



说明书

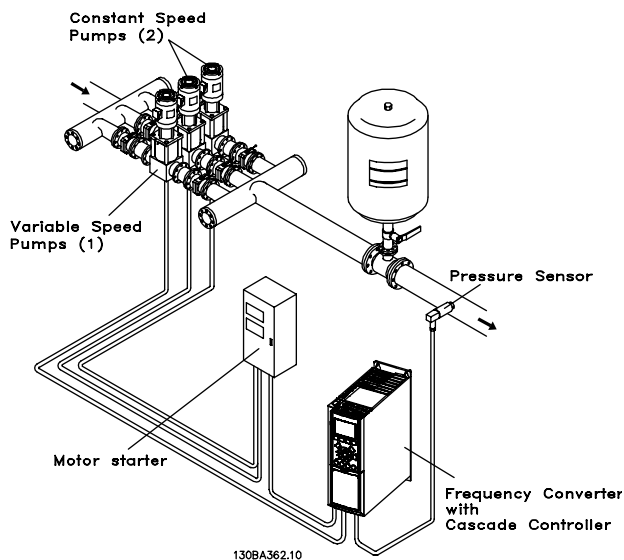
VLT® HVAC Basic Drive
多泵控制

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1.1 BASIC 多泵控制器

1.1.1 基本多泵控制器



基本多泵控制器用于需要在广泛的动态范围内保持某个压力（“压力差”）或水平的泵应用。在较大的速度变化范围内使用大型泵并不是一种理想的解决方案，因为泵的效率低，并且泵的实际运行速度只能达到其额定满载速度的25%。

在基本多泵控制器中，变频器通过控制变速电动机来实现对变速泵（变频）的控制，它最多可以切入2台另外的恒速泵并控制其开/关。它通过改变初始泵的速度来实现对整个系统的可变速度控制。借此不仅能保持恒定压力，而且还可以避免压力冲击，从而降低泵系统的系统应力和运行噪音。

固定变频器

电动机必须具有相同的规格。基本多泵控制器允许变频器借助变频器内置的2个继电器来控制多台具有相同规格的泵（最多3台）。当变频泵直接与变频器相连时，另外2台泵将由内置的2个继电器来控制。当启用变频泵轮换时，各台泵将同内置继电器相连，变频器此时可以控制2台泵。

变频泵轮换

电动机必须具有相同的规格。该功能使变频器可以交替控制系统中的泵（最多2台）。这种工作模式可以使各台泵的运行时间基本相等，因此有助于降低泵的维护要求、提高可靠性以及延长系统的使用寿命。变频泵的轮换可以根据命令信号或在切入（添加另外的泵）时发生。

这种命令可以是手动轮换或轮换事件信号。如果选择了轮换事件，则每当该事件发生时都会发生变频泵轮换。选项包括：每当某个轮换计时器期满时；在一天之内某个事先定义的时间；或者当变频泵进入睡眠模式时。切入是根据系统的实际负载来确定的。

通过一个独立参数，可以限制轮换仅在所需总容量超过50%时才发生。总的泵容量是变频泵与恒速泵的容量和。

带宽管理

在多泵控制系统中，为了避免恒速泵频繁开关，所要求的系统压力保持在一个带宽内，而不是维持在某个恒定水平。切入带宽提供了所要求的运行带宽。一旦系统压力发生较大并且较快的变化，立即切泵带宽便会取代切入带宽，以防止系统立即对瞬时的压力变化作出响应。通过设置一个立即切泵带宽计时器，可以防止在系统压力尚未稳定并且尚未建立正常控制之前发生切入。

如果变频器在多泵控制器被启用并在正常运行时发出了一个跳闸报警，则会通过切入和停止恒速泵来保持系统的压力差。为避免频繁的切入和停止并且尽量减小压力波动，系统将使用一个更宽的恒速带宽，而不是切入带宽。

1.1.2 系统状态和运行

如果变频泵进入“睡眠模式”，在LCP上会显示这一功能。在“睡眠模式”状态下可以实现变频泵的轮换。

当启用多泵控制器后，会在LCP中通过25-81, Pump Status和25-80, Cascade Status显示各泵及多泵控制器的工作状态。所显示的信息包括：

- 泵的状态。这是分配给每台泵的继电器的状态读数。该信息显示了泵的下述状态：禁用、关闭、依靠变频器运行或依靠电网/电动机启动器运行。
- 多泵状态是多泵控制器的状态读数。该状态信息包括：多泵控制器被禁用、所有泵处于关闭状态、恒速泵切入/停止以及变频泵发生轮换。
- 当所有继电器被去能后，第一个要被赋能的内置继电器将接入到同其控制的泵相对应的接触器中。如，继电器1接入接触器K1，从而将受其控制的泵变成变频泵。
- K1通过机械互锁装置实现同K2的互锁，借此可防止通过K1将电网连接至变频器的输出端。
- K1上的辅助常闭触点可防止K3接入。
- 继电器2负责控制接触器K4，进而实现对恒速泵的开/关控制。
- 在轮换时，两个继电器都被去能，而继电器2将成为首先被赋能的继电器。

1.1.3 启动/停止条件

分配给数字输入的命令。 请参阅参数组 5-1* *Digital Inputs*。

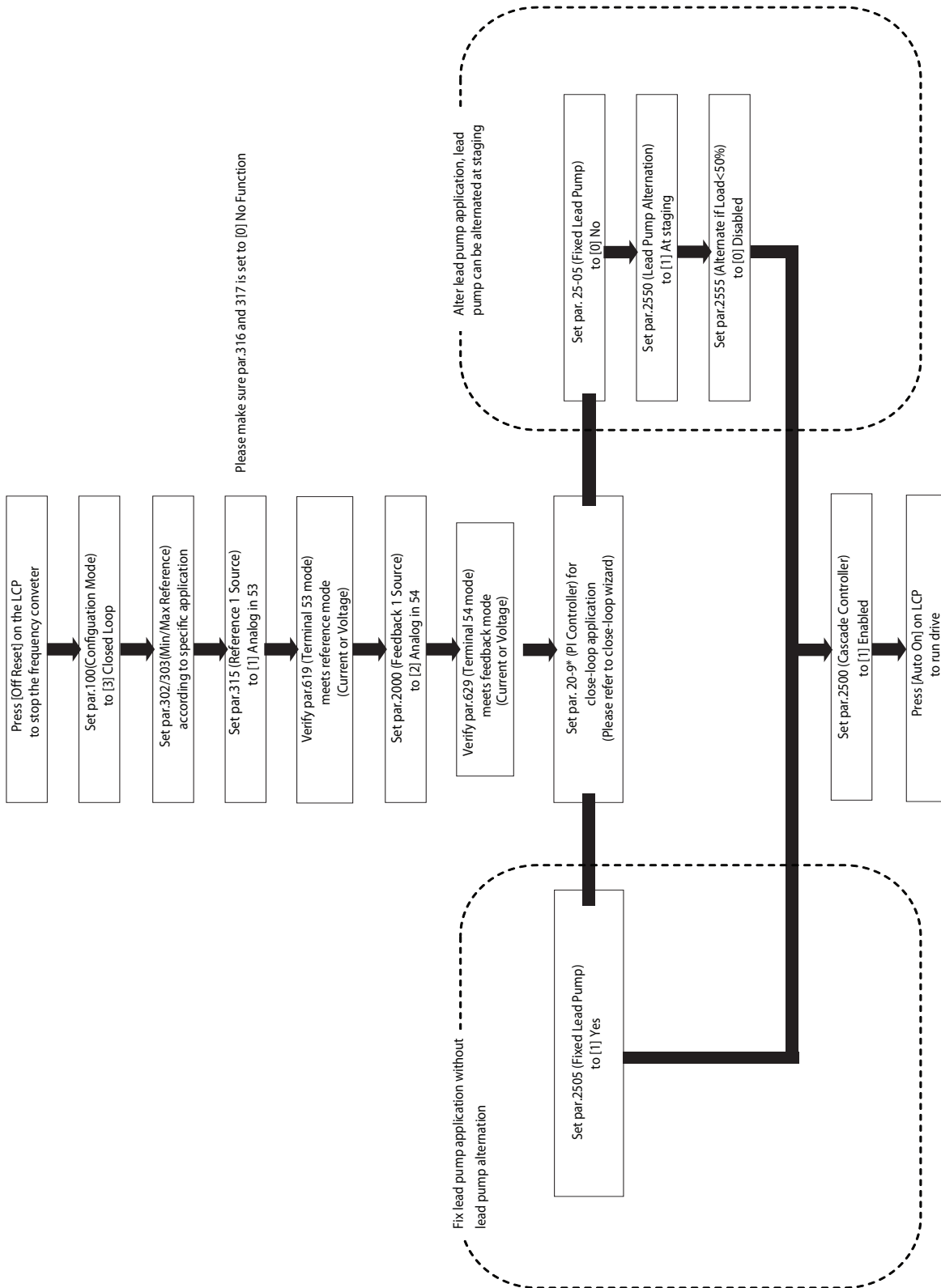
	变速泵 (变频)	恒速泵
启动 (系统启动/停止)	加速 (如果已停止并且存在需求)	切入 (如果已停止并且存在请求)
变频泵启动	加速 (如果激活了“系统启动”)	不受影响
惯性停车 (紧急停止)	惯性停车	断开 (内置继电器被去能)
外部互锁	惯性停车	断开 (内置继电器被去能)

LCP 上按钮的功能:

	变速泵 (变频)	恒速泵
手动启动	加速 (如果已在正常停止命令下停止) 或保持运行 (如果在运行)	停止 (如果在运行)
关	减速	正在停止
自动启动	根据端子或串行总线的命令启动和停止	切入/停止

1.1.4 多泵应用向导

130BB983.10



1.2 安装

1.2.1 控制端子

图 1.1 显示了变频器的所有控制端子。通过施加启动信号（端子 18），端子 12 与 27 之间的连接以及模拟参考值（端子 53 或 54 和 55）可以使变频器运行。

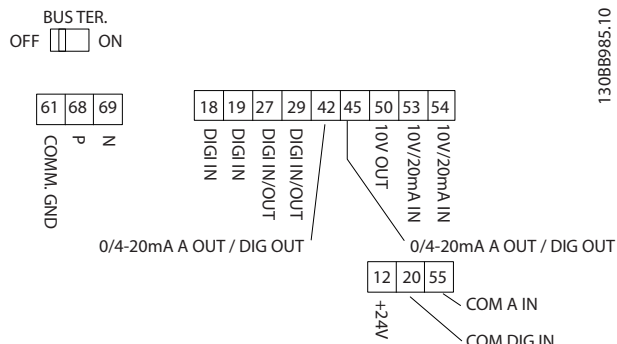
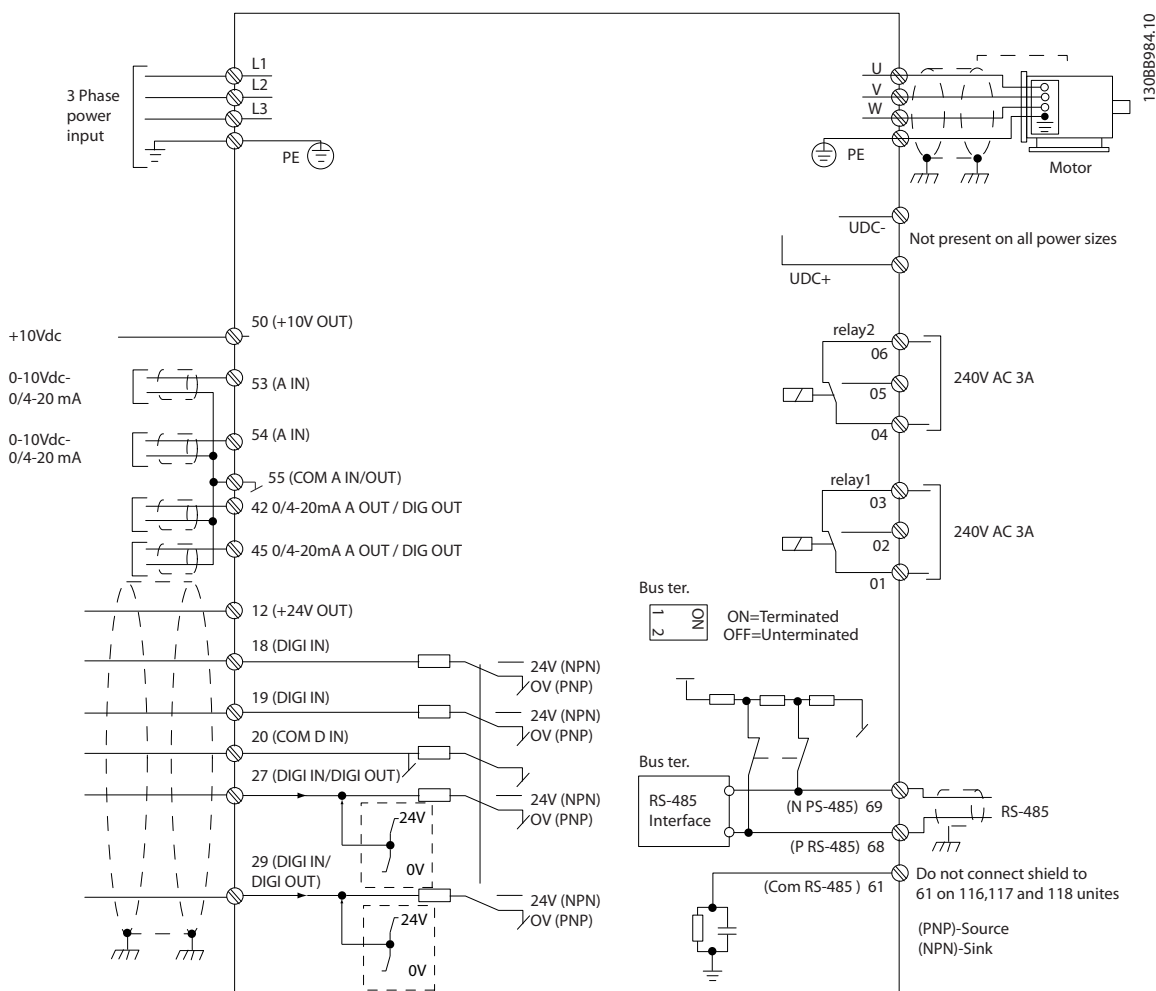


图 1.1 控制端子

1.2.2 电气概述



注意

请注意，在下述设备上无 UDC- 和 UDC+：
IP20 380-480V 30-90kW

1.3 规格

1.3.1 产品一般规范

变频器	PK37	PK75	P1K5	P2K2	P3K0	P4K0	P5K5	P7K5	P11K
典型主轴输出 (kW)	0.37	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11
IP 20 机架	H1	H1	H1	H2	H2	H2	H3	H3	H4
射频干扰级别	A1	A1	A1	A1	A1	A1	A1	A1	A1
PCB	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层
变频器	P15K	P18K	P22K	P30K	P37K	P45K	P55K	P75K	P90K
典型主轴输出 (kW)	15	18	22	30	37	45	55	75	90
IP 20 机架	H4	H5	H5	H6	H6	H6	H7	H7	H8
射频干扰级别	A1	A1	A1	A1	A1	A1	A1	A1	A1
PCB	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层	有涂层

1.4 参数概述

参数概述			
0-** Operation / Display 0-0* Basic Settings 0-01 Language *[0] English [1] Deutsch [2] Francais [3] Dansk [4] Espanol [5] Italiano [28] Portuguese [255] No Text 0-03 Regional Settings *[0] International [1] US 0-04 Operating State at Power-up *[0] Resume [1] Forced stop, ref=old 0-06 GridType 0] 200-240V/50Hz/IT-grid [1] 200-240V/50Hz/Delta [2] 200-240V/50Hz [10] 380-440V/50Hz/IT-grid [11] 380-440V/50Hz/Delta [12] 380-440V/50Hz [20] 440-480V/50Hz/IT-grid [21] 440-480V/50Hz/Delta [22] 440-480V/50Hz [30] 525-600V/50Hz/IT-grid [31] 525-600V/50Hz/Delta [32] 525-600V/50Hz [100] 200-240V/60Hz/IT-grid [101] 200-240V/60Hz/Delta [102] 200-240V/60Hz [110] 380-440V/60Hz/IT-grid [111] 380-440V/60Hz/Delta [112] 380-440V/60Hz [120] 440-480V/60Hz/IT-grid [121] 440-480V/60Hz/Delta [122] 440-480V/60Hz [130] 525-600V/50Hz/IT-grid [131] 525-600V/50Hz/Delta [132] 525-600V/50Hz 0-07 Auto DC Braking IT [0] Off *[1] On 0-1* Set-up Operations 0-10 Active Set-up *[1] Set-up 1 [2] Set-up 2 [9] Multi Set-up 0-11 Programming Set-up [1] Set-up 1 [2] Set-up 2 *[9] Active Set-up 0-12 Link Setups [0] Not linked *[20] Linked	0-3* LCP Readout 0-30 Custom Readout Unit [0] None *[1] % [5] PPM [10] 1/Min [11] RPM [12] Pulse/s [20] l/s [21] l/min [22] l/h [23] m3/s [24] m3/min [25] m3/h [30] kg/s [31] kg/min [32] kg/h [33] t/min [34] t/h [40] m/s [41] m/min [45] m [60] Degree Celsius [70] mbar [71] bar [72] Pa [73] kPa [74] m Wg [80] kW [120] GPM [121] gal/s [122] gal/min [123] gal/h [124] CFM [127] ft3/h [140] ft/s [141] ft/min [160] Degree Fahr [170] psi [171] lb/in2 [172] in WG [173] ft WG [180] HP 0-31 Custom Readout Min Value 0.00 - 1,000,000.0, * 0.00 0-32 Custom Readout Max Value 0.00 - 1,000,000.0, * 100.00 0-37 Display Text 1 0-38 Display Text 2 0-39 Display Text 3 0-4* LCP Keypad 0-40 [Hand on] Key on LCP [0] Disabled *[1] Enabled 0-44 [Off / Reset] Key on LCP	[0] Disable All *[1] Enable All [7] Enable Reset Only 0-42 [Auto on] Key on LCP [0] Disabled *[1] Enabled 0-5* Copy/Save 0-50 LCP Copy *[0] No copy [1] All to LCP [2] All from LCP [3] Size indep. from LCP 0-51 Set-up Copy *[0] No copy [1] Copy from setup 1 [2] Copy from setup 2 [9] Copy from Factory setup 0-6* Password 0-60 Main Menu Password 0 - 999, * 0 1-** Load and Motor 1-0* General Settings 1-00 Configuration Mode *[0] Open loop [3] Closed loop 1-01 Motor Control Principle [0] U/f *[1] VVC+ 1-03 Torque Characteristics *[1] Variable torque [3] Auto Energy Optim. 1-06 Clockwise Direction *[0] Normal [1] Inverse 1-20 Motor Power [2] 0.12kW - 0.16Hp [3] 0.18kW - 0.25Hp [4] 0.25kW - 0.33Hp [5] 0.37 kW - 0.50Hp [6] 0.55 kW - 0.75Hp [7] 0.75 kW - 1.00Hp [8] 1.10 kW - 1.50Hp [9] 1.50 kW - 2.00Hp [10] 2.20 kW - 3.00Hp [11] 3.00 kW - 4.00Hp [12] 3.70 kW - 5.00Hp [13] 4.00 kW - 5.40Hp [14] 5.50 kW - 7.50Hp [15] 7.50 kW - 10.0Hp [16] 11.00 kW - 15.00Hp [17] 15.00kW - 20Hp [18] 18.5kW - 25Hp [19] 22kW - 30Hp [20] 30kW - 40Hp [21] 37kW-50Hp [22] 45kW-60Hp [23] 55kW-75Hp [24] 75kW-100Hp	[25] 90kW-120Hp [26] 110kW-150Hp 1-22 Motor Voltage 50 - 1000V 1-23 Motor Frequency 20 - 400, *(50)Hz 1-24 Motor Current 0.01 - (26.00), [A] 1-25 Motor Nominal Speed 100 rpm - 6000 rpm, 1-29 Automatic Motor Adaption (AMA) *[0] Off [1] Enable Complete AMA [2] Enable Reduced AMA 1-3* Adv. Motor Data I 1-30 Stator Resistance (Rs) 0.000 ohm - 99.990 ohm 1-33 Stator Leakage Reactance (X1) 0.000 ohm - 999.900 ohm 1-35 Main Reactance (Xh) 0.00 - 999.90 ohm 1-39 Motor Poles 2 - 100, * 4 1-4* Adv. Motor Data II 1-42 Motor Cable Length 0 - 150, * 50m 1-43 Motor Cable Length Feet 0 - 431, * 144 1-5* Load Indep. Setting 1-50 Motor Magnetisation at Zero Speed 0 - 300, * 100% 1-52 Min Speed Normal Magnetising [Hz] 0.0 - 10.0, * 0.0 1-55 U/f Characteristic - U 0 - 999V, *0V 1-56 U/f Characteristic - F 0 - 400Hz, *(0) 1-6* Load Depend. Setting 1-62 Slip Compensation -400 - 399%, *0% 1-63 Slip Compensation Time Constant 0.05 - 5.00s, * 0.10 1-64 Resonance Dampening 0 - 500%, * 100 1-65 Resonance Dampening Time Constant 0.001 - 0.050s, * 0.005 1-7* Start Adjustments 1-71 Start Delay 0.0 - 10.0s, * 0.0 1-72 Start Function [0] DC Hold/delay time

参数概述			
*[2] Coast/delay time 1-73 Flying Start *[0] Disabled [1] Enabled 1-8* Stop Adjustments 1-80 Function at Stop *[0] Coast [1] DC hold/MotorPreheat 1-82 Min Speed for Function at Stop [Hz] 0.0 - 20.0Hz, * 0.0 1-9* Motor Temperature 1-90 Motor Thermal Protection *[0] No protection [1] Thermistor warning [2] Thermistor trip [3] ETR warning 1 [4] ETR trip 1 1-93 Thermistor Resource *[0] None [1] Analog input 53 [6] Digital input 29 2-** Brakes 2-0* DC-Brake 2-00 DC Hold/Motor Preheat Current 0 - 160%, * 50 2-01 DC Brake Current 0 - 150%, * 50 2-02 DC Braking Time 0.0 - 60.0s, * 10.0 2-04 DC Brake Cut In Speed 0.0 - 400.0Hz, * 0.0 2-1* Brake Energy Funct. 2-17 Over-voltage Control [0] Disabled *[2] Enabled 3-** Reference / Ramps 3-0* Reference Limits 3-02 Minimum Reference (-4999.000) - 4999.000, * 0.000 3-03 Maximum Reference (-4999.000) - 4999.000, * 50.000 3-1* References 3-10 Preset Reference -100.00 - 100.00%, * 0.00 3-11 Jog Speed [Hz] 0.0 - 400.0Hz, * 5.0 3-14 Preset Relative Reference -100.00 - 100.00, * 0.00 3-15 Reference Resource 1 [0] No function *[1] Analog in 53 [2] Analog in 54 [11] Local bus reference	3-16 Reference 2 Resource [0] No function [1] Analog in 53 *[2] Analog in 54 [11] Local bus reference 3-17 Reference 3 Resource [0] No function [1] Analog in 53 [2] Analog in 54 *[11] Local bus reference 3-4* Ramp 1 3-41 Ramp 1 Ramp up Time 0.05 - 3600.00s, *与规格有关 3-42 Ramp 1 Ramp Down Time 0.05 - 3600.00s, *与规格有关 3-5* Ramp 2 3-51 Ramp 2 Ramp up Time 0.05 - 3600.00s, *与规格有关 3-52 Ramp 2 Ramp down Time 0.05 - 3600.00s, *与规格有关 3-8* Other Ramps 3-80 Jog Ramp Time 0.05 - 3600.00s, *与规格有关 3-81 Quick Stop Ramp Time 0.05 - 3600.00s, *与规格有关 4-** Limits / Warnings 4-1* Motor Limits 4-10 Motor Speed Direction [0] Clockwise *[2] Both directions 4-12 Motor Speed Low Limit [Hz] 0.0 - 400Hz, *0.0Hz 4-14 Motor Speed High Limit [Hz] 0.1 - 400Hz, *65.0Hz 4-18 Current Limit 0 - 300%, *110% 4-19 Max Output Frequency 0.0 - 400.0Hz, * 65.0 4-4* Adj. Warnings 2 4-40 Warning Freq. Low 0.0-400.0Hz, *400.0 4-41 Warning Freq. High 0.0-400.0Hz, *400.0 4-5* Adj. Warnings 4-50 Warning Current Low 0.00 - 194.00A, * 0.00 4-51 Warning Current High 0.00 - 194.00A, * 194.00	4 -54 Warning Reference Low -4999.000 - 4999.000, *-4999.000 4 -55 Warning Reference High -4999.000 - 4999.000, *4999.000 4 -56 Warning Feedback Low -4999.000 - 4999.000, *-4999.000 4 -57 Warning Feedback High -4999.000 - 4999.000, *4999.000 4-58 Missing Motor Phase Function [0] Off *[1] On 4-6* Speed Bypass 4-61 Bypass Speed From [Hz] 0.0 - 400.0, * 0.0 4-63 Bypass Speed To [Hz] 0.0 - 400.0, * 0.0 4-64 Semi-Auto Bypass Set-up *[0] Off [1] Enable 5-** Digital In/Out 5-0* Digital I/O mode 5-00 Digital Input Mode *[0] PNP [1] NPN 5-01 Terminal 27 I/O Mode *[0] Input [1] Output 5-02 Terminal 29 I/O Mode *[0] Input [1] Output 5-03 Digital Input 29 Mode *[0] PNP [1] NPN 5-1* Digital Inputs 5-10 Terminal 18 Digital Input [0] No operation [1] Reset [2] Coast inverse [3] Coast and reset inverse [4] Quick stop inverse [5] DC-brake inverse [6] Stop inverse [7] External Interlock *[8] Start [9] Latched start [10] Reversing [11] Start reversing [14] Jog [16] Preset ref bit 0 [17] Preset ref bit 1	[18] Preset ref bit 2 [19] Freeze reference [20] Freeze output [21] Speed up [22] Speed down [23] Set-up select bit 0 [34] Ramp bit 0 [37] Fire mode [52] Run permissive [53] Hand Start [54] Auto start [60] Counter A (up) [61] Counter A (down) [62] Reset Counter A [63] Counter B (up) [64] Counter B (down) [65] Reset Counter B [120] Lead Pump Start [121] Lead Pump Alternation [130] Pump 1 Interlock [131] Pump 2 Interlock [132] Pump 3 Interlock 5-11 Terminal 19 Digital Input 请参阅参数 5-10, *[0] No operation 5-12 Terminal 27 Digital Input 请参阅参数 5-10, *[2] Coast inverse 5-13 Terminal 29 Digital Input 请参阅参数 5-10, *[14 Jog] 5-3* Digital Outputs 5-30 Terminal 27 Digital Output [0] No operation [1] Control ready [2] Drive ready [3] Drive ready/remote control [4] Standby/no warning [5] Drive running [6] Running/no warning [7] Run in range/no warning [8] Run on ref/no warning [9] Alarm [10] Alarm or warning [12] Out of current range [13] Below current, low [14] Above current, high [19] Below feedback, low [20] Above feedback, high [21] Thermal warning [22] Ready, no thermal warning [23] Remote, ready, no thermal warning

参数概述			
[24] Ready, Voltage OK [25] Reverse [26] Bus OK [28] Brake, no brake warning [29] Brake ready, no fault [30] Brake fault (IGBT) [32] Mech brake control [35] External interlock [36] Control word bit 11 [37] Control word bit 12 [45] Bus Control [60] Comparator 0 [61] Comparator 1 [62] Comparator 2 [63] Comparator 3 [64] Comparator 4 [65] Comparator 5 [70] Logic rule 0 [71] Logic rule 1 [72] Logic rule 2 [73] Logic rule 3 [74] Logic rule 4 [75] Logic rule 5 [80] SL digital output A [81] SL digital output B [82] SL digital output C [83] SL digital output D [160] No alarm [161] Running reverse [165] Local ref. active [166] Remote ref. active [167] Start command active [168] Drive in hand mode [169] Drive in auto mode [193] Sleep mode [194] Broken belt function [196] Fire mode [198] Drive bypass [200] Full capacity [201] Pump 1 running [202] Pump 2 running [203] Pump 3 running 5-31 Terminal 29 Digital Output 请参阅参数 5-30 5 -34 On Delay, Digital Output 0.00 - 600.00 s, *0.01 s 5 -35 Off Delay, Digital Output 0.00 - 600.00 s, *0.01 s 0.00 ~ 600.00 secs 5-4* Relays 5-40 Function Relay * [0] No operation [1] Control ready [2] Drive ready	[3] Drive ready/remote control [4] Enable / no warning [5] VLT running [6] Running / no warning [7] Run in range/no warning [8] Run on ref/no warning [9] Alarm [10] Alarm or warning [12] Out of current range [13] Below current, low [14] Above current, high [16] Below frequency, low [17] Above frequency, high [19] Below feedback, low [20] Above feedback, high [21] Thermal warning [22] Ready, no thermal warning [23] Remote, ready, no thermal warning [24] Ready, Voltage OK [25] Reverse [26] Bus OK [35] External Interlock [36] Control word bit 11 [37] Control word bit 12 [45] Bus Control [60] Comparator 0 [61] Comparator 1 [62] Comparator 2 [63] Comparator 3 [64] Comparator 4 [65] Comparator 5 [70] Logic rule 0 [71] Logic rule 1 [72] Logic rule 2 [73] Logic rule 3 [74] Logic rule 4 [75] Logic rule 5 [80] SL digital output A [81] SL digital output B [82] SL digital output C [83] SL digital output D [160] No alarm [161] Running reverse [165] Local ref. active [166] Remote ref. active [167] Start command activ [168] Drive in hand mode [169] Drive in auto mode [193] Sleep Mode [194] Broken Belt Function [196] Fire Mode [198] Drive Bypass [211] Cascade Pump 1 [212] Cascade Pump 2 [213] Cascade Pump 3	5 -41 On Delay, Relay 0.00 - 600.00 s, *0.01 s 5 -42 Off Delay, Relay 0.00 ~ 600.00s, *0.01s 5-5* Pulse Input 5-9* Bus Controlled 5-90 Digital and Relay Bus Control 0 - 0xFFFFFFFF, * 0 6-* Analog In/Out 6-0* Analog I/O Mode 6-00 Live Zero Timeout Time 1 - 99s, * 105-5* Pulse Input 5-9* Bus Controlled 5-90 Digital and Relay Bus Control 0 - 0xFFFFFFFF, * 0 6-* Analog In/Out 6-0* Analog I/O Mode 6-00 Live Zero Timeout Time 1 - 99s, * 10 6-01 Live Zero Timeout Function * [0] Off [1] Freeze output [2] Stop [3] Jogging [4] Max. speed [5] Stop and trip 6-1* Analog Input 53 6-10 Terminal 53 Low Voltage 0.00 - 10.00V, * 0.07 6-11 Terminal 53 High Voltage 0.00 - 10.00V, * 10.00 6-12 Terminal 53 Low Current 0.00 - 20.00, * 4.00mA 6-13 Terminal 53 High Current 0.00 - 20.00, * 20.00mA 6-14 Terminal 53 Low Ref./Feedb. Value -4999.000 - 4999.000, * 0.000 6-15 Terminal 53 High Ref./Feedb. Value -4999.000 - 4999.000, * 50.000 6-16 Terminal 53 Filter Time Constant 0.01 - 10.00s, * 0.01 6-19 Terminal 53 mode [0] Current mode * [1] Voltage mode 6-2* Analog Input 54 6-20 Terminal 54 Low Voltage 0.00 - 10.00V, * 0.07	6-21 Terminal 54 High Voltage 0.00 - 10.00V, * 10.00 6-22 Terminal 54 Low Current 0.00 - 20.00, * 4.00mA 6-23 Terminal 54 High Current 0.00 - 20.00, * 20.00mA 6-24 Terminal 54 Low Ref./Feedb. Value -4999.000 - 4999.000, * 0.000 6-25 Terminal 54 High Ref./Feedb. Value -4999.000 - 4999.000, * 50.000 6-26 Terminal 54 Filter Time Constant 0.01 - 10.00, * 0.01 6-29 Terminal 54 mode [0] Current mode [0] Current mode * [1] Voltage mode 6-7* Analog Output 45 6-70 Terminal 45 Mode * [0] 0-20 mA [1] 4-20 mA [2] Digital Output 6-71 Terminal 45 Analog Output * [0] No operation [100] Output frequency [101] Reference [102] Feedback [103] Motor current [106] Power [139] Bus Control 6-72 Terminal 45 Digital Output * [0] No operation [1] Control ready [2] Drive ready [3] Drive ready/remote control [4] Standby / no warning [5] Drive running [6] Running / no warning [7] Run in range/no warning [8] Run on ref/no warning [9] Alarm [10] Alarm or warning [12] Out of current range [13] Below current, low [14] Above current, high [19] Below feedback, low [20] Above feedback, high [21] Thermal warning

参数概述			
[22] Ready, no thermal warning	[101] Reference	[193] Sleep Mode	8-33 FC Port Parity
[23] Remote, ready, no thermal warning	[102] Feedback	[194] Broken Belt Function	*[0] Even Parity, 1 Stop Bit
[24] Ready, Voltage OK	[103] Motor current	[196] Fire Mode	Bit
[25] Reverse	[105] TorquereltoRated	[198] Drive Bypass	[1] Odd Parity, 1 Stop Bit
[26] Bus OK	[106] Power	[200] Full capacity	[2] No Parity, 1 Stop Bit
[35] External Interlock	[139] Bus Control	[201] Pump 1 running	[3] No Parity, 2 Stop Bits
[45] Bus Control	6-92 Terminal 42 Digital Output	[202] Pump 2 running	8-35 Minimum Response Delay
[60] Comparator 0	*[0] No operation	[203] Pump 3 running	0.001 - 0.500s, * 0.010
[61] Comparator 1	[1] Control ready	6-93 Terminal 42 Output Min Scale	8-36 Max Response Delay
[62] Comparator 2	[2] Drive ready	0.00 - 200.00%, * 0.00	0.100 - 10.000s, *5.000
[63] Comparator 3	[3] Drive ready/remote control	6-94 Terminal 42 Output Max Scale	8-37 Max Inter-char delay
[64] Comparator 4	[4] Enable / no warning	0.00 - 200.00%, * 100.00	0.025 - 0.025s, * 0.025
[65] Comparator 5	[5] Drive running	6-96 Terminal 42 Output Bus Control	8-5* Digital/Bus
[70] Logic rule 0	[6] Running / no warning	0.00 - 100.00%, * 0.00	8-50 Coasting Select
[71] Logic rule 1	[7] Run in range/no warning	8-** Comm. and Options	[0] Digital input
[72] Logic rule 2	[8] Run on ref/no warning	8-0* Comm. General Settings	[1] Bus
[73] Logic rule 3	[9] Alarm	8-01 Control Site	[2] Logic AND
[74] Logic rule 4	[10] Alarm or warning	*[0] Digital and ctrl.word	*[3] Logic OR
[75] Logic rule 5	[12] Out of current range	[1] Digital only	8-51 Quick Stop Select
[80] SL digital output A	[13] Below current, low	[2] Controlword only	[0] Digital input
[81] SL digital output B	[14] Above current, high	8-02 Control Source	[1] Bus
[82] SL digital output C	[19] Below feedback, low	[0] None	[2] Logic AND
[83] SL digital output D	[20] Above feedback, high	*[1] FC Port	*[3] Logic OR
[160] No alarm	[21] Thermal warning	8-03 Control Timeout Time	8-52 DC Brake Select
[161] Running reverse	[22] Ready, no thermal warning	0.1 - 6500.0s, * 1.0	[0] Digital input
[165] Local ref. active	[23] Remote, ready, no thermal warning	8-04 Control Timeout Function	[1] Bus
[166] Remote ref. active	[24] Ready, Voltage OK	*[0] Off	[2] Logic AND
[167] Start command activ	[25] Reverse	[1] Freeze output	*[3] Logic OR
[168] Drive in hand mode	[26] Bus OK	[2] Stop	8-53 Start Select
[169] Drive in auto mode	[35] External Interlock	[3] Jogging	[0] Digital input
[193] Sleep Mode	[45] Bus Control	[4] Max. speed	[1] Bus
[194] Broken Belt Function	[60] Comparator 0	[5] Stop and trip	[2] Logic AND
[196] Fire Mode	[61] Comparator 1	[20] N2 Override Release	*[3] Logic OR
[198] Bypass Mode	[62] Comparator 2	8-06 Reset Control Word Timeout	8-54 Reversing Select
[200] Full capacity	[63] Comparator 3	*[0] No function	[0] Digital input
[201] Pump 1 running	[64] Comparator 4	[1] Do reset	[1] Bus
[202] Pump 2 running	[65] Comparator 5	8-3* FC Port Settings	[2] Logic AND
[203] Pump 3 running	[70] Logic rule 0	8-30 Protocol	*[3] Logic OR
6-73 Terminal 45 Output Min Scale	[71] Logic rule 1	*[0] FC	8-55 Set-up Select
0.00 - 200.00%, * 0.00	[72] Logic rule 2	[2] Modbus RTU	[0] Digital input
6-74 Terminal 45 Output Max Scale	[73] Logic rule 3	[3] Metasys N2	[1] Bus
0.00 - 200.00%, * 100.00	[74] Logic rule 4	[4] FLN	[2] Logic AND
6-76 Terminal 45 Output Bus Control	[75] Logic rule 5	[5] BACnet	*[3] Logic OR
0.00 - 100.00%, * 0.00	[80] SL digital output A	8-31 Address	8-56 Preset Reference Select
6-9* Analog Output 42	[81] SL digital output B	1 - 247, * 1	[0] Digital input
6-90 Terminal 42 Mode	[82] SL digital output C	8-32 FC Port Baud Rate	[1] Bus
*[0] 0-20 mA	[83] SL digital output D	[0] 2400 Baud	[2] Logic AND
[1] 4-20 mA	[160] No alarm	[1] 4800 Baud	*[3] Logic OR
[2] Digital Output	[161] Running reverse	*[2] 9600 Baud	8-7* Bacnet
6-91 Terminal 42 Analog Output	[165] Local ref. active	[3] 19200 Baud	8-70 BACnet Device Instance
*[0] No operation	[166] Remote ref. active	[4] 38400 Baud	0 - 0x400000UL, *1
[100] Output frequency	[167] Start command activ	[5] 57600 Baud	8-72 MS/TP Maxmaster
	[168] Drive in hand mode	[6] 76800 Baud	0 - 127, * 127
	[169] Drive in auto mode	[7] 115200 Baud	8-73 MS/TP Max Info Frames
			1 - 65534, * 1
			8-74 "I am" Service
			*[0] Send at power-up
			[1] Continuously

参数概述			
8-75 Initialisation Password 8-8* FC Port Diagnostics 8-80 Bus Message Count 0 - 65536, * 0 8-81 Bus Error Count 0 - 65536, * 0 8-82 Slave Message Rcvd 0 - 65536, * 0 8-83 Slave Error Count 0 - 65536, * 0 8-84 Slave Message Sent 0 - 65536, * 0 8-85 Slave Timeout Errors 0 - 65536, * 0 8-88 Reset FC port Diagnostics * [0] Do not reset [1] Reset counter 8-9* Bus Feedback 8-94 Bus Feedback 1 -32768 - 32767, * 0 13-** Smart Logic 13-0* SLC Settings 13-00 SL Controller Mode * [0] Off [1] On 13-01 Start Event [0] False [1] True [2] Running [3] In range [4] On reference [7] Out of current range [8] Below I_{low} [9] Above I_{high} [16] Thermal warning [17] Mains out of range [18] Reversing [19] Warning [20] Alarm (trip) [21] Alarm (trip lock) [22] Comparator 0 [23] Comparator 1 [24] Comparator 2 [25] Comparator 3 [26] Logic rule 0 [27] Logic rule 1 [28] Logic rule 2 [29] Logic rule 3 [33] Digital input 18 [34] Digital input 19 [35] Digital input 27 [36] Digital input 29 * [39] Start command [40] Drive stopped [41] Reset trip [42] Auto reset trip [43] Key Ok	[44] Key Reset [47] Key Up [48] Key Down [50] Comparator 4 [51] Comparator 5 [60] Logic rule 4 [83] Broken belt 13-02 Stop Event 请参阅参数 13-02, * [40] Drive stopped 13-03 Reset SLC * [0] Do not reset [1] Reset SLC 13-1* Comparators 13-10 Comparator Operand * [0] Disabled [1] Reference [2] Feedback [3] Motor speed [4] Motor current [6] Motor power [7] Motor voltage [8] DC-link voltage [12] Analog in 53 [13] Analog in 54 [20] Alarm number [30] Counter A [31] Counter B 13-11 Comparator Operator [0] Less Than * [1] Approx. Equal [2] GreaterThan 13-12 Comparator Value -9999.0 - 9999.0, * 0.0 13-2* Timers 13-20 SL Controller Timer 0.00 - 3600.00, * 0.00 13-4* Logic Rules 13-40 Logic Rule Boolean 1 请参阅参数 13-01, * [0] False 13-41 Logic Rule Operator 1 * [0] Disabled [1] AND [2] OR [3] AND NOT [4] OR NOT [5] NOT AND [6] NOT OR [7] NOT AND NOT [8] NOT OR NOT 13-42 Logic Rule Boolean 2 请参阅参数 13-01, * [0] False 13-43 Logic Rule Operator 2 请参阅参数 13-41, * [0] Disabled 13-44 Logic Rule Boolean 3 请参阅参数 13-01, * [0] False	13-5* States 13-51 SL Controller Event 请参阅参数 13-01, * [0] False 13-52 SL Controller Action * [0] Disabled [1] No action [2] Select set-up 1 [3] Select set-up 2 [10] Select preset ref 0 [11] Select preset ref 1 [12] Select preset ref 2 [13] Select preset ref 3 [14] Select preset ref 4 [15] Select preset ref 5 [16] Select preset ref 6 [17] Select preset ref 7 [18] Select ramp 1 [19] Select ramp 2 [22] Run [23] Run reverse [24] Stop [25] Qstop [26] DC Brake [27] Coast [28] Freeze output [29] Start timer 0 [30] Start timer 1 [31] Start timer 2 [32] Set digital out A low [33] Set digital out B low [34] Set digital out C low [35] Set digital out D low [38] Set digital out A high [39] Set digital out B high [40] Set digital out C high [41] Set digital out D high [60] Reset Counter A [61] Reset Counter B [70] Start timer 3 [71] Start timer 4 [72] Start timer 5 [73] Start timer 6 [74] Start timer 7 [100] Reset Alarm 14-** Special Functions 14-0* Inverter Switching 14-01 Switching Frequency [0] Ran3 [1] Ran5 [2] 2.0 kHz [3] 3.0 kHz [4] 4.0 kHz [5] 5.0 kHz [6] 6.0 kHz [7] 8.0 kHz [8] 10.0 kHz [9] 12.0kHz [10] 16.0kHz	14-03 Overmodulation [0] Off * [1] On 14-08 Damping Gain Factor 0 - 100-%, * 96 14-1* Mains on/off 14-12 Function at Mains Imbalance * [0] Trip [1] Warning [2] Disabled [3] Derate 14-2* Reset Functions 14-20 Reset Mode * [0] Manual reset [1] Automatic reset x 1 [2] Automatic reset x 2 [3] Automatic reset x 3 [4] Automatic reset x 4 [5] Automatic reset x 5 [6] Automatic reset x 6 [7] Automatic reset x 7 [8] Automatic reset x 8 [9] Automatic reset x 9 [10] Automatic reset x 10 [11] Automatic reset x 15 [12] Automatic reset x 20 [13] Infinite auto reset 14-21 Automatic Restart Time 0 - 600s, * 10 14-22 Operation Mode * [0] Normal operation [2] Initialisation 14-27 Action At Inverter Fault [0] Off * [1] On 14-28 Production Settings * [0] No action [1] Service reset [3] Software Reset 14-29 Service Code 0 - 0x7FFFFFFF, * 0 14-3* Current Limit Ctrl. 14-4* Energy Optimising 14-40 VT Level 40 - 90%, * 90% 14-41 AEO Minimum Magnetisation 40 - 75%, * 66 14-5* Environment 14-50 RFI Filter [0] Off * [1] On

参数概述			
14-51 DC-link Voltage Compensation [0] Off *[1] On 14-52 Fan Control *[0] Auto [4] Auto Low temp env 14-53 Fan Monitor [0] Disabled *[1] Warning [2] Trip 14-55 Output Filter *[0] No Filter [1] Sine-Wave Filter [3] Sine-Wave Filter with Feedback 14-63 Min Switch Frequency 1 - 16kHz, * 1 15-** Drive Information 15-0* Operating Data 15-00 Operating Hours 0 - 2147483647, * 0 15-01 Running Hours 0 - 2147483647, * 0 15-02 kWh Counter 0 - 65535, * 0 15-03 Power Up's 0 - 2147483647, * 0 15-04 Over Temp's 0 - 65535, * 0 15-05 Over Volt's 0 - 65535, * 0 15-06 Reset kWh Counter *[0] Do not reset [1] Reset counter 15-07 Reset Running Hours Counter *[0] Do not reset [1] Reset counter 15-3* Fault Log 15-30 Fault Log: Error Code 0 - 255, * 0 15-4* Drive Identification 15-40 FC Type 15-41 Power Section 15-42 Voltage 15-43 Software Version 15-44 OrderedTypeCode 15-46 Frequency Converter Ordering No 15-47 Power Card Ordering No 15-48 LCP Id No 15-49 Software ID Control Card 15-50 Software ID Power Card	15-51 Frequency Converter Serial Number 15-53 Power Card Serial Number 16-** Data Readouts 16-0* General Status 16-00 Control Word 0 - 65535, * 0 16-01 Reference [Unit] -4999.000 - 4999.000, * 0.000 16-02 Reference % -200.0 - 200.0, * 0.0 16-03 Status Word 0 - 65535, * 0 16-05 Main Actual Value [%] -200.00 - 200.00, * 0.00 16-09 Custom Readout 0.00 - 9999.00, * 0.00 16-1* Motor Status 16-10 Power [kW] 0.000-4.294, 967.500, *0.000 16-11 Power [hp] 0.000 - 2.294, 967.500 *0.000 16-3* Drive Status 16-30 DC Link Voltage 0 - 65535, * 0 16-34 Heatsink Temp. 0 - 255, * 0 16-35 Inverter Thermal 0 - 255%, * 0 16-36 Inv. Nom. Current 0.00 - 655.35, * 0.00 16-37 Inv. Max. Current 0.00 - 655.35 16-38 SL Controller State 0 - 255, * 0 16-5* Ref. and Feedb. 16-50 External Reference -200.0 - 200.0%, * 0.0 16-52 Feedback -4999.000 - 4999.000, * 0.000 16-6* Inputs and Outputs 16-60 Digital input 0 - 65535, * 0 16-61 Terminal 53 Setting *[0] Current mode [1] Voltage mode 16-62 Analog Input 53 0.00 - 10.00, * 1.00 16-63 Terminal 54 Setting *[0] Current mode [1] Voltage mode 16-64 Analog Input 54 0.00 - 20.00, * 1.00	16-65 Analog Output 42 [mA] 0.00 - 20.00, * 0.00 16-61 Digital Output 16-72 Counter A -32768 - 32767, * 0 16-73 Counter B -32768 - 32767, * 0 16-79 Analog output 45 20 - 20mA, * 0 16-8* Fieldbus / FC Port 16-86 FC Port REF 1 -32768 - 32767, * 0 16-9* Diagnosis Readouts 16-90 Alarm Word 0 - 0xFFFFFFFF, * 0 16-91 Alarm Word 2 0 - 0xFFFFFFFF, * 0 16-92 Warning Word 0 - 0x7FFFFFFF, * 0 16-93 Warning Word 2 0 - 0x7FFFFFFF, * 0 16-94 Ext. Status Word 0 - 0x7FFFFFFF, * 0 16-95 Ext. Status Word 2 0 - 0x7FFFFFFF, * 0 18-**Extended Motor Data 18-1* Firemode Log 18-10 Firemode log: Event 0-255, *0 20-** FC Closed Loop 20-0* Feedback 20-00 Feedback 1 Source *[0] No function [1] Analog in 53 [2] Analog in 54 [100] Bus Feedback 1 20-01 Feedback 1 Conversion *[0] Linear [1] Square root 20-8* PI Basic Setting 20-81 Process PI Normal/Inverse Control *[0] Normal [1] Inverse 20-83 Process PI Start Speed[Hz] 0.0 - 200.0, * 0.0 20-84 On Reference Bandwidth 0 - 200%, * 5 20-9* PI Controller 20-91 PI Anti Windup [0] Off *[1] On 20-93 PI Proportional Gain 0.00 - 10.00, * 0.01 20-94 PI Integral Time 0.10 - 9999.00s, * 9999.00	20-97 Process PI Feed Forward Factor 0 - 400%, * 0.22-** Appl. functions 22-4* Sleep mode 22-40 Minimum Run Time 0 - 600s, * 10 22-41 Minimum Sleep Time 0 - 600s, * 10 22-43 Wake-Up Speed [Hz] 0.0 - 400.0, * 100.0 22-44 Wake-Up Ref./FB difference 0 - 100%, * 10 22-45 Setpoint Boost -100 - 100%, * 0 22-46 Maximum Boost Time 0 - 600s, * 60 22-47 Sleep Speed [Hz] 0.0 - 400.0, * 0.0 22-60 Broken Belt Detection *[0] Off [1] Warning [2] Trip 22-61 Broken Belt Torque 5 - 100%, * 10 22-62 Broken Belt Delay 0 - 600s, * 10 24-** Appl. functions 2 24-0* Fire mode 24-00 Fire Mode Function *[0] Disabled [1] Enabled Run Forward [2] Enabled Run Reverse [3] Enable-Coast [4] Enabled - Run Fwd/Rev 24-05 Fire Mode Preset Reference -100 - 100%, * 0 24-09 Fire Mode Alarm Handling *[1] Trip, Critical Alarms [2] Trip, All Alarms/Test 24-1* Drive Bypass 24-10 Drive Bypass Function *[0] Disabled [2] Enabled (Fire Mode only) 24-11 Bypass Delay Timer 0 - 600s, * 0 25-** Cascade Controller 25-0* System Settings 25-00 Cascade Controller *[0] Disabled [1] Enabled 25-04 Pump Cycling *[0] Disabled

参数概述			
[1] Enabled 25-05 Fixed Lead Pump [0] No *[1] Yes 25-06 Number of Pumps 如果参数 25-05 = No, 则为 0-2; 如果参数 25-05 = Yes, 则为 0-3 25-2* Bandwidth Settings 25-20 Staging Bandwidth 1 ~ P. 25-21%, *10% 25-21 Override Bandwidth P. 25-20 ~ 100%, *100% 25-22 Fixed Speed Bandwidth P. 25-20 ~ P. 25-21%, *10% 25-23 SBW Staging Delay 0 ~ 300s, *15s 25-24 SBW Destaging Delay 0 ~ 300s, *15s	25-25 OBW Time 0 ~ 300s, *10s 25-27 Stage Function [0] Disabled *[1] Enabled 25-28 Stage Function Time 0 ~ 300s, *15s 25-29 Destage Function [0] Disabled *[1] Enabled 25-30 Destage Function Time 0 ~ 300s, *15s 25-4* Staging Settings 25-42 Staging Threshold P. 4-12/P. 4-14 ~ 100%, *90% 25-43 Destaging Threshold P. 4-12/P. 4-14 ~ 100%, *50%	25-45 Staging Speed [Hz] P. 4-12 ~ P. 4-14 Hz, *0Hz 25-47 Destaging Speed [Hz] P. 4-12 ~ P. 4-14 Hz, *0Hz 25-5* Alternation Settings 25-50 Lead PUMP Alternation *[0] Off [1] At staging [2] At command [3] At staging or at command 25-51 Alternation Event *[0] None [1] Alternation timer [2] Sleep mode 25-52 Alternation Time Interval 1 ~ 999h, *24h 25-53 Alternation Time Value 无 25-55 Alternate if Load < 50% [0] Disabled	*[1] Enabled 25-56 Staging Mode at Alternation *[0] Slow [1] Quick 25-58 Run Next Pump Delay 0.1 ~ 5.0s, *0.1s 25-59 Run on Mains Delay P. 25-58 ~ 5.0s, *0.5s 25-8* Status 25-80 Cascade Status 无 25-81 Pump Status 无 25-84 Pump ON Time 0 ~ 2147483647h, *0h 25-9* Service 25-90 Pump Interlock *[0] Off [1] On



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