# 1 Parameter Table

## 1.1 Introduction

Groups P and A include standard function parameters. Group U includes the monitoring function parameters and extension card communication parameters.

The parameter description tables in this chapter use the following symbols. The symbols in the parameter table are described as follows:

| Symbol | Meaning |
|---|---|
| ☆ | It is possible to modify the parameter with the drive in the stop or in the Run status. |
| ★ | It is not possible to modify the parameter with the drive in the Run status. |
| ● | The parameter is the actual measured value and cannot be modified. |
| ✸ | The parameter is a factory parameter and can be set only by the manufacturer. |

## 1.2 Standard Parameters

| Para. No. | Para. Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group P0: Standard Parameters | | | | |
| P0-00 | G/P type display | 1 : G type<br>2: P type | 1 | ● |
| P0-01 | Motor 1 control mode | 0: SVC control<br>2: V/F control | 2 (If the torque is not enough, 0 is recommended) | ★ |
| P0-02 | Command source selection | 0: Operating panel (keypad & display) (LED off)<br>1: Terminal I/O control (LED on)<br>2: Serial Communication. (LED flashing) | 0 | ☆ |
| P0-03 | Main frequency reference setting channel selection | 0: digital setting (non-retentive at power down)<br>1: digital setting (retentive at power down)<br>2: VI (Voltage 0-10 V input)<br>3: CI (Default current 0-20 Milliampere input,If current 4-20 Milliampere input, p4.18 = 2.0)<br>4: KEY resistance range<br>5: Pulse reference (X3)<br>6: Multi-reference<br>7: Simple PLC<br>8: PID reference<br>9: Serial Communication | 0 | ★ |
| P0-04 | Auxiliary frequency reference setting channel selection | 0: digital setting (non-retentive at power down)<br>1: digital setting (retentive at power down)<br>2: VI<br>3: CI<br>4: KEY resistance range<br>5: Pulse reference<br>6: Multi-reference | 0 | ★ |

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|---|---|---|---|---|
| | | 7: Simple PLC<br>8: PID reference<br>9: Serial Communication. | | |
| P0-05 | Base value of range of auxiliary frequency reference for Main and auxiliary calculation | 0: Relative to maximum frequency<br>1: Relative to main frequency reference | 0 | ☆ |
| P0-06 | Range of auxiliary frequency reference for main and auxiliary calculation | 0% to 150% | 100% | ☆ |
| P0-07 | Final Frequency reference setting selection | 00 to 34 | 00 | ☆ |
| P0-08 | Preset frequency | 0.00 to max. frequency (P0-10) | 50.00 Hz | ☆ |
| P0-09 | Running direction | 0: Run in default direction<br>1: Run in direction reverse to default direction | 0 | ☆ |
| P0-10 | Max. frequency | 50.00 to 500.00 Hz | 50.00 Hz | ★ |
| P0-11 | Setting channel of frequency upper limit | 0: Set by P0-12<br>1: VI<br>2: CI<br>3: KEY resistance range<br>4: Pulse reference (X3)<br>5: Communication reference | 0 | ★ |
| P0-12 | Frequency reference upper limit | P0-14 to P0-10 | 50.00 Hz | ☆ |
| P0-13 | Frequency reference upper limit offset | 0.00 Hz to max. frequency (P0-10) | 0.00 Hz | ☆ |
| P0-14 | Frequency reference lower limit | 0.00 Hz to frequency upper limit (P0-12) | 0.00 Hz | ☆ |
| P0-15 | Carrier frequency | 2.0 to 8.0 kHz | Model dependent | ☆ |
| P0-16 | Carrier frequency adjusted with temperature | 0: disabled<br>1: Enabled | 1 | ☆ |
| P0-17 | Acceleration time 1 | 0.0s to 6500.0s (P0-19 = 1) | Model dependent | ☆ |
| P0-18 | Deceleration time 1 | 0.0s to 6500.0s (P0-19 = 1) | Model dependent | ☆ |

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|---|---|---|---|---|
| P0-23 | Retentive of digital setting frequency upon stop | 0: Not retentive<br>1: Retentive | 1 | ☆ |
| P0-26 | Base frequency for UP/DOWN modification during running | 0: Running frequency | 1 | ★ |
| | | 1: Frequency Reference | | |
| P0-27 | Command source + frequency source | Ui’ ii Bnigoeain panel command to frequency source) | 000 | ☆ |
| | | 0: No binding | | |
| | | 1 rqec oreb iia setting | | |
| | | 2: VI | | |
| | | 3: CI | | |
| | | 4: KEY resistance range | | |
| | | 5: Pulse setting (X3) | | |
| | | 6: Multi-reference | | |
| | | 7: Simple PLC | | |
| | | 8: PID | | |
| | | 9: Communication setting | | |
| | | Tnsdgt(idn emnl command to frequency source) | | |
| | | 0 - 9, same as unit’s digit | | |
| | | Hnrdsdgt(idn communication command to frequency source) | | |
| | | 0 - 9, same as unit’s digit | | |
| P0-28 | Serial port comms. protocol | 0: Modbus protocol | 0 | ★ |
| Group P1: Motor 1 Parameters | | | | |
| P1-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor | 0 | ★ |
| P1-01 | Rated motor power | 0.1 to 1000.0 kW | Model dependent | ★ |
| P1-02 | Rated motor voltage | 1 to 2000 V | Model dependent | ★ |
| P1-03 | Rated motor current | 0.01 to 655.35 A (AC drive power ≤ 55 kW)<br>0.1 to 6553.5 A (AC drive power > 55 kW) | Model dependent | ★ |
| P1-04 | Rated motor frequency | 0.01 Hz to max. frequency | Model dependent | ★ |
| P1-05 | Rated motor speed | 1 to 65535 rpm | Model dependent | ★ |
| P1-37 | Motor auto-tuning method selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning | 0 | ★ |
| Group P3: V/F Control Parameters | | | | |

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|---|---|---|---|---|
| P3-00 | V/F curve setting | 0: Linear V/F<br>1: Multi-point V/F<br>2: Square V/F<br>3: 1.2-power V/F<br>4: 1.4-power V/F<br>6: 1.6-power V/F<br>8: 1.8-power V/F<br>9: Reserved<br>10: V/F complete separation<br>11: V/F half separation | 0 | ★ |
| P3-01 | Torque boost | 0.0%: fixed boost<br>0.1% to 30% | Model dependent | ☆ |
| P3-02 | Cut-off frequency of torque boost | 0.00 Hz to max. frequency | 50.00 Hz | ★ |
| P3-03 | Multi-point V/F frequency 1 | 0.00 Hz to P3-05 | 0.00 Hz | ★ |
| P3-04 | Multi-point V/F voltage 1 | 0.0% to 100.0% | 0.0% | ★ |
| P3-05 | Multi-point V/F frequency 2 | F3-03 to F3-07 | 0.00 Hz | ★ |
| P3-06 | Multi-point V/F voltage 2 | 0.0% to 100.0% | 0.0% | ★ |
| P3-07 | Multi-point V/F frequency 3 | F3-05 to rated motor frequency (F1-04) | 0.00 Hz | ★ |
| P3-08 | Multi-point V/F voltage 3 | 0.0% to 100.0% | 0.0% | ★ |
| P3-10 | V/F over-excitation gain | 0 to 200 | 64 | ☆ |
| P3-11 | V/F oscillation suppression gain | 0 to 100 | 40 | ☆ |

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|---|---|---|---|---|
| P4-00 | FWD function selection | 0: No function<br>1: Forward run (FWD)<br>2: Reverser run (REV)<br>3: Three-wire control<br>4: Forward jog (FJOG)<br>5: Reverse jog (RJOG)<br>6: Terminal UP<br>7: Terminal DOWN<br>8: Coast to stop<br>9:Fault reset (RESET)<br>10:RUN disabled<br>11:External fault NO input<br>12:Multi-reference terminal 1<br>13:Multi-reference terminal 2<br>14:Multi-reference terminal 3<br>15:Multi-reference terminal 4<br>16:Terminal 1 for acceleration deceleration time selection<br>17:Terminal 2 for acceleration deceleration time selection<br>18:Frequency reference setting channel switchover<br>19:UP and DOWN setting clear (terminal, operation panel)<br>20:Command source switchover 1<br>21:Acceleration/Deceleration prohibited<br>22:PID disabled<br>23:PLC state reset<br>24:Wobble disabled<br>25:Counter input<br>26:Counter reset<br>27:Length signal pulses count<br>28:Length reset<br>29:Torque control prohibited<br>30:Pulse input as frequency reference (valid only for X3)<br>31:Reserved<br>32:Immediate DC injection braking<br>33:External fault NC input<br>34:Frequency modification enabled<br>35:PID operation direction reverse<br>36:External stop 1 | 1 | ★ |

| Para. No. | Para. Name | Setting Range | Default | Property |
|---|---|---|---|---|
| P4-01 | REV function selection | 44: User-defined fault 1<br>45: User-defined fault 2<br>46: Speed control/ Torque control<br>47: Emergency stop (ES)<br>48: External stop 2<br>49: Deceleration DC injection braking<br>50: Clear running time this time<br>51: Two-wire control/ Three-wire control<br>52: Reverse running prohibited<br>53 to 59: Reserved | 2 | ★ |
| P4-02 | X1 function selection | | 9 | ★ |
| P4-03 | X2 function selection | | 12 | ★ |
| P4-04 | X3 function selection | | 13 | ★ |
| P4-05 | X4 function selection | | 0 | ★ |
| P4-06 | X5 function selection | | 0 | ★ |
| P4-07 | X6 function selection | | 0 | ★ |
| P4-08 | | | 0 | ★ |
| P4-09 | | | 0 | ★ |
| P4-10 | X filter time | 0.000s to 1.000s | 0.010s | ☆ |
| P4-11 | Terminal control mode | 0: Two-wire control mode 1<br>1: Two-wire control mode 2<br>2: Three-wire control mode 1<br>3: Three-wire control mode 2 | 0 | ★ |
| P4-12 | Terminal UP/DOWN rate | 0.001 to 65.535 Hz/s | 1.000 Hz/s | ☆ |
| P4-13 | VI min. input | 0.00 V to P4-15 | 0.00 V | ☆ |
| P4-14 | Corresponding percentage of VI min. input | -100.00% to 100.0% | 0.0% | ☆ |
| P4-15 | VI max. input | P4-13 to 10.00 V | 10.00 V | ☆ |
| P4-16 | Corresponding percentage of VI max. input | -100.00% to 100.0% | 100.0% | ☆ |
| P4-17 | VI filter time | 0.00s to 10.00s | 0.10s | ☆ |
| P4-18 | CI min. input | 0.00 V to P4-20 | 0.00 V | ☆ |
| P4-19 | Corresponding percentage of CI min. input | -100.00% to 100.0% | 0.0% | ☆ |
| P4-20 | CI max. input | P4-18 to 10.00 V | 10.00 V | ☆ |
| P4-21 | Corresponding percentage of CI max. input | -100.00% to 100.0% | 100.0% | ☆ |
| P4-22 | CI filter time | 0.00s to 10.00s | 0.10s | ☆ |
| P4-35 | FWD delay | 0.0s to 3600.0s | 0.0s | ☆ |
| P4-36 | REV delay | 0.0s to 3600.0s | 0.0s | ★ |
| P4-37 | X1 delay | 0.0s to 3600.0s | 0.0s | ★ |
| Group P5: Output Terminals | | | | |

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|---|---|---|---|---|
| P5-01 | | 0: No output<br>1: AC drive running<br>2: Fault output<br>3: Frequency level detection 1 output<br>4: Frequency reached<br>5: Zero-speed running (no output at stop)<br>6: Motor overload pending<br>7: AC drive overload pending<br>8: Set count value reached<br>9: Designated count value reached<br>10: Length reached<br>11: PLC cycle completed<br>12: Accumulative running time reached<br>13: Frequency limited<br>14: Torque limited<br>15: Ready for RUN<br>16: VI > CI<br>17: Frequency upper limit reached<br>18: Frequency lower limit reached (no output at stop)<br>19: Undervoltage<br>20: Communication setting<br>21, 22: Reserved<br>23: Zero-speed running 2 (having output at stop)<br>24: Accumulative power-on time reached<br>25: Frequency level detection 2<br>26: Frequency 1 reached | 0 | ☆ |
| P5-02 | Relay1 (A-B-C) function selection | | 2 | ☆ |
| P5-03 | | | 0 | ☆ |
| P5-04 | Relay2 (A1-B1-C1) function selection | 27: Frequency 2 reached<br>28: Current 1 reached<br>29: Current 2 reached<br>30: Timing reached<br>31: VI input exceeding limit<br>32: Load lost<br>33: Reverse running<br>34: Zero current<br>35: IGBT temperature reached<br>36: Output current exceeding limit<br>37: Frequency lower limit reached (having output at stop)<br>38: Alarm output<br>39: Motor overheat pending<br>40: Current running time reached<br>41: Fault output | 1 | ☆ |
| P5-05 | | | 4 | ☆ |

| | | | | |
|---|---|---|---|---|
| P5-06 | | 0: Running frequency<br>1: Frequency reference<br>2: Output current<br>3: Output torque (absolute value)<br>4: Output power<br>5: Output voltage<br>6: Pulse input<br>7: VI<br>8: CI<br>9: KEY<br>10: Length<br>11: Counting value<br>12: Communication reference<br>13: Motor speed<br>14: Output current<br>15: Output voltage<br>16: Output torque of the motor (actual value, a percentage of the rated motor torque) | 0 | ☆ |
| P5-07 | AM function selection | | 0 | ☆ |
| P5-08 | FM function selection | | 1 | ☆ |
| P5-10 | AM zero offset coefficient | -100.0% to 100.0% | 0.0% | ☆ |
| P5-11 | AM gain | -10.00 to 10.00 | 1.00 | ☆ |
| P5-12 | FM zero offset coefficient | -100.0% to 100.0% | 0.00% | ☆ |
| P5-13 | FM gain | -10.00 to 10.00 | 1.00 | ☆ |
| P5-18 | Relay1(A-B-C)output | 0.0s to 3600.0s | 0.0s | ☆ |
| P5-19 | Relay2(A1-B1-C1) output | 0.0s to 3600.0s | 0.0s | ☆ |

| Para. No. | Para. Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group P6: Start/Stop Control | | | | |
| P6-10 | Stop mode | 0: Decelerate to stop<br>1: Coast to stop | 0 | ☆ |
| P6-15 | Braking use ratio | 0% to 100% | 100% | ☆ |
| Group P7: Keypad Operation and LED display | | | | |
| P7-00 | LED default display check | 0, 1 | 0 | ☆ |
| P7-01 | MF.K key function selection | 0 to 4 | 0 | ★ |
| P7-02 | STOP/RESET key function | 0: Available for just operation panel control<br>1: Available always | 1 | ☆ |
| P7-03 | LED display running parameters 1 | 0000 to FFFF | 1F | ☆ |
| P7-04 | LED display running parameters 2 | 0000 to FFFF | 0 | ☆ |
| P7-05 | LED display stop parameters | 0000 to FFFF | 33 | ☆ |
| P7-06 | Load speed display coefficient | 0.0001 to 6.5000 | 1.0000 | ☆ |
| P7-07 | Heatsink temperature of IGBT | -20° C to 120° C | - | ● |

| | | | | |
|---|---|---|---|---|
| P7-08 | Product series | - | - | ● |
| P7-09 | Accumulative running time | 0 to 65535 h | - | ● |
| P7-10 | Performance software version | - | - | ● |
| P7-11 | Function software version | - | - | ● |
| P7-12 | Number of decimal places for load speed display | 10 to 23 | 21 | ☆ |
| P7-13 | Accumulative power-on time | 0 to 65535 h | - | ● |
| P7-14 | Accumulative power consumption | 0 to 65535 kWh | - | ● |
| Group P8: Auxiliary Functions | | | | |
| P8-00 | Jog frequency reference | 0.00 Hz to max. frequency | 2.00 Hz | ☆ |
| P8-01 | Jog acceleration time | 0.0s to 6500.0s | 20.0s | ☆ |
| P8-02 | Jog deceleration time | 0.0s to 6500.0s | 20.0s | ☆ |
| P8-12 | Forward/Reverse run switchover dead-zone time | 0.0s to 3000.0s | 0.0s | ☆ |
| P8-13 | Reverse RUN selection | 0: disabled<br>1: Enabled | 0 | ☆ |
| P8-14 | Running mode when frequency reference lower than frequency lower limit | 0: Running at lower limit speed<br>1: Stop<br>2: Run at Zero speed | 0 | ☆ |
| P8-16 | Accumulative power-on time threshold | 0 to 65000 h | 0 h | ☆ |
| P8-17 | Accumulative running time threshold | 0 to 65000 h | 0 h | ☆ |
| P8-18 | Startup protection selection | 0: disabled<br>1: Enabled | 0 | ☆ |
| P8-27 | Set highest priority to terminal JOG function | 0: disabled<br>1: Enabled | 0 | ☆ |
| P8-47 | IGBT temperature threshold | 0° C to 100° C | 75° C | ☆ |
| P8-48 | Cooling fan working mode | 0: Working during drive running<br>1: Working continuously | 0 | ☆ |
| P8-49 | Wakeup frequency | P8-51 to max. frequency (P0-10) | 0.00 Hz | ☆ |
| P8-50 | Wakeup delay time | 0.0s to 6500.0s | 0.0s | ☆ |
| P8-51 | Hibernating frequency | 0.00 Hz to wakeup frequency (P8-49) | 0.00 Hz | ☆ |

| | | | | |
|---|---|---|---|---|
| P8-52 | Hibernating delay time | 0.0s to 6500.0s | 0.0s | ☆ |
| P8-53 | Running time threshold this time | 0.0 to 6500.0 min | 0.0 min | ☆ |
| Group P9: Fault and Protection | | | | |
| P9-00 | Motor overload protection | 0: disabled<br>1: Enabled | 1 | ☆ |
| P9-01 | Motor overload protection gain | 0.20 to 10.00 | 1.00 | ☆ |
| P9-02 | Motor overload pre-warning coefficient | 50% to 100% | 80% | ☆ |
| P9-03 | Overvoltage protection gain | 0 (no overvoltage stall) to 100 | 0 | ☆ |
| P9-04 | Overvoltage protection voltage | 120% to 150% | 130% | ☆ |
| P9-05 | Current limit gain | 0 to 100 | 20 | ☆ |
| P9-06 | Current limit level | 50% to 200% | 150% | ★ |
| P9-07 | Selection of detecting short-circuit to ground | 00 to 11 | 01 | ☆ |
| P9-09 | Auto reset times | 0 to 20 | | ☆ |
| P9-10 | Selection of DO action during auto reset | 0: Not act<br>1: Act | | ☆ |
| P9-11 | Delay of auto reset | 0.1s to 100.0s | 1.0s | ☆ |
| P9-12 | Input phase loss/pre-charge relay protectio | 00 to 11 | | ☆ |
| P9-13 | Output phase loss protection | 00 to 11 | 01 | ☆ |
| P9-14 | 1st fault type | 0 to 55 | | ● |
| P9-15 | 2nd fault type | 0 to 55 | | ● |
| P9-16 | 3rd (latest) fault type | 0 to 55 | | ● |
| P9-17 | Frequency upon 3rd fault | - | | ● |
| P9-18 | Current upon 3rd fault | - | | ● |
| P9-19 | Bus voltage upon 3rd fault | - | | ● |
| P9-20 | X state upon 3rd fault | - | | ● |
| P9-21 | DO state upon 3rd fault | - | | ● |
| P9-22 | AC drive state upon 3rd fault | - | — | ● |
| P9-23 | Power-on time upon 3rd fault | - | — | ● |
| P9-24 | Running time upon 3rd fault | - | — | ● |

## 1.2 Parameter Table

| Para. No. | Para. Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group FA: PID Function | | | | |
| PA-00 | PID reference setting channel | 0 to 6 | 0 | ☆ |
| PA-01 | PID digital setting | 0.0% to 100.0% | 50.0% | ☆ |

| | | | | |
|---|---|---|---|---|
| PA-02 | PID feedback setting channel | 0 to 8 | 0 | ☆ |
| PA-03 | PID operation direction | 0, 1 | 0 | ☆ |
| PA-04 | PID reference and feedback range | 0 to 65535 | 1000 | ☆ |
| PA-05 | Proportional gain Kp1 | 0.0 to 1000.0 | 20.0 | ☆ |
| PA-06 | Integral time Ti1 | 0.01s to 10.00s | 0.00s | ☆ |
| PA-07 | differential time Td1 | 0.000s to 10.000s | 0.000s | ☆ |
| PA-08 | PID output limit in reverse direction | 0.00 Hz to max. frequency | 0.00 Hz | ★ |
| PA-09 | PID error limit | 0.0% to 100.0% | 0.0% | ☆ |
| PA-10 | PID differential limit | 0.00% to 100.00% | 0.10% | ☆ |
| PA-11 | PID reference change time | 0.00s to 650.00s | 0.00s | ☆ |

| Group Pc: Multi-Reference and Simple PLC Function | | | | |
|---|---|---|---|---|
| PC-00 | Reference 0 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-01 | Reference 1 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-02 | Reference 2 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-03 | Reference 3 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-04 | Reference 4 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-05 | Reference 5 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-06 | Reference 6 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-07 | Reference 7 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-08 | Reference 8 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-09 | Reference 9 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-10 | Reference 10 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-11 | Reference 11 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-12 | Reference 12 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-13 | Reference 13 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-14 | Reference 14 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-15 | Reference 15 | -100.0% to 100.0% | 0.0% | ☆ |
| PC-16 | Simple PLC running mode | 0: Stop after running one cycle<br>1: Keep final values after running one cycle<br>2: Repeat after running one cycle | 0 | ☆ |
| PC-17 | Simple PLC retentive selection | 00 to 11 | 00 | ☆ |
| PC-18 | Running time of simple PLC reference 0 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-19 | Acceleration/deceleration time of simple PLC reference 0 | 0 to 3 | 0 | ☆ |
| PC-20 | Running time of simple PLC reference 1 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-21 | Acceleration/deceleration time of simple PLC reference 1 | 0 to 3 | 0 | ☆ |
| PC-22 | Running time of simple PLC reference 2 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |

| | | | | |
|---|---|---|---|---|
| PC-23 | Acceleration/deceleration time of simple PLC reference 2 | 0 to 3 | 0 | ☆ |
| PC-24 | Running time of simple PLC reference 3 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-25 | Acceleration/deceleration time of simple PLC reference 3 | 0 to 3 | 0 | ☆ |
| PC-26 | Running time of simple PLC reference 4 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-27 | Acceleration/deceleration time of simple PLC reference 4 | 0 to 3 | 0 | ☆ |
| PC-28 | Running time of simple PLC reference 5 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-29 | Acceleration/deceleration time of simple PLC reference 5 | 0 to 3 | 0 | ☆ |
| PC-30 | Running time of simple PLC reference 6 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-31 | Acceleration/deceleration time of simple PLC reference 6 | 0 to 3 | 0 | ☆ |
| PC-32 | Running time of simple PLC reference 7 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-33 | Acceleration/deceleration time of simple PLC reference 7 | 0 to 3 | 0 | ☆ |
| PC-34 | Running time of simple PLC reference 8 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-35 | Acceleration/deceleration time of simple PLC reference 8 | 0 to 3 | 0 | ☆ |
| PC-36 | Running time of simple PLC reference 9 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-37 | Acceleration/deceleration time of simple PLC reference 9 | 0 to 3 | 0 | ☆ |
| PC-38 | Running time of simple PLC reference 10 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-39 | Acceleration/deceleration time of simple PLC reference 10 | 0 to 3 | 0 | ☆ |
| PC-40 | Running time of simple PLC reference 11 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-41 | Acceleration/deceleration time of simple PLC reference 11 | 0 to 3 | 0 | ☆ |
| PC-42 | Running time of simple PLC reference 12 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-43 | Acceleration/deceleration time of simple PLC reference 12 | 0 to 3 | 0 | ☆ |

| | | | | |
|---|---|---|---|---|
| PC-44 | Running time of simple PLC reference 13 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-45 | Acceleration/deceleration time of simple PLC reference 13 | 0 to 3 | 0 | ☆ |
| PC-46 | Running time of simple PLC reference 14 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-47 | Acceleration/deceleration time of simple PLC reference 14 | 0 to 3 | 0 | ☆ |
| PC-48 | Running time of simple PLC reference 15 | 0.0s (h) to 6553.5s (h) | 0.0s (h) | ☆ |
| PC-49 | Acceleration/deceleration time of simple PLC reference 15 | 0 to 3 | 0 | ☆ |
| PC-50 | Time unit of simple PLC running | 0: s<br>1: h | 0 | ☆ |
| PC-51 | Reference 0 source | 0: Set by PC-00<br>1: VI<br>2: CI<br>3: KEY resistance range<br>4: Pulse reference(X3)<br>5: PID reference<br>6: Set through UP/DOWN key/function based on preset frequency (P0-08) | 0 | ☆ |

| Para. No. | Para. Name | Setting Range | Default | Property |
|---|---|---|---|---|
| Group Pd: Communication | | | | |
| Pd-00 | Baud rate | 0000 to 6039 | 5005 | ☆ |
| Pd-01 | Data format symbol | 0 to 3 | 0 | ☆ |
| Pd-02 | Local address | 0: Broadcast address;<br>1 to 247 | 1 | ☆ |
| Pd-03 | Response delay | 0 to 20 ms | 2 | ☆ |
| Pd-04 | Communication timeout | 0.0: invalid<br>0.1s to 60.0s | 0.0s | ☆ |
| Pd-05 | Modbus protocol selection and PROFIBUS-DP data frame | 00 to 31 | 31 | ☆ |
| Pd-06 | Current resolution read by communication | 0: 0.01A<br>1: 0.1A | 0 | ☆ |
| Para. No. | Para. Name | Setting Range | Default | Property |
| PP-00 | User password | 0 to 65535 | 0 | ☆ |
| PP-01 | Parameter initialization | 00: No operation<br>01: Restore factory parameters except motor parameters<br>02: Clear records | 0 | ★ |

| Group A5: Control Optimization | | | | |
|---|---|---|---|---|
| A5-00 | DPWM switchover frequency upper limit | 0.00 Hz to 15.00Hz | 12.00 Hz | ☆ |
| A5-01 | PWM modulation pattern | 0, 1 | 0 | ☆ |
| A5-02 | Dead zone compensation mode selection | 0, 1 | 1 | ☆ |
| A5-03 | Random PWM depth | 0 to 10 | 0 | ☆ |
| A5-04 | Overcurrent fast prevention | 0, 1 | 1 | ☆ |
| A5-06 | Undervoltage threshold | 60% to 140% | 100.0% | ☆ |
| A5-08 | Dead-zone time adjustment | 100% to 200% | 150% | ★ |

# 2 Description of Function Codes

Group P0: Basic Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-00 | G/P type Display | 1: G type (constant torque load) | Model |
| | | 2: P type (variable torque load e.g. fan and pump) | dependent |

This parameter is used to Display the delivered model and cannot be modified

* 1: Applicable to constant torque load with rated parameters specified

* 2: Applicable to variable torque load (fan and pump) with rated parameters specified

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-01 | Motor 1 control mode | 0: Sensorless flux vector control (SFVC) | 0 |
| | | 1: Closed-loop vector control (CLVC) | |
| | | 2: Voltage/Frequency (V/F) control | |

* 0: Sensorless flux vector control (SFVC)

It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. One AC drive can operate only one motor.

* 1: Closed-loop vector control (CLVC)

It is applicable to high-accuracy speed control or torque control applications such as high-speed paper making machine, crane and elevator. One AC drive can operate onl one motor. An encoder must be installed at the motor side, and a PG card matching the encoder must be installed at the AC drive side.

* 2: Voltage/Frequency (V/F) control

It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting speed regulator parameters in group P2 .

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| P0-02 | Command source selection | 0: Operation panel control (LED off) | 0 |
| | | 1: Terminal control (LED on) | |
| | | 2: Communication control (LED blinking) | |

It is used to determine the input channel of the AC drive control commands, such as run, stop, forward rotation, reverse rotation and jog operation. You can input the commands in the following three channels:

* 0: Operation panel control ("LOCAL/REMOT" indicator off)

Commands are given by pressing keys ' RUN' and 'STOP' on the operation panel.

* 1: Terminal control ("LOCAL/REMOT" indicator on)

Commands are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF, and JOGR.

* 2: Communication control ("LOCAL/REMOT" indicator blinking)

Commands are given from host computer. If this parameter is set to 2, a communication card (Modbus RTU card ) must be installed.

**Note:**

If any other card is selected, commands are written by means of the communication address 0x2000.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-03 | Main frequency source di selection | 0: digital setting (non-retentive at power failure) | 0 |
| | | 1: digital setting (retentive at power failure) | |
| | | 2: VI | |
| | | 3: CI | |
| | | 4: KEY | |
| | | 5: Pulse setting (X3) | |
| | | 6: Multi-reference | |
| | | 7: Simple PLC | |
| | | 8: PID | |
| | | 9: Communication setting | |

It is used to select the setting channel of the main frequency. You can set the main frequency in the following 10 channels:

* 0: digital setting (non-retentive at power failure)

The initial value of the set frequency is the value of F0-08 (Preset frequency). You can change the set frequency by pressing △ and ▽ on the operation panel (or using the UP/DOWN function of input terminals).

When the AC drive is powered on again after power failure, the set frequency reverts to the value of F0-08.

* 1: digital setting (retentive at power failure)

The initial value of the set frequency is the value of F0-08 (Preset frequency)

You can change the set frequency by pressing keys and on the operation panel (or using the UP/DOWN function of input terminals).

When the AC drive is powered on again after power failure, the set frequency is the value memorized at the moment of the last power failure.

Note that P0-23 (Retentive of digital setting frequency upon power failure) determines whether the set frequency is memorized or cleared when the AC drive stops. It is related to stop rather than power failure.

* 2: VI (0 - 10 V voltage input)
* 3: CI (0 - 10 V voltage input or 4 - 20 mA current input, determined by jumper J8)
* 4:KEY

The frequency is set by analog input. The KC500 control board provides two analog input (AI) terminals (VI, CI). Another AI terminal (KEY) is provided by the I/O extension card.

The KC500 provides five curves indicating the mapping relationship between the input voltage of VI, CI and KEY and the target frequency, three of which are linear (point-point) correspondence and two of which are four-point correspondence curves. You can set the curves by using function codes F4-13 to P4-27 and function codes in group A6, and select curves for VI, CI and KEY resistance range in P4-33.

When AI is used as the frequency setting source, the corresponding value 100% of the voltage/current input corresponds to the value of P0-10 (Maximum frequency).

* 5: Pulse setting (X3)

The frequency is set by X3 (high-speed pulse). The signal specification of pulse setting is 9 - 30 V (voltage range) and 0 - 100 kHz (frequency range). The corresponding value 100% of pulse setting corresponds to the value of P0-10 (Maximum frequency).

* 6: Multi-reference

In multi-reference mode, combinations of different X terminal states correspond to Different set frequencies. The KC500 supports a maximum of 16 speeds implemented by 16 state combinations of four X terminals (allocated with functions 12 to 15) in Group PC. The multiple references indicate percentages of the value of P0-10 (Maximum frequency). If a X terminal is used for the multi-reference function, you need to perform related setting in group P4.

* 7: Simple PLC

When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched over among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group PC.

* 8: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop

control and constant tension closed-loop control.When applying PID as the frequency source, you need to set parameters of PID function in group PA.

* 9: Communication setting

The frequency is set by means of communication. If the AC drive is a slave in point-point communication and receives data as the frequency source, data transmitted by the master is used as the set frequency. For details, see the description of group A8.

In other conditions, data is given by the host computer through the communication address 0x1000. The data format is -100.00% to 100.00%. 100.00% corresponds to the value of P0-10 (Maximum frequency).

The KC500 supports four host computer communication protocols: Modbus

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-04 | Auxiliary frequency source Y selection | 0: digital setting (non-retentive at power failure) | 0 |
| | | 1: digital setting (retentive at power failure) | |
| | | 2: VI | |
| | | 3: CI | |
| | | 4: KEY | |
| | | 5: Pulse setting (X3) | |
| | | 6: Multi-reference | |
| | | 7: Simple PLC | |
| | | 8: PID | |
| | | 9: Communication setting | |

When used as an independent frequency input channel (frequency source switched over from X to Y), the auxiliary frequency source Y is used in the same way as the main frequency source X (refer to P0-03).

When the auxiliary frequency source is used for operation (frequency source is "di and Y operation"), pay attention to the following aspects:

1) If the auxiliary frequency source Y is digital setting, the preset frequency (P0-08) does not take effect. You can directly adjust the set main frequency by pressing keys  and  on the operation panel (or using the UP/DOWN function of input terminals).

2) If the auxiliary frequency source is analog input (VI, CI and KEY) or pulse setting,100% of the input corresponds to the range of the auxiliary frequency Y (set in P0-05 and P0-06).

3) If the auxiliary frequency source is pulse setting, it is similar to analog input.

Note:

The main frequency source X and auxiliary frequency source Y must not use the same channel.That is, P0-03 and P0-04 cannot be set to the same value.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-05 | Range of auxiliary frequency Y for X and Y operation | 0: Relative to maximum frequency | 0 |
| | | 1: Relative to main frequency X | |
| P0-06 | Range of auxiliary frequency Y for X and Y operation | 0%－150% | 0 |

If X and Y operation is used, P0-05 and P0-06 are used to set the adjustment range of the auxiliary frequency source.

You can set the auxiliary frequency to be relative to either maximum frequency or main frequency X. If relative to main frequency X, the setting range of the auxiliary frequency Y varies according to the main frequency X.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-07 | Frequency source selection | Unit's digit (Frequency source selection) | 0 |
| | | 0: Main frequency source X | |
| | | 1: X and Y operation ((operation relationship determined by ten's digit) | |
| | | 2: Switchover between X and Y | |
| | | 3: Switchover between X and "X and Y operation" | |
| | | 4: Switchover between Y and "X and Y operation" | |
| | | Ten's digit (X and Y operation relationship) | |
| | | 0: X+Y | |
| | | 1: X-Y | |
| | | 2: Maximum | |
| | | 3: Minimum | |

It is used to select the frequency setting channel. If the frequency source involves X and Y operation, you can set the frequency offset in P0-21 for superposition to the X and Y operation result, flexibly satisfying various requirements.

Figure 6-1 Frequency setting based on main frequency source X and auxiliary frequency source Y.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-08 | Preset frequency | 0.00 to maximum frequency (valid when frequency source is digital setting) | 50HZ |

If the frequency source is digital setting or terminal UP/DOWN, the value of this parameter is the initial frequency of the AC drive (digital setting).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-09 | Rotation direction | 0: Same direction | 0 |

| | | | |
|---|---|---|---|
| | | 1: Reverse direction | |

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Note:

The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-10 | Maximum frequency | 50.00 - 320.00 Hz | 50HZ |

When the frequency source is AI, pulse setting (X3), or multi-reference, 100% of the input corresponds to the value of this parameter.

The output frequency of the KC500 can reach up to 3200 Hz. To take both frequency reference resolution and frequency input range into consideration, you can set the number of decimal places for frequency reference in P0-22.

If P0-22 is set to 1, the frequency reference resolution is 0.1 Hz. In this case, the setting range of P0-10 is 50.0 to 3200.0 Hz.

If P0-22 is set to 2, the frequency reference resolution is 0.01 Hz. In this case, the setting range of P0-10 is 50.00 to 320.00 Hz.

Note:

After the value of P0-22 is modified, the frequency resolution of all frequency related function codes change accordingly.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-11 | Source of frequency upper limit | 0: Set by F0-12 | 0 |
| | | 1: VI | |
| | | 2: CI | |
| | | 3: KEY | |
| | | 4: Pulse setting (X3) | |
| | | 5: Communication setting | |

It is used to set the source of the frequency upper limit, including digital setting (P0-12), AI, pulse setting or communication setting. If the frequency upper limit is set by means of VI, CI, KEY, X3 or communication, the setting is similar to that of the main frequency source X.For details, see the description of P0-03.

For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-12 | Frequency upper limit | Frequency lower limit (F0-14) to maximum frequency (P0-10) | 50.00HZ |

This parameter is used to set the frequency upper limit.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-13 | Frequency upper limit | 0.00 Hz to maximum frequency (P0-10) | 0.00HZ |

| | | | |
|---|---|---|---|
| | offset | | |

If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter to the frequency upper limit set in P0-11.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-14 | Frequency lower limit | 0.00 Hz to frequency upper limit (P0-12) | 0.00HZ |

If the frequency reference is lower than the value of this parameter, the AC drive can stop, run at the frequency lower limit, or run at zero speed, determined by P8-14.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-15 | Carrier frequency | 0.5 - 16.0 kHz | Model dependent |

It is used to adjust the carrier frequency of the AC drive, helping to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the AC drive.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines.However, the AC drive has an increase in power loss, temperature rise and interference.

Adjusting the carrier frequency will exert influences on the aspects listed in the following table.

Table 6-1 Influences of carrier frequency adjustment

| Carrier frequency | Low | High |
|---|---|---|
| Motor noise | Large | Small |
| Output current waveform | Bad | Good |
| Motor temperature rise | High | Low |
| AC drive temperature rise | Low | High |
| Leakage current | Small | Large |
| External radiation interference | Small | Large |

The factory setting of carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than factory setting, it will lead to an increase in temperature rise of the AC drive's heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may overheat and alarm.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-16 | Carrier frequency adjustment with temperature | 0: No | 1 |
| | | 1: Yes | |

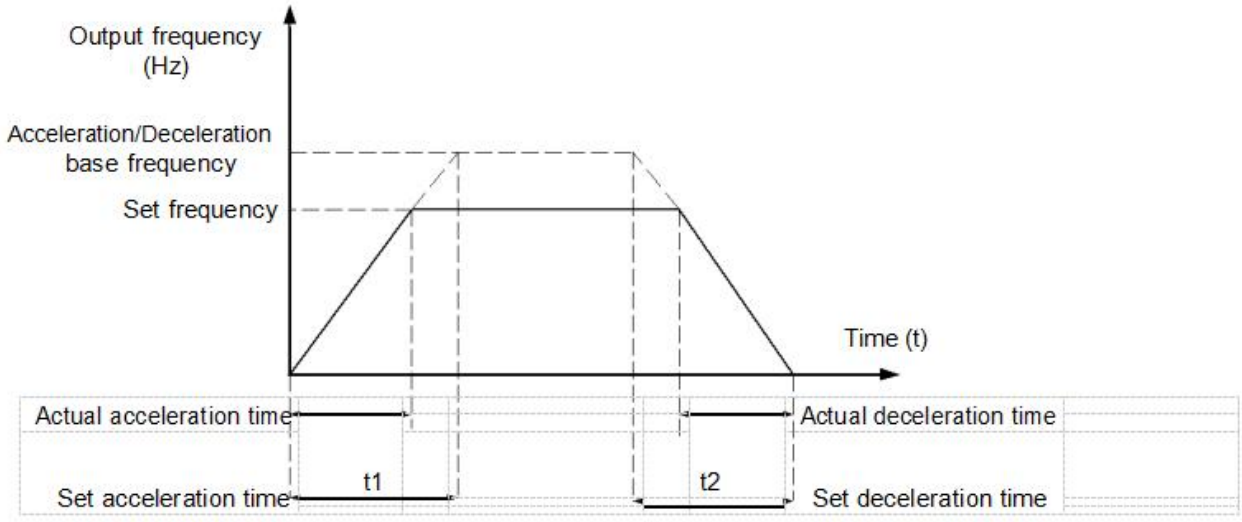
It is used to set whether the carrier frequency is adjusted based on the temperature. The AC drive automatically reduces the carrier frequency when detecting that the heatsink temperature is high. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the overheat alarms.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-17 | Acceleration time 1 | 0.00 - 650.00s (P0-19 = 2) | Model |
| | | 0.0 - 6500.0s (P0-19 = 1) | dependent |
| | | 0 - 65000s (P0-19 = 0) | |
| P0-18 | Deceleration time 1 | 0.00 - 650.00s (P0-19 = 2) | Model |
| | | 0.0 - 6500.0s (P0-19 = 1) | dependent |
| | | 0 - 65000s (P0-19 = 0) | |

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to"Acceleration/Deceleration base frequency" (P0-25), that is, t1 in Figure 6-2.

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (P0-25) to 0 Hz, that is, t2 in Figure 6-2.

Figure 6-2 Acceleration/Deceleration time




The KC500 provides totally four groups of acceleration/deceleration time for selection. You can perform switchover by using a X terminal.

Group 1: P0-17, P0-18

Group 2: P8-03, P8-04

Group 3: P8-05, P8-06

Group 4: P8-07, P8-08

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P0-28 | Serial communication protocol | 0: Modbus protocol | 0 |

The KC500 supports Modbus

## Group P1: Motor 1 Parameters

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| P1-00 | Motor type selection | 0: Common asynchronous motor<br>1: Variable frequency asynchronous motor | 0 |
| P1-01 | Rated motor power | 0.1 - 1000.0 kW | Model dependent |
| P1-02 | Rated motor voltage | 1 - 2000 V | Model dependent |
| P1-03 | Rated motor current | 0.01 - 655.35 A( AC drive power <=55kW)<br>0.1 - 6553.5 A(AC drive power >55kW) | Model dependent |
| P1-04 | Rated motor frequency | 0.01 Hz to maximum frequency | Model dependent |
| P1-05 | Rated motor rotational speed | 1 - 65535 RPM | Model dependent |

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted.

To achieve better V/F or vector control performance, motor auto -tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P1-37 | Auto-tuning selection | 0: No auto-tuning<br>1: Asynchronous motor static auto-tuning<br>2: Asynchronous motor complete auto-tuning | 0 |

* 0: No auto-tuning

Auto-tuning is prohibited.

* 1: Asynchronous motor static auto-tuning

It is applicable to scenarios where complete auto-tuning cannot be performed because the asynchronous motor cannot be disconnected from the load.

Before performing static auto-tuning, properly set the motor type and motor nameplate parameters of P1-00 to P1-05 first. The AC drive will obtain parameters of P1-06 to P1-08 by static auto-tuning.

Set this parameter to 1, and press RUN. Then, the AC drive starts static auto-tuning.

* 2: Asynchronous motor complete auto-tuning

To perform this type of auto-tuning, ensure that the motor is disconnected from the load.

During the process of complete auto-tuning, the AC drive performs static auto-tuning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in P0-17. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in P0-18.

Before performing complete auto-tuning, properly set the motor type, motor nameplate parameters of P1-00 to P1-05.

## Group P3: V/F Control Parameters

Group P3 is valid only for V/F control.

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive operates multiple motors or there is a large difference between the AC drive power and the motor power.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-00 | V/F curve setting | 0: Linear V/F | 0 |
| | | 1: Multi-point V/F | |
| | | 2: Square V/F | |
| | | 3: 1.2-power V/F | |
| | | 4: 1.4-power V/F | |
| | | 6: 1.6-power V/F | |
| | | 8: 1.8-power V/F | |
| | | 9: Reserved | |
| | | 10: V/F complete separation | |
| | | 11: V/F half separation | |

* 0: Linear V/F

It is applicable to common constant torque load.

* 1: Multi-point V/F

It is applicable to special load such as dehydrator and centrifuge. Any such V/F curve can be obtained by setting parameters of P3-03 to P3-08.

* 2: Square V/F

It is applicable to centrifugal loads such as fan and pump.

* 3 to 8: V/F curve between linear V/F and square V/F

* 10: V/F complete separation

In this mode, the output frequency and output voltage of the AC drive are independent.

The output frequency is determined by the frequency source, and the output voltage is determined by "Voltage source for V/F separation" (P3-13).

It is applicable to induction heating, inverse power supply and torque motor control.

* 11: V/F half separation

In this mode, V and F are proportional and the proportional relationship can be set in P3-13. The relationship between V and F are also related to the rated motor voltage and rated motor frequency in Group P1.

Assume that the voltage source input is X (0 to 100%), the relationship between V and F is:

V/F = 2 x di x (Rated motor voltage)/(Rated motor frequency)

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-01 | Torque boost | 0.0% - 30% | Model dependent |
| P3-02 | Cut-off frequency of torque boost | 0.00 Hz to maximum output frequency | 50.00 Hz |

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying P3-01.

If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer overcurrent.

If the load is large and the motor startup torque is insufficient, increase the value of P3-01.

If the load is small, decrease the value of P3-01. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

P3-02 specifies the frequency under which torque boost is valid. Torque boost becomes invalid when this frequency is exceeded, as shown in the following figure.

Figure 6-4 Manual torque boost

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-09 | V/F slip compensation gain | 0%－200.0% | 0.0% |

This parameter is valid only for the asynchronous motor.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group P1.

Generally, if the motor rotational speed is different from the target speed, slightly adjust this parameter.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-10 | V/F over-excitation gain | 0－200 | 64 |

During deceleration of the AC drive, over- excitation can restrain rise of the bus voltage, preventing the overvoltage fault. The larger the over-excitation is, the better the restraining result is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current. Set P3-09 to a proper value in actual applications.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P3-11 | V/F oscillation suppression gai | 0－100 | Model dependent |

Set this parameter to a value as small as possible in the prerequisite of efficient oscillation suppression to avoid influence on V/F control.

Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The larger the value is, the better the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no-load current must be correct. Otherwise, the V/F oscillation suppression effect will not be satisfactory.

## Group P4: Input Terminals

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-00 | FWD function selection | 1: Forward RUN (FWD) | Standard |
| P4-01 | REV function selection | 2: Reverser run (REV) | Standard |
| P4-02 | X1 function selection | 9: Fault reset (RESET) | Standard |
| P4-03 | X2 function selection | 12: Multi-reference terminal 1 | Standard |
| P4-04 | X3 function selection | 13: Multi-reference terminal 2 | Standard |
| P4-05 | X4 function selection | 0 | Extended |
| P4-06 | X5 function selection | 0 | Extended |
| P4-07 | X6 function selection | 0 | Extended |

The following table lists the functions available for the X terminals.

Table 6-1 Functions of X terminals

| Value | Function | Description |
|---|---|---|
| 0 | No function | Set 0 for reserved terminals to avoid malfunction. |
| 1 | Forward RUN (FWD) | The terminal is used to control forward or reverse RUN of the AC drive. |
| 2 | Reverse RUN (REV) | |
| 3 | Three-line control | The terminal determines three-line control of the AC drive. For details, see the description of P4-11. |
| 4 | Forward JOG (FJOG) | FJOG indicates forward JOG running, while RJOG indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in P8-00, P8-01 and P8-02. |
| 5 | Reverse JOG (RJOG) | |

| Value | Function | Description |
|---|---|---|
| 6 | Terminal UP | If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification. When the frequency source is digital setting, they are used to adjust the frequency. |
| 7 | Terminal DOWN | |
| 8 | Coast to stop | The AC drive blocks its output, the motor coasts to rest and is not controlled by the AC drive. It is the same as coast to stop described in P6-10. |
| 9 | Fault reset (RESET) | The terminal is used for fault reset function, the same as the |

| | | |
|---|---|---|
| | | function of RESET key on the operation panel.Remote fault reset is implemented by this function. |
| 10 | RUN pause | The AC drive decelerates to stop, but the running parameters are all memorized, such as PLC, swing frequency and PID parameters. After this function is disabled, the AC drive resumes its status before stop. |
| 11 | Normally open (NO) input of external fault | If this terminal becomes ON, the AC drive reports Err15 and performs the fault protection action. For more details, see the description of P9-47. |
| 12 | Multi-reference terminal 1 | The setting of 16 speeds or 16 other references can be implemented through combinations of 16 states of these four terminals. |
| 13 | Multi-reference terminal 2 | |
| 14 | Multi-reference terminal 3 | |
| 15 | Multi-reference terminal 4 | |
| 16 | Terminal 1 for acceleration/ deceleration time selection | Totally four groups of acceleration/deceleration time can be selected through combinations of two states of these two terminals. |
| 17 | Terminal 2 for acceleration/ deceleration time selection | |
| 18 | Frequency source switchover | The terminal is used to perform switchover between two frequency sources according to the setting in P0-07. |
| 19 | UP and DOWN setting clear (terminal, operation panel) | If the frequency source is digital setting, the terminal is used to clear the modification by using the UP/DOWN function or the increment/decrement key on the operation panel, returning the set frequency to the value of P0-08. |
| 20 | Command source switchover terminal | If the command source is set to terminal control (P0-02= 1), this terminal is used to perform switchover between terminal control and operation panel control.If the command source is set to communication control (P0-02 = 2), this terminal is used to perform switchover between communication control and operation panel control. |
| 21 | Acceleration/Deceleration prohibited | It enables the AC drive to maintain the current frequency output without being affected by external signals (except the STOP command). |

| Value | Function | Description |
|---|---|---|
| 22 | PID pause | PID is invalid temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source. |
| 23 | PLC status reset | The terminal is used to restore the original status of PLC control for the AC drive when PLC control is started again after a pause. |
| 24 | Swing pause | The AC drive outputs the central frequency, and the swing frequency function pauses. |
| 25 | Counter input | This terminal is used to count pulses. |

| | | |
|---|---|---|
| 26 | Counter reset | This terminal is used to clear the counter status. |
| 27 | Length count input | This terminal is used to count the length. |
| 28 | Length reset | This terminal is used to clear the length. |
| 29 | Torque control prohibited | The AC drive is prohibited from torque control and enters the speed control mode. |
| 30 | Pulse input (enabled only for X3) | X3 is used for pulse input. |
| 31 | Reserved | Reserved. |
| 32 | Immediate DC braking | After this terminal becomes ON, the AC drive directly switches over to the DC braking state. |
| 33 | Normally closed (NC) input of external fault | After this terminal becomes ON, the AC drive reports Err15 and stops. |
| 34 | Frequency modification forbidden | After this terminal becomes ON, the AC drive does not respond to any frequency modification. |
| 35 | Reverse PID action direction | After this terminal becomes ON, the PID action direction is reversed to the direction set in PA-03. |
| 36 | External STOP terminal 1 | In operation panel mode, this terminal can be used to stop the AC drive, equivalent to the function of the STOP key on the operation panel. |
| 37 | Command source switchover terminal 2 | It is used to perform switchover between terminal control and communication control. If the command source is terminal control, the system will switch over to communication control after this terminal becomes ON. |
| 38 | PID integral pause | After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still valid. |
| 39 | Switchover between main frequency source X and preset frequency | After this terminal becomes ON, the frequency source X is replaced by the preset frequency set in P0-08. |
| 40 | Switchover between auxiliary frequency source Y and preset frequency | After this terminal is enabled, the frequency source Y is replaced by the preset frequency set in P0-08. |

| Value | Function | Description |
|---|---|---|
| 41 | Motor selection terminal 1 | Switchover among the four groups of motor parameters can be implemented through the four state combinations of these two terminals. |
| 42 | Motor selection terminal 2 | |
| 43 | PID parameter switchover | If the PID parameters switchover performed by means of di terminal (PA-18 = 1), the PID parameters are PA-05 to PA-07 when the terminal becomes OFF; the PID parameters are PA-15 to PA-17 when this terminal becomes ON. |
| 44 | User-defined fault 1 | If these two terminals become ON, the AC drive reports Err27 and |

| | | |
|---|---|---|
| 45 | User-defined fault 2 | Err28 respectively, and performs fault protection actions based on the setting in P9-49. |
| 46 | Speed control/Torque control switchover | This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in A0-00. When this terminal becomes ON, the AC drive switches over to the other control mode. |
| 47 | Emergency stop | When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state. |
| 48 | External STOP terminal 2 | In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4. |
| 49 | Deceleration DC braking | When this terminal becomes ON, the AC drive decelerates to the initial frequency of stop DC braking and then switches over to DC braking state. |
| 50 | Clear the current running time | When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by P8-42 and P8-53. |
| 51 | Switchover between two-line mode and three-line mode | It is used to perform switchover between two-line control and three-line control. If P4 -11 is set to Two-line mode 1, the system switches over to three-line mode 1 when the X allocated with this function becomes ON |

The four multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table.

Table 6-2 State combinations of the four multi-reference terminals

| K4 | K3 | K2 | K1 | Reference Setting | Corresponding Parameter |
|---|---|---|---|---|---|
| OFF | OFF | OFF | OFF | Reference 0 | PC-00 |
| OFF | OFF | OFF | ON | Reference 1 | PC-01 |
| OFF | OFF | ON | OFF | Reference 2 | PC-02 |
| OFF | OFF | ON | ON | Reference 3 | PC-03 |
| OFF | ON | OFF | OFF | Reference 4 | PC-04 |
| OFF | ON | OFF | ON | Reference 5 | PC-05 |
| OFF | ON | ON | OFF | Reference 6 | PC-06 |
| OFF | ON | ON | ON | Reference 7 | PC-07 |
| ON | OFF | OFF | OFF | Reference 8 | PC-08 |
| ON | OFF | OFF | ON | Reference 9 | PC-09 |
| ON | OFF | ON | OFF | Reference 10 | PC-10 |
| ON | OFF | ON | ON | Reference 11 | PC-11 |
| ON | ON | OFF | OFF | Reference 12 | PC-12 |
| ON | ON | OFF | ON | Reference 13 | PC-13 |

| | | | | | |
|---|---|---|---|---|---|
| ON | ON | ON | OFF | Reference 14 | PC-14 |
| ON | ON | ON | ON | Reference 15 | PC-15 |

If the frequency source is multi-reference, the value 100% of PC-00 to PC-15 corresponds to the value of P0-10 (Maximum frequency).

Besides the multi-speed function, the multi-reference can be also used as the PID setting source or the voltage source for V/F separation, satisfying the requirement on switchover of different setting values.

Two terminals for acceleration/deceleration time selection have four state combinations, as listed in the following table.

Table 6-3 State combinations of two terminals for acceleration/deceleration time selection

| Terminal 2 | Terminal 1 | Acceleration/Deceleration Time Selection | Corresponding Parameters |
|---|---|---|---|
| OFF | OFF | Acceleration/Deceleration time 1 | P0-17, P0-18 |
| OFF | ON | Acceleration/Deceleration time 2 | P8-03, P8-04 |
| ON | OFF | Acceleration/Deceleration time 3 | P8-05, P8-06 |
| ON | ON | Acceleration/Deceleration time 4 | P8-07, P8-08 |

Two motor selection terminals have four state combinations, corresponding to four motors, as listed in the following table.

Table 6-4 State combinations of two motor selection terminals

| Terminal 2 | Terminal 1 | Selected Motor | Corresponding Parameters |
|---|---|---|---|
| OFF | OFF | Motor 1 | Group P1, Group P2 |
| OFF | ON | Motor 2 | Group A2 |
| ON | OFF | Motor 3 | Group A3 |
| ON | ON | Motor 4 | Group A4 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-10 | X filter time gai | 0.000 - 1.000s | 0.010s |

It is used to set the software filter time of X terminal status. If X terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of X filter time will reduce the response of X terminals.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-11 | Terminal command mode | 0: Two-line mode 1 | 0 |
| | | 1: Two-line mode 2 | |
| | | 2: Three-line mode 1 | |
| | | 3: Three-line mode 2 | |

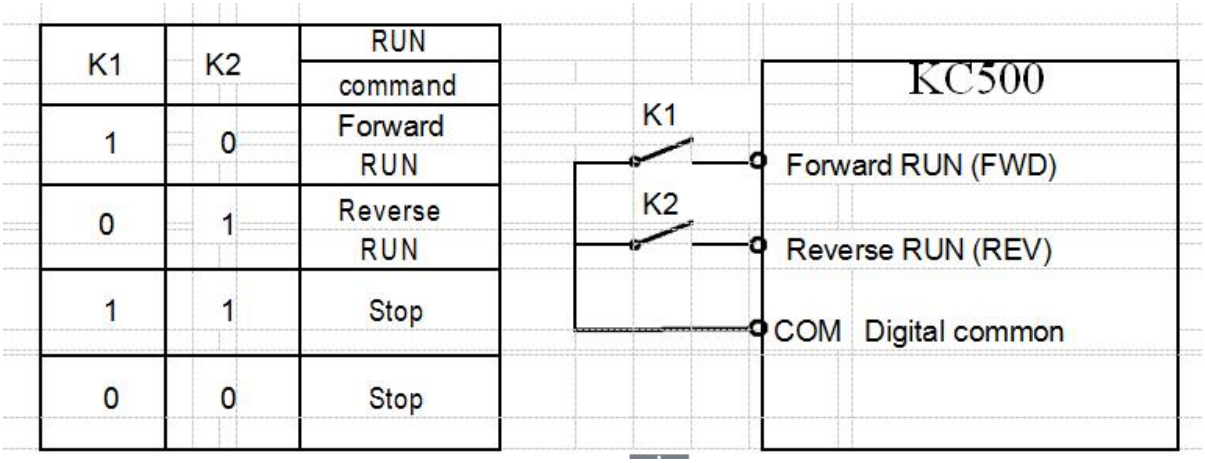
This parameter is used to set the mode in which the AC drive is controlled by external terminals. The following uses FWD, REV and X1 as an example, with allocating functions of FWD, REV and X1 by setting P4-00 to P4-02.

* 0: Two-line mode 1

It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor is decided by FWD and REV. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 0 | Two-line 1 |
| P4-00 | FWD function selection | 1 | Forward RUN (FWD) |
| P4-01 | REV function selection | 2 | Reverse RUN (REV) |

Figure 6-7 Setting of two-line mode 1



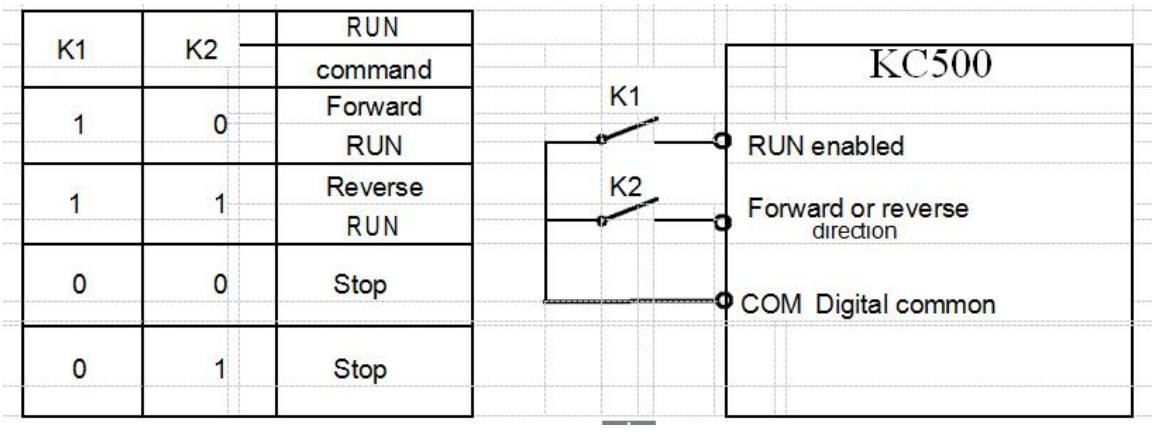

As shown in the preceding figure, when only K1 is ON, the AC drive instructs forward rotation. When only K2 is ON, the AC drive instructs reverse rotation. When K1 and K2 are ON or OFF simultaneously, the AC drive stops.

* 1: Two-line mode 2

In this mode, FWD is RUN enabled terminal, and REV determines the running direction. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 1 | Two-line 2 |
| P4-00 | FWD function selection | 1 | RUN enabled |
| P4-01 | REV function selection | 2 | Forward or reverse direction |

Figure 6-8 Setting of two-line mode 2



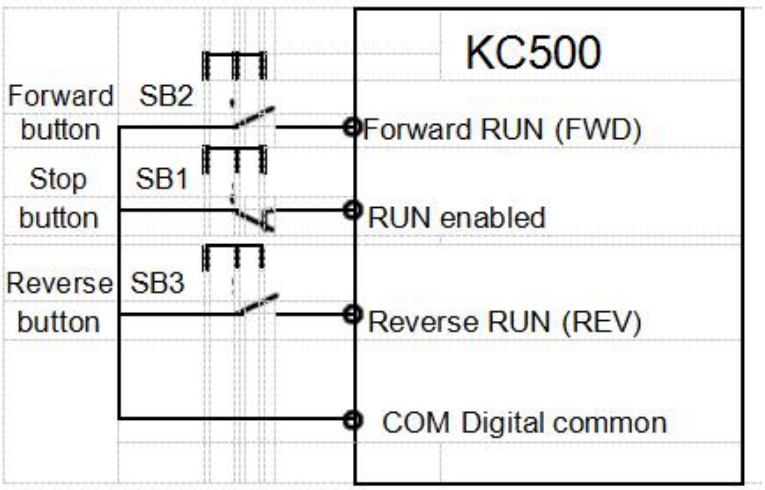

As shown in the preceding figure, if K1 is ON, the AC drive instructs forward rotation when K2 is OFF, and instructs reverse rotation when K2 is ON. If K1 is OFF, the AC drive stops.

* 2: Three-line mode 1

In this mode, X1 is RUN enabled terminal, and the direction is decided by FWD and REV. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 2 | Three-line 1 |
| P4-00 | FWD function selection | 1 | Forward RUN (FWD) |
| P4-01 | REV function selection | 2 | Reverse RUN (REV) |
| P4-02 | X1 function selection | 3 | Three-line control |

Figure 6-9 Setting of three-line mode 1



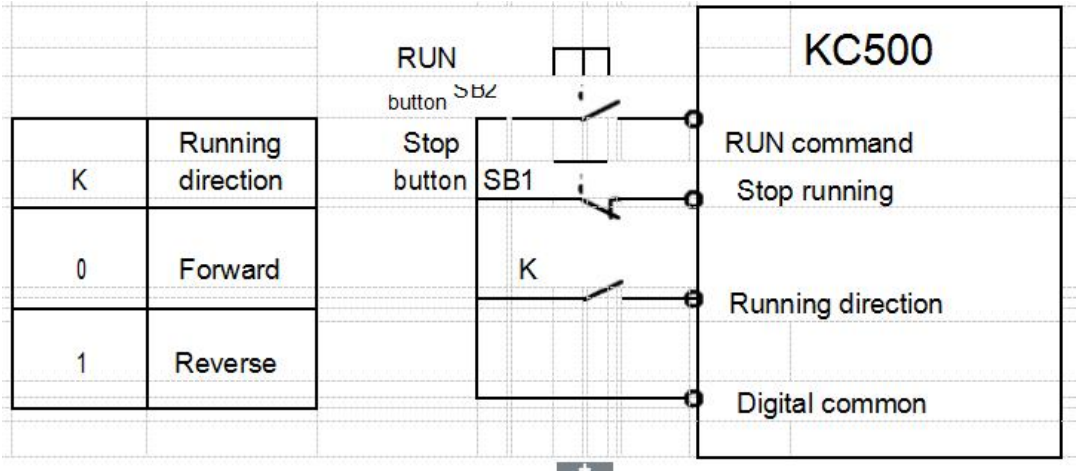

As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions on SB1, SB2 and SB3.

* 3: Three-line mode 2

In this mode, X1 is RUN enabled terminal. The RUN command is given by FWD and the direction is decided by REV. The parameters are set as below:

| Function Code | Parameter Name | Value | Function Description |
|---|---|---|---|
| P4-11 | Terminal command mode | 3 | Three-line 2 |
| P4-00 | FWD function selection | 1 | RUN enabled |
| P4-01 | REV function selection | 2 | Forward or reverse direction |
| P4-02 | X1 function selection | 3 | Three-line control |

Figure 6-10 Setting of three-line mode 2




As shown in the preceding figure, if SB1 is ON, the AC drive starts running when SB2 is pressed to be ON; the AC drive instructs forward rotation when K is OFF and instructs reverse rotation when K is ON. The AC drive stops immediately after SB1 becomes OFF. During normal startup and running, SB1 must remain ON. The AC drive's running state is determined by the final actions of SB1, SB2 and K.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-12 | Terminal UP/DOWN rate | 0.01 - 65.535 Hz/s | 1.00 Hz/s |

It is used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

If P0-22 (Frequency reference resolution) is 2, the setting range is 0.001 - 65.535 Hz/s.

If P0-22 (Frequency reference resolution) is 1, the setting range is 0.01 - 655.35 Hz/s.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-13 | VI minimum input | 0.00 V to P4-15 | 0.00 V |
| P4-14 | Corresponding setting of VI minimum input | -100.00% - 100.0% | 0.0% |
| P4-15 | VI maximum input | P4-13 to 10.00 V | 10.00 V |
| P4-16 | Corresponding setting of VI maximum input | -100.00% - 100.0% | 100.0% |
| P4-17 | VI filter time | 0.00 - 10.00s | 0.10s |

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (P4-15), the maximum value is used. When the analog input voltage is less than the minimum value (P4-13), the value set in P4-34 (Setting for AI less than minimum input) is used.

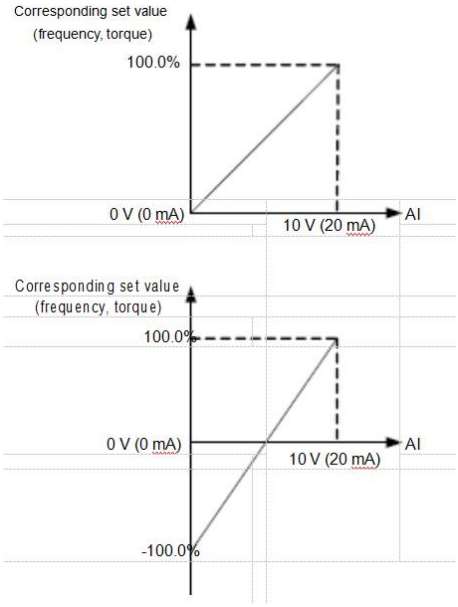
When the analog input is current input, 1 mA current corresponds to 0.5 V voltage.P4-17 (VI filter time) is used to set the software filter time of VI. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input.

However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

Two typical setting examples are shown in the following figure.

Figure 6-11 Corresponding relationship between analog input and set values




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-18 | CI minimum input | 0.00 V to P4-20 | 0.00 V |
| P4-19 | Corresponding setting of CI minimum input | -100.00% - 100.0% | 0.0% |
| P4-20 | CI maximum input | P4-18 to 10.00 V | 10.00 V |
| P4-21 | Corresponding setting of CI maximum input | -100.00% - 100.0% | 100.0% |
| P4-22 | CI filter time | 0.00 - 10.00s | 0.10s |
| Function Code | Parameter Name | Setting Range | Default |
| P4-35 | FWD delay time | 0.0 - 3600.0s | 0.0s |
| P4-36 | REV delay time | 0.0 - 3600.0s | 0.0s |
| P4-37 | X1 delay time | 0.0 - 3600.0s | 0.0s |

These parameters are used to set the delay time of the AC drive when the status of X terminals changes.

Currently, only FWD, REV and X1 support the delay time function.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P4-38 | X valid mode selection 1 | Unit's digit (FWD valid mode) | 00000 |
| | | 0: High level valid | |
| | | 1: Low level valid | |
| | | Ten's digit (REV valid mode) | |
| | | 0, 1 (same as FWD) | |
| | | Hundred's digit (X1 valid mode) | |

| | | | |
|---|---|---|---|
| | | 0, 1 (same as FWD) | |
| | | Thousand's digit (X2 valid mode) | |
| | | 0, 1 (same as FWD) | |
| | | Ten thousand's digit (X3 valid mode) | |
| | | 0, 1 (same as FWD) | |
| P4-39 | X valid mode selection 2 | Unit's digit (X4 valid mode) | 00000 |
| | | 0, 1 (same as FWD) | |
| | | Ten's digit (X5 valid mode) | |
| | | 0, 1 (same as FWD) | |
| | | Hundred's digit (X6 state) | |
| | | 0, 1 (same as FWD) | |
| | | | |
| | | | |
| | | | |
| | | | |

These parameters are used to set the valid mode of X terminals.

* 0: High level valid

The X terminal is valid when being connected with COM, and invalid when being disconnected from COM.

* 1: Low level valid

The X terminal is invalid when being connected with COM, and invalid when being disconnected from COM.

## Group P5: Output Terminals

| Function Code | Parameter Name | Default |
|---|---|---|
| F5-02 | Relay function (A-B-C) | 2 |
| F5-04 | Relay function (A1-B1-C1) | 1 |

The functions of the output terminals are described in the following table.

Table 6-5 Functions of output terminals

| Value | Function | Description |
|---|---|---|
| 0 | No output | The terminal has no function. |
| 1 | AC drive running | When the AC drive is running and has output frequency (can be zero), the terminal becomes ON. |
| 2 | Fault output (stop) | When the AC drive stops due to a fault, the terminal becomes ON. |
| 3 | Frequency-level detection FDT1 output | Refer to the descriptions of P8-19 and P8-20. |

| Value | Function | Description |
|---|---|---|
| 4 | Frequency reached | Refer to the descriptions of P8-21. |
| 5 | Zero-speed running (no output at stop) | If the AC drive runs with the output frequency of 0, the terminal becomes ON. If the AC drive is in the stop state, the terminal becomes OFF. |

| | | |
|---|---|---|
| 6 | Motor overload pre-warning | The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of P9-00 to P9-02. |
| 7 | AC drive overload pre-warning | The terminal becomes ON 10s before the AC drive overload protection action is performed. |
| 8 | Set count value reached | The terminal becomes ON when the count value reaches the value set in PB-08. |
| 9 | Designated count value reached | The terminal becomes ON when the count value reaches the value set in PB-09. |
| 10 | Length reached | The terminal becomes ON when the detected actual length exceeds the value set in PB-05. |
| 11 | PLC cycle complete | When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms. |
| 12 | Accumulative running time reached | If the accumulative running time of the AC drive exceeds the time set in P8-17, the terminal becomes ON. |
| 13 | Frequency limited | If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON. |
| 14 | Torque limited | In speed control mode, if the output torque reaches the torque limit, the AC drive enters the stall protection state and meanwhile the terminal becomes ON. |
| 15 | Ready for RUN | If the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON. |
| 16 | VI larger than CI | When the input of VI is larger than the input of CI, the terminal becomes ON. |
| 17 | Frequency upper limit reached | If the running frequency reaches the upper limit, the terminal becomes ON. |
| 18 | Frequency lower limit reached (no output at stop) | If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF. |
| 19 | Undervoltage state output | If the AC drive is in undervoltage state, the terminal becomes ON. |
| 20 | Communication setting | Refer to the communication protocol. |
| 21 | Reserved | Reserved. |
| 22 | Reserved | Reserved. |
| 23 | Zero-speed running 2 (having output at stop) | If the output frequency of the AC drive is 0, the terminal becomes ON. In the state of stop, the signal is still ON. |
| 24 | Accumulative power-on time reached | If the AC drive accumulative power-on time (P7-13) exceeds the value set in P8-16, the terminal becomes ON. |
| 25 | Frequency level detection FDT2 output | Refer to the descriptions of P8-28 andP8-29. |

| Value | Function | Description |
|---|---|---|
| 26 | Frequency 1 reached | Refer to the descriptions of P8-30 and P8-31. |
| 27 | Frequency 2 reached | Refer to the descriptions of P8-32 and P8-33. |
| 28 | Current 1 reached | Refer to the descriptions of P8-38 and P8-39. |

| | | |
|---|---|---|
| 29 | Current 2 reached | Refer to the descriptions of P8-40 and P8-41. |
| 30 | Timing reached | If the timing function (P8-42) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time. |
| 31 | VI input limit exceeded | If VI input is larger than the value of P8-46 VI input voltage upper limit) or lower than the value of P8-45 (VI input voltage lower limit), the terminal becomes ON. |
| 32 | Load becoming 0 | If the load becomes 0, the terminal becomes ON. |
| 33 | Reverse running | If the AC drive is in the reverse running state, the terminal becomes ON. |
| 34 | Zero current state | Refer to the descriptions P8-28 and P8-29. |
| 35 | IGBT temperature reached | If the heatsink temperature of the AC drive IGBT (P7-07)reaches the set IGBT temperature threshold (P8-47), the terminal becomes ON. |
| 36 | Software current limit exceeded | Refer to the descriptions of P8-36 and P8-37. |
| 37 | Frequency lower limit reached (having output at stop) | If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the signal is still ON. |
| 38 | Alarm output | If a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal. |
| 39 | Motor overheat warning | If the motor temperature reaches the temperature set in P9-58 (Motor overheat warning threshold), the terminal becomes ON. You can view the motor temperature by using U0-34. |
| 40 | Current running time reached | If the current running time of AC drive exceeds the value of P8-53, the terminal becomes ON. |

| Function Code | Parameter Name | Default |
|---|---|---|
| P5-07 | AM function selection | 0 |
| P5-08 | FM function selection | 1 |

The output range of AM and FM is 0–20 mA or 0–10 V. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table.

Table 6-6 Relationship between pulse and analog output ranges and corresponding functions

| Value | Function | Range (Corresponding to Pulse or Analog Output Range 0.0%–100.0%) |
|---|---|---|
| 0 | Running frequency | 0 to maximum output frequency |
| 1 | Set frequency | 0 to maximum output frequency |
| 2 | Output current | 0 to 2 times of rated motor current |
| 3 | Output torque (absolute value) | 0 to 2 times of rated motor torque |

| Value | Function | Range (Corresponding to Pulse or Analog Output Range 0.0%–100.0%) |
|---|---|---|
| 4 | Output power | 0 to 2 times of rated power |
| 5 | Output voltage | 0 to 1.2 times of rated AC drive voltage |
| 6 | Pulse input | 0.01–100.00 kHz |
| 7 | VI | 0–10 V |
| 8 | CI | 0–10 V (or 0–20 mA) |
| 9 | KEY | 0–0 V |

| | | |
|---|---|---|
| 10 | Length | 0 to maximum set length |
| 11 | Count value | 0 to maximum count value |
| 12 | Communication setting | 0.0% - 100.0% |
| 13 | Motor rotational speed | 0 to rotational speed corresponding to maximum output frequency |
| 14 | Output current | 0.0 - 1000.0 A |
| 15 | Output voltage | 0.0 - 000.0 V |
| 16 | Output torque (actual value) | -2 times of rated motor torque to 2 times of rated motor torque |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-10 | AM offset coefficient | -100.0% - 100.0% | 0.0% |
| P5-11 | AM gain | -10.00 - 10.00 | 1.00 |
| P5-12 | FM offset coefficient | -100.0% - 100.0% | 0.00% |
| P5-13 | FM gain | -10.00 - 10.00 | 1.00 |

These parameters are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve.

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output, the actual output is: Y = kX + b.

The zero offset coefficient 100% of FM and AM corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to20 mA) with no zero offset or gain adjustment.

For example, if the analog output is used as the running frequency, and it is expected that the output is 8 V when the frequency is 0 and 3 V at the maximum frequency, the gain shall be set to -0.50, and the zero offset shall be set to 80%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P5-18 | Relay 1(A-B-C) output delay time | 0.0 - 3600.0s | 0.0s |
| P5-19 | Relay 2(A1-B1-C1) output delay time | 0.0 - 3600.0s | 0.0s |

## Group P6: Start/Stop Control

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P6-10 | Stop mode | 0: Decelerate to stop<br>1: Coast to stop | 0 |

* 0: Decelerate to stop

After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

* 1: Coast to stop

After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| P6-15 | Brake use ratio | 0%－100% | 100% |

It is valid only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

## Group P7: Operation Panel and display

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-01 | MF.K Key function selection | 0: MF.K key disabled | 0 |
| | | 1: Switchover between operation panelcontrol and remote command control(terminal or communica-tion) | |
| | | 2: Switchover between forward rotation and reverse rotation | |
| | | 3: Forward JOG | |
| | | 4: Reverse JOG | |

MF.K key refers to multifunctional key. You can set the function of the MF.K key by using this parameter. You can perform switchover by using this key both in stop or running state.

* 0: MF.K key disabled

This key is disabled.

* 1: Switchover between operation panel control and remote command control (terminal or communication)

You can perform switchover from the current command source to the operation panel control (local operation). If the current command source is operation panel control, this key is invalid.

* 2: Switchover between forward rotation and reverse rotation

You can change the direction of the frequency reference by using the MF.K key. It is valid only when the current command source is operation panel control

* 3: Forward JOG

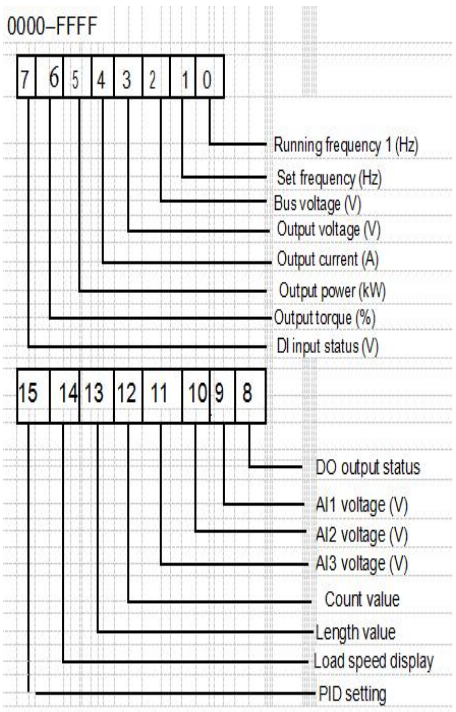
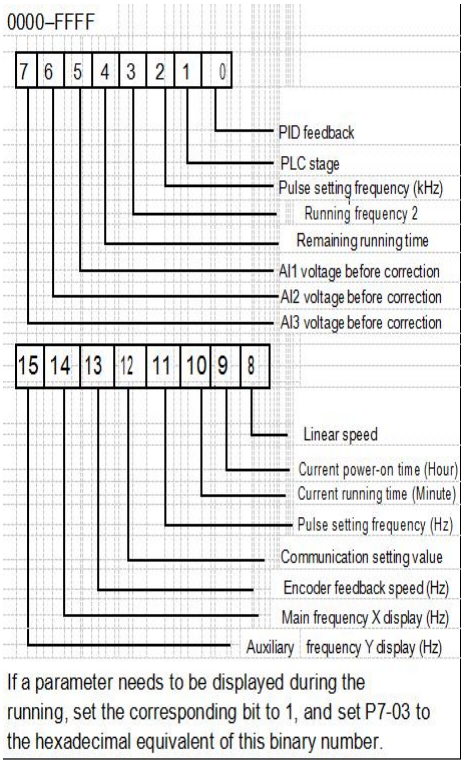
You can perform forward JOG (FJOG) by using the MF.K key.

* 4: Reverse JOG

You can perform reverse JOG (FJOG) by using the MF.K key.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-02 | STOP/RESET key function | 0: STOP/RESET key enabled only in operation panel control | 0 |
| | | 1: STOP/RESET key enabled in any operation mode | |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| P7-03 | LED display<br>running parameters 1 |  <br>If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number. | 1F |
| P7-04 | LED display<br>running parameters 2 |  <br>If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set P7-03 to the hexadecimal equivalent of this binary number. | 0 |

These two parameters are used to set the parameters that can be viewed when the AC drive is in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of P7-03.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-06 | Load speed display coefficient | 0.0001 - 6.5000 | 1.0000 |

This parameter is used to adjust the relationship between the output frequency of the AC drive and the load speed. For details, see the description of P7-12.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-07 | Heatsink temperature of AC drive IGB | 0.0 - 100.0° C | - |

It is used to display the insulated gate bipolar transistor (IGBT) temperature of the AC drive IGBT, and the IGBT overheat protection value of the AC drive IGBT depends on the model.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-09 | Accumulative running time | 0 - 65535 h | - |

It is used to display the accumulative running time of the AC drive. After the accumulative running time reaches the value set in F8-17, the terminal with the digital output function 12 becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-10 | Product number | AC drive product number | - |
| P7-11 | Software version | Software version of control board | - |
| P7-12 | Number of decimal places for load speed display | 0: 0 decimal place | 1 |
| | | 1: 1 decimal place | |
| | | 2: 2 decimal places | |
| | | 3: 3 decimal places | |

P7-12 is used to set the number of decimal places for load speed display. The following gives an example to explain how to calculate the load speed:Assume that P7-06 (Load speed display coefficient) is 2.000 and P7-12 is 2 (2 decimal places). When the running frequency of the AC drive is 40.00 Hz, the load speed is 40.00 x 2.000 = 80.00 (display of 2 decimal places).

If the AC drive is in the stop state, the load speed is the speed corresponding to the set frequency, namely, "set load speed". If the set frequency is 50.00 Hz, the load speed in the stop state is 50.00 x 2.000 = 100.00 (display of 2 decimal places).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P7-13 | Accumulative power-on time | 0 - 65535 h | 0h |

It is used to display the accumulative power-on time of the AC drive since the delivery. If the time reaches the set power-on time (P8-17), the terminal with the digital output function 24 becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| P7-14 | Accumulative power consumption | 0 - 65535 kWh | / |

It is used to display the accumulative power consumption of the AC drive until now.

## Group F8: Auxiliary Functions

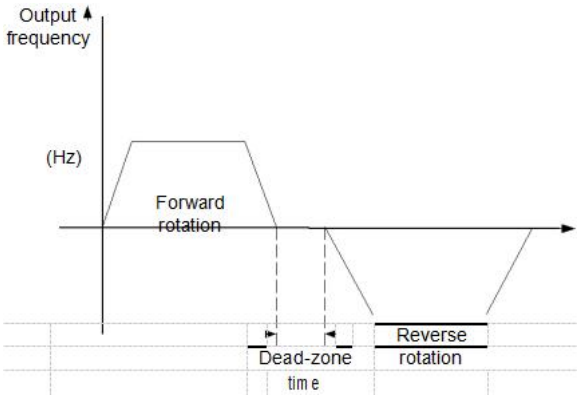
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-00 | JOG running frequency | 0.00 Hz to maximum frequency | 2.00 Hz |
| P8-01 | JOG acceleration time | 0.0 - 6500.0s | 20.0s |
| P8-02 | JOG deceleration time | 0.0 - 6500.0s | 20.0s |

These parameters are used to define the set frequency and acceleration/ deceleration time of the AC drive when jogging. The startup mode is "direct start" (P6-00 = 0) and the stop mode is "Decelerate to stop" (P6-10 = 0) during jogging.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-12 | Forward/Reverse rotation dead-zone time | 0.0 - 3000.0s | 0.0s |

It is used to set the time when the output is 0 Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

Figure 6-16 Forward/Reverse rotation dead-zone time




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-13 | Reverse control | 0: Enabled<br>1: disabled | 0 |

It is used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to 1.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-14 | Running mode when set frequency lower than frequency lower limit | 0: Run at frequency lower limit<br>1: Stop<br>2: Run at zero speed | 0 |

It is used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The KC500 provides three running modes to satisfy requirements of various applications.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-17 | Accumulative running time threshold | 0 - 65000 h | 0 h |

It is used to set the accumulative running time threshold of the AC drive. If the accumulative running time (P7-09) reaches the value set in this parameter, the corresponding DO terminal becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-18 | Startup protection | 0: No<br>1:Yes | 0 |

This parameter is used to set whether to enable the safety protection. If it is set to 1, the AC drive does not respond to the run command valid upon AC drive power-on (for example, an input terminal is ON before power-on). The AC drive responds only after the run command is cancelled and becomes valid again.

In addition, the AC drive does not respond to the run command valid upon fault reset of the AC drive. The run protection can be disabled only after the run command is cancelled.

In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-27 | Terminal JOG preferred | 0: disabled<br>1: Enabled | 0 |

It is used to set whether terminal JOG is preferred.

If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-48 | Cooling fan control | 0: Fan working during running<br>1: Fan working continuously | 0 |

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40° C, and stops working if the heatsink temperature is lower than 40° C.

If this parameter is set to 1, the cooling fan keeps working after power-on.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-49 | Wakeup frequency | Dormant frequency (P8-51) to maximum frequency (P0-10) | 0.00 Hz |
| P8-50 | Wakeup delay time | 0.0 - 6500.0s | 0.0s |
| P8-51 | Dormant frequency | 0.00 Hz to wakeup frequency (P8-49) | 0.00 Hz |
| P8-52 | Dormant delay time | 0.0 - 6500.0s | 0.0s |

These parameters are used to implement the dormant and wakeup functions in the water supply application.

When the AC drive is in running state, the AC drive enters the dormant state and stops automatically after the dormant delay time (P8-52) if the set frequency is lower than or equal to the dormant frequency (P8-51).

When the AC drive is in dormant state and the current running command is effective, the AC drives starts up after the wakeup delay time (P8-50) if the set frequency is higher than or equal to the wakeup frequency (P8-49).

Generally, set the wakeup frequency equal to or higher than the dormant frequency. If the wakeup frequency and dormant frequency are set to 0, the dormant and wakeup functions are disabled.

When the dormant function is enabled, if the frequency source is PID, whether PID operation is performed in the dormant state is determined by PA-28. In this case, select PID operation enabled in the stop state (PA-28 = 1).

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P8-53 | Current running time reached | 0.0 - 6500.0 min | 0.0 min |

If the current running time reaches the value set in this parameter, the corresponding DO becomes ON, indicating that the current running time is reached.

## Group P9: Fault and Protection

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-00 | Motor overload protection selection | 0: disabled<br>1: Enabled | 1 |
| P9-01 | Motor overload protection gain | 0.20 - 10.00 | 1.00 |

* P9-00 = 0

The motor overload protective function is disabled. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the AC drive and the motor.

* P9-00 = 1

The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection.

The inverse time-lag curve of the motor overload protection is:220% x P9-01 x rated motor current (if the load remains at this value for one minute, the AC drive reports motor overload fault), or150% x P9-01 x rated motor current (if the load remains at this value for 60 minutes, the AC drive reports motor overload fault) Set P9-01 properly based on the actual overload capacity. If the value of P9-01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-02 | Motor overload warning coefficient | 50% - 100% | 80% |

This function is used to give a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by P9-02, the DO terminal on the AC drive allocated with function 6 (Motor overload pre-warning) becomes ON.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-03 | Overvoltage stall gain | 0 (no stall overvoltage) - 100 | 0 |
| P9-04 | Overvoltage stall protective voltage | 120% - 150% | 130% |

When the DC bus voltage exceeds the value of P9-04 (Overvoltage stall protective voltage) during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate.P9-03 (Overvoltage stall gain) is used to adjust the overvoltage suppression capacity of the AC drive. The larger the value is, the greater the overvoltage suppression capacity will be.

In the prerequisite of no overvoltage occurrence, set P9-03 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overvoltage fault may occur.

If the overvoltage stall gain is set to 0, the overvoltage stall function is disabled. The overvoltage stall protective voltage setting 100% corresponds to the base values in the following table:

Table 6-7 Overvoltage stall protective voltage setting 100% corresponds to base values

| Voltage Class | Corresponding Base Value |
|---|---|
| Single-phase 220 V | 290 V |
| Three-phase 220 V | 290 V |
| Three-phase 380 V | 530 V |
| Three-phase 480 V | 620 V |
| Three-phase 690 V | 880 V |

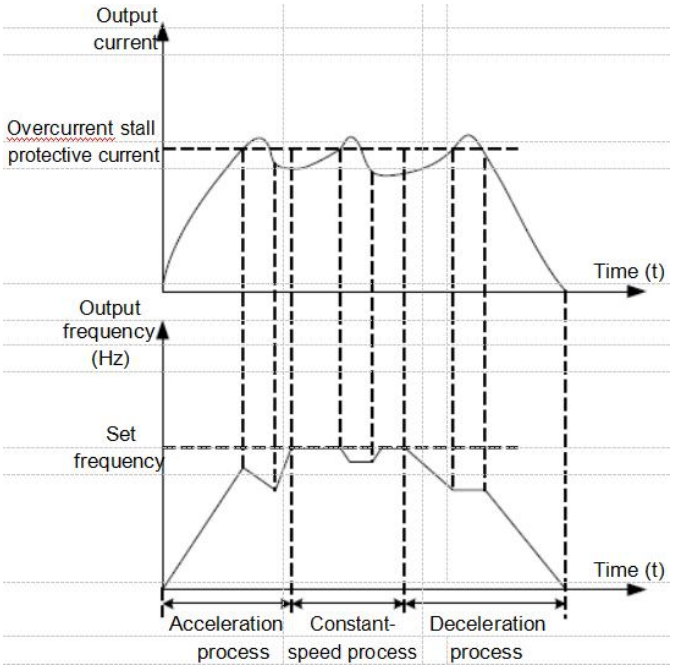
| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-05 | Overcurrent stall gain | 0 - 100 | 20 |
| P9-06 | Overcurrent stall protective current | 100% - 200% | 150% |

When the output current exceeds the overcurrent stall protective current during acceleration/ deceleration of the AC drive, the AC drive stops acceleration/deceleration and keeps the present running frequency. After the output current declines, the AC drive continues to accelerate/decelerate.

P9-05 (Overcurrent stall gain) is used to adjust the overcurrent suppression capacity of the AC drive. The larger the value is, the greater the overcurrent suppression capacity will be. In the prerequisite of no overcurrent occurrence, set t P9-05 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and overcurrent fault may occur.If the overcurrent stall gain is set to 0, the overcurrent stall function is disabled.

Figure 6-25 diagram of the overcurrent stall protection function




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-07 | Short-circuit to ground upon power-on | 0: disabled<br>1: Enabled | 1 |

It is used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive. If this function is enabled, the AC drive's UVW will have voltage output a while after power-on.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-12 | Input phase loss protection/ contactor energizing protection selection | Unit's digit: Input phase loss protection | 11 |
| | | Ten's digit: Contactor energizing protection | |
| | | 0: disabled | |
| | | 1: Enabled | |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| P9-13 | Output phase loss protection selection | 0: disabled<br>1: Enabled | 1 |

It is used to determine whether to perform output phase loss protection.

| Function Code | Parameter Name | Setting Range |
|---|---|---|
| P9-14 | 1st fault type | 0 - 99 |
| P9-15 | 2nd fault type | |
| P9-16 | 3rd (latest) fault type | |

It is used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 8.

| Function Code | Parameter Name | Description |
|---|---|---|
| P9-17 | Frequency upon 3rd fault | It displays the frequency when the latest fault occurs. |
| P9-18 | Current upon 3rd fault | It displays the current when the latest fault occurs. |

| | | |
|---|---|---|
| P9-19 | Bus voltage upon 3rd fault | It displays the bus voltage when the latest fault occurs. |

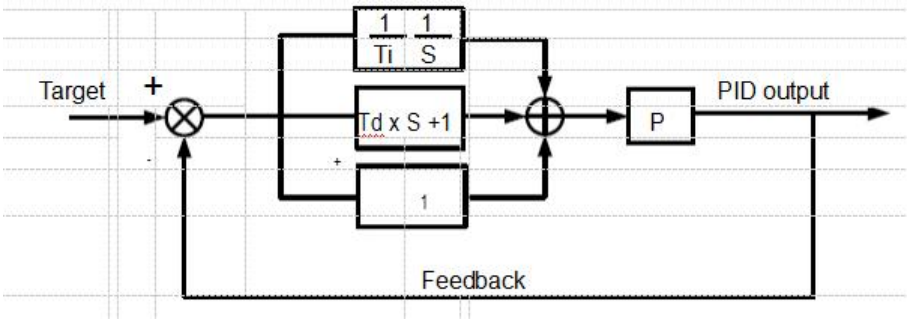
| Function Code | Parameter Name | Description |
|---|---|---|
| P9-20 | X status upon 3rd fault | It displays the status of all X terminals when the latest fault occurs. The sequence is as follows: If a X is ON, the setting is 1. If the X is OFF, the setting is 0. The value is the equivalent decimal number converted from the X status. |
| P9-21 | Output terminal status upon 3rd fault | It displays the status of all output terminals when the latest fault occurs. The sequence is as follows: If an output terminal is ON, the setting is 1. If the output terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the X statuses. |
| P9-22 | AC drive status upon 3rd fault | Reserved |
| P9-23 | Power-on time upon 3rd fault | It displays the present power-on time when the latest fault occurs. |
| P9-24 | Running time upon 3rd fault | It displays the present running time when the latest fault occurs. |

## Group PA: Process Control PID Function

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

Figure 6-27 Principle block diagram of PID control




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-00 | PID setting source | 0: FA-01 | 0 |
| | | 1: VI | |
| | | 2: CI | |
| | | 3: KEY resistance range | |
| | | 4: Pulse setting (X3) | |
| | | 5: Communication setting | |
| | | 6: Multi-reference | |

| | | | |
|---|---|---|---|
| PA-01 | PID digital setting | 0.0%－100.0% | 50.0% |

PA-00 is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value.

The purpose of PID control is to make the PID setting and PID feedback equal.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-02 | PID feedback source | 0: VI | 0 |
| | | 1: CI | |
| | | 2: KEY | |
| | | 3: VI －CI | |
| | | 4: Pulse setting (X3) | |
| | | 5: Communication setting | |
| | | 6: VI + CI | |
| | | 7: MAX (\|VI\|, \|CI\|) | |
| | | 8: MIN (\|VI\|, \|CI\|) | |

This parameter is used to select the feedback signal channel of process PID.The PID feedback is a relative value and ranges from 0.0% to 100.0%.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-03 | PID action direction | 0: Forward action<br>1: Reverse action | 0 |

＊ 0: Forward action

When the feedback value is smaller than the PID setting, the AC drive's output frequency rises. For example, the winding tension control requires forward PID action.

＊ 1: Reverse action

When the feedback value is smaller than the PID setting, the AC drive's output frequency reduces. For example, the unwinding tension control requires reverse PID action.Note that this function is influenced by the X function 35 "Reverse PID action direction".

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-04 | PID setting feedback range | 0－65535 | 1000 |

This parameter is a non-dimensional unit. It is used for PID setting display (U0-15) and PID feedback display (U0-16).

Relative value 100% of PID setting feedback corresponds to the value of PA-04. If PA-04 is set to 2000 and PID setting is 100.0%, the PID setting display (U0-15) is 2000.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-05 | Proportional gain Kp1 | 0.0－100.0 | 20.0 |
| PA-06 | Integral time Ti1 | 0.01－10.00s | 2.00s |
| PA-07 | differential time Td1 | 0.00－10.000 | 0.000s |

＊ PA-05 (Proportional gain Kp1)

It decides the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation

between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

* PA-06 (Integral time Ti1)

It decides the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in PA-06. Then the adjustment amplitude reaches the maximum frequency.

* PA-07 (differential time Td1)

It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PA-09 | PID deviation limit | 0.0%-100.0% | 0.0% |

If the deviation between PID feedback and PID setting is smaller than the value of PA-09,PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications.

## Group PC: Multi-Reference and Simple PLC Function

The KC500 multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

The simple PLC function is different from the KC500 user programmable function. Simple PLC can only complete simple combination of multi-reference, while the user programmable function is more practical. For details, see the descriptions of group A7.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-00 | Reference 0 | -100.0%-100.0% | 0.0% |
| PC-01 | Reference 1 | -100.0%-100.0% | 0.0% |
| PC-02 | Reference 2 | -100.0%-100.0% | 0.0% |
| PC-03 | Reference 3 | -100.0%-100.0% | 0.0% |
| PC-04 | Reference 4 | -100.0%-100.0% | 0.0% |
| PC-05 | Reference 5 | -100.0%-100.0% | 0.0% |
| PC-06 | Reference 6 | -100.0%-100.0% | 0.0% |
| PC-07 | Reference 7 | -100.0%-100.0% | 0.0% |
| PC-08 | Reference 8 | -100.0%-100.0% | 0.0% |
| PC-09 | Reference 9 | -100.0%-100.0% | 0.0% |
| PC-10 | Reference 10 | -100.0%-100.0% | 0.0% |
| PC-11 | Reference 11 | -100.0%-100.0% | 0.0% |
| PC-12 | Reference 12 | -100.0%-100.0% | 0.0% |
| PC-13 | Reference 13 | -100.0%-100.0% | 0.0% |
| PC-14 | Reference 14 | -100.0%-100.0% | 0.0% |
| PC-15 | Reference 15 | -100.0%-100.0% | 0.0% |

Multi-reference can be the setting source of frequency, V/F separated voltage and process PID. The multi-reference is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

Multi-reference can be switched over based on different states of X terminals. For details, see the descriptions of group P4.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-16 | Simple PLC running mode | 0: Stop after the AC drive runs one cycle | 0 |
| | | 1: Keep final values after the AC drive runs one cycle | |
| | | 2: Repeat after the AC drive runs one cycle | |

* 0: Stop after the AC drive runs one cycle

The AC drive stops after running one cycle, and will not start up until receiving another command.

* 1: Keep final values after the AC drive runs one cycle

The AC drive keeps the final running frequency and direction after running one cycle.

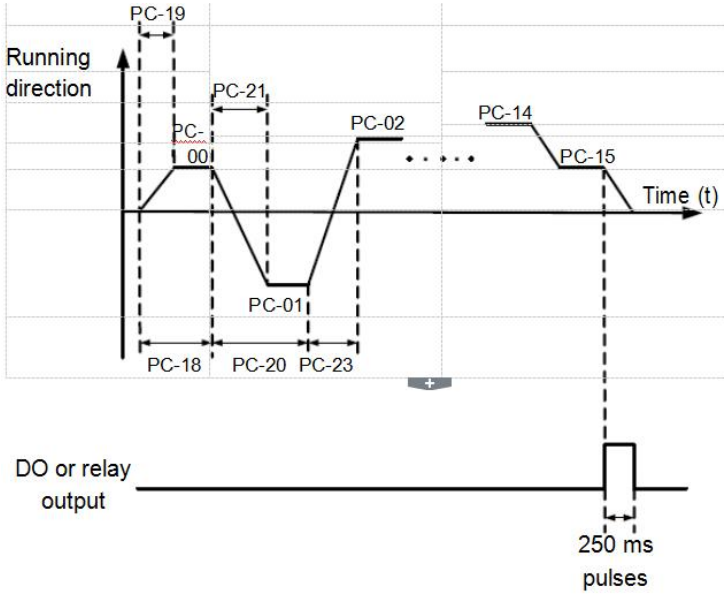
* 2: Repeat after the AC drive runs one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

Simple PLC can be either the frequency source or V/F separated voltage source.

When simple PLC is used as the frequency source, whether parameter values of PC-00 to PC-15 are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

Figure 6-32 Simple PLC when used as frequency source




| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PC-17 | Simple PLC retentive selection | Unit's digit (Retentive upon power failure) | 0 |
| | | 0: No<br>1: Yes | |
| | | Ten's digit (Retentive upon stop) | |
| | | 0: No<br>1: Yes | |

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PC-18 | Running time of simple PLC reference 0 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-19 | Acceleration/deceleration time of simple PLC reference 0 | 0 - 3 | 0 |
| PC-20 | Running time of simple PLC reference 1 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-21 | Acceleration/deceleration time of simple PLC reference 1 | 0 - 3 | 0 |
| PC-22 | Running time of simple PLC reference 2 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-23 | Acceleration/deceleration time of simple PLC reference 2 | 0 - 3 | 0 |
| PC-24 | Running time of simple PLC reference 3 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-25 | Acceleration/deceleration time of simple PLC reference 3 | 0 - 3 | 0 |
| PC-26 | Running time of simple PLC reference 4 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-27 | Acceleration/deceleration time of simple PLC reference 4 | 0 - 3 | 0 |
| PC-28 | Running time of simple PLC reference 5 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-29 | Acceleration/deceleration time of simple PLC reference 5 | 0 - 3 | 0 |
| PC-30 | Running time of simple PLC reference 6 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-31 | Acceleration/deceleration time of simple PLC reference 6 | 0 - 3 | 0 |
| PC-32 | Running time of simple PLC reference 7 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-33 | Acceleration/deceleration time of simple PLC reference 7 | 0 - 3 | 0 |
| PC-34 | Running time of simple PLC reference 8 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-35 | Acceleration/deceleration time of simple PLC reference 8 | 0 - 3 | 0 |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PC-36 | Running time of simple PLC reference 9 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-37 | Acceleration/deceleration time of simple PLC reference 9 | 0 - 3 | 0 |
| PC-38 | Running time of simple PLC reference 10 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-39 | Acceleration/deceleration time of simple PLC reference 10 | 0 - 3 | 0 |
| PC-40 | Running time of simple PLC reference 11 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-41 | Acceleration/deceleration time of simple PLC reference 11 | 0 - 3 | 0 |
| PC-42 | Running time of simple PLC reference 12 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-43 | Acceleration/deceleration time of simple PLC reference 12 | 0 - 3 | 0 |
| PC-44 | Running time of simple PLC reference 13 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-45 | Acceleration/deceleration time of simple PLC reference 13 | 0 - 3 | 0 |
| PC-46 | Running time of simple PLC reference 14 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-47 | Acceleration/deceleration time of simple PLC reference 14 | 0 - 3 | 0 |
| PC-48 | Running time of simple PLC reference 15 | 0.0 - 6553.5s (h) | 0.0s (h) |
| PC-49 | Acceleration/deceleration time of simple PLC reference 15 | 0 - 3 | 0 |
| PC-50 | Time unit of simple PLC running | 0: s (second) | 0 |
| | | 1: h (hour) | |
| PC-51 | Reference 0 source | 0: Set by PC-00 | 0 |
| | | 1: VI | |
| | | 2: CI | |
| | | 3: KEY resistance range | |
| | | 4: Pulse setting | |
| | | 5: PID | |
| | | 6: Set by preset frequency (P0-08),modified via terminal UP/DOWN | |

It determines the setting channel of reference 0. You can perform convenient switchover between the setting channels. When multi-reference or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.

## Group PP: User Password

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PP-00 | User password | 0 - 65535 | 0 |

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters.

If PP-00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| PP-01 | Restore default settings | 0: No operation<br>1: Restore factory settings except motor parameters<br>2: Clear records | 0 |

* 1: Restore default settings except motor parameters

If PP-01 is set to 1, most function codes are restored to the default settings except motor parameters, frequency reference resolution (P0-22), fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14).

* 2: Clear records

If PP-01 is set to 2, the fault records, accumulative running time (P7-09), accumulative power-on time (P7-13) and accumulative power consumption (P7-14) are cleared.

**Group A5: Control Optimization Parameters**

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-03 | Random PWM depth | 0: Random PWM invalid<br>1 - 10 | 0 |

The setting of random PWM depth can make the shrill motor noise softer and reduce the electromagnetic interference. If this parameter is set to 0, random PWM is invalid.

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-06 | Undervoltage threshold | 60.0% - 140.0% | 100% |

It is used to set the undervoltage threshold of Err09. The undervoltage threshold 100% of the AC drive of different voltage classes corresponds to different nominal values, as listed in the following table.

Table 6-11 Undervoltage nominal values for different voltage

| Voltage Class | Nominal Value of Undervoltage threshold |
|---|---|
| Single-phase 220 V | 200 V |
| Three-phase 220 V | 200 V |
| Three-phase 380 V | 350 V |

| Function Code | Parameter Name | Setting Range | Default |
|---|---|---|---|
| A5-07 | SFVC optimization mode selection | 0: No optimization<br>1: Optimization mode 1<br>2: Optimization mode 2 | 1 |

* 1: Optimization mode 1

It is used when the requirement on torque control linearity is high.

* 2: Optimization mode 2

It is used for the requirement on speed stability is high.

# 3 Troubleshooting

## 3.1 Routine Repair and Maintenance of the KC500

3.1.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

1) Routine maintenance involves checking:

2) Whether the motor sounds abnormally during running

3) Whether the motor vibrates excessively during running

4) Whether the installation environment of the AC drive changes.

5) Whether the AC drive's cooling fan works normally

6) Whether the AC drive overheats Routine cleaning involves:

7) Keep the AC drive clean all the time.

8) Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.

9) Clear the oil stain on the cooling fan of the AC drive.

3.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

Check and clean the air duct periodically.

Check whether the screws become loose.

Check whether the AC drive is corroded.

Check whether the wiring terminals show signs of arcing;

Main circuit insulation test

Before measuring the insulating resistance with megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Prompt Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

3.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor.

Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

| Component | Service Life | Possible Damage Reason | Judging Criteria |
|---|---|---|---|
| Fan | 2 to 3 years | Bearing worn | • Whether there is crack on the blade |
| | | Blade aging | • Whether there is abnormal vibration noise upon startup |
| Electrolytic capacitor | 4 to 5 years | Input power supply | • Whether there is liquid leakage. |
| | | in poor quality | • Whether the safe valve has projected. |
| | | High ambient temperature | • Measure the static capacitance. |
| | | Frequent load jumping | • Measure the insulating resistance. |
| | | Electrolytic aging | |

3.1.4 Storage of the AC Drive

For storage of the AC drive, pay attention to the following two aspects:

1) Pack the AC drive with the original packing box provided by the agent .

2) Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

### 3.2 Warranty Agreement

1) Free warranty only applies to the AC drive itself.

2) the agent will provide 12-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 12 months, reasonable repair expenses will be charged.

3) Reasonable repair expenses will be charged for the damages due to the following causes:

Improper operation without following the instructions

Fire, flood or abnormal voltage.

Using the AC drive for non-recommended function

## Figure 9-1 Solutions to the faults of the KC500

| display | Fault Name | Possible Causes | Solutions |
|---|---|---|---|
| Err01 | AC drive unit protection | 1: The output circuit is grounded or short circuited. | 1: Eliminate external faults. |
| | | 2: The connecting cable of the motor is too long. | 2: Install a reactor or an output filter. |
| | | 3: The IGBT overheats. | 3: Check the air filter and the |
| | | 4: The internal connections become loose. | 4: Connect all cables properly. |
| | | 5:The main control board is faulty. | |
| | | 6: The drive board is faulty. | |
| | | 7: The AC drive IGBT is faulty. | |

| display | Fault Name | Possible Causes | Solutions |
|---|---|---|---|
| Err02 | Overcurrent during acceleration | Ground fault or short circuit exists in the output circuit. | Check whether short-circuit occurs on the motor, motor cable or contactor. |
| | | Control mode is SVC or FVC but motor auto-tuning is not performed. | Set motor parameters according to motor nameplate and perform motor auto-tuning. |
| | | Acceleration time is too short. | Increase acceleration time. |
| | | The overcurrent stall prevention parameters are set improperly. | Ensure that current limit is enabled (P3-19 = 1).<br>The setting of current limit level (P3-18) is too large.<br>Adjust it between 120% and 150%.<br>The setting of current limit gain (P3-20) is too small.<br>Adjust it between 20 and 40. |
| | | Customized torque boost or V/F curve is not appropriate. | Adjust the customized torque boost or V/F curve. |
| | | The spinning motor is started. | Enable the catching a spinning motor function or start the motor after it stops. |

| | | | |
|---|---|---|---|
| | | The AC drive suffers external interference. | View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem. |
| Err03 | Overcurrent during deceleration | Ground fault or short circuit exists in the output circuit. | Check whether short-circuit occurs on the motor,motor cable or contactor. |
| | | Control mode is SVC or FVC but motor auto-tuning is not performed. | Set the motor parameters according to the motor nameplate and perform motor auto-tuning. |
| | | Acceleration time is too short. | Increase acceleration time. |
| | | The overcurrent stall prevention parameters are set improperly. | Ensure that current limit is enabled (P3-19 = 1).<br>The setting of current limit level (P3-18) is too large.<br>Adjust it between 120% and 150%.<br>The setting of the current limit gain P3-20) is too small. Adjust it between 20 and 40. |
| | | Braking unit and braking resistor are not installed. | Install braking unit and braking resistor. |
| | | The AC drive suffers external interference. | View historical fault records. If the current value is far from the overcurrent level, find interf-Erence source. If external interf-erence does not exist, it is the drive board or hall device problem. |
| display | Fault Name | Possible Causes | Solutions |
| Err04 | Overcurrent at constant speed | Ground fault or short circuit exists in the output circuit. | Check whether short-circuit occurs on the motor, motor cable or contactor. |
| | | Control mode is SVC or FVC but motor auto-tuning is not performed. | Set motor parameters according to motor nameplate and perform motor auto-tuning. |
| | | The overcurrent stall prevention parameters are set improperly. | Ensure that current limit is enabled (P3-19 = 1).<br>The setting of current limit level (P3-18) is too large.<br>Adjust it between 120% and 150%.<br>The setting of current limit gain (PF3-20) is too small.<br>Adjust it between 20 and 40. |
| | | The AC drive power class is small. | If output current exceeds rated motor current or rated output current of the AC drive during stable running, replace a drive of larger power class. |

| | | | |
|---|---|---|---|
| | | The AC drive suffers external interference. | View historical fault records. If the current value is far from the overcurrent level, find interf-erence source. If external interference does not exist, it is the drive board or hall device problem. |
| Err05 | Overvoltage during accel-eration | Input voltage is too high. | Adjust input voltage to normal range. |
| | | An external force drives motor during acceleration. | Cancel the external force or install a braking resistor. |
| | | The overvoltage stall prevention parameters are set improperly. | Ensure that the voltage limit function is enabled (P3-23 = 1).<br>The setting of voltage limit (P3-22) is too large.Adjust it between 700 V and 770 V.<br>The setting of frequency gain for voltage limit (P3-24) is too small. Adjust it between 30 and 50. |
| | | Braking unit and braking resistor are not installed. | Install braking unit and braking resistor. |
| | | Acceleration time is too short. | Increase acceleration time. |
| Err06 | Overvoltage during dece-leration | The overvoltage stall prevention parameters are set improperly. | Ensure that the voltage limit function is enabled (P3-23 = 1).<br>The setting of voltage limit (P3-22) is too large。Adjust it between 700 V and 770 V.<br>The setting of frequency gain for voltage limit (P3-24) is too small. Adjust it between 30 and 50. |
| | | An external force drives motor during deceleration. | Cancel the external force or install braking resistor. |

| display | Fault Name | Possible Causes | Solutions |
|---|---|---|---|
| | | Deceleration time is too short. | Increase deceleration time. |
| | | Braking unit and braking resistor are not installed. | Install braking unit and braking resistor. |
| Err07 | Overvoltage at constant speed | The overvoltage stall prevention parameters are set improperly. | Ensure that the voltage limit function is enabled (P3-23 = 1).<br>The setting of voltage limit (P3-22) is too large. Adjust it between 700 V and 770 V.<br>The setting of frequency gain for voltage limit (P3-24) is too small. Adjust it between 30 and 50.<br>The setting of frequency rise threshold during voltage limit (P3-26) is too small. Adjust it between 5Hz and 20 Hz. |
| | | An external force drives motor during running. | Cancel the external force or install a braking resistor |

| | | | |
|---|---|---|---|
| Err08 | Pre-charge resistor fault | Bus voltage fluctuates around undervoltage threshold continuously. | Contact the agent or .the agent |
| Err09 | Undervoltage | Instantaneous power failure occurs | Enable power dip ride through (P9-59 ≠ 0). |
| | | The AC drive's input voltage is not within the permissible range. | Adjust the voltage to normal range. |
| | | The bus voltage is abnormal. | Contact the agent or the agent. |
| | | The rectifier bridge, the buffer resistor,the drive board or the control board are abnormal. | Contact the agent or the agent. |
| Err10 | Drive overload | Load is too heavy or locked-rotor occurs on motor. | Reduce load or check motor and mechanical conditions. |
| | | The AC drive power class is small. | Replace a drive of larger power class. |
| Err11 | Motor overload | P9-01 (Motor overload protection gain) is set improperly. | Set P9-01 correctly. |
| | | Load is too heavy or locked-rotor occurs on motor. | Reduce load or check motor and mechanical conditions. |
| Err12 | Power input phase loss | Input phase loss occurs. | Eliminate faults in external circuitry. |
| | | Drive board, lightning protection board,control board, or rectifier bridge is abnormal. | Contact the agent or the agent. |
| Err13 | One drive output phase loss | Motor winding is damaged. | Check resistance between motor wires.Replace motor is winding is damaged. |
| | | The cable connecting the AC drive and the motor is abnormal. | Check for wiring errors and ensure the output cable is connected properly. |
| | | The AC drive's three-phase outputs are unbalanced when the motor is running. | Check whether the motor three-phase winding is normal. |
| | | The drive board or the IGBT is abnormal. | Contact the agent or the agent. |

| display | Fault Name | Possible Causes | Solutions |
|---|---|---|---|
| Err14 | IGBT overheat | The ambient temperature is too high. | Lower the ambient temperature. |
| | | The ventilation is clogged. | Clean the ventilation. |
| | | The fan is damaged. | Replace the cooling fan. |
| | | Thermally sensitive resistor of IGBT is damaged. | Replace the damaged thermally sensitive resistor. |
| | | The inverter IGBT is damaged. | Replace the inverter IGBT. |
| Err15 | External equipment fault | External fault signal is input via X. | Confirm that the mechanical condition allows restart (F8-18) and reset the operation. |
| | | External fault signal is input via virtual I/O. | Confirm that the virtual I/O parameters in group A1 are set correctly and reset the operation. |
| Err16 | Communication fault | Host computer is in abnormal state. | Check the cable of host computer. |
| | | Communication cable is abnormal. | Check the communication cables. |

| | | | |
|---|---|---|---|
| | | The serial port communication protocol (P0-28) of extension communication card is set improperly. | Set P0-28 of extension communication card correctly. |
| | | Communication parameters in group Fd are set improperly. | Set communication parameters in group Fd properly. |
| | | After all the preceding checkings are done but the fault still exists, restore the default settings. | |
| Err17 | Contactor fault | Drive board and power supply are abnormal. | Replace drive board or power supply board. |
| | | Contactor is abnormal. | Replace contactor. |
| | | The lightning protection board is abnormal. | Replace the lightning protection board. |
| Err18 | Current dete-Ction fault | The hall is abnormal. | Replace the hall . |
| | | The drive board is abnormal. | Replace the drive board. |
| Err23 | Short circuit to ground | Motor is short circuited to the ground. | Replace cable or motor. |
| Err26 | Accumulative running time reached | Accumulative running time reaches the setting value. | Clear the record through parameter initialization. |
| Err40 | Quick current limit | Load is too heavy or locked-rotor occurs on motor. | Reduce load or check motor and mechanical conditions. |
| | | The AC drive power class is small. | Replace a drive of larger power class. |