AR Intelligent Pump Controller

# Operation Manual

Simple adjustment

Convenient assembly

Quick cascade



# Content


01 Safety precautions

02 Naming way

05 Installation &wiring

07 Operation panel description

08 Mode selection

10 Wiring diagram

11 Running datas

12 PID parameters

20 Faulty & solution




## Safety and cautions

Make sure the wiring and the pump's rotation direction is correct before using. This manual will be helpful in the installation, parameter setting, trouble shooting, and daily maintenance. To guarantee safe operation of the equipment, read the following safety guideline s before connecting power to it. Keep this operating manual handy and distribute to all users for reference.

Safety Definition
There are three kinds of safety cautions in the manual:
Danger----Operations which are not performed according to the requirements will cause severe hurt or even death.
Warning----Operations which are not performed according to the requirements may cause severe hurt or even death.
Note----Operations which are not performed according to requirements may cause light hurt or equipment damage.

## Naming way

AR200 – F 0015 L 2 3

- 1: One phase output 3: Three phase output
- Input voltage: 1-110V 2-220V 4-380V
- Freq. range: L: 0-400.0Hz
- Applicable motor:0015 is 1.5kw
- Series: F-Intelligent water supply controller
- 1: One phase output 3: Three phase output

## Selection table

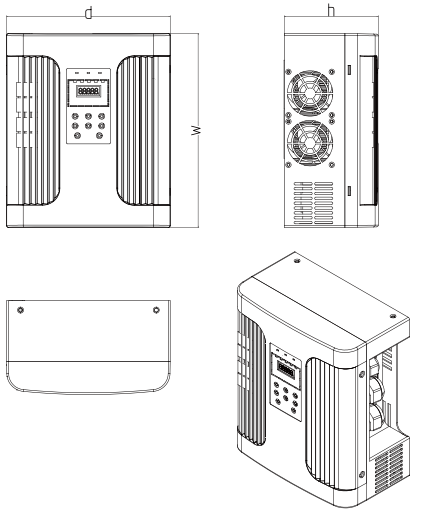
| Voltage | Model | Output power(Kw) | Applicable motor(hp) | Rated current (A) | AR100 | AR200 | AR300 | Enclosure |
|---|---|---|---|---|---|---|---|---|
| (1PH-1PH) 220V | F0015L21 | 1.5 | 2 | 10.0 | √ | √ | | R103/R203/R205 |
| | F0022L21 | 2.2 | 3 | 13.0 | √ | √ | | R103/R203/R205 |
| (1PH-3PH) 220V | F0007L23 | 0.75 | 1 | 4.1 | √ | √ | √ | R103/R203/R205/R302 |
| | F0015L23 | 1.5 | 2 | 7.0 | √ | √ | √ | R103/R203/R205/R302 |
| | F0022L23 | 2.2 | 3 | 10.0 | √ | √ | √ | R105/R203/R205/R302 |
| | F0030L23 | 3.0 | 4 | 13.0 | √ | | √ | R105//R302/R303 |
| | F0040L23 | 4.0 | 5 | 18.0 | √ | | √ | R105/R303 |
| | F0055L23 | 5.5 | 7.5 | 24.0 | √ | | √ | R105/R303/R305 |
| | F0075L23 | 7.5 | 10 | 31.0 | √ | | √ | R105/R305 |
| (3PH-3PH) 380V | F0007L43 | 0.75 | 1 | 2.5 | √ | √ | √ | R103/R203/R205/R302 |
| | F0015L43 | 1.5 | 2 | 3.7 | √ | √ | √ | R103/R203/R205/R302 |
| | F0022L43 | 2.2 | 3 | 5.1 | √ | √ | √ | R103/R203/R205/R302 |
| | F0030L43 | 3.0 | 4 | 6.5 | √ | √ | √ | R103/R203/R205/R302 |
| | F0040L43 | 4.0 | 5 | 8.5 | √ | √ | √ | R105/R203/R205/R303 |
| | F0055L43 | 5.5 | 7 | 13 | √ | | √ | R105/R108/R303 |
| | F0075L43 | 7.5 | 10 | 16 | √ | | √ | R105/R108/R303 |
| | F0110L43 | 11.0 | 15 | 25 | √ | | √ | R108/R303/R305 |
| | F0150L43 | 15.0 | 20 | 32.0 | √ | | √ | R109/R305 |
| | F0185L43 | 18.5 | 25 | 38.0 | √ | | √ | R109/R305 |
| | F0220L43 | 22.0 | 30 | 45.0 | √ | | √ | R109/R305 |
| | F0300L43 | 30 | 40 | 60.0 | √ | | √ | R110/R306 |
| | F0370L43 | 37 | 50 | 75.0 | √ | | √ | R110/R306 |
| | F0450L43 | 45 | 60 | 90.0 | √ | | √ | R110/R503/R306 |
| | F0550L43 | 55 | 70 | 110.0 | √ | | | R503 |
| | F0750L43 | 75 | 100 | 150.0 | √ | | | R503 |
| | F0930L43 | 93 | 125 | 170.0 | √ | | | R505 |
| | F1100L43 | 110 | 150 | 210.0 | √ | | | R505 |
| | F1320L43 | 132 | 175 | 250.0 | √ | | | R506 |
| | F1600L43 | 160 | 210 | 300.0 | √ | | | R506 |
| | F1870L43 | 187 | 245 | 340.0 | √ | | | R506 |
| | F2000L43 | 200 | 260 | 380.0 | √ | | | R507 |
| | F2200L43 | 220 | 300 | 415.0 | √ | | | R507 |
| | F2500L43 | 250 | 350 | 470.0 | √ | | | R507 |
| | F2800L43 | 280 | 370 | 520.0 | √ | | | R508 |





| Voltage | Model | Output power(Kw) | Applicable motor(hp) | Rated current (A) | AR100 | AR200 | AR300 | Enclosure |
|---|---|---|---|---|---|---|---|---|
| (3PH-3PH) 380V | F3150L43 | 315 | 500 | 600.0 | √ | | | R508 |
| | F3550L43 | 355 | 420 | 650.0 | √ | | | R508 |
| | F4000L43 | 400 | 530 | 725.0 | √ | | | R508 |

| Enclosure | Dimension | | | Installation size | |
|---|---|---|---|---|---|
| | w | d | h | H1 | W1 |
| R103 | 164 | 89 | 125 | 155 | 80 |
| R105 | 185 | 97 | 135 | 175 | 90 |
| R107 | 257 | 146 | 165 | 247 | 133 |
| R108 | 320 | 170 | 174 | 306 | 153 |
| R202 | 210 | 170 | 111 | 144 | 170 |
| R302 | 283 | 233 | 133 | 265 | 215 |
| R303 | 320 | 270 | 155 | / | / |



| Item | | Specification |
|---|---|---|
| Basic functions | Control system | Current Vector VFD---Performance and functions are specially for water pump |
| | Drive performance | High efficiency drive induction motor and synchronous motor |
| | Max. frequency | Vector control: 0~300Hz V/F control: 0~3200Hz |
| | Carrier frequency | 0.5kHz~15kHz |
| | | Auto regulate the carrier frequency for different load |
| | Input frequency | Digital setting: 0.01Hz |
| | | Analog setting: Max. Frequency x0.025% |
| | Control mode | SVC FVC V/F |
| | Start torque | 0.5Hz/110% |
| | Speed control range | 1:100(SVC) 1:1000(FVC) |
| | Speed accuracy | 0.5%(SVC) 0.02%(FVC) |
| | Pressure accuracy | 0.01Mpa |
| | Torque control accuracy | 5%(FVC) |
| | Accel/decel curve | Lines or S curve accel/decel way |
| | | 4 independent setting 0.0~6500.0s |
| | Jog control | Jog frequency range: 0.00Hz~50.00Hz |
| | | Jog accel/decel time: 0.0s~6500.0s |
| | Auto voltage regulate | Output voltage keep constant |
| | Over voltage/current ontrol | Voltage & current auto limit to avoid over current/voltage trip |
| | Quick current limit | Limit the over current trip to protect VFD normal running |
| Running | Order given | Keypad setting, control terminal setting, communication setting (4G/WIFI setting is optional) |
| | Frequency given | keypad setting, analog voltage setting, analog current setting,communication setting (4G/WIFI setting is optional) |
| | Pressure given | Keypad setting, control terminal setting, communication setting (4G/WIFI setting is optional) |
| | Input/output terminal | 4 digital input terminals; 2 relays output terminals |
| | | 2 analog 4-20mA input terminals |
| Display and keypad operation | LED display | Parameter display |
| | Button lock& function choose | Parameters lock. To define parameter ranges to avoid wrong operation |
| | Protect functions | Input/output phase failure protection, Over current protection;Over voltage protection;Under voltage protection; Overheat protection; overload protection,etc |
| Environment | Installation location | Indoor in which there is no direct sunlight, dust, erosive gas, combustible gas, oil smoke, water vapor, dripping, salt, etc. |
| | Altitude | 1000m or lower |
| | Ambient temperature | -10 ~+40 (If it is 40 -50,please derating using) |
| | Ambient humidity | Below 90% RH(non-condensing) |
| | Vibration | <5.9m/s²(0.6g) |
| | Storage temperature | -20 ~+60 |





# Mechanical & Electrical Installation

## Installation environment:

1) Ambient temperature: Ambient temperature influences the inverter life greatly, so it should be within the range of -10 ~50 .

2) Mount the inverter in a flame retardant surface and the clearance around the inverter shall be enough because the inverter will generate lots of heat during running, besides mount the inverter on the base vertically with screws.

3) Mount the inverter in the location free of water drop, steam, dirt, dust and metal powder.

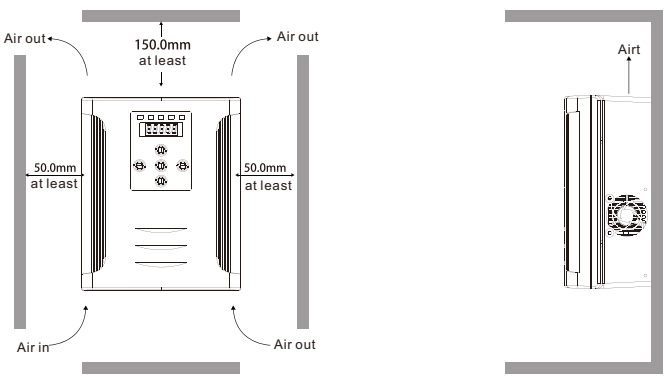
4) Mount in the location free of oil, salt and corrosive gas.

5)Mount in the location where vibration is less than 0.6G; the inverter shall be far away from impacting lathe.

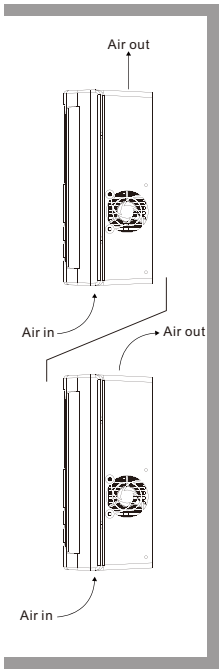
6) Please don't install the inverter in the place with direct sunlight, high humidity (<95%) and water.

7) Mount the inverter in the location free of inflammability, explosive gas, liquid.

## Installation




2-2.1

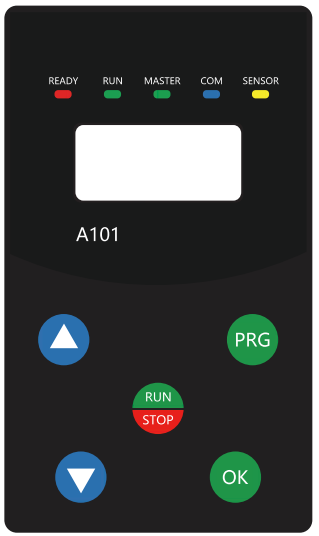



2-2.2

The user shall focus on the heat dissipation issues when installing the inverter, and pay attention to the following points:
1.Installation space is shown in Fig.2-2.1 so as to ensure the heat dissipation space, but consider the heat dissipation of other components when placing the inverter.
2.Install the inverter vertically so that he heat may be expelled from the top, but do not install the inverter upside down. When to Variable Speed Drives are mounted up and down, an air flow diverting plate should be fixed in between as shown in Fig.2-2.2.
3. The installation bracket must be flame retardant.
4.Install the heat sink outside of the cabinet if the inverter is installed in the area with metal powder. And in this case, the space inside the sealing cabinet shall be big enough.








Operation panel SP102

## Operation panel description

| | Light on | Light off | Light twinkle |
|---|---|---|---|
| **Power/Alarm** | Be ready for run | Not ready, check again | Controller failure |
| **Run/Stop** | Run state | Stop state | Sleep state |
| **Maser/Auxiliary** | Master unit | Man or failure state | Auxiliary state |
| **Power/alarm** | | Non or failure communication | Communication state |
| **Communiction** | Sensor normal state | No transmitter detected | No sensor or sensor abnormal |
| **A** | Master unit | | Auxiliary unit |
| **M** | Man mode | | |
| **C** | Speed mode | | |

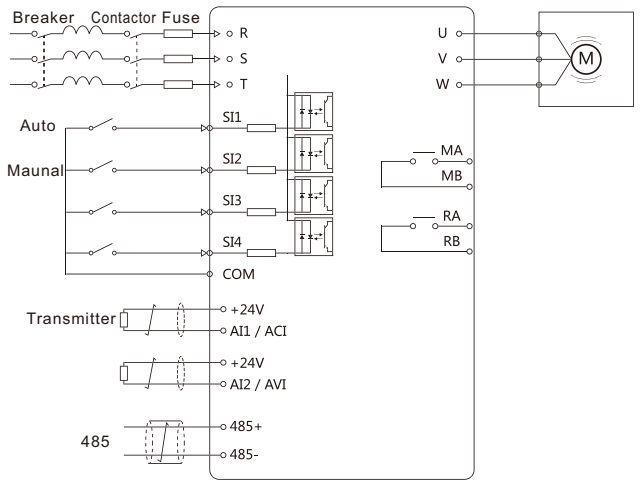
| Serial No. | Button | Display | Description |
|---|---|---|---|
| | PRG | P*<br>00003(Password) | Enter parameter group |
| Parameters setting | ▲ ▼ | PA-PE | (See parameter list) |
| | OK | | Enter parameter group |
| | RUN | | Shift |
| | PRG | | Exit parameter group |
| Pressure setting | ▲ ▼ | 3.0 - 3.0 | Constant pressure mode:<br>The first 2 bits are setting pressure<br>The next 2 bits are actual pressure |
| Speed setting | ▲ ▼ | H 33.12 | Speed mode:<br>Adjust the output frequency directly |
| Master selection | ▲ ▼ | F1 | |
| | OK | | Select as master mode |
| | PRG | | Exit |
| Auxiliary selection | ▲ ▼ | F2 | |
| | OK | | Select as auxiliary mode |
| | PRG | | Exit |
| Choose man mode | ▲ ▼ | F3 | |
| | OK | | Select as man mode |
| | PRG | | Exit |
| Running data query | ▲ ▼ | F0 | See running data 2 |
| | OK | | Query running data |
| | PRG | | Exit |
| State query | OK | | |
| | PRG | P,h,c,u,l,t | See running data1 |



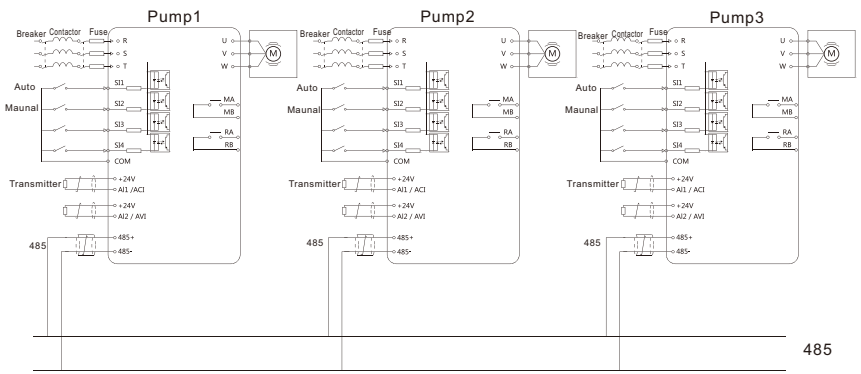


| Button | Display | Code | Description |
|---|---|---|---|
| OK | P 1358 | P | Motor speed |
| OK | H 50.00 | H | Given frequency |
| OK | C 5.8 | C | |
| OK | d 380.0 | d | Output voltage |
| OK | U 623.7 | U | Bus voltage |
| OK | 5.0 - 4.9 | — | Setting pressure--Actual pressure |
| OK | T 35.6 | T | Temperature |
| OK | A 2.00 | A | Setting pressure |
| OK | b 2.35 | b | Actual pressure |

## Single pump wiring diagram




## Multi-pumps wiring diagram




Notes: Wireless functions is optional.





| Code | Name | Precision | Unit | Description |
|---|---|---|---|---|
| F0-00 | Motor speed | 1233 | | |
| F0-01 | Setting frequency | 0.01 | Hz | |
| F0-03 | DC bus voltage | 0.1 | V | |
| F0-04 | Output voltage | 1 | V | |
| F0-05 | Output current | 0.01 | A | |
| F0-06 | Output power | 0.1 | kw | |
| F0-07 | Output torque | 0.1 | % | |
| F0-08 | Input terminal state | 1 | | 0～14 bit: Input terminal state:<br>0: Invalid<br>1: Valid |
| F0-09 | Output terminal state | 1 | | 0～9 bit: Output terminal state:<br>0: Invalid<br>1: Valid |
| F0-10 | AI1 analog | 0.01 | | |
| F0-11 | AI2 analog | 0.01 | | |
| F0-12 | Stop time | 0.1 | Min | |
| F0-13 | Operate time | 0.1 | Min | |
| F0-14 | Power on timing | 1 | Min | |
| F0-15 | Operate timing | 0.1 | Min | |
| F0-16 | PID pressure set point | 1 | Bar | |
| F0-17 | PID feedback pressure | 1 | Bar | |
| F0-18 | Setting-Actual pressure | | | |
| F0-19 | Radiator temperature | 0.1 | C | |
| F0-20 | Countdown to exchange | 0 | Min | |
| F0-21 | Pump change over | | | |
| F0-22 | + pump | | | |
| F0-23 | - pump | | | |
| F0-24 | Countdown to pressure holding | 0.1 | s | |
| F0-25 | Pump numbers | | | |
| F0-26 | Auxiliary pump number set | | | |
| F0-27 | Auxiliary pump numbers | | | |
| F0-28 | Sensor range | | | |
| F0-29 | Version type | 0.1 | | |
| F0-30 | Delay of reducing pumps | 0.1 | | |
| F0-31 | Reserve | | | |
| F0-32 | Reserve | | | |
| F0-33 | Reserve | | | |
| F0-34 | Reserve | | | |
| F0-35 | Reserve | | | |
| F0-36 | Reserve | | | |
| F0-37 | Reserve | | | |
| F0-38 | Reserve | | | |

| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PA00 | Sensor range | 0-90.00 | 010.00 | |
| PA01 | Pressure given source | 0-6 | 0 | 0:PA02 set<br>1: AI1<br>2:AI2<br>3:Reserved<br>4:Reserved<br>5:Communication<br>6:Mulit-command |
| PA02 | Pressure set value | 0.0-100.0% | 030.00 | |
| PA03 | Pressure feedback source | 0-3 | 0 | 0:AI1 1:AI2 |
| PA04 | PID initial speed | 0.0-100.0% | 40.00% | |
| PA05 | Initial speed hold time | 0.00-650.00s | 000.10 | |
| PA06 | Feedback filtering time | 0.00-60.00s | 00.00 | |
| PA07 | Output filtering time | 0.00-60.00s | 00.00 | |
| PA08 | Max.forward deviation | 0.0-100.0% | 001.00 | |
| PA09 | Max. Reverse deviation | 0.0-100.0% | 001.00 | |
| PA10 | Proportional gain:Kp1 | 0.0-100.0 | 030.0 | |
| PA11 | Integraltime:Ti1 | 0.01-10.00s | 00.80 | |
| PA12 | Differential time:Td1 | 0.00-10.000 | 00.000 | |
| PA13 | Proportional gain:Kp2 | 0.0-100.0 | 100.0 | |
| PA14 | Integraltime:Ti2 | 0.01-10.00s | 00.20 | |
| PA15 | Differential time:Td2 | 0.00-10.000 | 00.000 | |
| PA16 | PID exchange condition | 0-2 | 0 | 0:Non-exchange<br>1:Exchange by terminal DI<br>2:Auto exchange by deviation<br>3:Auto exchange by run frequency |
| PA17 | Exchange deviation 1 | 0.0-PA20 | 000.5 | |
| PA18 | Exchange deviation 2 | PA19-100.0% | 001.0 | |
| PA19 | Feedback missing value | 0-5 | 0.00 | 0.0%:No judgment feedback loss<br>0.1%: 0.1%~100.0% |
| PA20 | Feedback missing time | 0.0-20.00s | 000.0 | |





| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PA21 | Water shortage protection detection point | 0-100% | 000.0 | 0:Intelligent calculation: non-zero values repressent the percentage of the rated current |
| PA22 | Monitoring pressure | 0.0-99.0Bar | 000.0 | 0: Invalid:<br>non-zero values represent the monitoring pressure.<br>When the pressure adjusted via the panel or communication exceeds 0.5Bar, the pressure will be forced to revert to the monitoring pressure value." |
| PA23 | Given pressure | | 00.0 | |
| PA24 | PID deviation limit | | 000.0 | |
| PA25 | PID differential amplitude | | 000.10 | |
| PA26 | Wake-up acceleration time | | 0002.5 | After the wake-up function takes effect, the system will accelerate at the speed set by PA26 to improve constant pressure efficiency |
| PA27 | PID direction | | 0 | 0: Positive<br>1:Reverse |

| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PC-00 | Function parameters | 0-100.0 | 0000 | Pump station set<br>Eg.: 05.01<br>Pump quantity:5pcs.<br>Current pump number:1ST |
| PC-01 | Multi-setting 1 | 0-100.0 | 000.0 | Speed mode: percentage of rated rotation<br>Pressure mode: percentage of pressure |
| PC-02 | Multi-setting 2 | 0-100.0 | 000.0 | |
| PC-03 | Multi-setting 3 | 0-100.0 | 000.0 | |
| PC-04 | Multi-setting 4 | 0-100.0 | 000.0 | |
| PC-05 | Multi-setting 5 | 0-100.0 | 000.0 | |
| PC-06 | Multi-setting 6 | 0-100.0 | 000.0 | |
| PC-07 | Multi-setting 7 | 0-100.0 | 000.0 | |
| PC-08 | Pump quantity | 2—16 | 01 | Pump quantity<br>(Decide by PC-00 value) |
| PC-09 | Current pump number | 1—16 | 01 | Current pump number<br>(Decide by PC-00 value) |
| PC-10 | Serial number | 0-9999 | 00 | Reserve |
| PC-11 | Operation mode | 1-5 | 1 | 1:Master 2:Auxiliary: 3:Manual 4:Disable 5:Failure: |
| PC-12 | WiFi serial setting | 0-99999 | 00000 | Reserve |
| PC-13 | Communication address of the second unit | 18-21 | 000 | When two or morte units are connected to the same 485 communication bus, the address of the second unit must be set to a value between 18 and 21 |
| PC-14 | Quantity of main pumps | 1-16 | 1 | The quantity of pumps will run in the system |
| PC-15 | Quantity of small pumps | 1-5 | 0 | The quantity of small flow pumps will run in the system |
| PC-16 | Pump's exchange time | 0-65000s | 10080s | Exchange time of master pump |
| PC-17 | Small pump's exchange time | 0-6000s | 00000 | Exchange time of small pump |
| PC-18 | Small pump's exchange speed | 0-9999 | 0000 | Small pump exchange speed point |





| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PC-19 | Exchange temperature point | 0-100.0 | 050.00 | Auto exchanged when master controller's temperature more than this value |
| PC-20 | Adding pump speed | 0-100 | 095.0 | Auxiliary pump speed value |
| PC-21 | Reducing pump speed | 100% | 075.0 | Auxiliary pump speed value |
| PC-22 | Delay of adding&reducing pump | 0-6500s | 0010.0 | Delay of adding&reducing pump |
| PC-23 | Reserve | | 0 | |
| PC-24 | Water source sensor range | 0-100.00 | 000.00 | sensor range |
| PC-25 | Water source detect deviation | 0-10.00 | 00.00 | Water detect deviation |
| PC-26 | Water source alarm1 | 0-100 | 000.00 | PC26>PC27, high level alarm;<br>PC26<PC27, recovered |
| PC-27 | Water source alarm 2 | 0-100 | 000.00 | Water alarm deviation |
| PC-28 | High pressure alarm | 0-3.0 Deviation mode<br>>3.0 Actual value mode | 02.0 | Eg.: PC28 = 0.5 (Deviation Mode)<br>High pressure deviation value = Setpoint + PC28 = 2.8 bar (given setpoint is 2.3 bar).<br>When the feedback pressure reaches 2.8 bar, the inverter stops and triggers alarm HP-37.<br>When the feedback pressure drops back to the recovery pressure (wake -up pressure), the alarm is cleared and operation resumes.<br><br>Eg.2: PC28 = 5.5 (Actual Value Mode)<br>High pressure alarm threshold = PC28 = 5.5 bar.<br>When the feedback pressure reaches 5.5 bar, the inverter stops and triggers alarm HP-37.<br>When the feedback pressure drops back to the recovery pressure (wake-up pressure),the alarm is cleared and operation resumes." |
| PC-29 | Pipe burst detection pressure differcnce | 0.0-10.0bar | 02.0 | If the system presure fails to reach the set value after all water pumps are in operation and the pressure difference exceeds the value of PC29, the pipe welding alarm 'E. 057' will be triggered after a delay of PC30 |
| PC-30 | Pipe burst detection delay time | 0-6500 | 0120.0 | |
| PC-31 | Float ball recovery delay | 0-600.0s | 000.0 | After the float ball protection is activated, the system wil restart automatically after the delay time set by PC31 when the float ball recovers |

| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PC-32 | Delay of low water level alarm | 0-600.0s | 000.0 | 0:Alarm Err.27, reset by manual<br>>0, alarm delay, reset delay<br>(Terminal function:10) |
| PC-33 | Anti-clogging time | 0-600.0s | 0000 | 0:Function invalid;<br>1:Anti-clogging action activated at each startup;<br>Other values: Anti-clogging function takes effect when the shutdown interval exceeds the value of PC33 |
| PC-34 | Inspect interval | 0-6500 | 4320.0 | Pumps auto start after long time no use to avoid freezing or rusting |
| PC-35 | Anti-freeze interval | 0-1000 | 0700 | |
| PC-36 | Anti-freeze operating time | 0-6500.0 | 0001.00 | |
| PC-37 | Input terminal function:<br>S1 for AR100/AR300<br>S2 for AR200 | 0-18 | 01 | |
| PC-38 | Input terminal function:<br>S2 for AR100/AR300<br>S1 for AR200 | 0-18 | 04 | |
| PC-39 | Terminal | 0-18 | 09 | S3 digital input |
| PC-40 | Terminal | 0-18 | 00 | S4 digital input |
| PC-41 | Output termina 1(MA/MB) | 0-18 | 01 | |
| PC-42 | Output terminal 2(RA/RB) | 0-18 | 02 | |
| PC-43 | Output terminal function3 | 0-18 | 00 | |
| PC-44 | The last failure record | | 26 | |
| PC-45 | The last two failure | | 31 | |
| PC-46 | The latest failure | | 01 | |
| PC-47 | Recent failure frequency | 3times failure frequency | 003.98 | The latest failure frequency |
| PC-48 | Recent failure current | 3times failure current | 005.06 | The latest failure current |
| PC-49 | Recent failure DC voltage | 3 times bus voltage | 0174.6 | The latest failure bus voltage |
| PC-50 | Recent failure running | 3 power on time | 0000.0 | The latest power on time |
| PC-51 | Failure's feedback pressure | | 0 | |





## Input terminal functions PC37---PC40 description

| Code | Display | Setting range | Factory setting | Change limit |
|---|---|---|---|---|
| PC-37 | Input terminal function:<br>S1 for AR100/AR300; S2 for AR200 | 0~18 | 1 | ★ |
| PC-38 | Input terminal function:<br>S2 for AR100/AR300; S1 for AR200 | 0~18 | 4 | ★ |
| PC-39 | Reserve | 0~18 | 9 | ★ |
| PC-40 | Reserve | 0~18 | 0 | ★ |

| Setting | Function | Description |
|---|---|---|
| 0 | No function | The terminals can set as no functionis you don't use them. |
| 1 | (FWD) | User the external terminals to control inverter's FWD & REV. |
| 2 | (REV) | |
| 3 | Three-wire operation instruction | |
| 4 | (FJOG) | FJOG: FWD inching turning，RJOG: REV reverse inching turning。Jog running frequency, JOG-acc./dec. Time, Parameter PE08, PE09 |
| 5 | (RJOG) | |
| 6 | UP | Modify the frequency by external terminal setting frequency.<br>When the frequency set as Numbers, press UP/DOWN to change the frequency |
| 7 | DOWN | |
| 8 | (RESET) | To reset by the teminal control.<br>It is with same function as panel's RESET. |
| 9 | External fault input1 | PC31=0:, Alarm immediately Er.31，Reset by manual.<br>PC31>0: Alarm delay Er.31，Reset delay |
| 10 | External fault input2 | PC32=0: Alarm immediatelyEr.27，Reset by manual.<br>PC32>0:Alarm delayEr.27，Reset delay |
| 11 | External fault normal open input | When the signal deliver to inverter, it display Er.014 |
| 12 | Multi-speed terminal1 | With 8 multi-speed setting by these three terminals. |
| 13 | Multi-speed terminal2 | |
| 14 | Multi-speed terminal3 | |
| 17 | Normal open for low level | |
| 18 | Normal closed for low level | |
| 25 | External command control | Support max.3pumps |
| 26 | PE01=3 | Valid |
| 27 | PC31>0 | Normal open for high level |
| 28 | PC31<0 | Normal closed for high level |

## Ouput terminal functions PC41---PC43 description

| Code | Display | Setting range | Factory setting | Change limit |
|---|---|---|---|---|
| PC-41 | Relay output function choose | MA/MB(AR100,AR200) 0~18 | 1 | ★ |
| PC-42 | Relay output function choose | RA/RB (AR100,AR200) 0~18 | 2 | ★ |
| PC-43 | Relay output function choose | 0~18 | 0 | ★ |

Functions as follows:

| Setting | Function | Description |
|---|---|---|
| 0 | No output | The output terminal has no function. |
| 1 | Inverter running | This indicates the inverter is running state. With output frequency(frequency can be 0), output as ON Signal. |
| 2 | Fault output(fault shutdown) | When the inverter fails and stops, output as ON Signal. |
| 21 | System failure | |
| 22 | Pumps running | |
| 23 | System sleep | |
| 24 | System running | |
| 27 | Low level | |
| 28 | High level | |





| Code | Name | Range | Factory setting | Description |
|---|---|---|---|---|
| PE-00 | Pump motor working mode | 0-2 | 2 | 0：Vector 2：VF |
| PE-01 | Control mode | 0-3 | 0 | 0: Only panel control and communication control are valid;<br>1: Only external terminals are valid;<br>3: Multi-terminal external control startup is valid |
| PE-02 | Frequency source choose | 0-8 | 8 | 0：Frequency set by keypad<br>8：Constant pressure control mode |
| PE-03 | Motor rotation | 0-1 | 0 | 0：Run as choose<br>1：Run the opposite direction |
| PE-04 | Carrier frequency | 0.5-16.0KHz | 8 | According to the inverter power |
| PE-05 | Preset frequency | 0.001-Max.frequency | 030.00 | |
| PE-06 | Acc. time | 0.0-6500.0s | 5 | |
| PE-07 | Dec. time | 0.0-6500.0s | 5 | |
| PE-08 | Jog frequency | 0-Max.frequency | 010.00 | |
| PE-09 | Jog acc./dec.time | 0-6500.0s | 0020.0 | |
| PE-10 | Sleep frequency | 0-Max.speed | 1500 | |
| PE-11 | Sleep delay | 0-6500.0s | 0060.0 | |
| PE-12 | Wake up differential pressure | 0-6553.5 | 000.30 | |
| PE-13 | Wake up delay | 0-500.0S | 000.10 | |
| PE-14 | Barometric coefficients | 0-120 | 20.0 | |
| PE-15 | Delay of built-in lack of water | 0-6553.5 | 0060.0 | 0: Closed |
| PE-16 | Speed limit lack of water | 0-Max.speed | 02800 | |
| PE-17 | Delay of transmitter breakage | 0-6553.5 | 0060.0 | 0: Closed |
| PE-18 | Speed limit as transmitter breakage | 0-Max.speed | 02100 | |
| PE-19 | Delay of non-motor | 0-6553.5 | 0030.0 | 0: Closed |
| PE-20 | Motor type | 0: Normal asynchronous motor<br>1: Variable frequency asynchronous motor<br>2:Permanent magnet synchronous motor | 0 | |
| PE-21 | Rated voltage | 1-200v | | |
| PE-22 | Rated power | 0.1-1000.0kw | | |
| PE-23 | Rated current | 0.01A-655.35A | | |
| PE-24 | Rated rpm | 1-65535rpm | | |
| PE-25 | Rated frequency | 0.01--Max. frequency | | |

## Fault code

| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| Err.01P | Under voltage | 1.Transient power cut exists or not<br>2.Check if the input voltage of the motor driver inverter is within the value required by the regulation<br>3.Measure if the DC bus voltage is normal<br>4.Check if the rectifying bridge or the buffering resistor is normal<br>5.Check if the drive board is normal<br>6.Check if the main control board is normal | 1.Motor driver inverter reset<br>2.Adjust the power supply or remove the peripheral power -supply loop fault<br>3.Seek technical support |
| Err.02P | Over voltage during accel. | 1.Is there any brake unit or brake resistor installed<br>2.The input voltage is too high or not<br>3.f there exists the external force driving the motor operation during the acceleration process<br>4.The acceleration time is too short or not | 1.Install the brake unit and resistor<br>2.Adjust the voltage within the normal range<br>3.Cancel the external force or install the brake resistor<br>4.Increase the acceleration time |
| Err.03P | Over-current during decel. | 1.Check if the output loop of the inverter has the earthing or short circuit<br>2.Whether the motor parameter identification has been performed or not<br>3.Is the deceleration time too short<br>4.Is the voltage too low<br>5.Whether there exists a shock load during the deceleration process<br>6.Is there the brake unit or brake resistor installed | 1.Remove the peripheral fault<br>2. Perform the motor parameter Identification<br>3.Increase the deceleration time<br>4.Adjust the voltage within the normal range<br>5.Cancel the shock load<br>6.Install the brake unit and brake resistor |
| Err.04P | Over-current at constant speed | 1.Check if the output loop of the motor driver inverter has the short circuit or leakage circuit<br>2.Whether it is V/F mode, the motor parameter identification has been performed or not<br>3.The voltage is too low<br>4.Is there the shock load during the running<br>5.The type of inverter is too small | 1.Remove the peripheral fault<br>2.Perform the motor parameter identification<br>3.Adjust the voltage within the normal range<br>4.Cancel the shock load<br>5.Choose the bigger power inverter |
| Err.05P | Over-current during accel. | 1.Is the acceleration time too short.<br>2.Whether it is proper to manually raise torque or V/F curve<br>3.The voltage is too low or not<br>4.If the output loop of the inverter has the earthing or short circuit<br>5.Control mode is V/F,but the motor parameter if is indentification performed.<br>6.Try to drive the rotating motor.<br>7.Is there the shock load during the acceleration process<br>8.The type of inverter is small | 1、Increase the acceleration time<br>2、Adjust the manual raising of torque or V/F curve<br>3、Adjust the voltage to the normal range<br>4、Remove the peripheral fault<br>5、Perform the motor parameter ide Select the rotation speed tracing before restarting or restart after the motor stops<br>7、Cancel shock load<br>8、Choose the bigger power inverter |





| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| Err.06P | Over voltage during decel | 1.The input voltage is too high. If there exists external forces driving the<br>2.motor operation during the deceleration process<br>3.The deceleration time is too short or no<br>4.Is there any brake resistor installed | 1.Adjust the voltage within normal range<br>2.Cancel the external force or install the brake resistor<br>3.Increase the deceleration time<br>or install the brake resistor<br>4.Install the brake resistor |
| Err.07P | Motor Over Load | 1.The type of inverter is small<br>2.The motor protection parameter P9.01 setting is suitable or not<br>3.The load is too big or the motor is blocked | 1.Increase the inverter capacity<br>2.Correctly set up the parameter<br>3.Reduce the load |
| Err.08P | Inverter Over Load | 1.The type of inverter is small<br>2.The load is too big or the motor is blocked | 1.Increase the inverter capacity<br>2.Reduce the load |
| Err.09P | Inverter unit protection | 1.Inverter's output to motor possible short circuits.<br>2.The wiring between motor and inverter is too long<br>3.Moduel is overheat<br>4.Inverter inner wiring loose<br>5.Motherboard unnormal<br>6.Power board unnormal<br>7.Inverter module unnormal | 1.Check and rule out external faulty<br>2.Add electric reactor and output filter<br>3.Check air duct if is blocking; fan if could normal work<br>4.Plug all connection cables<br>5.Please seek technical service |
| Err.10P | Power supply fault | 1.Check if the input voltage of the motor driver inverter is within the value required by the normal range | 1.Adjust the power supply |
| Err.11P | Over voltage during constant running | 1.Is there any the external force driving the motor during the operation<br>2.The input voltage is too high or not | 1.Cancel the external force or install the brake resistor<br>2.Adjust the voltage within the normal range |
| Err.12P | Output phase failure | 1.Check if the lead wire from frequency inverter to the motor is normal<br>2.Check if the thre-e p hase output of frequency inverter is balanced when running without motor<br>3.Check if drive board is normal<br>4.Check if the module is normal | 1.Remove peripheral fault<br>2. Check if the motor thre-phase winding is normal, If no, remove the fault<br>3.Seek technical support |
| Err.13P | Module overheat | 1.If the wind channel is blocked<br>2.If the fan is damaged<br>3.If the environmental temperature is too high<br>4.If the module heat-variable resistor is damaged<br>5.If the inverse module is damaged | 1.Clear the wind channel<br>2.Change the fan<br>3.Reduce the environmental temperature<br>4.Change the heatvariable resistor<br>5.Change the inverse module |
| Err.14P | External device fault | 1.Input peripheral fault signal via multifunctional terminal DI or not<br>2.Input external fault signal via analog IO function | 1.Reset running |

| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| Err.15P | Communication fault | 1.Communication connection is normal or not<br>2.Communication parameters P0.28 are correctly set up or not<br>3.Communication parameters PD are correctly set up or not<br>4.Master station works or not | 1.Check communication connection<br>2.Change communication parameters |
| Err.16P | Contactor fault | 1.Input phase fault<br>2.Drive board, contactor is normal or not | 1.Check and remove the problems in the peripheral lines<br>2.Change the drive board, power board, contactor |
| Err.17P | Current Inspection Circuit Failure | 1.Check if Hall device is normal<br>2.Check if the drive board is normal | 1.Change Hall device<br>2.Change drive board |
| Err.18P | Motor self-learning failure | 1.The parameters identification process is overtime or not<br>2.The motor parameters are configured as per the data on the nameplate or not | 1.Check the lead wire from frequency inverter to motor<br>2.Correctly configure the motor parameters |
| Err.19P | Encoder disk fault | 1.Encoder damaged<br>2.PG card problem<br>3.Encoder model not correct<br>4.Encoder connection wrong | 1.Change the encoder<br>2.Change the PG card<br>3.Set the correct encoder type<br>4.Check the connection |
| Err.20P | Input phase failure | 1.Check if the drive board is normal<br>2.Check if the lightning protection board is normal<br>3.Check if The main control board is normal<br>4.Check if the three-phase input power is normal | 1.Change drive board, main control board<br>2.Seek technical support<br>3.Check and remove the problems in the peripheral lines,To make the three-phase power entering the frequency inverter normal |
| Err.21P | Hardware fault | 1.Over voltage<br>2.Over current | 1.Over voltage solve way<br>2.Over current solve way |
| Err.22P | Ground fault | 1.Motor to Ground short circuit | 1. Change cable or motor |
| Err.25P | Total running time failure | 1.Total running time achieve the setting value | 1. To use the reset function to clear the record |
| Err.26P | EEPROM read-write failure | 1.Whether it is normal after the renewal of the main control board | 1.main control board fault |
| Err.27P | User fault 2 | 1.Input user fault1 signal via multifunctional terminal DI or not<br>2.Input user fault1 signal via analog IO function | 1.Reset running |





| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| Err.31P | User fault 1 | 1、Input user fault1 signal via multifunctional terminal DI or not<br>2、Input user fault1 signal via analog IO function | 1、Reset running |
| Err.32P | Transmitter breakdown or broken | 1. No transmitter<br>2. Transmitter problem | PE.17 Protection time<br>0：Close protection |
| Err.33P | Lack of water | 1. Water coming not enough<br>2. Air in the pipeline | PE.15 Protection time<br>0：Close protection |
| Err.35P | Water pump run without any load | 1. If air in the pump body<br>2. If suction side block | PE.19 Protection time<br>0：Close protection |
| Err.36P | Low level alarm | Digital signal terminal, set function code 27 :<br>connect, alarm Err.36<br>Disconnect, recovered .(usually for float switch) | Check the function code and signal if is normal |
| Err.37P | High level alarm | Digital signal terminal, set function code 28 :<br>connect, alarm Err.38<br>Disconnect, recovered .(usually for float switch) | Check the function code and signal if is normal |
| Err.38P | Low level alarm2 | 1.The command from up machine | The commmunication and signal from up machine if is normal |
| Err.39P | High level alarm2 | 1.The command from up machine | The commmunication and signal from up machine if is normal |
| Err.040P | Change over fault | 1.Change the motorby terminal when inverter is running | 1.Operate after inverter stop |
| Err.41P | Speed deviation fault | 1.Speed deviation is toobig, and P9.69&P9.60 setting is not correct.<br>2.Encoder parameter setting is not correct.<br>3、Does not with parameter identification | 1、Setting the value suitable<br>2、Set the correct encoder<br>3. Motor parameter identification |
| Err.42P | Motor over speed fault | 1.Speed deviation is toobig, and P9.69&P9.60 setting is not correct.<br>2.Encoder parameter setting is not correct.<br>3、Does not with parameter identification | 1.Setting the value suitable<br>2.Set the correct encoder<br>3.Motor parameter identification |

| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| Err.43P | Reserve | | |
| Err.44P | Reserve | | |
| Err.45P | Motor Jammed | Below 1000 RPM, the load reaches full load, triggering an abnormal alarm | Check the rpm |
| Err.57P | Pipe burst alarm function | When the actual pressure is lower than the set pressure and the pressure difference exceeds the value of PC29, an ERR57 alarm will be triggered after a delay of PC30. | Check the pipeline if is normal |
| LL-36 | Low water level signal | Upon receiving a low-water-level signal from the float switch, the system will decelerate to a stop and trigger alarm LL-36.<br>After the float switch returns to its normal state, the system will automatically resume operation after a time delay of PC31. | Code 17: normal open for low level;<br>Code 18: normal closed for low level |
| HL-36 | High water level signal | | Code 27: normal open for high level;<br>Code 28: normal closed for high level |
| HP-37 | High pressure alarm | PC 28<br>When the PC28 setting value is between 0 and 3.0, the system identifies it as Deviation Mode;<br>When the PC28 setting value is > 3.0, the system identifies it as Actual Value Mode.<br><br>Example 1: PC28 = 0.5 (Deviation Mode)<br>High-pressure deviation value = Setpoint + PC28 = 2.8 bar (given that the setpoint pressure is 2.3 bar).<br>When the feedback pressure reaches 2.8 bar, the VFD (variable frequency drive) will stop and trigger alarm HP-37.<br>When the feedback pressure drops back to the wake-up pressure, the alarm will be cleared and the system will resume operation. | |

Intelligent water supply controller
Fault and solution

| Fault code | Fault name | Fault reason | Disposal methods |
|---|---|---|---|
| | | Example 2: PC28 = 5.5 (Actual Value Mode)<br>High-pressure alarm value = PC28 = 5.5 bar.<br>When the feedback pressure reaches 5.5 bar, the VFD will stop and trigger alarm HP-37<br>When the feedback pressure drops back to the wake-up pressure, the alarm will be cleared and the system will resume operation. | |