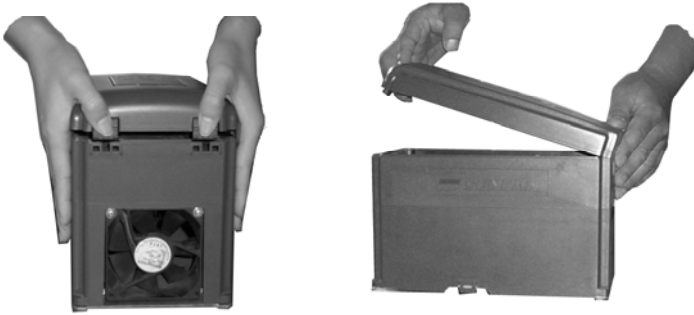
出风口Air outlet  
 变频器Inverter  
 导流隔板Baffle plate  
 进风口Air inlet  
 变频器Inverter

## 3.2 变频器部件的拆卸和安装

### 3.2. Uninstallation/Installation of Inverter Components

#### 3.2.1 盖板面板的拆卸和安装

##### 3.2.1. Uninstallation/Installation of Cover and Control Panel



#### 3.2.2 操作面板的拆卸和安装

##### 3.2.2. Uninstallation/Installation of Control Panel

拆卸：将手指放在操作面板上方的半球坑处，按住操作面板顶部的弹片后向外拉，如下图所示。

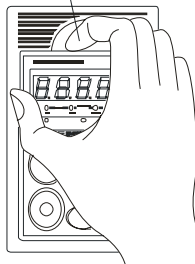
Uninstallation: Stick a finger into the hemispheric depression above the control panel, press the elastic flap on top of the panel and pull the panel out. Refer to the following drawing.

安装：先将操作面板的底部固定卡口对接在操作面板安装槽下方的卡钩上，用手指按住操作面板上部后往里推，到位后松开，如下图所示：

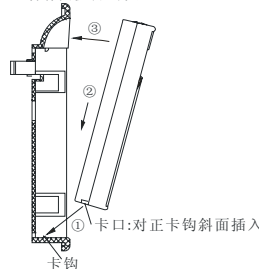
Installation: Fit the fixing bayonet at the bottom of the panel into the dog at the bottom of the installation slot of the panel, press the upper side forward with a finger and release the finger after the panel is in place.

Refer to the following drawings:

从半球坑处按住操作面板弹性卡片往外拉即可取出



操作面板装入方法



---

从半圆球坑处按住操作面板弹性卡片往外拉即可取出 Press the elastic flap at the hemispheric depression and pull the panel out.

操作面板装入方法 Control panel installation steps

卡口：对正卡钩斜面插入 Fixing Bayonet: Fit the dog in a slanted way in place

卡钩 Dog

### 3.2.3 操作面板在机柜面板上的安装

#### 3.2.3. Installation of Control Panel on Cabinet Panel

SB200系列变频器的操作面板可以从变频器本体上取下，安装到机柜的面板上，操作面板和变频器本体之间通过延长电缆连接，用户可以选择下面介绍的两种方式之一。

The user may remove the control panel from the SB200 inverter series and install it on the cabinet panel. The control panel and the inverter may be connected by an extension cord. The user may choose from the following two installation methods:

◆ 方法1，直接安装：

◆ Method 1: Direct Installation:

① 在机柜面板上按下图要求开口、打孔；

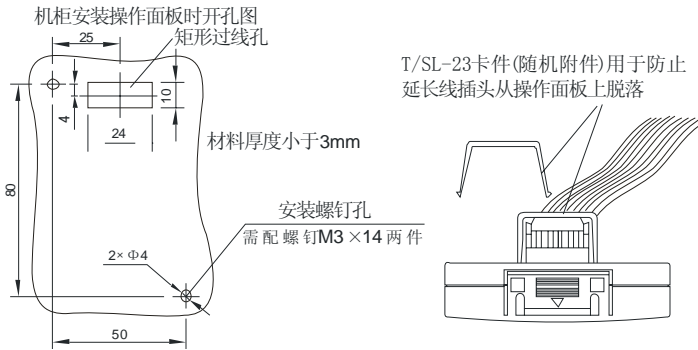
① Drill holes and openings on the cabinet panel as per the following drawing.

② 取下操作面板，并取下操作面板对角线上的两个螺钉；用附送的M3×14螺钉将操作面板固定到机柜面板上；

② Remove the control panel and then the two screws on the diagonal line of the panel. Then fix the panel onto the cabinet panel with the complimentary M3×14 screws.

③ 将延长线一头的插座插入操作面板，并用随机附送的卡件紧固。另一头插到变频器电路板上的对应插座上，并锁紧；注意盖好机箱盖板。

③ Insert the socket at one end of the extension cord into the control panel and fix it with the complimentary fasteners. The other end of the cord should be plugged firmly into the corresponding socket on the circuit board of the inverter. Take care to cover the inverter.



机柜安装操作面板时开孔图Hole drilling for installing the control panel onto the cabinet

矩形过线孔Rectangular hole for the cord

材料厚度小于3mm The thickness of the cabinet panel is less than 3mm

安装螺钉孔（需配螺钉M3×14两件）

Screw Hole (Two M33×14 screws are needed)

T/SL-23卡件（随机附件）用于防止延长线插头从操作面板上脱落

The complimentary T/SL-23 fastener is used to prevent the plug of the extension cord from coming off the control panel

◆ 方法2，通过操作面板安装盒安装：

◆ Method 2: Installation into the Mounting box:

① 在机柜面板上按下图要求开口；

① Make an opening in the cabinet panel as per the following drawing.

② 将操作面板安装盒（选件）安装到机柜面板上；

② Install the mounting box (optional) of the control panel onto the cabinet panel.

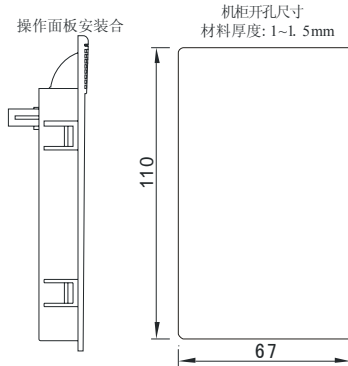
③ 将操作面板安装到安装盒里；

③ Install the control panel into the box.

④ 将延长线一头的插座插入操作面板。另一头插到变频器电路板上的对应插座上，并锁紧；注意盖好机箱盖板。

④ Plug the socket at one end of the extension cord into the control panel, plug the other end firmly into the corresponding socket on the circuit board of the inverter. Cover the inverter.





操作面板安装盒 Mounting box of the control panel

机柜开孔尺寸 Opening dimensions

材料厚度: 1-1.5mm Cabinet thickness: 1-1.5mm

### 3.3 变频器的配线

#### 3.3. Wiring of Inverter



- 1、变频器的配线工作只能由经过培训的专业人员进行。
- 2、只有在可靠切断变频器供电电源，操作面板的所有指示灯熄灭后，并等待5分钟以上，才可打开变频器盖板。
- 3、仅在确认变频器内部的高压指示灯灭，或用电压表测出主回路端子P+、N-之间的电压值在36V以下，才能开始内部配线工作。
- 4、变频器外壳必须可靠接地，否则可能发生电击或火灾事故。
- 5、禁止将P+与N-短接，否则有发生火灾和损坏财物的危险。
- 6、禁止将电源线与U、V、W相连。
- 7、变频器出厂前已通过耐压试验，用户不必再对变频器进行耐压试验。否则有可能损坏变频器。
- 8、通电前认真核实变频器的额定输入电压是否与交流供电电源的电压等级一致，否则可能造成人员伤亡和设备损坏。
- 9、主回路端子与导线冷压端子必须牢固连接。
- 10、输出U、V、W端子须按照严格的相序接线。
- 11、禁止在变频器的输出端连接浪涌吸收的电容器、压敏电阻。

CAUTION

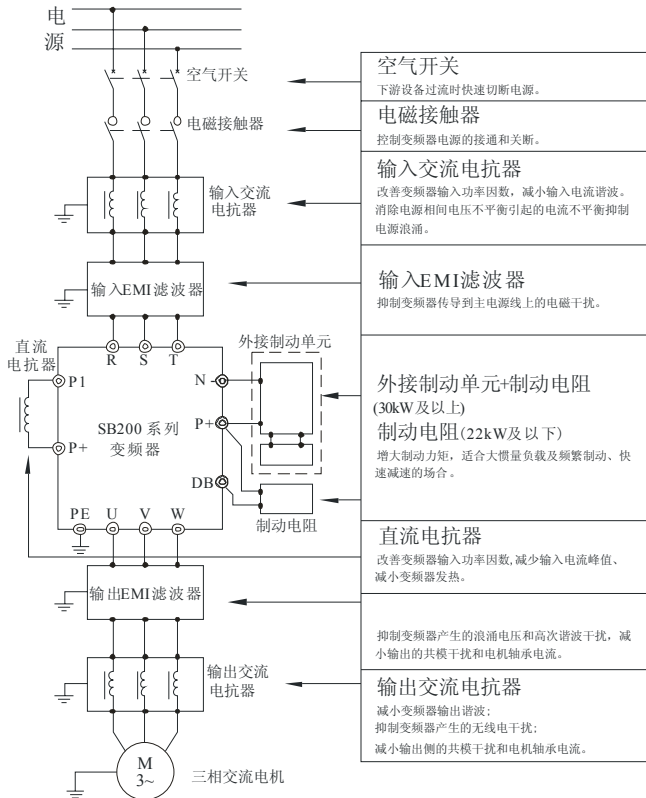
1. Wiring operations for the inverter must be conducted by trained professionals.
2. The cover of the inverter must not be opened until five minutes after the power supply for the inverter is reliably disconnected and all indicator lamps on the control panel are extinguished
3. Internal wiring operations must not commence until the high voltage indicator lamp inside the inverter is extinguished, or the voltage between the main loop terminals (P+ and N-) measured with a voltmeter is below 36V.
4. The enclosure of the inverter must be securely earthed; otherwise there may be an electric shock or fire.
5. Terminals P+ and N- must not be connected with a jumper; otherwise there may be hazards of fire or property damage.
6. The power cord must not be connected to Terminal U, V or W.
7. The inverter must be put through a withstand voltage test prior to ex-factory delivery. It is required that no more withstand voltage tests has to be conducted; otherwise, there may be a damage to the inverter;
8. Prior to connection to the power supply, verify that the rated input voltage of the inverter conforms to the voltage rating of the AC power supply; otherwise there may be a personal injury or equipment damage.
9. The main loop terminal must be securely connected to the cold-pressed terminal of the conductor.
10. Output Terminals U, V and W must be wired in strict compliance with the phase sequence.
11. It is forbidden to connect capacitors or pressure-sensitive resistors to the output terminal of the inverter with an attempt to absorb surges.

## 3.3.1 主回路端子配线及配置

## 3.3.1. Wiring and Configuration of Main Loop Terminal

变频器与周边设备的连接如下图：

Refer to the following drawing for the connection between the inverter and the peripherals:



电源Power supply

空气开关Air circuit-breaker

电磁接触器Electromagnetic contactor

输入交流电抗器Input AC reactor

输入EMI滤波器Input EMI filter

直流电抗器DC reactor

外接制动单元External braking unit

SB200系列变频器 SB200 inverter series

制动电阻Braking resistor

输出EMI滤波器Output EMI filter

输出交流电抗器Output AC reactor

三相交流电机：3-phase AC motor

空气开关：下游设备过流时快速切断电源Air Circuit-Breaker: Cuts off power supply quickly in the event of an overcurrent of any downstream equipment

电磁接触器：控制变频器电源的接通和关断Electromagnetic Contactor: Control the on/off of the power supply for the inverter

输入交流电抗器：改善变频器输入功率因数，减少输入电流谐波，消除电源相间电压不平衡引起的电流不平衡，抑制浪涌Input AC Reactor: Improves input power factor of the inverter, minimizes input current harmonics, alleviates current unbalance induced by unbalance of voltage between phases of the power supply and control surges

输入EMI滤波器：抑制变频器传导至主电源线上的电磁干扰Input EMI Filter: Controls the electromagnetic interference conducted by the inverter to the main power cord

外接制动单元+制动电阻（30kW及以上）/制动电阻（22kW及以下）：增大制动扭矩，适合大惯量负载及频繁制动、快速减速的场合External Braking Unit + Braking Resistor (30kW and above)/Braking Resistor (22kW and below): Increases braking torque and adapts to large-inertia loads and frequent braking or quick deceleration applications

直流电抗器：改善变频器输入功率因数，减少输入电流峰值、减少变频器发热DC Reactor: Improves the input power factor of the inverter, reduces input current crest value and minimizes heat dissipation of the inverter.

输出EMI滤波器：抑制变频器产生的浪涌电压和高次谐波干扰，减少输出的共模干扰和电机轴承电流

Output EMI Filter: Controls surge voltage and higher harmonics interference generated by the inverter and reduces the common mode interference at the output terminal and motor bearing current

输出交流电抗器：减小变频器输出谐波；抑制变频器产生的无线电干扰；减小输出侧的共模干扰和电机轴承电流

Output AC Reactor: Reduces output harmonics and the radio wave interference generated by the inverter and minimizes the common mode interference at the output terminal and motor bearing current

空气开关容量和铜芯绝缘导线截面选择推荐如下表：

Refer to the following table for selecting the capacitance of the air circuit-breaker and the cross section of the copper-core insulated conductor:

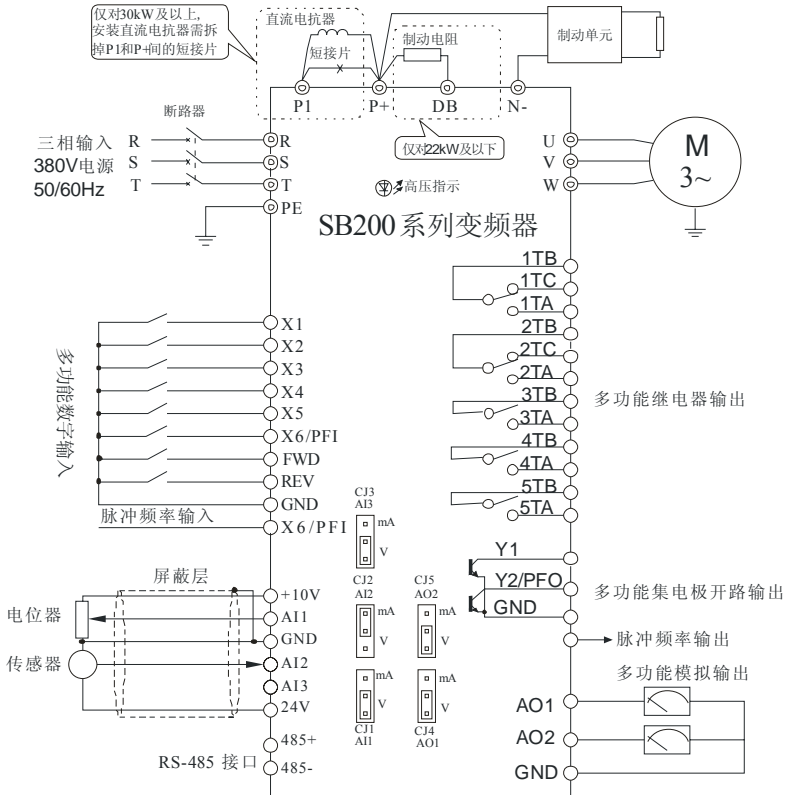
型号	空气开关 (A)	主电路配线 (mm <sup>2</sup> )	型号	空气开关 (A)	主电路配线 (mm <sup>2</sup> )
SB200-1.5T4	16	2.5	SB200-75T4~90T4	315	60
SB200-2.2T4~4T4	20	4	SB200-110T4~132T4	400	90
SB200-5.5T4~7.5T4	40	6	SB200-160T4	500	120
SB200-11 T4~15 T4	63	8	SB200-200T4	630	180
SB200-18.5T4~22T4	100	10	SB200-220T4	630	210
SB200-30T4	125	16	SB200-250T4~280T4	850	240
SB200-37T4	160	25	SB200-315T4	1000	300
SB200-45T4~55T4	200	35	SB200-375T4~400T4	1500	400

Model No.	Air Circuit-Breaker (A)	Main Circuit Wiring (mm <sup>2</sup> )	Model No.	Air Circuit-Breaker (A)	Main Circuit Wiring (mm <sup>2</sup> )
SB200-1.5T4	16	2.5	SB200-75T4—90T4	315	60
SB200-2.2T4—4T4	20	4	SB200-110T4—132T4	400	90
SB200-5.5T4—7.5T4	40	6	SB200-160T4	500	120
SB200-11 T4—15	63	8	SB200-200T4	630	180

T4					
SB200-18.5T4— 22T4	100	10	SB200-220T4	630	210
SB200-30T4	125	16	SB200-250T4—280T4	850	240
SB200-37T4	160	25	SB200-315T4	1000	300
SB200-45T4— 55T4	200	35	SB200-375T4—400T4	1500	400

基本运行配线连接如下图:

Refer to the following drawing for fundamental wiring required for operation:



仅对30kW及以上, 安装直流电抗器需拆掉P1和P+之间的短接片 Applied to 30kW and above only; The installation of a DC reactor requires the removal of the jumper between P1 and P+.

直流电抗器DC reactor

短接片Short lug

制动电阻Braking resistor

制动单元Braking unit

断路器Circuit-breaker

仅对22kW及以下 Applied to 22kW and below only

三相输入3-phase input

380V电源 380V power supply

高压指示High-voltage indication

SB200系列变频器 SB200 inverter series

多功能数字输入Multifunctional digital input

多功能继电器输出Multifunctional relay output

脉冲频率输入Pulse frequency input

屏蔽层Shielded layer

电位器Potentiometer

传感器Transducer

RS-485接口 RS-485 interface

多功能集电极开路输出Multifunctional collector open-circuit output

脉冲频率输出Pulse frequency output

多功能模拟输出Multifunctional analog output

注：控制端子连接线建议使用1mm<sup>2</sup>的铜导线。

Note: Copper-core conductors of 1mm<sup>2</sup> are recommended for connecting wires of the control terminal.

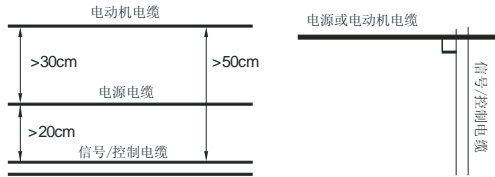
主回路端子功能说明：

端子符号	端子名称	说明
R、S、T	输入电源端子	接三相 380V 电源
U、V、W	变频器输出端子	接三相电机
P1、P+	直流电抗器端子	外接直流电抗器（不用电抗器时用短接片短接）
P+、N-	直流输出端子	用于连接制动单元
DB	制动输出端子	在 P+ 和 DB 之间连接制动电阻
PE	接地端子	变频器外壳接地端子，必须接大地

Terminal Code	Terminal Name	Description
R/S/T	Power supply terminal	Connected to the 3-phase 380V power supply
U/V/W	Inverter output terminal	Connected to the 3-phase motor
P1/P+	DC reactor terminal	Connected to the external DC reactor (A jumper is used for connection if a reactor is inapplicable)
P+/N-	DC output terminal	Used for connection to a braking unit
DB	Braking output terminal	A braking resistor connects P+ to DB
PE	Earth terminal	The earth terminal on the inverter enclosure must be earthed

为避免相互耦合产生干扰，控制电缆、电源电缆与电机电缆应该分开放置，它们之间应该保证足够的距离且尽可能远，特别是当电缆平行安装并且延伸距离较长时。信号电缆必须穿越电源电缆时，则应垂直穿越，如下图所示：

The control cable, power cable and motor cable must be kept apart in order to prevent intercoupling interference. The three types of cable must be spaced at a sufficiently wide distance, especially when they are installed parallel to each other and run for a relatively long distance. Whenever the signal cable has to cross over the power cable, they must be vertical to each other. Refer to the following drawings:



电动机电缆 Motor cable

电源电缆 Power cable

信号/控制电缆 Signal/control cable

电源或电动机电缆 Power/motor cable

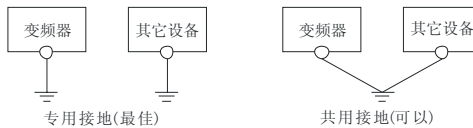
信号/控制电缆： Signal/control cable

电机电缆越长或者电机电缆横截面积越大时，对地电容就越大，干扰相互耦合也越强，应该使用规定截面积的电缆，并尽量减小长度。

The bigger the length and the cross section of the motor cable, the bigger the capacitance to earth and the interference caused by intercoupling. Therefore, cables of a specified cross section and of an appropriately minimized length are recommended.

下图给出了配线时推荐采用的接地方式：

The following drawings specify earthing modes recommended for the wiring:



变频器 Inverter

其它设备 Other equipment

专用接地（最佳） Separately earthed (Preferred)

变频器 Inverter

其它设备 Other equipment

共同接地（可以） Jointly earthed (Acceptable)

不要采用下面的接地线方式：



The following earthing modes are not allowed:



变频器Inverter  
其它设备Other equipment

变频器Inverter  
其它设备Other equipment

### 3.3.2 控制板端子、跳线及配线

#### 3.3.2. Terminal, Jumper and Wiring of Control Panel

控制板跳线的功能如下表:

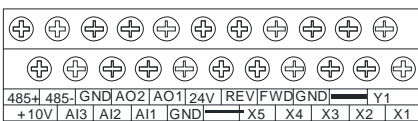
Refer to the following table for the functions of jumpers on the control panel:

标号	名称	功能及设置	出厂设置
CJ1	AI1	AI1 输入类型选择 V: 电压型 mA: 电流型	V
CJ2	AI2	AI2 输入类型选择 V: 电压型 mA: 电流型	mA
CJ3	AI3	AI3 输入类型选择 V: 电压型 mA: 电流型	V
CJ4	AO1	AO1 输出类型选择 V: 0~10V 电压信号 mA: 0/4~20mA 电流信号	V
CJ5	AO2	AO2 输出类型选择 V: 0~10V 电压信号 mA: 0/4~20mA 电流信号	V

Code	Name	Function and Configuration	Factory Setting
CJ1	AI1	Input Type Options: V: Voltage mode; mA: Current mode	V
CJ2	AI2	Input Type Options: V: Voltage mode; mA: Current mode	mA
CJ3	AI3	Input Type Options: V: Voltage mode; mA: Current mode	V
CJ4	AO1	Input Type Options: V: 0-10V (voltage signal); mA: 0/4-20mA (current signal)	V
CJ5	AO2	Input Type Options: V: 0-10V (voltage signal); mA: 0/4-20mA (current signal)	V

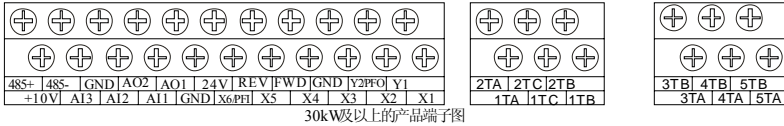
控制板端子排列:

Refer to the following tables for the layout of terminals on the control panel:



22kW及以下的产品端子图

22kW及以下的产品端子图 Terminals of 22kW series and below



30kW及以上的产品端子图Terminals of 30kW series and above

控制板端子功能如下表：

Refer to the following table for the functions of terminals on the control panel:

端子符号	端子名称	端子功能及说明	技术规格
485+	485 差分信号正端	RS485 通讯接口	可接 1~32 个 RS485 站点 输入阻抗: >10kΩ
485-	485 差分信号负端		
GND	地	模拟输入/输出、数字输入/输出、PFI、PFO、通讯和+10V、24V 电源接地端子	
+10V	+10V 基准电源	提供给用户的+10V 电源	+10V 最大输出电流 50mA, 电压精度优于 2%
Y2/PFO	脉冲频率输出(该端子用于 PFO 时)	输出功能选择见参数 F6-38 的说明	0~50 kHz, 集电极开路输出 规格: 24V/50mA
X6/PFI	脉冲频率输入(该端子用于 PFI 时)	设置见参数 F6-35~37 的说明	0~50 kHz, 输入阻抗 1.5 kΩ 高电平: >6V 低电平: <3V 最高输入电压: 30V
AO1	多功能模拟输出 1	功能选择: 详见参数 F6-27、F6-31 的说明 通过跳线 CJ4、CJ5 选择电压或电流输出形式	电流型: 0~20mA, 负载≤500Ω 电压型: 0~10V, 输出 10mA
AO2	多功能模拟输出 2		
24V	24V 电源端子	提供给用户的 24V 电源	最大输出电流 80mA
AI1	模拟输入 1	功能选择: 详见参数 F6-00~26 的说明 通过跳线 CJ1、CJ2、CJ3 选择电压或电流输入形式	输入电压范围: -10~+10V 输入电流范围: -20~+20mA 输入阻抗: 电压输入: 110kΩ 电流输入: 250Ω
AI2	模拟输入 2		
AI3	模拟输入 3		
X1	X1 数字输入端子	功能选择及设置见 F4 菜单	输入阻抗: ≥3kΩ 输入电压范围: <30V 采样周期: 1ms 消抖时间: 10ms 高电平: >10V 低电平: <4V 不接线时相当于高电平
X2	X2 数字输入端子		
X3	X3 数字输入端子		
X4	X4 数字输入端子		
X5	X5 数字输入端子		
X6/PFI	X6 数字输入端子(该端子用于 X6 时)		
REV	REV 数字输入端子		
FWD	FWD 数字输入端子		
Y1	Y1 数字输出端子	功能选择及设置见 F5 菜单	集电极开路输出 规格: 24Vdc/50mA 输出动作频率: <500Hz
Y2/PFO	Y2 数字输出端子(该端子用于 Y2 时)		
1TA	继电器 1 输出端子	功能选择及设置见 F5 菜单	TA-TB: 常开 TB-TC: 常闭 触点规格: 250V AC/3A 24V DC/5A
ITB			
ITC			
2TA			
2TB	继电器 2 输出端子		

端子符号	端子名称	端子功能及说明	技术规格
2TC			
3TA	继电器 3 输出端子		
3TB			
4TA	继电器 4 输出端子		
4TB			
5TA	继电器 5 输出端子		
5TB			

Terminal Code	Terminal Name	Function and Description	Technical Specification
485+	Positive terminal of 485 differential signal	RS485 communication interface	Connectable to 1—32 RS485 stations Input impedance: >10k $\Omega$
485—	Negative terminal of 485 differential signal		
GND	Ground (Earth)	Analog and digital input/output, +10V/24V earth terminals	PFI, PFO, communication and
+10V	Reference power supply: +10V	+10V power supply provided for the user	+10V: Max output current: 50mA Voltage accuracy: Above 2%
Y2/PFO	Pulse frequency output (when the terminal is use for PFO)	Refer to the description of Parameter F6-38 for output function options	0—50 kHz Collector open-circuit output Specification: 24V/50mA
X6/PFI	Pulse frequency input (when the terminal is applied to PFI)	Refer to the description of Parameters F6-35—F6-37	0—50 kHz; Input impedance: 1.5k $\Omega$ High level: >6V Low level: <3V Max input voltage: 30V
AO1	Multifunctional Analog Output 1	Function options: Refer to the description of Parameters F6-27 and F6-31	Current mode: 0—20mA; load: $\leq$ 500 $\Omega$
AO2	Multifunctional Analog Output 2	Select the voltage/current output modes via Jumpers CJ4 and CJ5	Voltage mode: 0—10V; output: 10mA
24V	24V power supply terminal	24V power supply provided for the user	Max output current: 30mA
AI1	Analog Input 1	Function option: Refer to the description of Parameters F6-00—26	Input voltage range: -10—+10V Input current range: -20—+20mA Input impedance: Voltage input: 110k $\Omega$ Current input: 250 $\Omega$
AI2	Analog Input 2		
AI3	Analog Input3		
X1	Digital Terminal X1 Input	Refer to Menu F4 for function options and settings	Input impedance: $\geq$ 3k $\Omega$ Input voltage range: <30V Sampling period: 1ms Debouncing time: 10ms
X2	Digital Terminal X2 Input		

Terminal Code	Terminal Name	Function and Description	Technical Specification
X3	Digital Terminal X3	Input	High level: >10V Low level: <4V Equivalent to high level when disconnected from the power supply
X4	Digital Terminal X4	Input	
X5	Digital Terminal X5	Input	
X6/PFI	Digital Terminal X6 (when the terminal is used for X6)	Input	
REV	Digital Terminal REV	Input	
FWD	Digital Terminal FWD	Input	
Y1	Digital terminal Y1	Output	Collector open-circuit output: Specification: 24Vdc/50mA Output action frequency: < 500Hz
Y2/PFO	Digital terminal Y2 (when the terminal applies to Y2)	Output	
1TA	Output terminal of Relay 1	Refer to Menu F5 for function options and settings	TA-TB: Constantly open TB-TC: Constantly closed Contact specification: 250V AC/3A 24V DC/5A
1TB			
1TC			
2TA	Output Terminal of Relay 2		
2TB			
2TC			
3TA	Output Terminal of Relay 3		
3TB			
4TA	Output Terminal of Relay 4		
4TB			
5TA	Output Terminal of Relay 5		
5TB			

### 1) 模拟输入端子配线

#### (1) Wiring of Analog Input Terminal

使用模拟信号远程操作时，操作器与变频器之间的控制线长度应小于30m，由于模拟信号容易受到干扰，模拟控制线应与强电回路、继电器、接触器等回路分离布线。配线应尽可能短且连接线应采用屏蔽双绞线，屏蔽线一端接到变频器的GND端子上。

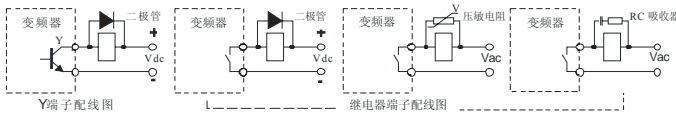
In a remote operation supported by analog signals, the control cable between the operation device and the inverter must be less than 30m. As analog signals are very vulnerable to interference, the analog control cables must be separately installed away from the strong current loop, relay loop and contactor loop. The wiring must have a sufficiently short distance and the connecting wires must be STP (shielded twisted pair) with one end connected to the GND terminal of the inverter.

## 2) 多功能数字输出 (Y) 端子和继电器输出端子TA、TB、TC配线

## (2) Wiring of Multifunctional Digital Output Terminal (Y) and Relay Output Terminals (TA, TB and TC)

如果驱动感性负载（例如电磁继电器、接触器、电磁制动器），则应加装浪涌电压吸收电路、压敏电阻或续流二极管（用于直流电磁回路，安装时一定要注意极性）等。吸收电路的元件要就近安装在继电器或接触器的线圈两端，如下图所示：

If the inverter is used to drive inductive loads (e.g. electromagnetic relays, contactors and electromagnetic brakes), a surge voltage absorption circuit, pressure-sensitive resistor or freewheeling diode (used for a DC electromagnetic loop; pay attention to polarity in the course of installation) must be installed. The elements of the absorption circuit must be installed close by (at the two ends of the coil of the relay or the contactor). Refer to the following drawings:



Y端子配线图 Wiring of Terminal Y

变频器Inverter

二极管Diode

继电器端子配线图Wiring of Relay Terminal

变频器Inverter

二极管Diode

压敏电阻Pressure-sensitive resistor

变频器Inverter

RC吸收器RC Absorber

变频器Inverter

## 3.4 变频器电磁干扰的抑制方法

## 3.4. Electromagnetic Interference Control Methods

变频器的工作原理决定了它会产生一定的干扰，从而可能给设备或系统带来EMC（电磁兼容）问题，变频器作为电子设备，也会受到外部电磁干扰的影响。下面介绍符合EMC规范的一些安装设计方法，可供变频器现场安装、配线参考。

The mechanism of the inverter necessarily involves the emission of interferences which may cause electromagnetic compatibility problems to the equipment or the system (EMC). As an electronic device, the inverter is also exposed to external electromagnetic interference sources. The following paragraphs list some of the installation/design methods complying with the EMC codes. The user may refer to the information when installing or providing wiring for an inverter.

一、抑制电磁干扰对策如下表：

(1) Refer to the following table for electromagnetic interference control methods:

干扰传播路径	减小影响对策
漏电流 接地回路	外围设备通过变频器的布线构成闭合回路时，变频器接地线漏电流会使设备产生误动作。此时若设备不接地，会减少误动作。
电源线传播	当外围设备和变频器共用同一电源时，变频器产生的干扰逆电源线传播，会使同一系统中的其它设备误动作。可采取下列措施： (1) 变频器的输入端安装 EMI 滤波器或铁氧体共模滤波器（磁环）。 (2) 将其它设备用隔离变压器或电源滤波器进行噪声隔离。
电机线辐射 电源线辐射 变频器辐射	测量仪表、无线电装置、传感器等微弱信号的设备或信号线，和变频器装于同一柜子里，且布线很近时，容易受空间干扰产生误动作，需采取以下对策： (1) 容易受影响的设备和信号线，应尽量远离变频器安装。信号线应使用屏蔽线，屏蔽层接地，信号线电缆套入金属管中，并应尽量远离变频器和变频器输入、输出线。如果信号电缆必须穿越动力电缆，二者之间需保持垂直。 (2) 在变频器输入、输出侧分别安装 EMI 滤波器或铁氧体共模滤波器（磁环）。 (3) 电机电缆线应放置于较大厚度的屏障中，如置于较大厚度（2mm 以上）的管道或埋入水泥槽中。动力线套入金属管中，并屏蔽接地（电机电缆采用 4 芯电缆，其中一根在变频器侧接地，另一侧接电机外壳）。
静电感应 电磁感应	(1) 避免信号线和动力线平行布线或与动力线捆扎成束布线。 (2) 使容易受影响的设备或信号线尽量远离变频器和变频器输入、输出线。 (3) 信号线和动力线都使用屏蔽线，分别套入金属管，金属管之间距离至少 20cm。

Communication Interference Sources	Solution to Interference Reduction
Leakage Current/Earthed Loop	In cases where the peripherals form a closed loop via the wiring of the inverter, the leakage current from the earth wire of the inverter will cause a misoperation of the equipment. If the equipment is not earthed, there will be fewer misoperations.
Power Cable Transmission	In cases where the peripherals and the inverter share the same power supply, the interference generated by the inverter will be transmitted along the power cable in a reversed direction and cause misoperations of other equipment in the same system. The following steps may be taken: (1) Install an EMI filter or a ferrite chip common-mode filter (magnetic core) at the input end of the inverter. (2) Use an isolation transformer or a power supply filter to isolate the noise of other equipment.
Motor Radiation	In cases where measurement instruments, radio devices, transducers and other

<p>Power Cord Radiation</p> <p>Inverter Radiation</p>	<p>equipment or signal lines emitting feeble signals are housed in the same cabinet as the inverter and the different wirings are closely arranged, there are more chances of misoperations as a result of interference. The following solutions are recommended:</p> <p>(1) Devices and signal lines susceptible to interference must be installed at an appropriate max distance from the inverter. The signal lines must be shielded and the shielding layer must be earthed and the signal lines must be housed in metal tubes. An appropriate max distance must be kept between the signal lines and the inverter or its lead-in/lead-out wires. In cases where a signal line has to cross over a power cable, they must be vertical to each other.</p> <p>(2) Install EMI filters or ferrite chip common-mode filter (magnetic core) on both the input side and the output side of the inverter.</p> <p>(3) The motor cable must be housed in an enclosure of relatively great thickness, e.g. tubes of relatively great thickness (above 2mm), or buried in a cement tub. The power cable must be earthed shielded cable housed in a metal tube (The motor cables must adopt 4-core cables. One cable is earthed on the inverter side and the other is connected to the motor enclosure).</p>
<p>Electrostatic Induction</p> <p>Electromagnetic Induction</p>	<p>(1) Signal lines must not run parallel to or be bound along with power cables.</p> <p>(2) Equipment or signal lines susceptible to interference must be at a max appropriate distance from the inverter and its lead-in/out wires.</p> <p>(3) Signal lines and power cables must be shielded lines housed in metal tubes. Metal tubes must be spaced at a min. of 20cm.</p>

## 二、漏电流及其对策

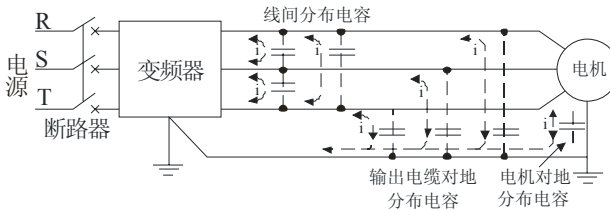
## (2) Leakage Current and Solution

由于变频器输入、输出侧电缆的对地电容、线间电容以及电机对地电容的存在，会产生漏电流。漏电流包括对地漏电流、线间漏电流，其大小取决于分布电容的大小和载波频率的高低。

The existence of earth capacitance/wire-to-wire capacitance of cables on the input/output side of the inverter and earth capacitance of the motor may induce leakage current. Leakage current includes earth leakage current and wire-to-wire leakage current, the intensity of which depends on the numerical value of distributed capacitance and carrier frequency.

漏电流途径如下图：

Refer to the following drawing for the path of leakage current:



电源 Power supply

断路器 Circuit-breaker

变频器 Inverter

线间分布电容 Wire-to-wire distributed capacitance

输出电缆对地分布电容 Earth distributed capacitance of the output cable

电机对地分布电容 Earth distributed capacitance of the motor

电机 Motor

## 对地漏电流

## Earth Leakage Current

漏电流不仅会流入变频器系统，而且可能通过地线流入其它设备，这些漏电流可能使漏电断路器、继电器或其它设备误动作。变频器载波频率越高、漏电流越大；电机电缆越长、漏电流也越大。

Leakage currents may leak into not only the inverter system, but also into other devices via the earth wire. These leakage currents may cause misoperations of the residual current circuit-breaker, relay or other devices. The higher the carrier frequency of the inverter, the larger the leakage current; the longer the motor cable, the larger the leakage current.

抑制措施：

Control methods include:

降低载波频率，但电机噪声会增加；

Reduction of carrier frequency (although this method may increase motor noise);



电机电缆尽可能短；

Reduction of the motor cable length as much as possible;

变频器系统和其它系统使用为针对高谐波和浪涌漏电流而设计的漏电断路器。

Adoption of residual current circuit-breakers specifically designed for the inverter system and other systems to minimize higher harmonics and surge leakage current.

线间漏电流

#### Wire-to-Wire Leakage Current

流过变频器输出侧电缆间分布电容的漏电流，其高次谐波可能使外部热继电器误动作，特别是小容量变频器，当配线很长时（50m以上），漏电流增加很多，易使外部热继电器误动作，推荐使用温度传感器直接监测电机温度或使用变频器本身的电机过载保护功能代替外部热继电器。

Leakage currents which leak into the wire-to-wire distributed capacitance on the output side of the inverter generate higher harmonics which may cause misoperations of external thermal relays, especially a small-capacity inverter. If the wire is very long (50m or above), there will be a substantial increase of leakage currents which may cause misoperations of external thermal relays. It is recommended that a temperature transducer be used to monitor motor temperature directly, or the inverter function of motor overload protection be adopted to substitute an external thermal relay.

抑制措施：

Control methods include:

降低载波频率；在输出侧安装电抗器。

Reduction of carrier frequency and installation of a reactor on the output side.

## 4 变频器操作与试运行

## 4. Inverter Operation and Trial Operation

### 4.1 变频器操作与显示

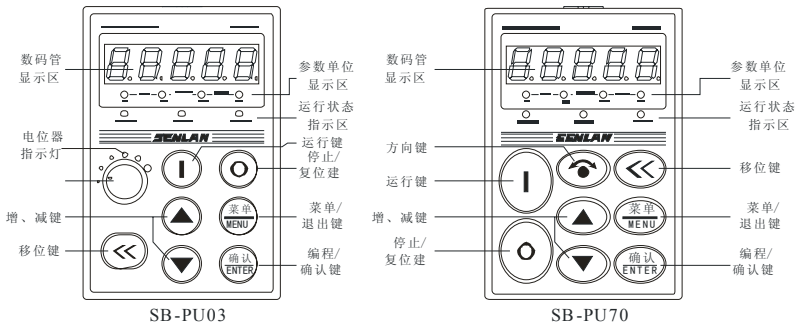
#### 4.1.1 Inverter Operation and Display

##### 4.1.1.1 操作面板的功能

##### 4.1.1.1.1 Functions of Control Panel

操作面板是变频器接受命令、显示参数的部件。使用LED操作面板SB-PU70（标准配置）、SB-PU03、SB-PU70E和LCD操作面板SB-PU200可以设定和查看参数、进行运行控制、显示故障、报警信息等，SB-PU70E还可实现参数复制功能，SB-PU200可以实现实时时钟和参数复制功能，SB-PU03、SB-PU70 操作面板如下图。

The control panel is the inverter component that receives a command or displays parameters. Parameters may be set up or checked via LED control panels, such as SB-PU70 (Standard), SB-PU03 and SB-PU70E or LCD control panels (e.g. SB-PU200). Also, a control panel enables operation control, fault display and alarm emission. SB-PU70E also enables parameter copying and SB-PU200 enables real-time clock and parameter copying. Refer to the following drawings



数码管显示区: Nixie tube display area

参数单位显示区: Parameter unit display area

数码管显示区: Nixie tube display area

参数单位显示区: Parameter unit display area

电位器指示灯: Potentiometer Indicator Light

运行状态指示区: Operating status indication

area 方向键: Direction key

运行状态指示区: Operating status indication area

增、减键: INCR/DECR (Increase/Decrease)

运行键 EXE

运行键:

EXE 移位键: SHIFT

移位键: SHIFT

停止 / 复位键: STOP/RESET

增、减键: INCR/DECR

(Increase/Decrease)

菜单 / 退出键: Menu/ESC key

菜单 / 退出键: Menu/ESC

停止 / 复位键: STOP/RESET







编程 / 确认键 PRGM/CONF (Program/Confirm)



编程 / 确认键PRGM/CONF (Program/Confirm)

SB-PU70 操作面板按键功能如下表:

Refer to the following table for the functions of the keys on the SB-PU70 control panel:





按键标识	按键名称	功 能
	菜单/退出键	返回到上一级菜单; 进入/退出监视状态
	编程/确认键	进入下一级菜单; 存储参数; 清除报警信息
	增键	数字递增, 按住时递增速度加快
	减键	数字递减, 按住时递减速度加快
	移位键	选择待修改位; 监视状态下切换监视参数
	方向键	运转方向切换, FC-01百位设为0方向键无效
	运行键	运行命令
	停止/复位键	停机、故障复位






Icon	Name	Function
	MENU/ESC	Back to the superior menu; entry into/exit from monitoring status
	PRGM/CONF	Entry into the inferior menu; parameter storage; alarm info cancellation
	INCR	Numerical increase; press the key to attain a speed at an increased rate
	DECR	Numerical decrease; press the key to attain a speed at a decreased rate
	SHIFT	Selection of digits to be revised; monitoring parameter switching in a monitoring status
	DIR	Running direction switching; the direction key to set the hundreds-digit as 0 is null

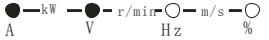



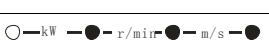
	EXE	Execution of a command
	STOP/RESET	Shutdown and fault reset

单位指示灯的各种组合表示的单位如下:

Refer to the following units of measurement for the combinations of different indicator lamps:

显示	单位	说明
	无	无单位、无法显示的单位 (°C、N、rad/s 等)
	A	安
	V	伏
	Hz	赫兹
	%	百分比
	kW	千瓦 (A 和 V 灯同时点亮)
	r/min	转/分 (V 和 Hz 灯同时点亮)
	m/s	米/秒 (Hz 和 % 灯同时点亮)
	长度	米或毫米 (A、V 和 Hz 灯同时点亮)
	时间	小时、分钟、秒、毫秒 (V、Hz 和 % 灯同时点亮)

Display	Unit	Description
	Unavailable	No unit or non-displayable unit (such as °C, N, rad/s)
	A	Ampere
	V	Volt
	Hz	Hertz
	%	Percent

	kW	Kilowatt (Lamps A and V are simultaneously illuminated)
	r/min	Rotation/minute (Lamps V and Hz are simultaneously illuminated)
	m/s	Meter/second (Lamps Hz and % are simultaneously illuminated)
	Length	Meter or millimeter (Lamps A, V and Hz are simultaneously illuminated)
	Time	Hour, minute, second and millisecond (Lamps V, Hz and % are simultaneously illuminated)

操作面板三个状态指示灯RUN、REV和EXT指示意义见下表:

Refer to the following table for the indication of the three status indicator lamps (RUN, REV and EXT) on the control panel:

指示灯	显示状态	指示变频器的当前状态
RUN 指示灯	灭	待机状态
	亮	稳定运行状态
	闪烁	加速或减速过程中
REV 指示灯	灭	设定方向和当前运行方向均为正
	亮	设定方向和当前运行方向均为反
	闪烁	设定方向与当前运行方向不一致
EXT 指示灯	灭	操作面板控制状态
	亮	端子控制状态
	闪烁	通讯控制状态
电位器指示灯	亮	主给定、辅助给定或PID给定选择了面板电位器, 仅对SB-PU03有效

Indicator Lamp	Display Status	Indicated Present Status of Inverter
RUN	Distinguished	Standby
	Illuminated	Stable operation
	Flashing	In acceleration or deceleration
REV	Distinguished	Both the direction settings and the present rotation direction are clockwise
	Illuminated	Both the direction settings and the present rotation direction are anticlockwise
	Flashing	The setup direction and the present running direction are not the same
EXT	Distinguished	Control status of the control panel
	Illuminated	Control status of the terminal
	Flashing	Control status of communication

---

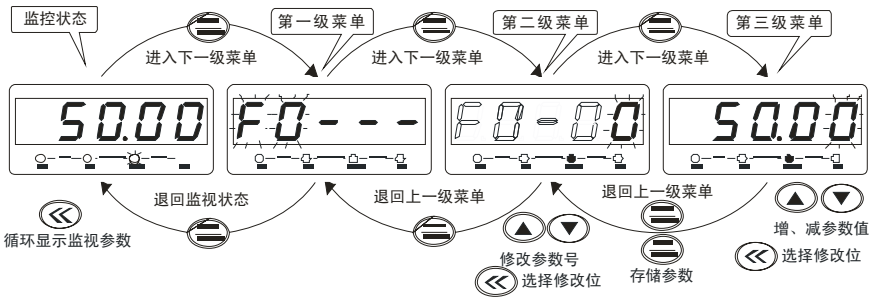
Potentiometer	Illuminated	The panel potentiometer is selected via the main settings, auxiliary settings or PID settings. The settings are only effective for SB-PU03.
---------------	-------------	---

## 4.1.2 操作面板的显示状态和操作

## 4.1.2. Display Status and Operation of Control Panel

SB200系列变频器操作面板的显示状态分为监视状态（包括待机监视状态、运行监视状态）、参数编辑状态、故障、报警状态等。各状态的转换关系如下图

The control panel of the SB200 inverter series has the following display statuses: monitoring status (including standby monitoring and operation monitoring), parameter editing status, fault status, alarm status, etc. Refer to the following drawings for how to switch between different statuses:





监控状态: Monitoring status 进入下一级菜单: Enter inferior menu 第一级菜单: Top hierarchy menu 进入下一级菜单: Enter inferior menu 第二级菜单: Second hierarchy menu 进入下一级菜单: Enter inferior menu 第三级菜单: Third hierarchy menu

循环显示监视参数: Display monitoring parameter in a cyclic way 退回监视状态: Return to monitoring status 退回上一级菜单: Return to superior menu 修改参数号: Modify parameter No. 选择修改位: Select digit to be modified 退回上一级菜单: Return to superior menu 存储参数: Save parameter 增、减参数值: Increase/decrease parameter value 选择修改位: Select digit to be modified

## 待机监视状态


## Standby Monitoring


该状态下按 ，操作面板可循环显示不同的待机状态参数（由FC-02~FC-08定义）。

Press  under this status and the control panel will display different standby parameters (defined via FC-02—FC-08) in a cycling way.

## 运行监视状态







## Operation Monitoring








该状态下按 ，可循环显示所有监视参数（由FC-02~FC-12定义）。

Press  under this status and all monitoring parameters (defined via FC-02—FC-12) will be displayed in a cycling way.



## 参数编辑状态 Parameter Editing







在监视状态下，按  可进入编辑状态，编辑状态按三级菜单方式进行显示，其顺序依次为：参数组号→参数组内序号→参数值。按  可逐级进入下一级，按  退回到上一级菜单（在第一级菜单则退回监视状态）。使用  、  改变参数组号、参数组内序号或参数值。使用  可以移动可修改位，按下  存储修改结果、返回到第二级菜单并指向下一参数。

Press  under the monitoring status to enter the editing status. Under the editing status, the display will be in the form of a 3-hierarchy menu system (sequence: parameter group No. → serial No. within parameter groups → parameter value). Press  to enter inferior hierarchies level by level and press to  return to the superior hierarchy (if it is the top hierarchy of the menu, you will return to the monitoring status). Use  or  to change the parameter group No., serial No., within parameter groups or parameter value. Use  to shift or modify digits. Press  to store modified results, return to the second hierarchy and redirect to the next parameter.




当FC-00设为1（只显示用户参数）或2（只显示不同于出厂值的参数）时，为用户操作更快捷，不出现第一级菜单。



When FC-00 is set up as 1 (user parameters are displayed only) or 2 (parameters other than factory parameters are displayed only), the top hierarchy will not be displayed. This is intended to facilitate user operations.

## 密码校验状态 Password Verification

如有用户密码（F0-15不为零），进入参数编辑前先进入密码校验状态，此时显示“0.0.0.0.”，用户通过  、  、  输入密码（输入时一直显示“———”），输入完按  可解除密码保护；若密码不正确，键盘将闪烁显示“Err”，此时按  退回到校验状态，再次按  将退出密码校验状态。

If a user password has been set up, enter the password verification status before entry into the parameter editing status. In this case, “0.0.0.0.” will be displayed. The user may enter the password by pressing

,  and  (“——” will be displayed when the password is being entered).

After the password entry is finished, press  to cancel password protection. If the password is incorrect, the keyboard will flash and “ERR” will be displayed. Press  to return to the verification state and press the same key again to exit from the verification state.

密码保护解除后在监视状态下按  +  或2分钟内无按键操作密码保护自动生效。


After password protection is cancelled, press  +  under the monitoring status, or avoid any key operation within 2 minutes, and password protection will be automatically actuated.

FC-00为1（只显示用户参数）时，用户参数不受密码保护，但改变FC-00时需输入用户密码。


When FC-00 is set as 1 (only user parameters are displayed), the user parameters will not be subject to password protection. But the user password is required when changing FC-00.

## 故障显示状态

### Fault Display

变频器检测到故障信号，即进入故障显示状态，闪烁显示故障代码。可以通过输入复位命令（操作面板的 、控制端子或通讯命令）复位故障，若故障仍然存在，将继续显示故障代码，可在这段时间内修改设置不当的参数以排除故障。



The inverter will enter the fault display status upon detecting a fault signal and the indicator lamp will flash to display a fault code. The user may reset and rectify the fault by entering a reset command (press


 on the control panel or operate via the control terminal or a communication command). If the fault persists, the fault code will remain. The user may modify the incorrect parameters during this time to eliminate the fault.

## 报警显示状态

### Alarm Display

若变频器检测到报警信息，则数码管闪烁显示报警代码，同时发生多个报警信号则交替显示，按

 或  暂时屏蔽报警显示。变频器自动检测报警值，若恢复正常后自动清除报警信号。报警时变频器不停机。

If the inverter detects an alarm signal, the nixie tube will flash to display the alarm code. If more than one type of alarm signal is emitted at one time, they will be displayed in an alternate way. Press  or



to disable alarm display temporarily. The inverter will automatically detect the alarm value. If the inverter returns to normal, the alarm signal will be automatically cleared. The operation of the inverter will continue in the event of an alarm.

其它显示状态

Other Display Statuses

提示信息	内容及说明
UP	参数上传中
dn	参数下载中
CP	参数比较中
Ld	出厂值恢复中
yES	参数比较结果一致

Prompt	Description
UP	Uploading parameters
DN	Downloading parameters
CP	Comparing parameters
LD	Resetting to factory settings
YES	The results of the comparison comply

## 4.2 首次通电

### 4.2. Initial Energization

请按照本手册3.3节“变频器的配线”中提供的技术要求进行配线连接。

Wiring operations must be conducted as per the technical requirements of 3.3. *Wiring of Inverter* of this manual.

接线及电源检查确认无误后，合上变频器输入侧交流电源的空气开关，给变频器上电，变频器操作面板首先显示“8.8.8.8.8.”，当变频器内部的接触器正常吸合后，LED数码管显示字符变为给定频率时，表明变频器已初始化完毕。如果上电过程出现异常，请断开输入侧空气开关，检查原因并排除异常。

Check and confirm the wiring and power supply. Then close the air circuit-breaker for the AC power supply on the input side of the inverter. “8.8.8.8.8.” will be displayed on the control panel of the inverter. If the contactor in the inverter is normally picked up and the characters displayed by the LED nixie tube change to the set frequency, it indicates that the inverter has been successfully initialized. If any abnormality occur in the aforesaid energization steps, please open the air circuit-breaker on the output side, check the cause and rectify the fault.

## 4.3 快速调试指南

### 4.3. Guide to Quick Debugging

本节在出厂值基础上给出了SB200系列变频器常用的、必要的调试步骤。

This part prescribes the commonest but necessary debugging steps for the SB200 inverter series on the basis of the factory settings:

- 1、选择频率给定通道及设置给定频率：详见106页F0-01“普通运行主给定通道”的说明。  
1. Frequency Setting Channel and Frequency Setting: For details, refer to “F0-01: Main Setting Channel for Normal Operation” on Page 43.
- 2、选择运行命令通道：详见107页F0-02“运行命令通道选择”的说明。  
2. Selection Command Execution Channel Options: For details, Refer to “F0-02: Command Execution Channel Options” on Page 43.
- 3、正确设置F0-06“最大频率”、F0-07“上限频率”、F0-08“下限频率”，详见110页。  
3. To correctly set “Max Frequency” (F0-06), “Upper Frequency Limit” (F0-07) and “Lower Frequency Limit” (F0-08), refer to Page 44 for details.
- 4、电机运转方向：确认电机接线相序并按机械负载的要求设置F0-09“方向锁定”，详见110页。  
4. Direction of Motor Rotation: To confirm the phase sequence of the motor wiring and configure “Direction Lock” (F0-09) as required by the mechanical load, refer to Page 44 for details.
- 5、加减速时间：在满足需要的情况下尽量设长。太短会产生过大的转矩而损伤负载或引起过流。详见113页F1-00~F1-03加减速时间说明。  
5. Acceleration/Deceleration Time: Set the parameter to as long as possible to meet the requirements. If the time is too short, a great torque will be generated and damage the load, or cause an overcurrent. For details, refer to *F1-00—F1-03: Acceleration/Deceleration Time* on Page 45.
- 6、起动方式和停机方式：详见117页F1-11“起动方式”和119页F1-16“停机方式”的说明。  
6. Startup/Shutdown Mode: For details, refer to *F1-11: Startup Mode* and *F1-16: Shutdown Mode* on Page 46.
- 7、电机铭牌参数：额定功率、电机极数、额定电流、额定转速，详见128页。  
7. Parameters on Motor Nameplate: Rated power, number of poles, rated current and rated rotation speed. Refer to Page 51 for details.
- 8、电机过载保护：详见202页Fb-00“电机散热条件”、Fb-01“电机过载保护值”、Fb-02“电机过载保护动作选择”的说明。  
8. Motor Overload Protection: For details, refer to Fb-00: Motor Heat Dissipation Conditions, Fb-01: “Motor Overload Protection Value” and Fb-02: Motor Overload Protection Action Options.  
优化调整：  
For details about optimized settings, refer to the following tips:
  - 1、F2-00“V/F曲线设定”，详见121页。  
1. F2-00: V/F Curve Settings on Page 48.
  - 2、F2-01“转矩提升选择”，详见122页。

2. F2-01: Torque Elevation Options on Page 48.

3、F2-09“防振阻尼”：用来消除电机轻载时的振荡。如果电机发生振荡，从小往大调节该参数，调至振荡消除即可，不宜过大，详见125页。

3. F2-09: “Vibration Dampening” on Page 49. This function is used to eliminate motor vibrations under a light load. If the motor vibrates, adjust the parameter from by stepping up the values until the vibration is eliminated. The parameter value must not be too great.

4、F2-02“手动转矩提升幅值”：如果起动开始的电流过大，可以减小该参数的值，详见122页。

4. F2-02: Amplitude of Manual Toque Elevation on Page 48. If the starting current is too great, you may reduce the parameter value.

5、自动转矩提升：为了增加变频器的起动转矩和低速运行时的输出转矩，建议使用自动转矩提升（F2-01“转矩提升选择”=2）。

5. Auto Torque Elevation. To increase the starting torque and output torque (in low-speed operation) of the inverter, auto torque elevation is recommended (F2-01: Torque Elevation Options =2).

6、滑差补偿：可减小负载引起的速降。在自动转矩提升有效时，滑差补偿才有效。需要设置：F2-05“滑差补偿增益”、F2-06“滑差补偿滤波时间”，还可设置F2-07、F2-08“滑差补偿限幅”，详见124页。

6. Slip Compensation on Page 49. Slip compensation can reduce a fall in speed caused by loads. This function is not enabled unless auto torque elevation is enabled. The following settings are required: F2-05: “Slip Compensation Gain”, F2-06: “Filter Time of Slip Compensation” and F2-07 and F2-08: Clipping of Slip Compensation .



## 5 功能参数一览表

## 5. Lists of Function Parameters

说明:

NOTE:

更改: “○”表示待机和运行状态均可更改, “×”表示仅运行状态不可更改, “△”表示只读。

Modification: “○” means that both the standby status and the operating status can be changed. “×” means that only the operating status can not be changed. “△” means “Read Only”.

### F0 基本参数

#### F0: Basic Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
F0-00	数字给定频率	0.00Hz~F0-06“最大频率”	50.00Hz	○	106
F0-01	普通运行主给定通道	0: F0-00数字给定            1: 通讯给定 2: UP/DOWN调节值        3: AI1 4: AI2        5: AI3        6: PFI 7: 面板电位器 (仅SB-PU03有效)	0	○	106
F0-02	运行命令通道选择	0: 操作面板    1: 端子    2: 通讯控制	0	×	107
F0-03	给定频率保持方式	个位: 掉电存储选择 0:   或通讯修改的主给定频率掉电存储到F0-00 1:   或通讯修改的主给定频率掉电不存储 十位: 停机保持选择 0: 停机时   或通讯修改的主给定频率保持 1: 停机时   或通讯修改的主给定频率恢复为F0-00	00	○	109
F0-04	辅助给定通道选择	0: 无    1: F0-00    2: UP/DOWN调节值 3: AI1    4: AI2    5: AI3    6: PFI	0	○	109
F0-05	辅助通道增益	-1.000~1.000	1.000	○	109
F0-06	最大频率	F0-07~650.00Hz	50.00Hz	×	110
F0-07	上限频率	F0-08“下限频率”~F0-06“最大频率”	50.00Hz	×	110
F0-08	下限频率	0.00Hz~F0-07“上限频率”	0.00 Hz	×	110
F0-09	方向锁定	0: 正反向均可    1: 锁定正向 2: 锁定反向	0	○	110
F0-10	参数写入保护	0:不保护    1:F0-00、F7-04除外    2:全保护	0	○	111
F0-11	参数初始化	11: 初始化    22: 初始化, 通讯参数除外	00	×	111
F0-12	参数复制 (对SB-PU70E、 SB-PU200有效)	11: 参数由变频器上传到面板 22: 参数由面板下载到变频器 33: 验证面板和变频器参数的不一致性 44: 清除面板中存储的参数	00	×	111



参数	名称	设定范围及说明	出厂值	更改	页码
F0-13	变频器额定功率	最小单位: 0.01kW	机型确定	△	112
F0-14	软件版本号	0.00~99.99	版本确定	△	112
F0-15	用户密码设定	0000~9999, 0000为无密码	0000	○	113

Parameter	Name	Setting Range and Description	Factory Settings	Modification	Page
F0-00	Digital Frequency Settings	0.00Hz—F0-06“Max. Frequency”	50.00Hz	○	106
F0-01	Main Setting Channel for Normal Operation	1: Communication Settings 0: F0-00 digital settings UP/DOWN adjustment 3: AI1 4: AI2 5: AI3 6: PFI 7: Panel potentiometer (applicable to SB-PU03 only)	0	○	106
F0-02	Command Execution Channel Options	0: Control panel 1: Terminal 2: Communication control Units digit: Storage option on Power Failure	0	×	107
F0-03	Frequency Setting Retention Mode	0: Stores the main frequency settings modified by pressing ▲▼ or by communication to F0-00 upon poweroff 1: Does not store the main frequency settings modified by pressing ▲▼ or by communication upon poweroff Tens digit: Retention options on shutdown 0: Retains the main frequency settings modified by pressing ▲▼ or by communication upon shutdown 1: Restores the main frequency settings modified by pressing ▲▼ or by communication upon shutdown to F0-00	00	○	109
F0-04	Auxiliary Setting Channel Options	0: Unavailable F0-00 1: UP/DOWN adjustment 2: AI1 3: AI2 4: AI3 5: AI3 6: PFI	0	○	109
F0-05	Auxiliary Channel Gain	-1.000—1.000	1.000	○	109
F0-06	Max. Frequency	F0-07—650.00Hz	50.00Hz	×	110
F0-07	Upper Frequency Limit	F0-08 “Lower Frequency Limit”—F0-06 “Max. Frequency”	50.00Hz	×	110

Parameter	Name	Setting Range and Description	Factory Settings	Modification	Page
F0-08	Lower Frequency Limit	0.00Hz—F0-07 “Upper Frequency Limit”	0.00 Hz	×	110
F0-09	Direction Lock	0: Clockwise and anticlockwise direction 1: Clockwise direction lock 2: Anticlockwise direction lock	0	○	110
F0-10	Parameter Write Protection	0: Inapplicable 1: Applicable to all parameters but F0-00 and F7-04 2: Applicable to all parameters	0	○	111
F0-11	Parameter Initialization	11: Initialization 22: Initialization applicable to all parameters but communication parameters	00	×	111
F0-12	Parameter Copying (Applicable to SB-PU70E and SB-PU200)	11: Parameters are uploaded from the inverter to the panel 22: Parameters are downloaded from the panel to the inverter 33: Verifies the unconformity of panel settings to inverter parameters 44: Clears parameters stored in the panel	00	×	111
F0-13	Rated Inverter Power	Min. unit: 0.01kW	Depend on inverter model	△	112
F0-14	Software Version No.	0.00—99.99	Depend on version	△	112
F0-15	User Password Settings	0000—9999; “0000” means no password has been set	0000	○	113

## F1 加减速、起动、停机和点动参数

### F1: Acceleration/Deceleration, Startup, Shutdown and Jog Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
F1-00	加速时间1	0.1~3600.0s	机型确定	○	113
F1-01	减速时间1	加速时间: 频率增加50Hz所需的时间 减速时间: 频率减小50Hz所需的时间			113
F1-02	加速时间2	注: 22 kW及以下机型出厂设定6.0s 30 kW及以上机型出厂设定20.0s			113
F1-03	减速时间2				113
F1-04	紧急停机减速时间	0.1~3600.0s	10.0s	○	113
F1-05	加减速时间自动切换点	0.00~650.00Hz, 该点以下为加减速时间2	0.00Hz	×	113
F1-06	点动运行频率	0.10~50.00Hz	5.00Hz	○	115
F1-07	点动加速时间	0.1~60.0s	机型确定	○	116
F1-08	点动减速时间	0.1~60.0s	机型确定	○	116
F1-09	正反转死区时间	0.0~3600.0s	0.0s	×	116
F1-10	起动延时时间	0.0~3600.0s F8-00≠0时无效	0.0s	○	117

F1-11	起动方式	0: 从起动频率起动 1: 先直流制动再从起动频率起动 2: 转速跟踪起动	0	×	117
F1-12	起动频率	0.00~60.00Hz	0.50Hz	○	117
F1-13	起动频率保持时间	0.0~60.0s	0.0s	○	117
F1-14	起动直流制动时间	0.0~60.0s	0.0s	○	117
F1-15	起动直流制动电流	0.0~100.0%，以变频器额定电流为100%	0.0%	○	117
F1-16	停机方式	0: 减速停机                    1: 自由停机 2: 减速+直流制动	0	○	119
F1-17	停机/直流制动频率	0.00~60.00Hz	0.50Hz	○	119
F1-18	停机直流制动等待时间	0.00~10.00s	0.00s	○	119
F1-19	停机直流制动时间	0.0~60.0s	0.0s	○	119
F1-20	停机直流制动电流	0.0~100.0%，以变频器额定电流为100%	0.0%	○	119

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F1-00	Acceleration Time 1	0.1—3600.0s	Depend on inverter model No.	○	113
F1-01	Deceleration Time 1	Acceleration Time: The time required for the frequency to increase by 50Hz			113
F1-02	Acceleration Time 2	Deceleration Time: The time required for the frequency to decrease by 50Hz NOTE: Factory settings for 22kW inverters and below are 6.0s Factory settings for 30 kW inverters and above are 20.0s			113
F1-03	Deceleration Time 2				
F1-04	Deceleration Time in an Emergency Shutdown	0.1—3600.0s	10.0s	○	113
F1-05	Auto Switching Point for Acceleration/Deceleration Time	0.00—650.00Hz; Below this range is Acceleration/Deceleration Time 2	0.00Hz	×	113
F1-06	Jog Frequency	0.10—50.00Hz	5.00Hz	○	115
F1-07	Jog Acceleration Time	0.1—60.0s	Depend on inverter model No.	○	116
F1-08	Jog Deceleration Time	0.1—60.0s	Depend on inverter model No.	○	116
F1-09	Clockwise/Anticlockwise Rotation Deadband Time	0.0—3,600.0s	0.0s	×	116
F1-10	Startup Delay Time	0.0—3,600.0s    Inapplicable when F8-00 is not "0"	0.0s	○	117

F1-11	Startup Mode	0: Startup at the startup frequency 1: DC braking comes before startup at the startup frequency 2: Startup in the rotation speed tracking mode	0	×	117
F1-12	Startup Frequency	0.00—60.00Hz	0.50Hz	○	117
F1-13	Startup Frequency Maintenance Time	0.0—60.0s	0.0s	○	117
F1-14	Startup DC Braking Time	0.0—60.0s	0.0s	○	117
F1-15	Startup DC Braking Current	0.0—100.0%; the rated current of the inverter is taken as 100%	0.0%	○	117
F1-16	Shutdown Mode	0: Shutdown in deceleration mode 1: Free shutdown 2: Deceleration+ DC braking	0	○	119
F1-17	Shutdown/DC Braking Frequency	0.00—60.00Hz	0.50Hz	○	119
F1-18	Shutdown DC Braking Latency Time	0.00—10.00s	0.00s	○	119
F1-19	Shutdown DC Braking Time	0.0—60.0s	0.0s	○	119
F1-20	Shutdown DC Braking Current	0.0—100.0%; the rated inverter current is taken as 100%	0.0%	○	119

## F2 V/F控制参数

## F2: V/F Control Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
F2-00	V/F曲线设定	0: 自定义 1: 线性 2: 降转矩V/F曲线1 3: 降转矩V/F曲线2 4: 降转矩V/F曲线3 5: 降转矩V/F曲线4 6: 降转矩V/F曲线5	1	×	121
F2-01	转矩提升选择	0: 无 1: 手动提升 2: 自动提升 3: 手动提升+自动提升	1	×	122
F2-02	手动转矩提升幅值	0.0%~机型确定最大值, 最小单位0.1%	机型确定	○	122
F2-03	手动转矩提升截止点	0.0~100.0%, 以F2-12为100%	10.0%	○	122
F2-04	自动转矩提升度	0.0~100.0%	100.0%	×	122
F2-05	滑差补偿增益	0.0~300.0%	0.0%	○	124
F2-06	滑差补偿滤波时间	0.1~25.0s	1.0s	×	124
F2-07	电动滑差补偿限幅	0~250%, 以电机额定滑差频率为100%	200%	×	124
F2-08	再生滑差补偿限幅	0~250%, 以电机额定滑差频率为100%	200%	×	124
F2-09	防振阻尼	0~200	机型确定	○	125
F2-10	AVR功能设置	0: 无效 1: 一直有效 2: 仅减速时无效	1	×	125
F2-11	自动节能运行选择	0: 无效 1: 有效	0	○	126
F2-12	基本频率	1.00~650.00Hz	50.00Hz	×	127
F2-13	最大输出电压	150~500V	380V	×	127
F2-14	V/F频率值F4	F2-16~F2-12	0.00Hz	×	127
F2-15	V/F电压值V4	F2-17~100.0%, 以F2-13为100%	0.0%	×	127
F2-16	V/F频率值F3	F2-18~F2-14	0.00Hz	×	127
F2-17	V/F电压值V3	F2-19~F2-15, 以F2-13为100%	0.0%	×	127
F2-18	V/F频率值F2	F2-20~F2-16	0.00Hz	×	127
F2-19	V/F电压值V2	F2-21~F2-17, 以F2-13为100%	0.0%	×	127
F2-20	V/F频率值F1	0.00Hz~F2-18	0.00Hz	×	127
F2-21	V/F电压值V1	0.0%~F2-19, 以F2-13为100%	0.0%	×	127

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F2-00	V/F Curve Settings	0: Custom 1: Linear 2: V/F Curve 1 (Torque lowering) 3: V/F Curve 2 (Torque lowering) 4: V/F Curve 3 (Torque lowering) 5: V/F Curve 4 (Torque lowering) 6: V/F Curve 5 (Torque lowering)	1	×	121

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F2-01	Torque Elevation Options	0: Inapplicable 1: Manual elevation 2: Auto elevation 3: Manual elevation + auto elevation	1	×	122
F2-02	Amplitude of Manual Torque Elevation	0.0%—the max. value depends on inverter model number; min. unit: 0.1%	Depend on inverter model No.	○	122
F2-03	Cut-Off Point of Manual Torque Elevation	0.0—100.0%; F2-12 is taken as 100%	10.0%	○	122
F2-04	Auto Torque Elevation Range	0.0—100.0%	100.0%	×	122
F2-05	Slip Compensation Gain	0.0—300.0%	0.0%	○	124
F2-06	Filter Time of Slip Compensation	0.1—25.0s	1.0s	×	124
F2-07	Clipping of Electric Slip Compensation	0—250%; The rated slip frequency of the motor is taken as 100%	200%	×	124
F2-08	Clipping of Regenerated Slip Compensation	0—250%; The rated slip frequency of the motor is taken as 100%	200%	×	124
F2-09	Vibration Dampening	0—200	Depend on inverter model No.	○	125
F2-10	AVR Settings	0: Inapplicable 1: Always applicable 2: Only inapplicable in deceleration	1	×	125
F2-11	Auto Energy-Saving Options	0: Inapplicable 1: Applicable	0	○	126
F2-12	Basic Frequency	1.00—650.00Hz	50.00Hz	×	127
F2-13	Max. Output Voltage	150—500V	380V	×	127
F2-14	V/F Frequency F4	F2-16—F2-12	0.00Hz	×	127
F2-15	V/F Voltage V4	F2-17—100.0%; F2-13 is taken as 100%	0.0%	×	127
F2-16	V/F Frequency F3	F2-18—F2-14	0.00Hz	×	127
F2-17	V/F Voltage V3	F2-19—F2-15; F2-13 is taken as 100%	0.0%	×	127
F2-18	V/F Frequency F2	F2-20—F2-16	0.00Hz	×	127
F2-19	V/F Voltage V2	F2-21—~F2-17; F2-13 is taken as 100%	0.0%	×	127
F2-20	V/F Frequency F1	0.00Hz—F2-18	0.00Hz	×	127
F2-21	V/F Voltage V1	0.0%—F2-19; F2-13 is taken as 100%	0.0%	×	127

### F3 电机参数

#### F3. Motor Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
F3-00	电机额定功率	0.40~500.00kW	机型确定	×	128
F3-01	电机极数	2~48	4	×	129
F3-02	电机额定电流	0.5~1200.0A	机型确定	×	129
F3-03	电机额定频率	1.00~650.00Hz	50.00Hz	×	129

参数	名称	设定范围及说明	出厂值	更改	页码
F3-04	电机额定转速	125~40000r/min	机型确定	×	129

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F3-00	Rated Power	0.40—500.00kW	Depend on inverter model No.	×	128
F3-01	Number of Poles	2—48	4	×	129
F3-02	Rated Current	0.5—1200.0A	Depend on inverter model No.	×	129
F3-03	Rated Frequency	1.00—650.00Hz	50.00Hz	×	129
F3-04	Rated Rotation Speed	125—40000r/min	Depend on inverter model No.	×	129

#### F4: 数字输入端子及多段速

#### F4: Digital Input Terminals and Multi-Speed

参数	名称	设定范围及说明	出厂值	更改	页码
F4-00	X1数字输入端子功能	0: 不连接到下列的信号	1	×	130
F4-01	X2数字输入端子功能	±1: 多段频率选择1	2		
F4-02	X3数字输入端子功能	±2: 多段频率选择2	3		
F4-03	X4数字输入端子功能	±3: 多段频率选择3	12		
F4-04	X5数字输入端子功能	±4: 清水池上限水位检测	13		
F4-05	X6/PFI数字输入端子功能/ 脉冲频率输入	±5: 清水池下限水位检测	0		
F4-06	X7数字输入端子功能 (扩展端子)	±6: 清水池缺水水位检测	0		
F4-07	X8数字输入端子功能 (扩展端子)	±7: 加减速时间2选择	0		
F4-08	X9数字输入端子功能 (扩展端子)	±8: 多段PID选择1	0		
F4-09	X10数字输入端子功能 (扩展端子)	±9: 多段PID选择2	0		
F4-10	X11数字输入端子功能 (扩展端子)	±10: 多段PID选择3	0		
F4-11	FWD端子功能	±11: 给定频率切换至A11	38		
F4-12	REV端子功能	±12: 外部故障输入	39		

参数	名称	设定范围及说明	出厂值	更改	页码
F4-13	端子运转模式	0: 单线式(起停) 1: 两线式1(正转、反转) 2: 两线式2(起停、方向) 3: 两线式3(起停、停止) 4: 三线式1(正转、反转、停止) 5: 三线式2(运行、方向、停止)	1	×	139
F4-14	数字输入端子消抖时间	0~2000ms	10ms	○	142
F4-15	UP/DOWN调节方式	0: 端子电平式 1: 端子脉冲式 2: 操作面板电平式 3: 操作面板脉冲式	0	○	142
F4-16	UP/DOWN速率/步长	0.01~100.00, 单位是%/s或%	1.00	○	142
F4-17	UP/DOWN记忆选择	0: 掉电存储 1: 掉电清零 2: 停机、掉电均清零	0	○	142
F4-18	UP/DOWN上限	0.0~100.0%	100.0%	○	142
F4-19	UP/DOWN下限	-100.0~0.0%	0.0%	○	143
F4-20 ~ F4-26	多段频率1~7	0.00~650.00Hz 多段频率1~多段频率7出厂值为各自的多段频率号, 例: 多段频率3出厂值为3.00Hz	n.00Hz (n=1~7)	○	133

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F4-00	Functions of Digital Input Terminal X1	0: Connection to the following signals is 5K2	1	×	130
F4-01	Functions of Digital Input Terminal X2	±31: Check of Contactor ±32: Auxiliary setting ±1: Multi-band frequency channel disabled	2		
F4-02	Functions of Digital Input Terminal X3	option 1 ±2: Multi-band frequency settings to A12 option 2 ±34: Shutdown	3		
F4-03	Functions of Digital Input Terminal X4	±3: Multi-band frequency DC-braking option 3 ±35: PID (Process	12		
F4-04	Functions of Digital Input Terminal X5	±4: Check of upper water identification) disabled level limit of clean water pool ±36: PID Parameter 2	13		
F4-05	Functions of Digital Input Terminal X6/PFI/Pulse Frequency Input	±5: Check of lower water level limit of clean water shutdown command pool ±37: Three-wire mode	0		
F4-06	Functions of Digital Input Terminal X7 (Extension Terminal)	±6: Check of water terminal shortage level of clean water pool ±39: Internal virtual REV terminal	0		
F4-07	Functions of Digital Input Terminal X8 (Extension Terminal)	±7: Acceleration/deceleration time option 2 ±40: Retention of analog frequency settings	0		
F4-08	Functions of Digital Input Terminal X9 (Extension Terminal)	±8: Multi-PID Option 1 ±9: Multi-PID Option 2 ±10: Multi-PID Option 3 ±11: Switching of command execution	0		
F4-09	Functions of Digital Input Terminal X10 (Extension Terminal)	frequency settings to A11 ±12: External fault input ±13: Fault reset ±43: Pump #1	0		



Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F4-10	Functions of Digital Input Terminal X11 (Extension Terminal)	±14: Clockwise jog disabled/Motor Option 1 ±15: Anticlockwise jog ±16: Emergency shutdown #2 ±17: Inverter operation disabled/Motor Option 2	0		
F4-11	Functions of FWD Terminal	±18: Free shutdown disabled ±19: UP/DOWN: UP ±20: UP/DOWN: DOWN ±21: UP/DOWN CLEAR ±22: Check of Contactor 1K1 ±23: Check of Contactor 1K2 ±24: Check of Contactor 2K1 ±25: Check of Contactor 2K2 ±26: Check of Contactor 3K1 ±27: Check of Contactor 3K2 ±28: Check of Contactor 4K1 ±29: Check of Contactor 4K2 ±30: Check of Contactor 5K1	38		
F4-12	Functions of REV Terminal	±45: Pump #3 disabled ±46: Pump#4 disabled ±47: Pump #5 disabled ±48: Small sleeping pump disabled ±49: Drainage pump disabled ±50: Lower water level limit of Wastewater Pool ±51: Upper water level limit of Wastewater Pool ±52: Signal of upper water level limit ±53: Signal of lower water level limit ±54: Signal of firefighting system in operation ±55: Priority pump startup option 1 ±56: Priority pump startup option 2 ±57: Priority pump tartup option 3 NOTE: A negative value indicates an effective high level	39		
F4-13	Terminal Working Mode	0: Single-wire mode (startup/shutdown) 1: Two-Wire Mode 1 (anticlockwise) 2: Two-Wire Mode 2 (startup/shutdown and direction) 3: Two-Wire Mode 3 (startup/shutdown) 4: Three-Wire Mode 1 (clockwise/anticlockwise and shutdown) 5: Three-Wire Mode 2 (operation, direction and shutdown)	1	×	139
F4-14	Debouncing Time of Digital Input Terminal	0—2,000ms	10ms	○	142
F4-15	UP/DOWN Adjustment	0: Terminal level mode 1: Terminal pulse mode 2: Control panel level mode 3: Control panel pulse mode	0	○	142
F4-16	UP/DOWN Rate/Step Length	0.01—100.00; unit: %/s or %	1.00	○	142
F4-17	UP/DOWN Memory Options	0: Storage on poweroff 1: Reset on poweroff 2: Reset on shutdown or poweoff	0	○	142
F4-18	UP/DOWN Upper Limit	0.0—100.0%	100.0%	○	142
F4-19	UP/DOWN Lower Limit	-100.0—0.0%	0.0%	○	143

Para meter	Name	Setting Range and Description	Factory settings	Mod ificat ion	Page
F4-20 —F4- 26	Multi-Band Frequency (1—7)	0.00—650.00Hz The factory settings of Multi-Band Frequency 1 through to Multi-Band Frequency 7 are their respective Multi-Band Frequency Numbers. Example: The factory setting of Multi-Band Frequency 3 is 3.00Hz	n.00Hz (n=1—7)	○	133

多段频率对应参数表:

Frequency Bands and Corresponding Parameters

n	1	2	3	4	5	6	7
多段频率n	F4-20	F4-21	F4-22	F4-23	F4-24	F4-25	F4-26

n	1	2	3	4	5	6	7
Frequency Band n	F4-20	F4-21	F4-22	F4-23	F4-24	F4-25	F4-26

## F5 数字输出和继电器输出设置

### F5: Settings of Digital Output and Relay Output

参数	名称	设定范围及说明	出厂值	更改	页码
F5-00	Y1数字输出端子功能	0: 变频器运行准备就绪 ±1: 变频器运行中	1	×	145
F5-01	Y2/PFO数字输出端子 功能/脉冲频率输出	±2: 频率到达 ±3: 监控检测1输出	2		
F5-02	T1继电器输出功能	±4: 监控检测2输出 ±5: 监控检测3输出	6		145
F5-03	T2继电器输出功能	±6: 故障输出 ±7: 电机负载过重	24		145
F5-04	T3继电器输出功能	±8: 电机过载 ±9: 欠压封锁	25		145
F5-05	T4继电器输出功能	±10: 外部故障停机 ±11: 故障自复位过程中	26		145
F5-06	T5继电器输出功能	±12: 瞬时停电再上电动 作中 ±13: 报警输出	27		145
F5-07	T6/Y3输出功能 (扩展输出)	±14: 反转运行中 ±15: 停机过程中 ±16: 运行禁止状态	28		145
F5-08	T7/Y4输出功能 (扩展输出)	±17: 操作面板控制中 ±18: 指定时间输出 ±19: 频率上限限制中	29		145
F5-09	T8/Y5输出功能 (扩展输出)	±20: 频率下限限制中 ±21: 发电运行中	30	145	

参数	名称	设定范围及说明		出厂值	更改	页码
F5-10	T9/Y6输出功能 (扩展输出)	±22: 上位机数字量1 ±23: 上位机数字量2	±54: 排污泵控制 ±55: 1#泵注水阀控制	31		145
F5-11	T10/Y7输出功能 (扩展输出)	±24: 1#电机变频运行 ±25: 1#电机工频运行 ±26: 2#电机变频运行	±56: 1#泵排气管阀控制 ±57: 2#泵注水阀控制 ±58: 2#泵排气管阀控制	32		145
F5-12	T11/Y8输出功能 (扩展输出)	±27: 2#电机工频运行 ±28: 3#电机变频运行 ±29: 3#电机工频运行 ±30: 4#电机变频运行	±59: 消防巡检运行中 ±60: AI1 > AI3 注: 负表示信号有效时, 继电器断开	33		145
F5-13	频率到达检出宽度	0.00~650.00Hz		2.50Hz	○	151
F5-14	监控检测1、2、3选择	百位: 监控检测3 十位: 监控检测2 个位: 监控检测1	0: 运行频率, 检测方式1 1: 运行频率, 检测方式2 2: PID反馈值, 检测方式1 3: PID反馈值, 检测方式2	000	○	152
F5-15	监控检测1检测值	频率检测: 输入参数为检测频率值 PID反馈值检测: 输入参数为反馈检测值		20.00	○	152
F5-16	监控检测1检测滞后值			5.00	○	152
F5-17	监控检测2检测值			40.00	○	152
F5-18	监控检测2检测滞后值			5.00	○	152
F5-19	监控检测3检测值			60.00	○	152
F5-20	监控检测3检测滞后值			5.00	○	152

Parameter	Name	Setting Range and Description	Factor y setting s	Mod ification	Page
F5-00	Functions of Digital Output Terminal Y1	0: Inverter ready for operation ±31: Motor #4 in line-frequency operation	1	×	145
F5-01	Functions of Digital Output Terminal Y2/PFO/Pulse Frequency Output	±1: Inverter in operation ±2: Frequency attained ±3: Output of Monitor 1 ±4: Output of Monitor 2	2		145
F5-02	Output Functions of Relay T1	±5: Output of Monitor 3 ±6: Fault output ±7: Motor overload ±8: Motor overload	6		145
F5-03	Output Functions of Relay T2	±9: Undervoltage lockout ±10: Shutdown by external	24		145
F5-04	Output Functions of Relay T3	±34: X1 ±35: X2 ±36: X3 ±37: X4 ±38: X5 ±39: X6	25		145
F5-05	Output Functions of Relay T4	fault ±11: Fault self-reset in process ±12: Instantaneous poweroff/poweron process	26		145
F5-06	Output Functions of Relay T5	±40: X7 (Extension terminal) ±41: X8 (Extension terminal) ±42: X9 (Extension terminal) ±43: X10 (Extension terminal) ±44: X11 (Extension terminal) ±45: FWD	27		145
F5-07	Output Functions of T6/Y3 (extension output)	±13: Alarm output ±46: REV	28		145

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page	
F5-08	Output Functions of T7/Y4 (extension output)	±14: Anticlockwise operation in process ±15: Shutdown in process	±47: Pump ready for acceleration ±48: Pump ready for deceleration	29	145	
F5-09	Output Functions of T8/Y5 (extension output)	±16: Operation disabled ±17: Under control of control panel	±49: Startup signal of auxiliary starter ±18: Output at a preset time	30	145	
F5-10	Output Functions of T9/Y6 (Extension output)	±19: Upper frequency limit enabled ±20: Lower frequency limit enabled	±51: Indication for sleeping operation ±52: Water shortage in suction pool	31	145	
F5-11	Output Functions of T10/Y7 (Extension Output)	±21: Power generation in process ±22: PC digital quantity 1 ±23: PC digital quantity 2	±53: Abnormal closing of contactor ±54: drainage pump control ±55: Water injection valve control for Pump #1	32	145	
F5-12	Output Functions of T11/Y8 (Extension output)	±24: Motor #1 in variable-frequency operation ±25: Motor #1 in line frequency operation ±26: Motor #2 in variable frequency operation ±27: Motor #2 in line-frequency operation ±28: Motor #3 in variable frequency operation ±29: Motor #3 in switched off when an effective line-frequency operation signal is emitted ±30: Motor #4 in variable frequency operation	±56: Air vent valve control for Pump #1 ±57: Water injection valve control for Pump #2 ±58: Air vent valve control for Pump #2 ±59: Firefighting patrol in operation ±60: A11>A13 NOTE: A negative value indicates that the relay will be	33	145	
F5-13	Attainment of Frequency to Detection Width	0.00—650.00Hz	2.50Hz	○	151	
F5-14	Monitors 1, 2 and 3 Options	Hundreds digit: Monitor 3 Tens digit: Monitor 2 Units digit: Monitor 1	0: Working frequency; Detection Mode 1 1: Working frequency; Detection Mode 2 2: PID feedback value; Detection Mode 1 3: PID feedback value; Detection Mode 2	000	○	152
F5-15	Detected Value of Monitor 1	Frequency detection: The input parameter is the value of the detected frequency PID feedback value detection: The input parameter is the value of the detected feedback value	20.00	○	152	
F5-16	Detection Lag Value of Monitor 1		5.00	○	152	

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F5-17	Detected Value of Monitor 2		40.00	○	152
F5-18	Detection Lag Value of Monitor 2		5.00	○	152
F5-19	Detected Value of Monitor 3		60.00	○	152
F5-20	Detection Lag Value of Monitor 3		5.00	○	152

参数	名称	设定范围及说明	出厂值	更改	页码
F5-21	Y1端子闭合延时	0.00~650.00s	0.00s	○	153
F5-22	Y1端子分断延时		0.00s		
F5-23	Y2端子闭合延时		0.00s		
F5-24	Y2端子分断延时		0.00s		
F5-25	T1端子闭合延时	0.00~650.00s	0.00s	○	154
F5-26	T1端子分断延时		0.00s		
F5-27	T2端子闭合延时		0.00s		
F5-28	T2端子分断延时		0.00s		
F5-29	T3端子闭合延时		0.00s		
F5-30	T3端子分断延时		0.00s		
F5-31	T4端子闭合延时		0.00s		
F5-32	T4端子分断延时		0.00s		
F5-33	T5端子闭合延时		0.00s		
F5-34	T5端子分断延时		0.00s		

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F5-21	Terminal Y1 Closing Delay	0.00—650.00s	0.00s	○	153
F5-22	Terminal Y1 Opening Delay		0.00s		
F5-23	Terminal Y2 Closing Delay		0.00s		
F5-24	Terminal Y2 Opening Delay		0.00s		
F5-25	Terminal T1 Closing Delay	0.00—650.00s	0.00s	○	154
F5-26	Terminal T1 Opening Delay		0.00s		
F5-27	Terminal T2 Closing Delay		0.00s		
F5-28	Terminal T2 Opening Delay		0.00s		
F5-29	Terminal T3 Closing Delay		0.00s		

F5-30	Terminal T3 Opening Delay		0.00s		
F5-31	Terminal T4 Closing Delay		0.00s		
F5-32	Terminal T4 Opening Delay		0.00s		
F5-33	Terminal T5 Closing Delay		0.00s		
F5-34	Terminal T5 Opening Delay		0.00s		

## F6 模拟量及脉冲频率端子设置

### F6: Terminals Settings for Analog Quantities and Pulse Frequency

参数	名称	设定范围及说明	出厂值	更改	页码
F6-00	AI1最小输入模拟量	-100.00~100.00%	0.00%	○	156
F6-01	AI1最大输入模拟量		100.00%	○	156
F6-02	AI1最小输入模拟量对应的给定值/反馈值	-100.00~100.00% 注：给定频率时以最高频率为参考值 PID给定/反馈时以PID参考标量的百分比	0.00%	○	156
F6-03	AI1最大输入模拟量对应的给定值/反馈值		100.00%	○	156
F6-04	AI1拐点输入模拟量	F6-00“最小模拟量”~F6-01“最大模拟量”	0.00%	○	156
F6-05	AI1拐点偏差	0.00~50.00%	2.00%	○	156
F6-06	AI1拐点对应的给定值/反馈值	-100.00~100.00%	0.00%	○	156
F6-07	AI1掉线门限	-20.00~20.00%	0.00	○	156
F6-08	AI1输入滤波时间	0.000~10.000s	0.100s	○	156
F6-09	AI2最小输入模拟量	-100.00~100.00%	20.00%	○	156
F6-10	AI2最大输入模拟量		100.0%	○	156
F6-11	AI2最小输入模拟量对应的给定值/反馈值	-100.00~100.00% 注：给定频率时以最高频率为参考值 PID给定/反馈时以PID参考标量的百分比	0.00%	○	156
F6-12	AI2最大输入模拟量对应的给定值/反馈值		100.00%	○	156
F6-13	AI2拐点输入模拟量	F6-09“最小模拟量”~F6-10“最大模拟量”	20.00%	○	156
F6-14	AI2拐点偏差	0.00~50.00%	2.00%	○	156

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F6-00	AI1 Min. Input Analog Quantity	-100.00—100.00%	0.00%	○	156
F6-01	AI1 Max. Input Analog Quantity		100.00%	○	156
F6-02	Set Value/Feedback Value Corresponding with AI1 Min. Input Analog Quantity	-100.00—100.00% NOTE: Frequency settings must be based on the	0.00%	○	156

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F6-03	Set Value/Feedback Value Corresponding with AI1 Max. Input Analog Quantity	max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values	100.00%	○	156
F6-04	Input Analog Quantity of AI1 Inflection Point	F6-00 “Min. Analog Quantity”—F6-01“Max. Analog Quantity”	0.00%	○	156
F6-05	Deviation from AI1 Inflection Point	0.00—50.00%	2.00%	○	156
F6-06	Set Value/Feedback Value Corresponding with AI1 Inflection Point	-100.00—100.00%	0.00%	○	156
F6-07	AI1 Offline Threshold	-20.00—20.00%	0.00	○	156
F6-08	AI1 Input Filter Time	0.000—10.000s	0.100s	○	156
F6-09	AI2 Min. Input Analog Quantity	-100.00—100.00%	20.00%	○	156
F6-10	AI2 Max. Input Analog Quantity		100.0%	○	156
F6-11	Set Value/Feedback Value Corresponding with AI2 Min. Input Analog Quantity	-100.00—100.00% NOTE: Frequency settings must be based on the max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values	0.00%	○	156
F6-12	Set Value/Feedback Value Corresponding with AI2 Max. Input Analog Quantity		100.00%	○	156
F6-13	Input Analog Quantity of AI2 Inflection Point	F6-09 “min. analog quantity” — F6-10“maximum analog quantity”	20.00%	○	156
F6-14	Deviation from AI2 Inflection Point	0.00—50.00%	2.00%	○	156

参数	名称	设定范围及说明	出厂值	更改	页码
F6-15	AI2拐点对应的 给定值/反馈值	-100.00~100.00%	0.00%	○	156
F6-16	AI2掉线门限	-20.00~20.00%	0.00	○	156
F6-17	AI2输入滤波时间	0.000~10.000s	0.100s	○	156
F6-18	AI3最小输入模拟量	-100.00~100.00%	0.00%	○	156
F6-19	AI3最大输入模拟量		100.0%	○	156
F6-20	AI3最小输入模拟量对 应的给定值/反馈值	-100.00~100.00%	0.00%	○	157
F6-21	AI3最大输入模拟量对 应的给定值/反馈值	注： 给定频率时以最高频率为参考值 PID给定/反馈时以PID参考标量的百分比	100.00%	○	157
F6-22	AI3拐点输入模拟量	F6-18“最小模拟量”~F6-19“最大模拟量”	0.00%	○	157
F6-23	AI3拐点偏差	0.00~50.00%	2.00%	○	157
F6-24	AI3拐点对应的 给定值/反馈值	-100.00~100.00%	0.00%	○	157
F6-25	AI3掉线门限	-20.00~20.00%	0.00%	○	157
F6-26	AI3输入滤波时间	0.000~10.000s	0.100s	○	157
F6-27	AO1功能选择	0: 运行频率 1: 给定频率 2: 输出电流 3: 输出电压 4: 输出功率 5: PID反馈值 6: PID给定值 7: PID输出值 8: AI1 9: AI2 10: AI3 11: PFI 12: UP/DOWN调节值 13: 直流母线电压 14: 以偏置作为输出（不能为负）	0	○	166
F6-28	AO1类型选择	0: 0~10V或0~20mA 1: 2~10V或4~20mA 2: 以5V或10mA为中心	0	○	166
F6-29	AO1增益	0.0~1000.0%	100.0%	○	166
F6-30	AO1偏置	-100.00~100.00%，以10V或20mA为100%	0.00%	○	167
F6-31	AO2功能选择	同AO1功能选择F6-27	2	○	167
F6-32	AO2类型选择	同AO1类型选择F6-28	0	○	167
F6-33	AO2增益	0.0~1000.0%	100.0%	○	167
F6-34	AO2偏置	-100.00~100.00%，以10V或20mA为100%	0.00%	○	167
F6-35	100%对应的PFI频率	0~50000Hz	10000Hz	○	169
F6-36	0%对应的PFI频率	0~50000Hz	0Hz	○	169
F6-37	PFI滤波时间	0.000~10.000s	0.100s	○	169
F6-38	Y2/PFO功能选择	0~13同AO1功能选择F6-27, 14: 数字输出	14	○	169
F6-39	PFO输出脉冲调制方式	0: 频率调制 1: 占空比调制	0	○	169
F6-40	100%对应的PFO频率	0~50000Hz, 兼做占空比调制频率	10000Hz	○	169
F6-41	0%对应的PFO频率	0~50000Hz	0Hz	○	169
F6-42	100%对应的PFO占空比	0.0~100.0%	100.0%	○	170
F6-43	0%对应的PFO占空比	0.0~100.0%	0.0%	○	170



Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F6-15	Set Value/Feedback Value Corresponding with AI2 Inflection Point	-100.00—100.00%	0.00%	○	156
F6-16	AI2 Offline Threshold	-20.00—20.00%	0.00	○	156
F6-17	AI2 Input Filter Time	0.000—10.000s	0.100s	○	156
F6-18	AI3 Min. Input Analog Quantity	-100.00—100.00%	0.00%	○	156
F6-19	AI3 Max. Input Analog Quantity		100.0%	○	156
F6-20	Set Value/Feedback Value of AI3 Min. Input Analog Quantity	-100.00—100.00% NOTE: Frequency settings must be based on the max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values	0.00%	○	157
F6-21	Set Value/Feedback Value of AI3 Max. Input Analog Quantity		100.00%	○	157
F6-22	Input Analog Quantity of AI3 Inflection Point	F6-18“min. analog quantity”— F6-19“max. analog quantity”	0.00%	○	157
F6-23	Deviation from AI3 Inflection Point	0.00—50.00%	2.00%	○	157
F6-24	Set Value/Feedback Value Corresponding with AI3 Inflection Point	-100.00—100.00%	0.00%	○	157
F6-25	AI3 Offline Threshold	-20.00—20.00%	0.00%	○	157
F6-26	AI3 Input Filter Time	0.000—10.000s	0.100s	○	157
F6-27	AO1 Function Options	0: Working frequency 1: Set frequency 2: Output current 3: Output voltage 4: Output power 5: PID feedback value 6: PID set value 7:PID output value 8: AI1 9: AI2 10: AI3 11:PFI 12: UP/DOWN adjustment 13: DC busbar voltage 14: Take the offset value as output value (the value must not be negative)	0	○	166
F6-28	AO1 Type Options	0: 0—10V or 0—20mA 1: 2—10V or 4—20mA 2: 5V or 10mA is taken as the center	0	○	166
F6-29	AO1 Gain	0.0—1000.0%	100.0%	○	166
F6-30	AO1 Offset	-100.00—100.00%; take 10V or 20mA as 100%	0.00%	○	167
F6-31	AO2 Function Options	Same as AO1 function options: F6-27	2	○	167
F6-32	AO2 Type Options	Same as AO1 type options: F6-28	0	○	167
F6-33	AO2 Gain	0.0—1,000.0%	100.0%	○	167
F6-34	AO2 Offset	-100.00—100.00%; take 10V or 20mA as 100%	0.00%	○	167
F6-35	PFI Frequency Corresponding with 100%	0—50,000Hz	10000Hz	○	169
F6-36	PFI Frequency Corresponding with 0%	0—50,000Hz	0Hz	○	169
F6-37	PFI Filter Time	0.000—10.000s	0.100s	○	169

F6-38	Y2/PFO Function Options	0—13; same as AO1 function option F6-27 14: Digital output	14	○	169
F6-39	PFO Output Pulse Modulation Mode	0: Frequency modulation 1: Duty ratio modulation	0	○	169
F6-40	PFO Frequency Corresponding with 100%	0—50,000Hz; also used as the frequency of duty ratio modulation	10000Hz	○	169
F6-41	PFO Frequency Corresponding with 0%	0—50,000Hz	0Hz	○	169
F6-42	PFO Duty Ratio Corresponding with 100%	0.0—100.0%	100.0%	○	170
F6-43	PFO Duty Ratio Corresponding with 0%	0.0—100.0%	0.0%	○	170

## F7 过程PID参数

### F7: PID Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
F7-00	PID控制功能选择	0:不选择过程PID控制 1:选择过程PID控制 2: 选择PID对给定频率修正 3: 选择过程PID控制用于恒压供水	0	×	171
F7-01	给定通道选择	0: F7-04 1: AI1 2: AI2 3: AI3 4: UP/DOWN调节值 5: PFI 6: 通讯给定 7: AI1-AI2 8: AI1+AI2 9: 面板电位器 (仅SB-PU03)	0	×	173
F7-02	反馈通道选择	0: AI1 1: AI2 2: AI3 3: AI1-AI2 4: AI1+AI2 5: $\sqrt{ AI1 }$ 6: $\sqrt{ AI2 }$ 7: $\sqrt{ AI1-AI2 }$ 8: $\sqrt{ AI1 }+\sqrt{ AI2 }$ 9: PFI 10: MAX(AI1, AI3) 11: MIN(AI1, AI3)	0	×	173
F7-03	PID参考标量	0.00~100.00 (传感器量程)	10.00	○	173
F7-04	PID数字给定	—F7-03~F7-03	5.00	○	173
F7-05	比例增益1	0.00~100.00	0.20	○	174
F7-06	积分时间1	0.01~100.00s	20.00s	○	174
F7-07	微分时间1	0.00~10.00s	0.00s	○	174
F7-08	比例增益2	0.00~100.00	0.20	○	174
F7-09	积分时间2	0.01~100.00s	20.00s	○	174
F7-10	微分时间2	0.00~10.00s	0.00s	○	174
F7-11	PID参数过渡方式	0: 数字输入36“PID参数2选择”确定 1: 根据运行频率过渡 2: 根据偏差过渡	0	×	174
F7-12	采样周期	0.001~10.000s	0.010s	○	176
F7-13	偏差极限	0.0~20.0%, 以PID给定值为100%	0.0%	○	176
F7-14	给定量增减时间	0.00~20.00s	0.00s	○	177
F7-15	PID调节特性	0: 正作用 1: 反作用	0	×	177
F7-16	积分调节选择	0: 无积分作用 1: 有积分作用	1	×	178
F7-17	PID上限幅值	F7-18“PID下限幅值”~100.0%	100.0%	○	178

参数	名称	设定范围及说明	出厂值	更改	页码
F7-18	PID下限幅值	-100.0%~F7-17“PID上限幅值”	0.0%	○	178
F7-19	PID微分限幅	0.0~100.0%，对微分量进行上下限幅	5.0%	○	178
F7-20	PID预置	F7-18~F7-17	0.0%	○	178
F7-21	PID预置保持时间	0.0~3600.0s	0.0s	×	178
F7-22	多段PID给定1	-F7-03~F7-03	1.00	○	179
F7-23	多段PID给定2		2.00		
F7-24	多段PID给定3		3.00		
F7-25	多段PID给定4		4.00		
F7-26	多段PID给定5		5.00		
F7-27	多段PID给定6		6.00		
F7-28	多段PID给定7		7.00		

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F7-00	PID Control Function Options	0: PID control is not selected 1: PID control is selected 2: PID is selected for frequency settings modification 3: PID control is selected for constant pressure water supply	0	×	171
F7-01	Channel Setting Options	0: F7-04 1: AI1 2: AI2 3: AI3 4: UP/DOWN adjustment 5: PFI 6: Communication settings 7: AI1-AI2 8: AI1+AI2 9: Panel potentiometer (available only for SB-PU03)	0	×	173
F7-02	Feedback Channel Options	0: AI1 1: AI2 2: AI3 3: AI1-AI2 4: AI1 + AI2 5: $\sqrt{ AI1 }$ 6: $\sqrt{ AI2 }$ 7: $\sqrt{ AI1-AI2 }$ 8: $\sqrt{ AI1 }+\sqrt{ AI2 }$ 9: PFI 10: MAX(AI1, AI3) 11: MIN(AI1, AI3)	0	×	173
F7-03	PID Reference Scalar	0.00—100.00 (Transducer measurement range)	10.00	○	173
F7-04	PID Digital Setting	-F7-03—F7-03	5.00	○	173
F7-05	Proportional Gain 1	0.00—100.00	0.20	○	174
F7-06	Integration Time 1	0.01—100.00s	20.00s	○	174
F7-07	Derivation Time 1	0.00—10.00s	0.00s	○	174
F7-08	Proportional Gain 2	0.00—100.00	0.20	○	174
F7-09	Integration Time 2	0.01—100.00s	20.00s	○	174
F7-10	Derivation Time 2	0.00—10.00s	0.00s	○	174
F7-11	PID Parameter Transition Mode	0: Input 36 for “PID Parameter 2 Options” in a digital mode and confirm 1: Transition according to the Working frequency 2: Transition according to the deviation	0	×	174
F7-12	Sampling Period	0.001—10.000s	0.010s	○	176

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F7-13	Ultimate Deviation	0.0—20.0%; PID settings is taken as 100%	0.0%	○	176
F7-14	Set Value Increase/Decrease Time	0.00—20.00s	0.00s	○	177
F7-15	PID Adjustment Characteristics	0: Positive action                      1: Negative action	0	×	177
F7-16	Integral Control Options	0: No integral action                      1: Integral action	1	×	178
F7-17	PID Upper Amplitude Limit	F7-18“PID Lower Amplitude Limit”—100.0%	100.0%	○	178
F7-18	PID Lower Amplitude Limit	-100.0%—F7-17“PID Upper Amplitude Limit”	0.0%	○	178
F7-19	PID Differential Amplitude Clipping	0.0 — 100.0%; clipping of the upper/lower amplitude limits of differential components	5.0%	○	178
F7-20	PID Preset Value	-F7-18—F7-17	0.0%	○	178
F7-21	PID Preset Value Hold Time	0.0—3,600.0s	0.0s	×	178
F7-22	Multi-PID Setting 1	-F7-03—F7-03	1.00	○	179
F7-23	Multi-PID Setting 2		2.00		
F7-24	Multi-PID Setting 3		3.00		
F7-25	Multi-PID Setting 4		4.00		
F7-26	Multi-PID Setting 5		5.00		
F7-27	Multi-PID Setting 6		6.00		
F7-28	Multi-PID Setting 7		7.00		

## F8 供水专用功能

## F8: Dedicated Water Supply Functions

参数	名称	设定范围及说明	出厂值	更改	页码
F8-00	供水功能模式	0: 不选择供水功能 1: 普通PI调节恒压供水 2: 水位控制 3: 单台泵依次运行, 以水泵容量排序 4: 消防专用供水	0	×	180
F8-01	水泵配置及休眠选择	个位: 变频循环投切泵的数量 1~5 十位: 辅助运行泵的数量0~4 百位: 辅助泵起动方式 0: 直接起动                      1: 通过软起动器起动 千位: 休眠及休眠泵选择 0: 不选择休眠运行                      1: 休眠泵变频运行 2: 休眠泵工频运行                      3: 主泵休眠运行 万位: 排污泵选择 0: 不控制排污泵                      1: 控制排污泵	00001	×	181
F8-02	故障及PID下限选择	个位: PID下限选择 0: 停止运行                      1: 保持运行 十位: 故障动作选择 0: 全部泵停止运行, 处于故障状态 1: 保持工频运行的泵, 故障复位后继续运行 2: 保持工频运行的泵, 故障复位后处于待机状态	00	×	183

参数	名称	设定范围及说明	出厂值	更改	页码
F8-03	清水池、污水池水位信号选择	十位：污水池信号选择 个位：清水池信号选择 0：不检测水位信号      1：模拟信号 AI1 输入 2：模拟信号 AI2 输入      3：模拟信号 AI3 输入 4：数字信号输入	00	○	183
F8-04	清水池水位下限信号	0.0~100.0%	30.0%	○	183
F8-05	清水池水位上限信号		80.0%	○	183
F8-06	清水池缺水信号		50.0%	○	183
F8-07	清水池缺水时压力给定	-F7-03~F7-03	4.00	○	184
F8-08	污水池下限水位信号	0.0~100.0%	30.0%	○	184
F8-09	污水池上限水位信号		80.0%	○	184
F8-10	加泵延时时间	0.0~600.0s	30.0s	○	186
F8-11	减泵延时时间		30.0s	○	186
F8-12	加泵切入频率	0.00~50.00Hz	40.00 Hz	○	187
F8-13	减泵切入频率		45.00 Hz	○	187
F8-14	减泵偏差上限设定	-F7-03~F7-03	0.20	○	187
F8-15	加泵偏差下限设定		-0.20	○	187
F8-16	机械互锁时间	0.05~20.00s	0.50s	○	188
F8-17	辅助起动机启动时间	0.50~60.00s	5.00s	○	188
F8-18	定时轮换时间	0.0~1000.0h (0.0无效)	360.0h	○	189
F8-19	下限频率运行停止时间	0.0~1200.0s (0.0无效)	300.0s	○	189
F8-20	休眠频率	1.00~50.00Hz	40.00 Hz	○	189
F8-21	休眠等待时间	1.0~1800.0s	60.0s	○	189
F8-22	唤醒偏差设定	-F7-03~F7-03	-0.20	○	190
F8-23	唤醒延时时间	0.1~300.0s	30.0s	○	190
F8-24 ~28	1#~5#水泵 最低运行频率	1.00~F0-07“上限频率”	20.00 Hz	○	191
F8-29	休眠小泵最低运行频率		20.00 Hz	○	191
F8-30 ~34	1#~5#泵额定电流	0.5~1200.0A	机型确定	×	192
F8-35	休眠小泵额定电流			×	192
F8-36	试运转频率	1.00~F0-07“上限频率”	25.00 Hz	○	193
F8-37	水泵试运转	111 休眠泵试运转 222 排污泵试运转 331~335 1#~5#变频试运转 441~445 1#~5#工频试运转	000	×	193

参数	名称	设定范围及说明	出厂值	更改	页码
F8-38	水泵试运转计时时间	0.5~3000.0s	20.0s	○	193
F8-39	水泵启动/停止顺序	个位：停止顺序（仅用于辅助泵） 0:先启动先停止 1:先启动后停止 十位：启动顺序(0~5 循环投切泵选择) 0: 由控制端子选择优先启动的水泵 1: 1#泵优先启动 2: 2#泵优先启动 3: 3#泵优先启动 4: 4#泵优先启动 5: 5#泵优先启动 6: 启动停止时间较长的泵	10	×	194
F8-40	消防巡检间隔时间	0.1~720.0h	360.0h	○	195
F8-41	消防巡检运转时间	10.0s~1800.0s	900.0s	○	195
F8-42	注水阀、排气阀控制	十位：2#泵 个位：1#泵 0: 无注水阀和排气阀 1: 控制注水阀	00	○	195
F8-43	注水、排气时间	10.0~360.0s	180.0s	○	195
F8-44 ~48	1#~5#泵禁止	0: 无效 11: 禁止该泵运行	0	○	196
F8-49	休眠小泵禁止		0	○	196
F8-50	排污泵禁止		0	○	196
F8-51	备用泵台数设置	00~22 个位： 循环投切备用泵台数 十位： 辅助泵备用台数	00	○	197

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F8-00	Water Supply Function Modes	0: Water supply function is not selected 1: Common PI-regulated constant-pressure water supply 2: Water level control 3: Pumps are started on by one in the sequence based on water pump capacity 4: Firefighting water supply	0	×	180

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F8-01	Pump Settings and Sleeping Options	Units digit: Number of variable frequency cyclical switchover pumps: 1~5 Tens digit: Number of auxiliary pumps : 0~4 Hundreds digit: Startup mode of auxiliary pump 0: Direct startup                    1: Started by soft starter Thousands digit: Sleeping and sleeping pump options 0: Sleeping operation is not selected    1: The sleeping pump works at a variable frequency 2: The sleeping pump works at a line frequency    3: The main pump is working in sleeping mode Ten thousands digit: Drainage pump options 0: Drainage pump not under control    1: Drainage pump under control	00001	×	181
F8-02	Fault and PID Lower Limit Options	Units digit: PID lower limit options 0: Operation stopped            1: Operation maintained Tens digit: Fault action options 0: All pumps are shut down and in fault status 1: The pump in line frequency operation resumes operation after a fault reset 2: The pump in line frequency operation are on standby after a fault reset	00	×	183
F8-03	Clean Water Pool/Waste Water Pool Level Signal Options	Tens digit: Waste water pool signal options Units digit: Clean water pool signal options: 0: Water level signal is not subject to detection 1: Analog signal AI1 input 2: Analog signal AI2 input    3: Analog signal AI3 input 4: Digital signal input	00	○	183
F8-04	Clean Water Pool Lower Level Limit Signal	0.0~100.0%	30.0%	○	183
F8-05	Clean Water Pool Upper Level Limit Signal		80.0%	○	183
F8-06	Clean Water Pool Water Shortage Signal		50.0%	○	183
F8-07	Pressure Settings for Clean Water Pool at the Time of Water Shortage	-F7-03~F7-03	4.00	○	184
F8-08	Waste Water Pool Lower Level Limit Signal	0.0~100.0%	30.0%	○	184
F8-09	Waste Water Pool Upper Level Limit Signal		80.0%	○	184
F8-10	加泵 Time Delay	0.0~600.0s	30.0s	○	186
F8-11	减泵Time Delay		30.0s	○	186
F8-12	加泵切入频率	0.00~50.00Hz	40.00 Hz	○	187
F8-13	减泵切入频率		45.00 Hz	○	187

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F8-14	减泵 Deviation Upper Limit Settings	-F7-03~F7-03	0.20	○	187
F8-15	加泵 Deviation Lower Limit Settings		-0.20	○	187
F8-16	Mechanical Interlock Time	0.05~20.00s	0.50s	○	188
F8-17	Auxiliary Starter Startup Time	0.50~60.00s	5.00s	○	188
F8-18	Periodic Rotation Time	0.0~1000.0h (0.0 is ineffective)	360.0h	○	189
F8-19	Lower Frequency Limit Operation Shutdown Time	0.0~1200.0s (0.0 is ineffective)	300.0s	○	189
F8-20	Sleeping Frequency	1.00~50.00Hz	40.00 Hz	○	189
F8-21	Sleeping Latency Time	1.0~1800.0s	60.0s	○	189
F8-22	Wakeup Deviation Settings	-F7-03~F7-03	-0.20	○	190
F8-23	Wakeup Time Delay	0.1~300.0s	30.0s	○	190
F8-24~28	Min. Working frequency of Water Pumps #1~#5	1.00~F0-07 <sup>4</sup> “Upper Frequency Limit”	20.00 Hz	○	191
F8-29	Min. Working frequency of Small Sleeping Pump		20.00 Hz	○	191
F8-30~34	Rated Current of Pumps #1~#5	0.5~1200.0A	Depend on inverter model No.	×	192
F8-35	Rated Current of Small Sleeping Pump			×	192
F8-36	Trial Working frequency	1.00~F0-07 <sup>4</sup> “Upper Frequency Limit”	25.00 Hz	○	193
F8-37	Pump Trial Operation	111 Sleeping pump in trial operation 222 Drainage pump in trial operation 331~335 Pumps #1~#5 in trial operation at a variable frequency 441~445 Pumps #1~#5 in trial operation at a line frequency	000	×	193
F8-38	Pump Trial Operation Timekeeping	0.5~3000.0s	20.0s	○	193



Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F8-39	Pump Startup/Shutdown Sequence	Units digit: Shutdown sequence (applicable only to auxiliary pumps) 0: First to be started and first to be shut down 1: First to be started and last to be shut down Tens digit: Startup sequence (0~5 Cyclical Switchover Pump Options) 0: The pump to be first started is selected via the control terminal 1: Pump #1 is the first to start 2: Pump #2 is the first to start 3: Pump #3 is the first to start 4: Pump #4 is the first to start 5: Pump #5 is the first to start 6: Start pumps that have been shut down for a long time	10	×	194
F8-40	Firefighting Patrol Interval	0.1~720.0h	360.0h	○	195
F8-41	Firefighting Patrol Duration	10.0s~1,800.0s	900.0s	○	195
F8-42	Water Injection Valve/Air Vent Valve Control	Tens digit: Pump #2 Units digit: Pump #1 0: Water injection valve/air vent valve inapplicable 1: Control for water injection valve	00	○	195
F8-43	Water Injection/Air Vent Duration	10.0~360.0s	180.0s	○	195
F8-44~48	Pumps #1~#5 Disabled	0: Ineffective 11: Pump operation disabled	0	○	196
F8-49	Small Sleeping Pump Disabled		0	○	196
F8-50	Drainage Valve Disabled		0	○	196
F8-51	Standby Pump Number Settings	00~22 Units digit: Number of cyclical switchover pumps on standby Tens digit: Number of auxiliary pumps on standby	00	○	197

## F9 时间管理(仅适用于LCD操作面板)

## F9: Time Management (Applicable to LCD Control Panel Only)

参数	名称	设定范围及说明	出厂值	更改	页码	
F9-00	T1时刻时间设定	0~23点, 0~59分 (T1≤T2≤T3≤T4≤T5≤T6≤T7≤T8)	0.00	○	198	
F9-01	T2时刻时间设定		3.00	○	198	
F9-02	T3时刻时间设定		6.00	○	198	
F9-03	T4时刻时间设定		9.00	○	198	
F9-04	T5时刻时间设定		12.00	○	198	
F9-05	T6时刻时间设定		15.00	○	198	
F9-06	T7时刻时间设定		18.00	○	198	
F9-07	T8时刻时间设定		21.00	○	198	
F9-08	T1时刻动作选择	0: 无动作 ±1: 控制Y1数字输出 ±2: 控制Y2数字输出 ±3: 控制T1继电器输出 ±4: 控制T2继电器输出 ±5: 控制T3继电器输出 ±6: 控制T4继电器输出 ±7: 控制T5继电器输出 ±8: 虚拟数字输入1 ±9: 虚拟数字输入2 ±10: 虚拟数字输入3 ±11: 虚拟数字输入4	0	×	198	
F9-09	T2时刻动作选择		0	×	198	
F9-10	T3时刻动作选择		0	×	198	
F9-11	T4时刻动作选择		0	×	198	
F9-12	T5时刻动作选择		0	×	198	
F9-13	T6时刻动作选择		0	×	198	
F9-14	T7时刻动作选择		0	×	198	
F9-15	T8时刻动作选择		0	×	198	
F9-16	虚拟数字输入1功能		0~54与X输入端子定义相同	0	×	198
F9-17	虚拟数字输入2功能			0	×	198
F9-18	虚拟数字输入3功能			0	×	198
F9-19	虚拟数字输入4功能	0		×	198	

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
F9-00	Time Settings at Point T1	Hour: 0~23; minute: 0~59 (T1≤T2≤T3≤T4≤T5≤T6≤T7≤T8)	0.00	○	198
F9-01	Time Settings at Point T2		3.00	○	198
F9-02	Time Settings at Point T3		6.00	○	198
F9-03	Time Settings at Point T4		9.00	○	198
F9-04	Time Settings at Point T5		12.00	○	198
F9-05	Time Settings at Point T6		15.00	○	198
F9-06	Time Settings at Point T7		18.00	○	198
F9-07	Time Settings at Point T8		21.00	○	198

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page	
F9-08	Action Options at Point T1	0: No action ±1: Control for Y1 Digital Output ±2: Control for Y2 Digital Output ±3: Control for T1 Relay Output ±4: Control for T2 Relay Output ±5: Control for T3 Relay Output ±6: Control for T4 Relay Output ±7: Control for T5 Relay Output ±8: Virtual Digital Input 1 ±9: Virtual Digital Input 2 ±10: Virtual Digital Input 3 ±11: Virtual Digital Input 4	0	×	198	
F9-09	Action Options at Point of Time T2		0	×	198	
F9-10	Action Options at Point T3		0	×	198	
F9-11	Action Options at Point T4		0	×	198	
F9-12	Action Options at Point T5		0	×	198	
F9-13	Action Options at Point T6		0	×	198	
F9-14	Action Options at Point T7		0	×	198	
F9-15	Action Options at Point T8		0	×	198	
F9-16	Functions of Virtual Digital Input 1		0~54 have the same definitions as Input Terminal X	0	×	198
F9-17	Functions of Virtual Digital Input 2			0	×	198
F9-18	Functions of Virtual Digital Input 3			0	×	198
F9-19	Functions of Virtual Digital Input 4	0		×	198	

## Fb 保护功能及变频器高级设置

### Fb: Protection Functions and Advanced Inverter Settings

参数	名称	设定范围及说明	出厂值	更改	页码
Fb-00	电机散热条件	0: 普通电机 1: 变频电机或带独立风扇	0	○	202
Fb-01	电机过载保护值	50.0~150.0%, 以电机额定电流为100%	100.0%	○	202
Fb-02	电机过载保护动作选择	0: 不动作 1: 报警 2: 故障并自由停机	2	×	202
Fb-03	电机负载过重保护选择	个位: 负载过重检测选择 0: 一直检测 1: 仅恒速运行时检测 十位: 负载过重动作选择 0: 不动作 1: 报警 2: 故障并自由停机	00	×	203
Fb-04	电机负载过重检出水平	20.0~200.0%, 以电机额定电流为100%	130.0%	×	204
Fb-05	电机负载过重检出时间	0.0~30.0s	5.0s	×	204
Fb-06	电机欠载保护	0: 不动作 1: 报警 2: 故障并自由停机	0	×	204
Fb-07	电机欠载保护水平	0.0~100.0%, 以电机额定电流为100%	30.0%	×	204
Fb-08	欠载保护检出时间	0.0~100.0s	1.0s	×	204
Fb-09	模拟输入掉线动作	0: 不动作 1: 报警, 按掉线前10s平均运行频率运行 2: 报警, 按模拟输入掉线强制频率运行 3: 故障, 并自由停机	0	×	205

参数	名称	设定范围及说明	出厂值	更改	页码
Fb-10	模拟输入掉线强制频率	0.00Hz~F0-06“最大频率”	0.00Hz	○	205
Fb-11	其他保护动作选择	个位：变频器输入缺相保护 0：不动作 1：报警 2：故障并自由停机 十位：变频器输出缺相保护 0：不动作 1：报警 2：故障并自由停机 百位：操作面板掉线保护 0：不动作 1：报警 2：故障并自由停机 千位：参数存储失败动作选择 0：报警 1：故障并自由停机	0022	×	206
Fb-12	加速过流失速防止选择	0：无效 1：有效，失速超时报异常停机（Er.Abb） 2：有效，失速无时间限制	1	×	207
Fb-13	加速过流失速点	10.0~130.0%，以变频器额定电流为100%	110.0%	×	207
Fb-14	恒速过流失速防止选择	0：无效 1：有效，失速超时报异常停机（Er.Abb） 2：有效，失速无时间限制	1	×	207
Fb-15	恒速过流失速点	10.0~110.0%，以变频器额定电流为100%	110.0%	×	207
Fb-16	过压失速防止选择	0：无效 1：有效	1	×	207
Fb-17	过压失速点	650~750V	700V	×	207
Fb-18	直流母线欠压动作	0：自由停机，并报欠压故障（Er.dCL） 1：自由停机，限时电源恢复再起 2：自由停机，CPU运行中电源恢复再起 3：减速运行，维持母线电压	0	×	209
Fb-19	直流母线欠压点	300~450V	380V	×	209
Fb-20	瞬时停电允许时间	0.0~30.0s	0.1s	×	209
Fb-21	瞬停减速时间	0.0~200.0s，设为0.0则使用当前的减速时间	0.0s	×	209
Fb-22	故障自动复位次数	0~10，模块保护和外部故障无自复位功能	0	×	211
Fb-23	自动复位间隔时间	1.0~30.0s	5.0s	×	211
Fb-24	自动复位期间故障输出	0：不输出 1：输出	0	×	211
Fb-25	瞬停、自复位、运行中断再起方式	0：按起动方式起动 1：跟踪起动	1	×	211
Fb-26	上电自起动允许	0：禁止 1：允许	1	○	212
Fb-27	制动单元工作点	620~720V	680V	○	212
Fb-28	调制方式	0：自动 1：连续调制	0	○	213
Fb-29	载波频率	15kW及以下：1.1k~12.0 kHz，出厂值4.0kHz 18.5~160 kW：1.1k~8.0 kHz，出厂值2.5kHz 200kW及以上：1.1k~5.0 kHz，出厂值2.0kHz	机型确定	○	213
Fb-30	随机PWM设定	0~30%	0%	○	213
Fb-31	载波频率自动调整选择	0：禁止 1：允许	1	○	213
Fb-32	死区补偿允许	0：禁止 1：允许	1	×	214

参数	名称	设定范围及说明	出厂值	更改	页码
Fb-33	空间矢量角度停机记忆	0: 不记忆                      1: 记忆	0	×	215
Fb-34	过调制使能	0: 禁止                              1: 允许	1	×	215
Fb-35	冷却风扇控制	0: 自动运转                      1: 一直运转	0	○	215
Fb-36	回避频率1	0.00~625.00Hz	0.00Hz	○	216
Fb-37	回避频率1宽度	0.00~20.00Hz	0.00Hz	○	216
Fb-38	回避频率2	0.00~625.00Hz	0.00Hz	○	216
Fb-39	回避频率2宽度	0.00~20.00Hz	0.00Hz	○	216
Fb-40	回避频率3	0.00~625.00Hz	0.00Hz	○	216
Fb-41	回避频率3宽度	0.00~20.00Hz	0.00Hz	○	216
Fb-42	水位传感器异常选择	0: 不动作    1: 报警    2: 故障并自由停机	0	○	217
Fb-43 ~ Fb-60		保留	—	—	—

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
Fb-00	Motor Heat Dissipation Conditions	0: Conventional motor    1: Variable frequency motor or complete with a separate fan	0	○	202
Fb-01	Motor Overload Protection Value	50.0~150.0%; the rated motor current is taken as 100%	100.0%	○	202
Fb-02	Motor Overload Protection Action Options	0: No action    1: Alarm    2: Fault and free shutdown	2	×	202
Fb-03	Motor Overload Protection Options	Units digit: Overload detection options 0: Always on    1: During only constant-speed operation Tens digit: Overload action options 0: No action    1: Alarm    2: Fault and free shutdown	00	×	203
Fb-04	Motor Overload Detection Level	20.0~200.0%: the rated motor current is taken as 100%	130.0%	×	204
Fb-05	Motor Overload Detection Time	0.0~30.0s	5.0s	×	204
Fb-06	Motor Underload Protection	0: No action    1: Alarm    2: Fault and free shutdown	0	×	204
Fb-07	Motor Underload Protection Level	0.0~100.0%: : the rated motor current is taken as 100%	30.0%	×	204
Fb-08	Underload Protection Detection Time	0.0~100.0s	1.0s	×	204
Fb-09	Analog Input Offline Action	0: No action 1: Alarm; operation at the average frequency during the 10s before offline 2: Alarm; operation at the analog input offline forced frequency 3: Fault and free shutdown	0	×	205
Fb-10	Analog Input Offline Forced Frequency	0.00Hz~F0-06“max. frequency”	0.00Hz	○	205

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
Fb-11	Other Protection Action Options	Units digit: Inverter input phase lack protection 0: No action 1: Alarm 2: Fault and free shutdown Tens digit: Inverter output phase lack protection 0: No action 1: Alarm 2: Fault and free shutdown Hundreds digit: Control panel offline protection 0: No action 1: alarm 2: fault and free shutdown Thousands digit: Parameter storage failure action options 0: Alarm 1: Fault and free shutdown	0022	×	206
Fb-12	Acceleration Overcurrent Stall Prevention Options	0: Invalid 1: Valid; Abnormal shutdown will be reported in the event of a stall timeout (Er.Abb) 2: Valid; No time limit is set for stall	1	×	207
Fb-13	Acceleration Overcurrent Stall Point	10.0~130.0%; the rated inverter current is taken as 100%	110.0%	×	207
Fb-14	Constant Speed Overcurrent Stall Prevention Options	0: Invalid 1: Valid; Abnormal shutdown will be reported in the event of a stall timeout (Er.Abb) 2: Valid; No time limit is set for stall	1	×	207
Fb-15	Constant Speed Overcurrent Stall Point	10.0~110.0%; the rated inverter current is taken as 100%	110.0%	×	207
Fb-16	Overvoltage Stall Prevention Options	0: Invalid 1: Valid	1	×	207
Fb-17	Overvoltage Stall Point	650~750V	700V	×	207
Fb-18	DC Busbar Undervoltage Action	0: Free shutdown; an undervoltage fault is reported (Er.dcL) 1: Free shutdown; the time-limited power supply is restored and restarted 2: Free shutdown; the power supply is restored and restarted while the CPU is in operation 3: Decelerated operation; busbar voltage is maintained	0	×	209
Fb-19	DC Busbar Undervoltage Point	300~450V	380V	×	209
Fb-20	Instantaneous Power Failure Time Allowance	0.0~30.0s	0.1s	×	209
Fb-21	Instantaneous Power Failure Deceleration Time	0.0~200.0s; if the value is set as 0.0, the present deceleration time is adopted	0.0s	×	209
Fb-22	Fault Self-Reset Frequency	0~10; module protection and external fault protection are not complete with the self-reset function.	0	×	211
Fb-23	Self-Reset Interval	1.0~30.0s	5.0s	×	211
Fb-24	Fault Output during Self-Reset	0: Output applicable 1: Output inapplicable	0	×	211
Fb-25	Restart Mode of Instantaneous Power Failure, Self-Reset and Operation Suspension	0: Startup in the startup mode 1: Tracking startup	1	×	211
Fb-26	Poweron Self-Restart Enabled	0: Disabled 1: Enabled	1	○	212
Fb-27	Braking Unit Working Point	620~720V	680V	○	212
Fb-28	Modulation Mode	0: Auto modulation	0	○	213

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
		1: Continuous modulation			
Fb-29	Carrier Frequency	15kW and below: 1.1k~12.0kHz; factory settings: 4.0kHz 18.5~160 kW: 1.1k~8.0 kHz; factory settings: 2.5kHz 200kW and above: 1.1k~5.0kHz; factory settings: 2.0kHz	Depend on inverter model No.	○	213
Fb-30	Random PWM Settings	0~30%	0%	○	213
Fb-31	Carrier Frequency Auto Adjustment Options	0: Disabled                      1: Enabled	1	○	213
Fb-32	Deadband Compensation Enabled	0: Disabled                      1: Enabled	1	×	214
Fb-33	Space Vector Angle Shutdown Memory	0; Memory inapplicable      1: Memory	0	×	215
Fb-34	Overmodulation Enablement	0: Disabled                      1: Enabled	1	×	215
Fb-35	Cooling Fan Control	0: Auto operation              1: Uninterrupted operation	0	○	215
Fb-36	Width of Avoidance Frequency 1	0.00~625.00Hz	0.00Hz	○	216
Fb-37	Avoidance Frequency 1	0.00~20.00Hz	0.00Hz	○	216
Fb-38	Avoidance Frequency 2	0.00~625.00Hz	0.00Hz	○	216
Fb-39	Width of Avoidance Frequency 2	0.00~20.00Hz	0.00Hz	○	216
Fb-40	Avoidance Frequency 3	0.00~625.00Hz	0.00Hz	○	216
Fb-41	Width of Avoidance Frequency 3	0.00~20.00Hz	0.00Hz	○	216
Fb-42	Water Level Transducer Abnormality Options	0: No action    1: Alarm    2: Fault and free shutdown	0	○	217
Fb-43 ~ Fb-60		Retained	—	—	—

## FC 键盘操作及显示设置











## FC: Keyboard Operation and Display Settings

参数	名称	设定范围及说明	出厂值	更改	页码
FC-00	显示参数选择	0: 所有 1: 用户参数 2: 不同于出厂值	0	○	218
FC-01	按键功能及自动锁定	<p>个位: 按键自动锁定功能            0: 不锁定 1: 全锁定            2: 除  外全锁定 3: 除  外全锁定            4: 除 、 外全锁定            5: 除 、 外全锁定</p> <p>十位:  功能选择            0: 仅在操作面板运行命令通道时有效            1: 在操作面板、端子、通讯运行命令通道时均有效, 按停机方式停机            2: 在操作面板运行命令通道时按停机方式停机, 非操作面板运行命令通道时自由停机, 报Er.Abb</p> <p>百位:  功能选择 (仅对面板命令通道)            0: 无效 1: 仅在待机状态下有效            2: 待机、运行状态下均有效</p> <p>千位:  功能选择 (仅对面板命令通道)            0: 选择运行功能 1: 选择点动功能</p>	0000	×	218
FC-02	监视参数选择1	-1~50	1	○	219
FC-03	监视参数选择2	-1表示空, 0~50表示FU-00~FU-50 用于选择运行、待机监视状态均显示的监视参数	-1	○	219
FC-04	监视参数选择3		-1	○	219
FC-05	监视参数选择4		-1	○	219
FC-06	监视参数选择5	1~50	-1	○	219
FC-07	监视参数选择6	-1表示空, 0~50表示FU-00~FU-50 用于选择运行、待机监视状态均显示的监视参数	-1	○	219
FC-08	监视参数选择7		-1	○	219
FC-09	运行监视参数1		0	○	219
FC-10	运行监视参数2	-1~50	2	○	219
FC-11	运行监视参数3	-1表示空, 0~50表示FU-00~FU-50 用于选择仅在运行监视状态显示的监视参数	4	○	219
FC-12	运行监视参数4		-1	○	219
FC-13	转速显示系数	0.001~10.000	1.000	○	221
FC-14	线速度系数	0.01~100.00	0.01	○	221



参数	名称	设定范围及说明	出厂值	更改	页码
FC-15	PID给定值、反馈值单位 (LCD显示面板有效)	0: Hz 1: A 2: V 3: % 4: kW 5: s 6: rpm 7: mps 8: m 9: mA 10: mV 11: Pa 12: kPa 13: °C 14: kg/cm <sup>2</sup> 15: mmH <sub>2</sub> O 16: MPa	14	○	221
FC-16 ~ FC-45	用户参数1 ~ 用户参数30	-00.01~FU.50, 厂家参数Fn除外 -00.01为空, 其他为参数号, 例如F0.01表示 F0-01	-00.01	○	错误! 未定义书签。
FC-46	用户参数31	固定为FC-00“显示参数选择”	FC.00	△	103
FC-47	用户参数32	固定为F0-10“参数写入保护”	F0.10	△	103

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
FC-00	Display Parameter Options	0: All parameters 1: User parameters 2: Those different from factory settings	0	○	218

Parameter	Name	Setting Range and Description	Factory settings	Modification	Page
FC-01	Key Functions and Auto Lock	<p>Units digit: Auto key lock</p> <p>0: Unlocked                      1: All locked</p> <p>2: All locked except  3: All locked except  </p> <p>4: All locked except  and </p> <p>5: All locked except  and </p> <p>Tens digit: Function options for :</p> <p>0: Effective only when the command execution channel is the control panel</p> <p>1: Effective when the command execution channel is the control panel, terminal or communication port; the system is shut down in the shutdown mode</p> <p>2: When the control panel is the command execution channel, the system can be shut down in the shutdown mode; If a free shutdown is executed when the command execution channel is not the control panel, Er.Abb will be reported</p> <p>Hundreds digit: Function options for  (applicable only to panel command channels):</p> <p>0: Ineffective                      1: Only effective in standby mode</p> <p>2: Effective in both standby mode and operation mode</p> <p>Thousands digit: Function options for  (applicable only to panel command channels)</p> <p>0: Operation</p> <p>1: Jog</p>	0000	×	218
FC-02	Monitoring Parameter Option 1	-1~50	1	○	219
FC-03	Monitoring Parameter 2	-1 means void; 0~50 mean FU-00~FU-50 which are used to select monitoring parameters displayed in both operation monitoring mode and standby monitoring mode	-1	○	219
FC-04	Monitoring Parameter 3		-1	○	219
FC-05	Monitoring Parameter 4	1~50	-1	○	219
FC-06	Monitoring Parameter 5	-1 means void; 0~50 mean FU-00~FU-50 which are used to select monitoring parameters displayed in both operation monitoring mode and standby monitoring mode	-1	○	219
FC-07	Monitoring Parameter 6		-1	○	219
FC-08	Monitoring Parameter 7		-1	○	219
FC-09	Operation Monitoring Parameter 1	-1~50	0	○	219
FC-10	Operation Monitoring Parameter 2	-1 means void; 0~50 mean FU-00~FU-50 which are used to select monitoring parameters displayed in operation monitoring mode	2	○	219
FC-11	Operation Monitoring Parameter 3		4	○	219

Para meter	Name	Setting Range and Description	Factory settings	Mod ific ation	Page
FC-12	Operation Monitoring Parameter 4		—1	○	219
FC-13	Rotation Speed Display Coefficient	0.001~10.000	1.000	○	221
FC-14	Linear Velocity Coefficient	0.01~100.00	0.01	○	221
FC-15	Units of PID Settings and Feedback Values (Applicable to LCD Panel)	0: Hz 1: A 2: V 3: % 4: kW 5: s 6: rpm 7: mps 8: m 9: mA 10: mV 11: Pa 12: kPa 13: °C 14: kg/cm <sup>2</sup> 15: mmH <sub>2</sub> O 16: MPa	14	○	221
FC-16 ~ FC-45	User Parameter 1 ~ User Parameter 30	-00.01—FU.50 (except Factory Settings Fn) -00.01 is void and the other are parameter numbers; for example, F0.01 means F0-01	-00.01	○	错误! 未定 义书 签。
FC-46	User Parameter 31	Fixed as FC-00 “Display Parameter Options”	FC.00	△	103
FC-47	User Parameter 32	Fixed as F0-10 “Parameter Write Protection”	F0.10	△	103

用户参数对应表:

Table of User Parameters

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
用户参数n	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21	FC-22	FC-23	FC-24	FC-25	FC-26	FC-27	FC-28	FC-29	FC-30	FC-31
n	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
用户参数n	FC-32	FC-33	FC-34	FC-35	FC-36	FC-37	FC-38	FC-39	FC-40	FC-41	FC-42	FC-43	FC-44	FC-45	FC-46	FC-47

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
User Parameter n	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21	FC-22	FC-23	FC-24	FC-25	FC-26	FC-27	FC-28	FC-29	FC-30	FC-31
n	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
User Parameter n	FC-32	FC-33	FC-34	FC-35	FC-36	FC-37	FC-38	FC-39	FC-40	FC-41	FC-42	FC-43	FC-44	FC-45	FC-46	FC-47

## FF 通讯参数

### FF: Communcation Parameters

参数	名称	设定范围及说明	出厂值	更改	页码
FF-00	通讯协议选择	0: Modbus 1: USS指令 2: CAN	0	×	222
FF-01	通讯数据格式	0: 8,N,1 1: 8,E,1 2: 8,O,1 3: 8,N,2	0	×	222
FF-02	波特率选择	0:1200bps 1:2400bps 2:4800bps 3:9600bps 4:19200bps 5:38400bps 6:57600bps 7:115200bps 8:250000bps 9:500000bps	3	×	222
FF-03	本机地址	0~247	1	×	222
FF-04	通讯超时检出时间	0.1~600.0s	10.0s	○	222
FF-05	本机应答延时	0~1000ms	5ms	○	222
FF-06	通讯超时动作	0: 不动作 1: 报警 2: 故障并自由停机	0	×	222

参数	名称	设定范围及说明	出厂值	更改	页码
		3: 报警按F0-00运行 4: 报警按F0-07运行 5: 报警按F0-08运行			
FF-07	USS报文PZD字数	0~4	2	×	222
FF-08	通讯设定频率比例	0.001~30.000	1.000	○	222

Parameter	Name	Setting Range and Description	Factory Setting	Modification	Page
FF-00	Communication Protocol Options	0: Modbus 1: USS command 2: CAN	0	×	222
FF-01	Communication Data Format	0: 8,N,1 1: 8,E,1 2: 8,O,1 3: 8,N,2	0	×	222
FF-02	Baud Rate Options	0:1,200bps 1:2,400bps 2:4,800bps 3:9,600bps 4:19,200bps 5:38,400bps 6:57,600bps 7:115,200bps 8:250,000bps 9:500,000bps	3	×	222
FF-03	Local IP Address	0~247	1	×	222
FF-04	Communication Timeout Detection Time	0.1~600.0s	10.0s	○	222
FF-05	Local Response Delay	0~1,000ms	5ms	○	222
FF-06	Communication Timeout Action	0: No action 1: Alarm 2: Fault and free shutdown 3: Alarm; press F0-00 for operation 4: Alarm; press F0-07 to operate at an upper frequency limit 5: Press F0-08 to alarm	0	×	222
FF-07	USS Message PZD Words	0~4	2	×	222
FF-08	Communication Frequency Setting Proportion	0.001~30.000	1.000	○	222

Fn 厂家参数

Fn: Factory Settings

参数	名称	设定范围及说明	出厂值	更改
—	—	—	—	—

Parameter	Name	Setting Range and Description	Factory settings	Modification
—	—	—	—	—

## FP 故障记录

## FP: Fault Logs

参数	名称	内容及说明	页码
FP-00	最近一次故障类型	0.无故障 1. ocb: 起动瞬间过流 2. ocA: 加速运行过流 3. ocd: 减速运行过流 4. ocn: 恒速运行过流 5. ouA: 加速运行过压 6. oud: 减速运行过压 7. oun: 恒速运行过压 8. ouE: 待机时过压 9. dcL: 运行中欠压 10. PLI: 输入缺相 11. PLO: 输出缺相 12. FoP: 功率器件保护 13. oHI: 变频器过热 14. oLI: 变频器过载 15. oLL: 电机过载 16. EEF: 外部故障 17. oLP: 电机负载过重 18. ULd: 变频器欠载 19.cnF: 主回路接触器故障 20. cno: 供水系统接触器故障 21. EEP: 参数存储失败 22. CFE: 通讯异常 23. ccF: 电流检测故障 24. LPo: 水位传感器异常 25. Aco: 模拟输入掉线 26. PLL: 清水池缺水 27. rHo: 热敏电阻开路 28. Abb: 异常停机故障 29.保留 30.保留 31. PnL: 操作面板掉线	237
FP-01	最近一次故障时累计运行时间	最小单位: 1h	237
FP-02	最近一次故障时的运行频率	最小单位: 0.01Hz	237
FP-03	最近一次故障时的给定频率	最小单位: 0.01Hz	237
FP-04	最近一次故障时的输出电流	最小单位: 0.1A	237
FP-05	最近一次故障时的输出电压	最小单位: 0.1V	237
FP-06	最近一次故障时的输出功率	最小单位: 0.1kW	237
FP-07	最近一次故障时的母线电压	最小单位: 0.1V	237
FP-08	最近一次故障时的逆变桥温度	最小单位: 0.1°C	237
FP-09	最近一次故障时水泵状态1	万: 5# 千: 4# 百: 3# 十: 2# 个: 1#	237
FP-10	最近一次故障时水泵状态2	十: 排污泵 个: 休眠泵	237
FP-11	倒数第二次故障类型	内容意义同FP-00	237
FP-12	倒数第二次故障时累计运行时间	最小单位: 1h	237
FP-13	倒数第三次故障类型	内容意义同FP-00	237
FP-14	倒数第三次故障时累计运行时间	最小单位: 1h	237
FP-15	倒数第四次故障类型	内容意义同FP-00	237
FP-16	倒数第四次故障时累计运行时间	最小单位: 1h	237
FP-17	倒数第五次故障类型	内容意义同FP-00	237
FP-18	倒数第五次故障时累计运行时间	最小单位: 1h	237
FP-19	故障时的单次运行时间	最小单位: 0.1h	237
FP-20	故障记录清除	11: 清除本菜单参数, 操作完自动变为00	237

Parameter	Name	Setting Range and Description	Factory settings
FP-00	Type of Last Fault	0. No fault 1. ocb: Instantaneous startup overcurrent 2. ocA: Accelerated operation overcurrent 3. ocd: Decelerated operation overcurrent 4. ocn: Constant speed operation overcurrent 5. ouA: Accelerated operation overvoltage 6. oud: Decelerated operation overvoltage 7. ouN: Constant speed operation overvoltage 8. ouE: Overvoltage on standby 9. dcl: Undervoltage in operation 10. PLI: Input phase lack 11. PLo: Output phase lack 12. FoP: Power device protection 13. oHI: Inverter overheat 14. oLI: Inverter overload 15. oLL: Motor overload 16. EEF: External fault 17. oLP: Motor overload 18. ULd: Inverter underload 19.cnF: Main loop contactor fault 20. cno: Water supply system contactor fault 21. EEP: Parameter storage failure 22. CFE: Communication abnormality 23. ccF: Current detection fault 24. LPO: Water level transducer abnormality 25. Aco: Analog input offline 26. PLL: Clean water pool water shortage 27. rHo: Thermal resistor open-circuit 28. Abb: Abnormal shutdown fault 29. Retained 30. Retained 31. PnL: Control panel offline	237
FP-01	Cumulative Operation Time during Last Fault	Min. unit: 1h	237
FP-02	Working frequency during Last Fault	Min. unit: 0.01Hz	237
FP-03	Frequency Settings during Last Fault	Min. unit: 0.01Hz	237
FP-04	Output Current during Last Fault	Min. unit: 0.1A	237
FP-05	Output Voltage during Last Fault	Min. unit: 0.1V	237
FP-06	Output Power during Last Fault	Min. unit: 0.1kW	237
FP-07	Busbar Voltage during Last Fault	Min. unit: 0.1V	237
FP-08	Inverter Bridge Temperature during Last Fault	Min. unit: 0.1°C	237
FP-09	Pump Status 1 during Last Fault	Ten thousands digit: #5 Thousands digit: #4 Hundreds digit: #3 Tens digit: #2 Units digit: #1	237
FP-10	Pump Status 2 during Last Fault	Tens digit: Drainage pump Units digit: Sleeping pump	237
FP-11	Type of Last but One Fault	The same designation as FP-00	237
FP-12	Cumulative Operation Time during Last but One Fault	Min. unit: 1h	237
FP-13	Type of Last but Two Fault	The same designation as FP-00	237
FP-14	Cumulative Operation Time during Last but Two Fault	Min. unit: 1h	237
FP-15	Type of Last but Three Fault	The same designation as FP-00	237
FP-16	Cumulative Operation Time during Last but Three Time	Min. unit: 1h	237
FP-17	Type of Last but Four Fault	The same designation as FP-00	237
FP-18	Cumulative Operation Time during Last but Four Time	Min. unit: 1h	237
FP-19	Single Operation Time during a Fault	Min. unit: 0.1h	237

<b>Parameter</b>	<b>Name</b>	<b>Setting Range and Description</b>	<b>Factory settings</b>
FP-20	Fault Logs Cleared	11: Parameters in this menu are cleared and the settings automatically change to 00 upon completion.	237





## FU 数据监视

## FU: Data Monitoring

参数	名称	内容及说明	页码
FU-00	运行频率	反映电机转速的频率, 最小单位: 0.01Hz	239
FU-01	给定频率	单位指示闪烁, 最小单位: 0.01Hz	239
FU-02	输出电流	最小单位: 0.1A	239
FU-03	负载电流百分比	以变频器额定电流为100%, 最小单位: 0.1%	239
FU-04	输出电压	最小单位: 0.1V	239
FU-05	运行转速	最小单位: 1r/min	239
FU-06	给定转速	单位指示闪烁, 最小单位: 1r/min	239
FU-07	直流母线电压	最小单位: 0.1V	239
FU-08	输出功率	最小单位: 0.1kW	239
FU-09	运行线速度	最小单位: 1m/s	239
FU-10	给定线速度	单位指示闪烁, 最小单位: 1m/s	240
FU-11	PID反馈值	最小单位0.01	240
FU-12	PID给定值	最小单位0.01	240
FU-13	AI1	最小单位: 0.1%	240
FU-14	AI2	最小单位: 0.1%	240
FU-15	AI3	最小单位: 0.1%	240
FU-16	PF1	最小单位: 0.1%	240
FU-17	UP/DOWN调节值	单位指示闪烁, 最小单位: 0.1%	240
FU-18	水泵状态1	万: 5#泵 千: 4#泵 百: 3#泵 十: 2#泵 个: 1#泵 0: 待机中 1: 变频运行中 2: 工频运行中 3: 故障检修中	240
FU-19	水泵状态2	十: 排污泵 个: 休眠泵 同 FU18 (0~3)	240
FU-20	PID输出值	最小单位: 0.1%	240
FU-21	散热器温度	最小单位: 0.1°C	240
FU-22	输出功率因数	最小单位: 0.01	240
FU-23	电度表千瓦时	0.0~6553.5kWh, 同时按住(▲)、(▼), 本参数和电度计时器同时清零	240
FU-24	电度表计时器	0.00~655.35h, 同时按住(▲)、(▼), 本参数和电度表千瓦时同时清零	240
FU-25	数字输入端子状态1	万: X5 千: X4 百: X3 十: X2 个: X1 0: 断开 1: 接通	240
FU-26	数字输入端子状态2	百: REV 十: FWD 个: X6 0: 断开 1: 接通	240
FU-27	数字输出端子状态	十: Y2 个: Y1 0: 断开 1: 接通	240
FU-28	继电器输出端子状态	万: T5 千: T4 百: T3 十: T2 个: T1 0: 断开 1: 接通	240



参数	名称	内容及说明	页码
FU-29	扩展数字输入端子状态	万: X11 千: X10 百: X9 十: X8 个: X7 0: 断开 1: 接通	240
FU-30	扩展数字输出端子状态	万: T10/Y7 千: T9/Y6 百: T8/Y5 十: T7/Y4 个: T6/Y3 0: 断开 1: 接通	240
FU-31	扩展数字输出端子状态	继电器T11 0: 断开 1: 接通	241
FU-32	通讯出错次数	0~60000	241
FU-33	加减速斜坡后的 给定频率	最小单位: 0.01Hz	241
FU-34	输出频率	变频器输出电压的频率(厂家用), 最小单位: 0.01Hz	241
FU-35 ~ FU-50		保留	241

Parameter	Name	Setting Range and Description	Factory settings
FU-00	Working frequency	Motor rotation frequency; min. unit: 0.01Hz	239
FU-01	Frequency Settings	Unit indicator lamp flashes; min. unit: 0.01Hz	239
FU-02	Output Current	Min. unit: 0.1A	239
FU-03	Load Current Percentage	The rated inverter current is taken as 100%; min. unit: 0.1%	239
FU-04	Output Voltage	Min. unit: 0.1V	239
FU-05	Rotation Speed	Min. unit: 1r/min	239
FU-06	Rotation Speed Settings	Unit indicator lamp flashes; min. unit: 1r/min	239
FU-07	DC Busbar Voltage	Min. unit: 0.1V	239
FU-08	Output Power	Min. unit: 0.1kW	239
FU-09	Working Linear Velocity	Min. unit: 1m/s	239
FU-10	Linear Velocity Settings	Unit indicator lamp flashes; min. unit: 1m/s	240
FU-11	PID Feedback Value	Min. unit: 0.01	240
FU-12	PID Settings	Min. unit: 0.01	240
FU-13	AI1	Min. unit: 0.1%	240
FU-14	AI2	Min. unit: 0.1%	240
FU-15	AI3	Min. unit: 0.1%	240
FU-16	PFI	Min. unit: 0.1%	240
FU-17	UP/DOWN Adjustment	Unit indicator lamp flashes; min. unit: 0.1%	240
FU-18	Pump Status 1	Ten thousands digit: Pump #5    Thousands digit: Pump #4    Hundreds digit: Pump #3    Tens digit: Pump #2    Units digit: Pump #1 0: On standby 1: In variable-frequency operation 2: In line-frequency operation 3: In fault overhaul	240
FU-19	Pump Status 2	Tens digit: Drainage pump    Units digit: Sleeping pump    Same as FU18 (0~3)	240
FU-20	PID Output Value	Min. unit: 0.1%	240
FU-21	Radiator Temperature	Min. unit: 0.1°C	240
FU-22	Output Power Factor	Min. unit: 0.01	240
FU-23	kWh Meter Settings	0.0 ~ 6553.5kWh; hold  and  at one time to reset the parameters and the KWH timer	240
FU-24	KWH Timer	0.00~655.35h; hold  and  at one time to reset the parameters and the KWH timer	240
FU-25	Digital Input Terminal Status 1	Ten thousands digit: X5    Thousands digit: X4    Hundreds digit: X3 Tens digit: X2    Units digit: X1 0: OFF    1: ON	240
FU-26	Digital Input Terminal Status 2	Hundreds digit: REV    Tens digit: FWD    Units digit: X6 0: OFF    1: ON	240
FU-27	Digital Output Terminal Status	Tens digit: Y2    Units digit: Y1 0: OFF    1: ON	240
FU-28	Relay Output Terminal Status	Ten thousands digit: T5    Thousands digit: T4    Hundreds digit: T3 Tens digit: T2    Unit digit: T1 0: OFF    1: ON	240
FU-29	Extension Digital Input Terminal Status	Ten thousands digit: X11    Thousands digit: X10    Hundreds digit: X9 Tens digit: X8    Units digit: X7 0: OFF    1: ON	240

Parameter	Name	Setting Range and Description	Factory settings
FU-30	Extension Digital Output Terminal Status	Ten thousands digit: T10 /Y7    Thousands digit: T9/Y6    Hundreds digit: T8/Y5    Tens digit: T7 /Y4 Units digit: T6/Y3                    0: OFF                    1: ON	240
FU-31	Extension Digital Output Terminal Status	Relay T11    0: OFF                    1: ON	241
FU-32	Communication Error Frequency	0~60,000	241
FU-33	Frequency Settings after Acceleration/Deceleration Ramp	Min. unit: 0.01Hz	241
FU-34	Output frequency	Frequency of inverter output voltage (factory settings); min. unit: 0.01Hz	241
FU-35 ~ FU-50		Retained	241

<b>FC-16</b> ~ <b>FC-45</b>	<b>用户参数1</b> ~ <b>用户参数30</b>	出厂值	-00.01	更改	○
设定范围	-00.01~FU.50, 厂家参数Fn除外, -00.01为空, 其他为参数号, 例如F0.01表示F0-01				
<b>FC-46</b>	<b>用户参数31</b>	出厂值	FC.00	更改	△
<b>FC-47</b>	<b>用户参数32</b>	出厂值	F0.10	更改	△

<b>FC-16</b> ~ <b>FC-45</b>	<b>User Parameter 1</b> ~ <b>User Parameter 30</b>	Factory Setting s	-00.01	Modification	○
Setting Range	-00.01~FU.50; Except Fn (factory settings), -00.01 is void and others are parameter numbers. For example, F0.01 represents F0-01				
<b>FC-46</b>	<b>User Parameter 31</b>	Factory Setting s	FC.00	Modification	△
<b>FC-47</b>	<b>User Parameter 32</b>	Factory Setting s	F0.10	Modification	△

- 📖 用户参数 1~30 用来选择用户常用或关心的参数。FC-00=1 时, 只显示这些参数。该功能特别适合于配套用户使用。
- 📖 User Parameters 1—30 are used to select parameters the user frequently uses or is concerned about. When FC-00=1, only these parameters are displayed. This function is especially suited for 配套用户;
- 📖 用户参数 31、32 固定为“显示参数选择”和“参数写入保护”不可修改。
- 📖 User Parameters 31 and 32 cannot be modified. They respectively indicate “display parameter settings” and “parameter write protection”.
- 📖 设置举例: 在 FC-16 中设定 F0.01 表示用户参数的第一个功能就是 F0-01, 然后将 FC-00 设为 1。这样在监视状态下进入菜单时, 只能看到 F0-01、FC-00 和 F0-10 三个参数。
- 📖 Instance: If F0.01 is set for FC-16, the first function of the user parameter will be F0-01. Then set FC-00 as 1. If the menu is accessed in the monitoring mode, only three parameters are displayed (F0-01, FC-00 and F0-10).



## 6 功能参数详解

## 6. Details about Function Parameters

### 6.1 F0 基本参数

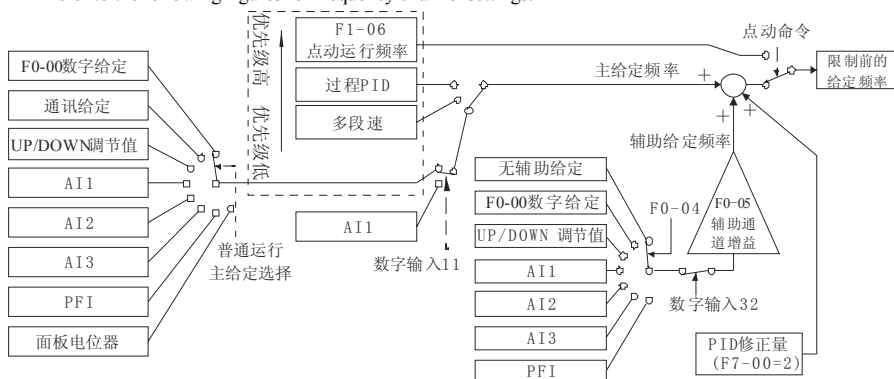
#### 6.1.1 F0: Basic Parameters

<b>F0-00</b>	<b>数字给定频率</b>	出厂值	50.00Hz	更改	○
设定范围	0.00Hz~F0-06“最大频率”				
<b>F0-01</b>	<b>普通运行主给定通道</b>	出厂值	0	更改	○
设定范围	0: F0-00数字给定, 操作面板(▲)、(▼)调节 1: 通讯给定, F0-00作初值 2: UP/DOWN调节值 3: AI1 4: AI2 5: AI3 6: PFI 7: 面板电位器 (仅SB-PU03有效)				

<b>F0-00</b>	<b>Digital Frequency Settings</b>	<b>Factory Settings</b>	<b>50.00Hz</b>	<b>Modification</b>	<b>○</b>
Setting Range	0.00Hz~F0-06“Max. Frequency”				
<b>F0-01</b>	<b>Main Setting Channel for Normal Operation</b>	<b>Factory Settings</b>	<b>0</b>	<b>Modification</b>	<b>○</b>
设定范围	0: F0-00 adopts digital settings via the control panel adjustment (▲ and ▼) 1: Communication settings; F0-00 is used for initial value 2: UP/DOWN adjustment 3: AI1 4: AI2 5: AI3 6: PFI 7: Panel potentiometer (applicable only to SB-PU03)				

给定频率通道如下图:

Refer to the following figures for frequency channel settings:



F0-00 数字给定: F0-00 digital settings    通讯给定: Communication settings    普通运行主给定选择: Main settings option for normal operation    UP/DOWN 调节值: UP/DOWN Adjustment    无辅助给定: Non-auxiliary settings    优先级高 优先级低: High priority/Low priority    点动运行频率: Jog

frequency 过程 PID: PID (Process identification) 多段速: Multi-speed 数字输入 11 Digital Input 11 无辅助给定: Auxilairy settings inapplicable F0-00 数字给定: Digital settings for F0-00 UP/DOWN 调节值: UP/DOWN Adjustment 面板电位器: Panel potentiometer 主给定频率: Main frequency settings 点动命令: Jog command 限制前的给定频率: Frequency settings before adjustment 辅助给定频率: Auxiliary frequency settings 辅助通道增益: Auxiliary channel gain 数字输入 32: Digital Input 32 PID 修正量: PID correction

变频器有 4 种运行方式，优先级由高到低依次为点动、过程 PID、多段速、普通运行。例如：在普通运行时，如果多段速有效，则主给定频率由多段频率确定。

The inverter has four operation modes with the following priority levels (from high to low): jogging, process identification (PID), multi-speed and normal operation. For instance, if the multi-speed mode is effective in a normal operation, the main frequency settings will depend on the multi-band frequency.



- ☐ 普通运行主给定可由 F0-01“普通运行主给定通道”选择，并可用数字输入 11“给定频率切换至 A11”进行强制切换，详见 134 页。
- ☐ The main settings of normal operation may be selected via F0-01 “Main Setting Channel for Normal Operation”. Forced switching may be executed by digital input 11(“Switching of frequency settings to A11”). Refer to Page 53 for details.
- ☐ 辅助给定通道由 F0-04“辅助给定通道选择”确定，数字输入 32“辅助通道禁止”可将其禁止，详见 136 页。
- ☐ Define the auxiliary setting channel via F0-04 “Auxiliary Setting Channel Options”, or disable it via digital input 32 “auxiliary channel disabled”. Refer to Page 53 for details.
- ☐ F7-00“PID 控制功能选择”= 2 可对斜坡前给定频率进行修正。
- ☐ If F7-00 “PID control function options” is set as 2, the pre-ramp frequency settings may be modified.
- ☐ 点动命令是指在面板控制时键盘点动有效 (FC-01 的千位等于 1)，或者端子控制时数字输入 14“正转点动运行”或 15“反转点动运行”有效，详见 135 页。
- ☐ A jogging command means that a keyboard jogging via panel control is effective, or that a digital input 14 “Clockwise Jogging” or 15 “Anticlockwise Jogging” via terminal control is effective.
- ☐ 最终使用的给定频率还要受 F0-07“上限频率”和 F0-08“下限频率”的限制。
- ☐ The final frequency settings will be subject to F0-07 “Upper frequency limit” and F0-08 “Lower frequency limit”.

F0-02	运行命令通道选择		出厂值	0	更改	×
设定范围	0: 操作面板 (EXT灭)	1: 端子 (EXT亮)	2: 通讯控制 (EXT闪烁)			

F0-02	运行命令通道选择		出厂值	0	更改	×
Setting Range	0: Control panel (EXT Extinguished)	1: Terminal (EXT Illuminated)	2:			

- ☐ 操作面板命令通道时  可改变方向，上电默认为正向。  的功能由 FC-01 的百位选择。



- 📖 When the command execution channel is the control panel, press  to change direction. When power supply is on, the default direction is clockwise. The function of  is selected via the hundreds digit of FC-01.
- 📖 数字输入 42“运行命令通道切换到端子或面板”可强制切换运行命令通道，详见 137 页。
- 📖 Forced switching of the channel of command execution channel is enabled via digital input 42 “Switching of command execution channel to terminal or panel”. Refer to Page 54 for details.

F0-03	给定频率保持方式	出厂值	00	更改	○
设定范围	个位: 掉电存储选择	0:   或通讯修改的主给定频率掉电存储到F0-00			
		1:   或通讯修改的主给定频率掉电不存储			
	十位: 停机保持选择	0: 停机时   或通讯修改的主给定频率保持			
		1: 停机时   或通讯修改的主给定频率恢复为F0-00			

F0-03	Frequency Setting Retention Mode	Factory settings	00	Modification	○
Setting Range	Units digit: Poweroff storage option	0: Upon poweroff, the main frequency settings modified via communication or   will be stored to F0-00			
		1: Upon poweroff, the main frequency settings modified via communication or   will not be stored			
	Tens digit: Shutdown retention options	0: Upon shutdown, the main frequency settings modified via communication or   will be retained			
		1: Upon shutdown, the main frequency settings modified via communication or   will be restored to F0-00			

该参数仅对 F0-01“普通运行主给定通道”=0、1 时有效。

This parameter is effective only when F0-01 “Main setting channel for normal operation” is 0 or 1.

F0-04	辅助给定通道选择	出厂值	0	更改	○
设定范围	0: 无 3: AI1 6: PFI	1: F0-00“数字给定频率” 4: AI2	2: UP/DOWN调节值 5: AI3		
F0-05	辅助通道增益	出厂值	1.000	更改	○
设定范围	-1.000~1.000				

F0-04	Auxiliary Setting Channel Options	Factory Settings	0	Modification	○
Setting Range	0: Inapplicable 3: AI1 6: PFI	1: F0-00 “digital frequency settings” 4: AI2	2: UP/DOWN adjustment 5: AI3		
F0-05	Auxiliary Channel Gain	Factory settings	1.000	Modification	○
Setting Range	-1.000~1.000				

☞ 详见 106 页 F0-00、F0-01 的说明。

☞ Refer to Page 43 for descriptions of F0-00 and F0-01.

<b>F0-06</b>	<b>最大频率</b>	出厂值	50.00Hz	更改	×
设定范围	F0-07“上限频率”~650.00Hz				
<b>F0-07</b>	<b>上限频率</b>	出厂值	50.00Hz	更改	×
设定范围	F0-08“下限频率”~F0-06“最大频率”				
<b>F0-08</b>	<b>下限频率</b>	出厂值	0.00Hz	更改	×
设定范围	0.00Hz~F0-07“上限频率”				

<b>F0-06</b>	<b>Max. Frequency</b>	Factory Setting	50.00Hz	Modification	×
Setting Range	F0-07 “Upper Frequency Limit”~650.00Hz				
<b>F0-07</b>	<b>上限频率</b>	Factory Setting	50.00Hz	Modification	×
Setting Range	F0-08“Lower Frequency Limit”~F0-06“Max. Frequency”				
<b>F0-08</b>	<b>下限频率</b>	Factory Setting	0.00Hz	Modification	×
Setting Range	0.00Hz~F0-07 “Upper Frequency Limit”				

☞ F0-06“最大频率”：频率给定为 100%时对应的频率，用于模拟输入、PFI 作频率给定时的标定。


☞ F0-06 “Max. Frequency”：This is the frequency corresponding with a frequency setting of 100%. It is used for calibration for a frequency setting by analog input or PFI.


☞ F0-07“上限频率”、F0-08“下限频率”：限制最终的给定频率。



☞ F0-07 “Upper Frequency Limit”/F0-08 “Lower Frequency Limit”：Limits for the final frequency settings.

<b>F0-09</b>	<b>方向锁定</b>	出厂值	0	更改	○
设定范围	0: 正反向均可                      1: 锁定正向                      2: 锁定反向				

<b>F0-09</b>	<b>Direction Lock</b>	Factory Setting	0	Modification	○
Setting Range	0: Both clockwise and anticlockwise direction are applicable                      1: Clockwise lock                      2: Anticlockwise direction lock				

 建议只需要单向旋转时锁定旋转方向。


 It is recommended that the direction lock be used only for a single-direction rotation.


 若需要通过操作面板的  改变方向，必须将 FC-01 的百位设为 1 或 2。

 If a direction change is required by turning  on the control panel, the hundreds digit of FC-01 must be set as 1 or 2.

F0-10	参数写入保护	出厂值	0	更改	○
设定范围	0: 不保护，全部参数允许被改写（只读参数除外） 1: 除F0-00“数字给定频率”、F7-04“PID数字给定”和本参数外其它参数禁止改写 2: 除本参数外全部禁止改写				


F0-10	Parameter Write Protection	Factory Settings	0	Modification	○
Setting Range	0: Write protection inapplicable; all parameters are subject to rewriting except read-only parameters 1: No parameter is subject to rewriting except F0-00 “Digital Frequency Settings”, F7-04 “PID Digital Settings” and this parameter 2: No parameter is subject to rewriting except this parameter				


 该功能可防止参数被误修改。

 This function prevents modification of parameters by error.

F0-11	参数初始化	出厂值	00	更改	×
设定范围	11: 初始化    22: 初始化，通讯参数除外    注：初始化完成后自动变为00				

F0-11	Parameter Initialization	Factory Settings	00	Modification	×
Setting Range	11: Initialization    22: Initialization applicable to all parameters except communication parameters    NOTE: The parameter automatically changes to 00 upon completion of initialization				

 参数初始化可将参数恢复为出厂时的状态值，故障记录不恢复（故障记录可通过 FP-20 清除）。

 Parameter initialization restores a parameter to factory settings and the fault logs are not restored (Fault logs may be cleared by FP-20).

F0-12	参数复制	出厂值	00	更改	×
设定范围	11: 参数由变频器上传到面板    22: 参数由面板下载到变频器 33: 验证面板和变频器参数的一致性    44: 清除面板中存储的参数 操作完成后，自动变为00				

<b>F0-12</b>	<b>Parameter Copying</b>	Factory Settings	00	Modification	×
Setting Range	11: Parameters are uploaded from the inverter to the panel 33: Conformity of the control panel to the inverter parameters is verified After verification, the parameter automatically changes to 00		22: Parameters are downloaded from the control panel to the inverter 44: Parameters stored in the control panel are cleared		

- 📖 参数复制功能在多台变频器使用相同设置的场合非常有用。
- 📖 Parameter copying is a very useful function on occasions where more than one inverter adopts the same settings.
- 📖 建议最好不要在不同功率等级的变频器之间使用下载功能。
- 📖 It is inadvisable to use the downloading function between inverters of different power ratings.
- 📖 该功能仅对带参数复制功能的操作面板（SB-PU70E、SB-PU200）有效。
- 📖 This function only applies to control panels integrating parameter copying (SB-PU70E and SB-PU200).

<b>F0-13</b>	<b>变频器额定功率</b>	出厂值	机型确定	更改	△
--------------	----------------	-----	------	----	---

<b>F0-13</b>	<b>Rated Inverter Power</b>	Factory Settings	Depend on inverter model No.	Modification	△
--------------	-----------------------------	------------------	------------------------------	--------------	---

- 📖 可查看变频器的额定功率，最小单位：0.01kW。
- 📖 Rated inverter power can be checked (min. value: 0.01kW).



<b>F0-14</b>	<b>软件版本号</b>	出厂值	版本确定	更改	△
--------------	--------------	-----	------	----	---



<b>F0-14</b>	<b>Software Version</b>	Factory Settings	Depend on Version	Modification	△
--------------	-------------------------	------------------	-------------------	--------------	---

- 📖 可查看软件版本，范围 0.00~99.99。
- 📖 Software version is verifiable; range: 0.00~99.99.

<b>F0-15</b>	<b>用户密码设定</b>	出厂值	0000	更改	○
设定范围	0000~9999, 0000表示密码无效				

<b>F0-15</b>	<b>User Password Settings</b>	Factory Setting s	0000	Modification	○
Setting Range	0000~9999; 0000 indicate an ineffective password				

☞ 密码设定后，2分钟内无按键，密码生效；监视状态下，按  +  密码立即生效。

☞ The password will become effective if there is no key operation within 2 minutes after the password is set. In the monitoring mode, press  and  to activate the password immediately.

## 6.2 F1 加减速、起动、停机和点动参数

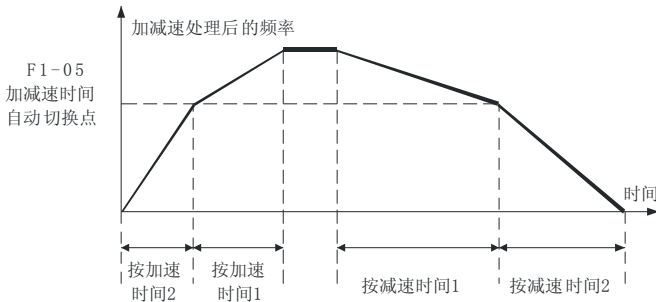
### 6.2. F1: Acceleration/Deceleration, Startup, Shutdown and Jog Parameters

<b>F1-00</b>	<b>加速时间1</b>	出厂值	机型确定	更改	○
<b>F1-01</b>	<b>减速时间1</b>	出厂值	机型确定	更改	○
<b>F1-02</b>	<b>加速时间2</b>	出厂值	机型确定	更改	○
<b>F1-03</b>	<b>减速时间2</b>	出厂值	机型确定	更改	○
设定范围	0.1~3600.0s 加速时间：频率增加50Hz所需的时间 减速时间：频率减小50Hz所需的时间 注：22 kW及以下机型出厂设定6.0s，30 kW及以上机型出厂设定20.0s				
<b>F1-04</b>	<b>紧急停机减速时间</b>	出厂值	10.0s	更改	○
设定范围	0.1~3600.0s				
<b>F1-05</b>	<b>加减速时间自动切换点</b>	出厂值	0.00Hz	更改	×
设定范围	0.00~650.00Hz，该点以下强制为加减速时间2（F1-02、F1-03）				

<b>F1-00</b>	<b>Acceleration Time 1</b>	Factory Setting s	Depend on inverter model No.	Modification	○
<b>F1-01</b>	<b>Deceleration Time 1</b>	Factory Setting s	Depend on inverter model No.	Modification	○
<b>F1-02</b>	<b>Acceleration Time 2</b>	Factory Setting s	Depend on inverter model No.	Modification	○
<b>F1-03</b>	<b>Deceleration Time 2</b>	Factory Setting s	Depend on inverter model No.	Modification	○

Setting Range	0.1~3600.0s Acceleration time: The time required to increase the frequency by 50Hz Deceleration time: The time required to decrease the frequency by 50Hz NOTE: Factory settings are 6.0s for 22kW inverter series and below and 20.0s for 30kW and above				
<b>F1-04</b>	<b>Deceleration Time in an Emergency Shutdown</b>	Factory Settings	10.0s	Modification	○
Setting Range	0.1~3600.0s				
<b>F1-05</b>	<b>Auto Switching Point for Acceleration/Deceleration Time</b>	Factory Settings	0.00Hz	Modification	×
Setting Range	0.00~650.00Hz; the range below this point is forced to be acceleration/deceleration time 2 (F1-02/F1-03)				

- 📖 F1-00~F1-03 提供了 2 套加、减速时间。可通过数字输入 7 选择，详见 134 页。
- 📖 F1-00~F1-03 provide 2 acceleration/deceleration time systems. Options may be made by digital input “7”. Refer to Page 52 for details.
- 📖 F1-05“加减速时间自动切换点”的功能如下图所示。如果不需要自动分段加减速功能，可将该参数设置为零。加减速时间自动切换功能在点动运行、紧急停机、失速防止时无效。
- 📖 For the function of F1-05 “Auto Switching Point for Acceleration/Deceleration Time”, refer to the following figure. If auto segmented acceleration is not required, the parameter may be set as zero. The auto switching function for acceleration/deceleration is ineffective in the case of jog, emergency shutdown and stall prevention.



F1-05 加减速时间自动切换点: F1-05: Auto switching point for acceleration/deceleration time 加减速处理后的频率: Frequency after acceleration/deceleration 按加速时间 2: By Acceleration Time 2 按加速时间 1: By Acceleration Time 1 按减速时间 1: By Deceleration Time 1 按减速时间 2: By Deceleration Time 2 时间: Time

F1-04“紧急停机减速时间”: 当数字输入 16“紧急停机”或通讯给出紧急停机命令时，变频器按“紧急停机减速时间”停机。

F1-04 “Deceleration Time in an Emergency Shutdown”: When Digital Input 16 is inputted or the

communication port sends an emergency shutdown command, the inverter will shut down as indicated by “Deceleration time in an emergency shutdown”.



<b>F1-06</b>	<b>点动运行频率</b>	出厂值	5.00Hz	更改	○
设定范围	0.10~50.00Hz				
<b>F1-07</b>	<b>点动加速时间</b>	出厂值	机型确定	更改	○
<b>F1-08</b>	<b>点动减速时间</b>	出厂值	机型确定	更改	○
设定范围	0.1~60.0s 注：22 kW及以下机型点动加速、减速时间出厂设定6.0s， 30 kW及以上机型点动加速、减速时间出厂设定20.0s				

<b>F1-06</b>	<b>Jog Frequency</b>	Factory Setting s	5.00Hz	Modification	○
Setting Range	0.10~50.00Hz				
<b>F1-07</b>	<b>Jog Acceleration Time</b>	Factory Setting s	Depend on inverter model No.	Modification	○
<b>F1-08</b>	<b>Jog Deceleration Time</b>	Factory Setting s	Depend on inverter model No.	Modification	○
Setting Range	0.1~60.0s NOTE: Factory settings for jog acceleration/deceleration time are 6.0s for 22kW inverter series and below Factory settings for jog acceleration/deceleration time are 20.0s for 30kW inverter series and above				

- 📖 在面板控制时，FC-01 的千位设为 1，则 **①** 为点动功能；在端子控制且待机时，数字输入 14“正转点动运行指令”、15“反转点动运行指令”可实现点动运行，当两个信号同时为有效或同时为无效时，点动运行无效。
- 📖 In the panel control mode, set the thousands digit of FC-01 as 1 and **①** will be used for the jog; in the terminal control, standby mode, jogging will be enabled by Digital Inputs 14 “Clockwise Jog” and 15 “Anticlockwise Jog”. When both the signals are effective or ineffective, jog will not be enabled.
- 📖 点动运行时辅助给定和 PID 频率修正无效。
- 📖 In the jog mode, auxiliary settings and PID frequency modification are ineffective.
- 📖 点动运行的起停方式固定为：按起动频率起动、减速停机方式停机。
- 📖 The start/stop mode of a jog is fixed as startup at the startup frequency and shutdown in the deceleration mode.

<b>F1-09</b>	<b>正反转死区时间</b>	出厂值	0.0s	更改	×
设定范围	0.0~3600.0s				

<b>F1-09</b>	<b>Clockwise/Anticlockwise Rotation Deadband Time</b>	Factory Settings	0.0s	更改	×
Setting Range	0.0~3600.0s				

📖 F1-09“正反反转死区时间”：正反反转交替时的等待时间，用来减少正反反转交替时对机械的冲击。

📖 F1-09“Clockwise/Anticlockwise Rotation Deadband Time”: This means the latency time for switching between clockwise/anticlockwise rotation. The function used to dampen the impact of the switching between clockwise/anticlockwise rotation on the machine.

<b>F1-10</b>	<b>起动延时时间</b>	出厂值	0.0s	更改	○
设定范围	0.0~3600.0s, 当接收到运行命令后, 延时设置的时间后运转, F8-00≠0时无效				

<b>F1-10</b>	Startup Delay Time	Factory Settings	0.0s	Modification	○
Setting Range	0.0~3600.0s; when an operation command is received, the latency settings will be effective in a latter time; when F8-00≠0, this parameter is ineffective				

📖 当变频器选择供水模式时, F1-10“起动延时时间”无效, 即接收到运行命令后立即运行。

📖 When selecting the water supply mode for the inverter, F1-10 “startup delay time” will be ineffective and the operation command will be immediately executed.

<b>F1-11</b>	<b>起动方式</b>	出厂值	0	更改	×
设定范围	0: 从起动频率起动    1: 先直流制动再从起动频率起动    2: 转速跟踪起动				
<b>F1-12</b>	<b>起动频率</b>	出厂值	0.50Hz	更改	○
设定范围	0.00~60.00Hz				
<b>F1-13</b>	<b>起动频率保持时间</b>	出厂值	0.0s	更改	○
设定范围	0.1~60.0s				
<b>F1-14</b>	<b>起动直流制动时间</b>	出厂值	0.0s	更改	○
设定范围	0.0~60.0s				
<b>F1-15</b>	<b>起动直流制动电流</b>	出厂值	0.0%	更改	○
设定范围	0.0~100.0%, 以变频器额定电流为100%				

<b>F1-11</b>	<b>Startup Mode</b>	Factory Settings	0	Modification	×
Setting Range	0: Startup from the startup frequency    1: DC braking comes before startup from the startup frequency    2: Startup in the rotation speed tracking mode				
<b>F1-12</b>	<b>Startup Frequency</b>	Factory Settings	0.50Hz	Modification	○
Setting Range	0.00~60.00Hz				

<b>F1-13</b>	<b>Startup Frequency Maintenance Time</b>	Factory Setting	0.0s	Modification	○
Setting Range	0.1~60.0s				
<b>F1-14</b>	<b>Startup DC Braking Time</b>	Factory Setting	0.0s	Modification	○
Setting Range	0.0~60.0s				
<b>F1-15</b>	<b>Startup DC Braking Current</b>	Factory Setting	0.0%	Modification	○
Setting Range	0.0~100.0%; the rated current of the inverter is taken as 100%				

🔒 变频器的起动方式:

🔒 Inverter Startup Modes:

**F1-11=0“由起动频率起动”**: 起动时先以 F1-12“起动频率”运行, 保持 F1-13“起动频率保持时间”设定的时间后升速, 可以减少起动时的电流冲击。

When F1-11=0, the inverter will start up from the startup frequency. After startup, the inverter will operate at the “startup frequency” (F1-12), which is maintained for a time set by F1-13 “Startup Frequency Maintenance Time”. This is intended to reduce the impact current at startup.

**F1-11=1“先直流制动再从起动频率起动”**: 有时电机在起动之前处于旋转状态(如风机在起动前可能会因顶风而反转), 可以采取起动前直流制动, 先将电机停下来再起, 以防止起动冲击过流。可通过 F1-14“起动直流制动时间”和 F1-15“起动直流制动电流”设置相关参数。

When F1-11=1, the inverter will enforce a DC braking before startup from the startup frequency. In some cases where the motor is running upwind in an anticlockwise direction before startup, a DC braking may be enforced before startup to prevent a startup impact overcurrent. The parameter may be set via F1-14 “Startup DC Braking Time” and F1-15 “Startup DC Braking Current”.

**F1-11=2“转速跟踪起动”**: 在电机起动之前自动辨识电机的转速和方向, 然后从对应的频率开始平滑无冲击起动。对于旋转中的电机不必等完全停下再起, 可缩短起动时间, 减小起动冲击。

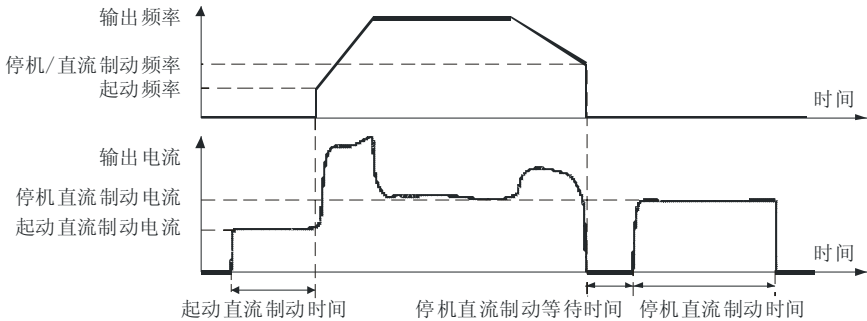
When F1-11=2, the inverter will startup in a rotation speed tracking mode. The inverter will automatically identify the motor rotation speed/direction prior to motor startup and then start up the motor smoothly from the corresponding frequency without producing any impact. It is not necessary to wait until a running motor stops thoroughly before enforcing a restart. You may minimize the startup time and impact.

🔒 在瞬停、自复位、运行中断再起时, 可由 Fb-25“瞬停、自复位、运行中断再起方式”强制为跟踪起动。

🔒 In the case of a restart during an instantaneous stop, self-reset or restart after an operation suspension, tracking startup may be enforced via Fb-25 “Restart Mode of Instantaneous Power Failure, Self-Reset and Operation Suspension”.

☐ 启动和停机直流制动如下图所示：

☐ Refer to the following figures for startup/shutdown DC braking:



输出频率：Output frequency

停机/直流制动频率：Shutdown/DC braking frequency

启动频率：Startup frequency 时间：Time

输出频率：Output frequency

停机直流制动频率：Shutdown DC braking frequency

启动直流制动电流：Startup DC braking current 启动直流制动时间：Startup DC braking time 停机直流制动等待时间：Shutdown DC braking latency time 停机直流制动时间：Shutdown DC braking time 时间：Time



**注意：**对于高速或者大惯量的负载的启动，不宜采取先长时间直流制动再起动的的方式，建议使用跟踪启动方式。

NOTE: It is inadvisable to restart after a prolonged DC braking in the event of a high-speed startup or startup with great-inertia loads. Tracking startup is recommended.



**注意：**在自由停机后立即从启动频率启动会由于电机存在剩磁反电势而导致过流，因此在自由停机后电机未停止转动的情况下，如需立即启动建议采用跟踪启动方式。

NOTE: If the inverter is started immediately after a free shutdown, the remanence of the counter-electromotive force will cause an overcurrent. Therefore, if the motor requires an immediate startup when it is still running after a free shutdown, tracking startup is recommended.

<b>F1-16</b>	<b>停机方式</b>	出厂值	0	更改	○
设定范围	0: 减速停机 1: 自由停机 2: 减速停机+直流制动				
<b>F1-17</b>	<b>停机/直流制动频率</b>	出厂值	0.50Hz	更改	○
设定范围	0.00~60.00Hz				
<b>F1-18</b>	<b>停机直流制动等待时间</b>	出厂值	0.00s	更改	○
设定范围	0.00~10.00s				
<b>F1-19</b>	<b>停机直流制动时间</b>	出厂值	0.0s	更改	○
设定范围	0.0~60.0s				
<b>F1-20</b>	<b>停机直流制动电流</b>	出厂值	0.0%	更改	○
设定范围	0.0~100.0%，以变频器额定电流为100%				

<b>F1-16</b>	Shutdown Mode	Factory Setting	0	Modification	○
--------------	---------------	-----------------	---	--------------	---

Setting Range	0: Shutdown in deceleration mode	1: Free shutdown	2: Deceleration+ DC braking + DC Braking		
<b>F1-17</b>	<b>Shutdown/DC Braking Frequency</b>	Factory Settings	0.50Hz	Modification	○
Setting Range	0.00~60.00Hz				
<b>F1-18</b>	Shutdown DC Braking Latency Time	Factory Settings	0.00s	Modification	○
Setting Range	0.00~10.00s				
<b>F1-19</b>	Shutdown DC Braking Time	Factory Settings	0.0s	Modification	○
Setting Range	0.0~60.0s				
<b>F1-20</b>	Shutdown DC Braking Current	Factory Settings	0.0%	Modification	○
Setting Range	0.0~100.0%; the rated inverter current is taken as 100%				

☞ 变频器停机方式：

☞ Inverter Shutdown Mode:

**F1-16=0“减速停机”**：变频器降低运行频率，到 F1-17“停机/直流制动频率”时进入待机状态。

When F1-16=0, the inverter will shut down in an deceleration mode: The working frequency will become lower until the inverter changes into the standby mode when F1-17 “Shutdown/DC Braking Frequency” is actuated.


**F1-16=1“自由停机”**：变频器封锁输出，电机自由滑行；但当点动运行停机或紧急停机时，仍为减速停机。对于水泵的停机，一般不要使用自由停机，因水泵停机时间较短，突然停止会发生水锤效应。

When **F1-16=1**, the inverter will have a free shutdown. The inverter will lock the output and the motor will slide freely to a shutdown. But if it is a jog shutdown or an emergency shutdown, the deceleration-mode shutdown will still be effective. Generally, a free shutdown is not recommended for water pumps, because the pump has a shorter shutdown time and a sudden shutdown may cause a water hammer effect.


**F1-16=2“减速停机+直流制动”**：变频器收到停机指令后减速，到F1-17“停机/直流制动频率”时封锁输出，经过F1-18“停机直流制动等待时间”后，向电机注入F1-20“停机直流制动电流”设定的直流电流，经F1-19“停机直流制动时间”的设定值后停机，详见119页起动和停机直流制动。可利用数字输入34“停机直流制动”强制保持直流制动状态，详见136页。

When F1-16=2, the “shutdown in deceleration mode + DC Braking” will be effective. Upon receipt of the shutdown command, the inverter will decelerate; when F1-17 “shutdown/DC braking frequency” is actuated, the output will be clocked. After F1-18 “shutdown DC braking latency time”, provide a DC current for the motor as directed by F1-20 “Shutdown DC Braking Current”. After the settings for F1-19 “Shutdown

DC Braking Time” are actuated, the motor will shut down. Please refer to Page 47 for startup/shutdown DC braking. The DC braking status will be maintained by digital input 34 “DC Braking Shutdown”. Refer to Page 53 for details.




 注意：建议只在低速（一般 10Hz 以下）或者小电机情况下使用直流制动方式。

CAUTION: DC braking is recommended only for low-speed operation (10Hz and below) or small-power motors.

 注意：直流制动将负载机械能消耗在电机转子中，长时间或频繁的直流制动容易引起电机过热。

CAUTION: In a DC braking, the mechanical energy of the load is transferred to the rotor. Frequent or longtime DC brakings may cause a motor overheat.

 在任意运行命令通道下（通讯控制除外），按住  双击  均可以令变频器自由停机，但操作面板必须处于未锁定的状态。


 In a command execution channel other than communication control, hold  and double-click  to enforce a free shutdown of the inverter, provided that the control panel is not locked.


## 6.3 F2 V/F控制参数


### 6.3. F2: V/F Control Parameters


F2-00	V/F曲线设定	出厂值	1	更改	×
设定范围	0: 自定义(详见参数F2-14~F2-21) 2: 降转矩V/F曲线1(1.2次幂) 4: 降转矩V/F曲线3(1.7次幂) 6: 降转矩V/F曲线5(3.0次幂)	1: 线性V/F曲线(1.0次幂) 3: 降转矩V/F曲线2(1.5次幂) 5: 降转矩V/F曲线4(2.0次幂)			

F2-00	V/F Curve Settings	Factory Setting	1	Modification	×
Setting Range	0: Custom (Refer to Parameters F2-14~F2-21) 2: V/F Curve 1 (Torque lowering; 1.2-th power) 4: V/F Curve 3(Torque lowering; 1.7-power) 6: V/F Curve 5(Torque lowering; 3.0-th power)	1: Linear V/F Curve (1.0-th power) 3: V/F Curve 2 (Torque lowering; 1.5-th power) 5: V/F Curve 4(Torque lowering; 2.0-th power)			

 V/F 曲线可以设定为自定义的多段折线式、线性和多种降转矩式。

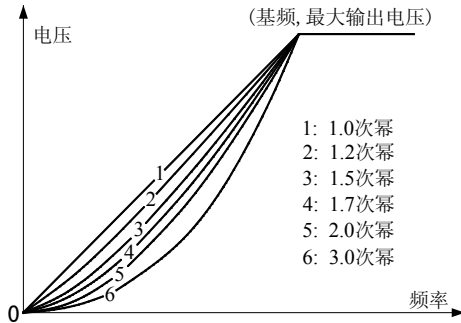
 V/F curves may be set as 自定义的多段折线式、线性和多种降转矩式。

 降转矩的 V/F 曲线可以提高风机泵类降转矩负载在轻载运行时的电机效率。对此类负载还可以使用自动节能运行方式（详见 126 页 F2-11 的说明）提高电机效率。

 V/F curves (torque lowering) can improve motor efficiency of fans and pumps when the torque lowering load is operating at a light load. For these loads, auto energy-saving modes can be applied to improve

motor efficiency (refer to descriptions of F2-11 on Page 49).

- 📖 降转矩 V/F 曲线和自动节能功能在提高效率的同时还可降低噪声。线性及降转矩 V/F 曲线如下图：
- 📖 V/F curves (torque lowering) and auto energy-saving can reduce operation noise while improving efficiency. Refer to the following figures for linear V/F curves and V/F curves (torque lowering):



电压: Voltage (基频, 最大输出电压) (Basic frequency; max. output voltage)

- 1: 1.0 次幂 1: 1.0-th power  
 2: 1.2 次幂 2: 1.2-th power  
 3: 1.5 次幂 3: 1.5-th power  
 4: 1.7 次幂 4: 1.7-th power  
 5: 2.0 次幂 5: 2.0-th power  
 6: 3.0 次幂 6: 3.0-th power

频率: Frequency

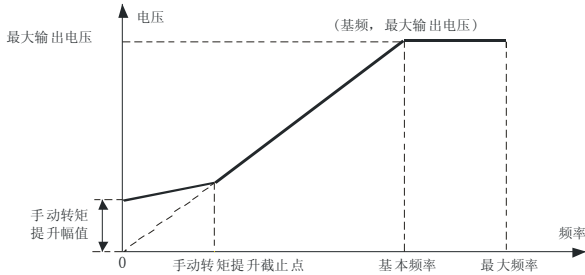
<b>F2-01</b>	<b>转矩提升选择</b>	出厂值	1	更改	×
设定范围	0: 无转矩提升 2: 仅允许自动转矩提升	1: 仅允许手动转矩提升 3: 手动转矩提升+自动转矩提升			
<b>F2-02</b>	<b>手动转矩提升幅值</b>	出厂值	机型确定	更改	○
设定范围	15kW及以下机型: 0.0~15.0%, 以F2-13“最大输出电压”为100%	18.5kW及以上机型: 0.0~10.0%			
<b>F2-03</b>	<b>手动转矩提升截止点</b>	出厂值	10.0%	更改	○
设定范围	0.0~100.0%, 以F2-12“基本频率”为100%				
<b>F2-04</b>	<b>自动转矩提升度</b>	出厂值	100.0%	更改	×
设定范围	0.0~100.0%				

<b>F2-01</b>	<b>Torque Elevation Options</b>	Factory Settings	1	Modification	×
Setting Range	0: Inapplicable 2: Auto torque elevation only	1: Manual torque elevation only 3: Manual torque elevation + auto torque elevation			
<b>F2-02</b>	<b>Amplitude of Manual Torque Elevation</b>	Factory Settings	Depend on inverter model No.	Modification	○

Setting Range	15kW inverters and below: 0.0~15.0%, 10.0% F2-13 “max. output voltage” is taken as 100%		18.5kW inverters and above: 0.0~		
<b>F2-03</b>	<b>Cut-Off Point of Manual Torque Elevation</b>	Factory Settings	10.0%	Modification	○
Setting Range	0.0~100.0%; F2-12 “Basic frequency” is taken as 100%				
<b>F2-04</b>	<b>Auto Torque Elevation Range</b>	Factory Settings	100.0%	Modification	×
Setting Range	0.0~100.0%				

- 📖 手动转矩提升可提高电机的低速转矩和起动转矩。从小向大调整 F2-02“手动转矩提升幅值”，直至满足起动要求，不要设置过大，否则会出现电机过热或过流。
- 📖 Manual torque elevation can improve the low-speed torque and startup torque of the motor. Tune up F2-02 “Amplitude of Manual Torque Elevation” until the startup requirements are met. The amplitude value must not be too great, otherwise there will be motor overheating or overcurrent.
- 📖 输出电压 V 和频率 F 的关系曲线由设定的 V/F 曲线、手动转矩提升、自动转矩提升组成。F2-02“手动转矩提升幅值”、F2-03“手动转矩提升截止点”、F2-12“基本频率”、F2-13“最大输出电压”等的关系如下图：
- 📖 The relation curve of output voltage (V) and frequency (F) consists of a setup V/F curve, manual torque elevation and auto torque elevation. Please refer to the following figure for the relation between F2-03 “Cut-off point of auto torque elevation”, F2-12 “Basic frequency” and F2-13 “max. output voltage”:
- 📖 自动转矩提升可以根据负载电流的大小实时改变电压的值，补偿定子阻抗的电压损失，自动适应各种负载情况，输出合适的电压，实现在重载下有较大的输出转矩和空载时有较小的输出电流。
- 📖 Auto torque elevation can change the voltage real-time according to the load current intensity, compensate the voltage loss of the stator impedance, automatically adapt to different loads and output appropriate voltage. This function can ensure larger output torque under heavy loads and smaller output currents under zero load.
- 📖 跟踪起动、自动转矩提升、滑差补偿用到了部分电机参数，在使用前请确定电机参数与电机名牌参数是否一致。
- 📖 Tracking startup, auto torque elevation and slip compensation involve some motor parameters. Please confirm that these parameters conform to the parameters on the nameplate.





最大输出电压: Max. output voltage    电压 (基频, 最大输出电压): Voltage (Basic frequency; max. output voltage)

手动转矩提升幅值: Amplitude of manual torque elevation    手动转矩提升截止点: Cut-Off Point of Manual Torque Elevation    基本频率: Basic frequency    最大频率: Max. frequency    频率: Frequency

<b>F2-05</b>	<b>滑差补偿增益</b>	出厂值	0.0%	更改	○
设定范围	0.0~300.0%				
<b>F2-06</b>	<b>滑差补偿滤波时间</b>	出厂值	1.0s	更改	×
设定范围	0.1~25.0s				
<b>F2-07</b>	<b>电动滑差补偿限幅</b>	出厂值	200%	更改	×
<b>F2-08</b>	<b>再生滑差补偿限幅</b>	出厂值	200%	更改	×
设定范围	0~250%，以电机额定滑差频率为100%				

<b>F2-05</b>	<b>Slip Compensation Gain</b>	Factory Setting	0.0%	Modification	○
Setting Range	0.0~300.0%				
<b>F2-06</b>	<b>Filter Time of Slip Compensation</b>	Factory Setting	1.0s	Modification	×
Setting Range	0.1~25.0s				
<b>F2-07</b>	<b>Clipping of Electric Slip Compensation</b>	Factory Setting	200%	Modification	×
<b>F2-08</b>	<b>Clipping of Regenerated Slip Compensation</b>	Factory Setting	200%	Modification	×
Setting Range	0~250%; the rated motor slip frequency is taken as 100%				

📖 滑差补偿功能: 如果输出频率不变, 负载变化引起滑差变化, 转速会产生降落, 滑差补偿功能可以根据负载转矩在线调整变频器输出频率, 减小转速随负载的变化, 提高速度控制精度。

📖 Slip Compensation: If the output frequency remains unchanged, the load change may cause a slip change



- AVR 功能即自动电压调整功能。当输入电压或直流母线电压变化时，AVR 功能可以保持输出电压不受影响，使生产工艺和产品质量稳定。
- AVR means auto voltage regulation. This function ensures that the output voltage is stable when the input voltage or the DC busbar voltage oscillates, thus securing the production process and product quality.
- 在输入电压高于额定值时应打开 AVR 功能以使电机不在过高的电压下运行。
- When the input voltage exceeds the rated value, enable AVR to prevent the motor from operating under too high a voltage.
- AVR“仅减速时无效”的方式比“一直有效”的方式可允许更快地减速，但是减速电流稍大。这因为：减速使直流母线电压升高，若 AVR 无效输出电压也会升高，使电机损耗增大，电机的机械能回馈变少，从而减速时间可以设置更短。
- Compared with the “always applicable” mode, the “only inapplicable in the event of a deceleration” mode allows faster deceleration, but requires a larger deceleration current. This is because a deceleration causes the DC busbar voltage to rise. If the dead output voltage of AVR also increases, the loss of the motor also increases and the mechanical energy feedback is reduced. Therefore, the deceleration time is shorter.



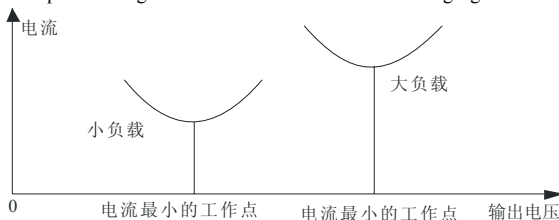
注意：如果负载转动惯量很大，应设为 AVR“一直有效”，以防止减速时电压过高导致电机发热。

CAUTION: If the load has a very large rotary inertia, AVR must be set as “Always Applicable” to prevent a motor overheat caused by overvoltage in deceleration.

<b>F2-11</b>	<b>自动节能运行选择</b>	出厂值	0	更改	○
设定范围	0: 无效	1: 有效			

<b>F2-11</b>	<b>Auto Energy-Saving Options</b>	Factory Setting	0	Modification	○
Setting Range	0: Inapplicable	1: Applicable			

- 自动节能运行：自动调整输出电压，使在电机转速不变的情况下负载电流最小，减小电机损耗。本功能对降转矩特性的风机和泵类负载尤为有效，如下图：
- Auto Energy-Saving Options: The output voltage is automatically adjusted to minimize the load current and motor loss at a constant rotation speed. This function is especially effective for such loads as fans and pumps with torque lowering characteristics. Refer to the following figures:



电流：Current 小负载：Light load

大负载：Heavy load

电流最小的工作点：Min.working point of current

电流最小的工作点：Working point of min.

current 输出电压: Output voltage

📖 自动节能运行只适用于负载平稳的情况。

📖 Auto energy-saving applies to stable loads only.

📖 自动节能运行时需要同时使用自动转矩提升和滑差补偿功能。

📖 Auto energy-saving requires the application of auto torque elevation and slip compensation.

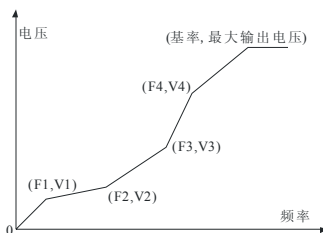
<b>F2-12</b>	<b>基本频率</b>	出厂值	50.00Hz	更改	×
设定范围	1.00~650.00Hz				
<b>F2-13</b>	<b>最大输出电压</b>	出厂值	380V	更改	×
设定范围	150~500V				
<b>F2-14</b>	<b>V/F频率值F4</b>	出厂值	0.00Hz	更改	×
设定范围	F2-16“V/F频率值F3”~F2-12“基本频率”				
<b>F2-15</b>	<b>V/F电压值V4</b>	出厂值	0.0%	更改	×
设定范围	F2-17“V/F电压值V3”~100.0%，以F2-13“最大输出电压”为100%				
<b>F2-16</b>	<b>V/F频率值F3</b>	出厂值	0.00Hz	更改	×
设定范围	F2-21“V/F频率值F2”~F2-14“V/F频率值F4”				
<b>F2-17</b>	<b>V/F电压值V3</b>	出厂值	0.0%	更改	×
设定范围	F2-19“V/F频率值V2”~F2-15“V/F频率值V4”，以F2-13“最大输出电压”为100%				
<b>F2-18</b>	<b>V/F频率值F2</b>	出厂值	0.00Hz	更改	×
设定范围	F2-20“V/F频率值F1”~F2-16“V/F频率值F3”				
<b>F2-19</b>	<b>V/F电压值V2</b>	出厂值	0.0%	更改	×
设定范围	F2-21“V/F频率值V1”~F2-17“V/F频率值V3”，以F2-13“最大输出电压”为100%				
<b>F2-20</b>	<b>V/F频率值F1</b>	出厂值	0.00Hz	更改	×
设定范围	0.00Hz~F2-18“V/F频率值F2”				
<b>F2-21</b>	<b>V/F电压值V1</b>	出厂值	0.0%	更改	×
设定范围	0.0%~F2-19“V/F电压值V2”，以F2-13“最大输出电压”为100%				

<b>F2-12</b>	<b>Basic Frequency</b>	Factory Setting	50.00Hz	Modification	×
Setting Range	1.00~650.00Hz				
<b>F2-13</b>	<b>Max. Output Voltage</b>	Factory Setting	380V	Modification	×
Setting Range	150~500V				
<b>F2-14</b>	<b>V/F Frequency F4</b>	Factory Setting	0.00Hz	Modification	×
Setting Range	F2-16“V/F Frequency F3”~F2-12“Basic Frequency”				

<b>F2-15</b>	<b>V/F Voltage V4</b>	Factory Setting s	0.0%	Modification	×
Setting Range	F2-17“V/F Voltage V3”~100.0%; F2-13“Max. Output Voltage” is taken as100%				
<b>F2-16</b>	<b>V/F Frequency F3</b>	Factory Setting s	0.00Hz	Modification	×
Setting Range	F2-21“V/F Frequency F2”~F2-14“V/F Frequency F4”				
<b>F2-17</b>	<b>V/F Voltage V3</b>	Factory Setting s	0.0%	Modification	×
Setting Range	F2-19“V/F Frequency V2”~F2-15“V/F Frequency V4”; F2-13“Max. Output Voltage” is taken as100%				
<b>F2-18</b>	<b>V/F Frequency F2</b>	出厂值	0.00Hz	更改	×
Setting Range	F2-20“V/F Frequency F1”~F2-16“V/F Frequency F3”				
<b>F2-19</b>	<b>V/F Voltage V2</b>	出厂值	0.0%	更改	×
Setting Range	F2-21“V/F Frequency V1”~F2-17“V/F Frequency V3”; F2-13 “max. output voltage” is taken as 100%				
<b>F2-20</b>	<b>V/F Frequency F1</b>	出厂值	0.00Hz	更改	×
Setting Range	0.00Hz~F2-18“V/F Frequency F2”				
<b>F2-21</b>	<b>V/F Voltage V1</b>	出厂值	0.0%	更改	×
Setting Range	0.0%~F2-19“V/F Voltage V2”; F2-13 “Max. Output Voltage” is taken as 100%				

自定义 V/F 曲线设置如下图:

Refer to the following figures for custom settings of the V/F curve:



电压: Voltage (基率, 最大输出电压) (Basic frequency; max. output voltage) 频率: Frequency

## 6.4 F3 电机参数

### 6.4. F3: Motor Parameters

<b>F3-00</b>	<b>电机额定功率</b>	出厂值	机型确定	更改	×
--------------	---------------	-----	------	----	---

设定范围	0.40~500.00kW				
<b>F3-01</b>	<b>电机极数</b>	出厂值	4	更改	×
设定范围	2~48				
<b>F3-02</b>	<b>电机额定电流</b>	出厂值	机型确定	更改	×
设定范围	0.5~1200.0A				
<b>F3-03</b>	<b>电机额定频率</b>	出厂值	50.00Hz	更改	×
设定范围	1.00~650.00Hz				
<b>F3-04</b>	<b>电机额定转速</b>	出厂值	机型确定	更改	×
设定范围	125~40000r/min				

<b>F3-00</b>	<b>Rated Frequency</b>	Factory Settings	Depend on inverter model No.	Modification	×
Setting Range	0.40~500.00kW				
<b>F3-01</b>	<b>Number of Poles</b>	Factory Settings	4	Modification	×
Setting Range	2~48				
<b>F3-02</b>	<b>Rated Current</b>	Factory Settings	Depend on inverter model No.	Modification	×
Setting Range	0.5~1200.0A				
<b>F3-03</b>	<b>Rated Frequency</b>	Factory Settings	50.00Hz	Modification	×
Setting Range	1.00~650.00Hz				
<b>F3-04</b>	<b>Rated Rotation Speed</b>	Factory Settings	Depend on inverter model No.	Modification	×
Setting Range	125~40000r/min				

- 📖 变频器运行之前务必输入电机铭牌参数 F3-00~F3-04。
- 📖 Prior to the operation of the inverter, input Parameters F3-00~F3-04 inscribed on the nameplate.
- 📖 当 F8-00≠0 (选择供水功能) 时, 请设置 F8-30~35 各水泵额定电流值。
- 📖 When F8-00≠0 (water supply options), set up the rated current for pumps (F8-30~35).

## 6.5 F4 数字输入端子及多段速

## 6.5. F4: Digital Input Terminals and Multi-Speed

<b>F4-00</b>	<b>X1数字输入端子功能</b>	出厂值	1	更改	×
<b>F4-01</b>	<b>X2数字输入端子功能</b>	出厂值	2	更改	×
<b>F4-02</b>	<b>X3数字输入端子功能</b>	出厂值	3	更改	×
<b>F4-03</b>	<b>X4数字输入端子功能</b>	出厂值	12	更改	×
<b>F4-04</b>	<b>X5数字输入端子功能</b>	出厂值	13	更改	×
<b>F4-05</b>	<b>X6/PFI 数字输入端子功能/脉冲频率输入</b>	出厂值	0	更改	×
<b>F4-06</b>	<b>X7数字输入端子功能(扩展端子)</b>	出厂值	0	更改	×
<b>F4-07</b>	<b>X8数字输入端子功能(扩展端子)</b>	出厂值	0	更改	×
<b>F4-08</b>	<b>X9数字输入端子功能(扩展端子)</b>	出厂值	0	更改	×
<b>F4-09</b>	<b>X10数字输入端子功能(扩展端子)</b>	出厂值	0	更改	×
<b>F4-10</b>	<b>X11数字输入端子功能(扩展端子)</b>	出厂值	0	更改	×
<b>F4-11</b>	<b>FWD端子功能</b>	出厂值	38	更改	×
<b>F4-12</b>	<b>REV端子功能</b>	出厂值	39	更改	×
设定范围	见下表数字输入功能定义表				

<b>F4-00</b>	<b>Functions of Digital Input Terminal X1</b>	Factory Setting	1	Modification	×
<b>F4-01</b>	<b>Functions of Digital Input Terminal X2</b>	Factory	2	Modification	×
<b>F4-02</b>	<b>Functions of Digital Input Terminal X3</b>	Factory	3	Modification	×
<b>F4-03</b>	<b>Functions of Digital Input Terminal X4</b>	Factory	12	Modification	×
<b>F4-04</b>	<b>Functions of Digital Input Terminal X5</b>	Factory	13	Modification	×
<b>F4-05</b>	<b>Functions of Digital Input Terminal X6/PFI/Pulse Frequency Input</b>	Factory	0	Modification	×
<b>F4-06</b>	<b>Functions of Digital Input Terminal X7 (Extension Terminal)</b>	Factory	0	Modification	×
<b>F4-07</b>	<b>Functions of Digital Input Terminal X8 (Extension Terminal)</b>	Factory	0	Modification	×
<b>F4-08</b>	<b>Functions of Digital Input Terminal X9 (Extension Terminal)</b>	Factory	0	Modification	×
<b>F4-09</b>	<b>Functions of Digital Input Terminal X10 (Extension Terminal)</b>	Factory	0	Modification	×
<b>F4-10</b>	<b>Functions of Digital Input Terminal X11 (Extension Terminal)</b>	Factory	0	Modification	×
<b>F4-11</b>	<b>Functions of FWD Terminal</b>	Factory	38	Modification	×
<b>F4-12</b>	<b>Functions of REV Terminal</b>	Factory	39	Modification	×
Setting Range	Refer to the following table for definitions of digital input functions				


📖 数字输入功能定义表（任何两个数字输入端子不能同时选择同一数字输入功能）：


📖 Table of Definitions of Digital Input Functions (The same function must not be selected for any two different digital input terminals)

0: 不连接到下列的信号	±20: UP/DOWN减	±40: 模拟给定频率保持
±1: 多段频率选择1	±21: UP/DOWN清除	±41: 加减速禁止
±2: 多段频率选择2	±22: 1K1接触器检测	±42: 运行命令通道切换到端子或面板
±3: 多段频率选择3	±23: 1K2接触器检测	±43: 1#水泵禁止/电机选择1
±4: 清水池上限水位检测	±24: 2K1接触器检测	±44: 2#水泵禁止/电机选择2
±5: 清水池下限水位检测	±25: 2K2接触器检测	±45: 3#水泵禁止
±6: 清水池缺水水位检测	±26: 3K1接触器检测	±46: 4#水泵禁止
±7: 加减速时间2选择	±27: 3K2接触器检测	±47: 5#水泵禁止
±8: 多段PID选择1	±28: 4K1 接触器检测	±48: 休眠小泵禁止
±9: 多段PID选择2	±29: 4K2接触器检测	±49: 排污泵禁止
±10: 多段PID选择3	±30: 5K1接触器检测	±50: 污水池下限水位
±11: 给定频率切换至A11	±31: 5K2接触器检测	±51: 污水池上限水位
±12: 外部故障输入	±32: 辅助给定通道禁止	±52: 水位控制上限信号
±13: 故障复位	±33: PID给定切换至A12	±53: 水位控制下限信号
±14: 正转点动运行	±34: 停机直流制动	±54: 消防运转信号
±15: 反转点动运行	±35: 过程PID禁止	±55: 优先起动车水泵选择1
±16: 紧急停机	±36: PID参数2选择	±56: 优先起动车水泵选择2
±17: 变频器运行禁止	±37: 三线式停机指令	±57: 优先起动车水泵选择3
±18: 自由停机	±38: 内部虚拟FWD端子	
±19: UP/DOWN增	±39: 内部虚拟REV端子	



0: Connection to the following signals is inapplicable	±20: UP/DOWN: Down	±40: Maintenance of Analog Frequency Settings
±1: Multi-band frequency option 1	±21: UP/DOWN: CLEAR	±41: Acceleration/Deceleration disabled
±2: Multi-band frequency option 2	±22: Check of Contactor 1K1	±42: Switching of command execution channel to terminal or panel
±3: Multi-band frequency option 3	±23: Check of Contactor 1K2	±43: Pump #1 disabled/Motor Option 1
±4: Check of upper water level limit of clean water pool	±24: Check of Contactor 2K1	±44: Pump #2 disabled/Motor Option 2
±5: Check of lower water level limit of clean water pool	±25: Check of Contactor 2K2	±45: Pump #3 disabled
±6: Check of water shortage level of clean water pool	±26: Check of Contactor 3K1	±46: Pump #4 disabled
±7: Acceleration/deceleration time option 2	±27: Check of Contactor 3K2	±47: Pump #5 disabled
±8: Multi-PID Option 1	±28: Check of Contactor 4K1	±48: Small sleeping pump disabled
±9: Multi-PID Option 2	±29: Check of Contactor 4K2	±49: Drainage pump disabled
±10: Multi-PID Option 3	±30: Check of Contactor 5K1	±50: Wastewater tank lower water level limit
±11: Switching of frequency settings to AII	±31: Check of Contactor 5K2	±51: Wastewater tank upper water level limit
±12: External fault input	±32: Auxiliary setting channel disabled	±52: Signal of upper water level limit
±13: Fault reset	±33: Switching of PID settings to AI2	±53: Signal of lower water level limit
±14: Clockwise jog	±34: DC-braking shutdown	±54: Signal of firefighting system in operation
±15: Anticlockwise jog	±35: PID (Process identification) disabled	±55: Priority pump startup option 1
±16: Emergency shutdown	±36: PID Parameter Option 2	±56: Priority pump startup option 2
±17: Inverter operation disabled	±37: Three-wire mode shutdown command	±57: Priority pump startup option 3
±18: Free shutdown	±38: Internal virtual FWD terminal	
±19: UP/DOWN: UP	±39: Internal virtual REV terminal	

 负表示该端子输入为高电平或上升沿有效，正表示该端子输入为低电平或下降沿有效。F4-00~F4-12 选择了相同的功能时，参数号大的有效。

 A negative value means that the terminal input is a high level or that the rising edge is effective. A

positive value means that the .terminal input has a low level, or that the falling edge is effective. If the same function is selected via F4-00 through F4-12, the setting with the greater parameter number is effective.

- 📖 SB200 内置 8 个多功能可编程数字输入端子 X1~X6、FWD、REV，还可提供 5 个扩展输入端子。
- 📖 SB200 is inbuilt with 8 multifunctional programmable digital input terminals (X1, X2, X3, X4, X5, X6, FWD and REV). Five other extension input terminals are also provided.
- 📖 除了数字输入端子可以选择数字输入功能定义表中的功能外，通过实时时钟模块构建的虚拟输入端子也可以连接到表中的数字输入功能，详见 F9 一节。
- 📖 Functions in the table of digital input functions may be selected by the digital input terminal. Also, the virtual input terminal, composed of the real-time clock module, can also be linked with the digital input functions in the table. Refer to the description of F9 for details.
- 📖 相关监视参数：FU-25“数字输入端子状态 1”、FU-26“数字输入端子状态 2”。
- 📖 Related Monitoring Parameters: FU-25 (Digital Input Terminal Status 1) and FU-26 (Digital Input Terminal Status 2)
- 📖 数字输入功能详细说明如下：

📖 Refer to the following detailed description of digital input functions:

**0**：除 F4-05 为 0 时 X6/PFI 连接到 PFI 外其它 X 端子为不连接。

**0**: Except when F4-05 = 0, connection of X6/PFI to other X terminals than PFI is inapplicable.

**1~3**：多段频率选择。编码选择多段频率 1~7，如下表，表中“0”为无效，“1”为有效：

**1~3: Multi-Band Frequency Options: For coding, select Multi-Band Frequency 1—7. Refer to the following table, where “0” means effective and “1” means ineffective:**

多段频率选择 3	多段频率间选择 2	多段频率选择 1	选择的多段频率
0	0	0	频率由 F0-01 选择的通道给定
0	0	1	F4-20 多段频率 1
0	1	0	F4-21 多段频率 2
0	1	1	F4-22 多段频率 3
1	0	0	F4-23 多段频率 4
1	0	1	F4-24 多段频率 5
1	1	0	F4-25 多段频率 6
1	1	1	F4-26 多段频率 7

Multi-Band Frequency Option 3	Multi-Band Frequency Option 2	Multi-Band Frequency Option 1	Multi-Band Frequency Selected
0	0	0	The frequency is set by the channel selected via F0-01
0	0	1	F4-20 Multi-Band Frequency 1
0	1	0	F4-21 Multi-Band Frequency 2
0	1	1	F4-22 Multi-Band Frequency 3
1	0	0	F4-23 Multi-Band Frequency 4
1	0	1	F4-24 Multi-Band Frequency 5
1	1	0	F4-25 Multi-Band Frequency 6

1	1	1	F4-26 Multi-Band Frequency 7
---	---	---	------------------------------

**4~6: 清水池水位检测。**用于恒压供水时缺水保护，详细描述见 183 页 F8-03 描述。

4~6: Check of Water Level of Clean Water Pool. Used for water shortage protection in constant-pressure water supply. See the description of F80-3 on Page 72.

**7: 加减速时间 2 选择。**若该信号有效，选择第 2 加减速时间，点动运行和紧急停机时加减速时间选择无效。

7: Acceleration/Deceleration Time 2. If the signal is effective, select Acceleration/Deceleration Time 2. Acceleration/deceleration time for jog and emergency shutdown is ineffective.

**8~10: 多段 PID 选择 1~3。**该 3 个端子功能通过编码选择当前 PID 的给定值。

**8~10: Multi-PID Options 1-3. The three terminals are used to select the present PID settings via coding.**

多段 PID 选择 3	多段 PID 选择 2	多段 PID 选择 1	选择的 PID 给定
0	0	0	由 F7-01“给定通道选择”确定
0	0	1	F7-22“多段 PID 给定 1”
0	1	0	F7-23“多段 PID 给定 2”
0	1	1	F7-24“多段 PID 给定 3”
1	0	0	F7-25“多段 PID 给定 4”
1	0	1	F7-26“多段 PID 给定 5”
1	1	0	F7-27“多段 PID 给定 6”
1	1	1	F7-28“多段 PID 给定 7”

Multi-PID Option 3	Multi-PID Option 2	Multi-PID Option 1	PID Settings Selected
0	0	0	Depend on F7-01 “Channel Setting Options”
0	0	1	F7-22 “Multi-PID Setting 1”
0	1	0	F7-23 “Multi-PID Setting 2”
0	1	1	F7-24 “Multi-PID Setting 3”
1	0	0	F7-25 “Multi-PID Setting 4”
1	0	1	F7-26 “Multi-PID Setting 5”
1	1	0	F7-27 “Multi-PID Setting 6”
1	1	1	F7-28 “Multi-PID Setting 7”

**11: 给定频率切换至 AI1。**当该信号有效时，普通运行频率给定通道将强制切换为 AI1 模拟电压/电流给定。无效后，频率给定通道恢复。

11: Switching of Frequency Settings to AI1: When the signal is effective, the normal working frequency setting channel will be switched to AI1 analog voltage/current setting. After the signal becomes ineffective, the frequency setting channel will be restored.

**12: 外部故障输入。**通过该信号将变频器外围设备的异常或故障信息输入到变频器，使变频器停机，并报外部故障。该故障无法自动复位，必须进行手动复位。可通过设置正负值来确定常闭/常开输

入。外部故障可由数字输出 10“外部故障停机”进行指示，面板显示 *Er.EEF* (Er.EEF)。

- 12: External Fault Input:** This signal helps to input abnormality or fault information of inverter peripherals into the inverter, cause a shutdown and report an external fault. The signal can not be reset automatically. It can only be reset in the manual mode. NOMALLY OFF/ON may be inputted by setting positive/negative values. External faults may be indicated by digital output 10 “External Fault Shutdown” (Panel display: Er.EEF).
- 13: 故障复位。**该信号为有效边沿时对故障进行复位，功能与操作面板  的复位功能一样。
- 13: Fault Reset:** The fault will be reset when the signal is an effective edge. The function is the same as the reset function of  on the control panel.
- 14~15: 正转、反转点动运行。**详见 115 页点动功能的描述。
- 14~15: Clockwise/Anticlockwise Jog: Refer to the description of the function of jog on Page 45.**
- 16: 紧急停机。**若该信号有效，变频器按 F1-04“紧急停机减速时间”停机。
- 16: Emergency Shutdown:** If this signal is effective, press F1-04 “Deceleration Time in an Emergency Shutdown” to shut down.
- 17: 变频器运行禁止。**该信号有效时会禁止变频器运行，若在运行中则变频器自由停机。
- 17: Inverter Operation Disabled:** When this signal is effective, the inverter operation will be disabled. If the inverter is in operation, a free shutdown will be executed.
- 18: 自由停机。**变频器在运行中若该信号为有效，立即封锁输出，电机惯性滑行停机。
- 18: Free Shutdown:** If the signal is effective when the inverter is in operation, the output will be locked immediately and the motor will shutdown in a freewheeling mode.
- 19~21: UP/DOWN 增、减、清除。**详见 143 页 UP/DOWN 的说明。
- 19~21: UP/DOWN: UP, DOWN, CLEAR. Refer to the description of UP/DOWN on Page 56.**
- 22: 1K1 接触器检测，**用于 1#泵变频运行接触器检测。
- 22: Check of Contactor 1K1: Used to check the contactor for Pump #1 variable frequency operation.**
- 23: 1K2 接触器检测，**用于 1#泵工频运行接触器检测。
- 23: Check of Contactor 1K2: Used to check the contactor for Pump #1 line frequency operation.**
- 24: 2K1 接触器检测，**用于 2#泵变频运行接触器检测。
- 24: Check of Contactor 2K1: Used to check the contactor for Pump #2 variable frequency operation.**
- 25: 2K2 接触器检测，**用于 2#泵工频运行接触器检测。
- 25: Check of Contactor 2K2: Used to check the contactor for Pump #2 line frequency operation.**
- 26: 3K1 接触器检测，**用于 3#泵变频运行接触器检测。
- 26: Check of Contactor 3K1: Used to check the contactor for Pump #3 variable frequency operation.**
- 27: 3K2 接触器检测，**用于 3#泵工频运行接触器检测。
- 27: Check of Contactor 3K2: Used to check the contactor for Pump #3 line frequency operation.**
- 28: 4K1 接触器检测，**用于 4#泵变频运行接触器检测。
- 28: Check of Contactor 4K1: Used to check the contactor for Pump #4 variable frequency operation.**

**29: 4K2 接触器检测**, 用于 4#泵工频运行接触器检测。

29: Check of Contactor 4K2: **Used to check** the contactor for Pump #4 line frequency operation.

**30: 5K1 接触器检测**, 用于 5#泵变频运行接触器检测。

30: Check of Contactor 5K1: **Used to check** the contactor for Pump #5 variable frequency operation.

**31: 5K2 接触器检测**, 用于 5#泵工频运行接触器检测。

31: Check of Contactor 5K2: **Used to check** the contactor for Pump #5 line frequency operation.

当用于恒压供水时, 通过连接控制水泵接触器的常开或常闭触点, 检测接触器是否处于指定动作的状态。若检测到接触器的状态与指定的状态不相同, 报供水系统接触器故障 Er.cno。出现供水系统接触器故障时, 供水系统全部停止, 以避免故障扩大, 请即时排除故障。

In the case of a constant-pressure water supply, verify if the contactor is in the indicated operation status by connection to the NORMALLY ON/OFF contacts of the pump control contactor. If the detected status of the contactor is different from the indicated status, a contactor fault of the water supply system will be reported (Er.cno). If there is a contactor fault, the water system will shut down to prevent the fault from escalation. Please rectify the fault immediately.

**32: 辅助给定通道禁止**。该信号有效, 则辅助给定无效。

32: Auxiliary Setting Channel Disabled: If this signal is effective, the auxiliary setting function will be disabled.

**33: PID 给定切换至 AI2**。当该信号有效时, PID 给定通道将强制切换为 AI2 模拟电压/电流给定。无效后, PID 给定通道恢复为 F7-01 指定的通道。

33: **Switching of PID settings to AI2**: When this signal is effective, the PID setting channel will be switched to AI2 analog voltage/current settings in a forced mode. When this signal becomes ineffective, the PID setting channel will be restored to the channel assigned by F7-01.

**34: 停机直流制动**。在停机过程中, 当运行频率小于 F1-17“停机/直流制动频率”且 F1-16=2 时, 如果该信号有效, 则进行停机直流制动, 制动时间超过 F1-19 并且该指令解除时直流制动才结束。

34: **Shutdown DC-braking**: In the shutdown process, when the working frequency is lower than F1-17-“Shutdown/DC Braking Frequency” (and F1-16=2), if this signal is effective, the shutdown DC-breaking will be effective. The DC braking will not end until the braking time exceeds F1-19 and the command is repealed.

**35: 过程 PID 禁止**。该信号有效时将禁止 PID 运行, 只有在该信号无效且没有更高优先级的运行方式时, 才开始 PID 运行。

35: **Process Identification Disabled**: When this signal is effective, PID will be disabled. PID will not be enabled until this signal is ineffective and there is no other priority operation mode.

**36: PID 参数 2 选择**。在 F7-11“PID 参数过渡方式”=0 时, 且该信号有效, 选择 PID 参数 2(F7-08~F7-10); 无效选择 PID 参数 1 (F7-05~F7-07)。

36: **PID Parameter 2 Options: When F7-11 “PID parameter transition mode”=0 and is effective, choose PID Parameter 2 (F7-08~F7-10); when the parameter is ineffective, choose PID Parameter 1 (F7-05~F7-07).**

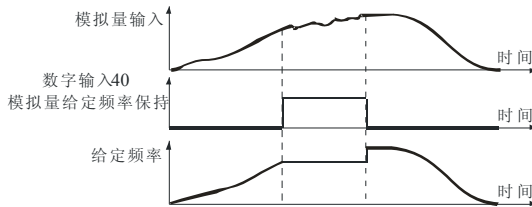
**37~39: 三线式停机指令、内部虚拟 FWD、REV 端子**。详见 139 页 F4-13 端子运转模式的描述。

**37~39: Three-wire mode shutdown command, Internal Virtual FWD Terminal and Internal**

**Virtual REC Terminal: Refer to the description of the F4-13 terminal operation mode on Page 55.**

**40: 模拟量给定频率保持。**当给定频率由模拟输入得到时，该信号若有效，则给定频率不随着模拟输入变化。若信号无效，则给定频率随模拟量输入而变化。该功能在由于电磁干扰导致模拟输入指令非常容易改变的场合非常有用，如下图：

**40: Maintenance of Analog Quantity Frequency Settings:** If this signal is effective when the frequency settings is acquired by analog input, the frequency settings will not vary with the analog input. If this signal is ineffective, the frequency settings will vary with the analog input. This function is very useful in cases where electromagnetic interference makes analog input commands susceptible to changes. Refer to the following figures:



模拟量输入: Analog quantity input

数字输入 40: Digital Input 40

时间: Time

模拟量给定频率保持: Maintenance of analog frequency settings

时间: Time

给定频率: Frequency settings 时间: Time

**41: 加减速禁止。**该信号有效时，变频器的加减速过程停止；无效时，恢复正常的加减速动作。

**41: Acceleration/Deceleration Disabled:** When this signal is effective, the acceleration/deceleration process of the inverter is stopped; when this signal is ineffective, the inverter will be restored to normal acceleration/deceleration operations.

**42: 运行命令通道切换到端子或面板。**可根据 F0-02 用该信号切换命令通道，如下表：

**42: Switching of Command Execution Channel to Terminal or Panel:** The command channel may be switched with this signal according to F0-02. Refer to the following table:

F0-02“运行命令通道选择”	数字输入 42 状态	切换后的运行命令通道
0: 操作面板	无效	操作面板
	有效	端子
1: 端子	无效	端子
	有效	操作面板
2: 通讯	无效	通讯
	有效	操作面板

F0-02 Command Execution Channel Options	Status of Digital Input 42	Command Execution Channel after Switching
0: Control Panel	Ineffective	Control Panel
	Effective	Terminal
1: Terminal	Ineffective	Terminal

	Effective	Control Panel
2: Communication	Ineffective	Terminal
	Effective	Control Panel

**43~44: 水泵禁止/电机选择。**为满足部分客户选用 SB200 系列变频器驱动多台不同容量电机时（非恒压供水模式），手动切换运行的电机，这时，需要设置不同的电机过载保护值。

**43~44: Pump Disabled/Motor Options:** To meet the requirements of users of the SB200 inverter series which supports more than one motor of different capacities (non constant-pressure water supply mode), auto switching functions for motors in operation are required. In this case, different motor overload protection values have to be set.

±43: 1#水泵禁止/电机选择 1

±43: Pump #1 Disabled/Motor Option 1

±44: 2#水泵禁止/电机选择 2

±44: Pump #2 Disabled/Motor Option 2

非恒压供水模式时，数字输入设置 43、44 时，作为电机选择端子，用以选择电机额定电流，实现不同的保护值。

In non-constant pressure water supply mode, the digital inputs of 43 and 44 are used as a motor option terminal to select the rated motor current and achieve different protection values.

电机选择端子	1 # 电机电流 (F3-02)	2 # 电机电流 (F8-30)	3 # 电机电流 (F8-31)	4 # 电机电流 (F8-32)
电机选择 1	0	1	0	1
电机选择 2	0	0	1	1

Motor Option Terminal	Current of Motor #1(F3-02)	Current of Motor #2 (F8-30)	Current of Motor #3 (F8-31)	Current of Motor #4 (F8-32)
Motor Option 1	0	1	0	1
Motor Option 2	0	0	1	1

恒压供水模式时，自动选择相应水泵的额定电流，实现过载保护值。数字输入设置为 43、44 时，其对应功能为水泵禁止输入选择。

In the constant-pressure water supply mode, the rated current will be automatically selected for the corresponding pumps to achieve overload protection values. When the digital input is set as 43 and 44, the corresponding function is Pump Disabled Options

**45~49: 水泵禁止。**输入相应的水泵禁止信号，可将出现异常的水泵停止运行，进行检修。该功能主要适用于水泵检修时，不需要停止系统运行。当水泵检修完毕后，解除禁止指令，该泵自动投入系统。

**45~49: Pump Disabled:** After the corresponding water pump disablement signal is inputted, an overhaul of an abnormal pump shutdown will be carried out. This function applies primarily to water pump overhaul and no manual shutdown of system operation is required. After the water pump is overhauled, repeal the disablement command and the pump will be automatically started.

**50~51: 污水池水位检测。**参见 183 页 F8-03 功能描述。

**50~51: Check of Waste Water Pool Level:** Refer to the description of F8-03 on Page 72.

**52~53: 水位控制检测信号。**当供水模式选择为水位控制时，根据水位检测信号起/停水泵。下限信号无效时，启动水泵运行；上限信号有效时，停止水泵运行。

**52~53: Water Level Control Detection Signal:** When the water supply mode is switched to water level control, the water pump will be started up or shut down according to the water level detection signal. When the lower limit signal is ineffective, the pump will be started; when the upper limit signal is effective, the pump will be shut down.

**54: 消防运转信号。**该信号有效时，主泵、辅助泵全部投入运行，以最大供水能力运行，不进行恒压控制。当消防指令解除后，系统自动恢复到原运行状态。

**54: Signal of Firefighting System in Operation:** When this signal is effective, the main pumps and auxiliary pumps are started and run at the max. capacity. No constant pressure control is executed. After the firefighting command is repealed, the system will be automatically restored to the original operation status.

**55~57: 优先启动水泵选择。**当 F8-39 十位为 0 时，可以通过控制端子，直接指定优先启动的水泵，仅在恒压系统中系统处于待机状态时有效。见下表：

**55~57: Priority Pump Startup Options:** When the tens digit of F8-39 is 0, the pump to be started first may be directly designated via the control terminal. The priority mode is only effective for a system in standby, constant-pressure mode.

优先启动水泵选择 3	优先启动水泵选择 2	优先启动水泵选择 1	优先启动水泵
0	0	0	1#水泵优先启动
0	0	1	1#水泵优先启动
0	1	0	2 水#泵优先启动
0	1	1	3#水泵优先启动
1	0	0	4#水泵优先启动
1	0	1	5#水泵优先启动

Priority Pump Startup Option 3	Priority Pump Startup Option 2	Priority Pump Startup Option 1	Sequence of Priority
0	0	0	#1 Water Pump
0	0	1	#1 Water Pump
0	1	0	#2 Water Pump
0	1	1	#3 Water Pump
1	0	0	#4 Water Pump
1	0	1	#5 Water Pump

F4-13	端子运转模式	出厂值	1	更改	×
-------	--------	-----	---	----	---



设定范围	0: 单线式 (起停) 2: 两线式2 (起停、方向) 4: 三线式1 (正转、反转、停止)	1: 两线式1 (正转、反转) 3: 两线式3 (起停、停止) 5: 三线式2 (运行、方向、停止)
------	--	--

F4-13	Terminal Operation Mode	Factory Settings	1	Modification	×
Setting Range	0: Single-wire mode (startup/shutdown) 2: Two-Wire Mode 2 (startup/shutdown and direction) 4: Three-Wire Mode 1 (clockwise/anticlockwise and shutdown)	1: Two-Wire Mode (Clockwise/Anticlockwise) 3: Two-Wire Mode (Startup/Shutdown) 5: Three-Wire Mode 2 (Operation, direction and shutdown)			

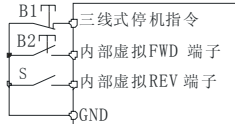
📖 相关数字输入 37“三线式停机指令”、38“内部虚拟 FWD 端子”、39“内部虚拟 REV 端子”。


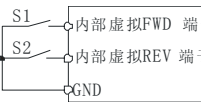
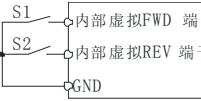

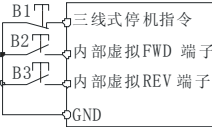
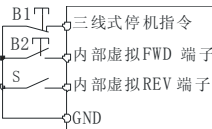
📖 Digital input commands: 37 “Three-wire mode shutdown command”, 38 “Internal virtual FWD terminal” and 39 “Internal virtual REV terminal”.

📖 下表列出了各种运行模式的逻辑和图解，表中 S 为电平有效；B 为边沿有效：

📖 The following table lists the logics and diagrams of different operation modes. In this table, S means “level effective” and B means “Edge effective”:

F4-13	模式名称	运行逻辑			图示
0	单线式 (起停)	S: 运行开关, 有效时运行 注: 方向由给定频率的方向确定			
1	两线式 1 (正转、反转)	S2 (反转)	S1 (正转)	意义	
		无效	无效	停止	
		无效	有效	正转	
		有效	无效	反转	
2	两线式 2 (起停、方向)	S2 (方向)	S1 (起停)	意义	
		无效	无效	停止	
		无效	有效	正转	
		有效	无效	停止	
3	两线式 3 (起停、停止)	B1: 运行按钮 (常开) B2: 停止按钮 (常闭) 注: 方向由给定频率的方向确定			
		B1: 停止按钮 (常闭) B2: 正转按钮 (常开) B3: 反转按钮 (常开)			
		三式式 1 (正转、反转、停止) 须附加数字输入 37“三线式停机指令”			
		三式式 1 (正转、反转、停止) 须附加数字输入 37“三线式停机指令”			
4	三式式 1 (正转、反转、停止) 须附加数字输入 37“三线式停机指令”	B1: 停止按钮 (常闭) B2: 正转按钮 (常开) B3: 反转按钮 (常开)			

F4-13	模式名称	运行逻辑	图示
5	三线式 2 (运行、方向、停止) 须附加数字输入 37“三线式停机指 令”	B1: 停止按钮 (常闭) B2: 运行按钮 (常开) S: 方向开关, 有效时反转	

F4-13	Mode Name	Operation Logic			Diagram
0	Single-Wire Mode (Startup/Shutdown)	S: Operation switch; operable when effective NOTE: The direction conforms to the direction of the frequency settings			
1	Two-Wire Mode 1 (Clockwise/Anticlockwise)	<b>S2 (Anticlockwise)</b>	<b>S1 (Clockwise)</b>	<b>Designation</b>	
		Ineffective	Ineffective	Stop	
		Ineffective	Effective	Clockwise	
		Effective	Ineffective	Anticlockwise	
2	Two-Wire Mode 2 (Startup/Shutdown and Direction)	<b>S2 (Direction)</b>	<b>S1 (Startup/Shutdown)</b>	<b>Designation</b>	
		Ineffective	Ineffective	Stop	
		Ineffective	Effective	Clockwise	
		Effective	Ineffective	Stop	
3	Two-Wire Mode 3 (Startup/Shutdown)	<b>S2 (Direction)</b>	<b>S1 (Startup/Shutdown)</b>	<b>Designation</b>	
		Ineffective	Ineffective	Stop	
4	Three-Wire Mode 1 (Clockwise, Anticlockwise and Shutdown) Digital input 37 “Three-Wire Mode Shutdown Command” must be attached	<b>S2 (Direction)</b>	<b>S1 (Startup/Shutdown)</b>	<b>Designation</b>	
		Ineffective	Ineffective	Stop	
		Ineffective	Effective	Clockwise	
		Effective	Ineffective	Anticlockwise	
5	Three-Wire Mode 2 (Operation, Direction and Shutdown) Digital input 37 “Three-Wire Mode Shutdown Command” must be attached	<b>S2 (Direction)</b>	<b>S1 (Startup/Shutdown)</b>	<b>Designation</b>	
		Ineffective	Ineffective	Stop	
		Ineffective	Effective	Clockwise	
		Effective	Ineffective	Anticlockwise	

- ☞ 端子控制模式下，对于单线式或两线式运转模式 1 和 2，虽然都是电平有效，但当停机命令由其它来源产生而使变频器停止时，要再次起动，需要先给停机信号再给运行信号。
- ☞ In the terminal control mode, whether single-wire mode ( 1 ) or two-wire mode (2), although they are both level-effective, the restart of the inverter after a shutdown caused by a shutdown command originating from other sources requires a shutdown signal prior to the emission of operation signal.
- ☞ 对于两线式 3 运转模式和三线式运转模式，常闭停机按钮断开时运行按钮无效。
- ☞ For Two-Wire Mode 3 or Three-Wire Mode, the start button will be ineffective when the NORMALLY OFF stop button is switched off.
- ☞ 即使运转模式确定了运转方向，但还要受到方向锁定的限制。
- ☞ Even if the operation mode defines the operation direction, the direction lock still overrides.
- ☞ 如果端子命令没有方向信息，运转方向由给定频率通道的正负确定。
- ☞ If the terminal command contains no information about direction, the operation direction will be determined by the frequency channel settings (Positive/Negative).



**危险：在运行信号存在并且 Fb-26“上电自启动允许”= 1（出厂值）时，变频器上电会自启动。**

**CAUTION: When there is an operation signal and Fb-26 “Poweron Self-Restart Enabled”= 1 (factory settings), the inverter will start automatically after connection to power supply.**

<b>F4-14</b>	<b>数字输入端子消抖时间</b>	出厂值	10ms	更改	○
设定范围	0~2000ms				

<b>F4-14</b>	Debouncing Time of Digital Input Terminal	Factory Settings	10ms	Modification	○
Setting Range	0~2000ms				

- ☞ 数字输入端子消抖时间：定义数字输入信号的消抖时间，持续时间小于消抖时间的信号将被忽略。
- ☞ **Debouncing Time of Digital Input Terminal:** This function is used to define the debouncing time of the digitally inputted signals. Signals with a duration shorter than the debouncing time are negligible.

<b>F4-15</b>	<b>UP/DOWN调节方式</b>	出厂值	0	更改	○
设定范围	0: 端子电平式      1: 端子脉冲式      2: 操作面板电平式      3: 操作面板脉冲式				
<b>F4-16</b>	<b>UP/DOWN速率/步长</b>	出厂值	1.00	更改	○
设定范围	0.01~100.00, 最小单位: 电平式0.01%/s, 脉冲式0.01%				
<b>F4-17</b>	<b>UP/DOWN记忆选择</b>	出厂值	0	更改	○
设定范围	0: 掉电存储零      1: 掉电清零      2: 停机、掉电均清零				
<b>F4-18</b>	<b>UP/DOWN上限</b>	出厂值	100.0%	更改	○

设定范围	0.0~100.0%				
<b>F4-19</b>	<b>UP/DOWN下限</b>	出厂值	0.0%	更改	○
设定范围	-100.0~0.0%				

<b>F4-15</b>	<b>UP/DOWN Adjustment</b>	Factory Setting s	0	Modification	○
Setting Range	0: Terminal level mode 1: Terminal pulse mode 2: Control panel level mode 3: Control panel pulse mode				
<b>F4-16</b>	<b>UP/DOWN Rated/Step Length</b>	Factory Setting s	1.00	Modification	○
Setting Range	0.01~100.00; min. settings: level mode: 0.01%/s; pulse mode 0.01%				
<b>F4-17</b>	<b>UP/DOWN Memory Options</b>	Factory Setting s	0	Modification	○
Setting Range	0: Storage on poweroff 1: Reset on poweroff 2: Reset on shutdown or poweroff				
<b>F4-18</b>	<b>UP/DOWN Upper Limit</b>	Factory Setting s	100.0%	Modification	○
Setting Range	0.0~100.0%				
<b>F4-19</b>	<b>UP/DOWN Lower Limit</b>	Factory Setting s	0.0%	Modification	○
Setting Range	-100.0~0.0%				

📖 UP/DOWN 功能实现了开关方式的连续调节，其调节值可用作频率给定、PID 给定等。

📖 The UP/DOWN function realizes continuous adjustment. The adjustment value can be used for frequency settings and PID settings.





📖 **F4-15=0**“端子电平式”时，当数字输入 19“UP/DOWN 增”或 20“UP/DOWN 减”有效时，FU-17 “UP/DOWN 调节值”按 F4-16 设定的速率增减。数字输入 19 和 20 同时有效或无效时，FU-17 的值保持不变。





📖 **In the terminal level mode (F4-15=0)**, when the digital input 19 (UP/DOWN: UP) or 20 (UP/DOWN: DOWN) is effective, FU-17 (UP/DOWN adjustment) will rise or fall at the rate set by F4-16. When the digital inputs (19 and 20) are effective or ineffective at one time, the value of FU-17 will remain unchanged.


**F4-15=1**“端子脉冲式”时，当数字输入 19“UP/DOWN 增”或 20“UP/DOWN 减”每来一个有效脉冲，FU-17“UP/DOWN 调节值”增减 F4-16 设定的步长。


**In the terminal pulse mode (F4-15=1)**, when each effective pulse is generated by digital input 19 “UP/DOWN: UP” or 20 (UP/DOWN: DOWN), FU-17 (UP/DOWN Adjustment) will rise or fall by the

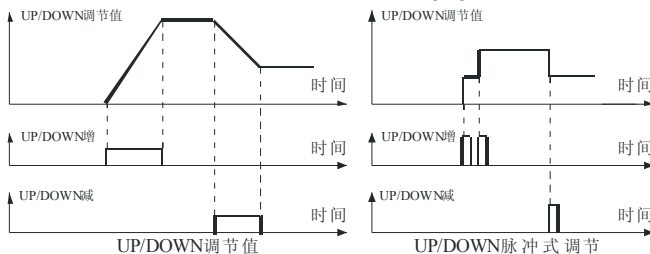
step length set by F4-16.

**F4-15=2、3** 的情况与 0、1 类似，区别是用操作面板的  和  代替数字输入 19 和 20，并且仅在当前显示为 FU-17“UP/DOWN 调节值”的值时可用  和  进行调节。

**F4-15=2 or 3 is similar to F4-15=0 or 1.** The difference is that in the former case,  and  on the control panel are used to substitute 19 and 20 (digital inputs). Only when FU-17 “UP/Down Adjustment” is displayed can adjustments be made with  and .

 UP/DOWN 两种控制方式如下图所示：

 Refer to the two control modes for UP/DOWN in the following figure:



UP/DOWN 调节值: UP/DOWN adjustment      时间: Time      UP/DOWN 调节值:


UP/DOWN adjustment      时间: Time


UP/DOWN 增: UP/DOWN: UP      时间: Time      UP/DOWN 增: UP/DOWN: UP

时间: Time

UP/DOWN 减: UP/DOWN: Down      时间: Time      UP/DOWN 减: UP/DOWN:


DOWN      时间: Time


 数字输入 21“UP/DOWN 清除”。该信号为有效边沿时清除 FU-17“UP/DOWN 调节值”。

 Digital Input 21 “UP/DOWN CLEAR”: This signal is used to clear FU-17 “UP/DOWN Adjustment” if it is an effective edge.

<b>F4-20</b> ~ <b>F4-26</b>	<b>多段频率1~7</b>	出厂值	n.00Hz (n=1~7)	更改	○
设定范围	0.00~650.00Hz 多段频率1~多段频率7出厂值为各自的多段频率号，例：多段频率3出厂值为3.00Hz				

<b>F4-20</b> ~ <b>F4-26</b>	<b>Multi-Band Frequency 1~7</b>	Factory Setting s	n.00Hz (n=1~7)	Modification	○
Setting Range	0.00~650.00Hz The factory settings of Multi-Band Frequency 1—Multi-Band Frequency 7 are their respective Multi-Band Frequency numbers. For example, the factory settings of Multi-Band Frequency 3 are 3.00Hz.				

 多段频率的选择见第 133 页多段频率选择。

 For Multi-Band Frequency options, refer to Page 52 “Multi-Band Frequency Options”.

## 6.6 F5 数字输出和继电器输出设置

## 6.6. F5: Digital Output and Relay Output Settings

F5-00	Y1数字输出端子功能	出厂值	1	更改	×
F5-01	Y2数字输出端子功能	出厂值	2	更改	×
F5-02	T1继电器输出功能	出厂值	6	更改	×
F5-03	T2继电器输出功能	出厂值	24	更改	×
F5-04	T3继电器输出功能	出厂值	25	更改	×
F5-05	T4继电器输出功能	出厂值	26	更改	×
F5-06	T5继电器输出功能	出厂值	27	更改	×
F5-07	T6 /Y3输出功能 (扩展输出)	出厂值	28	更改	×
F5-08	T7 /Y4输出功能 (扩展输出)	出厂值	29	更改	×
F5-09	T8 /Y5输出功能 (扩展输出)	出厂值	30	更改	×
F5-10	T9 /Y6输出功能 (扩展输出)	出厂值	31	更改	×
F5-11	T10/Y7输出功能 (扩展输出)	出厂值	32	更改	×
F5-12	T11/Y8输出功能 (扩展输出)	出厂值	33	更改	×
设定范围	0~59, 见下表数字输出功能定义表				

F5-00	Functions of Digital Output Terminal Y1	Factory Settings	1	Modification	×
F5-01	Functions of Digital Output Terminal Y2	Factory Settings	2	Modification	×
F5-02	Output Functions of Relay Output T1	Factory Settings	6	Modification	×
F5-03	Output Functions of Relay Output T2	Factory Settings	24	Modification	×
F5-04	Output Functions of Relay T3	Factory Settings	25	Modification	×
F5-05	Output Functions of Relay T4	Factory Settings	26	Modification	×
F5-06	Output Functions of T5	Factory Settings	27	Modification	×
F5-07	Output Functions of T6/Y3 (Extension Output)	Factory Settings	28	Modification	×
F5-08	Output Functions of T7 /Y4 (Extension Output)	Factory Settings	29	Modification	×

<b>F5-09</b>	<b>Output Functions of T8/Y5 (Extension Output)</b>	Factory Settings	30	Modification	×
<b>F5-10</b>	<b>Output Functions of T9 /Y6 (Extension Output)</b>	Factory Settings	31	Modification	×
<b>F5-11</b>	<b>Output Functions of T10/Y7 (Extension Output)</b>	Factory Settings	32	Modification	×
<b>F5-12</b>	<b>Output Functions of T11/Y8 (Extension Output)</b>	Factory Settings	33	Modification	×
Setting Range	0~59; refer to the following table of definitions of digital output functions				

📖 相关监视参数: FU-27、FU-28、FU-30、FU-31 “数字输出端子状态”。

📖 Related Monitoring Parameters: FU-27, FU-28, FU-30 and FU-31(Digital Output Terminal Status)

📖 数字输出功能定义表

📖 Table of Definitions of Digital Output Functions

0: 变频器运行准备就绪	±21: 发电运行中	±42: X9(扩展端子)
±1: 变频器运行中	±22: 上位机数字量1	±43: X10(扩展端子)
±2: 频率到达	±23: 上位机数字量2	±44: X11(扩展端子)
±3: 监控检测1输出	±24: 1#电机变频运行	±45: FWD
±4: 监控检测2输出	±25: 1#电机工频运行	±46: REV
±5: 监控检测3输出	±26: 2#电机变频运行	±47: 加泵准备就绪中
±6: 故障输出	±27: 2#电机工频运行	±48: 减泵准备就绪中
±7: 电机负载过重	±28: 3#电机变频运行	±49: 辅助启动器启动信号
±8: 电机过载	±29: 3#电机工频运行	±50: 休眠泵运行端子
±9: 欠压封锁	±30: 4#电机变频运行	±51: 休眠运行指示
±10: 外部故障停机	±31: 4#电机工频运行	±52: 进水池缺水
±11: 故障自复位过程中	±32: 5#电机变频运行	±53: 接触器吸合异常
±12: 瞬时停电再上电动作中	±33: 5#电机工频运行	±54: 排污泵控制
±13: 报警输出	±34: X1	±55: 1#泵注水阀控制
±14: 反转运行中	±35: X2	±56: 1#泵排气阀控制
±15: 停机过程中	±36: X3	±57: 2#泵注水阀控制
±16: 运行禁止状态	±37: X4	±58: 2#泵排气阀控制
±17: 操作面板控制中	±38: X5	±59: 消防巡检运行中
±18: 指定时间输出	±39: X6	±60: A11 > A13
±19: 频率上限限制中	±40: X7(扩展端子)	
±20: 频率下限限制中	±41: X8(扩展端子)	

0: Inverter ready for operation	±21: Power generation in process	±42: X9 (Extension terminal)
±1: Inverter in operation	±22: PC Digital Quantity 1	±43: X10 (Extension terminal)
±2: Frequency attained	±23: PC Digital Quantity 2	±44: X11 (Extension terminal)
±3: Output of Monitor 1	±24: Motor #1 in variable-frequency operation	±45: FWD
±4: Output of Monitor 2	±25: Motor #1 in line frequency operation	±46: REV
±5: Output of Monitor 3	±26: Motor #2 in variable frequency operation	±47: Pump ready for acceleration
±6: Fault output	±27: Motor #2 in line frequency operation	±48: Pump ready for deceleration
±7: Motor overload	±28: Motor #3 in variable-frequency operation	±49: Startup signal of auxiliary starter
±8: Motor overload	±29: Motor #3 in line frequency operation	±50: Working terminal of sleeping pump
±9: Undervoltage lockout	±30: Motor #4 in variable frequency operation	±51: Indication for sleeping operation
±10: Shutdown by external fault	±31: Motor #4 in line frequency operation	±52: Water shortage in suction pool
±11: Fault self-reset in process	±32: Motor #5 in variable frequency operation	±53: Abnormal closing of contactor
±12: Instantaneous poweroff/poweron in process	±33: Motor #5 in line frequency operation	±54: Drainage pump control
±13: Alarm output	±34: X1	±55: Water injection valve control for Pump #1
±14: Anticlockwise operation in process	±35: X2	±56: Air vent valve control for Pump #1
±15: Shutdown in process	±36: X3	±57: Water injection valve control for Pump #2
±16: Operation disabled	±37: X4	±58: Air vent valve control for Pump #2
±17: Under control of control panel	±38: X5	±59: Firefighting patrol in operation
±18: Output at a preset time	±39: X6	±60: A11>A13
±19: Upper frequency limit enabled	±40: X7 (Extension terminal)	
±20: Lower frequency limit enabled	±41: X8 (Extension terminal)	

☞ Refer to the following details about the digital output function:

**注:** 当信号有效时: 如果选择的值为正, 继电器动作为吸合, Y 端子动作为晶体管导通; 如果选择的值为负, 继电器动作为断开, Y 端子动作为晶体管截止。

**NOTE:** When the signal is effective, if the value is positive, the relay will be closed and Terminal Y will be connected to the transistor. If the value is negative, the relay will be open and Terminal Y will be disconnected from the transistor.

**0: 变频器运行准备就绪。** 充电接触器已吸合且无故障的状态。

**0: Inverter ready for operation:** The energized contactor has been closed. There is no fault.

**1: 变频器运行中。** 当变频器处于运行状态。

**1: Inverter in operation:** The inverter is in operation.

**2: 频率到达。** 当变频器的运行频率在给定频率的正负检出宽度内时有效。详见 151 页 F5-13。

**2: Frequency attained:** The function is effective when the operating frequency is within the positive/negative detection width of the frequency settings. Refer to F5-13 on page 60 for details.

**3~5: 监控检测 1、2、3 输出。** 详见 152 页 F5-14~F5-20。

**3~5: Output of Monitors 1, 2 and 3:** Refer to F5-14~F5-20 on Page 60 for details.

**6: 故障输出。** 若变频器处于故障状态, 则输出有效信号。

**6: Fault output:** An effective signal will be outputted if the inverter has a fault.

**7: 电机负载过重。** 当变频器检测到电机负载过重时该信号有效, 详见 203 页。

**7: Motor overload:** The signal will be effective when the inverter detects a motor overload. Refer to Page



80 for details.

**8: 电机过载。**当电机过载时该信号有效，详见 202 页。

**8: Motor overload:** The signal will be effective when the motor is overloaded. Refer to Page 79 for details.

**9: 欠压封锁。**当直流母线欠压引起停机时该信号有效。

**9: Undervoltage lockout:** The signal will be effective when the DC busbar undervoltage causes a shutdown.

**10: 外部故障停机。**由于外部故障引起停机时该信号变有效，外部故障复位后该信号变无效。

**10: Shutdown by external fault:** The signal will be effective when an external fault causes a shutdown. The signal will be ineffective when the external fault is reset.

**11: 故障自复位过程中。**在发生故障并且等待变频器自复位的过程中该信号有效。

**11: Fault self-reset in process:** The signal will be effective when the inverter is resetting after a fault.

**12: 瞬时停电再上电动作中。**主回路欠压后，并等待再启动时，该信号有效。

**12: Instantaneous poweron/poweroff in process:** The signal will be effective after the main loop has an undervoltage and is in the process of a restart.

**13: 报警输出。**当变频器报警时该信号有效。

**13: Alarm output:** The signal will be effective when the inverter sounds an alarm.

**14: 反转运行中。**当变频器在反转运行时该信号有效。

**14: Anticlockwise operation in process:** The signal will be effective when the inverter is in anticlockwise operation.

**15: 停机过程中。**当变频器减速停机过程中该信号有效。

**15: Shutdown in process.** The signal will be effective when the inverter is decelerating to a shutdown.

**16: 运行禁止状态。**变频器处于运行禁止状态该信号有效。

**16: Operation disabled:** The signal will be effective when inverter operation is disabled.

**17: 操作面板控制中。**运行命令通道为操作面板时该信号有效。

**17: Under control of control panel:** The signal will be effective when the command execution channel is the control panel.

**18: 指定时间输出。**当使用时钟模块控制输出时使用该选择，见 198 页。

**18: Output at a preset time:** The option will be used when the clock module is used for output control. Refer to Page 78.

**19: 频率上限限制中。**设定频率 $\geq$ 上限频率，且运行频率到达上限频率时该信号有效。

**19: Upper frequency limit enabled:** The signal will be effective when the working frequency setting is equal to or exceeds the upper frequency limit.

**20: 频率下限限制中。**设定频率 $\leq$ 下限频率，且运行频率到达下限频率时该信号有效。

**20: Lower frequency limit enabled:** The signal will be effective when the working frequency reaches the lower frequency limit.

**21: 发电运行中。**变频器处于发电运行状态。

**21: Power generation in process:** The inverter is in a power generation operating status.

**22~23: 上位机数字量 1、2。**

**22-23: PC Digital Quantities 1 and 2.**

**24: 1#电机变频运行。**当变频器用于恒压供水时，选择该信号用于 1# 泵变频运行接触器控制。

**24: #1 motor in variable frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (variable-frequency operation) of Pump #1.

**25: 1#电机工频运行。**当变频器用于恒压供水时，选择该信号用于1#泵工频运行接触器控制。

**25: #1 motor in line frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (line frequency operation) of Pump #1.

**26: 2#电机变频运行。**当变频器用于恒压供水时，选择该信号用于2#泵变频运行接触器控制。当2#泵为辅助泵，直接启动时，该信号无效；通过软起动机启动时，该信号用于2#泵切换至软起动机控制信号。

**26: Motor #2 in variable frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (variable frequency operation) of Pump #2.

**27: 2#电机工频运行。**当变频器用于恒压供水时，选择该信号用于2#泵工频运行接触器控制。

**27: Motor #2 in line frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (line frequency operation) of Pump #2.

**28: 3#电机变频运行。**当变频器用于恒压供水时，选择该信号用于3#泵变频运行接触器控制。当3#泵为辅助泵，直接启动时，该信号无效；通过软起动机启动时，该信号用于3#泵切换至软起动机控制信号。

**28: Motor #3 in variable frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (variable frequency operation) of Pump #3. If Pump #3 is an auxiliary pump that is directly started, the signal will be ineffective. If the pump is started by a soft starter, the signal will be used to switch Pump 3 to the soft starter.

**29: 3#电机工频运行。**当变频器用于恒压供水时，选择该信号用于3#泵工频运行接触器控制。

**29: Motor #3 in line frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (line frequency operation) of Pump #3.

**30: 4#电机变频运行。**当变频器用于恒压供水时，选择该信号用于4#泵变频运行接触器控制。当4#泵为辅助泵，直接启动时，该信号无效；通过软起动机启动时，该信号用于4#泵切换至软起动机控制信号。

**30: Motor #4 in variable frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (variable frequency operation) of Pump #4. If Pump #4 is an auxiliary pump that is directly started, the signal will be ineffective. If the pump is started by a soft starter, the signal will be used to switch Pump #4 to the soft starter.

**31: 4#电机工频运行。**当变频器用于恒压供水时，选择该信号用于4#泵工频运行接触器控制。

**31: Motor #4 in line frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (line frequency operation) of Pump #4.

**32: 5#电机变频运行。**当变频器用于恒压供水时，选择该信号用于5#泵变频运行接触器控制。

**32: Motor #5 in variable frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor (variable frequency operation) of Pump #5.

**33: 5#电机工频运行。**当变频器用于恒压供水时，选择该信号用于5#泵工频运行接触器控制。当5#泵为辅助泵，直接启动时，该信号无效；通过软起动机启动时，该信号用于5#泵切换至软起动机控制信号。

**33: Motor #5 in line frequency operation:** When the inverter is used for constant pressure water supply, the signal is used to control the contactor of (line frequency operation) Pump #5. If Pump #5 is an auxiliary pump that is directly started, the signal is ineffective. If the pump is started by a soft starter, the signal will be used to switch Pump #5 to the soft starter.

**34~39: X1~X6。**经消抖处理后的数字输入信号。

**34~39: X1~X6:** Digital input signals after debouncing.

**40~44: X7~X11(扩展端子)**。经消抖处理后的扩展数字输入信号。

**40~44: X7~X11 (Extension terminal):** Extension digital input signals after debouncing.

**45、46: FWD、REV**。经消抖处理的数字输入信号。

**45 and 46: FWD/REC:** Digital input signals after debouncing.

**47: 加泵就绪信号**。当变频器用于恒压供水时，该信号有效，当需要增加泵运行时输出信号。

**47: Pump ready for acceleration:** The signal will be effective when the inverter is used for constant pressure water supply. The signal will be outputted when the pump needs a boost.

**48: 减泵就绪信号**。当变频器用于恒压供水时，该信号有效，当需要减少泵运行时输出信号。

**48: Pump ready for deceleration:** The signal will be effective when the inverter is used for constant pressure water supply. The signal will be outputted when the pump needs a deboost.

**49: 辅助起动机起动信号**。当变频器用于恒压供水且配置的辅助泵由软起动机起动时该信号有效，该信号用于控制软起动机起动/停止。详见 181 页 F8-01 水泵配置及休眠选择。

**49: Startup signal of auxiliary starter:** The signal will be effective when the inverter is used for constant pressure water supply and the auxiliary pump is started by the soft starter. The signal is used to control the startup/shutdown of the soft starter. Refer to F801 “Pump Settings and Sleeping Options” on Page 71 for details.

**50: 休眠泵运行端子**。当变频器用于恒压供水且有休眠泵时，时该信号有效，用于休眠泵控制。若休眠泵选择为变频运行时，该信号将休眠泵切换至与变频器连接。若休眠泵为工频运行，该信号将休眠泵切换至与工频电源连接。详见 181 页 F8-01 水泵配置及休眠选择。

**50: Working terminal of sleeping pump:** The signal will be effective when the inverter is used for constant pressure water supply and there is a sleeping pump. The signal is used to control the sleeping pump. If the sleeping pump is in variable frequency operation, the signal will connect the sleeping pump to the inverter. If the sleeping pump is in line frequency operation, the signal will connect the sleeping pump to the line frequency power supply. Refer to F80-1 “Pump Settings and Sleeping Pump Options” on Page 71 for details.

**51: 休眠运行中指示**。当处于休眠运行时输出该信号。

**51: Indication for sleeping operation:** The signal will be outputted when the pump is in sleeping operation.

**52: 进水池缺水**。进水池缺水时，停止泵运行，输出信号报警并停机。

**52: Water shortage in suction pool:** The pump will be shut down when there is a water shortage in the suction pool. The signal will be outputted for an alarm and a shutdown will follow.

**53: 接触器吸合异常**。当可编程数字输入端有用于接触器检测时，如果检测接触器的状态与控制逻辑不一致时，输出该信号报警并停机。

**53: Abnormal closing of contactor:** When the programmable digital terminal is used for contactor detection, if the status of the contactor is detected to be uncompliant with the control logic, the signal will be outputted for an alarm and a shutdown will follow.

**54: 排污泵控制**。通过污水水位检测，输出该信号控制排污泵的起动/停止。

**54: Drainage pump control:** The signal is outputted to control the startup/shutdown of the drainage pump via wastewater level detection.

**55: 1#泵注水阀控制**。

**55: Water injection valve control for Pump #1.**

**56: 1#泵排气阀控制**。

**56: Air vent valve control for Pump #1.**

**57: 2# 泵注水阀控制。**

**57: Water injection valve control for Pump #2**

**58: 2# 泵排气阀控制。**

**58: Air vent valve control for Pump #2**

当水泵变频运行时，如果检测到不能正常供水，则判断为管路有空气，则打开注水阀和排气阀，向管路注水、排气。详见 195 页 F8-42 注水阀、排气阀控制。

If normal water supply is not detected when the pump is working at a variable frequency, the pipe may have air trapped within. Open the water injection valve and the air vent valve to inject water and displace air from the pipe. Refer to F8-42 Water injection valve/air vent valve control on Page 77.

**59: 消防巡检运行中。**当变频器用于专用消防供水时，定期对水泵进行巡检运行，巡检运行输出该信号。仅在 F8-00=4 时有效。

**59: Firefighting patrol in operation:** If the inverter is used specifically for firefighting water supply, a periodic patrol will be conducted to inspect the pumps and this signal will be outputted. The signal is effective only when F8-00=4.

**60: AI1>AI3。**指示 AI1>AI3 的状态。

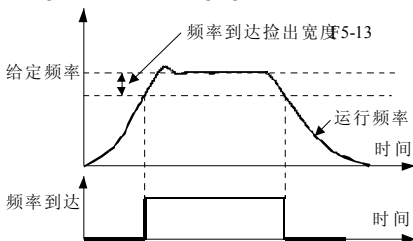
**60: AI1>AI3.** The status where AI1>AI3 is indicated.

<b>F5-13</b>	<b>频率到达检出宽度</b>	出厂值	2.50Hz	更改	○
设定范围	0.00~650.00Hz				

<b>F5-13</b>	<b>Attainment of Frequency to Detection Width</b>	Factory Setting s	2.50Hz	Modification	○
Setting Range	0.00~650.00Hz				

当变频器的运行频率在给定频率的附近检出宽度内时发出频率到达信号，如下图所示：

A frequency attainment signal will be emitted when the working frequency approaches the detection width of the frequency settings. See the following figure:



给定频率：Frequency settings

频率到达检出宽度 5-13 The frequency attains

## Detection Width 5-13

频率到达: Frequency attained

运行频率: Working frequency

时间: Time

时间: Time

F5-14	监控检测1、2、3选择		出厂值	000	更改	○
设定范围	百位: 监控检测 3      十位: 监控检测 2      个位: 监控检测 1					
	0: 运行频率    检测输出方式 1	2: PID 反馈值    检测输出方式 1				
	1: 运行频率    检测输出方式 2	3: PID 反馈值    检测输出方式 2				
F5-15	监控检测1检测值	出厂值	20.00	更改	○	
F5-16	监控检测1检测滞后值	出厂值	5.00	更改	○	
F5-17	监控检测2检测值	出厂值	40.00	更改	○	
F5-18	监控检测2检测滞后值	出厂值	5.00	更改	○	
F5-19	监控检测3检测值	出厂值	60.00	更改	○	
F5-20	监控检测3检测滞后值	出厂值	5.00	更改	○	
设定范围	频率检测: 输入参数为频率检测值      PID 反馈值检测: 输入参数为反馈检测值。					

F5-14	Monitors 1, 2 and 3 Options	Factory Settings	000	Modification	○
Setting Range	Hundreds digit: Monitor 3      Tens digit: Monitor 2      Units digit: Monitor 1				
	0: Working frequency, Output Detection Mode 1      2: PID feedback value, Output Detection Mode 1 1: Working frequency, Output Detection Mode 2      3: PID feedback value, Output Detection Mode 2				
F5-15	Detected value of Monitor 1	Factory settings	20.00	Modification	○
F5-16	Detection lag value of Monitor 1	Factory settings	5.00	Modification	○
F5-17	Detected value of Monitor 2	Factory settings	40.00	Modification	○
F5-18	Detection lag value of Monitor 2	Factory settings	5.00	Modification	○
F5-19	Detected value of Monitor 3	Factory settings	60.00	Modification	○
F5-20	Detection lag value of Monitor 3	Factory settings	5.00	Modification	○
Setting Range	Frequency detection: The inputted parameter is the detected frequency. PID feedback value detection: The inputted parameter is the detected feedback value.				

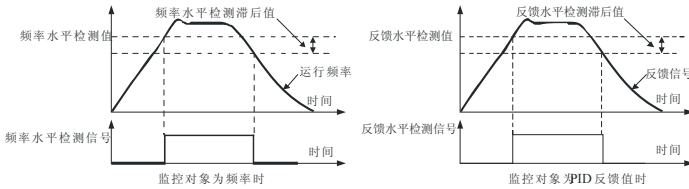
当监控对象为频率时，运行频率大于“监控检测值”时数字输出“监控检测信号”有效，直到运行频率小于“监控检测值 - 监控检测滞后值”后变无效，如下图所示：

When the monitored parameter is frequency and the working frequency exceeds the detected value, the digital output of “monitoring signal” is effective. The signal will be ineffective after the working frequency drops below the detected value-the detection lag value. Refer to the following figure:

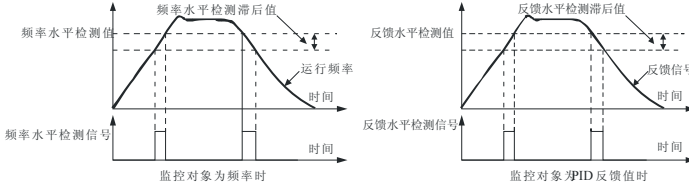
当监控对象为 PID 反馈值时，反馈值大于“监控检测值”时数字输出“监控检测信号”有效，直到反馈值小于“监控检测值 - 监控检测滞后值”后变无效，如下图所示：

When the monitored parameter is PID feedback value which is larger than the detected value, the digital output of monitoring signal is effective. The signal will be ineffective after the feedback value drops below the detected value-the detection lag value. Refer to the following figure:

输出方式 1:



输出方式 2:



#### 输出方式一：Output Mode 1

频率水平检测值: Detected frequency value    频率水平检测滞后值: Frequency detection lag value    运行频率: Working frequency    时间: Time

反馈水平检测值: Detected feedback value    反馈水平检测滞后值: Feedback detection lag value    反馈信号: Feedback signal    时间: Time

频率水平检测信号: Frequency detection signal    监控对象为频率时: When the monitored parameter is frequency    时间: Time    反馈水平检测信号: Feedback detection signal

监控对象为 PID 反馈值时: When the monitored parameter is PID feedback value    时间: Time

#### 输出方式二：Output Mode 2

频率水平检测值: Detected frequency value    频率水平检测滞后值: Frequency detected lag value

运行频率: Working frequency    时间: Time

反馈水平检测值: Detected feedback value    反馈水平检测滞后值: Feedback detection lag value    反馈信号: Feedback signal    时间: Time

频率水平检测信号: Frequency detection signal    监控对象为频率时: When the monitored parameter is frequency    时间: Time    反馈水平检测信号: Feedback detection signal

监控对象为 PID 反馈值时: When the monitored parameter is PID feedback value    时间:

Time

F5-21	Y1端子闭合延时	出厂值	0.00s	更改	○
-------	----------	-----	-------	----	---

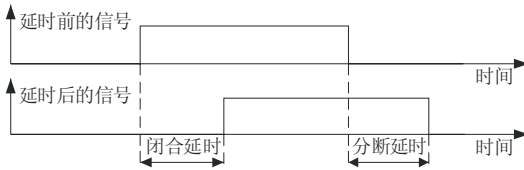
<b>F5-22</b>	<b>Y1端子分断延时</b>	出厂值	0.00s	更改	○
<b>F5-23</b>	<b>Y2端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-24</b>	<b>Y2端子分断延时</b>	出厂值	0.00s	更改	○
设定范围	0.00~650.00s				
<b>F5-25</b>	<b>T1端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-26</b>	<b>T1端子分断延时</b>	出厂值	0.00s	更改	○
<b>F5-27</b>	<b>T2端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-28</b>	<b>T2端子分断延时</b>	出厂值	0.00s	更改	○
<b>F5-29</b>	<b>T3端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-30</b>	<b>T3端子分断延时</b>	出厂值	0.00s	更改	○
<b>F5-31</b>	<b>T4端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-32</b>	<b>T4端子分断延时</b>	出厂值	0.00s	更改	○
<b>F5-33</b>	<b>T5端子闭合延时</b>	出厂值	0.00s	更改	○
<b>F5-34</b>	<b>T5端子分断延时</b>	出厂值	0.00s	更改	○
设定范围	0.00~650.00s				

<b>F5-21</b>	<b>Terminal Y1 Closing Delay</b>	Factory settings	0.00s	Modification	○
<b>F5-22</b>	<b>Terminal Y1 Opening Delay</b>	Factory Settings	0.00s	Modification	○
<b>F5-23</b>	<b>Terminal Y2 Closing Delay</b>	Factory Settings	0.00s	Modification	○
<b>F5-24</b>	<b>Terminal Y2 Opening Delay</b>	Factory Settings	0.00s	Modification	○
Setting Range	0.00~650.00s				
<b>F5-25</b>	<b>Terminal T1 Closing Delay</b>	Factory Setting s	0.00s	Modification	○
<b>F5-26</b>	<b>Terminal T1 Opening Delay</b>	Factory Setting s	0.00s	Modification	○
<b>F5-27</b>	<b>Terminal T2 Closing Delay</b>	Factory Setting s	0.00s	Modification	○
<b>F5-28</b>	<b>Terminal T2 Opening Delay</b>	Factory Setting s	0.00s	Modification	○
<b>F5-29</b>	<b>Terminal T3 Closing Delay</b>	Factory Setting s	0.00s	Modification	○

<b>F5-30</b>	<b>Terminal T3 Opening Delay</b>	Factory Setting	0.00s	Modification	○
<b>F5-31</b>	<b>Terminal T4 Closing Delay</b>	Factory Setting	0.00s	Modification	○
<b>F5-32</b>	<b>Terminal T4 Opening Delay</b>	Factory Setting	0.00s	Modification	○
<b>F5-33</b>	<b>Terminal T5 Closing Delay</b>	Factory Setting	0.00s	Modification	○
<b>F5-34</b>	<b>Terminal T5 Opening Delay</b>	Factory Setting	0.00s	Modification	○
Setting Range	0.00~650.00s				

📖 数字输出及继电器输出延时，如下图所示：

📖 **Digital Output and Relay Output Delay:** Refer to the following figure:



延时前的信号: Signal before delay

延时后的信号: Signal after delay

时间:

Time

闭合延时: Closing delay

分段延时: Segmented delay

时

间: Time

⚠️ 危险: 当输出端子选择为24~33时, 该端子对应的闭合延时和分断延时应设置为0.00, 否则可能发生意想不到的结果。

CAUTION: If the output terminals are 24~33, the closing/opening delay must be set as 0.00; otherwise an unexpected consequence will occur.



## 6.7 F6 模拟量及脉冲频率端子设置

## 6.7 F6: Settings of Analog Quantities and Pulse Frequency Terminals

<b>F6-00</b>	<b>AI1最小输入模拟量</b>	出厂值	0.00%	更改	○
<b>F6-01</b>	<b>AI1最大输入模拟量</b>	出厂值	100.00%	更改	○
设定范围	-100.00~100.00%				
<b>F6-02</b>	<b>AI1最小输入模拟量对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
<b>F6-03</b>	<b>AI1最大输入模拟量对应的给定值/反馈值</b>	出厂值	100.00%	更改	○
设定范围	-100.00~100.00% 注：给定频率时以最高频率为参考值，PID 给定/反馈时以 PID 参考标为参考值。				
<b>F6-04</b>	<b>AI1拐点输入模拟量</b>	出厂值	0.00%	更改	○
设定范围	F6-00“最小模拟量”~F6-01“最大模拟量”				
<b>F6-05</b>	<b>AI1拐点偏差</b>	出厂值	2.00%	更改	○
设定范围	0.00~50.00%				
<b>F6-06</b>	<b>AI1拐点对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
设定范围	-100.00~100.00%				
<b>F6-07</b>	<b>AI1掉线门限</b>	出厂值	0.00%	更改	○
设定范围	-20.00~20.00%				
<b>F6-08</b>	<b>AI1输入滤波时间</b>	出厂值	0.100s	更改	○
设定范围	0.000~10.000s				
<b>F6-09</b>	<b>AI2最小输入模拟量</b>	出厂值	20.00%	更改	○
<b>F6-10</b>	<b>AI2最大输入模拟量</b>	出厂值	100.00%	更改	○
设定范围	-100.00~100.00%				
<b>F6-11</b>	<b>AI2最小输入模拟量对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
<b>F6-12</b>	<b>AI2最大输入模拟量对应的给定值/反馈值</b>	出厂值	100.00%	更改	○
设定范围	-100.00~100.00% 注：给定频率时以最高频率为参考值，PID 给定/反馈时以 PID 参考标为参考值。				
<b>F6-13</b>	<b>AI2拐点输入模拟量</b>	出厂值	20.0%	更改	○
设定范围	F6-09“最小模拟量”~F6-10“最大模拟量”				
<b>F6-14</b>	<b>AI2拐点偏差</b>	出厂值	2.00%	更改	○
设定范围	0.00~50.00%				
<b>F6-15</b>	<b>AI2拐点对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
设定范围	-100.00~100.00%				
<b>F6-16</b>	<b>AI2掉线门限</b>	出厂值	0.00%	更改	○
设定范围	-20.00~20.00%				
<b>F6-17</b>	<b>AI2输入滤波时间</b>	出厂值	0.100s	更改	○
设定范围	0.000~10.000s				
<b>F6-18</b>	<b>AI3最小输入模拟量</b>	出厂值	0.00%	更改	○
<b>F6-19</b>	<b>AI3最大输入模拟量</b>	出厂值	100.00%	更改	○

设定范围	-100.00~100.00%				
<b>F6-20</b>	<b>AI3最小输入模拟量对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
<b>F6-21</b>	<b>AI3最大输入模拟量对应的给定值/反馈值</b>	出厂值	100.00%	更改	○
设定范围	-100.00~100.00% 注：给定频率时以最高频率为参考值，PID 给定/反馈时以 PID 参考标为参考值。				
<b>F6-22</b>	<b>AI3拐点输入模拟量</b>	出厂值	0.00%	更改	○
设定范围	F6-18“最小模拟量”~F6-19“最大模拟量”				
<b>F6-23</b>	<b>AI3拐点偏差</b>	出厂值	2.00%	更改	○
设定范围	0.00~50.00%				
<b>F6-24</b>	<b>AI3拐点对应的给定值/反馈值</b>	出厂值	0.00%	更改	○
设定范围	-100.00~100.00%				
<b>F6-25</b>	<b>AI3掉线门限</b>	出厂值	0.0%	更改	○
设定范围	-20.00~20.00%				
<b>F6-26</b>	<b>AI3输入滤波时间</b>	出厂值	0.100s	更改	○
设定范围	0.000~10.000s				

<b>F6-00</b>	<b>AI1 Min. Input Analog Quantity</b>	Factory Settings	0.00%	Modification	○
<b>F6-01</b>	<b>AI1 Max. Input Analog Quantity</b>	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00-100.00%				
<b>F6-02</b>	<b>Set Value/Feedback Value Corresponding with AI1 Min. Input Analog Quantity</b>	Factory Settings	0.00%	Modification	○
<b>F6-03</b>	<b>Set Value/Feedback Value Corresponding with AI1 Max. Input Analog Quantity</b>	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00-100.00% NOTE: Frequency settings must be based on the max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values				
<b>F6-04</b>	<b>Input analog Quantity of AI1 Inflection Point</b>	Factory Settings	0.00%	Modification	○
Setting Frequency	F6-00 “Min. analog quantity”~F6-01 “Max. analog quantity”				
<b>F6-05</b>	<b>Deviation from AI1 Inflection Point</b>	Factory Settings	2.00%	Modification	○

Setting Frequency	0.00~50.00%				
<b>F6-06</b>	Set Value/Feedback Value Corresponding with AI1 Inflection Point	Factory Settings	0.00%	Modification	○
Setting Frequency	-100.00~100.00%				
<b>F6-07</b>	AI1 Offline Threshold	Factory Settings	0.00%	Modification	○
Setting Frequency	-20.00~20.00%				
<b>F6-08</b>	AI1 Input Filter Time	Factory Settings	0.100s	Modification	○
Setting Frequency	0.000~10.000s				
<b>F6-09</b>	AI2 Min. Input Analog Quantity	Factory Settings	20.00%	Modification	○
<b>F6-10</b>	<b>AI2 Max. Input Analog Quantity</b>	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00~100.00%				
<b>F6-11</b>	Set Value/Feedback Value Corresponding with AI2 Min. Input Analog Quantity	Factory Settings	0.00%	Modification	○
<b>F6-12</b>	Set Value/Feedback Value Corresponding with AI2 Max. Input Analog Quantity	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00~100.00% NOTE: Frequency settings must be based on the max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values				
<b>F6-13</b>	Input Analog Quantity of AI2 Inflection Point	Factory Settings	20.0%	Modification	○
Setting Frequency	F6-09 “Min. analog quantity”~F6-10“Max. analog quantity”				
<b>F6-14</b>	<b>Deviation from AI2 Inflection Point</b>	Factory Settings	2.00%	Modification	○
Setting Frequency	0.00~50.00%				

<b>F6-15</b>	Set Value/Feedback Value Corresponding with AI2 Inflection Point	Factory Settings	0.00%	Modification	○
Setting Frequency	-100.00~100.00%				
<b>F6-16</b>	AI2 Offline Threshold	Factory Settings	0.00%	Modification	○
Setting Frequency	-20.00~20.00%				
<b>F6-17</b>	AI2 Input Filter Time	Factory Settings	0.100s	Modification	○
Setting Frequency	0.000~10.000s				
<b>F6-18</b>	AI3 Min. Input Analog Quantity	Factory Settings	0.00%	Modification	○
<b>F6-19</b>	AI3 Max. Input Analog Quantity	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00~100.00%				
<b>F6-20</b>	Set Value/Feedback Value of AI3 Min. Input Analog Quantity	Factory Settings	0.00%	Modification	○
<b>F6-21</b>	Set Value/Feedback Value of AI3 Max. Input Analog Quantity	Factory Settings	100.00%	Modification	○
Setting Frequency	-100.00~100.00% NOTE: Frequency settings must be based on the max. frequency as a reference; the PID set value/feedback value must be represented as the percentage of the PID reference values				
<b>F6-22</b>	Input Analog Quantity of AI3 Inflection Point	Factory Settings	0.00%	Modification	○
Setting Frequency	F6-18"Min. analog quantity"—F6-19"Max. analog quantity"				
<b>F6-23</b>	Deviation from AI3 Inflection Point	Factory Settings	2.00%	Modification	○
Setting Frequency	0.00~50.00%				
<b>F6-24</b>	Set Value/Feedback Value Corresponding with AI3 Inflection Point	Factory Settings	0.00%	Modification	○

Setting Frequency	-100.00—100.00%				
<b>F6-25</b>	<b>AI3 Offline Threshold</b>	Factory Settings	0.0%	Modification	○
Setting Frequency	-20.00~20.00%				
<b>F6-26</b>	<b>AI3 Input Filter Time</b>	Factory Settings	0.100s	Modification	○
Setting Frequency	0.000~10.000s				

☞ 最大、最小输入模拟量以 -100.00~100.00% 对应电压输入 -10V~10V (或电流信号 -20mA~20mA)。最大、最小输入模拟量为给定或反馈的最小有效信号, 如: AI1 输入信号为 0~10V, 而实际需求为 2~8V 对应 0~100.00%, 则 F6-00=20.00 (20.00%), F6-01=80.00 (80.00%)。同样, 当 AI1 输入为电流信号时, 实际需求为 4~20mA 对应 0~100.00%, 则 F6-00=20.00 (20.00%), F6-01=100.00 (100.00%)。

☞ The max./min. input analog quantity (-100.00—100.00%) corresponds with the voltage input of -10V—10V or the current signal of -20mA~20mA. The max./min. input analog quantity is the min. effective signal set or fed back. For example, If AI1 input signal is 0~10V and the actual demand is 2-8V in correspondence with 0~100.00%, F6-00=20.00 (20.00%) and F6-01=80.00 (80.00%). Likewise, if AI1 input is a current signal and actual demand is 4-20mA in correspondence with 0~100.00%, F6-00=20.00 (20.00%) and F6-01=100.00 (100.00%).

☞ 模拟输入 AI1、AI2、AI3 均可输入电流信号 (-20mA~20mA) 或电压信号(-10V~10V)

☞ Analog inputs AI1, AI2 and AI3 can be used to input current signals (-20mA—20mA) or voltage signals (-10V—10V)

☞ AI1、AI2、AI3 具有相同的电气特性和相同含义的参数设置, 以 AI1 通道参数为例:

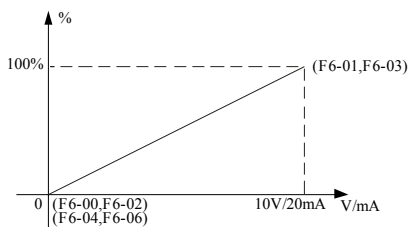
☞ AI1, AI2 and AI3 have the same electrical properties and parameter settings. Take AI1 channel parameter for example:

模拟输入例 1: (AI1、AI3 出厂值)

Analog Input Example 1: (Factory settings of AI1 and AI3)

多数应用场合模拟输入电压为 0~10V/0~20mA 对应给定/反馈为 0~100% 的应用时可直接使用默认的出厂值。此时的拐点输入模拟量和最小输入模拟量重合。

When most applications have an analog input voltage of 0~10V/0~20mA in correspondence with the set value/feedback value of 0~100%, the default factory settings can be directly applied. At this point, the input analog quantity at inflection point overlaps the min. input analog.



F6-00=0.00	最小输入模拟量
F6-01=0.00	最大输入模拟量
F6-02=0.00	最小输入模拟量对应的给定值/反馈值
F6-03=100.00	最大输入模拟量对应的给定值/反馈值
F6-04=0.00	拐点输入模拟量
F6-05=0.00	拐点偏差
F6-06=0.00	拐点对应的给定值/反馈值

最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input Analog Quantity of Inflection Point

拐点偏差: Deviation from inflection point

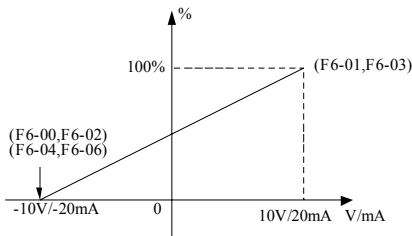
拐点对应的给定值/反馈值: Settings/feedback value corresponding with inflection point

模拟输入例 2:

Analog Input Example 2:

某些应用场合模拟输入电压为 $-10\sim 10\text{V}/-20\sim 20\text{mA}$  对应给定/反馈为 $0\sim 100\%$ 的应用时参数设置如下图。

In some applications where the analog input voltage is  $-10\sim 10\text{V}/-20\sim 20\text{mA}$  in correspondence with the set value/feedback value ( $0\sim 100\%$ ), the parameter settings will be as follows:



F6-00=-100.00	最小输入模拟量
F6-01=100.00	最大输入模拟量
F6-02=0.00	最小输入模拟量对应的给定值/反馈值
F6-03=100.00	最大输入模拟量对应的给定值/反馈值
F6-04=-100.00	拐点输入模拟量
F6-05=0.00	拐点偏差
F6-06=0.00	拐点对应的给定值/反馈值

最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

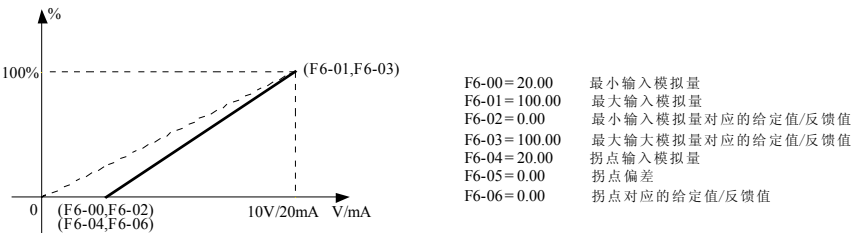
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 3: (AI2 出厂值)

Analog Input Example 3 (Factory settings of AI2):

多数应用场合模拟输入电压为  $2\sim 10\text{V}/4\sim 20\text{mA}$  对应给定/反馈为  $0\sim 100\%$  的应用时参数设置如下图。此时的拐点输入模拟量和最小输入模拟量重合。

In most applications where the analog input voltage is  $2\sim 10\text{V}/4\sim 20\text{mA}$  in correspondence with the set value/feedback value of  $0\sim 100\%$ , the parameter settings will be as follows. At this point, the input analog quantity at inflection point overlaps the min. input analog quantity.



最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

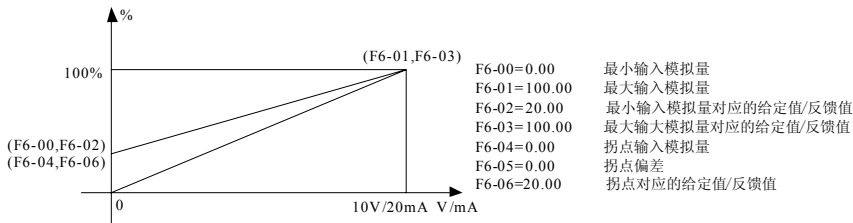
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 4: (带偏置的应用)

## Analog Input Example 4 (Application with offset):

某些应用场合模拟输入电压为  $0\sim 10V/0\sim 20mA$  对应给定/反馈为  $20\sim 100\%$  的应用时参数设置如下图。此时的拐点输入模拟量和最小输入模拟量重合。

In some applications where the analog input voltage is  $0\sim 10V/0\sim 20mA$  in correspondence with the set value/feedback value of  $20\sim 100\%$ , the parameter settings will be as follows. At this point, the input analog quantity at inflection point overlaps the min. input analog quantity:



最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

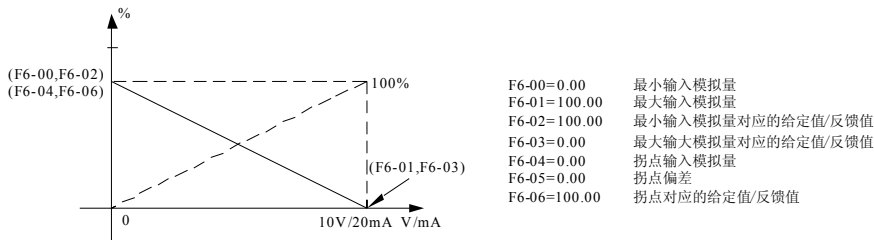
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 5: (反极性应用)

## Analog Input Example 5 (Reversed polarity application):

某些应用场合模拟输入电压为  $0\sim 10V/0\sim 20mA$  对应给定/反馈为  $100\sim 0\%$  的应用时参数设置如下图。此时的拐点输入模拟量和最小输入模拟量重合。

In some applications where the analog input voltage is  $0\sim 10V/0\sim 20mA$  in correspondence with the set value/feedback value of  $100\sim 0\%$ , the parameter settings will be as follows. At this point, the input analog quantity at inflection point overlaps the min. analog input quantity.





最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

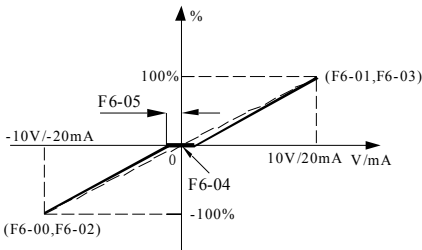
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 6: (带拐点的应用)

Analog Input Example 6 (Application with inflection point):

某些应用场合模拟输入电压为 $-10\sim 10\text{V}/-20\sim 20\text{mA}$  对应给定/反馈为 $-100\sim 100\%$ 的应用时参数设置如下图。该应用中当模拟输入作为频率给定时, 电机的转向由输入量的正负来确定, 拐点设置用于正反转的死区设置。

In some application where the analog input voltage is  $-10\sim 10\text{V}/-20\sim 20\text{mA}$  in correspondence with the set value/feedback value of  $-100\sim 100\%$ , the parameter settings will be as follows. In this case, when the analog input is used for frequency settings, the rotation direction of the motor will depend on the positive/negative feature of the input quantity. The inflection point settings are used for deadband settings in clockwise/anticlockwise rotation.



F6-00=-100.00	最小输入模拟量
F6-01=100.00	最大输入模拟量
F6-02=-100.00	最小输入模拟量对应的给定值/反馈值
F6-03=100.00	最大输入模拟量对应的给定值/反馈值
F6-04=0.00	拐点输入模拟量
F6-05=5.00	拐点偏差
F6-06=0.00	拐点对应的给定值/反馈值

最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

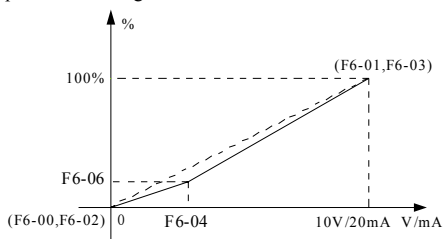
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 7: (带拐点的应用)

Analog Input Example 7 (Application with inflection point):

某些应用场合模拟输入电压为 0~10V/0~20mA 分为两段斜率时, 参数设置如下图。

In some applications where the analog input voltage is 0~10V/0~20mA (split into two slope rates), the parameter settings will be as follows.



F6-00=0.00	最小输入模拟量
F6-01=100.00	最大输入模拟量
F6-02=0.00	最小输入模拟量对应的给定值/反馈值
F6-03=100.00	最大输入模拟量对应的给定值/反馈值
F6-04=30.00	拐点输入模拟量
F6-05=0.00	拐点偏差
F6-06=20.00	拐点对应的给定值/反馈值

最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

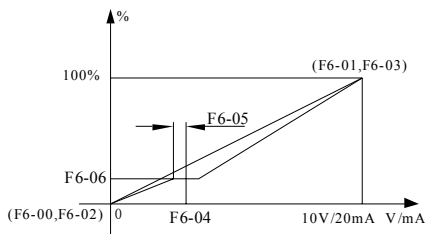
拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

模拟输入例 8: (带拐点的应用)

Analog Input Example 8 (Application with inflection point):

某些应用场合模拟输入电压为 0~10V/0~20mA 分为两段斜率时, 参数设置如下图。

In some applications where the analog input voltage is 0~10V/0~20mA (split into two slope rates), the parameter settings will be as follows:



F6-00=0.00	最小输入模拟量
F6-01=100.00	最大输入模拟量
F6-02=0.00	最小输入模拟量对应的给定值/反馈值
F6-03=100.00	最大输入模拟量对应的给定值/反馈值
F6-04=30.00	拐点输入模拟量
F6-05=5.00	拐点偏差
F6-06=20.00	拐点对应的给定值/反馈值

最小输入模拟量: Min. Input Analog Quantity

最大输入模拟量: Max. Input Analog Quantity

最小输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with min. input analog quantity

最大输入模拟量对应的给定值/反馈值: Settings/feedback value corresponding with max. input analog quantity

拐点输入模拟量: Input analog quantity of inflection point

拐点偏差: Deviation from inflection point

拐点对应的给定值/反馈值: Settings/feedback value corresponding with the inflection point

📖 AI2、AI3 的所有设置与 AI1 相同。

📖 All settings of AI2 and AI3 are identical to those of AI1.

📖 “滤波时间”: 加大它会使响应变慢, 但抗干扰性增强; 减小它会使响应变快, 但抗干扰性变差。

📖 “Filter time”: If the filter time is increased, the response will be slower, but the anti-interference performance will be better; if the filter time is decreased, the response will be faster, but the anti-interference performance will be poorer.

📖 “掉线门限”: 模拟输入低于掉线门限时认为掉线, 掉线动作由 Fb-09“模拟输入掉线动作”确定。

📖 “Offline threshold”: When the analog input falls below the offline threshold, it is considered as an offline. An offline is confirmed by Fb-09 “Analog Input Offline Action”.

**注意:** 当输入信号为有负有正时, 无法判断掉线, 请将掉线门限设置为零则内部不作判断。


**NOTE:** If there are both positive and negative input signals, it's impossible to judge whether there is an offline. If the offline threshold is set as 0, no offline judgment will be needed.

<b>F6-27</b>	<b>AO1功能选择</b>	出厂值	0	更改	○
设定范围	见下面的模拟输出定义表				
<b>F6-28</b>	<b>AO1类型选择</b>	出厂值	0	更改	○
设定范围	0: 0~10V或0~20mA    1: 2~10V或4~20mA    2: 以5V或10mA为中心				
<b>F6-29</b>	<b>AO1增益</b>	出厂值	100.0%	更改	○
设定范围	0.0~1000.0%				

<b>F6-30</b>	<b>AO1偏置</b>	出厂值	0.00%	更改	○
设定范围	-100.00~100.00%，以10V或20mA为100%				
<b>F6-31</b>	<b>AO2功能选择</b>	出厂值	2	更改	○
<b>F6-32</b>	<b>AO2类型选择</b>	出厂值	0	更改	○
<b>F6-33</b>	<b>AO2增益</b>	出厂值	100.0%	更改	○
<b>F6-34</b>	<b>AO2偏置</b>	出厂值	0.00%	更改	○
设定范围	AO2的所有设置与AO1相同				

<b>F6-27</b>	<b>AO1 Function Options</b>	Factory Setting s	0	Modification	○
Setting Range	Refer to the following table of definitions of analog input				
<b>F6-28</b>	<b>AO1 Type Options</b>	Factory Setting s	0	Modification	○
Setting Range	0: 0~10V or 0~20mA      1: 2~10V or 4~20mA      2: 5V or 10mA is taken as the center				
<b>F6-29</b>	<b>AO1 Gain</b>	Factory Setting s	100.0%	Modification	○
Setting Range	0.0~1000.0%				
<b>F6-30</b>	<b>AO1 Offset</b>	Factory Setting s	0.00%	Modification	○
Setting Range	-100.00~100.00%; 10V or 20mA is taken as 100%				
<b>F6-31</b>	<b>AO2 Function Options</b>	Factory Setting s	2	Modification	○
<b>F6-32</b>	<b>AO2 Type Options</b>	Factory Setting s	0	Modification	○
<b>F6-33</b>	<b>AO2 Gain</b>	Factory Setting s	100.0%	Modification	○
<b>F6-34</b>	<b>AO2 Offset</b>	Factory Setting s	0.00%	Modification	○
Setting Range	All settings of AO2 are the same as those of AO1				

 模拟输出定义表

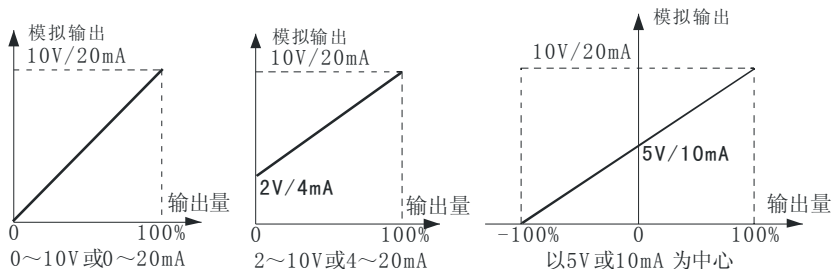
 Table of Definitions of Analog Output

0: 运行频率(以最大频率为满幅值)	8: AI1
1: 给定频率(以最大频率为满幅值)	9: AI2
2: 输出电流(以 2 倍变频器额定电流为满幅值)	10: AI3
3: 输出电压(以 1.5 倍变频器额定电压为满幅值)	11: PFI
4: 输出功率(以 2 倍电机额定功率为满幅值)	12: UP/DOWN 调节值
5: PID 反馈值	13: 直流母线电压(以 1000V 为满幅值)
6: PID 给定值	14: 以偏置作为输出 (偏置不能为负值)
7: PID 输出值	

0: Working Frequency (the max. frequency is taken as the full amplitude value)	8: AI1
1: Set frequency (the max. frequency is taken as the full amplitude value)	9: AI2
2: Output current (Two times the rated inverter current is taken as the full amplitude value)	10: AI3
3: Output voltage (1.5 times the rated inverter voltage is taken as the full amplitude value)	11: PFI
4: Output power (2 times the rated motor power is taken as the full amplitude value)	12: UP/DOWN adjustment
5: PID feedback value	13: DC busbar voltage (1000v is taken as the full amplitude value)
6: PID settings	14: The offset value is taken as the output value (the offset value must not be negative)
7: PID output value	

📖 模拟输出的三种类型如下图:

📖 Refer to the following figure for the three types of analog output:



模拟输出: Analog output

模拟输出: Analog output

模拟输出: Analog output

输出量: Output quantity

输出量: Output quantity

0~10V 或 0~20mA: 0~10V or 0~20mA

2~10V 或 4~20mA: 2~10V or 4~20mA:

以 5V 或 10mA 为中心: Take 5V or 10mA as the central value

输出量: Output quantity

📖 可通过调整增益和偏置来改变量程、校正零点。计算公式为: 输出=输出量×增益+偏置。

📖 The gain and offset may be adjusted to change the measurement range and calibrate the zero point. Formula: Output=Output×Gain+Offset.

📖 以偏置作为输出时,可以得到一个设定范围为 0~20mA (0~10V) 的恒定电流(电压)源。

📖 Take the offset as the output value and a constant current (voltage) source (setting range: 0~20mA (0~10V)) will be available.





fixed at F6-40.

## 6.8 F7 过程PID参数

### 6.8 F7: PID Parameters

F7-00	PID控制功能选择	出厂值	0	更改	×
设定范围	0: 不选择过程PID控制 1: 选择过程PID控制 (PID输出以最大频率为100%) 2: 选择PID对给定频率修正 (PID输出以最大频率为100%) 3: 选择过程PID控制, 用于恒压供水频率给定				

F7-00	PID Control Function Options	Factory Setting	0	Modification	×
Setting Range	0: PID control is not selected 1: PID control is selected (PID output takes the max. frequency as 100%) 2: PID is selected for frequency settings modification (PID output takes the max. frequency as 100%) 3: PID control is selected for frequency settings of constant pressure water supply				

过程 PID 可用于张力、压力、流量、液位、温度等过程变量的控制。比例环节产生与偏差成比例变化的控制作用来减少偏差；积分环节主要用于消除静差，积分时间越大，积分作用越弱，积分时间越短，积分作用越强；微分环节通过偏差的变化趋势预测偏差信号的变化，并在偏差变大之前产生抑制偏差变大的控制信号，从而加快控制的响应速度。

PID may be used to control such process variables as tension, pressure, flow rate, liquid level and temperature. 比例环节产生与偏差成比例变化的控制作用来减少偏差；the integral element is used primarily to eliminate steady-state errors. The longer the integral time, the weaker the integral effect; the shorter the integral time, the stronger the integral effect. The differential element predicts the change of deviational signals by analyzing the trend of deviational changes. It also inhibits the control signals prior to deviational increase so as to improve the response speed of the control.

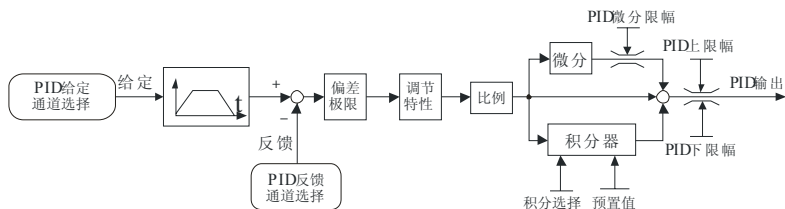
如果选择过程 PID 控制用于恒压供水 (F7-00=3)，而没有选择供水功能时 (F8-00)，参数设置无效，等同于 F7-00=0。

If the PID control is selected for constant pressure water supply (F7-00=3) but the water supply function (F8-00) is not selected, the parameter settings will be ineffective (F7-00=0).

过程 PID 的结构如下图：

Refer to the following figure for PID structure:





PID 给定通道选择: PID setting channel options 给定: Settings 反馈: Feedback PID 反馈通道选择: PID feedback channel options 偏差极限: Ultimate deviation 调节特性: Adjustment characteristics

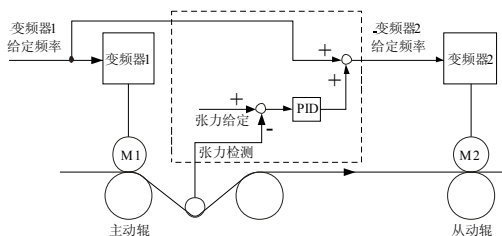
比例: Ratio 微分: Differentiator PID 微分限幅: PID differential amplitude clipping limit PID 上限幅: PID upper amplitude clipping limit PID 输出: PID output 积分器: Integrator 积分选择: Integral options 预置值: Preset value PID 下限幅: PID Lower amplitude clipping limit

过程 PID 用于给定频率修正可以使变频器方便地用于主从同步或张力控制的场合。

When PID is used for frequency correction, the inverter may be used in master-slave synchronization or tension control applications

**给定频率修正:** PID 输出叠加在加减速斜坡前的给定频率上, 进行修正, 如下图:

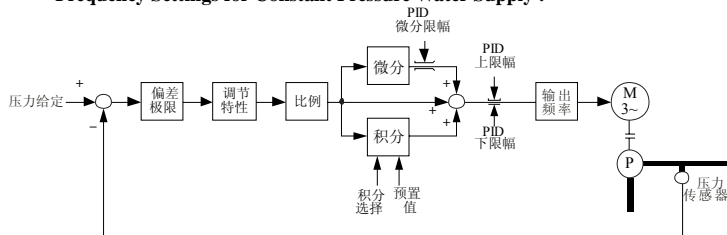
Frequency Setting Correction: For correction, PID output is superimposed on the set frequency prior to the acceleration/deceleration ramp. Refer to the following figure:



变频器 1 给定频率: Frequency settings of Inverter 1 变频器 1: Inverter 1 主动辊: Drive shaft 张力给定: Tension settings 张力检测: Tension detection 变频器 2 给定频率: Frequency settings of Inverter 2 变频器 2: Inverter 2 从动辊: Driven shaft

**恒压供水频率给定:**

**Frequency Settings for Constant Pressure Water Supply :**



压力给定: Pressure settings 偏差极限: Ultimate deviation 调节特性: Adjustment characteristics 比例: Ratio 微分: Differentiator PID 微分限幅: PID differential amplitude clipping limit 积分: Integrator 积分选择: Integral options 预置值: Preset value PID 上限幅: PID upper amplitude clipping limit PID 下限幅: PID lower amplitude clipping limit 输出频率: Output frequency 压力传感器:

## Pressure transducer

<b>F7-01</b>	<b>给定通道选择</b>			出厂值	0	更改	×
设定范围	0: F7-04 5: PFI	1: AI1 6: 通讯给定	2: AI2 7: AI1-AI2	3: AI3 8: AI1+AI2	4: UP/DOWN调节值 9: 面板电位器		
<b>F7-02</b>	<b>反馈通道选择</b>			出厂值	0	更改	×
设定范围	0: AI1 4: AI1+AI2 8: $\sqrt{ AI1 }+\sqrt{ AI2 }$	1: AI2 5: $\sqrt{ AI1 }$	2: AI3 6: $\sqrt{ AI2 }$	3: AI1-AI2 7: $\sqrt{ AI1-AI2 }$	10: MAX(AI1, AI3) 11: MIN(AI1, AI3)		
<b>F7-03</b>	<b>PID参考标量</b>			出厂值	10.00	更改	○
设定范围	0.00~100.00 (传感器量程)						
<b>F7-04</b>	<b>PID数字给定</b>			出厂值	5.00	更改	○
设定范围	-F7-03~F7-03						

<b>F7-01</b>	Channel Setting Options			Factory Setting s	0	Modification	×
Setting Range	0: F7-04 5: PFI	1: AI1 6: Communication settings	2: AI2 7: AI1-AI2	3: AI3 8: AI1+AI2	4: UP/DOWN adjustment 9: Panel potentiometer		
<b>F7-02</b>	<b>Feedback Channel Option</b>			Factory Setting s	0	Modification	×
Setting Range	0: AI1 4: AI1+AI2 8: $\sqrt{ AI1 }+\sqrt{ AI2 }$	1: AI2 5: $\sqrt{ AI1 }$	2: AI3 6: $\sqrt{ AI2 }$	3: AI1-AI2 7: $\sqrt{ AI1-AI2 }$	10: MAX(AI1, AI3) 11: MIN(AI1, AI3)		
<b>F7-03</b>	<b>PID Reference Value</b>			Factory Setting	10.00	Modification	○
Setting Range	0.00~100.00 (transducer measurement range)						
<b>F7-04</b>	<b>PID Digital Settings</b>			Factory Setting	5.00	Modification	○
Setting Range	-F7-03-F7-03						

过程 PID 采用归一化的输入和输出：输入输出范围都是±100%，输入的标定与反馈通道的选择、传感器特性和模拟输入的设置有关；输出的标定在频率控制时以最大频率为 100%。

PID adopts normalized input/output. The input/output range is ±100%. Input calibration is related to feedback channel options, transducer characteristics and analog input settings. Input calibration takes the max. frequency as 100% in frequency control mode.

- ☞ 给定通道和反馈通道中有滤波环节，例如 A11 的滤波时间为 F6-08，这些滤波环节会影响控制性能，可根据实际需要进行设置。
- ☞ Set channels and feedback channels have a filter process. For example, the filter time of A11 is F6-08. The filter process affects control performances and may be configured as required by basic demand.
- ☞ 在一些机械中（如离心机），入口压力信号的平方根和流量为线性关系，通过平方根反馈形式可以实现对流量的控制。
- ☞ In some mechanical applications (e.g. a centrifuge), the square root of the inlet pressure signal is linearly related to the flow rate. Flow rate control can be realized in the form of square root feedback.
- ☞ F7-03“PID 参考标量”，以传感器量程作为设定值，PID 给定值、反馈值以实际值设定和显示。
- ☞ F7-03 “PID reference value”: The transducer measurement range is used for value settings. PID settings and feedback values are configured and displayed as actual values.

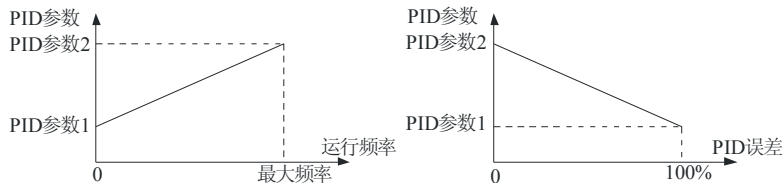
<b>F7-05</b>	<b>比例增益1</b>	出厂值	0.20	更改	○
设定范围	0.00~100.00				
<b>F7-06</b>	<b>积分时间1</b>	出厂值	20.00s	更改	○
设定范围	0.01~100.00s				
<b>F7-07</b>	<b>微分时间1</b>	出厂值	0.00s	更改	○
设定范围	0.00~10.00s				
<b>F7-08</b>	<b>比例增益2</b>	出厂值	0.20	更改	○
设定范围	0.00~100.00				
<b>F7-09</b>	<b>积分时间2</b>	出厂值	20.00s	更改	○
设定范围	0.01~100.00s				
<b>F7-10</b>	<b>微分时间2</b>	出厂值	0.00s	更改	○
设定范围	0.00~10.00s				
<b>F7-11</b>	<b>PID参数过渡方式</b>	出厂值	0	更改	×
设定范围	0: 由数字输入36“PID参数2选择”确定，见136页 1: 根据运行频率过渡 2: 根据偏差过渡				

<b>F7-05</b>	<b>Proportional Gain 1</b>	Factory Setting	0.20	Modification	○
Setting Range	0.00~100.00				
<b>F7-06</b>	<b>Integral Time 1</b>	Factory Setting	20.00s	Modification	○
Setting Range	0.01~100.00s				
<b>F7-07</b>	<b>Differential Time 1</b>	Factory Setting	0.00s	Modification	○

Setting Range	0.00~10.00s				
<b>F7-08</b>	<b>Proportional Gain 2</b>	Factory Settings	0.20	Modification	○
Setting Range	0.00~100.00				
<b>F7-09</b>	<b>Integral Time 2</b>	Factory Settings	20.00s	Modification	○
Setting Range	0.01~100.00s				
<b>F7-10</b>	<b>Differential Time 2</b>	Factory Settings	0.00s	Modification	○
Setting Range	0.00~10.00s				
<b>F7-11</b>	<b>PID Parameter Transition Mode</b>	Factory Settings	0	Modification	×
Setting Range	0: Depend on Digital input 36 "PID Parameter Option 2. Refer to Page 54 1: Transition by working frequency 2: Transition by deviation				

SB200 有两套 PID 参数：PID 参数 1 (F7-05、F7-06、F7-07) 和 PID 参数 2 (F7-08、F7-09、F7-10)，两套参数可通过数字输入 36“PID 参数 2 选择”进行参数切换；还可根据运行频率或给定与反馈的偏差百分比逐渐过渡切换，特别适合于卷径变化较大卷绕控制。

The SB200 series have two PID parameter systems: PID parameters 1 (F7-05/F7-06/F7-07) and PID parameters 2 (F7-08/F7-09/F7-10). Parameter switching is available for digital input 36 "PID Parameter Option 2". Also, gradual transition switching is available according to the working frequency or the percentage of the deviation between the settings and the feedback value. The two parameter systems are especially fit for winding control with a large winding diameter.



PID 参数: PID parameter

PID 参数 2: PID Parameter 2


PID 参数 1: PID Parameter 1

PID 误差: PID error

最大频率: Max. frequency 运行频率: Working frequency


PID 参数调整原则：先将比例增益从较小值（如 0.20）增大直至反馈信号开始振荡，然后减小 40~60%使反馈信号稳定；将积分时间从较大值（如 20.00s）减小直至反馈信号开始振荡，然后增大


10~50%使反馈信号稳定。如果系统对超调和动态误差要求较高，可以加入微分作用。

-  PID Parameter Adjustment Principle: Increase the proportional gain from a smaller value (0.20) until the feedback signal starts to oscillate and then reduce it by 40%-60% to stabilize the feedback signal. Decrease the integral time from a greater value (20.00s) until the feedback signal starts to oscillate and then increase it by 10%-50% to stabilize the feedback signal. If the system has a relatively high requirement on overshooting and dynamic error, differential action may be used.

<b>F7-12</b>	<b>采样周期</b>	出厂值	0.010s	更改	○
设定范围	0.001~10.000s				


<b>F7-12</b>	<b>Sampling Period</b>	Factory Setting s	0.010s	Modification	○
Setting Range	0.001~10.000s				


-  PID 的采样周期：一般设置应比被控对象的响应时间小 5~10 倍。

-  PID Sampling Period: Generally, the settings should be 5 to 10 times smaller than the response time of the controlled object.


<b>F7-13</b>	<b>偏差极限</b>	出厂值	0.0%	更改	○
设定范围	0.0~20.0%，以PID给定值为100%				

<b>F7-13</b>	<b>Ultimate Deviation</b>	Factory Setting s	0.0%	Modification	○
Setting Range	0.0~20.0%; PID settings are taken as 100%				

-  给定和反馈的偏差小于偏差极限时，PID 停止调节，输出保持不变。此功能可消除控制的频繁动作。如下图：

-  When the deviation between the set value and the feedback is smaller than the ultimate deviation, PID stops adjustment and the output remains unchanged. This function is used to eliminate frequent actions of the control.




-  PID adjustment characteristics: An positive action means that when the settings are increased under stable working conditions, the rotation speed is required to be increased (i.e. heating control); a negative action means that when the settings are increased under stable working conditions, the rotational speed is required to be decreased (i.e. cooling control).

<b>F7-16</b>	<b>积分调节选择</b>	出厂值	1	更改	×
设定范围	0: 无积分作用 1: 有积分作用				
<b>F7-17</b>	<b>PID上限幅值</b>	出厂值	100.0%	更改	○
设定范围	F7-18“PID下限幅值”~100.0%				
<b>F7-18</b>	<b>PID下限幅值</b>	出厂值	0.0%	更改	○
设定范围	-100.0%~F7-17“PID上限幅值”				
<b>F7-19</b>	<b>PID微分限幅</b>	出厂值	5.0%	更改	○
设定范围	0.0~100.0%，对微分分量进行上下限幅				

<b>F7-16</b>	<b>Integral Control Options</b>	Factory Setting	1	Modification	×
Setting Range	0: No integral action 1: Integral action				
<b>F7-17</b>	<b>PID Upper Amplitude Limit</b>	Factory Setting	100.0%	Modification	○
Setting Range	F7-18 “PID Lower Amplitude Limit”~100.0%				
<b>F7-18</b>	<b>PID Lower Amplitude Limit</b>	Factory Setting	0.0%	Modification	○
Setting Range	-100.0%~F7-17 “PID Upper Amplitude Limit”				
<b>F7-19</b>	<b>PID Differential Amplitude Clipping</b>	Factory Setting	5.0%	Modification	○
Setting Range	0.0~100.0%; clipping of the upper/lower amplitude limits of differential components				

-  用户根据需要对 PID 进行限幅，适当的限幅可减小超调，避免产生过大的控制量。

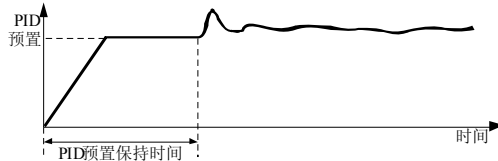
-  The user should clip PID amplitude as required. Appropriate clipping can reduce overshooting and prevent overlarge controlled quantities.

<b>F7-20</b>	<b>PID预置</b>	出厂值	0.0%	更改	○
设定范围	F7-18“PID下限幅值”~F7-17“PID上限幅值”				
<b>F7-21</b>	<b>PID预置保持时间</b>	出厂值	0.0s	更改	×
设定范围	0.0~3600.0s				

<b>F7-20</b>	<b>PID Preset Value</b>	Factory Settings	0.0%	Modification	○
Setting Range	F7-18 “PID lower amplitude limit”~F7-17 “PID Upper amplitude limit”				
<b>F7-21</b>	<b>PID Preset Value Hold Time</b>	Factory Settings	0.0s	Modification	×
Setting Range	0.0~3600.0s				

📖 PID 的预置功能：在预置保持时间内，PID 的输出保持为预置值，相当于开环控制。在预置阶段结束时刻，PID 的积分器初值置为预置值，转入 PID 闭环控制。如下图：

📖 PID Presetting: PID output will be maintained at the preset value within the preset maintenance time. It corresponds with an open-loop control. Upon completion of the preset stage, the integrator initial value of PID is the preset value and PID closed-loop control becomes effective. Refer to the following figures:



PID 预置: PID preset value

PID 预置保持时间: PID preset value hold time

时间: Time

📖 如果设置预置保持时间为零，则以预置值为积分器初值进行 PID 控制，相当于 PID 的预负载，可以提高启动时的响应速度。

📖 If the preset value maintenance time is set as zero, PID control will be conducted upon taking the preset value as the initial value of the integrator. It corresponds with the preload of PID and is used to improve the response speed at the startup stage.

<b>F7-22</b>	<b>多段PID给定1</b>	出厂值	1.00	更改	○
<b>F7-23</b>	<b>多段PID给定2</b>	出厂值	2.00	更改	○
<b>F7-24</b>	<b>多段PID给定3</b>	出厂值	3.00	更改	○
<b>F7-25</b>	<b>多段PID给定4</b>	出厂值	4.00	更改	○
<b>F7-26</b>	<b>多段PID给定5</b>	出厂值	5.00	更改	○
<b>F7-27</b>	<b>多段PID给定6</b>	出厂值	6.00	更改	○
<b>F7-28</b>	<b>多段PID给定7</b>	出厂值	7.00	更改	○
设定范围	—F7-03~F7-03				

<b>F7-22</b>	<b>Multi-PID Setting 1</b>	Factory Settings	1.00	Modification	○
--------------	----------------------------	------------------	------	--------------	---



<b>F7-23</b>	<b>Multi-PID Setting 2</b>	Factory Setting s	2.00	Modification	○
<b>F7-24</b>	<b>Multi-PID Setting 3</b>	Factory Setting s	3.00	Modification	○
<b>F7-25</b>	<b>Multi-PID Setting 4</b>	Factory Setting s	4.00	Modification	○
<b>F7-26</b>	<b>Multi-PID Setting 5</b>	Factory Setting s	5.00	Modification	○
<b>F7-27</b>	<b>Multi-PID Setting 6</b>	Factory Setting s	6.00	Modification	○
<b>F7-28</b>	<b>Multi-PID Setting 7</b>	Factory Setting s	7.00	Modification	○
Setting Range	-F7-03—F7-03				

📖 用于多段 PID 控制，详见 134 页数字输入 8、9、10“多段 PID 选择 1~3”的说明。

📖 For multi-PID control applications, refer to Digital Inputs 8, 9 and 10 “Multi-PID Options 1~3” on Page 53.





## 6.9 F8 供水专用功能


### 6.9. F8: Dedicated Water Supply Functions

<b>F8-00</b>	<b>Water Supply Mode Options</b>	Factory Setting s	0	Modification	×
Setting Range	0: Water supply function is not selected 1: Common PI-regulated constant-pressure water supply 2: Water level control 3: Pumps are started on by one in the sequence based on water pump capacity 4: Firefighting water supply				



📖 **F8-00=1 普通 PI 调节恒压供水。**变频器对压力信号进行采样，并经 PI 调节器运算确定变频器的输出频率，调节水泵的运行转速，从而实现恒压供水。当有消防运转指令输入时，以设定的加速时间快速启动水泵运行，这时输出频率不由 PID 调节器给出。

📖 When **F8-00=1, common PI-regulated constant-pressure water supply will be effective.** The inverter samples from pressure signals and adopt PI regulator calculation to determine the output frequency of the inverter. Thus the rotation speed of the water pump is adjusted to realize constant pressure water supply. If any firefighting operation command is inputted, the water pump will be quickly started at the preset acceleration time. At this point, the output frequency will not be set by the PID regulator.

-  **F8-00=2 水位控制。**在水位控制模式下，变频器接收到运行指令后，进入待机状态，依据水位信号（数字输入 52、53 见 139 页）起/停水泵。运行时，主泵、辅助泵均以全速运行。
-  **When F8-00, water level control is effective:** In water level control mode, the inverter will enter the standby mode after receipt of execution commands and start up or shut down the water pump according to water level signals (digital inputs 52 and 53; refer to Page 55). In operation, the main pump and the auxiliary pump operate at full speed.
-  **F8-00=3 单台泵依次运行，以水泵容量排序。**系统规定 1#容量为最小，遵循 1#泵<2#泵<3#泵...，当较小容量泵运行到上限频率时，如果压力低于设定值，则停止当前泵，起动较大容量泵运行。当较大泵运行在下限频率而压力高于设定值时，停止当前泵，起动较小容量泵运行。单台泵恒压运行时，运行频率由 PID 调节器给出。
-  **When F8-00=3, pumps are started on by one in the sequence based on water pump capacity.** The system prescribes the min. capacity for Pump #1 (Pump #1<Pump #2<Pump #3...). When the pump of a smaller capacity attains to the upper frequency limit, if the pressure is lower than the settings, the current pump will be shut down and the pump of a larger capacity will be started up. When the pump of a larger capacity is operating at a lower frequency limit and the pressure is higher than the settings, the current pump will be shut down and the pump of a smaller capacity will be started. In the case of a single pump in constant pressure operation, the working frequency is set by the PID regulator.

 **注意：F8-00 = 3 运行模式，辅助泵配置无效。**







**CAUTION:** In the working mode where **F8-00 = 3, the settings for auxiliary pumps are ineffective.**

-  **F8-00=4 专用消防供水。**选择专用消防供水时，定期对水泵进行巡检，以免水泵长期不运转而锈死。当消防运转指令输入时，系统快速起动所有泵，以最大供水能力运行。此模式下，输出频率不由 PID 调节器给出。
-  **When F8-00=4, firefighting water supply is selected.** When firefighting water supply is selected, regular patrols must be organized on a regular basis to prevent longtime disuse from causing rusts. When the firefighting operation command is inputted, the system will quickly start all the pumps at the largest water supply capacity. In this mode, the output frequency is not set by the PID regulator.

F8-01	水泵配置及休眠选择	出厂值	00001	更改	×
设定范围	个位：变频循环投切泵的数量 1~5				
	十位：辅助运行泵的数量0~4				
	百位：辅助泵起动方式				
	0：直接起动                      1：通过软起动器起动				
	千位：休眠及休眠泵选择 0：不选择休眠泵              1：休眠泵变频运行              2：休眠泵工频运行              3：主泵休眠运行				
万位：排污泵选择 0：不控制排污泵              1：控制排污泵					

F8-01	Water Pump Settings and Sleeping Options	Factory Setting	00001	Modification	×
		s			





设定范围	Units digit: Number of variable-frequency cyclic switchover pumps: 1~5
	Tens digit: Number of auxiliary pumps : 0~4
	Hundreds digit: Startup mode of auxiliary pumps 0: Direct startup                      1: Startup by soft starter
	Thousands digit: Sleeping and sleeping pump options 0: The sleeping pump is not selected      1: The sleeping pump works at a variable frequency      2: The sleeping pump works at a line frequency      3: The main pump is in sleeping mode
	Ten thousands digit: Drainage pump options 0: Drainage pump not under control      1: Drainage pump under control

-  **变频循环投切泵（主泵）数量：**指既可以变频运行又可以工频运行的水泵，最大配置为 5 台。
-  **Number of variable-frequency cyclic switchover pump s(main pumps):** These are pumps capable of both variable-frequency operation and line-frequency operation. The max. number is 5 pumps.
-  **辅助泵运行数量：**指仅工频运行的水泵。
-  **Number of auxiliary pumps:** These are pumps working only at a line frequency.
-  **辅助泵起动方式：**“0：直接起动”，只能用于较小功率水泵，通常为 30kW 以下的水泵。“1 通过软起动器 起动”，当水泵容量较大时，不能直接投入到工频运行，需要通过软起动器起动等方式，同时需要配置数字输出或继电器输出用以控制软起动器起动/停止。见 146 页数字输出功能定义表。
-  **Startup mode of auxiliary pumps:** “0” means direct startup. It is suitable for only pumps of a smaller power (30kW and below). “1” means startup by soft starter. A pump of a larger capacity must not be directly started at a line frequency; rather, a soft starter is required and digital output or relay output must be configured to control the startup/shutdown of the soft starter. Refer to the table of definitions of digital output functions on Page 58.



**注意：**主泵和辅助泵数目根据继电器数目配置，变频器内置 5 个继电器，可扩展到 11 个继电器，主泵+辅助泵≤5。当设置主、辅泵总数目大于 5 时，辅助泵台数=5—主泵台数（系统优先配置主泵，例：主泵台数为 2，辅助泵台数为 2 时主泵编号为 1#，2# 泵，辅助泵编号为 3#，4# 泵）。

**CAUTION:** The number of main pumps and auxiliary pumps must be configured according to the number of relays. The inverter has 5 inbuilt relays and expansibility allows for 11 relays in all (Main pumps + Auxiliary pumps≤5). When the total number of main pumps and auxiliary pumps exceeds 5, the number of auxiliary pumps=5—Number of main pumps (The system configures the main pumps as a priority. For example, if there are 2 main pumps and 2 auxiliary pumps, the serial number of the main pumps will be #1 and #2 and the serial number of the auxiliary pumps will be #3 and #4).

-  **休眠及休眠泵选择：**配置比主泵容量小的水泵作为休眠泵，在用水量很小时，起动休眠泵更节能。详见 189 页休眠功能描述。
-  **Sleeping and sleeping pump options:** Pumps with a smaller capacity than the main pump are used as the sleeping pump. If the water consumption is very small, the sleeping pump is a more energy-saving option. Refer to the description of the sleeping function on Page 75.
-  **排污泵选择：**安装污水池液位检测开关或液位传感器，控制排污泵运行。
-  **Drainage pump option:** A liquid level detector or transducer is installed for the wastewater pool to

control the operation of the drainage pump.

📖 请参见第十章应用举例

📖 Refer to the application cases in Chapter X

F8-02	故障及PID下限选择	出厂值	00	更改	×
设定范围	个位: PID下限选择 0: 停止运行      1: 保持运行				
	十位: 故障动作选择 0: 全部泵停止运行, 处于故障状态 1: 保持工频运行的泵, 故障复位后继续运行 2: 保持工频运行的泵, 故障复位后处于待机状态				

F8-02	Fault and PID Lower Limit Options	Factory Setting	00	Modification	×
Setting Range	Units digit: PID lower limit options 0: Operation shutdown      1: Operation maintained				
	Tens digit: Fault action options 0: All pumps are shut down and in fault status 1: The pump in line frequency operation resumes operation after a fault reset 2: The pump in line frequency operation are on standby after a fault reset				

📖 **PID 下限选择。**选“0: 停止运行”时, 当单台水泵处于下限频率运行而反馈值仍大于给定值时, 水泵停止运转; 在某些场合, 不允许全部水泵停止运转, 即便是单台水泵处于下限频率运行反馈值仍大于给定值, 在这种需求情况下, 需设置为“1: 保持运行”。

📖 **PID lower limit options:** When “0: operation shut down” is selected, if a single pump is operating at a lower frequency limit but the feedback value is still greater than the set value, the pump will stop operation. In some cases, the shutdown of all pumps is not allowed. Even if a single pump is working at a lower frequency limit but the feedback value is still greater than the set value, “1: operation maintained” must be set.

📖 **故障动作选择。**提供了几种动作选择, 选为 1、2 时, 当变频器或外部故障时, 保持已经处于工频运行的水泵继续运行。当接触器检测故障时, 此功能无效。

📖 **Fault action options:** Several action options are provided. If 1 or 2 is selected, in the case of an inverter fault or an external fault, the pump already working at a line frequency will be maintained in operation. When the contactor detects a fault, this function will be ineffective.

F8-03	清水池、污水池水位信号选择	出厂值	00	更改	○
设定范围	十位: 污水池信号选择 0: 不检测水位信号 3: 模拟信号 AI3 输入	个位: 清水池信号选择 1: 模拟信号 AI1 输入 4: 数字信号输入	2: 模拟信号 AI2 输入		
F8-04	清水池水位下限信号	出厂值	30.0%	更改	○
F8-05	清水池水位上限信号	出厂值	80.0%	更改	○
F8-06	清水池水缺水信号	出厂值	50.0%	更改	○

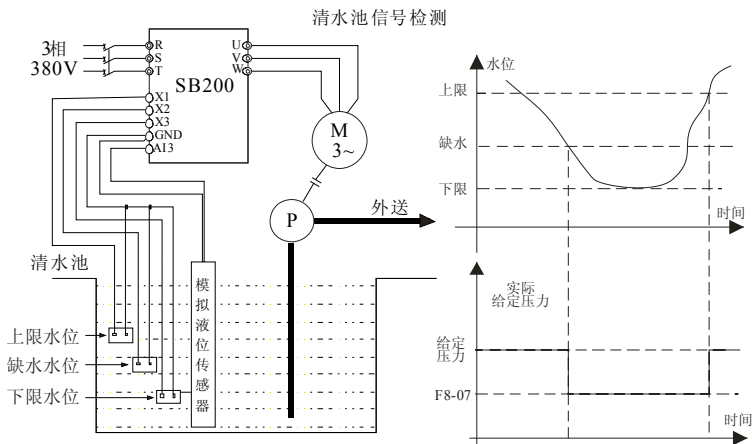
设定范围	0.0~100.0%				
<b>F8-07</b>	<b>清水池缺水时压力给定</b>	出厂值	4.00	更改	○
设定范围	—F7-03~F7-03				
<b>F8-08</b>	<b>污水池下限水位信号</b>	出厂值	30.0%	更改	○
<b>F8-09</b>	<b>污水池上限水位信号</b>	出厂值	80.0%	更改	○
设定范围	0.0~100.0%				

<b>F8-03</b>	<b>Clean Water Pool/Waste Water Pool Level Signal Options</b>	Factory Settings	00	Modification	○
Setting Range	Tens digit: Waste water pool signal options 0: Water level signal is not subject to detection Analog signal AI2 input 3: Analog signal AI3 input Units digit: Clean water pool signal options 1: Analog signal AI1 input 4: Digital signal input 2:				
<b>F8-04</b>	<b>Clean Water Pool Lower Level Limit Signal</b>	Factory Settings	30.0%	Modification	○
<b>F8-05</b>	<b>Clean Water Pool Upper Level Limit Signal</b>	Factory Settings	80.0%	Modification	○
<b>F8-06</b>	<b>Clean Water Pool Water Shortage Signal</b>	Factory Settings	50.0%	Modification	○
Setting Range	0.0~100.0%				
<b>F8-07</b>	<b>Pressure Settings for Clean Water Pool at the Time of Water Shortage</b>	Factory Settings	4.00	Modification	○
Setting Range	—F7-03~F7-03				
<b>F8-08</b>	Waste Water Pool Lower Level Limit Signal	Factory Settings	30.0%	Modification	○
<b>F8-09</b>	Waste Water Pool Upper Level Limit Signal	Factory Settings	80.0%	Modification	○
Setting Range	0.0—100.0%				

☞ **清水池水位信号**。可以通过液位传感器或外部液位开关进行检测，F8-04、F8-05、F8-06 分别设置清水池的下限、上限和缺水信号。当水位低于缺水水位时，将自动切换到缺水时压力给定(F8-07)运行，通过这样的处理，避免在水源较少时以最大能力投入运行，造成不必要的损耗。当水位信号低于下限水位信号时，系统停止运转，并报清水池缺水故障。选择为数字输入时，选择任意 3 个数字输入端作为液位输入，分别设置为“4、5、6 清水池水位检测信号”。

☞ **Clean Water Pool Level Signals**: Water level detection may be operated via a liquid level transducer or an external liquid level detector. F8-04, F8-05 and F8-06 are respectively used to set the lower limit

signal, upper limit signal and water shortage for the clean water pool. When the water level drops below the water shortage level, the inverter will automatically switch to F8-07 (Pressure Settings for Clean Water Pool at the Time of Water Shortage) for operation. This is intended to prevent max. operation capacity in the case of a water shortage which may cause unnecessary loss. When the water level signal is lower than the lower water level limit signal, the system will stop operation and report a water shortage fault. If digital input is selected, any three digital input terminals are used as liquid level input terminals and respectively set as “water level detection signals for Clean Water Pools 4, 5 and 6”.

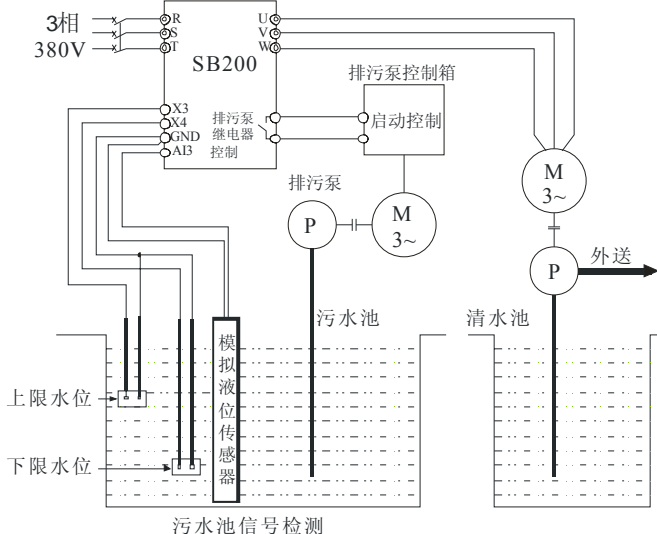


清水池信号检测: Clean water pool signal detection    3 相 380V: 3 phase, 380V    外送: Transmitted out  
 清水池: Clean water pool    上限水位: Upper water level limit  
 缺水水位: Water shortage level    下限水位: Lower water level limit    模拟液位传感器: Analog water level transducer  
 水位: Water level    上限: Upper limit    缺水: Water shortage    下限: Lower limit  
 时间: Time    实际给定压力: Actual pressure settings    给定压力: Pressure settings    时间: Time

**污水池水位信号。**可以通过液位传感器或外部液位开关进行检测，F8-08、F8-09 分别设置污水池的下限、上限，当检测到污水积水到达上限水位时，排污泵自动运行（需设置排污泵与相应控制继电器），当污水积水排放到下限液位时，排污泵停止运转。选择为数字输入时，选择任意 2 个数字输入端作为液位输入，分别设置为“50、51 污水池水位检测”，信号连接时，只需两个普通的简易水位探头（可用硬铜丝替代），固定于污水池中，如图所示，引出三根线至变频器可编程数字输入端子，即可实现污水池水位检测。

**Waste Water Pool Level Signals: Water level detection may be operated via a liquid level transducer or an external liquid level detector.** F8-08 and F8-09 are respectively used to set the lower limit signal and upper limit signal for the waste water pool. When the wastewater reaches the upper level limit, the drainage pump will automatically start (the pump and the corresponding control relays must be configured). When the water level drops to the water shortage level, the drainage pump will shut down. If digital input is selected, any two digital input terminals are used as liquid level input terminals and respectively set as “water level detection for Waste Water Pools 50 and 51”. The connection for signals requires only two common water level probes (hard copper wires are recommend as a substitute), which

are fixed in the waste water pool. Refer to the following figure. Three lead-out wires connected to the programmable digital input terminal of the inverter will realize water level detection.



污水池信号检测


3 相 380V: 3-phase, 380V      排污泵继电器控制: Drainage pump relay control      排污泵控制箱: Drainage pump control box  
 启动控制: Startup controller      排污泵: Drainage pump      外送: Transmitted out  
 上限水位: Upper water level limit      下限水位: Lower water level limit      模拟液位传感器: Analog water level transducer  
 污水池: Wastewater pool      清水池: Clean water pool      污水池信号检测: Wastewater pool signal detection


<b>F8-10</b>	<b>加泵延时时间</b>	出厂值	30.0s	更改	○
<b>F8-11</b>	<b>减泵延时时间</b>	出厂值	30.0s	更改	○
设定范围	0.0~600.0s				

<b>F8-10</b>	加泵 Time Delay	Factory Settings	30.0s	Modification	○
<b>F8-11</b>	减泵 Time Delay	Factory Settings	30.0s	Modification	○
Setting Range	0.0~600.0s				

**加泵延时时间:** 该参数是设定变频器的输出频率到达上限频率以后, 用来判断是否增加水泵的判断时间。消防运转指令输入时, 该参数设置无效, 这时以最短时间启动主泵和辅助泵。

**加泵 Time Delay:** This parameter is the think time used to judge if there is need for more pumps after the output frequency of the inverter reaches the upper frequency limit. This parameter will become ineffective after firefighting operation commands are inputted. At this point, the main pumps and the auxiliary pumps may be started in the shortest time.

 **减泵延时时间:** 该参数是设定变频器的输出频率到达泵下限频率以后, 用来判断是否减少水泵的判断时间。

 减泵 time delay: This parameter is used to judge if there is need for fewer pumps after the output frequency of the inverter reaches the lower frequency limit of the pump.


注: 加泵延时时间和减泵延时时间依据压力变化的快慢来设定, 在不发生振荡的范围内, 设置越短越好。


NOTE: The settings of the 加泵 Time Delay and 减泵 time delay depend on the rate of pressure change.


The settings must be the shortest without oscillation.


<b>F8-12</b>	<b>加泵切入频率</b>	出厂值	40.00 Hz	更改	○
<b>F8-13</b>	<b>减泵切入频率</b>	出厂值	45.00 Hz	更改	○
设定范围	0.00~50.00Hz				

<b>F8-12</b>	<b>加泵切入频率</b>	Factory Setting s	40.00 Hz	Modification	○
<b>F8-13</b>	<b>减泵切入频率</b>	Factory Setting s	45.00 Hz	Modification	○
Setting Range	0.00~50.00Hz				

 **加泵切入频率:** 当输出频率到达上限频率, 需要增加泵运行时, 变频器运行到加泵切入频率, 避免由于泵的增加造成压力突然增加, 从而压力超调, 发生振荡。

 加泵切入频率: If more pumps are needed after the output frequency reaches the upper frequency limit, the inverter will operate at the 加泵切入频率. This is intended to prevent a sudden pressure rise as a result of more pumps from causing pressure overshoot and oscillation.

 **减泵切入频率:** 当输出频率到达变频运行泵最低运行频率, 需要减少泵运行时, 变频器运行到减泵切入频率, 避免由于泵突然减少 (通常运行在工频状态下) 造成压力下降很多。

 **减泵切入频率:** If fewer pumps are needed after the output frequency reaches the lowest working frequency required for variable frequency operation, the inverter will operate at the 减泵切入频率. This is intended to prevent a sudden decrease of pumps from causing a substantial pressure drop at a line frequency.

<b>F8-14</b>	<b>减泵偏差上限设定</b>	出厂值	0.20	更改	○
<b>F8-15</b>	<b>加泵偏差下限设定</b>	出厂值	-0.20	更改	○
设定范围	-F7-03~F7-03				

<b>F8-14</b>	减泵 Deviation Upper Limit Settings	Factory Setting s	0.20	Moderation	○
<b>F8-15</b>	加泵 Deviation Lower Limit Settings	Factory Setting s	-0.20	Moderation	○
Setting Range	-F7-03~F7-03				



- 📖 **减泵偏差上限设定:** 当输出频率到达变频运行泵最低运行频率, 若压力仍高于设定压力 +F8-14 时, 进行减泵判断及减泵运行。
- 📖 **减泵 deviation upper limit settings:** If the pressure is still higher than the pressure settings (+F8-14) after the output frequency reaches the min. working frequency required for variable frequency operation, a 减泵 judgment and 减泵 operation will be started.
- 📖 **加泵偏差下限设定:** 当输出频率到达上限频率, 若压力仍低于设定压力 -F8-15 时, 进行加泵判断及加泵运行。
- 📖 **加泵偏差 lower limit settings:** If the pressure is still lower than the pressure settings -F8-15 after the output frequency reaches the upper frequency limit, a 加泵 judgment and 加泵 operation will be started.

<b>F8-16</b>	<b>机械互锁时间</b>	出厂值	0.50s	更改	○
设定范围	0.05~20.00s				

<b>F8-16</b>	<b>Mechanical Interlock Time</b>	Factory Setting	0.50s	Modification	○
Setting Range	0.05~20.00s				

- 📖 **机械互锁时间:** 此参数主要是用于将一台水泵(电机)从变频运行切换到工频运行, 为了防止由于电磁开关(接触器)动作的延时使变频器与工频交流电源发生短路而设置的参数。
- 📖 **Mechanical Interlock Time:** This parameter is primarily used to switch a pump (motor) from variable frequency operation to line frequency operation. This is a parameter configured to prevent a short-circuit (caused by a solenoid switch (contactor) action time delay) between the inverter and the line frequency AC power supply.
- 📖 电磁开关(接触器)容量越大, 通常设置的时间也应适当增大。
- 📖 The larger capacity a solenoid switch (contactor) has, the longer the set time is.

<b>F8-17</b>	<b>辅助起动机启动时间</b>	出厂值	5.00s	更改	○
设定范围	0.50~60.00s				


<b>F8-17</b>	<b>Auxiliary Starter Startup Time</b>	Factory Setting	5.00s	Modification	○
Setting Range	0.50~60.00s				


- 📖 **辅助起动机启动时间:** 辅助起动机一般为软起动机, 在辅助泵功率较大时, 为了避免直接启动产生太大的冲击电流, 一般通过配置软起动机来启动辅助泵运行。
- 📖 **Auxiliary Starter Startup Time:** Auxiliary starters are normally soft starters. In the case of a larger

power auxiliary pump, soft starters are normally used for startup in order to prevent large impact currents caused by direct startup.

<b>F8-18</b>	<b>定时轮换时间</b>	出厂值	360.0h	更改	○
设定范围	0.0~1000.0h (0.0无效)				


<b>F8-18</b>	<b>Periodic Rotation Time</b>	Factory Setting	360.0h	Modification	○
Setting Range	0.0~1000.0h (0.0 is ineffective)				


 **定时轮换时间:** 定时轮换的设置，可以有效防止因备用泵长期不用而发生锈死现象，提高设备的综合利用率，降低维护费用。该时间为水泵最长停止时间，如果备用泵停止时间超过该时间时，则起动备用泵运行。

 **Periodic Rotation Time:** Periodic rotation units can be used to prevent longtime disuse from causing rusts of standby pumps. They are effective in improving the utilization ratio and reduce maintenance cost. This is the longest shutdown time of the pump. If the standby pump is disused for a time longer than the periodic rotation time, the standby pump will be started for operation.

<b>F8-19</b>	<b>下限频率运行停止时间</b>	出厂值	300.0s	更改	○
设定范围	0.0~1200.0s (0.0无效)				

<b>F8-19</b>	<b>Lower Frequency Limit Operation Shutdown Time</b>	Factory Setting	300.0s	Modification	○
Setting Range	0.0~1200.0s (0.0 is ineffective)				


 **下限频率运行停止时间:** 当系统中一台以上水泵处于工频运行和一台水泵变频运行，变频运行泵长期运行在下限频率，若这种状态超过设定的时间，将停止一台处于工频运行的水泵。设置为0时，该功能无效，参数设置太小，可能会造成振荡。


 **Lower Frequency Limit Operation Shutdown Time:** If more than one pump is in line frequency operation, one pump is in variable frequency operation and the variable-frequency pump operates at the lower frequency limit for a long time, one pump working at line frequency will be shut down if this status exceeds the preset time. If the parameter is set as 0, this function will be ineffective. If the parameter settings are too small, oscillation may occur.

<b>F8-20</b>	<b>休眠频率</b>	出厂值	40.00Hz	更改	○
设定范围	1.00~50.00Hz				
<b>F8-21</b>	<b>休眠等待时间</b>	出厂值	60.0s	更改	○
设定范围	1.0~1800.0s				

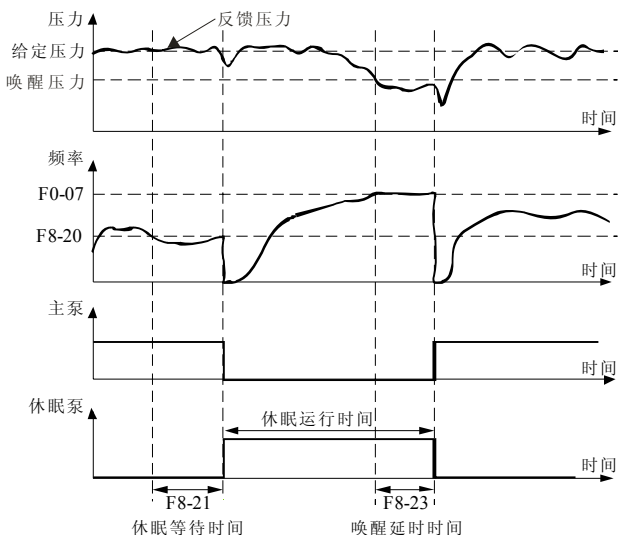
<b>F8-22</b>	<b>唤醒偏差设定</b>	出厂值	-0.20	更改	○
设定范围	-F7-03~F7-03				
<b>F8-23</b>	<b>唤醒延长时间</b>	出厂值	30.0s	更改	○
设定范围	0.1~300.0s				

<b>F8-20</b>	<b>Sleeping Frequency</b>	Factory Setting	40.00Hz	Modification	○
Setting Range	1.00~50.00Hz				
<b>F8-21</b>	<b>Sleeping Latency Time</b>	Factory Setting	60.0s	Modification	○
Setting Range	1.0~1800.0s				
<b>F8-22</b>	<b>Wakeup Deviation Settings</b>	Factory Setting	-0.20	Modification	○
Setting Range	-F7-03~F7-03				
<b>F8-23</b>	<b>Wakeup Time Delay</b>	Factory Setting	30.0s	Modification	○
Setting Range	0.1~300.0s				

 **休眠功能，需设置休眠方式。**当用水量较少，且只有一台水泵处于变频运行，如果运行频率低于休眠频率(F8-20)运行时间超过休眠等待时间（F8-21），系统转为休眠运行，主泵停止运行。若配置为休眠小泵运行，则起动休眠小泵运行，在休眠小泵运行期间：①如果运行频率为上限频率或工频，而压力持续低于唤醒压力（给定+F8-22），其运行时间超过唤醒延长时间（F8-23），系统恢复正常供水。②如果压力持续高于切换压力上限（给定+F8-14），小泵的动作根据 PID 下限选择（F8-02）确定（见 183 页）；若无专用休眠小泵，随着用水量增加，如压力低于唤醒压力（给定+F8-22）持续时间超过唤醒延长时间（F8-23），系统恢复正常供水。

 **The sleeping function requires sleeping mode settings.** If water consumption is small and only one pump is in variable frequency operation, the system will switch to the sleeping mode and the main pump will shut down when the working frequency is lower than the sleeping frequency ((F8-20) and the operation time exceeds the sleeping latency time (F8-21). If the small sleeping pump is used, the small sleeping pump will be started. ① If the working frequency is the upper frequency limit or the line frequency and the pressure persists at a value lower than the wakeup pressure (setting: +F8-22), the system will be restored to normal water supply when the working time exceeds the wakeup time delay (F8-23); ② If the pressure persists at a value above the upper limit of switching pressure (setting: +F8-14), the small pump will operate as determined by the PID lower limit options (F8-02) (see Page 72); if there is no small sleeping pump and

the water consumption increases, the system will be restored to normal water supply when the pressure drops below the wakeup pressure (setting: +F8-22) and persists for a time longer than the wakeup time delay.



休眠运行图


反馈压力: Feedback pressure      压力: Pressure      给定压力: Pressure settings      唤醒压力: Wakeup pressure      时间: Time      频率: Frequency      时间: Time


水泵: Water pump      时间: Time      休眠泵: Sleeping pump      休眠运行时间: Sleeping time      休眠等待时间: Sleeping latency time      唤醒延时时间: Wakeup time delay      时间: Time

F8-24	1#水泵最低运行频率	出厂值	20.00 Hz	更改	○
F8-25	2#水泵最低运行频率	出厂值	20.00 Hz	更改	○
F8-26	3#水泵最低运行频率	出厂值	20.00 Hz	更改	○
F8-27	4#水泵最低运行频率	出厂值	20.00 Hz	更改	○
F8-28	5#水泵最低运行频率	出厂值	20.00 Hz	更改	○
F8-29	休眠小泵最低运行频率	出厂值	20.00 Hz	更改	○
设定范围	1.00~F0-07“上限频率”				

F8-24	Min. Working Frequency of Pump #1	Factory Settings	20.00 Hz	Modification	○
F8-25	Min. Working Frequency of Pump #2	Factory Settings	20.00 Hz	Modification	○

<b>F8-26</b>	<b>Min. Working Frequency of Pump #3</b>	Factory Settings	20.00 Hz	Modification	○
<b>F8-27</b>	<b>Min. Working Frequency of Pump #4</b>	Factory Settings	20.00 Hz	Modification	○
<b>F8-28</b>	<b>Min. Working Frequency of Pump #4</b>	Factory Settings	20.00 Hz	Modification	○
<b>F8-29</b>	<b>Min. Working Frequency of Small Sleeping Pump</b>	Factory Settings	20.00 Hz	Modification	○
Setting Range	1.00~F0-07 “Upper frequency limit”				


 **水泵最低运行频率。**F8-24~29 各泵最低运行频率，为相应水泵变频运行时的下限频率，根据系统分别设置各泵的下限频率，有利于系统运行更合理。

 **Min. Working Frequency of Pumps.** The min. working frequency of Pumps F8-24~29 is the lower frequency limit of the corresponding pumps working at a variable frequency. The lower frequency limit of different pumps are set differently in order to rationalize system operation.

<b>F8-30</b>	<b>1#水泵额定电流</b>	出厂值	机型确定	更改	×
<b>F8-31</b>	<b>2#水泵额定电流</b>	出厂值	机型确定	更改	×
<b>F8-32</b>	<b>3#水泵额定电流</b>	出厂值	机型确定	更改	×
<b>F8-33</b>	<b>4#水泵额定电流</b>	出厂值	机型确定	更改	×
<b>F8-34</b>	<b>5#水泵额定电流</b>	出厂值	机型确定	更改	×
<b>F8-35</b>	<b>休眠小泵额定电流</b>	出厂值	机型确定	更改	×
设定范围	0.5~1200.0A				


<b>F8-30</b>	<b>Rated Current of Pump #1</b>	Factory Settings	Depend on inverter model No.	Modification	×
<b>F8-31</b>	<b>Rated Current of Pump #2</b>	Factory Settings	Depend on inverter model No.	Modification	×
<b>F8-32</b>	<b>Rated Current of Pump #3</b>	Factory Settings	Depend on inverter model No.	Modification	×
<b>F8-33</b>	<b>Rated Current of Pump #4</b>	Factory Settings	Depend on inverter model No.	Modification	×

<b>F8-34</b>	<b>Rated Current of Pump #5</b>	Factory Setting s	Depend on inverter model No.	Modification	×
<b>F8-35</b>	<b>Rated Current of Small Sleeping Pump</b>	Factory Setting s	Depend on inverter model No.	Modification	×
Setting Range	0.5~1200.0A				

 **Rated Current of Pumps:** The rated current of pumps F8-30~35 should be set according to parameters on the nameplates. This is used for an overload alarm. The function checks the overload protection of pumps working at a variable frequency.

<b>F8-36</b>	<b>试运转频率</b>	出厂值	25.00 Hz	更改	○
设定范围	1.00~F0-07“上限频率”				
<b>F8-37</b>	<b>水泵试运转</b>	出厂值	000	更改	×
设定范围	111 休眠泵试运转 222 排污泵试运转 331~335 1#~5#变频试运转 441~445 1#~5#工频试运转				
<b>F8-38</b>	<b>水泵试运转计时时间</b>	出厂值	20.0s	更改	○
设定范围	0.5~3000.0s				

<b>F8-36</b>	<b>Trial Working frequency</b>	Factory Setting s	25.00 Hz	Modification	○
设定范围	1.00~F0-07“上限频率”				
<b>F8-37</b>	<b>Pump Trial Operation</b>	Factory Setting s	000	Modification	×
设定范围	111 Sleeping pump in trial operation 222 Drainage pump in trial operation 331~335 Pumps #1~#5 in trial operation at a variable frequency 441~445 Pumps #1~#5 in trial operation at a line frequency				
<b>F8-38</b>	<b>Pump Trial Operation Timekeeping</b>	Factory Setting s	20.0s	Modification	○
Setting Range	0.5~3000.0s				

 **水泵试运转。**该参数用于系统调试，只有在 F8-00≠0 且处于停止状态时才有效，设置 F8-37 参数，按确认命令即进入测试状态，如果对变频循环泵进行工频运行试运转，则直接投切到工频运行。







设定范围	Tens digit: Pump #2		Units digit: Pump #1			
	0: Water injection valve and air vent valve inapplicable			1: Control for water injection valve and air vent valve		
<b>F8-43</b>	<b>Duration of Water Injection and Air Vent</b>	Factory Settings	180.0s	Modification	○	
Setting Range	10.0~360.0s					

☒ **注水阀、排气阀控制：**需要设置相应的输出端子（数字输出或继电器输出见 146 页数字输出功能定义表）用于控制注水阀、排气阀，当水泵起动运行到上限频率时，如果检测到水泵处于欠载状态，则对管网进行注水、排气处理，当注水、排气时间达到 F8-43 设定的时间时，水泵重新开始运行，如果连续几次都不能正常供水时，则以进水池缺水报警。

☒ **Control for Water Injection Valve and Air Vent Valve:** Corresponding output terminals must be set to control water injection valves and air vent valves (for digital output or relay output, see the table of definitions of digital output functions). After the pump attains to the upper frequency limit, if the pump is detected to be underloaded, the pipe network must have a water injection or air vent operation. When the duration of water injection and air vent reaches the time set by F8-43, the pump will restart for operation. If normal water supply can not be restored for several successive times, a suction pool water shortage alarm will be sounded.

<b>F8-44</b>	<b>1#水泵禁止运行</b>	出厂值	0	更改	○
<b>F8-45</b>	<b>2#水泵禁止运行</b>	出厂值	0	更改	○
<b>F8-46</b>	<b>3#水泵禁止运行</b>	出厂值	0	更改	○
<b>F8-47</b>	<b>4#水泵禁止运行</b>	出厂值	0	更改	○
<b>F8-48</b>	<b>5#水泵禁止运行</b>	出厂值	0	更改	○
<b>F8-49</b>	<b>休眠小泵禁止运行</b>	出厂值	0	更改	○
<b>F8-50</b>	<b>排污泵禁止运行</b>	出厂值	0	更改	○
设定范围	0: 无效		11: 禁止该泵运行		

<b>F8-44</b>	<b>Pump #1 Disabled</b>	Factory Settings	0	Modification	○
<b>F8-45</b>	<b>Pump #2 Disabled</b>	Factory Settings	0	Modification	○
<b>F8-46</b>	<b>Pump #3 Disabled</b>	Factory Settings	0	Modification	○
<b>F8-47</b>	<b>Pump #4 Disabled</b>	Factory Settings	0	Modification	○

<b>F8-48</b>	<b>Pump #5 Disabled</b>	Factory Setting s	0	Modification	○
<b>F8-49</b>	<b>Small Sleeping Pump Disabled</b>	Factory Setting s	0	Modification	○
<b>F8-50</b>	<b>Drainage Pump Disabled</b>	Factory Setting s	0	Modification	○
Setting Range	0: Ineffective 11: Pump operation disabled				

📖 **水泵禁止运行。** F8-44~50 供水系统中相应的参数为 11 时，禁止对应的水泵运行，以便对该泵进行检修和维护。该组参数与数字输入 43~49 并列有效。

📖 **Pump Operation Disabled:** When the parameters (F8-44~50) of the water supply system are 11, the corresponding pumps will be disabled to facilitate overhaul and maintenance. This parameter group will be effective as are Digital Inputs 43~49.

<b>F8-51</b>	备用泵台数设置	出厂值	00	更改	×
设定范围	个位: 循环投切备用泵台数 0~2				
	十位: 辅助备用泵台数0~2				

<b>F8-51</b>	Standby Pump Number Settings	Factory Setting s	00	MOdification	×
Setting Range	Units digit: Number of standby pumps to be started up/shut down in a cyclic mode: 0~2				
	Tens digit: Number of Auxiliary Standby Pumps: 0~2				

📖 当设置的备用泵台数大于或等于系统配置时，备用泵设置无效。

📖 When the standby pump number settings exceed or are equal to system settings, the standby pump settings will be ineffective.

## 6.10 F9时间管理(仅适用于LCD操作面板)

## 6.10. F9: Time Management (Applicable to LCD Control Panel Only)


<b>F9-00</b>	<b>T1时刻时间设定</b>	出厂值	0.00	更改	○
<b>F9-01</b>	<b>T2时刻时间设定</b>	出厂值	3.00	更改	○
<b>F9-02</b>	<b>T3时刻时间设定</b>	出厂值	6.00	更改	○
<b>F9-03</b>	<b>T4时刻时间设定</b>	出厂值	9.00	更改	○
<b>F9-04</b>	<b>T5时刻时间设定</b>	出厂值	12.00	更改	○
<b>F9-05</b>	<b>T6时刻时间设定</b>	出厂值	15.00	更改	○
<b>F9-06</b>	<b>T7时刻时间设定</b>	出厂值	18.00	更改	○
<b>F9-07</b>	<b>T8时刻时间设定</b>	出厂值	21.00	更改	○
设定范围	0~23点, 0~59分 (T1≤T2≤T3≤T4≤T5≤T6≤T7≤T8)				
<b>F9-08</b>	<b>T1时刻动作选择</b>	出厂值	0	更改	×
<b>F9-09</b>	<b>T2时刻动作选择</b>	出厂值	0	更改	×
<b>F9-10</b>	<b>T3时刻动作选择</b>	出厂值	0	更改	×
<b>F9-11</b>	<b>T4时刻动作选择</b>	出厂值	0	更改	×
<b>F9-12</b>	<b>T5时刻动作选择</b>	出厂值	0	更改	×
<b>F9-13</b>	<b>T6时刻动作选择</b>	出厂值	0	更改	×
<b>F9-14</b>	<b>T7时刻动作选择</b>	出厂值	0	更改	×
<b>F9-15</b>	<b>T8时刻动作选择</b>	出厂值	0	更改	×
设定范围	0: 无动作 ±1: 控制Y1数字输出 ±2: 控制Y2数字输出 ±3: 控制T1继电器输出 ±4: 控制T2继电器输出 ±5: 控制T3继电器输出 ±6: 控制T4继电器输出 ±7: 控制T5继电器输出 ±8: 虚拟数字输入1 ±9: 虚拟数字输入2 ±10: 虚拟数字输入3 ±11: 虚拟数字输入4				
<b>F9-16</b>	<b>虚拟数字输入1功能</b>	出厂值	0	更改	×
<b>F9-17</b>	<b>虚拟数字输入2功能</b>	出厂值	0	更改	×
<b>F9-18</b>	<b>虚拟数字输入3功能</b>	出厂值	0	更改	×
<b>F9-19</b>	<b>虚拟数字输入4功能</b>	出厂值	0	更改	×


设定范围	与X输入端子定义相同，见130页					
	<b>F4-00</b>	<b>Functions of Digital Input Terminal X1</b>	Factory Settings	1	Modification	×
	<b>F4-01</b>	<b>Functions of Digital Input Terminal X2</b>	Factory	2	Modification	×
	<b>F4-02</b>	<b>Functions of Digital Input Terminal X3</b>	Factory	3	Modification	×
	<b>F4-03</b>	<b>Functions of Digital Input Terminal X4</b>	Factory	12	Modification	×
	<b>F4-04</b>	<b>Functions of Digital Input Terminal X5</b>	Factory	13	Modification	×
	<b>F4-05</b>	<b>Functions of Digital Input Terminal X6/PFI/Pulse Frequency Input</b>	Factory	0	Modification	×
	<b>F4-06</b>	<b>Functions of Digital Input Terminal X7 (Extension Terminal)</b>	Factory	0	Modification	×
	<b>F4-07</b>	<b>Functions of Digital Input Terminal X8 (Extension Terminal)</b>	Factory	0	Modification	×
	<b>F4-08</b>	<b>Functions of Digital Input Terminal X9 (Extension Terminal)</b>	Factory	0	Modification	×
	<b>F4-09</b>	<b>Functions of Digital Input Terminal X10 (Extension Terminal)</b>	Factory	0	Modification	×
	<b>F4-10</b>	<b>Functions of Digital Input Terminal X11 (Extension Terminal)</b>	Factory	0	Modification	×
	<b>F4-11</b>	<b>Functions of FWD Terminal</b>	Factory	38	Modification	×
	<b>F4-12</b>	<b>Functions of REV Terminal</b>	Factory	39	Modification	×
Setting Range	Refer to the following table for definitions of digital input functions					
数字输入功能定义表						

<b>F9-00</b>	<b>Time Settings at Point T1</b>	Factory Settings	0.00	Modification	○
<b>F9-01</b>	<b>Time Settings at Point T2</b>	Factory Settings	3.00	Modification	○
<b>F9-02</b>	<b>Time Settings at Point T3</b>	Factory Settings	6.00	Modification	○
<b>F9-03</b>	<b>Time Settings at Point T4</b>	Factory Settings	9.00	Modification	○

<b>F9-04</b>	<b>Time Settings at Point T5</b>	Factory Settings	12.00	Modification	○
<b>F9-05</b>	<b>Time Settings at Point T6</b>	Factory Settings	15.00	Modification	○
<b>F9-06</b>	<b>Time Settings at Point T7</b>	Factory Settings	18.00	Modification	○
<b>F9-07</b>	<b>Time Settings at Point T8</b>	Factory Settings	21.00	Modification	○
Setting Range	Hour: 0~23; minute: 0~59 (T1≤T2≤T3≤T4≤T5≤T6≤T7≤T8)				
<b>F9-08</b>	Action Options at Point T1	Factory Settings	0	Modification	×
<b>F9-09</b>	Action Options at Point T2	Factory Settings	0	Modification	×
<b>F9-10</b>	Action Options at Point T3	Factory Settings	0	Modification	×
<b>F9-11</b>	Action Options at Point T4	Factory Settings	0	Modification	×
<b>F9-12</b>	Action Options at Point T5	Factory Settings	0	Modification	×
<b>F9-13</b>	Action Options at Point T6	Factory Settings	0	Modification	×
<b>F9-14</b>	Action Options at Point T7	Factory Settings	0	Modification	×
<b>F9-15</b>	Action Options at Point T8	Factory Settings	0	Modification	×
Setting Range	0: No action                      ±1: Control of Y1 digital output    ±2: Control for Y2 digital output ±3: Output Control for Relay T1    ±4: Output control for Relay T2    ±5: Output Control for Relay T3 ±6: Output Control for Relay T4    ±7: Output Control for Relay T5    ±8: Virtual Digital Input 1 ±9: Virtual Digital Input 2          ±10: Virtual Digital Input 3       ±11: Virtual Digital Input 4				
<b>F9-16</b>	<b>Functions of Virtual Digital Input 1</b>	Factory Settings	0	Modification	×
<b>F9-17</b>	<b>Functions of Virtual Digital Input 2</b>	Factory Settings	0	Modification	×

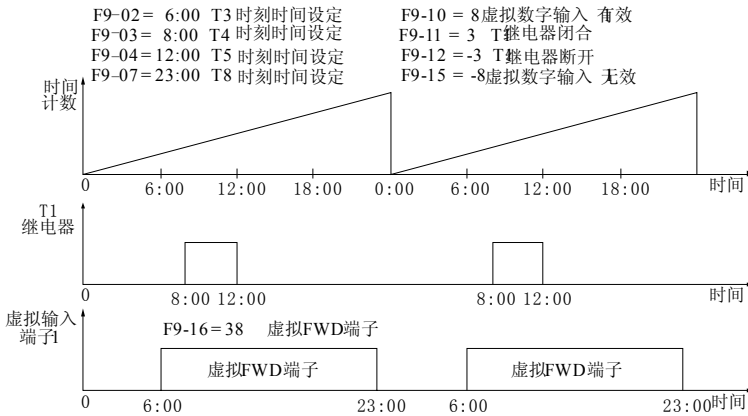
<b>F9-18</b>	<b>Functions of Virtual Digital Input 3</b>	Factory Settings	0	Modification	×
<b>F9-19</b>	<b>Functions of Virtual Digital Input 4</b>	Factory Settings	0	Modification	×
Setting Range	The same definition as Input Terminal X; refer to the table of definitions of digital input on Page 51				

 **时间管理:** SB200 系列液晶显示操作盒内置实时时钟模块, 可设置 8 个时间段, 设定时间请满足:  $T1 \leq T2 \leq T3 \leq T4 \leq T5 \leq T6 \leq T7 \leq T8$ , 设置每个时刻的动作, 可以指定时刻输出需要的功能 (当使用数字输出或继电器输出时, 要设置相应功能的数字输出为 18 见 146 页)。数字输出端子: 正表示 Y 输出晶体管导通, 负表示 Y 输出晶体管截止; 继电器输出: 正表示闭合继电器, 负表示断开继电器; 虚拟数字输入: 正表示选择相应功能, 负表示取消相应功能。

 **Time Management:** The LCD control panel of the SB200 series has an inbuilt time module capable of configuration for 8 time slots. The configuration of time must ensure that  $T1 \leq T2 \leq T3 \leq T4 \leq T5 \leq T6 \leq T7 \leq T8$ . When setting actions for each point in time, functions required to be outputted at a designated time may be assigned (In the case of a digital output or relay output, the digital output of the corresponding functions must be set as 18; see Page 58). In the case of a digital output terminal, a positive value means Output Transistor Y is connected and Output Transistor Y is disconnected. In the case of a relay output, a positive value means the relay is closed and a negative value means the relay is open. In the case of a virtual digital output: a positive value means the selection of a function and a negative value means the cancellation of a function.

📖 举例：如下图：

📖 Examples: Refer to the following figures:



时刻时间设定: Time Point settings      虚拟数字输入有效: Virtual digital input (effective)      T 继电器闭合: Relay T closed      T 继电器断开: Relay T open      虚拟数字输入无效: Virtual digital input ineffective

时间计数: Time count      继电器: Relay      虚拟输入端子 1: Virtual input terminal 1      虚拟 FWD 端子: Virtual FWD terminal      时间: Time

## 6.11 Fb 保护功能及变频器高级设置

### 6.11 Fb: Protection Functions and Advanced Inverter Settings

<b>Fb-00</b>	<b>电机散热条件</b>	出厂值	0	更改	○
设定范围	0: 普通电机      1: 变频电机或普通电机带独立风扇				
<b>Fb-01</b>	<b>电机过载保护值</b>	出厂值	100.0%	更改	○
设定范围	50.0~150.0%，以电机额定电流为100%				
<b>Fb-02</b>	<b>电机过载保护动作选择</b>	出厂值	2	更改	×
设定范围	0: 不动作      1: 报警，并继续运行      2: 故障，并自由停机				

<b>Fb-00</b>	<b>Motor Heat Dissipation Conditions</b>	Factory Settings	0	Modification	○
Setting Range	0: Conventional motor      1: Variable-frequency motor or conventional motor with a separate fan				
<b>Fb-01</b>	<b>Motor Overload Protection Value</b>	Factory Settings	100.0%	Modification	○
Setting Range	50.0~150.0%; the rated motor current is taken as 100%				

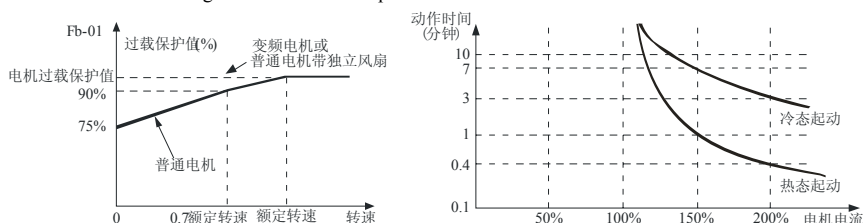
<b>Fb-02</b>	Motor Overload Protection Action Options	Factory Settings	2	Modification	×
Setting Range	0: No action	1: Alarm and continue operation	2: Fault and free shutdown		

📖 Fb-00“电机散热条件”需要用户指定变频器所带电机类型来了解电机的散热条件。普通电机低速运行时，自冷风扇散热效果变差，变频器的过载保护值在低速也相应变低，如下图：

📖 Fb-00“Motor heat dissipation conditions”: Motor heat dissipation depends on the motor type used in combination with the inverter. The heat dissipation performance of the self-cooling fan of a conventional motor deteriorates when the motor is working at a low speed; also, the overload protection value of the inverter also drops at a low speed. See the following figure:

📖 Fb-01“电机过载保护值”：用来调整电机过载保护曲线。电机在额定转速下运行，若 Fb-01 设为 100%，突然转到 150% 电机额定电流运行，1 分钟后将发生过载保护。保护时间曲线如下图：

📖 Fb-01“Motor overload protection value”: This parameter is used to adjust the overload protection curve of the motor. If Fb-01 is set as 100% for a motor working at a rated rotation speed and the parameter suddenly switches to 150% of the rated motor current, overload protection will be actuated in 1 minute. Refer to the following curves for overload protection time:



电机过载保护值: Motor overload protection value 过载保护值(%) : Overload protection value (%) 变频器或普通电机带独立风扇: Variable-frequency motor or conventional motor with a separate fan 普通电机: Conventional motor 0.7 额定转速: 0.7 times rated rotation speed 额定转速: Rated rotation speed 转速: rotation speed 动作时间(分钟): Action time (minute) 冷态启动: Cold startup 热态启动: Hot startup 电机电流: Motor current

📖 电机过载保护以后，需等待一段时间使电机冷却后才能继续运行。

📖 After overload protection becomes effective, the motor will not resume operation until the motor cools down over a period of time.

⚠️ 注意：电机过载保护只适用于一台变频器驱动一台电机的场合。在一台变频器同时驱动多台电机的场合，请在每台电机上分别安装热保护装置。

CAUTION: Motor overload protection only applies to cases where one motor is driven by one inverter. In cases where more than one motor is driven by the same inverter, heat protection must be provided for each motor.

<b>Fb-03</b>	<b>电机负载过重保护选择</b>	出厂值	00	更改	×
设定范围	个位: 负载过重检测选择	0: 一直检测	1: 仅恒速运行时检测		
	十位: 负载过重动作选择	0: 不动作	1: 报警, 并继续运行	2: 故障, 并自由停机	



<b>Fb-04</b>	<b>电机负载过重检出水平</b>	出厂值	130.0%	更改	×
设定范围	20.0~200.0%，以电机额定电流为100%				
<b>Fb-05</b>	<b>电机负载过重检出时间</b>	出厂值	5.0s	更改	×
设定范围	0.0~30.0s				

<b>Fb-03</b>	<b>Motor Overload Protection Options</b>	Factory Setting s	00	Modification	×
Setting Range	Units digit: overload detection options 0: Always on 1: During only constant-speed operation				
	Tens digit: Overload action options: 0: No action 1: Alarm and continue operation 2: Alarm and free shutdown				
<b>Fb-04</b>	<b>Motor Overload Detection Level</b>	Factory Setting s	130.0%	Modification	×
Setting Range	20.0~200.0%; the rated motor current is taken as 100%				
<b>Fb-05</b>	<b>Motor Overload Detection Time</b>	Factory Setting s	5.0s	Modification	×
Setting Range	0.0~30.0s				

📖 电机负载过重：当电机电流超过 Fb-04 并持续时间超过 Fb-05 设定的时间时，根据 Fb-03 设定的动作方式响应。该功能可以用于检测机械负载是否存在异常而使电流过大。

📖 Motor Overload: When the motor current exceeds Fb-04 and is maintained in excess of the time settings of Fb-05, a response will be made according to the action mode set by Fb-03. This function may be used to check if any abnormal mechanical load causes an overcurrent.

<b>Fb-06</b>	<b>电机欠载保护</b>	出厂值	0	更改	×
设定范围	0: 不动作 1: 报警，并继续运行 2: 故障，并自由停机				
<b>Fb-07</b>	<b>电机欠载保护水平</b>	出厂值	30.0%	更改	×
设定范围	0.0~100.0%，相对于电机额定电流				
<b>Fb-08</b>	<b>欠载保护检出时间</b>	出厂值	1.0s	更改	×
设定范围	0.0~100.0s				

<b>Fb-06</b>	<b>Motor Underload Protection</b>	Factory Setting s	0	Modification	×
Setting Range	0: No action 1: Alarm and continue operation 2: Fault and free shutdown				

<b>Fb-07</b>	<b>Motor Underload Protection Level</b>	Factory Settings	30.0%	Modification	×
Setting Range	0.0~100.0%; the rated motor current is taken as 100%				
<b>Fb-08</b>	<b>Underload Protection Detection Time</b>	Factory Settings	1.0s	Modification	×
Setting Range	0.0~100.0s				

电机欠载保护：当输出电流低于 Fb-07，且持续时间超过 Fb-08 设定时间时，根据 Fb-06 设定的动作方式响应。该功能对水泵无水空转、传动皮带断掉、电机侧接触器开路等故障可以及时检测。

Motor Underload Protection: When the output current is lower than Fb-07 and is maintained for a time longer than the time settings of Fb-08, a response will be made according to the action mode set by Fb-06. This function can promptly detect such faults as no-load pump idle operation, broken driving belts and motor-side contactor open-circuit.

当变频器进行空载测试时，不要打开此保护功能。

This protection function must be disabled when the inverter is under a no-load test.

<b>Fb-09</b>	<b>模拟输入掉线动作</b>	出厂值	0	更改	×
设定范围	0: 不动作                      1: 发出AL.ACo报警信号，按掉线发生前10s平均运行频率运行 2: 发出AL.ACo报警信号，按Fb-10“模拟输入掉线强制频率”运行 3: 发出Er.ACo故障信号，并自由停机				
<b>Fb-10</b>	<b>模拟输入掉线强制频率</b>	出厂值	0.00Hz	更改	○
设定范围	0.00Hz~F0-06“最大频率”				

<b>Fb-09</b>	<b>Analog Input Offline Action</b>	Factory Settings	0	Modification	×
Setting Range	0: No action                      1: “AL.ACo” alarm signal is emitted; operation at the average frequency during the 10s before offline 2: “AL.ACo” alarm signal is emitted; operation at the “analog input offline forced frequency” 3: Er.ACo error signal is emitted, followed by a free shutdown				
<b>Fb-10</b>	<b>Analog Input Offline Forced Frequency</b>	Factory Settings	0.00Hz	Modification	○
Setting Range	0.00Hz~F0-06 “Max. frequency”				

模拟输入掉线保护：当变频器检测到模拟输入信号小于相应的掉线门限时，则认为发生了掉线。

Analog Input Offline Protection: When the inverter detects an analog input signal lower than the corresponding offline threshold value, an offline is confirmed.

相关参数：F6-07“AI1 掉线门限”、F6-16“AI2 掉线门限”和 F6-23“AI3 掉线门限”。

📖 Related Parameters: F6-07 “A11Offline Threshold”, F6-16“AI2 Offline Threshold” and F6-23“A13 Offline Threshold”.

Fb-11	其他保护动作选择	出厂值	0022	更改	×
设定范围	个位: 变频器输入缺相保护	0: 不动作	1: 报警, 并继续运行	2: 故障, 并自由停机	
	十位: 变频器输出缺相保护	0: 不动作	1: 报警, 并继续运行	2: 故障, 并自由停机	
	百位: 操作面板掉线保护	0: 不动作	1: 报警, 并继续运行	2: 故障, 并自由停机	
	千位: 参数存储失败动作选择		0: 报警, 并继续运行	1: 故障, 并自由停机	

Fb-11	Other Protection Action Options	Factory Settings	0022	Modification	×
Setting Range	Units digit: Inverter input phase lack protection	input 0: No action	1: Alarm and continue operation	2: Fault and free shutdown	
	Tens digit: Inverter output phase lack protection	output 0: No action	1: Alarm and continue operation	2: Fault and free shutdown	
	Hundreds digit: Control panel offline protection	0: No action	1: Alarm and continue operation	2: Fault and free shutdown	
	Thousands digit: Parameter storage failure action options			0: Alarm and continue operation	1: Fault and free shutdown

- 📖 变频器的输入缺相保护功能根据输入缺相引起的直流母线电压纹波来判断, 当变频器空载或轻载时可能不会检出输入缺相; 当输入三相严重不平衡或者输出严重振荡时, 输入缺相也会检出。
- 📖 The input phase lack protection function of a inverter makes judgments according to the ripples of DC busbar voltage induced by an input phase lack. An input phase lack may not be detected in the case of a no-load or light-load inverter. An input phase lack will be detected if a serious input three-phase unbalance or output oscillation occurs.
- 📖 变频器输出缺相保护: 当变频器输出缺相时, 电机单相运行, 电流和转矩脉动都变大, 输出缺相保护可避免损坏电机和机械负载。
- 📖 Inverter Output Phase lack Protection: In the case of a inverter output phase lack, the motor will switch to single-phase operation and the current, torque and pulse will increase. Output phase lack protection can prevent damages to motors and mechanical loads.
- 📖 输出频率或电流很低时, 输出缺相保护无效。
- 📖 Output phase lack protection is ineffective in cases where the output frequency or current is very low.

<b>Fb-12</b>	<b>加速过流失速防止选择</b>	出厂值	1	更改	×
设定范围	0: 无效 1: 有效, 失速超时报异常停机 (Er.Abb) 2: 有效, 失速无时间限制				
<b>Fb-13</b>	<b>加速过流失速点</b>	出厂值	110.0%	更改	×
设定范围	10.0~130.0%, 以变频器额定电流为100%				
<b>Fb-14</b>	<b>恒速过流失速防止选择</b>	出厂值	1	更改	×
设定范围	0: 无效 1: 有效, 失速超时报异常停机 (Er.Abb) 2: 有效, 失速无时间限制				
<b>Fb-15</b>	<b>恒速过流失速点</b>	出厂值	110.0%	更改	×
设定范围	10.0~110.0%, 以变频器额定电流为100%				
<b>Fb-16</b>	<b>过压失速防止选择</b>	出厂值	1	更改	×
设定范围	0: 无效 1: 有效				
<b>Fb-17</b>	<b>过压失速点</b>	出厂值	700V	更改	×
设定范围	650~750V				

<b>Fb-12</b>	<b>Acceleration Overcurrent Stall Prevention Options</b>	Factory Settings	1	Modification	×
Setting Range	0: Ineffective 1: Effective; abnormal shutdown will be reported in the event of a stall timeout (Er.Abb) 2: Effective; no time limit is set for stall				
<b>Fb-13</b>	<b>Acceleration Overcurrent Stall Point</b>	Factory Settings	110.0%	Modification	×
Setting Range	10.0~130.0%; the rated inverter current is taken as 100%				
<b>Fb-14</b>	<b>Constant Speed Overcurrent Stall Prevention Options</b>	Factory Settings	1	Modification	×
Setting Range	0: Invalid 1: Effective; abnormal shutdown will be reported in the event of a stall timeout (Er.Abb) 2: Effective; no time limit is set for stall				
<b>Fb-15</b>	<b>Constant Speed Overcurrent Stall Point</b>	Factory Settings	110.0%	Modification	×
Setting Range	10.0~110.0%; the rated inverter current is taken as 100%				
<b>Fb-16</b>	<b>Overvoltage Stall Prevention Options</b>	Factory Settings	1	Modification	×
Setting Range	0: Ineffective 1: Valid				

Fb-17	Overvoltage Stall Point	Factory Settings	700V	Modification	×
Setting Range	650~750V				

在加速过程中，当 Fb-12“加速过流失速防止选择”有效且输出电流大于 Fb-13“加速过流失速点”时，暂时停止加速，电流降低后继续加速，如下图（a）：

In the acceleration process, when Fb-12 “Acceleration Overcurrent Stall Prevention Options” is effective and the output current is greater than Fb-13 “Acceleration Overcurrent Stall Point”, the acceleration will be suspended until the current drops to normal. After that, the acceleration process resumes. Refer to the following figure (a):

在恒速运行过程中，当 Fb-14“恒速过流失速防止选择”有效且输出电流大于 Fb-15“恒速过流失速点”时，减速运行，电流降低后，加速到原来的运行频率，如下图（b）：

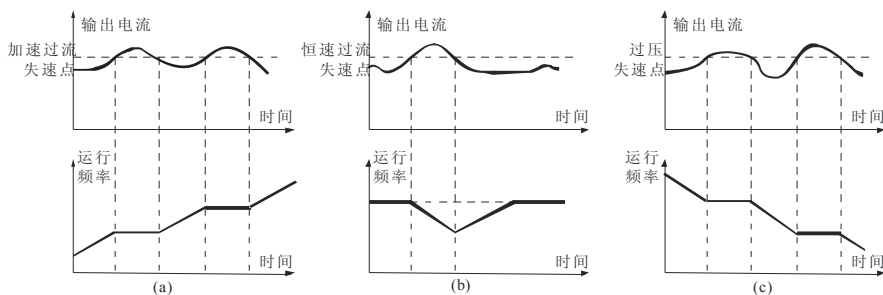
In the constant operation process, when Fb-14 “Constant Overcurrent Stall Prevention Options” is effective and the output current exceeds Fb-15 “Constant Speed Overcurrent Stall Point”, the motor will decelerate until the current drops to normal. After that the motor accelerates again to resume the original working frequency. See the following figure (b):

在减速过程中，当 Fb-16“过压失速防止选择”有效且直流母线电压超过 Fb-17“过压失速点”时，暂时停止减速，直流母线电压降至正常水平再继续减速，如下图（c）：

In the deceleration process, when Fb-16 “Overvoltage Stall Prevention Options” is effective and the DC busbar voltage exceeds Fb-17 “Overvoltage Stall Point”, the deceleration will be suspended until the DC busbar voltage drops to normal. After that, the deceleration process resumes. Refer to the following figure (c):

当选择失速超时限制时，若持续处于失速状态，则报异常停机故障（Er.Abb）。

When selecting the stall timeout limit, if the motor is in constant stall status, an abnormal shutdown fault will be reported (Er.Abb).



输出电流：Output current 加速过流：Acceleration Overcurrent 失速点：Stall point 时

间: Time 输出电流: Output current 恒速过流: Constant Speed Overcurrent 失速点: Stall point 时间: Time 输出电流: Output current 过压: Over pressure 失速点: Stall point 时间: Time

运行频率: Working frequency 时间: Time 运行频率: Working frequency 时间: Time 运行频率: Working frequency 时间: Time

<b>Fb-18</b>	<b>直流母线欠压动作</b>	出厂值	0	更改	×
设定范围	0: 自由停机, 并报欠压故障 (Er.dL) 1: 自由停机, 在Fb-20“瞬时停电允许时间”内, 电源恢复则再起, 若超出则报欠压故障 (Er.dL) 2: 自由停机, CPU运行中电源恢复则再起, 不报欠压故障 3: 减速运行, CPU运行中电源恢复则加速到给定频率, 不报欠压故障				
<b>Fb-19</b>	<b>直流母线欠压点</b>	出厂值	380V	更改	×
设定范围	300~450V				
<b>Fb-20</b>	<b>瞬时停电允许时间</b>	出厂值	0.1s	更改	×
设定范围	0.0~30.0s				
<b>Fb-21</b>	<b>瞬停减速时间</b>	出厂值	0.0s	更改	×
设定范围	0.0~200.0s, 若设为0.0则使用当前选择的减速时间				

<b>Fb-18</b>	<b>DC Busbar Undervoltage Action</b>	Factory Setting s	0	Modification	×
Setting Range	0: Free shutdown; an undervoltage fault is reported (Er.dL) 1: Free shutdown; within the “Instantaneous Power Failure Time Allowance” (Fb-20), the inverter will restart if the power supply is restored and an undervoltage fault will be reported (Er.dL) if the power supply is not restored. 2: Free shutdown; while the CPU is in operation, the inverter will restart if the power supply is restored. No undervoltage fault will be reported 3: Decelerated operation; if the power supply is restored while the CPU is in operation, the frequency will be accelerated till the frequency settings. No undervoltage fault will be reported.				
<b>Fb-19</b>	<b>DC Busbar Undervoltage Point</b>	Factory Setting s	380V	Modification	×
Setting Range	300~450V				
<b>Fb-20</b>	<b>Instantaneous Power Failure Time Allowance</b>	Factory Setting s	0.1s	Modification	×
Setting Range	0.0~30.0s				
<b>Fb-21</b>	<b>Instantaneous Power Failure Deceleration Time</b>	Factory Setting s	0.0s	Modification	×
Setting Range	0.0~200.0s; if the parameter is set as 0.0, the present deceleration time is adopted				

瞬时停电的检测是靠直流母线电压的检测完成的。当直流母线电压低于 Fb-19“直流母线欠压点”时，有以下处理方式：

The detection of instantaneous power failure is finished by DC busbar voltage detection. When the DC busbar voltage is lower than Fb-19 “DC busbar undervoltage point”, the following solutions may be adopted:

**Fb-18=0:** 将欠压视为故障，自由停机，报直流母线欠压故障；

**Fb-18=0:** In this case, an undervoltage is considered as a fault and a free shutdown will follow and a DC busbar undervoltage fault will be reported;

**Fb-18=1:** 封锁输出，从而直流母线电压下降变缓，若在 Fb-20“瞬时停电允许时间”内电压恢复，则再起动（起动方式由 Fb-25“瞬停、自复位、运行中断再起方式”确定），欠压超时则报故障；

**Fb-18=1:** In this case, the output will be locked and the drop in DC bus voltage slows down. If the voltage is restored within “Instantaneous Power Failure Time Allowance” (Fb-20), a restart (depending on “Restart Mode of Instantaneous Power Failure, Self-Reset and Operation Suspension”) will follow and the undervoltage timeout fault will be reported.

**Fb-18=2:** 封锁输出，从而直流母线电压下降变缓，只要 CPU 没有因欠压而掉电（可通过操作面板显示是否消失判断），检测到电压恢复，则再起动（起动方式由 Fb-25“瞬停、自复位、运行中断再起方式”确定）；

**Fb-18=2:** The output is locked and the drop in DC busbar voltage slows down. As long as the undervoltage does not cause a power failure (judged by control panel display), a restart will follow after detection of voltage restoration (The startup mode depends on Fb-25 “Restart Mode of Instantaneous Power Failure, Self-Reset and Operation Suspension”);

**Fb-18=3:** 欠压时刻开始按 Fb-21“瞬停减速时间”或当前减速时间减速运行，靠减速时负载动能回馈维持直流母线电压，若电压恢复则加速到给定频率。直流母线电压维持时间与负载惯量、转速、转矩和减速时间有关。

**Fb-18=3:** In the case of an undervoltage, press Fb-21 “Instantaneous Deceleration Time” or maintain the decelerated operation at the present deceleratin time. The DC busbar voltage is maintained by the kinetic energy feedback of the load in deceleration. If the voltage is restored, the motor will accelerate to the frequency settings. The maintenance time of DC busbar voltage is related to load inertia, rotation speed, torque and deceleration time.

**Fb-18=1、2、3** 的处理方式，对风机、离心机等大惯量负载，可避免瞬时停电导致的欠压停机。

**Fb-18=1, 2 or 3: This solution is intended for large-inertia loads, such as fans and centrifuges to prevent undervoltage shutdown caused by instantaneous power failure.**

Fb-20“瞬时停电允许时间”：该参数仅用于 Fb-18=1 的情况。

Fb-20 “Instantaneous Power Failure Time Allowance”: The parameter only applies to cases where Fb-18=1.

运行中欠压则自由停机并报欠压故障 (Er.dcl)，待机时欠压只报警 (AL.dcl)。

A free shutdown will follow and an undervoltage fault (Er.dcl) will be reported in the case of an





press Fb-25 “Restart Mode of Instantaneous Power Failure, Self-Reset and Operation Suspension” for a restart. If the fault persists and the reset frequency has not exceeded Fb-22, self-reset trials will continue; otherwise, a fault will be reported and the system will shut down.

故障已复位次数的清零条件：变频器故障自复位后，连续 10 分钟无故障；故障检出后，进行了手动复位；掉电后重新上电。


**Zero Clearing Conditions of Fault Reset Frequency:** After the inverter has a fault self-reset, no fault will follow in 10 minutes on end. If the fault is detected, manual reset will be needed. The power supply will be resumed after power failure.

Fb-24“自动复位期间故障输出”：选择自动复位期间，数字输出 6“故障输出”是否有效。

Fb-24 “Fault Output during Self-Reset”: During the self-reset, Digital Output 6 “Fault Output” can be tested if it is effective.

功率器件保护 (Er.FoP)、外部故障 (Er.EEF) 不进行自动复位。

Power device protection (Er.FoP) and external faults (Er.EEF) will not require a self-reset.

 **危险：慎用自动复位功能，否则可能会导致人身危险或财产损失。**

**CAUTION: Self reset must be used with care; otherwise personal injuries or property losses may occur.**

<b>Fb-26</b>	<b>上电自启动允许</b>	出厂值	1	更改	○
设定范围	0: 禁止 1: 允许				

<b>Fb-26</b>	<b>Poweron Self-Restart Enabled</b>	Factory Settings	1	Modification	○
Setting Range	0: Disabled 1: Enabled				

对于端子运行命令通道并且选择了电平式的运转模式 (F4-13=0、1、2) 时，如果上电时运行命令即有效，则可以根据该参数选择是否上电立即启动。


In the case of a terminal execution command channel where a level-type working mode is selected (F4-13=0, 1 or 2), if the execution command becomes effective upon power supply. You may choose if the parameter selection will cause a prompt startup upon power supply.


<b>Fb-27</b>	<b>制动单元工作点</b>	出厂值	680V	更改	○
设定范围	620~720V				


<b>Fb-27</b>	<b>Braking Unit Working Point</b>	Factory Settings	680V	Modification	○
Setting Range	620~720V				

使用制动单元可以将能量消耗在制动电阻上，以达到快速停机的目的。当直流母线电压超过制动

单元工作点时，制动单元将自动投入使用。


 The braking resistor of a braking unit will consume energy to realize a quick shutdown. If the DC busbar voltage exceeds the braking unit working point, the braking unit will automatically start up.


 仅对 22kW 及以下内置制动单元的机型有效。

 This parameter only applies to inverter types with inbuilt braking units.

<b>Fb-28</b>	<b>调制方式</b>	出厂值	0	更改	○
设定范围	0: 自动（连续和不连续调制自动切换） 1: 连续调制				

<b>Fb-28</b>	<b>Modulation Mode</b>	Factory Settings	0	Modification	○
Setting Range	0: Auto modulation (auto switching between continuous modulation and noncontinuous modulation) 1: Continuous modulation				

 自动方式在切换到不连续调制时，具有更低的开关损耗，但谐波大于连续调制方式。

 The auto mode has much lower switching loss when switching to noncontinuous modulation, but its harmonics is larger than continuous modulation.

<b>Fb-29</b>	<b>载波频率</b>	出厂值	机型确定	更改	○
设定范围	15kW及以下: 1.1k~12.0 kHz, 出厂值4.0kHz 18.5~160 kW: 1.1k~8.0 kHz, 出厂值2.5kHz 200 kW及以上: 1.1k~5.0 kHz, 出厂值2.0kHz				
<b>Fb-30</b>	<b>随机PWM设定</b>	出厂值	0%	更改	○
设定范围	0~30%				
<b>Fb-31</b>	<b>载波频率自动调整选择</b>	出厂值	1	更改	○
设定范围	0: 禁止 1: 允许				

<b>Fb-29</b>	<b>Carrier Frequency</b>	Factory Settings	Depend on inverter model No.	Modification	○
Setting Range	15kW and below: 1.1k~12.0 kHz Factory settings: 4.0kHz 18.5~160kW: 1.1k~8.0 kHz Factory settings: 2.5kHz 200kW and above: 1.1k~5.0 kHz Factory settings: 2.0kHz				
<b>Fb-30</b>	<b>Random PWM Settings</b>	Factory Settings	0%	Modification	○
Setting Range	0~30%				

<b>Fb-31</b>	<b>Carrier Frequency Auto Adjustment Options</b>	Factory Settings	1	Modification	○
Setting Range	0: Disabled		1: Enabled		

- 📖 Fb-29“载波频率”：载波频率高，则电机运行噪音低，电机谐波电流小从而发热降低，但共模电流变大，干扰大，变频器发热量大；载波频率低则情况相反。在需要静音工作的场合，可适当提高载波频率；当设定的载波频率在出厂值以上时，每升高 1kHz，变频器需降额 5% 使用。
- 📖 Fb-29 “Carrier Frequency”: A higher carrier frequency involves very low motor noise, current harmonics and heat dissipation. However, common-mode currents increase and there is more interference and inverter heat dissipation. The reverse will occur if the carrier wave has a lower frequency. In cases requiring silent operation, the carrier frequency may be appropriately improved. If the carrier frequency settings exceed the factory settings, each 1kHz of frequency rise requires the inverter to be derated by 5%.
- 📖 Fb-30“随机 PWM 设定”：随机 PWM 将载波的频谱分散，改善音色。可通过本参数使低载波频率时声音不刺耳。设定为 0% 表示固定载波频率。
- 📖 Fb-30 “Random PWM Settings”: Radom PWM can spread the spectrum of the carrier tone to improve the tone. This parameter can be used to make a low carrier frequency more pleasant to the ear. When the parameter is set as 0%, it means a fixed carrier frequency.
- 📖 Fb-31“载波频率自动调整选择”：可根据变频器散热器的温度、输出电流、输出频率自动调整载波频率，避免变频器因过热发生故障。在散热器温度过高、低频电流过大时载频会自动降低。
- 📖 Fb-31 “Carrier Frequency Auto Adjustment Options”: The carrier freuqncy can be automatically adjusted according to the temperature, output current and output freuqndcy of the radiator of the inverter. This is intended to prevent an overheat from causing a inverter fault. When the radiator has an overtemperature or low-frequency overcurrent, the carrier frequency will be automatically reduced.

<b>Fb-32</b>	<b>死区补偿允许</b>	出厂值	1	更改	×
设定范围	0: 禁止		1: 允许		

<b>Fb-32</b>	<b>Deadband Compensation Allowance</b>	Factory Settings	1	Modification	×
Setting Range	0: Disabled		1: Enabled		

- 📖 死区补偿可以减小输出谐波，减小转矩脉动。但在变频器作为电源使用时需要禁止死区补偿功能。
- 📖 Deadband compensation can reduce output harmonics and torque pulse. But deadband compensation must be disabled when the inverter is used for a power supply.



inverter.

<b>Fb-36</b>	<b>回避频率1</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~625.00Hz				
<b>Fb-37</b>	<b>回避频率1宽度</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~20.00Hz				
<b>Fb-38</b>	<b>回避频率2</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~625.00Hz				
<b>Fb-39</b>	<b>回避频率2宽度</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~20.00Hz				
<b>Fb-40</b>	<b>回避频率3</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~625.00Hz				
<b>Fb-41</b>	<b>回避频率3宽度</b>	出厂值	0.00Hz	更改	○
设定范围	0.00~20.00Hz				

<b>Fb-36</b>	<b>Avoidance Frequency 1</b>	Factory Setting	0.00Hz	Modification	○
Setting Range	0.00~625.00Hz				
<b>Fb-37</b>	<b>Width of Avoidance Frequency 1</b>	Factory Setting	0.00Hz	Modification	○
Modification	0.00~20.00Hz				
<b>Fb-38</b>	<b>Avoidance Frequency 2</b>	Factory Setting	0.00Hz	Modification	○
Modification	0.00~625.00Hz				
<b>Fb-39</b>	<b>Width of Avoidance Frequency 2</b>	Factory Setting	0.00Hz	Modification	○
Modification	0.00~20.00Hz				
<b>Fb-40</b>	<b>Avoidance Frequency 3</b>	Factory Setting	0.00Hz	Modification	○
Modification	0.00~625.00Hz				
<b>Fb-41</b>	<b>Width of Avoidance Frequency 3</b>	Factory Setting	0.00Hz	Modification	○
Modification	0.00~20.00Hz				

☞ 回避频率功能是为了使变频器的运行频率避开机械共振点。

☞ The avoidance frequency function is intended to protect the working frequency of the inverter from mechanic resonance points.












## 6.12 FC 键盘操作及显示设置







## 6.12 FC: Keyboard Operation and Display Settings




FC-00	显示参数选择	出厂值	0	更改	○
设定范围	0: 显示所有菜单    1: 只显示用户选择的参数    2: 只显示与出厂值不同的参数				






FC-00	Display Parameter Options	Factory Settings	0	Modification	○
Setting Range	0: All menus are displayed    1: Only parameters selected by the user are displayed    2: Only parameters different from factory settings are displayed				






- 📖 FC-00=1: 只显示 FC-16~FC-47“用户参数 1~32”选择的参数，用户密码对这些参数无效，但修改 FC-00 需要用户密码。
- 📖 FC-00=1: Only FC-16~FC-47 “User Parameters 1~32” are displayed. Although a user password is ineffective for these parameters, the modification of FC-00 requires the user password.
- 📖 FC-00=2: 只显示与出厂值不同的参数，方便调试和维护。
- 📖 FC-00=2: In order to facilitate debugging and maintenance, only parameters different from factory settings are displayed.

FC-01	按键功能及自动锁定	出厂值	0000	更改	×
设定范围	个位: 按键自动锁定功能 0: 不锁定    1: 全锁定    2: 除  外全锁定 3: 除  外全锁定    4: 除  、  外全锁定    5: 除  、  外全锁定				
	十位:  功能选择 0: 仅在操作面板运行命令通道时有效 1: 在操作面板、端子、通讯运行命令通道时均有效，按停机方式停机 2: 在操作面板运行命令通道时按停机方式停机，非操作面板运行命令通道时自由停机，报Er.Abb				
	百位:  功能选择（仅对面板命令通道） 0: 无效    1: 仅在待机状态下有效    2: 待机、运行状态下均有效				
	千位:  功能选择（仅对面板命令通道）    0: 选择运行功能    1: 选择点动功能				

FC-01	Keyboard Functions and Auto Lock	Factory Settings	0000	Modification	×
Setting Range	Units digit: Auto key lock 0: Unlocked    1: All locked    2: All locked except  3: All locked except  4: All locked except  and  5: All locked except  and 				

Tens digit: Function options for 
0: Effective only when the command execution channel is the control panel 1: Effective when the command execution channel is the control panel, terminal or communication port; the system is shut down in the shutdown mode 2: When the control panel is the command execution channel, the system can be shut down in the shutdown mode If a free shutdown is executed when the command execution channel is not the control panel, Er.Abb will be reported
Hundreds digit: Function options for  (applicable only to panel command channels)
0: Invalid                      1: Valid only in standby mode                      2: Valid in both standby mode and operation mode
Thousands digit: Function options for  (applicable only to panel command channels)      0:
Operation function options                      1: Jogging options

 按键自动锁定功能。1 分钟无按键，按键将自动锁定；在监视状态下，按  + ，按键将立即锁定；按  +  3s 即可解锁。


 Auto Key Lock: If no key is pressed within 1 minute, the keys will be locked automatically; in the monitor mode, press  +  and the keys will be automatically locked; to unlock the keys, hold  +  for 3 seconds.


FC-02	监视参数选择1	出厂值	1	更改	○
FC-03	监视参数选择2	出厂值	-1	更改	○
FC-04	监视参数选择3	出厂值	-1	更改	○
FC-05	监视参数选择4	出厂值	-1	更改	○
FC-06	监视参数选择5	出厂值	-1	更改	○
FC-07	监视参数选择6	出厂值	-1	更改	○
FC-08	监视参数选择7	出厂值	-1	更改	○
FC-09	运行监视参数1	出厂值	0	更改	○
FC-10	运行监视参数2	出厂值	2	更改	○
FC-11	运行监视参数3	出厂值	4	更改	○
FC-12	运行监视参数4	出厂值	-1	更改	○
设定范围	-1~50, -1表示空, 0~50表示FU-00~FU-50				


FC-02	Monitoring Parameter Option 1	Factory Settings	1	Modification	○
FC-03	Monitoring Parameter Option 2	Factory Settings	-1	Modification	○
FC-04	Monitoring Parameter Option 3	Factory Settings	-1	Modification	○




FC-05	Monitoring Parameter Option 4	Factory Settings	-1	Modification	○
FC-06	Monitoring Parameter Option 5	Factory Settings	-1	Modification	○
FC-07	Monitoring Parameter Option 6	Factory Settings	-1	Modification	○
FC-08	Monitoring Parameter Option 7	Factory Settings	-1	Modification	○
FC-09	Operation Monitoring Parameter Option 1	Factory Settings	0	Modification	○
FC-10	Operation Monitoring Parameter Option 2	Factory Settings	2	Modification	○
FC-11	Operation Monitoring Parameter Option 3	Factory Settings	4	Modification	○
FC-12	Operation Monitoring Parameter Option 4	Factory Settings	-1	Modification	○
Setting Range	-1~50; -1 means void; 0~50 mean FU-00~FU-50				

 监视参数选择：从 FU 菜单中选择要监视的参数，在待机和运行状态都显示。

 **Monitoring Parameter Options:** Parameters to be monitored are selected from the FU menu and displayed in both standby mode and operation mode.

 运行监视参数：从 FU 菜单中选择要监视的参数，只在运行状态显示。

 **Operation Monitoring Parameter Options:** Parameters to be monitored are selected from the FU menu and displayed only in operation mode.

FC-13	转速显示系数	出厂值	1.000	更改	○
设定范围	0.001~10.000 FU-05“运行转速”=120×运行频率÷电机极数×FC-13“转速显示系数” FU-06“给定转速”=120×给定频率÷电机极数×FC-13“转速显示系数”				

FC-13	Rotation Display Coefficient	Factory Settings	1.000	Modification	○
-------	------------------------------	------------------	-------	--------------	---

Setting Range	0.001~10.000 FU-05 “Actual Rotation Speed”= $120 \times \text{Working Frequency} \div \text{Number of Motor Poles} \times \text{FC-13}$ “Rotation Speed Display Coefficient” FU-06 “Set Rotation Speed”= $120 \times \text{Frequency Settings} \div \text{Number of Motor Poles} \times \text{FC-13}$ “Rotation Speed Display Coefficient”
---------------	--

仅用于转速换算，对实际转速和电机控制无影响。

This function is only used for conversion of rotation speed and does not affect the actual rotation speed and motor control.

<b>FC-14</b>	<b>线速度显示系数</b>	出厂值	0.01	更改	○
设定范围	0.01~100.00 FU-09“运行线速度”=运行频率×FC-14“线速度显示系数” FU-10“给定线速度”=给定频率×FC-14“线速度显示系数”				

<b>FC-14</b>	<b>Linear Velocity Display Coefficient</b>	Factory Setting	0.01	Modification	○
Setting Range	0.01~100.00 FU-09 “Actual Linear Velocity”= $\text{Working Frequency} \times \text{FC-14}$ “Linear Velocity Display Coefficient” FU-10 “Set Linear Velocity” = $\text{Frequency Settings} \times \text{FC-14}$ “Linear Velocity Display Coefficient”				

This is only used for conversion of linear velocity and does not affect the actual linear velocity and motor control.

<b>FC-15</b>	<b>PID给定值、反馈值单位</b>	出厂值	14	更改	○
设定范围	0: Hz    1: A    2: V    3: %    4: kW    5: s    6: rpm    7: mps    8: m 9: mA    10: mV    11: Pa    12: kPa    13: °C    14: kg/cm <sup>2</sup> 15: mmH <sub>2</sub> O    16: MPa				

<b>FC-15</b>	<b>Units of PID Settings and Feedback Values</b>	Factory Setting	14	Modification	○
Setting Range	0: Hz    1: A    2: V    3: %    4: kW    5: s    6: rpm    7: mps    8: m 9: mA    10: mV    11: Pa    12: kPa    13: °C    14: kg/cm <sup>2</sup> 15: mmH <sub>2</sub> O    16: MPa				

仅 LCD 显示面板有效，用于参数的单位显示。

The units are effective only for the LCD panel and are used to display the units of parameters.

## 6.13 FF 通讯参数

## 6.13 FF: Communication Parameters

<b>FF-00</b>	<b>通讯协议选择</b>	出厂值	0	更改	×
设定范围	0: Modbus协议      1: 兼容USS指令      2: CAN总线				
<b>FF-01</b>	<b>通讯数据格式</b>	出厂值	0	更改	×
设定范围	0: 8,N,1 (1个起始位, 8个数据位, 无奇偶校验, 1个停止位) 1: 8,E,1 (1个起始位, 8个数据位, 偶校验, 1个停止位) 2: 8,O,1 (1个起始位, 8个数据位, 奇校验, 1个停止位) 3: 8,N,2 (1个起始位, 8个数据位, 无奇偶校验, 2个停止位)				
<b>FF-02</b>	<b>波特率选择</b>	出厂值	3	更改	×
设定范围	0: 1200bps    1: 2400bps    2: 4800bps    3: 9600bps    4: 19200bps 5: 38400bps    6: 57600bps    7: 115200bps    8: 250000bps    9: 500000bps 注: Modbus和兼容USS指令协议选择范围0~5, CAN总线选择范围0~9				
<b>FF-03</b>	<b>本机地址</b>	出厂值	1	更改	×
设定范围	0~247 注: Modbus选择范围1~247, 兼容USS指令选择范围0~31, CAN总线选择范围0~127				
<b>FF-04</b>	<b>通讯超时检出时间</b>	出厂值	10.0s	更改	○
设定范围	0.1~600.0s				
<b>FF-05</b>	<b>本机应答延时</b>	出厂值	5ms	更改	○
设定范围	0~1000ms				
<b>FF-06</b>	<b>通讯超时动作</b>	出厂值	0	更改	×
设定范围	0: 不动作    1: 报警    2: 故障并自由停机    3: 报警, 按F0-00运行 4: 报警, 按 (F0-07) 上限频率运行    5: 报警, 按 (F0-08) 下限频率运行				
<b>FF-07</b>	<b>USS报文PZD字数</b>	出厂值	2	更改	×
设定范围	0~4				
<b>FF-08</b>	<b>通讯设定频率比例</b>	出厂值	1.000	更改	○
设定范围	0.001~30.000, 通讯给定频率乘以该参数后作为频率给定				

<b>FF-00</b>	<b>Communication Protocol Options</b>	Factory Setting s	0	Modification	×
Setting Range	0: Modbus protocol      1: Compatible USS commands      2: CAN bus				
<b>FF-01</b>	<b>Communication Data Format</b>	Factory Setting s	0	Modification	×
Setting Range	0: 8,N,1 (1 start bit; 8 data bits; no parity check; 1 stop bit) 1: 8,E,1 (1 start bit; 8 data bits; even parity check; 1 stop bit) 2: 8,O,1 (1 start bit; 8 data bits; odd parity check; 1 stop bit) 3: 8,N,2 (1 start bit; 8 data bits; no parity check; 2 stop bits)				
<b>FF-02</b>	<b>Baud Rate Options</b>	Factory Setting s	3	Modification	×

Setting Range	0: 1200bps    1: 2400bps    2: 4800bps    3: 9600bps    4: 19200bps 5: 38400bps    6: 57600bps    7: 115200bps    8: 250000bps    9: 500000bps NOTE: 0~5 are for Modbus and compatible USS command protocols; 0~9 are for CAN bus.				
<b>FF-03</b>	<b>Local IP Address</b>	Factory Settings	1	Modification	×
Setting Range	0~247 NOTE: 1~247 are for Modbus; 0~31 are for compatible USS commands; 0~127 are for CAN bus				
<b>FF-04</b>	<b>Communication Timeout Detection Time</b>	Factory Settings	10.0s	Modification	○
Setting Range	0.1~600.0s				
<b>FF-05</b>	<b>Local Response Delay</b>	Factory Settings	5ms	Modification	○
Setting Range	0~1000ms				
<b>FF-06</b>	<b>Communication Timeout Action</b>	Factory Settings	0	Modification	×
Setting Range	0: No action    1: Alarm    2: Fault and free shutdown    3: Alarm; press F0-00 for operation 4: Alarm; press F0-07 for operation at an upper limit frequency    5: Alarm; press F0-08 for operation at the lower limit frequency				
<b>FF-07</b>	USS Message PZD Words	Factory Settings	2	Modification	×
Setting Range	0~4				
<b>FF-08</b>	Communication Frequency Setting Proportion	Factory Settings	1.000	Modification	○
Setting Range	0.001~30.000; the communication frequency settings multiplied by this parameter are equal to the set frequency				

- 📖 SB200 变频器 RS485 Modbus 协议包含三个层次：物理层、数据链路层和应用层。物理层和数据链路层采取了基于 RS485 的 Modbus 协议，应用层即控制变频器运行、停止、参数读写等操作。
- 📖 The RS485 Modbus protocol of the SB200 inverter series comprises three layers: physical layer, data link layer and application layer. The physical layer and the data link layer adopt the RS485-based Modbus protocol. The application layer is used to control such inverter operations as operation, shutdown and parameter reading/writing.
- 📖 Modbus 协议为主从式协议。主机和从机之间的通讯有两类：主机请求，从机应答；主机广播，从

机不应答。任何时候总线上只能有一个设备在进行发送，主机对从机进行轮询。从机在未获得主机的命令情况下不能发送报文。主机在通讯不正确时可重复发命令，如果在给定的时间内没有收到响应，则认为所轮询的从机丢失。如果从机不能执行某一报文，则向主机发送一个异常信息。从机之间不能直接通讯，必须通过主机，读出一个从机的数据，再发送到另一个从机。

📖 The Modbus protocol is a master-slave protocol. There are two communication types for master-slave communication: 1. the master sends requests and the slave responds; 2. the master broadcasts and the slave does not respond. At any time, the bus can have only one sending device. The maser makes a poll on the slave, which can not send messages without obtaining the command from the master. If the communication is incorrect, the master can send the commands once again. If there is no response from the slave within a specified time, the master will treat the polled slave as being missing. If the slave can not execute a message, an abnormality message will be sent to the master. Direct communication is not available between the master and the slave. The data of a slave must be read by a master before they are sent to another slave.

📖 通讯对变频器参数的写入只修改 RAM 中的值，如果要把 RAM 中的参数写入到 EEPROM，需要用通讯把通讯变量的“EEP 写入指令”（Modbus 地址为 3209H）改写为 1。

📖 The read-in of inverter parameters via communication can only modify values in the RAM. If parameters in the RAM need to be read into the EEPROM, the “EEP Read-In Command” (The Modbus address is 3209H) of the communication variable must be modified to 1 via communication.

📖 变频器参数编址方法：16 位的 Modbus 参数地址的高 8 位是参数的组号，低 8 位是参数的组内序号，按 16 进制编址。例如参数 F4-17 的地址为：0411H。对于通讯变量（控制字，状态字等），参数组号为 50（32H）。注：通讯变量包括通讯可以访问的变频器参数、通讯专用指令变量、通讯专用状态变量。菜单代号对应的通讯用参数组号如下表所示：

📖 Inverter Parameter Addressing Mode: The 8 higher bits of a 16-bit Modbus parameter address are formed by the group number of the parameter and the 8 lower bits are formed by the in-group serial number. The address mode adopts the hexadecimal system. For example, the address of Parameter F4-17 is 0411H. For communication variables (control words and status words), the parameter group number is 50(32H). NOTE: Communication variables include accessible inverter parameters, communication-specific command variables and communication-specific status variables. The parameter group numbers corresponding with the menu codes are represented in the following table:

菜单代号	参数组号	菜单代号	参数组号	菜单代号	参数组号	菜单代号	参数组号
F0	0 (00H)	F5	5 (05H)	Fb	10 (0AH)	FU	15 (0FH)
F1	1 (01H)	F6	6 (06H)	FC	11 (0BH)	通讯变量	50 (32H)
F2	2 (02H)	F7	7 (07H)	FF	12 (0CH)	—	—
F3	3 (03H)	F8	8 (08H)	Fn	13 (0DH)	—	—
F4	4 (04H)	F9	9 (09H)	FP	14 (0EH)	—	—

Menu Code	Parameter Group	Menu Code	Parameter Group	Menu Code	Parameter Group	Menu Code	Parameter Group
-----------	-----------------	-----------	-----------------	-----------	-----------------	-----------	-----------------

	Number		Number		Number		Number
F0	0 (00H)	F5	5 (05H)	Fb	10 (0AH)	FU	15 (0FH)
F1	1 (01H)	F6	6 (06H)	FC	11 (0BH)	Communication Variable	50 (32H)
F2	2 (02H)	F7	7 (07H)	FF	12 (0CH)	—	—
F3	3 (03H)	F8	8 (08H)	Fn	13 (0DH)	—	—
F4	4 (04H)	F9	9 (09H)	FP	14 (0EH)	—	—

☞ 通讯中的数据类型：通讯中传输的数据为 16 位整数，最小单位可从参数一览表中参数的小数点位置看出。例如：对于 F0-00“数字给定频率”的最小单位为 0.01Hz，因此对 Modbus 协议而言，通讯传输 5000 就代表 50.00Hz。

☞ Data Types in Communication: Data transmitted by communication are 16-bit integers. The min. unit is indicated by the place of the decimal point. For example, the min. unit of F0-00 “Digital Frequency Settings” is 0.01Hz; therefore, for the Modbus protocol, the figure 5000 transmitted by communication means 50.00Hz.

☞ 通讯指令变量表：

☞ Table of Communication-Specific Command Variables

名称	Modbus地址	更改	说明
主控制字	3200H	○	位 0: ON/OFF1 (上升沿运行, 为 0 则停机) 位 1: OFF2 (为 0 则自由停机) 位 2: OFF3 (为 0 则紧急停机) 位 3: 驱动封锁 (为 0 则驱动封锁) 位 4: 斜坡使能 (为 0 则停止加减速) 位 5: 未使用 位 6: 未使用 位 7: 故障复位 (上升沿进行故障复位) 位 8: 正向点动 位 9: 反向点动 位 10: 未使用 位 11: 设定值反向 (为 1 则把给定频率反向, 为 0 则不反向) 位 12: 上位机数字量 1 位 13: UP 位 14: DOWN 位 15: 上位机数字量 2
通讯给定频率	3201H	○	单位 0.01Hz 的非负数, 乘以 FF-08 后作为频率给定
PID 给定	3202H	○	范围: -100.00~100.00%
上位机模拟量	3203H	○	范围: -100.00~100.00%
扩展控制字 1	3204H	○	位 0~位 15 对应数字输入 1~16
扩展控制字 2	3205H	○	位 0~位 15 对应数字输入 17~32
扩展控制字 3	3206H	○	位 0~位 15 对应数字输入 33~48
扩展控制字 4	3207H	○	位 0~位 5 对应数字输入 49~54, 其余位保留
扩展控制字 5	3208H	○	保留

名称	Modbus地址	更改	说明
EEPROM 写入	3209H	○	向该地址写入 1 时, 变频器 RAM 中的参数将写入 EEPROM
变频器功率	320DH	△	变频器功率信息
变频器软件版本	320EH	△	变频器软件版本信息
通讯协议及变频器机型	320FH	△	通讯协议版本号及变频器机型信息

Name	Modbus Address	Modification	Description
Primary Control Word	3200H	○	Bit 0: ON/OFF1 (rising edge operation; a shutdown will follow if the figure is 0) Bit 1: OFF2 (A free shutdown will follow if the figure is 0) Bit 2: OFF3 (An emergency shutdown will follow if the figure is 0) Bit 3: Drive lock (If the figure is 0, a drive lock will follow) Bit 4: Ramping enablement (The acceleration/deceleration will stop if the figure is 0) Bit 5: Unused Bit 6: Unused Bit 7: Fault reset (The rising edge will conduct a fault reset) Bit 8: Clockwise jogging Bit 9: Anticlockwise jogging Bit 10: Unused Bit 11: Settings inversion (If the figure is 1, the frequency settings will be inverted; if the figure is 0, there will be no frequency inversion) Bit 12: PC Digital Quantity 1 Bit 13: UP Bit 14: DOWN Bit 15: PC Digital Quantity 2
Communication Frequency Settings	3201H	○	A non-negative number (unit: 0.01Hz) times FF-08 will be used for the set frequency
PID Settings	3202H	○	Range: - 100.00~100.00%
PC Analog Quantity	3203H	○	Range: - 100.00~100.00%
Extension Control Word 1	3204H	○	Bit 0~Bit 15 correspond with Digital Inputs 1~16
Extension Control Word 2	3205H	○	Bit 0~Bit 15 correspond with Digital Inputs 17~32
Extension Control Word 3	3206H	○	Bit 0~Bit 15 correspond with Digital Inputs 33~48
Extension Control Word 4	3207H	○	Bit 0~Bit 5 correspond with Digital Inputs 49~54; all other bits are retained
Extension Control Word 5	3208H	○	Retained
EEPROM Read-In	3209H	○	When 1 is being read into this address, the parameters in the inverter RAM will be read into the EEPROM
Inverter Power	320DH	△	Info about inverter power
Inverter	320EH	△	Info about inverter software version

Name	Modbus Address	Modification	Description
Software Version Communication Protocol and Inverter Model	320FH	△	Info about communication protocol version No. and inverter model No.

注：数字输入 37“三线式停机指令”、38“内部虚拟 FWD 端子”、39“内部虚拟 REV 端子”，只用于端子控制，通讯修改无效。

NOTE: Digital Inputs 37 “Three-Wire Mode Shutdown Command”, 38 “Internal Virtual FWD Terminal” and 39 “Internal Virtual REV Terminal” apply only to terminal control. Modification via communication is ineffective.

☞ 扩展控制字 1~5 各位对应于数字输入 1~54，对应关系如下表：

☞ The bits (1~5) of Extension Control Words correspond respectively with Digital Inputs 1—54. See the following table for the relationship:

扩展控制字1	扩展控制字2	扩展控制字3	扩展控制字4	扩展控制字5
位 0~位 15	位 0~位 15	位 0~位 15	位 0~位 5	位 0~位 15
数字输入 1~16	数字输入 17~32	数字输入 33~48	数字输入 49~54	保留

Extension Control Word 1	Extension Control Word 2	Extension Control Word 3	Extension Control Word 4	Extension Control Word 5
Bit 0~Bit 15	Bit 0~Bit 15	Bit 0~Bit 15	Bit 0~Bit 5	Bit 0~Bit 15
Digital Inputs 1~16	Digital Inputs 17~32	Digital Inputs 33~48	Digital Inputs 49~54	Retained

☞ 通讯地址 320DH：变频器功率。

☞ Communication Address 320DH: Inverter Power

0~15 位：变频器功率信息 0~6553.5。单位 0.1kW。注意 0.75kW 就省略为 0.7kW。

Bit 0~Bit 15: Info about inverter power: 0~6553.5. Unit: 0.1kW. NOTE: 0.75kw should be rounded as 0.7kW.

☞ 通讯地址 320EH：变频器软件版本。

☞ Communication Address 320EH: Inverter software version

0~15 位：变频器软件版本号。

Bit 0~Bit 15: Inverter software version number

☞ 通讯地址 320FH：通讯协议版本号及变频器机型信息。

☞ Communication Address 320FH: Communication protocol version number and inverter model number.

15~12 位：MODBUS 通讯协议版本号。

Bit 15~Bit 12: MODbus communication protocol version number

11~8 位：变频器电压等级。



Bit 11~Bit 8: Inverter voltage grade

0~7 位: 变频器的机型。

Bit 0~Bit 7: Inverter model number

📖 通讯状态变量表:

📖 Table of Communication-Status Variables

名称	Modbus地址	更改	说明
主状态字	3210H	△	位 0: 就绪 位 1: 运行准备就绪 位 2: 运行中 位 3: 故障 位 4: OFF2 有效 (0 有效, 表示自由停机指令有效) 位 5: OFF3 停机中 (0 有效, 表示在紧急停机过程中) 位 6: 充电接触器断开 位 7: 报警 位 8: 保留 位 9: 保留 位 10: 频率水平检测信号 1 位 11: 保留 位 12: 保留 位 13: 保留 位 14: 正向运行中 位 15: 保留
运行频率	3211H	△	单位 0.01Hz 的非负数
保留	3212H	—	—
保留	3213H	—	—
给定频率	3214H	△	单位 0.01Hz 的非负数
输出电流	3215H	△	单位 0.1A
输出转矩	3216H	△	单位 0.1%额定转矩
输出电压	3217H	△	单位 0.1V
母线电压	3218H	△	单位 0.1V
故障代码	3219H	△	详见 247 页故障内容及对策表
报警字 1	321AH	△	详见 252 页报警内容及对策表
报警字 2	321BH	△	详见 252 页报警内容及对策表
扩展状态字 1	321CH	△	位 0~位 15 对应数字输出 0~15
扩展状态字 2	321DH	△	位 0~位 15 对应数字输出 16~31
扩展状态字 3	321EH	△	位 0~位 15 对应数字输出 32~47
扩展状态字 4	321FH	△	位 0~位 12 对应数字输出 48~59
扩展状态字 5	3220H	△	保留

Name	Modbus Address	Modification	Description
------	----------------	--------------	-------------

Name	Modbus Address	Modification	Description
Primary Status Word	3210H	△	Bit 0: Ready Bit 1: Ready for operation Bit 2: In operation Bit 3: Fault Bit 4: OFF2 is effective (0 means effective, or that the free shutdown command is effective) Bit 5: OFF3 is in shutdown status (0 means effective, the system is in an emergency shutdown process) Bit 6: The charging contactor has been disconnected Bit 7: Alarm Bit 8: Retained Bit 9: Retained Bit 10: Frequency Level Detection Signal 11 Bit 11: Retained Bit 12: Retained Bit 13: Retained Bit 14: In clockwise operation Bit 15: Retained
Working Frequency	3211H	△	Non-negative numbers (unit: 0.01Hz)
Retained	3212H	—	—
Retained	3213H	—	—
Frequency Settings	3214H	△	A non-negative number (unit: 0.01Hz)
Output Current	3215H	△	Unit: 0.1A
Output Torque	3216H	△	Unit: 0.1% of rated torque
Output Voltage	3217H	△	Unit: 0.1V
Busbar Voltage	3218H	△	Unit: 0.1V
Fault Code	3219H	△	Refer to the Table of Fault Description and Solution on Page 247
Alarm Word 1	321AH	△	Refer to the Table of Alarm Description and Solution on Page 252
Alarm Word 2	321BH	△	Refer to the Table of Alarm Description and Solution on Page 252
Extension Status Word 1	321CH	△	Bit 0~Bit 15 correspond with Digital Outputs 0~15
Extension Status Word 2	321DH	△	Bit 0~Bit 15 correspond with Digital Outputs 16~31
Extension Status Word 3	321EH	△	Bit 0~Bit 15 correspond with Digital Outputs 32~47
Extension Status Word 4	321FH	△	Bit 0~Bit 12 correspond with Digital Outputs 48~59
Extension Status Word 5	3220H	△	Retained

☞ 扩展状态字 1~5 各位对应于数字输出 0~60，对应关系如下表：

☞ The bits (Bit 1~Bit 5) of the extension status word correspond respectively with Digital Outputs 0~60. See the following table for the relationship:

扩展状态字1	扩展状态字2	扩展状态字3	扩展状态字4	扩展状态字5
--------	--------	--------	--------	--------

位 0~位 15	位 0~位 15	位 0~位 15	位 0~位 12	位 0~位 15
数字输出 0~15	数字输出 16~31	数字输出 32~47	数字输出 48~59	保留

Extension Status Word 1	Extension Status Word 2	Extension Status Word 3	Extension Status Word 4	Extension Status Word 5
Bit 0~Bit 15	Bit 0~Bit 15	Bit 0~Bit 15	Bit 0~Bit 12	Bit 0~Bit 15
Digital Outputs 0~15	Digital Outputs 16~31	Digital Outputs 32~47	Digital Outputs 48~59	Retained

SB200 变频器支持 RTU（远程终端单元）模式的 Modbus 协议，支持的功能有：功能 3（读多个参数，最大字数为 50），功能 16（写多个参数，最大字数为 10 个），功能 22（掩码写），功能 8（回路测试）。其中功能 16 和功能 22 支持广播。RTU 帧的开始和结束都以至少 3.5 个字符时间间隔（但对 19200bit/s 和 38400bit/s 的波特率为 2ms）为标志。典型的 RTU 帧的格式如下：

The SB200 inverter series support the Modbus protocol in RTU mode (Remote Terminal Unit). Supported functions include Function 3 (capable of reading multiple parameters; the largest number of words is 50), Function 16 (capable of writing multiple parameters; the largest number of words is 10), Function 22 (mask writing) and Function 8 (loop test). Functions 16 and 12 support broadcasting. RTU frames begin and end with a time interval of at least 3.5 characters (but the interval is 2ms for such baud rates as 19200bit/s and 38400bit/s). A typical RTU frame has the following format:

从机地址(1 字节)	Modbus 功能号 (1 字节)	数据 (多个字节)	CRC16 (2 个字节)
------------	-------------------	-----------	---------------

Slave Address (1 byte)	Modbus Function Number (1 byte)	Date (Multiple bytes)	CRC16 (2 bytes)
------------------------	---------------------------------	-----------------------	-----------------

一个字节的格式和发送顺序：1 个起始位、8 个数据位、1 个奇偶校验位或无校验位、1 个或 2 个停止位；从机地址的范围：1 至 247，地址为 0 的报文为广播报文；CRC(循环冗余校验)校验：CRC16 方式，先低字节后高字节。

Data Format and Sending Sequence of a Byte: 1 start bit, 8 data bits, 1 parity check bit (or no such bit) and 1 or 2 stop bits. Range of Slave Address: 1—247. If the message address is 0, it's a broadcast message. Cyclic Redundancy Check (CRC): CRC16 (lower bytes before higher bytes).

功能 3：多读。读取字数范围为 1 到 50。报文的格式如下例。

Function 3: Multi-reading. The range of number of words read is 1—50. See the following example for the format of a message:

例：读取 1 号从机的主状态字、运行频率和算术单元 1 输出（地址为 3210H 开始的 3 个字）：

Example: Reading the Primary Status Word, Working Frequency and Arithmetic Unit 1 Output of Slave

#1 (the address is the first 3 words of 3210H):

主机发出:

从机地址	01H
Modbus功能号	03H
起始地址 (高字节)	32H
起始地址 (低字节)	10H
读取字数 (高字节)	00H
读取字数 (低字节)	03H
CRC (低字节)	0AH
CRC (高字节)	B6H

从机回应:

从机地址	01H
Modbus功能号	03H
返回字节数	06H
3210H内容的高字节	44H
3210H内容的低字节	37H
3211H内容的高字节	13H
3211H内容的低字节	88H
3212H内容的高字节	00H
3212H内容的低字节	00H
CRC (低字节)	5FH
CRC (高字节)	5BH

Master Request:

Slave Address	01H
Modbus Function Number	03H
Start Address (Higher byte)	32H
Start Address (Lower byte)	10H
Number of Words Read (Higher byte)	00H
Number of Words Read (Lower byte)	03H
CRC (Lower byte)	0AH
CRC (Higher byte)	B6H

Slave Response:

Slave Address	01H
Modbus Function Number	03H
Number of Bytes Returned	06H
Higher Byte with 3210H	44H
Lower Byte with 3210H	37H
Higher Byte with 3211H	13H
Lower Byte with 3211H	88H
Higher Byte with 3212H	00H
Lower Byte with 3212H	00H
CRC (Lower byte)	5FH
CRC (Higher byte)	5BH

📖 单写: 06H

📖 Write Once: 06H

功能码 06H 用于单个功能参数设置, 报文的格式如下

Functional Code 06H is used for the settings of single functional parameters. Refer to the following example for the message format:

例: 设置 1 号从机给定频率为 20.00Hz, 报文格式如下:

Example: Set the frequency of Slave #1 as 20.00Hz. Refer to the following table for the message format:

主机发出:

从机地址	01H
Modbus功能号	06H
参数地址 (高字节)	32H
参数地址 (低字节)	01H

从机回应:

从机地址	01H
Modbus功能号	10H
参数地址 (高字节)	06H
参数地址 (低字节)	32H

数据（高字节）	07H
数据（低字节）	D0H
CRC（低字节）	D5H
CRC（高字节）	1EH

数据（高字节）	01H
数据（低字节）	07H
CRC（低字节）	D5H
CRC（高字节）	1EH

Master Request:

Slave Address	01H
Modbus Function Number	06H
Parameter Address (Higher byte)	32H
Parameter Address (Lower byte)	01H
Data (Higher byte)	07H
Data (Lower byte)	D0H
CRC (Lower byte)	D5H
CRC (Higher byte)	1EH

Slave Response:

Slave Address	01H
Modbus Function Number	10H
Parameter Address (Higher byte)	06H
Parameter Address (Lower byte)	32H
Data (Higher byte)	01H
Data (Lower byte)	07H
CRC (Lower byte)	D5H
CRC (Higher byte)	1EH

☞ 功能 16：多写。写的字数范围为 1 到 10。报文的格式如下例。

☞ Function 16: Write Many: The range of number of words written is 1—10. Refer to the following example for the message format.

例：使 1 号从机按 50.00Hz 正向运行，可将地址 3200H 开始的 2 个字改写为 003FH 和 1388H：

Example: If Slave #1 is operated in the clockwise direction at 50.00Hz, the first two words of Address 3200 can be changed to 003FH and 1388H:

主机发出：

从机地址	01H
Modbus功能号	10H
起始地址（高字节）	32H
起始地址（低字节）	00H
写的字数（高字节）	00H
写的字数（低字节）	02H
写的字节数	04H
第1个数的高字节	00H
第1个数的低字节	3FH
第2个数的高字节	13H
第2个数的低字节	88H
CRC（低字节）	83H
CRC（高字节）	94H

从机回应：

从机地址	01H
Modbus功能号	10H
起始地址（高字节）	32H
起始地址（低字节）	00H
写的字数（高字节）	00H
写的字数（低字节）	02H
CRC（低字节）	4FH
CRC（高字节）	70H

Master Request:

Slave Address	01H
---------------	-----

Slave Response:

Modbus Function Number	10H
Start Address (Higher byte)	32H
Start Address (Lower byte)	00H
Number of Words Written (Higher byte)	00H
Number of Words Written (Lower byte)	02H
Number of Bytes Written	04H
Higher Byte of the 1 <sup>st</sup> Number	00H
Lower Byte of the 1 <sup>st</sup> Number	3FH
Higher Byte of the 2 <sup>nd</sup> Number	13H
Lower Byte of the 2 <sup>nd</sup> Number	88H
CRC (Lower byte)	83H
CRC (Higher byte)	94H

Slave Address	01H
Modbus Function Number	10H
Start Address (Higher byte)	32H
Start Address (Lower byte)	00H
Number of Words Written (Higher byte)	00H
Number of Words Written (Lower byte)	02H
CRC (Lower byte)	4FH
CRC (Higher byte)	70H

例：使 1 号从机停机，设为正向 50.00Hz，可将地址 3200H 开始的 2 个字改写为 003EH 和 1388H：

Example: Shut down Slave #1 and set it as clockwise, 50.00Hz. The first 2 words of Address 3200H will be modified to 003EH and 1388H:

主机发出：

从机地址	01H
Modbus功能号	10H
起始地址（高字节）	32H
起始地址（低字节）	00H
写的字数（高字节）	00H
写的字数（低字节）	02H
写的字节数	04H
第1个数的高字节	00H
第1个数的低字节	3EH
第2个数的高字节	13H
第2个数的低字节	88H
CRC（低字节）	D2H
CRC（高字节）	54H

从机回应：

从机地址	01H
Modbus功能号	10H
起始地址（高字节）	32H
起始地址（低字节）	00H
写的字数（高字节）	00H
写的字数（低字节）	02H
CRC（低字节）	4FH
CRC（高字节）	70H

Master Request:

Slave Address	01H
Modbus Function Number	10H
Start Address (Higher byte)	32H
Start Address (Lower byte)	00H

Slave Response:

Number of Words Written (Higher byte)	00H
Number of Words Written (Lower byte)	02H
Number of Bytes Written	04H
Higher Byte of the 1 <sup>st</sup> Number	00H
Lower Byte of the 1 <sup>st</sup> Number	3EH
Higher Byte of the 2 <sup>nd</sup> Number	13H
Lower Byte of the 2 <sup>nd</sup> Number	88H
CRC (Lower byte)	D2H
CRC (Higher byte)	54H

Slave Address	01H
Modbus Function Number	10H
Start Address (Higher byte)	32H
Start Address (Lower byte)	00H
Number of Words Written (Higher byte)	00H
Number of Words Written (Lower byte)	02H
CRC (Lower byte)	4FH
CRC (Higher byte)	70H

## 功能 22: 掩码写

### Function 22: Mask Writing

在对控制字操作时，“读出—改变—写入”的方式繁琐且费时，掩码写功能为用户提供了一种方便地修改控制字的某一位或某几位的方法。该功能仅对控制字有效（包括主控控制字和扩展控制字）。操作如下：

When operating a control word, the “read-out—modify—read-in” mode is time-consuming and verbose. The mask writing function provides for the user a method to modify one or more bits of a control word. This function is only effective for control words (including primary control words and extension control words). Refer to the following description of operation:

结果 = (操作数 & AndMask) | (OrMask & (~ AndMask))，即：

Outcome=(operand & AndMask) | (OrMask & (~ AndMask)), that is,

当 OrMask 为全 0 时，结果为操作数和 AndMask 相与，可用于把某一位或几位清 0；

When OrMask is all-zero, the outcome is the operand and AndMask. It can be used to reset one or more bits;

当 OrMask 为全 1 时，将把操作数对应于 AndMask 为 0 的位改写为 1，可用于把某一位或几位置 1；

When OrMask is all-one, the operand bit (0) corresponding with AndMask will be modified to 1. It can be used to set one or more bits as 1;

当 AndMask 为全 0，结果为 OrMask；

When AndMask is all-zero, the outcome is OrMask;

当 AndMask 为全 1，结果不变；

When AndMask is all-one, the outcome remains unchanged;

例：将 1 号从机 3205H 地址（扩展扩展字 2）的位 7（数字输入 35：过程 PID 禁止）置 1、清零。

主机发出和从机响应如下（从机将主机命令原样返回）：

Example: If Bit 7 (Digital Input 35; PID disabled) of Address 3205 (extended Extension Word 2) of Slave #1 is set as 1 and reset, the master will send requests and the slave will respond as follows (the slave will send the master command back in original):

将扩展控制字2的位7置1

从机地址	01H
Modbus功能号	16H
操作数地址高字节	32H
操作数地址低字节	05H
AndMask高字节	FFH
AndMask低字节	7FH
OrMask高字节	FFH
OrMask低字节	FFH
CRC（低字节）	3EH
CRC（高字节）	68H

将扩展控制字2的位7清零

从机地址	01H
Modbus功能号	16H
操作数地址高字节	32H
操作数地址低字节	05H
AndMask高字节	FFH
AndMask低字节	7FH
OrMask高字节	00H
OrMask低字节	00H
CRC（低字节）	3FH
CRC（高字节）	D8H

Set Bit 7 of Extension Control Word 2 as 11

Slave Address	01H
Modbus Function Number	16H
Higher Byte of Operand Address	32H
Lower Byte of Operand Address	05H
Higher Byte of AndMask	FFH
Lower Byte of AndMask	7FH
Higher Byte of OrMask	FFH
Lower Byte of OrMask	FFH
CRC (Lower byte)	3EH
CRC (Higher byte)	68H

Reset Bit 7 of Extension Control Word 2

Slave Address	01H
Modbus Function Number	16H
Higher Byte of Operand Address	32H
Lower Byte of Operand Address	05H
Higher Byte of AndMask	FFH
Lower Byte of AndMask	7FH
Higher Byte of OrMask	00H
Lower Byte of OrMask	00H
CRC (Lower byte)	3FH
CRC (Higher byte)	D8H

📖 功能 8：回路测试，测试功能号 0000H，要求帧原样返回，如下例。

📖 Function 8: Loop test; Test Function Number: 0000H. The frame must be returned in original. See the following table.

📖 异常响应：当从站不能完成主站所发送的请求时返回异常响应报文，如下例。

📖 Abnormal Response: A message of abnormal response will be returned if the slave cannot fulfill the request of the master. See the following example:

回路测试举例：

从机地址	01H
Modbus功能号	08H

异常响应举例：

从机地址	1字节
响应代码	1字节（Modbus功能号+80H）
错误代码	1字节，意义如下： 1：不能处理的Modbus功能号



测试功能号高字节	00H
测试功能号低字节	00H
测试数据高字节	37H
测试数据低字节	DAH
CRC (低字节)	77H
CRC (高字节)	A0H

	2: 不合理的数据地址 3: 超出范围的数据值 4: 操作失败 (写只读参数、运行中更改运行中不可更改的参数等)
CRC (低字节)	—
CRC (高字节)	—

Loop test example:

Slave Address	01H
Modbus Function Number	08H
Higher Byte of Test Function Number	00H
Lower Byte of Test Function Number	00H
Higher Byte of Test Data	37H
Lower Byte of Test Data	DAH
CRC (Lower byte)	77H
CRC (Higher byte)	A0H

Abnormal response example:

Slave Address	1 byte
Response Code	1 byte (Modbus Function Number+80H)
Error Code	1 byte; see the following for the meaning: 1: Modbus function number unable to be processed 2: Irrational data address 3: Data value beyond the range 4: Operation fails (if read-only parameters are being written or parameters that cannot be modified in operation are being modified in operation)
CRC (Lower byte)	—
CRC (Higher byte)	—

## USS 指令兼容性

### USS Command Compatibility

SB200 还具有兼容 USS 指令方式，它是为兼容支持 USS 协议的上位机指令而设计的，可以通过支持 USS 协议的上位机软件（包括 PC、PLC 以及其它上位机软件）控制 SB200 系列变频器的运行，设定变频器的给定频率，读取变频器的运行状态参数、变频器的运行频率、变频器输出电流、输出电压、直流母线电压。用户如有此需求，请向厂家咨询。

The SB200 series are also USS command-compatible, for it's specifically designed to be compatible with PC commands supporting the USS protocol. Upper computer software that supports the USS protocol can be used to control the operation of the SB200 inverter series, configure inverter frequency and access such operation status parameters as working frequency, output current, output voltage and DC busbar voltage. The user may consult the manufacturer for acquisition of these data.

## 6.14 FP 故障记录

## 6.14 FP: Fault Lists

FP-00	最近一次故障类型	最小单位	—	更改	△
内容说明	见下面的故障列表				
FP-01	最近一次故障时累计运行时间	最小单位	1h	更改	△
FP-02	最近一次故障时的运行频率	最小单位	0.01Hz	更改	△
FP-03	最近一次故障时的给定频率	最小单位	0.01Hz	更改	△
FP-04	最近一次故障时的输出电流	最小单位	0.1A	更改	△
FP-05	最近一次故障时的输出电压	最小单位	0.1V	更改	△
FP-06	最近一次故障时的输出功率	最小单位	0.1kW	更改	△
FP-07	最近一次故障时的母线电压	最小单位	0.1V	更改	△
FP-08	最近一次故障时的逆变桥温度	最小单位	0.1°C	更改	△
FP-09	最近一次故障时水泵状态1	最小单位	—	更改	△
内容说明	万：5# 千：4# 百：3# 十：2# 个：1# 0：待机中 1：变频运行中 2：工频运行中 3：故障检修中				
FP-10	最近一次故障时水泵状态2	最小单位	—	更改	△
内容说明	十：排污泵 个：休眠泵 （同FP-09）				
FP-11	倒数第二次故障类型	最小单位	1	更改	△
FP-12	倒数第二次故障时累计运行时间	最小单位	1h	更改	△
FP-13	倒数第三次故障类型	最小单位	1	更改	△
FP-14	倒数第三次故障时累计运行时间	最小单位	1h	更改	△
FP-15	倒数第四次故障类型	最小单位	1	更改	△
FP-16	倒数第四次故障时累计运行时间	最小单位	1h	更改	△
FP-17	倒数第五次故障类型	最小单位	1	更改	△
FP-18	倒数第五次故障时累计运行时间	最小单位	1h	更改	△
FP-19	故障时的单次运行时间	最小单位	0.1h	更改	△
FP-20	故障记录清除	最小单位	1	更改	○
设定范围	11：清除本菜单参数，操作完成后自动变为00				

FP-00	Type of Last Fault	Min. Unit	—	Modification	△
Content Description	See the following list of faults:				
FP-01	Cumulative Operation Time during Last Fault	Min. Unit	1h	Modification	△
FP-02	Working frequency during Last Fault	Min. Unit	0.01Hz	Modification	△
FP-03	Frequency Settings during Last Fault	Min. Unit	0.01Hz	Modification	△
FP-04	Output Current during Last Fault	Min. Unit	0.1A	Modification	△

<b>FP-05</b>	Output Voltage during Last Fault	Min. Unit	0.1V	Modification	△
<b>FP-06</b>	Output Power during Last Fault	Min. Unit	0.1kW	Modification	△
<b>FP-07</b>	Busbar Voltage during Last Fault	Min. Unit	0.1V	Modification	△
<b>FP-08</b>	Inverter Bridge Temperature during Last Fault	Min. Unit	0.1°C	Modification	△
<b>FP-09</b>	Pump Status 1 during Last Fault	Min. Unit	—	Modification	△
Description	Ten thousands digit: #5 Thousands digit: #4 Hundreds digit: #3 Tens digit: #2 Units digit: #1				
	0: On standby 1: In variable-frequency operation 2: In line-frequency operation 3: Fault overhaul in operation				
<b>FP-10</b>	<b>Pump Status 2 during Last Fault</b>	Min. Unit	—	Modification	△
Description	Tens digit: Drainage pump Units digit: Sleeping pump (Same as FP-09)				
<b>FP-11</b>	<b>Type of Last but One Fault</b>	Min. Unit	1	Modification	△
<b>FP-12</b>	<b>Cumulative Operation Time during Last but One Fault</b>	Min. Unit	1h	Modification	△
<b>FP-13</b>	<b>Type of Last but Two Fault</b>	Min. Unit	1	Modification	△
<b>FP-14</b>	<b>Cumulative Operation Time during Last but Two Fault</b>	Min. Unit	1h	Modification	△
<b>FP-15</b>	Type of Last but Three Fault	Min. Unit	1	Modification	△
<b>FP-16</b>	Cumulative Operation Time during Last but Three Time	Min. Unit	1h	Modification	△
<b>FP-17</b>	Type of Last but Four Fault	Min. Unit	1	Modification	△
<b>FP-18</b>	Cumulative Operation Time during Last but Four Time	Min. Unit	1h	Modification	△
<b>FP-19</b>	Single Operation Time during a Fault	Min. Unit	0.1h	Modification	△
<b>FP-20</b>	Fault List Cleared	Min. Unit	1	Modification	○
Setting Range	11: Clear the parameters in this menu and they will change automatically into 00 upon completion of the operation				

变频器故障列表如下:

Refer to the follow list of inverter faults

0: 无故障	11.PLo: 输出缺相	22.CFE: 通讯异常
1.ocb: 启动瞬间过流	12.FoP: 功率器件保护	23.ccF: 电流检测故障
2.ocA: 加速运行过流	13.oHI: 变频器过热	24.LPo: 水位传感器异常
3.ocd: 减速运行过流	14.oLI: 变频器过载	25.Aco: 模拟输入掉线
4.ocn: 恒速运行过流	15.oLL: 电机过载	26.PLL: 清水池缺水
5.ouA: 加速运行过压	16.EEF: 外部故障	27.rHo: 热敏电阻开路
6.oud: 减速运行过压	17.oLP: 电机负载过重	28.Abb: 异常停机故障
7.oun: 恒速运行过压	18.ULd: 变频器欠载	29: 保留
8.ouE: 待机时过压	19.cnF: 主回路接触器故障	30: 保留
9.dcL: 运行中欠压	20.cno: 供水系统接触器故障	31.PnL: 操作面板掉线
10.PLI: 输入缺相	21.EEP: 参数存储失败	

0: No fault		
1.ocb: Instantaneous startup overcurrent		
2.ocA: Accelerated operation overcurrent		22.CFE: Communication abnormality
3.ocd: Decelerated operation overcurrent		23.ccF: Current detection fault
4.ocn: Constant speed operation overcurrent	11.PLo: Output phase lack	24.LPo: Water level transducer abnormality
5.ouA: Accelerated operation overvoltage	12.FoP: Power device protection	25.Aco: Analog input offline
6.oud: Decelerated operation overvoltage	13.oHI: Inverter overheat	26.PLL: Clean water pool water shortage
7.oun: Constant speed operation overvoltage	14.oLI: Inverter overload	27.rHo: Thermal resistor open-circuit
8.ouE: Overvoltage on standby	15.oLL: Motor overload	28.Abb: Abnormal shutdown fault
9.dcl: Undervoltage in operation	16.EEF: External fault	29: Retained
10.PLl: Input phase lack	17.oLP: Motor overload	30: Retained
	18.ULd: Inverter underload	31.PnL: Control panel offline
	19.cnF: Main loop contactor fault	
	20.cno: Water supply system contactor fault	
	21.EEP: Parameter storage failure	

## 6.18 FU 数据监视

### 6.18 FU: Data Monitoring

<b>FU-00</b>	<b>运行频率</b>	最小单位	0.01Hz	更改	△
内容说明	反映电机转速的频率				
<b>FU-01</b>	<b>给定频率</b>	最小单位	0.01Hz	更改	△
内容说明	单位指示闪烁				
<b>FU-02</b>	<b>输出电流</b>	最小单位	0.1A	更改	△
<b>FU-03</b>	<b>负载电流百分比</b>	最小单位	0.1%	更改	△
内容说明	以变频器额定电流为100%				
<b>FU-04</b>	<b>输出电压</b>	最小单位	0.1V	更改	△
<b>FU-05</b>	<b>运行转速</b>	最小单位	1r/min	更改	△
内容说明	FU-05 = 120×运行频率÷电机极数×FC-13“转速显示系数”				
<b>FU-06</b>	<b>给定转速</b>	最小单位	1r/min	更改	△
内容说明	FU-06 = 120×给定频率÷电机极数×FC-13“转速显示系数”，单位指示闪烁				
<b>FU-07</b>	<b>直流母线电压</b>	最小单位	0.1V	更改	△
<b>FU-08</b>	<b>输出功率</b>	最小单位	0.1kW	更改	△
<b>FU-09</b>	<b>运行线速度</b>	最小单位	1m/s	更改	△





内容说明	FU-09“运行线速度”=运行频率×FC-14“线速度显示系数”				
<b>FU-10</b>	<b>给定线速度</b>	最小单位	1m/s	更改	△
内容说明	FU-10“给定线速度”=给定频率×FC-14“线速度显示系数”，显示时单位指示闪烁				
<b>FU-11</b>	<b>PID反馈值</b>	最小单位	—	更改	△
<b>FU-12</b>	<b>PID给定值</b>	最小单位	—	更改	△
<b>FU-13</b>	<b>AI1</b>	最小单位	0.1%	更改	△
<b>FU-14</b>	<b>AI2</b>	最小单位	0.1%	更改	△
<b>FU-15</b>	<b>AI3</b>	最小单位	0.1%	更改	△
<b>FU-16</b>	<b>PFI</b>	最小单位	0.1%	更改	△
<b>FU-17</b>	<b>UP/DOWN调节值</b>	最小单位	0.1%	更改	△
<b>FU-18</b>	水泵状态1	最小单位	1	更改	△
内容说明	万: 5#泵 千: 4#泵 百: 3#泵 十: 2#泵 个: 1#泵 0: 待机中 1: 变频运行中 2: 工频运行中 3: 故障检修中				
<b>FU-19</b>	水泵状态2	最小单位	1	更改	△
内容说明	十: 排污泵 个: 休眠泵 0: 待机中 1: 变频运行中 2: 工频运行中 3: 故障检修中				
<b>FU-20</b>	<b>PID输出值</b>	最小单位	0.1%	更改	△
<b>FU-21</b>	<b>散热器温度</b>	最小单位	0.1°C	更改	△
<b>FU-22</b>	<b>输出功率因数</b>	最小单位	0.01	更改	△
<b>FU-23</b>	<b>电度表千瓦时</b>	最小单位	0.1kWh	更改	△
内容说明	0.0~6553.5kWh, 显示本参数时, 同时按  、  , 本参数和电度表计时器同时清零				
<b>FU-24</b>	<b>电度表计时器</b>	最小单位	0.01h	更改	△
设定范围	0.00~655.35h, 显示本参数时, 同时按  、  , 本参数和电度表千瓦时同时清零				
<b>FU-25</b>	<b>数字输入端子状态1</b>	最小单位	1	更改	△
设定范围	万位: X5 千位: X4 百位: X3 十位: X2 个位: X1 (0: 断开 1: 接通)				
<b>FU-26</b>	<b>数字输入端子状态2</b>	最小单位	1	更改	△
内容说明	百位: REV 十位: FWD 个位: X6 (0: 断开 1: 接通)				
<b>FU-27</b>	<b>数字输出端子状态</b>	最小单位	1	更改	△
内容说明	十位: Y2 个位: Y1 (0: 断开 1: 接通)				
<b>FU-28</b>	<b>继电器输出端子状态</b>	最小单位	1	更改	△
内容说明	万: T5 千: T4 百: T3 十: T2 个: T1 0: 断开 1: 接通				
<b>FU-29</b>	<b>扩展数字输入端子状态</b>	最小单位	1	更改	△
内容说明	万: X11 千: X10 百: X9 十: X8 个: X7 0: 断开 1: 接通				
<b>FU-30</b>	<b>扩展数字输出端子状态1</b>	最小单位	1	更改	△
内容说明	万: T10/Y7 千: T9/Y6 百: T8/Y5 十: T7/Y4 个: T6/Y3 0: 断开 1: 接通				

<b>FU-31</b>	<b>扩展数字输出端子状态2</b>	最小单位	1	更改	△
内容说明	继电器T11      0: 断开                  1: 接通				
<b>FU-32</b>	<b>通讯出错次数</b>	最小单位	1	更改	△
内容说明	0~60000				
<b>FU-33</b>	<b>加减速斜坡后的给定频率</b>	最小单位	0.01Hz	更改	△
内容说明	经加减速斜坡处理后产生的频率				
<b>FU-34</b>	<b>输出频率</b>	最小单位	0.01Hz	更改	△
内容说明	变频器输出的频率（厂家用）				
<b>FU-35~FU-50</b>	<b>保留</b>				



<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
Description	FU-10 “Linear Velocity Settings” = Frequency Settings×FC-14 “Linear Velocity Display Coefficient”; the Unit indicator lamp flashes				
<b>FU-11</b>	<b>PID Feedback Value</b>	Min. Unit	—	Modification	△
<b>FU-12</b>	<b>PID Settings</b>	Min. Unit	—	Modification	△
<b>FU-13</b>	<b>AI1</b>	Min. Unit	0.1%	Modification	△
<b>FU-14</b>	<b>AI2</b>	Min. Unit	0.1%	Modification	△
<b>FU-15</b>	<b>AI3</b>	Min. Unit	0.1%	Modification	△
<b>FU-16</b>	<b>PFI</b>	Min. Unit	0.1%	Modification	△
<b>FU-17</b>	<b>UP/DOWN Adjustment</b>	Min. Unit	0.1%	Modification	△
<b>FU-18</b>	Pump Status 1	Min. Unit	1	Modification	△
Description	Ten thousands digit: Pump #5 Thousands digit: Pump #4 Hundreds digit: Pump #3 Tens digit: Pump #2 Units digit: Pump #1 0: On standby 1: In variable-frequency operation 2: In line-frequency operation 3: In fault overhaul				
<b>FU-19</b>	Pump Status 2	Min. Unit	1	Modification	△
Description	Tens digit: Drainage pump Units digit: Sleeping pump 0: On standby 1: In variable-frequency operation 2: In line frequency operation 3: In fault overhaul				
<b>FU-20</b>	<b>PID Output Value</b>	Min. Unit	0.1%	Modification	△
<b>FU-21</b>	<b>Radiator Temperature</b>	Min. Unit	0.1°C	Modification	△
<b>FU-22</b>	<b>Output Power Factor</b>	Min. Unit	0.01	Modification	△



<b>FU-23</b>	<b>KWH Meter Settings</b>	Min. Unit	0.1kWh	Modification	△
Description	0.0~6553.5kWh; hold  and  at one time to reset the parameters and the KWH timer				
<b>FU-24</b>	<b>KWH Timer</b>	Min. Unit	0.01h	Modification	△
Description	0.00~655.35h; hold  and  at one time to reset the parameter and the KWH timer				
<b>FU-25</b>	<b>Digital Input Terminal Status 1</b>	Min. Unit	1	Modification	△
Description	Ten thousands digit: X5    Thousands digit: X4    Hundreds digit: X3    Tens digit: X2    Units digit: X1 0: OFF    1: ON				
<b>FU-26</b>	<b>Digital Input Terminal Status 2</b>	Min. Unit	1	Modification	△
Description	Hundreds digit: REV    Tens digit: FWD    Units digit: X6 0: OFF    1: ON				
<b>FU-27</b>	<b>Digital Output Terminal Status</b>	Min. Unit	1	Modification	△
Description	Tens digit: Y2    Units digit: Y1 0: OFF    1: ON				
<b>FU-28</b>	<b>Relay Output Terminal Status</b>	Min. Unit	1	Modification	△
Description	Ten thousands digit: T5    Thousands digit: T4    Hundreds digit: T3    Tens digit: T2    Unit digit: T1 0: OFF    1: ON				
<b>FU-29</b>	<b>Extension Digital Input Terminal Status</b>	Min. Unit	1	Modification	△
Description	Ten thousands digit: X11    Thousands digit: X10    Hundreds digit: X9    Tens digit: X8    Units digit: X7 0: OFF    1: ON				
<b>FU-30</b>	<b>Extension Digital Output Terminal Status 1</b>	Min. Unit	1	Modification	△
Description	Ten thousands digit: T10 /Y7    Thousands digit: T9/Y6    Hundreds digit: T8/Y5    Tens digit: T7 /Y4 Units digit: T6/Y3    0: OFF    1: ON				
<b>FU-31</b>	<b>Extension Digital Output Terminal Status 2</b>	Min. Unit	1	Modification	△
Description	Relay T11    0: OFF    1: ON				
<b>FU-32</b>	<b>Communication Error Frequency</b>	Min. Unit	1	Modification	△
Description	0~60000				
<b>FU-33</b>	<b>Frequency Settings after Acceleration/Deceleration Ramping</b>	Min. Unit	0.01Hz	Modification	△
Description	The frequency after acceleration/deceleration ramping				
<b>FU-34</b>	<b>Output Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Inverter output frequency (factory settings)				
<b>FU-35~FU -50</b>	<b>Retained</b>				

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△

## 7 故障对策及异常处理

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△

## 7 Solutions to Faults and Abnormalities

### 7.1 变频器故障及处理

#### 7.1 Inverter Faults and Solutions

故障内容及对策表:

List of Fault Description and Solutions

故障显示 (故障代码)	故障类型	可能的故障原因	排除方法
<b>Er.ocb</b> Er.ocb (1)	起动瞬间过流	电机内部或接线有相间或对地短路	检查电机及接线
		逆变模块有损坏	寻求服务
		起动开始电压过高	检查转矩提升设置
<b>Er.oCA</b> Er.oCA (2)	加速运行过流	加速时间太短	延长加速时间
		V/F 曲线不合适	调整 V/F 曲线或转矩提升设置
		对旋转中的电机进行再起动	设为转速跟踪起动 等电机完全停止后再起动
		电网电压低	检查输入电源
		变频器功率太小	选用功率等级大的变频器
<b>Er.oCd</b>	减速运行过流	减速时间太短	延长减速时间

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>故障显示 (故障代码)</b>	<b>故障类型</b>	<b>可能的故障原因</b>		<b>排除方法</b>	
		有势能负载或负载惯性转矩大		外加合适的能耗制动组件	
		变频器功率偏小		选用功率等级大的变频器	
<b>Er.o.cn</b> Er.o.cn (4)	恒速运行过流	负载发生突变		减小负载的突变	
		负载异常		进行负载检查	
		电网电压低		检查输入电源	
		变频器功率偏小		选用功率等级大的变频器	
		输入电压异常		检查输入电源	
<b>Er.ouA</b> Er.ouA (5)	加速运行过压	对旋转中的电机进行再起动		设为转速跟踪起动脉等电机完全停止后再起动脉	
		减速时间太短		延长减速时间	
<b>Er.oud</b> Er.oud (6)	减速运行过压	有势能负载或负载惯性大		选择合适的能耗制动组件	
		输入电压异常		检查输入电源	
<b>Er.oun</b> Er.oun (7)	恒速运行过压	加速时间设置太短		适当延长加速时间	
		负载惯性大		考虑采用能耗制动组件	
		输入电压异常		检查输入电源	
<b>Er.ouE</b>	待机时过压	直流母线电压检测电路故障		寻求服务	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>故障显示 (故障代码)</b>	<b>故障类型</b>	<b>可能的故障原因</b>		<b>排除方法</b>	
		输入电压异常或运行时掉电		检查输入电源、接线	
<b>Er.dL</b> Er.dL (9)	运行中欠压	有重负载冲击		检查负载	
		充电接触器损坏		检查并更换	
		输入缺相		检查输入电源、接线	
<b>Er.PLI</b> Er.PLI (10)	输入缺相	输入R、S、T有缺相		检查安装配线	
		输入三相不平衡		检查输入电压	
		输出严重振荡		调整参数消除振荡	
<b>Er.PLo</b> Er.PLo (11)	输出缺相	输出U、V、W有缺相		检查输出配线 检查电机及电缆	
<b>Er.FoP</b> Er.FoP (12)	功率器件保护	输出有相间短路或接地短路		重新配线	
		控制板连线或插件松动		检查并重新连线	
		电机与变频器连线过长		加输出电抗器或滤波器	
		22kW及以下机型制动单元过流		检查外部制动电阻阻值及接线	
		有严重干扰或变频器损坏		寻求服务	
<b>Er.oHI</b>	变频器过热	环境温度过高		降低环境温度	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>故障显示 (故障代码)</b>	<b>故障类型</b>	<b>可能的故障原因</b>		<b>排除方法</b>	
		风道阻塞或风扇损坏		清理风道或更换风扇	
		负载过大		检查负载或选用大功率变频器	
<b>Er.oLI</b> Er.oLI (14)	变频器过载	负载过大		检查负载或选用大功率变频器	
		变频器温度过高		检查风扇、风道和环境温度	
		加速时间太短		延长加速时间	
		直流制动电流过大		减小直流制动电流	
		V/F曲线不合适		调整V/F曲线和转矩提升量	
		对旋转中的电机进行再起动		设为转速跟踪起动物或等电机完全停止后再起动物	
		输入电压过低		检查输入电压	
<b>Er.oLL</b> Er.oLL (15)	电机过载	V/F曲线不合适		正确设置V/F曲线和转矩提升量	
		输入电压过低		检查输入电压	
		普通电机长期低速重载运行		加独立散热风扇或选用变频电机	
		电机铭牌或过载保护设置不当		正确设置F3-02、Fb-00、Fb-01	
		电机堵转或负载突变过大		检查负载	
<b>Er.EEF</b> Er.EEF (16)	外部故障	外部故障端子闭合		处理外部故障	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>故障显示 (故障代码)</b>	<b>故障类型</b>	<b>可能的故障原因</b>		<b>排除方法</b>	
<b>Er.oLP</b> Er.oLP (17)	电机负载过重	电机电流超出负载过重检出水平并超过检出时间		检查负载 检查负载过重保护设置	
<b>Er.ULd</b> Er.ULd (18)	变频器欠载	变频器输出电流小于于欠载保护水平并超过检出时间		检查负载 检查欠载保护设置	
<b>Er.cnF</b> Er.cnF (19)	主回路接触器故障	接触器损坏		更换主回路接触器，寻求服务	
		控制回路损坏		寻求服务	
<b>Er.cno</b> Er.cno (20)	供水系统接触器故障	供水系统接触器吸合异常		检查供水系统接触器	
<b>Er.EEP</b> Er.EEP (21)	参数存储失败	参数写入发生错误		复位后，重试，若问题仍然存在 请寻求服务	
<b>Er.CFE</b> Er.CFE (22)	通讯异常	通讯干扰严重		检查通讯回路配线及接地	
		上位机没有工作		检查上位机及接线	
		通讯参数设置不当		检查FF菜单设置	
<b>Er.ccf</b> Er.ccf (23)	电流检测故障	变频器内部连线或插件松动		检查并重新连线	
		电流传感器损坏或电路异常		寻求服务	



<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>故障显示 (故障代码)</b>	<b>故障类型</b>	<b>可能的故障原因</b>		<b>排除方法</b>	
<b>Er.LPo</b> Er.LPo (24)	水位传感器异常	水位传感器或水位开关异常		检查水位传感器或水位开关	
<b>Er.Aco</b> Er.Aco (25)	模拟输入掉线	连线断或外部设备坏		检查外部连线和外部设备	
		掉线门限设置不当		检查F6-07、F6-16、F6-25的设置	
<b>Er.PLL</b> Er.PLL (26)	清水池缺水	清水池缺水传感器故障		检查清水池水位和水位传感器是否正常	
<b>Er.rHo<sub>i</sub></b> Er.rHo (27)	热敏电阻开路	热敏电阻断线		检查热敏电阻连线或寻求服务	
<b>Er.Abb</b> Er.Abb (28)	异常停机故障	失速状态持续1分钟		正确设置运行参数	
		非操作面板下使用  停机		—	
<b>Er.PnL</b> Er.PnL (31)	操作面板掉线	操作面板丢失或断线		—	

<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>	<b>Solution</b>
---------------------------------------	-------------------	-----------------------	-----------------

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
<b>Er.ocb</b> Er.ocb (1)	Instantaneous Startup Overcurrent	The interior or wiring of the motor has an inter-phase short circuit or short circuit to earth		Check the motor and wiring	
		The inversion module is damaged		Seek for assistance	
		The voltage is too high at the outset of the startup		Check the torque elevation settings	
<b>Er.ocA</b> Er.ocA (2)	Accelerated Operation Overcurrent	The acceleration time is too short		Extend the acceleration time	
		The V/F curve is inappropriate		Adjust the V/F curve or the torque elevation settings	
		An operating motor is restarted		Set the motor as rotation speed tracking startup Do not restart until the motor is shut down	
		The power grid has a low voltage		Check the power supply	
		The inverter power is too low		Replace it with a inverter of greater ratings	
<b>Er.ocd</b> Er.ocd (3)	Decelerated Operation Overcurrent	The deceleration time is too short		Extend the deceleration time	
		There is a potential energy load or the inertia torque of the load is too great		Fit the inverter with an appropriate dynamic braking units	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
		The inverter power is too low		Select a inverter of greater power ratings	
<b>Er.o.cn</b> Er.o.cn (4)	Constant Speed Operation Overcurrent	Load surge		Reduce the load surge	
		Abnormal load		Check the load	
		The power grid has a low voltage		Check the power supply	
		The inverter power is too low		Select a inverter of greater power ratings	
		Abnormal input voltage		Check the power supply	
<b>Er.ouA</b> Er.ouA (5)	Accelerated Operation Overvoltage	An operating motor is restarted		Set the motor as rotation speed tracking startup Do not restart until the motor is shut down	
		The deceleration time is too short		Extend the deceleration time	
<b>Er.oud</b> Er.oud (6)	Decelerated Operation Overvoltage	There is a potential energy load or the inertia torque of the load is too great		Fit the inverter with an appropriate dynamic braking unit	
		Abnormal input voltage		Check the power supply	
<b>Er.oun</b>	Constant Speed Operation	The acceleration time settings are too short		Extend the acceleration time appropriately	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
Er.ouN (7)	Overvoltage	The inertia of the load is too great		Consider using a dynamic braking unit	
		Abnormal input voltage		Check the power supply	
<i>Er.ouE</i> Er.ouE (8)	Overvoltage on Standby	The DC busbar voltage detection circuit has a fault		Seek for assistance	
		Abnormal input voltage or power failure in operation		Check the power supply and wiring	
<i>Er.dcl</i> Er.dcl (9)	Undervoltage in Operation	Heavy load impact		Check the load	
		The charging contactor is damaged		Check and replace it	
		Input phase lack		Check the power supply and wiring	
<i>Er.PLI</i> Er.PLI (10)	Input Phase Lack	Input terminal R, S or T has a phase lack		Check the wiring and installation	
		Input 3-phase Unbalance		Check the input voltage	
		Serious output oscillation		Adjust parameters to eliminate oscillation	
<i>Er.PLo</i> Er.PLo (11)	Output Phase Lack	Output Terminal U, V or W has a phase lack		Check the output wiring Check the motor and cables	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
<b>Er.FoP</b> Er.FoP (12)	Power Device Protection	The output has an inter-phase short-circuit or an earth short-circuit		Re-wire	
		The control board or plug-in comes loose		Check and re-wire	
		The connection line between the motor and the inverter is too long		Fit the inverter with an output reactor or filter	
		An overcurrent of the braking unit of the 22kW inverter and below		Check the resistance and connection line of the external braking resistor	
		Serious interference or inverter damage		Seek for assistance	
<b>Er.oHI</b> Er.oHI (13)	Inverter Overheat	Ambient temperature too high		Reduce the ambient temperature	
		Obstructed air duct or damaged fan		Clean the air duct or replace the fan with a new one	
		Overload		Check the load or select a large-power inverter	
<b>Er.oLI</b> Er.oLI (14)	Inverter Overload	Overload		Check the load or select a large-power inverter	
		Inverter overtemperature		Check the fan, air duct and ambient temperature	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
		Acceleration time too short		Extend the acceleration time	
		DC braking current too large		Reduce the DC braking current	
		Inappropriate V/F curve		Adjust the V/F curve and torque elevation range	
		An operating motor is restarted		Set the motor as tracking start; do not restart the motor until it is completely shut down	
		Input voltage too low		Check the input voltage	
<b>Er.oLL</b> Er.oLL (15)	Motor Overload	Inappropriate V/F curve		Set the V/F curve and torque elevation range correctly	
		Input voltage too low		Check the input voltage	
		A conventional motor operates under a heavy load at a low speed for a long time		Fit the motor with a separate cooling fan or use a variable-frequency motor	
		The nameplate texts are incorrect or motor overload protection settings are inappropriate		Set F3-02, Fb-00 and Fb-01 correctly	
		The motor stalls or has an abrupt load change		Check the load	
<b>Er.EEF</b> Er.EEF (16)	External Fault	The external fault terminal is closed		Rectify the external fault	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
<b>Er.oLP</b> Er.oLP (17)	Motor Overload	The motor current exceeds the overload detection level and the overload detection time		Check the load Check the overload protection settings	
<b>Er.ULd</b> Er.ULd (18)	Inverter Underload	The output current of the inverter falls below the underload protection level and the underload detection time		Check the load Check the underload protection settings	
<b>Er.cnF</b> Er.cnF (19)	Main Loop Contactor Fault	Damaged contactor		Replace the main loop contactor and seek for assistance	
		Damaged control loop		Seek for assistance	
<b>Er.cno</b> Er.cno (20)	Water Supply System Contactor Fault	The contactor of the water supply system has a problem with closing.		Check the contactor of the water supply system	
<b>Er.EEP</b> Er.EEP (21)	Parameter Storage Failure	Parameter read-in error		Try it again after the reset. If the problem persists, seek for assistance	
<b>Er.CFE</b> Er.CFE (22)	Communication Abnormality	Serious communication interference		Check the wiring and earthing of the communication loop	
		The upper computer is not working		Check the upper computer and the wiring	
		Inappropriate communication parameter settings		Check the settings in Menu FF	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
<b>Er.ccfF</b> Er.ccf (23)	Current Detection Fault	The internal wiring of the inverter or the plug-in comes loose		Check and re-wire	
		Current transducer damage or electric circuit abnormality		Seek for assistance	
<b>Er.LPo</b> Er.LPo (24)	Water Level Transducer Abnormality	Water level transducer or water level switch abnormality		Check the water level transducer or water level switch	
<b>Er.Aco</b> Er.Aco (25)	Analog Input Offline	Broken connection line or faulty external equipment		Check the external connection line or the external equipment	
		Incorrect offline threshold settings		Check the settings of F6-07, F6-16 and F6-25	
<b>Er.PLL</b> Er.PLL (26)	Clean Water Pool Water Shortage	The clean water pool water shortage transducer has a fault		Check the water level and water level transducer of the clean water pool	
<b>Er.rHo</b> Er.rHo (27)	Thermal Resistor Open-Circuit	Thermal resistor offline		Check the connection of the thermal resistor or seek for assistance	
<b>Er.Abb</b> Er.Abb (28)	Abnormal Shutdown Fault	The stall persists for 1 minute		Set the operating parameters correctly	
		Shut down via ☉ in the non-control panel mode		—	



<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>Fault Display (Fault Code)</b>	<b>Fault Type</b>	<b>Possible Cause</b>		<b>Solution</b>	
<b>Er.PnL</b> Er.PnL (31)	Control Panel Offline	Control panel missing or offline		—	

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△

## 7.2 变频器报警及处理



### 7.2 Inverter Alarms and Solutions

报警内容及对策表:

List of Alarms and Solutions


报警显示	报警名称	内容及说明	对策	报警字对应位
<b>AL.oLL</b> AL.oLL	电机过载	电机热模型检测出电机温升过高	参照对应故障的对策	字1位0
<b>AL.oLP</b> AL.oLP	电机负载过重	电机电流超出负载过重检出水平并超过检出时间	参照对应故障的对策	字1位1
<b>AL.Uld</b> AL.Uld	变频器欠载	变频器输出电流小于欠载保护水平超过检出时间	参照对应故障的对策	字1位2
<b>AL.PnL</b> AL.PnL	操作面板掉线	操作面板断线或未连接(通过端子输出报警信号)	参照对应故障的对策	字1位4
<b>AL.Aco</b> AL.Aco	模拟输入掉线	模拟输入信号低于掉线门限	参照对应故障的对策	字1位5
<b>AL.PLI</b> AL.PLI	输入缺相	输入缺相或三相不平衡	参照对应故障的对策	字1位6



<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>AL.PLo</b> AL.PLo	输出缺相	输出缺相	参照对应故障的对策		字1 位7
<b>AL.CFE</b> AL.CFE	通讯异常	通讯超时	参照对应故障的对策		字1 位8
<b>AL.EEP</b> AL.EEP	参数存储失败	参数写入失败	参照对应故障的对策 按  清除		字1 位9
<b>AL.dcl</b> AL.dcl	直流母线欠压	直流母线电压低于欠压点	断电显示此信息为正常		字1 位11
<b>AL.Pd1</b> AL.Pd1	1#水泵禁止	数字输入43（见138页）有效	检查对应端子是否有效		字2 位6
.....	.....	.....	.....		.....
<b>AL.Pd5</b> AL.Pd5	5#水泵禁止	数字输入47（见138页）有效	检查对应端子是否有效		字2 位10
<b>AL.Pd6</b> AL.Pd6	休眠小泵禁止	数字输入48（见138页）有效	检查对应端子是否有效		字2 位11
<b>AL.Pd7</b> AL.Pd7	排污泵禁止	数字输入49（见138页）有效	检查对应端子是否有效		字2 位12
<b>AL.PcE</b> AL.PcE	参数检查错误	参数设置不当	改正参数设置或恢复出厂值，按  清除		字2 位1

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>AL.Pdd</b> AL.Pdd	操作面板数据不一致	操作面板中存储的参数与变频器中的参数不一致	按  清除		字2 位2
<b>AL.UPF</b> AL.UPF	参数上传失败	参数上传过程中面板EEP出错报警	检查操作面板型号是否为SB-PU70E、连线是否过长、干扰是否过大，重试		字2 位3
<b>AL.PdE</b> AL.PdE	操作面板数据错误	参数下载和比较时，面板数据校验出错	按  清除		字2 位4

Alarm Display	Alarm Name	Description	Solution	Corresponding Bit of Alarm Word
<b>AL.oLL</b> AL.oLL	Motor Overload	The thermal model detects an overhigh temperature rise	Refer to the corresponding solution to the fault	Word 1 Bit 0
<b>AL.oLP</b> AL.oLP	Motor Overload	The motor current exceeds the overload detection level and the detection time	Refer to the corresponding solution to the fault	Word 1 Bit 1
<b>AL.Uld</b> AL.Uld	Inverter Underload	The output current of the inverter is below the underload protection level and exceeds the detection time	Refer to the corresponding solution to the fault	Word 1 Bit 2

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△

<b>AL.PnL</b> AL.PnL	Control Panel Offline	The control panel is disconnected or unconnected (the alarm signal is outputted via the terminal)	Refer to the corresponding solution to the fault	Word 1 Bit 4
<b>AL.Aco</b> AL.Aco	Analog Input Offline	The analog input signal is below the threshold	Refer to the corresponding solution to the fault	Word 1 Bit 5
<b>AL.PLI</b> AL.PLI	Input Phase Lack	Input phase lack or 3-phase unbalance	Refer to the corresponding solution to the fault	Word 1 Bit 6
<b>AL.PLo</b> AL.PLo	Output Phase Lack	Output phase lack	Refer to the corresponding solution to the fault	Word 1 Bit 7
<b>AL.CFE</b> AL.CFE	Abnormal Communication	Communication timeout	Refer to the corresponding solution to the fault	Word 1 Bit 8
<b>AL.EEP</b> AL.EEP	Parameter Storage Failure	Parameter read-in failure	Refer to the corresponding solution to the fault; press  to clear	Word 1 Bit 9
<b>AL.dcl</b> AL.dcl	DC Busbar Undervoltage	DC busbar voltage is lower than the undervoltage point	The poweroff display shows that the data are normal	Word 1 Bit 11

<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>ALPd1</b> AL.Pd1	Pump #1 Disabled	Digital Input 43 (Refer to Page 54) is effective	Check if the corresponding terminal is effective	Word 2 Bit 6	
.....	.....	.....	.....	.....	
<b>ALPd5</b> AL.Pd5	Pump #5 Disabled	Digital Input 47 (Refer to Page 54) is effective	Check if the corresponding terminal is effective	Word 2 Bit 10	
<b>ALPd6</b> AL.Pd6	Small Sleeping Pump Disabled	Digital Input 48 (Refer to Page 54) is effective	Check if the corresponding terminal is effective	Word 2 Bit 11	
<b>ALPd7</b> AL.Pd7	Drainage Pump Disabled	Digital Input 49 (Refer to Page 54) is effective	Check if the corresponding terminal is effective	Word 2 Bit 12	
<b>ALPcE</b> AL.PcE	Parameter Check Error	Inappropriate parameter settings	Modify parameter settings or restore the factory settings; press  to clear	Word 2 Bit 1	
<b>ALPdd</b> AL.Pdd	Noncompliant Control Panel Data	The parameter stored in the control panel is different from the one stored in the inverter	Press  to clear	Word 2 Bit 2	
<b>ALUPF</b> AL.UPF	Parameter Uploading Failure	The panel EEP sounds an error alarm while the parameter is being uploaded	Check if the model number of the control panel is SB-PU70E and if the interference is too	Word 2 Bit 3	


<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
<b>ALPdE</b> AL.PdE	Control Panel Data Error	The panel has a data verification error while downloading and comparing parameters			Word 2 Bit 4

### 7.3 变频器操作异常及对策

#### 7.3. Inverter Operation Abnormalities and Solutions

操作异常及对策表:



List of Operation Abnormalities and Solutions



现象	出现条件	可能原因	对策
操作面板 按键无响应	个别键或所有 键均没有响应	操作面板按键自动锁定	按  +  保持 3s, 即可解锁
		操作面板连接线接触不良	检查连接线, 异常时向本公司寻求服务
		操作面板按键损坏	更换操作面板
参数不能修改	部分参数不能 修改	F0-10 设定为 1 或 2	将 F0-10 改设为 0
		参数更改属性为只读	用户不能修改只读参数



<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
	运行状态下不能修改	参数更改属性为运行时不可修改	在待机状态下进行修改		
运行中变频器意外停机	没有停机命令，变频器自动停机，运行指示灯灭	有故障	查找故障原因，复位故障		
		运行命令通道切换	检查操作及运行命令通道状态		
		Fb-18=3“瞬时停电时减速”，且停电时间过长	检查直流母线欠压动作设置和输入电压		
	没有停机命令，电机自动停机，变频器运行指示灯亮	故障自动复位等待期间	检查故障自动复位设置和故障原因		
		运行中断	检查运行中断设置		
		给定频率为 0，零频运行	检查给定频率		
	PID 正作用，反馈>给定 PID 反作用，反馈<给定	检查 PID 给定与反馈			
变频器无法起动	给出起动命令，变频器不起动，运行指示灯不亮	数字输入 18“自由停机”有效	检查自由停机端子		
		数字输入 17“变频器运行禁止”有效	检查变频器运行禁止端子		
		三线式 1、2 或两线式 3 控制方式下，停机按钮未闭合	检查停机按钮及连线		
		运行命令通道错误	修改运行命令通道		







<b>FU-00</b>	<b>Working Frequency</b>	Min. Unit	0.01Hz	Modification	△
Description	Frequency x, reflecting the rotation speed of the motor				
<b>FU-01</b>	<b>Frequency Settings</b>	Min. Unit	0.01Hz	Modification	△
Description	Unit indicator lamp flashes				
<b>FU-02</b>	<b>Output Current</b>	Min. Unit	0.1A	Modification	△
<b>FU-03</b>	<b>Load Current Percentage</b>	Min. Unit	0.1%	Modification	△
Description	The rated inverter current is taken as 100%				
<b>FU-04</b>	<b>Output Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-05</b>	<b>Rotation Speed</b>	Min. Unit	1r/min	Modification	△
Description	FU-05 = 120×Working Frequency÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”				
<b>FU-06</b>	<b>Rotation Speed Settings</b>	Min. Unit	1r/min	Modification	△
Description	FU-06 = 120× Frequency Settings÷Number of Motor Poles×FC-13 “Rotation Speed Display Coefficient”; Unit indicator lamp flashes				
<b>FU-07</b>	<b>DC Busbar Voltage</b>	Min. Unit	0.1V	Modification	△
<b>FU-08</b>	<b>Output Power</b>	Min. Unit	0.1kW	Modification	△
<b>FU-09</b>	<b>Working Linear Velocity</b>	Min. Unit	1m/s	Modification	△
Description	FU-09 “Working Linear Velocity” = Working Frequency×FC-14 “Linear Velocity Display Coefficient”				
<b>FU-10</b>	<b>Linear Velocity Settings</b>	Min. Unit	1m/s	Modification	△
		变频器有故障		排除故障	



Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters



Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
	Parameter modification in operation is not permitted	The attribute of the parameters is “Read-Only”  Parameters cannot be changed if the attribute is “In Operation”	Users are not permitted to modify read-only parameters  Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down by accident	The inverter shuts down without a shutdown command; the inverter operation indicator light goes off	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel
		Fb-18=3 “Deceleration during Instantaneous Power Failure”; the power outage lasts too long	Check the DC busbar undervoltage action settings and the input voltage
	The motor shuts down	The auto fault reset is in operation	Check the auto fault reset settings and identify the cause of the fault
		The operation suspends	Check the operation suspension settings

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is “Read-Only”	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel
		The set frequency is 0 and the motor is running at zero frequency	Check the frequency settings
		PID Positive Action; Feedback > Settings PID Negative Action; Feedback < Settings	Check the PID settings and feedback
The inverter fails to start up	The inverter fails to start after the startup command is issued; the operation indicator lamp is off	Digital Input 18 “Free Shutdown” is effective	Check the free shutdown terminal
		Digital Input 17 “Inverter Operation Disabled” is effective	Check the disablement terminal for inverter operation
		The shutdown key is not closed in Three-Wire Mode 1 or 2 or Two-Wire Mode 3	Check the shutdown button and the connection line
		The command execution channel has an error	Modify the command execution channel
		The inverter has a fault	Rectify the fault

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
	Parameter modification in operation is not permitted	The attribute of the parameters is “Read-Only”  Parameters cannot be changed if the attribute is “In Operation”	Users are not permitted to modify read-only parameters  Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

## 8 保养、维护及售后服务

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel



## 8. Upkeep, Maintenance and After-Sales Service



危险

- 1、只有受过专业培训的人员才能拆卸部件、进行维护及器件更换；
- 2、在检查及维护前，请确认变频器已切断电源、高压指示灯灭并且P+、N-之间电压小于36V，否则会有触电危险；
- 3、不要将螺丝、垫圈等Only金属件遗留在机器内，否则有损坏设备和火灾的危险；
- 4、更换控制板后，必须在运行前进行相关参数设置，否则有损坏设备的危险。

CAUTION

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel



- 1. Only trained professionals are permitted to dismount, maintain or replace the parts and components;**
- 2. Prior to inspection and maintenance, please confirm that the inverter has been disconnected from the power supply and that the voltage between P+ and N- is lower than 36V; otherwise there may be hazards of electric shocks;**
- 3. Do not leave any metal part, e.g. screws and washers, in the machine; otherwise there may be hazards of equipment damage and fire;**
- 4. After the control panel is replaced, set the relevant parameters prior to operation; otherwise, there may be hazards of equipment damage.**

## 8.1 日常保养及维护

### 8.1. Daily Upkeep and Maintenance



由于变频器受所处环境的粉尘、潮湿、振动等因素影响，以及器件老化、失效等因素，将导致故障，因此有必要对变频器及其运行环境作定期检查。保持良好的运行环境，记录日常运行的数据，并及时发现异常现象，是延长变频器使用寿命的好办法。在变频器的日常维护中应检查以下几点：



Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is “Read-Only”	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

Inverters may break down as a result of ambient conditions (dust, damp and vibration, etc.) and aging or deteriorating devices. Therefore, it is necessary to check a inverter and its operating environment at regular intervals. It is a good idea to maintain a sound operating environment, keep daily operation records and identify abnormalities as early as possible for an extended service life. Remember to check the following points in daily maintenance of inverters:

- 1、变频器的运行环境是否符合要求；
1. Check if the operating environment conforms to the requirements;
- 2、变频器的运行参数是否在规定的范围内；
2. Check if the operating parameters of the inverter are within the prescribed range;
- 3、是否有异常的振动、异响；
3. Check if there is any abnormal vibration or noise;
- 4、是否有异常的气味；
4. Check if there is any abnormal smell;
- 5、风机是否正常转动；
5. Check if the fans are working well;
- 6、输入电压是否在规定的范围内，各相电压是否平衡。
6. Check if the input voltage is within the prescribed range and if different phases have balanced voltage?

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

## 8.2 定期维护

### 8.2. Regular Maintenance

根据使用环境，用户可以3个月或6个月对变频器进行一次定期检查。一般检查内容如下：

The user may check the inverter on a 3-month or 6-month basis, depending on the operating environment.

Generally, the following items must be checked:

1、控制端子螺丝是否松动；

1. Check if the screws for the control terminals have come loose;

2、主回路端子是否有接触不良的情况，铜排连接处是否有过热痕迹；

2. Check if the main loop terminal has any poor contact and if the connection of copper bars has marks of overheat;



3、电力电缆、控制电缆有无损伤，尤其是与金属表面接触的表皮是否有划伤的痕迹；

3. Check if the power cables and control cables have any damage, especially scoring marks where the cables are in contact with metal surfaces;

4、电力电缆冷压端子的绝缘包扎带是否已脱落；

4. Check if the insulation bands on the cold-pressed terminals of the power cables have come off;

5、对电路板、风道上的粉尘进行全面清扫，最好使用吸尘器；

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

5. Clean away dust on the circuit board and the air duct thoroughly. A dust cleaner is recommended;

6、长期存放的变频器必须在2年以内进行一次通电实验，时间近5小时；通电时，采用调压器缓缓升高电压至额定值，可以不带负载。

6. If a inverter is to be stored for long, it must be subject to a 5-hour energizing test within 2 years. During the energizing test, step up the voltage slowly to a rated value with a voltage regulator. Loads may be dropped.





**危险：若对电机进行绝缘测试，必须将电机与变频器的连线断开后，单独对电机测试，否则将会造成变频器损坏。**

CAUTION: If an insulation test is required for the motor, the motor must be disconnected from the inverter and be subjected to an independent test; otherwise the inverter may be damaged.



**危险：不要对控制回路进行耐压和绝缘测试，否则将损坏电路元件。**

CAUTION: Do not conduct withstanding voltage tests or insulation tests on the control loop; otherwise electrical circuit elements may be damaged.

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is “Read-Only”	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

### 8.3. 变频器易损件更换

### 8.3. Replacement of Inverter Wearing Parts

变频器易损件主要有滤波用电解电容器和冷却风扇，其寿命与使用的环境及保养状况密切相关。用户可以根据运行时间确定是否需要更换易损件。

The inverter wearing parts primarily include the electrolytic capacitor (used for wave filtration) and the cooling fan. The service life and the service environment are closely related to maintenance conditions. The user can decide whether to change the wearing parts according to the operating time.

- ◆ 冷却风扇
- ◆ Cooling Fan

可能损坏原因：轴承磨损、叶片老化（风扇寿命一般3~4万小时）。



Possible Cause for Damage: Bearing abrasion and blade aging (the fan life is normally 30,000—40,000 hours);

判别标准：风扇叶片等是否有裂缝，开机时声音是否有异常振动声。

Judgment Criterion: Cracks on fan blades; abnormal vibration noise during startup.

更换注意：

NOTE:

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is “Read-Only”	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

1、更换时必须使用厂家指定的风扇型号（额定电压、电流、转速、风量必须相同）；

1. The replacement must be a fan of the same specification (rated voltage, current, rotation speed and air volume) as recommended by the manufacturer;

2、安装时注意风扇标记的方向必须与风扇送风的方向保持一致；

2. During installation, see to it that the indicated direction of the fan must be the same as the blasting direction.

3、不要忘记装上防护罩。

3. Remember to install a protective hood.

◆ 滤波电解电容

◆ Wave-Filtering Electrolytic Capacitor



可能损坏原因：环境温度较高，频繁的负载跳变造成脉动电流增大，电解质老化。

Possible Cause for Damage: As the ambient temperature is high, the frequent load jumps causes the pulsating current to increase in intensity; therefore the electrolyte ages and deteriorates.

判别标准：有无液体漏出，安全阀是否已凸出，静电电容的测定，绝缘电阻的测定。

Judgment Criterion: Liquid leak, bulged safety valve, electrostatic capacity measurement and insulation resistance measurement.

建议每4~5年更换一次母线电解电容。

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

It is recommended that the busbar electrolytic capacitor be replaced every 4 or 5 years.



## 8.4 变频器的存储

### 8.4. Storage of Inverters

用户购买变频器后，暂时存储和长期存储必须注意以下几点：

After purchasing the inverter, the user must advert to the following points on temporary/longtime storage:

- ◆ 避免在高温、潮湿、富含尘埃、金属粉尘的场所存储；
- ◆ Avoid storage in high-temperature, high-humidity environments filled with dust and metal dust;
- ◆ 长时间存放会导致电解电容的劣化，必须保证在2年之内通一次电，通电时间至少5小时，输入电压必须用调压器缓缓升高至额定值。
- ◆ Longtime storage will cause the electrolytic capacitor to deteriorate. The inverter must be charged at least once every two years for a min. of 5 hours. User a voltage regulator to step up the input voltage slowly to the rated voltage.

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is "Read-Only"	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is "In Operation"	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel



## 8.5 售后服务

### 8.5. After-Sales Service

产品的保修期为购买之日起12个月，但在以下情况下，即使在保修期内也是有偿修理。

The warranty is effective for 12 months commencing from the date of purchase. However, in any of the following cases, the repair will be non-gratuitous notwithstanding a warranty period:

- 1、 由于不按照用户手册操作和使用而导致损坏；
1. Any damage arising from noncompliance with the user's manual;
- 2、 自行改造造成的人为损坏；
2. Any damage arising from unauthorized modification of the product;
- 3、 超过标准规范的要求使用而导致损坏；
3. Any damage arising from above-norm use;
- 4、 购买后摔落损坏或运输中损坏；
4. Any damage caused by falls or in transit;
- 5、 火灾、水灾、异常电压、强烈雷击等原因导致损坏。
5. Any damage arising from fire, flood, abnormal voltage or lightning strike;

Abnormality	Description	Possible Cause	Solution
Keys on the control panel do not respond	Certain keys do not respond, or no key responds	The auto lock has been actuated for keys on the panel	Hold  and  simultaneously for 3 seconds and the keys will be unlocked
		The connection line of the panel has poor contacts	Check the connection line; seek for assistance from us whenever there is an abnormality
		Keys on the panel are damaged	Replace the panel
Parameters cannot be modified	Some parameters cannot be modified	F0-10 should be set as 1 or 2	Set F0-10as 0
		The attribute of the parameters is “Read-Only”	Users are not permitted to modify read-only parameters
	Parameter modification in operation is not permitted	Parameters cannot be changed if the attribute is “In Operation”	Modify parameters in the standby mode
The operating inverter shuts down	The inverter shuts down	There is a fault	Locate the cause and reset the fault
		The command execution channel is changed	Check the operation and the status of the command execution channel

发现变频器工作状态异常时，对照说明书进行检查和调整；出现故障时，请及时与供货方或森兰公司在当地的电气公司联系，也可以和公司总部联系；在保修期内，由于产品制造和设计上的原因造成的故障，本公司将无偿修理；超过保修期的修理，本公司将根据客户的要求有偿修理。

In the event of any abnormality arising in operation, check and adjust the inverter as per the user’s manual. In case any fault occurs, promptly contact the supplier, the local electrical engineering agent of Hope-Senlan Technologies Corporation or our headquarters. We will rectify any fault for free that arises from manufacturing and design within the warranty period. For a rectification beyond the warranty period, we will charge the user as required at a reasonable rate.



## 9 选配件

## 9. Optional Fittings

以下所列选配件，用户如有需要，请向我公司订购。

The user can order and we will provide on demand any of the following fittings:

### 9.1 制动组件

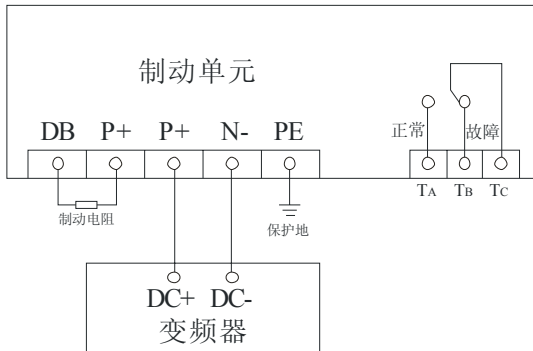
#### 9.1 Braking Units

森兰SZ系列制动单元和制动电阻配合，用来吸收电动机制动时的再生电能，除了用在森兰变频器上，还可以用在其它变频器上。内置制动单元的变频器，选用合适的制动电阻即可；无内置制动单元的变频器，需使用合适的外部制动单元和制动电阻。

The braking unit and the braking resistor are combined to absorb the electrical energy regenerated by the braking of the motor. This combination can be used both for Senlan® inverters and other inverters. Inverters with inbuilt braking units only need to be fitted with a proper braking resistor, while those without an inbuilt braking unit must be fitted with an appropriate external braking unit and a braking resistor.

制动单元、制动电阻与变频器接线图：

Wiring Diagram of the Braking Unit, Braking Resistor and Inverter:



制动单元: Braking unit    制动电阻: Braking resistor    保护地: protective earthing    正常: Normal    故障: Fault    变频器: Inverter

制动单元和变频器、制动单元和制动电阻之间的接线应在5m以内，并且使包围回路面积最小。

The length of the connection line between the braking unit and the inverter, or between the braking unit and the braking resistor, must be within 5m, and it is necessary to ensure the enclosed area of the loop is the smallest.

森兰SZ系列制动单元规格如下表：

Refer to the following table for the specification of Senlan® SZ braking unit series:

制动单元型号	电阻阻值( $\Omega$ )	适配变频器(kW)	制动电压(V)
SZ20G-30	$\geq 22$	18.5/22	680
SZ20G-60	$\geq 11$	30/37	680
SZ20G-85	$\geq 8$	45/55	680
SZ20G-130	$\geq 5$	75/90	680
SZ20G-170	$\geq 4$	110	680
SZ20G-260	$\geq 2.6$	132/160	680
SZ20G-380	$\geq 1.8$	200/250	680

Braking Unit Model Number	Resistance ( $\Omega$ )	Appropriate Inverter (kW)	Braking Voltage (V)
SZ20G-30	$\geq 22$	18.5/22	680
SZ20G-60	$\geq 11$	30/37	680
SZ20G-85	$\geq 8$	45/55	680
SZ20G-130	$\geq 5$	75/90	680
SZ20G-170	$\geq 4$	110	680
SZ20G-260	$\geq 2.6$	132/160	680
SZ20G-380	$\geq 1.8$	200/250	680

注：电阻值超过表中推荐数据时，制动能力减弱；一般不要大于推荐阻值的1.5~2.0倍。

NOTE: A resistance higher than the ratings recommended by the table will cause an attenuated braking force. Normally, the resistance should not exceed 1.5—2.0 times the recommended resistance.

## 9.2 通信组件

### 9.2 Communication Components

- 操作面板通讯线缆
- Communication cables for the Control Panel

用于操作面板和变频器主机的连接。分30kW及以上和22kW及以下两种形式，长度可定制。

Communication cables are used to connect the inverter mainframe to the control panel. They are available in two types, 30kW and above and 22kW and below. Cable length is customizable.

- 后台监控软件SbMonitor
- Background monitoring software (SbMonitor)

实时监控变频器设备的运行状态，实现变频器运行的集中管理。

The software is used to monitor the operation of the inverter real-time in order to centralize the management of inverter operation.

## 9.3 输入侧交流电抗器

### 9.3 AC Reactor on the Input Side

输入侧交流电抗器可抑制变频器输入电流的高次谐波,改善输入侧功率因数。建议在以下情况使用:

An AC reactor on the input side can be used to control the higher harmonics generated by the input current of an inverter and improve the power factor on the input side. It is recommended in the following cases:

- 电网容量远大于变频器容量以及变频器功率大于30kW;
- When the capacity of the power grid is much larger than the capacity of the inverter and the inverter power exceeds 30kW;
- 同一电源上接有晶闸管负载或带有开关控制的功率因数补偿装置;
- When there are thyristor loads or power factor compensation devices (with control switches) connected to the same power supply;
- 三相电源的电压不平衡度大于3%;
- When the voltage unbalance of the 3-phase power supply exceeds 3%;
- 需改善输入侧的功率因数。
- When the power factor of the input side needs to be improved.

## 9.4 EMI滤波器和铁氧体共模滤波器

### 9.4 EMI Filter and Ferrite Chip Common Mode Filter

EMI滤波器用于抑制变频器产生的辐射干扰,也可抑制外界无线电干扰以及瞬时冲击、浪涌对变频器的干扰。铁氧体共模滤波器(磁环)用于抑制变频器产生的辐射干扰。

EMI filters are used to control the radiation interference generated by an inverter, or the interference generated by external radio interference, transient surge or inrush current. The ferrite chip common mode filter (magnetic core) is used to control the radiation interference generated by the inverter.

在对防止无线电干扰要求较高及要求符合CE、UL、CSA标准的使用场合,或变频器周围有抗干扰能力不足的设备等情况下,均应使用滤波器。安装时注意接线尽量缩短,滤波器亦应尽量靠近变频器。

In cases where there are high requirements for radio interference resistance and compliance with CE, UL and CSA standards is required, or where equipment with poor interference resistance capacity is mounted adjacent to the inverter, a filter must be used. Check that the connection line length is minimized during installation and the filter must lie as close to the inverter as possible.

## 9.5 数字I/O扩展板

### 9.5. Digital I/O Extension Board

数字I/O扩展板用于数字输入输出端子数量的扩展。

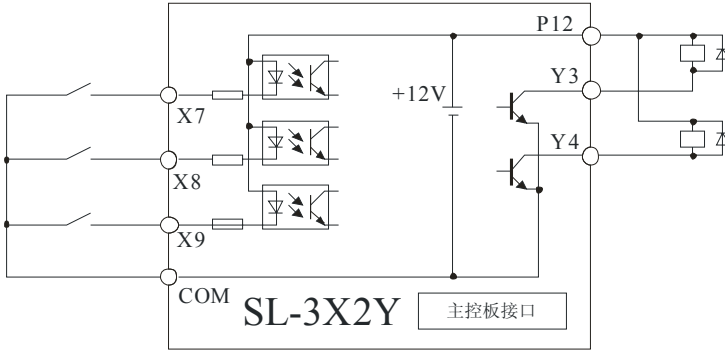
The digital I/O extension board is used to expand the number of digital I/O terminals.

安装方法: (1) 确认变频器断电; (2) 把扩展板附送的塑料柱大头插在主控板上; (3) 将扩展板的插座对准主控板接口处的插针(J1), 并使扩展板两个安装孔对准已放好的塑料柱按下。

Installation: (1) confirm that the inverter has been disconnected from the power supply; (2) insert the bigger end of the plastic pole (complimentary) into the main control panel; (3) Aim the socket of the extension board at the pins (J1) at the interface of the main control panel, aim the two installation holes on the extension board at the plastic pole and push it in place.

基本接线如下:

Refer to the following diagram for basic wiring:



主控板接口: Main Control panel interface

数字I/O扩展板提供多路数字输入输出量, 可由用户定制。例如: 5路数字输入型 (SL-5X)、5路数字输出型 (SL-5Y)、3路数字输入2路数字输出型 (SL-3X2Y) 等。以SL-3X2Y为例, 功能及规格如下:

The digital I/O extension board provides customizable multiplex digital input/output quantities, such as 5-channel digital input (SL-5X), 5-channel digital output (SL-5Y) and 3-channel digital input/2-channel digital output (SL-3X2Y). Take SL-3X2Y for example. Refer to the following table for functions and specification:

端子符号	端子名称	端子功能及说明	技术规格
X7	X7 扩展输入端子	多功能, 设置见 Fd 菜单 监视参数: FU-29	光耦隔离 输入阻抗: $\geq 3.9k\Omega$ 采样周期: 2ms 输入电压范围: $< 25V$ 高电平: $> 10V$ 低电平: $< 3V$
X8	X8 扩展输入端子		
X9	X9 扩展输入端子		
P12	12V 电源端子	供用户使用的 12V 电源	12V 最大输出电流 80mA
COM		12V 电源地	
Y3	Y3 扩展输出端子	多功能, 设置见 Fd 菜单 监视参数: FU-30	光耦隔离 集电极开路输出 规格: 24Vdc/50mA 输出动作频率: $< 250Hz$ 导通电压: $< 1.0V$
Y4	Y4 扩展输出端子		

Terminal Code	Terminal Name	Terminal Function and Description	Technical Specification
---------------	---------------	-----------------------------------	-------------------------

Terminal Code	Terminal Name	Terminal Function and Description	Technical Specification
X7	X7 Extension Input Terminal	Multifunction: Refer to Menu Fd for settings Monitoring Parameter: FU-29	Opto-isolator Input impedance: $\geq 3.9k\Omega$ Sampling period: 2ms Input voltage range: $< 25V$ High level: $> 10V$ Low level: $< 3V$
X8	X8 Extension Input Terminal		
X9	X9 Extension Input Terminal		
P12	12V Power Supply Terminal	12V power supply for the user	12V Max. output current (12V): 80mA
COM		12V Earth terminal	
Y3	Y3 Extension Output Terminal	Multifunction: See Menu Fd for settings Monitoring Parameter: FU-30	Opto-isolator Output Action Frequency: $< 250Hz$ Collector open-circuit output Break-over voltage: $< 1.0V$ Specification: 24Vdc/50mA
Y4	Y4 Extension Output Terminal		

## 9.6 继电器扩展单元 (SL-5X6T)

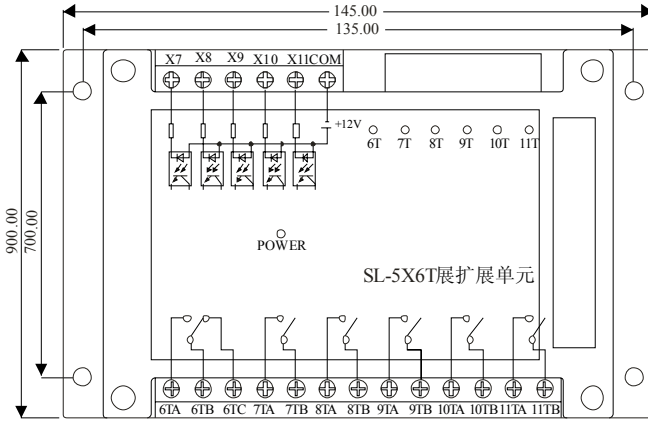
### 9.6 Relay Extension Unit (SL-5X6T)

可编程继电器扩展单元 (SL-5X6T) 用于数字输入和继电器输出接口数量的扩展。

The programmable relay extension unit (SL-5X6T) is used to expand the number of digital input/relay output interfaces.

安装方法：（1）确认变频器断电；（2）把控制单元的接口线连接到变频器主板插针（J5），**注意**接插件的1脚与J5的1脚对应。

Installation: (1) Confirm that the inverter has been disconnected from the power supply; (2) connect the interface bus of the control unit to the pins of the inverter mainboard (J5) and see to it that Pin 1 of the socket connector adapts to Pin 1 of J5.



SL-5X6T展扩展单元：SL-5X6T extension unit

可编程继电器扩展单元端子功能及规格如下表：

Refer to the following table for the functions and specifications of the programmable relay extension unit terminals:

端子符号	端子名称	端子功能及说明	技术规格	
X7	X7 扩展输入端子	多功能，设置见 F4 菜单 监视参数：FU-29	光耦隔离 输入阻抗： $\geq 3.9k\Omega$ 采样周期：2ms	输入电压范围： $< 25V$ 高电平： $> 10V$ 低电平： $< 3V$
X8	X8 扩展输入端子			
X9	X9 扩展输入端子			
X10	X10 扩展输入端子			
X11	X11 扩展输入端子			
COM	扩展输入地	扩展输入地		
6TA	继电器 6 输出端子	功能选择及设置见 F5 菜单	TA-TB：常开 TB-TC：常闭 触点规格： $250V_{AC}/3A$ $24V_{DC}/5A$	
6TB				
6TC				
7TA	继电器 7 输出端子			
7TB				
8TA	继电器 8 输出端子			
8TB				
9TA	继电器 9 输出端子			
9TB				
10TA	继电器 10 输出端子			
10TB				
11TA	继电器 11 输出端子			
11TB				

Terminal Code	Terminal Name	Terminal Function and Description	Technical Specification	
X7	X7 Extension Input Terminal	Multifunction; see Menu F4 for settings Monitoring parameter: FU-29	Opto-isolator Input impedance: $\geq 3.9k\Omega$ Sampling period: 2ms	Input voltage range: $< 25V$ High level: $> 10V$ Low level: $< 3V$
X8	X8 Extension Input Terminal			
X9	X9 Extension Input Terminal			
X10	X10 Extension Input Terminal			
X11	X11 Extension Input Terminal			
COM	Extension input earth terminal	Extension input earth terminal		
6TA	Output Terminal of Relay 6	See Menu F5 for function options and settings	TA-TB: Constantly open TB-TC: Constantly closed Contact specification: $250V_{AC}/3A$	
6TB				
6TC				



Terminal Code	Terminal Name	Terminal Function and Description	Technical Specification
7TA	Output Terminal of Relay 7		24V <sub>DC</sub> /5A
7TB			
8TA	Output Terminal of Relay 8		
8TB			
9TA	Output Terminal of Relay 9		
9TB			
10TA	Output Terminal of Relay 10		
10TB			
11TA	Output Terminal of Relay 11		
11TB			

### 9.7 带参数复制功能的操作面板（SB-PU70E）

#### 9.7 Control Panel Complete with Parameter Copying (SB-PU70E)

SB-PU70E此型号的操作面板可实现F0-12“参数复制”定义的功能，对多台变频器相同设置时特别有用。

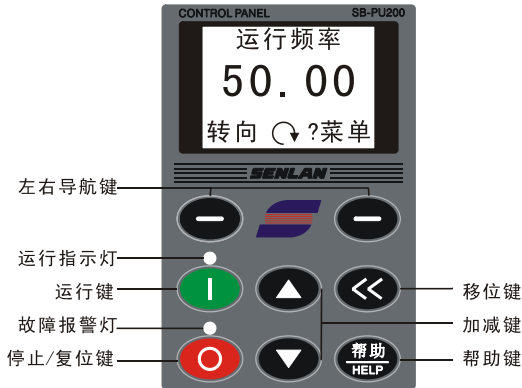
SB-PU70E control panels can realize the function of F0-12 “Parameter Copying”, which is especially useful in the case of more than one inverter with the same settings.

### 9.8 带参数复制功能的中文液晶操作面板（SB-PU200）

#### 9.8 LCD Control Panel Complete with Parameter Copying (SB-PU 200; Simplified Chinese Version)

操作面板是变频器接受命令、显示参数的部件。使用SB-PU200 操作面板可以设定和查看参数、进行运行控制、显示故障、报警信息等，可以实现实时时钟和参数复制功能，操作面板如下图。

The control panel of a inverter is used to receive commands and display parameters. With a SB-PU200 control panel, the user can set or check parameters, exercise operation control, display information on faults & alarms, enable the real-time clock and copy parameters. See the following figure for a control panel.









运行频率: Working frequency      转向: Rotation direction      菜单: Menu      左右导航键: NAVIGATE (L/R)  
运行指示灯: Operation indicator lamp      运行键: EXECUTE      故障报警灯: Fault alarm lamp  
停止/复位键: STOP/RESET      移位键: SHIFT      加减键: INCREASE/DECREASE  
帮助键: HELP

## 9.8.1 SB-PU200按键说明

### 9.8.1. SB-PU200: Keys

按键标识	按键名称	功 能
	导航键	根据其对应位置的显示完成相应功能
	增键	数字或菜单递增, 按住时递增速度加快
	减键	数字或菜单递减, 按住时递减速度加快
	移位键	选择待修改位; 监视状态下切换监视参数; 选择菜单时可翻页
	运行键	运行命令
	停止/复位键	停机、故障复位
	帮助键	当有“?”显示时按此键显示帮助信息

Icon	Key Name	Function
	NAVIGATE	The function corresponding with the display of a specific position will be realized

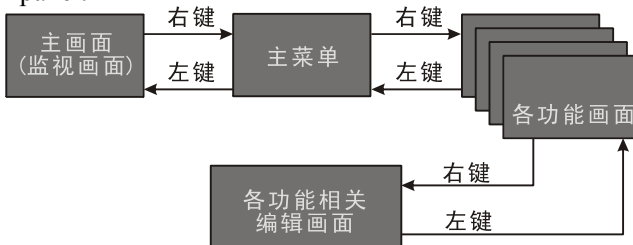
	INCREASE	Increase of numbers or menus; when this key is pressed, the increase speed will accelerate
	DECREASE	Decrease of numbers of menus; when this key is pressed, the decrease speed will decelerate
	SHIFT	Used to select the digit to be modified; in monitoring mode, this key is used to switch between monitoring parameters; In menu selection, the key can be used to turn pages
	EXECUTE	Execution of a command
	STOP/RESET	Shutdown or fault reset
	HELP	When “?” is displayed, press the key to display help information

## 9.8.2 SB-PU200 显示界面

### 9.8.2. SB-PU200 Display Interface

LCD 操作面板的基本层次架构如下图

Refer to the following figure for the fundamental architecture of the LCD control panel:



主画面 (监视画面): Main interface (monitoring interface) 右键: Right key 左键: Left key  
 主菜单: Main menu 右键: Right key 左键: Left key  
 各功能画面: Function interfaces  
 各功能相关编辑画面: Modification interfaces corresponding with individual functions  
 右键: Right key 左键: Left key

### 9.8.3 主菜单:

#### 9.8.3. Main Menu

当在监视画面按下右导航 (菜单) 键后则进入主菜单画面, 可用上下键进行选择 (按移位键可翻页) 主菜单现共有 9 个分别为:

In the monitoring interface mode, press the right navigation key (Menu) to enter the main menu. Make

selections with UP or DOWN (press SHIF to turn pages). The main menu has the 9 following functions:

编号	名称	说明
00	参数设定	设置变频器相关参数
01	供水功能	进入与供水相关的功能
02	PID 调节器	进入与 PID 调节相关的功能
03	I/O 口设置	进入与 I/O 口相关的功能
04	I/O 口状态	可查看 IO 口的状态；当数字端口选通时该端口后面的小方框为黑色
05	参数备份	可进行参数的上传、下载、比较不同等功能
06	故障记录	查看变频器近期记录的故障
07	修改过的参数	查看与出厂值不相同的参数
08	用户参数	用户可将常用的功能加入该列表并对其进行更改
09	LCD 设置	详见 LCD 设置菜单

Code	Name	Description
00	Parameter Setting	Settings of parameters relevant to the inverter
01	Water Supply	Entry into functions relevant to water supply
02	PID Controller	Entry into functions relevant to PID control
03	I/O Port Settings	Entry into functions relevant to I/O ports
04	I/O Port Status	Check of the status of I/O ports; when the digital port is selected, the box behind the port becomes black
05	Parameters Backup	Parameter uploading, downloading and comparison of difference
06	Fault Records	Check of the latest faults recorded by the inverter
07	Modified Parameters	Check parameters different from the factory settings
08	User Parameters	The user can add common functions to the list and modify them.
09	LCD Settings	Refer to the LCD setting menu for details

#### 9.8.4 LCD设置菜单:

#### 9.8.4. LCD Setting Menu

在 LCD 设置菜单里现可进行如下操作:

The following operations can be done in the LCD setting menu:

名称	说明
LCD 对比度调整	调整液晶的对比度已达到最好的显示效果
时间设定	设定系统时间 (24 小时制)
监视菜单字体	用于设定主画面监视参数数据的字体
监视项切换时间	指定监视项的自动切换时间 x 秒, x: 0~99; x=0 时不切换
∧∨键给定选择	指定在主画面时按 ∧∨键修改主给定频率、PID 数字给定或无效
LCD 软件版本	当前 LCD 操作面板的软件版本号
监视内容选择	用于更改主画面的监视参数, 共 6 个

Name	Description
------	-------------

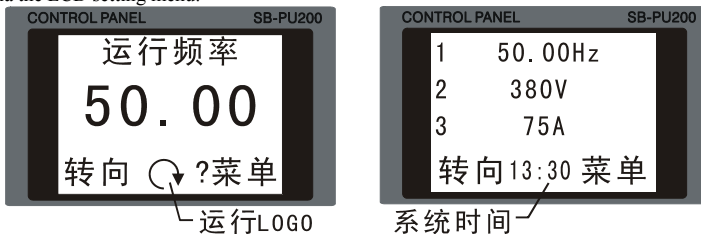
LCD Contrast Adjustment		Adjustment of LCD contrast to achieve the best display effect
Time Settings		System time settings (24 hours)
Monitoring Menu Font		Used to set the font of monitoring parameters & data on the main interface
Monitored Item Switching Time		Used to set the auto switching time (x second(s); switching is inapplicable when x is equal to 0) of the monitored item
^/\V Setting Options		Used to modify or disable the main frequency settings and PID digital settings by pressing ^ or \V on the main interface
LCD Software Version		The software version number of the current LCD control panel
Monitored Item Options		Used to modify the monitoring parameters of the main interface; 6 parameters in all

### 9.8.5 主画面:

#### 9.8.5. Main Interface:

主画面有大字体和小字体两种监视画面，可在 LCD 设置菜单里更改。

The main interface has two monitoring interface versions: big font and small font. The font format can be modified via the LCD setting menu.



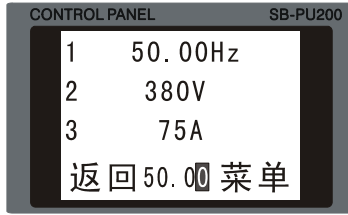
运行频率: Working frequency    转向: Rotation direction    菜单: Menu    运行 LOGO: Operation LOGO    转向: Rotation direction    菜单: Menu    系统时间: System clock

运行 LOGO 反映了当前变频器的运行状况。顺时针转动标示变频器为正传，逆时针为反转；LOGO 为虚线表示变频器处于加减速过程中。运行 LOGO 与系统时间交替显示。

The operation logo reflects the current operation conditions of the inverter. The clockwise icon indicates that the inverter is rotating in a clockwise direction and the anticlockwise icon indicates an anticlockwise rotation. If the logo is represented in broken lines, it means that the inverter is in an acceleration/deceleration process. The operation logo and the system time is displayed alternately.

用户可以在主画面修改给定频率（或数字 PID 给定），通过“LCD 设置”菜单里的“^/\V 键给定选择”功能进行修改，当修改给定频率时显示如下图：

The user can modify the frequency settings or digital PID settings via the main interface. This is done by using “^” or “\V” (setting options) in the “LCD settings” menu. The following picture will be displayed when the set frequency is being modified:



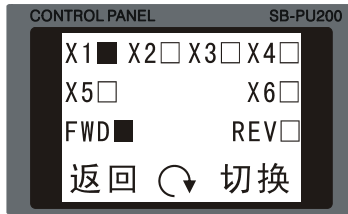
返回: Return 菜单: Menu

对 I/O 口状态的监视:  
I/O Port Status Monitoring:

选择 **主菜单** 里的 **04 I/O 口状态菜单** 可对 X 端子、Y 端子、继电器端子、模拟输入端子的状态进行查看。

Select "04 I/O Port Status Menu" in "Main Menu" to check the status of Terminal X, Terminal Y, Relay Terminal and Analog Input Terminal.

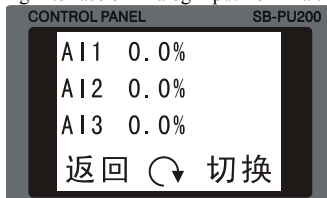
X 端子监视画面:  
Monitoring Interface of Terminal X:



返回: Return 切换: Switch to

■ 表示 X 端子 (Y 端子、继电器端子) 短接; □ 表示无断开。  
"■" means Terminal X (Terminal Y or Relay Terminal) is short-circuited; "□" means that they are not off.

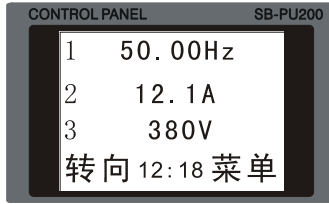
模拟输入端子监视画面:  
Monitoring Interface of Analog Input Terminal:





返回: Return 切换 Switch to

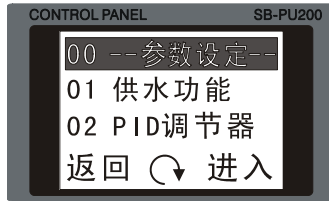
例: 修改 F0-00 功能

Example: Modification of the Function of F0-00



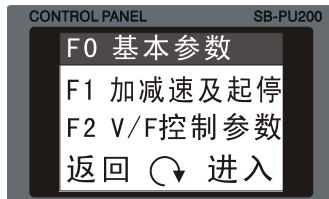
转向: Rotation direction 菜单: Menu

按“菜单”（右  键）键后进入主菜单画面  
Press “Menu” (Right  key) to enter the interface of the main menu





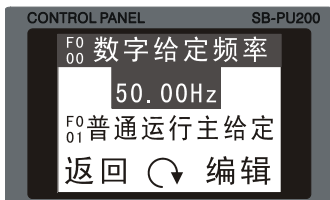
参数设定: Parameter settings 供水功能: Water supply PID 调节器: PID regulator 返回: Return  
进入: Enter

按“进入”（右  键）键进入功能选择画面  
Press “Enter” (Right  Key) to enter the interface of function options





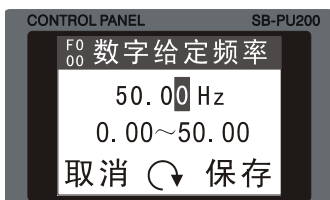
基本参数: Basic parameters 加减速及起停: Acceleration/Deceleration and start/stop V/F 控制参数:  
V/F control parameters 返回: Return 进入: Enter

按“进入”（右  键）键进入功能选择画面  
Press “Enter” (Right  Key) to enter the interface of function options





数字给定频率: Digital frequency settings      普通运行主给定: Main settings for normal operation      返回: Return      编辑: Edit

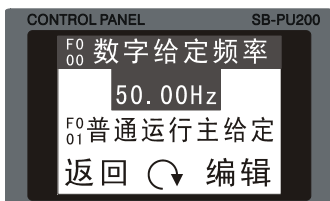
按“编辑”(右  键)键进入功能编辑画面  
Press “Edit” (Right  key) to enter the interface of function editing



数字给定频率: Digital frequency settings      取消: Cancel      保存: Save

利用“移位键”、“加减”键修改后按“保存”(右  键)键退回到功能选择画面。






Modify with “SHIFT” and “INSERT/DELETE”, press “SAVE” (right  and return to the interface of function options



数字给定频率: Digital frequency settings      普通运行主给定: Main settings for normal operation      返回: Return      编辑: Edit

## 9.8.6 组合键的说明:



### 9.8.6 Description of Key Combinations

锁键盘: (需修改 FC-01 功能) 按住  键再按右  键, 成功后将退回到监视画面显示。  
Keyboard Lock: If modification of FC-01 functions is required, hold  and press the right  key to lock the keyboard. After that, the system will return to the monitoring  interface.

解键盘锁: 同时按住  和  键 (大于 3 秒)。



---

Keyboard Unlock: Hold  and  for more than 3 seconds.

## 9.9 操作面板安装盒

### 9.9. Control Panel Mounting Box

用于在机柜上安装操作面板。安装尺寸见3.2.3“操作面板在机柜面板上的安装”一节。

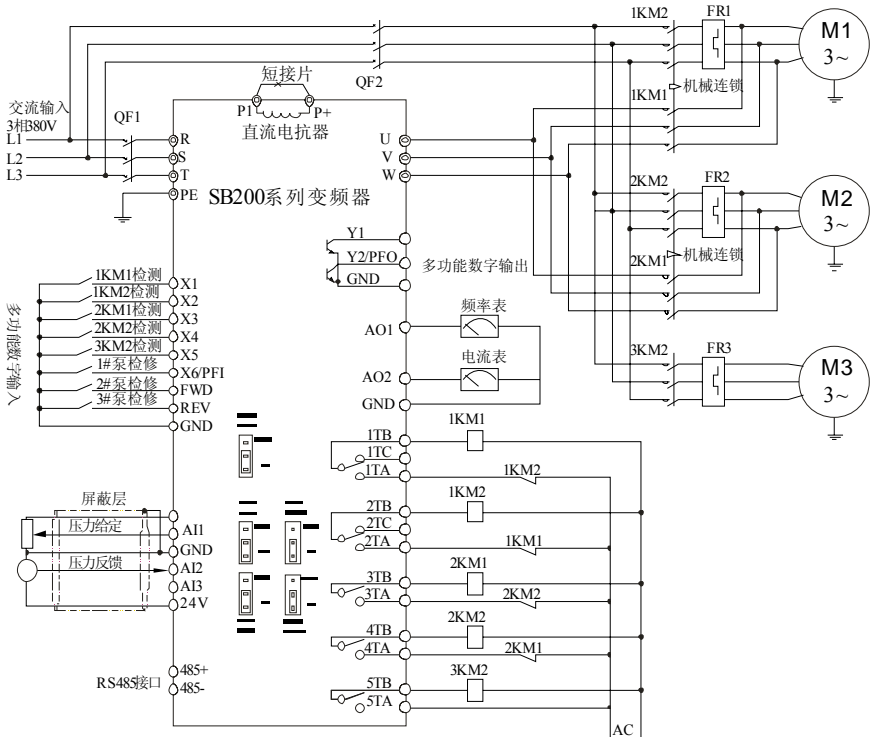
This is used to mount the control panel on the cabinet. For installation dimensions, refer to 3.2.3. “Installation of Control Panel on Cabinet Panel”.

## 10 应用举例

## 10. Application Examples

### 10.1 变频循环投切一控二和一台辅助泵的应用

#### 10.1. Example 1: Two Variable-Frequency Cyclic Switchover Pumps (under Common Control) plus One Auxiliary Pump



交流输入3相38伏: AC input (3 phase 380V) 短接片: Short lug 直流电抗器: DC reactor 机械连锁: Mechanical interlock SB200系列变频器: SB200 inverter series 多功能数字输出: Multifunctional digital output 机械连锁: mechanical interlock 1KM1检测: 1KM1 detection 1KM2检测: 1KM2 detection 2KM1检测: 2KM1 detection 2KM2检测: 2KM2 detection 3KM2检测: 3KM2 detection 1#泵检修: Pump #1 overhaul 2#泵检修: Pump #2 overhaul 3#泵检修: Pump #3 overhaul 多功能数字输入: Multifunctional digital input 多功能数字输出: Multifunctional digital output 频率表: Frequency meter 电流表: Ampere meter 屏蔽层: Shielded layer 压力给定: Pressure settings 压力反馈: Pressure feedback RS485接口: RS485 interface

变频循环投切一控二和一台辅助泵的应用图

Application Drawing of Two Variable-Frequency Cyclic Switchover Pumps (under Common Control) plus One Auxiliary Pump

## 变频循环投切一控二和一台辅助泵

## Two Variable-Frequency Cyclic Switchover Pumps (under Common Control) plus

## One Auxiliary Pump

变频循环一控二和一台辅助泵应用时部分参数的参考设置:

Reference: Parameter Settings in the application of Variable-Frequency Cyclic Switchover Pumps (一控二) plus One Auxiliary Pump

F0-02=0 操作面板启动/停止变频器

F0-02=0: Inverter startup/shutdown via the control panel

F4-00=22 选择 X1 作为 1K1 接触器检测输入

F4-00=22: X1 is selected as the detection input for Contactor 1K1

F4-01=23 选择 X2 作为 1K2 接触器检测输入

F4-01=23: X2 is selected as the detection input for Contactor 1K2

F4-02=24 选择 X3 作为 2K1 接触器检测输入

F4-02=24: X3 is selected as the detection input for Contactor 2K1

F4-03=25 选择 X4 作为 2K2 接触器检测输入

F4-03=25: X4 is selected as the detection input for Contactor 2K2

F4-04=27 选择 X5 作为 3K2 接触器检测输入

F4-04=27: X5 is selected as the detection input for Contactor 3K2

F4-05=43 选择 X6 作为 1#水泵禁止 (检修指令) 输入

F4-05=43: X6 is selected as the disablement input (overhaul command) for Pump #1

F4-11=44 选择 FWD 作为 2#水泵禁止 (检修指令) 输入

F4-11=44: FWD is selected as the disablement input (overhaul command) for Pump #2

F4-12=45 选择 REV 作为 3#水泵禁止 (检修指令) 输入

F4-12=45: REV is selected as the disablement input (overhaul command) for Pump #3

F5-02=24 选择 T1 继电器作为 1#泵变频运行控制输出

F5-02=24: Relay T1 is selected as the control output for Pump #1 (variable-frequency operation)

F5-03=25 选择 T2 继电器作为 1#泵工频运行控制输出

F5-03=25: Relay T2 is selected as the control output for Pump #1 (line frequency operation)

F5-04=26 选择 T3 继电器作为 2#泵变频运行控制输出

F5-04=26: Relay T3 is selected as the control output for Pump #2 (variable frequency operation)

F5-05=27 选择 T4 继电器作为 2#泵工频运行控制输出

F5-05=27: Relay T4 is selected as the control output for Pump #2 (line frequency operation)

F5-06=28 选择 T5 继电器作为 3#泵工频运行控制输出

F5-06=28: Relay T5 is selected as the control output for Pump #3 (line frequency operation)

F7-00=3 选择过程 PID 控制, 用于恒压供水频率给定

F7-00=3: PID control is selected to set constant-pressure water supply frequency

F7-01=1 选择 AI1 作为压力给定信号输入

F7-01=1: AI1 is selected as the signal input for pressure settings

F7-02=1 选择 AI2 作为压力反馈信号输入

F7-02=1: AI2 is selected as the signal input for pressure feedback

F7-03 根据压力传感器量程设置

F7-03: Set as per the measurement range of the pressure transducer

F8-00=1 选择普通 PI 调节恒压供水

F8-00=1: Common PI-regulated water supply is selected

F8-01=03012 设置变频循环泵台数为 2, 工频辅助泵台数为 1, 休眠方式为主泵休眠

F8-01 = 03012: Settings: Number of Variable Frequency Pumps: 2; Number of Line-Frequency Auxiliary Pumps: 1; Sleeping Mode: Main Pump Sleeping

F8-24、F8-25 分别根据 1#、2#水泵最低出水频率设置。

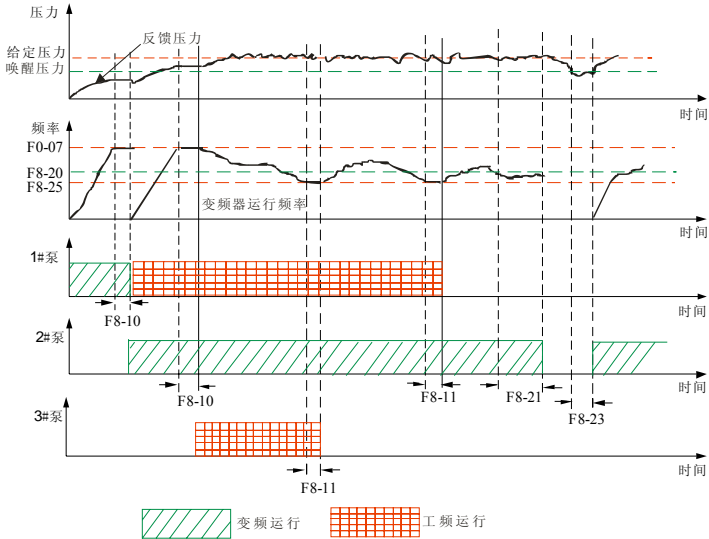
F8-24 and F8-25: Respectively set according to the min. outflow frequencies of Pumps #1 and #2

F8-30、F8-31 分别根据 1#、2#水泵额定电流 (名牌参数) 设置。

F8-30 and F8-31: Respectively set according to the rated current (nameplate parameters) of Pumps #1 and #2

系统运行时序图:

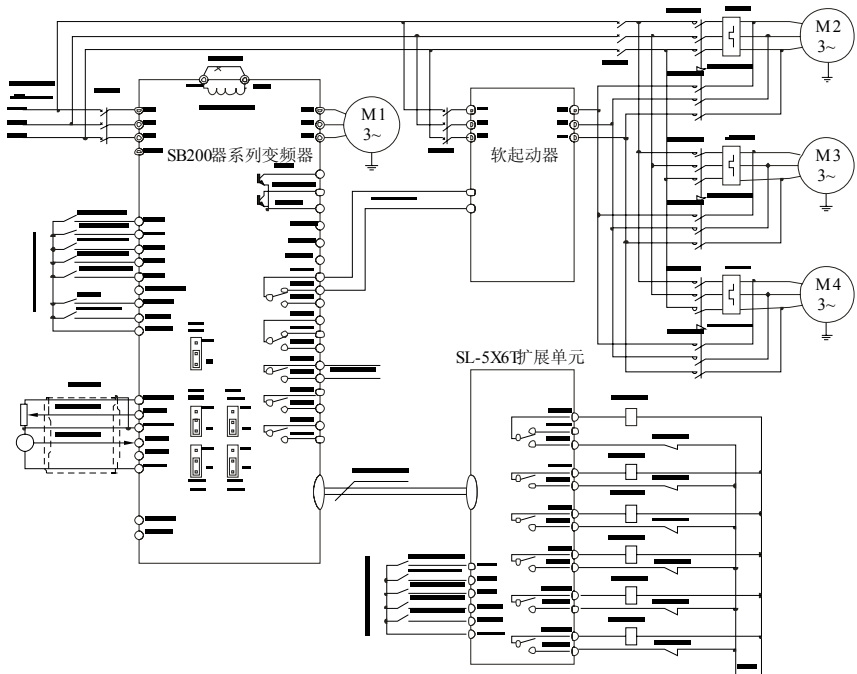
Time Sequence of System Operation:



压力: Pressure 给定压力: Pressure settings 唤醒压力: Wakeup pressure 反馈压力: Feedback pressure  
 时间: Time 频率: Frequency 变频器运行频率: Inverter working frequency 时间: Time 1#  
 泵: Pump#1 时间: Time  
 2#泵: Pump #2 时间: Time 3#泵: Pump #2 时间: Time 变频运行: Variable-frequency  
 operation 工频运行: Line frequency operation

## 10.2 变频器加软启动器恒压供水应用

## 10.2. Example 2: Constant Pressure Water Supply by Inverter plus Soft Starter



SB200系列变频器：SB200 inverter series      软启动器：soft starter      SL-5X6T扩展单元：SL-5X6T extension unit

变频器加软启动器恒压供水应用图

Application Drawing of Constant Pressure Water Supply by Inverter plus Soft Starter

变频器加软启动器恒压供水应用时的部分参数参考设置：

Reference: Parameter Settings in the Application of Inverter plus Soft Starter to Constant-Pressure Water Supply:

F4-00=43 选择 X1 作为 1#水泵禁止（检修指令）输入

F4-00=43: X1 is selected as the disablement input (overhaul command) for Pump #1

F4-01=44 选择 X2 作为 2#水泵禁止（检修指令）输入

F4-01=44: X2 is selected as the disablement input (overhaul command) for Pump #2

F4-02=45 选择 X3 作为 3#水泵禁止（检修指令）输入

F4-02=45: X3 is selected as the disablement input (overhaul command) for Pump #3

F4-03=46 选择 X4 作为 4#水泵禁止（检修指令）输入

F4-03=46: X4 is selected as the disablement input (overhaul command) for Pump #4

F4-04=29 选择 X5 作为 3K2 接触器检测输入

F4-04=29: X5 is selected as the detection input for Contactor 3K2

F4-06=24 选择 X7 作为 1K1 接触器检测输入

F4-06=24: X7 is selected as the detection input for Contactor 1K1

F4-07=25 选择 X8 作为 1K2 接触器检测输入

- F4-07=25: X8 is selected as the detection input for Contactor 1K2  
F4-08=26 选择 X9 作为 2K1 接触器检测输入  
F4-08=26: X9 is selected as the detection input for Contactor 2K1  
F4-09=27 选择 X10 作为 2K2 接触器检测输入  
F4-09=27: X10 is selected as the detection input for Contactor 2K2  
F4-10=28 选择 X11 作为 3K1 接触器检测输入  
F4-10=28: X11 is selected as the detection input for Contactor 3K1  
F4-11=38 选择 FWD 作为运转指令输入  
F4-11=38: FWD is selected as the operation command input  
F4-12=13 选择 REV 作为故障复位指令输入  
F4-12=13: REC is selected as the fault reset command input  
F5-02=49 选择 T1 继电器作为软起动器起动信号控制输出  
F5-02=49: Relay T1 is selected as the soft starter startup signal control output  
F5-04=13 选择 T3 继电器作为故障报警输出  
F5-04=13: Relay T3 is selected as the fault alarm output  
F5-07=26 选择 T6 继电器作为 2#泵软起动器运行控制输出  
F5-07=26: Relay T6 is selected as the operation control output for the soft starter of Pump #2  
F5-08=27 选择 T7 继电器作为 2#泵工频运行控制输出  
F5-08=27: Relay T7 is selected as the line frequency operation control output for Pump #2  
F5-09=28 选择 T8 继电器作为 3#泵软起动器运行控制输出  
F5-09=28: Relay T8 is selected as the operation control output for the soft starter of Pump #3  
F5-10=29 选择 T9 继电器作为 3#泵工频运行控制输出  
F5-10=29: Relay T9 is selected as the line-frequency operation control output for Pump #3  
F5-11=30 选择 T10 继电器作为 4#泵软起动器运行控制输出  
F5-11=30: Relay T10 is selected as the operation control output for the soft starter of Pump #4  
F5-12=31 选择 T11 继电器作为 4#泵工频运行控制输出  
F5-12=31: Relay T11 is selected as the line frequency operation control output for Pump #4  
F7-00=3 选择过程 PID 控制, 用于恒压供水频率给定  
F7-00=3: PID control is selected to set the frequency of constant-pressure water supply  
F7-01=1 选择 AI1 作为压力给定信号输入  
F7-01=1: AI1 is selected as the pressure setting signal input.  
F7-02=1 选择 AI2 作为压力反馈信号输入  
F7-02=1: AI2 is selected as the pressure feedback signal input.  
F7-03 根据压力传感器量程设置  
F7-03: Set according to the measurement range of the pressure transducer  
F8-00=1 选择普通 PI 调节恒压供水  
F8-00=1: Common PI-regulated constant pressure water supply is selected  
F8-01= 03031 设置变频循环泵台数为 1, 工频辅助泵台数为 3, 休眠方式为主泵休眠  
F8-01= 03031: Settings: Number of Variable Frequency Circulator Pumps: 1; Number of Line Frequency Auxiliary Pumps: 3; Sleeping Mode: Main Pump Sleeping  
F8-24 根据 1#水泵最低出水频率设置。  
F8-24: Set according to the min. outflow frequency of Pump #1  
F8-30 根据 1#水泵额定电流 (铭牌参数) 设置  
F8-30: Set according to the rated current (nameplate parameter) of Pump #1

## 11 版本信息



## 11 Version Information

新增功能:

New Functions:

- 1、 F7-02 增加10: MAX(AI1, AI3) 11: MIN(AI1, AI3)
  1. Amendments to F7-02: 10: MAX (AI1, AI3)  
11: MIN (AI1, AI3)
  - 2、 数字输出功能定义表增加:  $\pm 60$ : AI1 > AI3
  2. Amendment to Table of Definitions of Digital Output Functions:  $\pm 60$ : AI1 > AI3  
在数字输出功能解释中增加: 60: AI1>AI3。指示AI1>AI3的状态。  
Amendment to Table of Definitions of Digital Output Functions: 60: AI1>AI3. It is used to indicate the status where AI1>AI3.  
(软件版本V0.03及以后)  
(Software Version: V0.03 and later)
  - 3、 增加了F8-44~F8-50水泵禁止功能(软件版本V0.05及以后), 见196页。
  3. Pump disablement is added to F8-44~F8-50 (Software Version: V0.05 and later). See Page 77.
  - 4、 数字输入功能“43、44”增加复选项(电机选择), 见138页。
  4. Amendment: Check option items (motor options) for Digital Input Functions “43 and 44” are added. See Page 54.
  - 5、 SB200V1.2版本说明书增加内容(软件版本V0.06及以后)
  - 6、 Amendment to the User’s Manual of Version SB200V1.2 (Software Version: V0.06 and later)
    1. 监控检测增加检出方式2, 见152页。
    1. Output of Monitor 2 is added. See Page 60.
  - 7、 SB200V1.3版本说明书增加内容(软件版本V0.07及以后)
  7. Amendments to the User’s Manual of Version SB200V1.3 (Software Version: V0.07 and later)
    1. 数字输入端子功能“55、56、57”, 见139页;
    1. Digital Input Terminal functions “55, 56 and 57”. See Page 55;
    2. F8-39水泵起顺序选择, 见194页;
    2. F8-39: Pump Startup Sequence Options: See Page 76;
    3. F8-51备用泵台数设置, 见197页。
    3. F8-51: Standby Pump Number Settings. See Page 77.