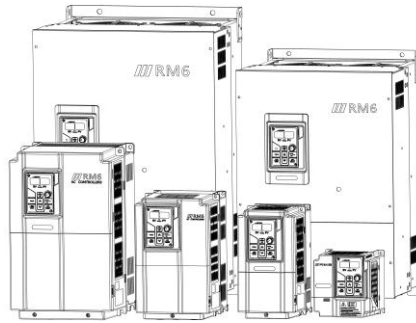
# RM6F5 Series
# Simple Version
# Operation Manual



2022.08.15 Edition XB200235

Thank you for using RHYMEBUS RM6F5 series drive.
For proper operations and safety purposes, please read manual carefully.
Only the qualified personnel may proceed with the installation.
Scan the QR code on the right side for the complete operation manual.
Please pay attention to the safety precautions marked with “DANGER” or “CAUTION” in complete manual before installation.

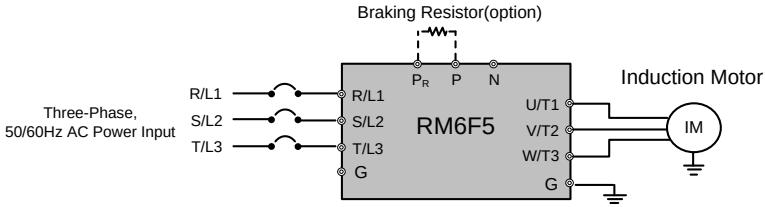
| | |
|---|---|
| **DANGER** | User may cause the casualty or serious damages if user does not abide by the instructions of the manual to execute the tasks. |
| **CAUTION** | User may cause injuries to the people or damage the equipment if user does not abide by the instructions of the manual to execute the tasks. |

## ■ Terminals of Main Circuit

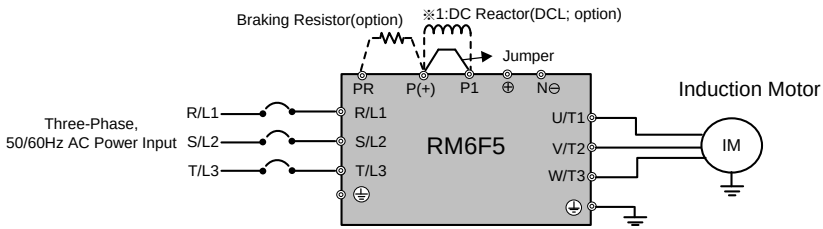
| | | | |
|---|---|---|---|
| Power Source | R,S,T (L1,L2,L3) | AC power source input terminals | Three-phase; sinusoidal power source input terminals. |
| | ⊕, N⊖ | DC power source input terminals | External DC power source terminal. ※Only 2007 ~ 2015, 4007 ~ 4020 models have the terminal. |
| Motor | U,V,W (T1,T2,T3) | Drive outputs to motor terminals | Output three-phase variable frequency and voltage to motor. |
| Power and Braking | P(+), N⊖ | Dynamic brake unit terminal | Connect to dynamic braking unit(option). |
| | P, N | | |
| | P, PR | External brakingresistor terminal | Connect to external brake resistor (option). |
| | P(+), PR | | |
| | P(+), P1 | External reactor terminal | Connect to DC reactor (DCL) for improving power factor. The default setting is connected by a jumper. |
| Grounding | PE(or G) ⏚ | Grounding terminal | Ground the drive in compliance with the NEC standard or local electrical code. |

## ■ Decription of terminal and wiring diagram

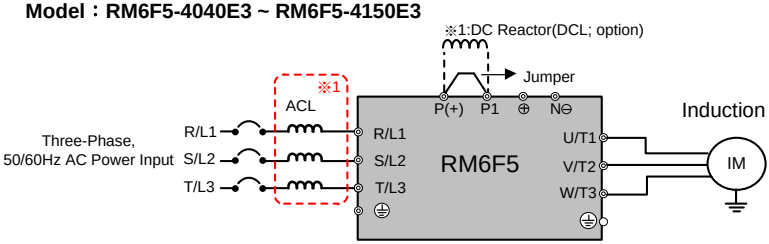
**Model：RM6F5-2001B3~RM6F5-2005B3 ;**
**Model：RM6F5-4001B3~RM6F5-4007B3**



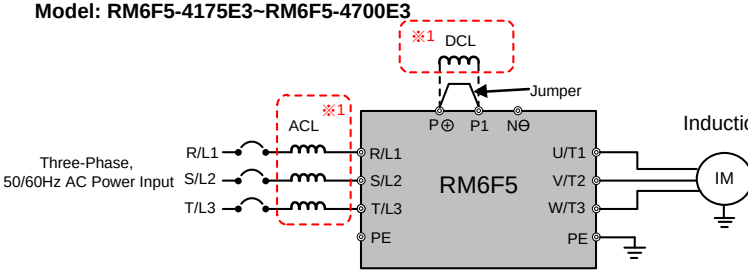

**Model：RM6F5-2007B3 ~ RM6F5-2020B3;**
**Model：RM6F5-4010B3 ~ RM6F5-4030B3**




**Model：RM6F5-2025E3 ~ RM6F5-2100E3;**
**Model：RM6F5-4040E3 ~ RM6F5-4150E3**




**Model: RM6F5-2125E3~RM6F5-2250E3;**
**Model: RM6F5-4175E3~RM6F5-4700E3**

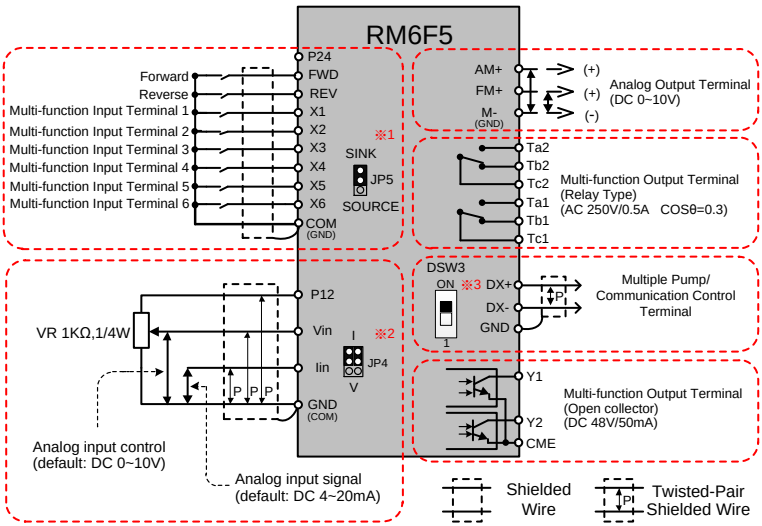



※1.125HP above drives: AC reactor (ACL) is the standard accessory;
200HP above drives: DC reactor (DCL) is the standard accessory.
Please remove the jumper between P1 and P terminal, when connecting the external DC reactor (DCL). Do Not remove the jumper, when DC reactor (DCL) does not be connected.

## ■ Control Termianl

| Type | | Symbol | Function | Description |
|---|---|---|---|---|
| Control circuit terminal | Control power | P24 | Power terminal; Control device usage | Output DC+24V; Maximum supplied current is 50mA. |
| | | P12/12V | | Output DC+12V; Maximum supplied current is 20mA. |
| | | GND (COM) | Common of analog input control terminals | Common terminal for control power (P12/12V,P24) and analog input terminal (Vin, Iin). |
| | Input terminals | FWD | Forward command terminal | Connect the FWD and COM terminals for forward operation. (F_001=0) |
| | | REV | Reverse command terminal | Connect the REV and COM terminals for reverse operation. (F_001=0) |
| | | X1 | Multi-function input terminal 1 | • The function is set by F_052.<br>• Default setting: Coast to stop command |
| | | X2 | Multi-function input terminal 2 | • The function is set by F_053.<br>• Default setting: Open loop selection |
| | | X3 | Multi-function input terminal 3 | • The function is set by F_054.<br>• Default setting: Jog command |
| | | X4 | Multi-function input terminal 4 | • The function is set by F_055.<br>• Default setting: Secondary accel/decel time command |
| | | X5 | Multi-function input terminal 5 | Reserve |
| | | X6 | Multi-function input terminal 6 | Reserve |
| | | COM (GND) | Common of digital input control terminals | Common of digital input control signal terminals. (FWD, REV and X1 ~ X4) |
| | | Vin | Analog input terminal | Input range: DC 0~10V。 |
| | | Iin | Analog input terminal | • Input signal selection<br>JP4: I position (current signal)<br>JP4: V position (voltage signal)<br>• Input range: DC 4~20mA (2~10V) or<br>DC 0~20mA (0~10V)<br>• The function is set by F_126. |
| | Output terminals | FM+<br>AM+ | Analog output terminals | • Voltage meter with 10V full scale spec.<br>(meter impedance: 10kΩ above)<br>• Maximum output current: 1mA |
| | | M-<br>(GND) | Common of analog output terminals | Common of analog output terminals. |
| | | Ta1 | Multi-function output terminals (relay type) | • N.O (contact a); The function is set by F_060 .<br>• Default setting: Error detection<br>• Capacity: AC250V, 0.5A Max, cosθ=0.3 |
| | | Tb1 | | • N.C (contact b); The function is set by F_060<br>• Capacity: AC250V, 0.5A Max, cosθ=0.3 |
| | | Tc1 | | Common terminal for Ta1, Tb1. |
| | | Ta2 | | • N.O (contact a); The function is set by F_061<br>• Default setting: Operation detection<br>• Capacity: AC250V, 0.5A Max, cosθ=0.3 |
| | | Tb2 | | • N.C (contact b); The function is set by F_061<br>• Capacity: AC250V, 0.5A Max, cosθ=0.3 |
| | | Tc2 | | Common terminal for Ta2. |
| | | Y1 | Multi-function output terminals (open collector type) | • The function is set by F_058, F_059.<br>• Capacity: DC48V, 50mA Max |
| | | Y2 | | |
| | | CME | | Common terminal of Y1, Y2. |
| External Communication Terminal | | DX+ | Signal transmission terminal(+) | • Connect the drive by transmission cable, when the drive controls multiple pumps or RS-485 communication interface.<br>• Communication protocol: Modbus |
| | | DX- | Signal transmission terminal(-) | |
| | | GND | Grounding terminal of signal transmission | Grounding terminal of shielding wire. |

## ■ Description of Terminal and Wiring Diagram



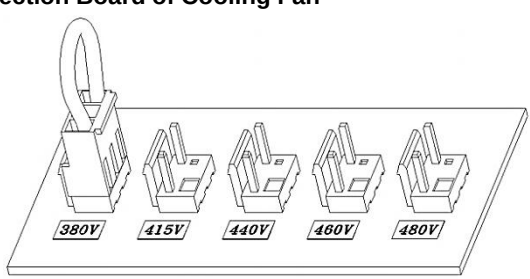

※1.JP5: SINK / SOURCE selection;
The signal input selection of multi-function input terminal(X1~X4), FWD/REV terminals.

※2.JP4: I / V selection;
I position: Iin-GND terminal is inputted with the current signal.(default)
V position: Iin-GND terminal is inputted with the voltage signal.

※3.DSW3: The terminal resistor selection for communication; The internal resistance is 100Ω. When external device control multiple drives, switch the DSW3 to “ON” position at the first and last drive.

※4.The analog input selection is set by F_126 (default: DC 2~10V(4~20mA))

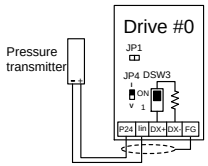
## ■ Voltage Selection Board of Cooling Fan




※Above models RM6F5-4100 have the voltage selection board shown in above figure when removing the main circuit terminal cover of the drive. Please carefully select the jumper position according to the power source(actual power voltage level) to avoid the burnout of the fan or the overheating of the drive.(EX: When the power source is 460V, selecting the position from 380V to 460V)

## ■ Wiring Diagram and Setting for Single-pump and Multi-pump Applications

### Single Pump Control(F_015=1)

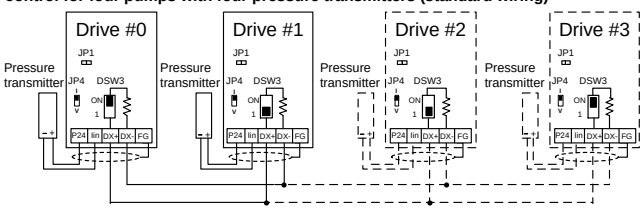



1. JP4: I position
2. JP1: Open
3. DSW3: ON position
4.F_015=1

JP4: Input signal type selection of Iin
JP1: Input impedance selection of Iin
DSW3: Terminal resistor switch
F_015: Selection of Pump Control Mode
F_016: Set Drive's No for Parallel Control

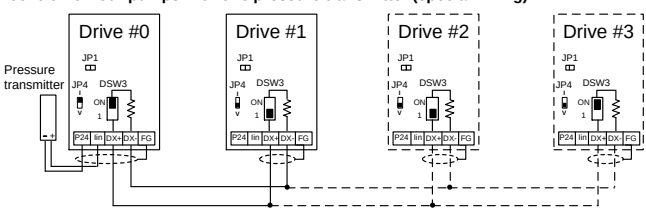
### Multi-Pump Control(F_015=2,3,4)

**1. Parallel control for four pumps with four pressure transmitters (standard wiring)**



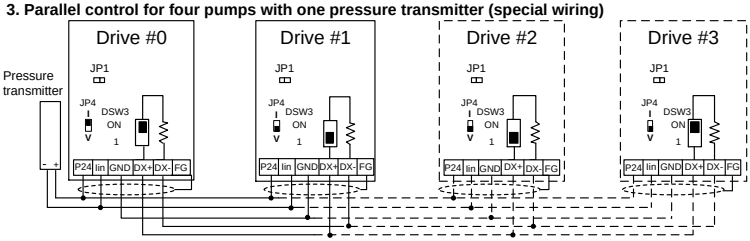

1. JP4: Drive #0 ~ #3 → I position
2. JP1: Drive #0 ~ #3 → open
3. DSW3: Drive #0 and Drive #3 → ON position; Drive #1 and #2 → 1 position
4. Set the number for every drive by F_016

**2. Parallel control for four pumps with one pressure transmitter (special wiring)**



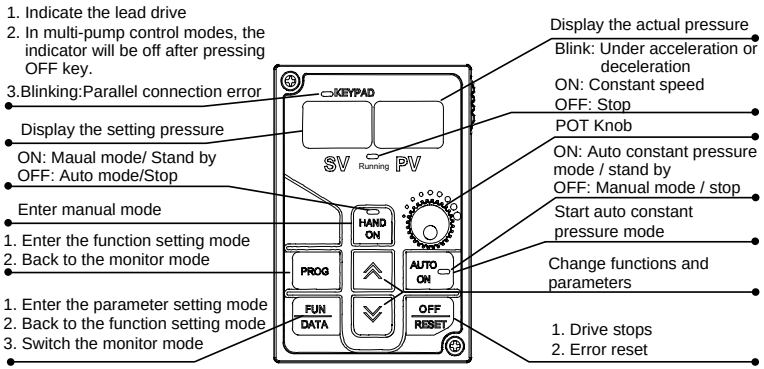

1. JP4: Drive #0 → I position; Drive #1 ~ #3 → V position
2. JP1: Drive #0 → open; Drive #1 ~ #3 → close
3. DSW3: Drive #0 and Drive #3 → ON position; Drive #1 and #2 → 1 position
4. Set the number for every drive by F_016

**3. Parallel control for four pumps with one pressure transmitter (special wiring)**



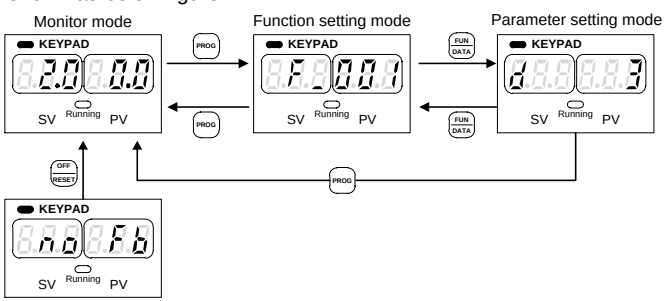

1. JP4: Drive #0 → I position; Drive #1 ~ #3 → V position
2. JP1: Drive #0 → open; Drive #1 ~ #3 → close
3. DSW3: Drive #0 and Drive #3 → ON position; Drive #1 and #2 → 1 position
4. Set the number for every drive by F_016

## ■ Digital Type Keypad (KP-605)




## ■ Operation of Keypad

The operation of the digital keypad includes fault messages and three modes. The switching methods are shown as below figure:

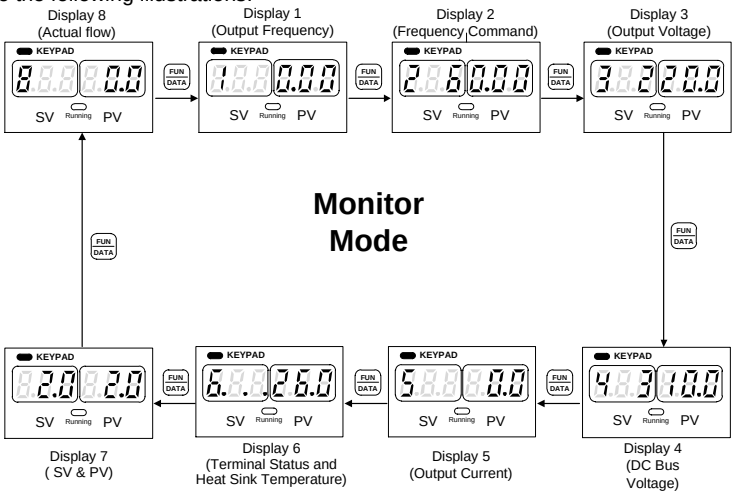



The operation steps are shown as below table (by default setting)

| Operation Steps | Display |
|---|---|
| 1.Start the drive and enter the monitor mode. |  |
| 2.Press PROG key and enter the function setting mode. |  |
| 3.Press FUN DATA key and enter the parameter setting mode. |  |
| 4.Press FUN DATA key and return to the function setting mode. |  |
| 5.Press PROG key and return to the monitor mode. |  |

## ■ Description of Monitor Mode

There are eight displays can be selected in the monitor mode. Press FUN DATA to switch the display in accordance with below sequence under monitor mode. User can determine one of eight displays as the main display from function F_006 (Selection of Main Display). Please refer to the following illustrations:




a. Select one of eight displays as the main display from function F_006 (Selection of Main Display).

b. Determine one of eight displays as the main display according to the application. When the parameter of function is completed without pressing key, the drive will automatically switch back to the main display after 3 minute.

## ■ Parameter List

| Func. | Name | Description | | | Range of Setting | Unit | Default |
|---|---|---|---|---|---|---|---|
| F_000 | Drive Information | 0: Software version<br>1: Drive model number<br>2: Drive running hours<br>3: Drive supply power time<br>4: Software checksum code<br>5: Reserved | | | – | – | – |
| F_001 | Start Command Selection | | **Start command** | **Rotation direction command** | 0~11 | – | 3 |
| | | 0: | FWD or REV terminal | FWD or REV terminal | | | |
| | | 1: | FWD terminal | REV terminal | | | |
| | | 2: | Keypad “AUTO RUN” key | FWD, REV terminal | | | |
| | | 3: | | Forward direction | | | |
| | | 4: | | Reverse direction | | | |
| | | 5~7: | Reserved | Reserved | | | |
| | | 8: | Communication interface | Communication interface | | | |
| | | 9: | Communication interface | REV terminal | | | |
| | | 10: | FWD terminal | Communication interface | | | |
| | | 11: | Keypad “AUTO RUN” key | Communication interface | | | |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_002 | Frequency Command Selection | 0: Frequency command by analog signal<br>1: Frequency command by keypad.<br>2: Pressure command by keypad.<br>3: Frequency command by communication.<br>4: Pressure command by communication.<br>5: Pressure command by analog signal<br>6: Frequency command by Pot on the keypad<br>7: Pressure command by Pot on the keypad | 0~7 | — | 2 |
| F_003 | Selection of "STOP" Key Validity | 0: Start command by terminal, "STOP" key disabled.<br>1: Start command by terminal, "STOP" key enabled. | 0,1 | — | 1 |
| F_004 | Setting Value(SV) Selection | 0: In the monitor mode, setting value cannot be changed.<br>1: In the monitor mode, setting value can be changed. | 0,1 | — | 1 |
| F_005 | Auto-Storing of Setting Value Selection | 0: In the monitor mode, setting value auto-storing disable.<br>1: In the monitor mode, setting value auto-storing after 3 minutes. | 0,1 | — | 1 |
| F_006 | Selection of Main Display | Select 1 of 8 "monitor modes" as the main display. | 1~8 | — | 7 |
| F_007 | Pressure Transducer Setting | Set upper limit value of pressure in accordance with pressure transducer specification.(pressure setting value is corresponding to maximum voltage or current. | 0.0~160.0 | bar | 10.0 |
| F_008 | Maximum Allowabel Operating Pressure | Set the maximum operating pressure value (F_007*F_008) in accordance with the specification of pump. | 0~100 | % | 100 |
| F_009 | Starting Frequency | The starting frequency of drive. | 0.1~10.0 | Hz | 0.5 |
| F_010 | Starting Voltage | The voltage corresponds to the starting frequency. | 0.1~50.0 | V | 8.0 (Note1) |
| | | | 0.1~100.0 | | 12.0 (Note2) |
| F_011 | Base Frequency | The frequency corresponds to the base voltage in V/F pattern. | 0.1~400.0 | Hz | 60.0 |
| F_012 | Base Voltage | The voltage corresponds to the base frequency in V/F pattern. | 0.1~255.0 | V | 220.0 (Note1) |
| | | | 0.1~510.0 | | 380.0 (Note2) |
| F_013 | Selection of Pump Shift Operation (Parallel control) | 0: Disable.<br>1: Shift the pump operation arriving the operating time (F_024).<br>2: Shift the pump operation after a drive stops.<br>3: Both 1 and 2 enabled. | 0~3 | — | 3 |
| F_015 | Control Mode Selection (Parallel control) | 0: Disable the functions related to pump.<br>1: Single pump application.<br>2: Multi-pump applications; (E-mode)<br>3: Multi-pump applications; (F-mode)<br>4: Multi-pump applications; (M-mode)<br>5: Multi-pump applications; (S-mode)<br>6: Air conditioning multiple control.<br>7: Proportional feedback control. | 0~7 | — | 1 |
| F_016 | Set Drive's No. for Parallel Control | Set the individual number for every drive.<br>#0 as the lead drive to command others. | 0~7 | — | 0 |
| F_017 | Maximum Output Frequency | The maximum output frequency of drive. | 0.1~120.0 | Hz | 60.0 |
| F_018 | Reference Frequency of Accel/Decel Time | The frequency corresponding to accel/decel time. | 0.01~ 120.00 | Hz | 60.00 |
| F_019 | Primary Acceleration Time | The acceleration time from stop to reference frequency. | 0.0~ 3200.0 | sec | 1.0 |
| F_020 | Primary Deceleration Time | The deceleration time from reference frequency to stop. | 0.0~ 3200.0 | sec | 1.0 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_021 | Launch Detection Time (Parallel Control) | In multi-pump control systems, If the pressure decreasing gradually, set the detection time to launch auxiliary drive. | 0.0~25.0 | sec | 6.0 |
| F_022 | Launch Detection Level (Parallel Control) | In multi-pump control systems, set the detection level when the pressure decreasing gradually. | 0.0~25.0 | bar | 0.4 |
| F_023 | Cut-off Frequency (Parallel Control) | In multi-pump control systems,set the cut-off frequency and start frequency for lead/auxiliary drive stopping. | 0.0~60.0 | Hz | 50.0 |
| F_024 | Pump Auto Shift Time (Parallel Control) | The time of pump shift operation in multi-pumps control system. | 0~240 | hr | 24 |
| F_025 | Cut-off Time (Parallel Control) | In multi-pump control systems, the detection time of pump departs from operation. | 0.0~25.0 | sec | 10.0 |
| F_026 | Communication Baud Rate (Parallel Control) | The communication baud rate setting for multi-pump control systems. | 0~3 | — | 1 |
| F_027 | Secondary Acceleration Time | Switch to secondary acceleration time by multi-function input terminal. | 0.0~ 3200.0 | sec | 0.5 |
| F_028 | Secondary Deceleration Time | Switch to secondary deceleration time by multi-function input terminal. | 0.0~ 3200.0 | sec | 0.5 |
| F_029 | Set S-curve for Accel/Decel Time | Set S-curve to slow the acceleration and deceleration time at start and stop. | 0.0~5.0 | sec | 0.0 |
| F_030 | V/F Pattern Selection | 0: Linear<br>1: Square curve.<br>2: 1.7$^{th}$ power curve.<br>3: 1.5$^{th}$ power curve. | 0~3 | — | 1 |
| F_031 | Primary Speed | Jog command: OFF<br>Multi-speed level 3 command: OFF<br>Multi-speed level 2 command: OFF<br>Multi-speed level 1 command: OFF | 0.00~ 120.00 | Hz | 0.00 |
| F_032 | Preset Speed 1 | OFF / OFF / OFF / ON | | | 20.00 |
| F_033 | Preset Speed 2 | OFF / OFF / ON / OFF | | | 25.00 |
| F_034 | Preset Speed 3 | OFF / OFF / ON / ON | | | 30.00 |
| F_035 | Preset Speed 4 | OFF / ON / OFF / OFF | | | 45.00 |
| F_036 | Preset Speed 5 | OFF / ON / OFF / ON | | | 50.00 |
| F_037 | Preset Speed 6 | OFF / ON / ON / OFF | | | 55.00 |
| F_038 | Preset Speed 7 | OFF / ON / ON / ON | | | 60.00 |
| F_039 | Jog Speed | ON / X / X / X | | | 7.00 |
| F_040 | Vin Gain | Analog input “Vin” gain ratio adjustment. | 0.00~2.00 | — | 1.00 |
| F_041 | Vin Bias | Analog input “Vin” bias ratio adjustment. | -1.00~1.00 | — | 0.00 |
| F_042 | Frequency Upper Limit | The upper limit of output frequency= F_017(Maximum Output Frequency )*F_042 | 0.00~1.00 | — | 1.00 |
| F_043 | Frequency Lower Limit | The lower limit of output frequency=F_017(Maximum Output Frequency )*F_043 | 0.00~1.00 | — | 0.00 |
| F_044 | Analog Output Signal Selection (FM+) | 0:Output frequency<br>1:Frequency command<br>2:Output current<br>3:“Vin” analog input signal<br>4:“Iin” analog input signal | 0~4 | — | 0 |
| F_045 | Gain(FM+) | Analog output gain ratioadjustment. | 0.00~2.00 | — | 1.00 |
| F_046 | Motor Overload Protection (OL) | 0: Disable<br>1: Overload protection for dependent cooling fan type motor:Enabled(OL)<br>2: Overload protection for independent cooling fan type motor: Enabled(OL) | 0~2 | — | 1 |
| F_047 | Filter Setting of Analog Input Signal | Filter the analog input signal when the frequency command is controlled by analog input. (F_002=0). | 0~255 | — | 20 |
| F_048 | Motor Rated Current | Set the value according to the motor rated current. | 10%~150% of drive rated current | A | According to the rated current of motor |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_049 | Motor No-Load Current | Set the value according to the motor's no-load condition. | 0~motor rated current | A | 1/3 motor rated current |
| F_050 | Motor Slip Compensation | According to the load condition, set the compensation for motor running at constant speed. (0.0: off) | -9.9~10.0 | Hz | 0.0 |
| F_051 | Operation Condition Memory | Record the last status of drive before power off.<br>0: Enable (F_001=2,3,4)<br>1: Disable | 0,1 | — | 0 |
| F_052 | Multi-function Input Terminal (X1) | =0: Manual control command 1 of M-mode (F_015=4)<br>±1: Jog command<br>±2: Secondary accel/decel time command<br>±3: Multi-speed level 1 command<br>±4: Multi-speed level 2 command<br>±5: Multi-speed level 3 command<br>±6: Reset command<br>±7: External fault command(thr)<br>±8: Interruption of output command(bb)<br>±9: Coast to stop command(Fr)<br>±10: Speed tracing from the maximum frequency<br>±11: Speed tracing from the setting frequency<br>±12: Holding command<br>±13: UP command<br>±14: DOWN command<br>±15: Clear UP/DOWN frequency command<br>±16: Analog input source selection<br>±17: Stop command with 3-wire start/stop circuit<br>±18: Under close-loop control condition (F_153≠0), open-loop selection.<br>±19: Reset the integrator at close-loop control condition (F_153≠0)<br>±20: Stop command<br>±21: Multi-speed level 4 command<br>±22: Sequential operation control.<br>±23: Flow switch input | -23~ +23 (Note 3) | — | 9 |
| F_053 | Multi-function Input Terminal (X2) | =0: Manual control command 2 of M-mode (F_015=4) | | | 13 |
| F_054 | Multi-function Input Terminal (X3) | =0: Manual control command 3 of M-mode (F_015=4) | | | 1 |
| F_055 | Multi-function Input Terminal (X4) | =0: Reserve | | | 2 |
| F_058 | Multi-function Output Terminal (Y1) | 0: Disable<br>±1: Standby detection<br>±2: Constant speed detection.<br>±3: Zero speed detection.<br>±4: Frequency detection.<br>±5: System overload detection. (OLO)<br>±6: Stall prevention detection.<br>±7: Low voltage detection. (LE)<br>±8: Braking detection.<br>±9: Restart after instantaneous power failure detection.<br>±10: Restart after error condition detection<br>±11: Error detection.<br>±12: Overheating warning detection. (Ht)<br>±13: Over pressure detection. (OP)<br>±15: Auxiliary pump 1 detection.<br>±16: Auxiliary pump 2 detection.<br>±17: Fan detection during operation.<br>±18: PTC overheating warning dection | -18 ~+18 (Note 7) | — | 1 |
| F_059 | Multi-function Output Terminal (Y2) | | | | 2 |
| F_060 | Multi-function Output Terminal (Ta1,Tb1) | | | | -11 |
| F_061 | Multi-function Output Terminal (Ta2/Tc2) | | | | -3 |
| F_062 | Frequency Detection Range | Set the bandwidth of frequency detection range. | 0.0~10.0 | Hz | 2.0 |
| F_063 | Frequency Detection Level | Set the frequency detection level of multi-function output terminal. | 0.0~120.0 | Hz | 0.0 |
| F_064 | Automatic Torque Compensation Range | According to the load condition, adjust the output voltage of the V/F pattern. (0.0: off) | 0.0~25.5 | — | 1.0 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_065 | System Overload Detection (OLO) | 0: Disable<br>1: Enable | 0,1 | — | 0 |
| F_066 | System Overload Detecting Selection | 0: Detection during constant speedonly<br>1: Detection during operation only | 0,1 | — | 0 |
| F_067 | Output Setting after System Overload | 0: Drive keeps operation when “OLO” is detected<br>1: Drive trips to protection when “OLO” is detected | 0,1 | — | 0 |
| F_068 | System Overload Detection Level | When the output current of drive is higher than the level (F_068 * drive’s rated current) with the duration of F_069, the drive will trip to protection. | 30%~160% of drive rated current | % | 160 |
| F_069 | System Overload Detection Time | | 0.1~25.0 | sec | 2.0 |
| F_070 | Stall Prevention Level at Acceleration | If stall is occurred during acceleration, the motor keeps running at constant speed. (200%: off) | 30%~160% of drive rated current | % | 140 |
| F_071 | Stall Prevention Level at Constant Speed | If the stall is occurred during constant speed, the motor decreases the speed.(200%: off) | 30%~160% of drive rated current | % | 130 |
| F_072 | Acceleration Time Setting after Stall Prevention under Constant Speed | Set the acceleration time after stall prevention under the constant speed. | 0.1~ 3200.0 | sec | 15.0 |
| F_073 | Deceleration Time Setting for Stall Prevention under Constant Speed | Set the deceleration time at the stallprevention under the constant speed. | 0.1~ 3200.0 | sec | 15.0 |
| F_074 | Stall Prevention Setting at Deceleration | 0: Disable<br>1: Enable | 0,1 | — | 1 |
| F_075 | DC Braking Level | Set the current level of DC braking. | 0~120% of drive rated current | % | 50 |
| F_076 | Time of DC Braking after Stop | Set the time for DC braking after drive stopped. | 0.0~20.0 | sec | 0.5 |
| F_077 | Time of DC Braking before Start | Set the time for DC braking before drive started. | 0.0~20.0 | sec | 0.0 |
| F_078 | Operation Selection at Instantaneous Power Failure | 0: Drive cannot be restarted<br>1: Drive can be restarted | 0,1 | — | 0 |
| F_079 | Auto-Restarting Selection for Error Trip Condition | 0: Short time interval to auto-restart according to the setting of F_080 (OC,OE,GF only).<br>1: Long time interval to auto-restart according to the setting of F_080 and F_083(all errors except Fb Lo). | 0,1 | — | 1 |
| F_080 | Maximum Reset Time of Auto-Restart at Drive’s Error Trip | Set the counting number for drive auto-restart when errors occur. | 0~16 | — | 10 |
| F_081 | Switching Frequency | The setting value is higher and the motor noise is lower. | 0~6 | — | 1 |
| F_082 | Stop Mode | 0: Ramp to stop<br>1: Coast to stop<br>2: Coast to stop+ DC braking | 0~2 | — | 0 |
| F_083 | Time Interval before Auto-Restart | Set the error tripping time interval before drive auto restarts for F_079 when the drive trips to stop. | 1~200 | 10sec | 6 |
| F_084 | Pressure Boost (Water Usage Detection) | Boost the pressure up to detect if the water is used. | 0.01~1.00 | bar | 0.15 |
| F_085 | Time Interval of Pressure Boost (Water Usage Detection) | Set the time interval for F_084 to detect if the water is used. (0: off) | 0~250 | sec | 35 |
| F_086 | (ON/OFF Mode) Starting Rate Setting | In constant pressure control mode and under low flow condition, setting the starting rate of drive to activate ON/OFF mode. (0: disable) | 0~100 | % | 0 |
| F_087 | (ON/OFF Mode) Pressure Dead Band Setting | In ON/OFF mode, drive will auto start/stop the pump in accordance with the setting value.<br>*Start level=SV(Setting pressure) - F_087<br>Stop level=SV(Setting pressure) + F_087 | 0.1~25.0 | bar | 0.3 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_088 | Speed Tracing Current Level | When the current is higher than the “speed tracing current level”, the output frequency will trace downward. | 0~160% of drive rated current | % | 150 |
| F_089 | Delay Time before Speed Tracing | Set the delay time before the speed tracing and coast stop+ DC braking. | 0.1~5.0 | sec | 0.5 |
| F_090 | The V/F Pattern of Speed Tracing | Set the percentage of V/F output voltage at the speed tracing. | 0~100% | % | 100 |
| F_091 | Error Record | Display the latest 5 error records. | — | — | — |
| F_092 | Parameter Setting Lock | 0: Parameters are changeable. Maximum frequency cannot exceed 120.0Hz.<br>1: Parameters are locked. Maximum frequency cannot exceed 120.0Hz.<br>2: Reserved<br>3: Reserved | 0~3 | — | 0 |
| F_093 | Automatic Voltage Regulation (AVR) | 0: Disable<br>1: Enable | 0,1 | — | 1 |
| F_094 | Drive Overload (OL1) | 0: Disable<br>1: Thermal protection<br>2: Current limit overload protection<br>3: Both 1 and 2 enable | 0~3 | — | 3 |
| F_095 | Power Source | Set the value according to the actual power source. | 190.0~240.0<br>340.0~480.0 | V | 220.0 (Note1)<br>380.0 (Note2) |
| F_096 | Analog Frequency Dead Band | When the signal noise is large, appropriately increase the dead band to stabilize the frequency. But this will reduce the tuning linearity. | 0.00~2.55 | Hz | 0.00 |
| F_097 | Digital Input Response Time | When the digital input signal is under the setting time, program will not be activated. | 1~16 | ms | 10 |
| F_098 | Grounding Fault Protection (GF) | 0: Disable<br>1: Enable(GF) | 0, 1 | — | 1 |
| F_099 | External Indicator 1 | Select the monitor mode of external indicator 1<br>0: Disable | 0~10 | — | 1 |
| F_100 | External Indicator 2 | Select the monitor mode of external indicator 2<br>0: Disable | 0~10 | — | 5 |
| F_101 | External Indicator 3 | Select the monitor mode of external indicator 3<br>0: Disable | 0~10 | — | 2 |
| F_102 | PID Compensation Gain | Compensate the gain for pressure command control under constant pressure control. | 0.1~8.0 | — | 1.0 |
| F_103 | PID Control Mode Selection | 0: Open-loop operation<br>1: Forward control; D postposition<br>2: Forward control; D preposition<br>3: Reverse control; D postposition<br>4: Reverse control; D preposition | 0~4 | — | 1 |
| F_104 | P Selection | 0: P postposition<br>1: P preposition | 0,1 | — | 1 |
| F_105 | Proportional Gain(P) | Set the gain value for deviation adjustment. (0.0: P control disabled) | 0.0~25.0 | — | 3.0 |
| F_106 | Integration Time(I) | Set the integration time for deviation adjustment. (0.0: I control disabled) | 0.0~25.0 | sec | 1.2 |
| F_107 | Derivative Time(D) | Set the derivative time for deviation adjustment. (0.00: D control disabled) | 0.00~2.50 | sec | 0.00 |
| F_108 | Derivative Time of Feedback | Set the derivative time for feedback signal. | 0.00~2.50 | sec | 0.00 |
| F_109 | Integration Upper Limitation | Set the upper limitation value of integrator. | 0~200% of maximum frequency | % | 100 |
| F_110 | Integration Lower Limitation | Set the lower limitation value of integrator. | -100~100% of maximum frequency | % | 0 |
| F_111 | Offset Adjustment for Integration Time | Adjust the integration time offset. | -100~100% of maximum frequency | % | 65 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_112 | PID Buffer Space | Set the buffer space of PID output value. | 0~255 | — | 2 |
| F_113 | Feedback Signal Filter | Filter the feedback signal. | 0~255 | — | 10 |
| F_114 | Feedback Signal Trip Detection | 0: Disable<br>1: Enable (at F_126=0) | 0,1 | — | 1 |
| F_115 | (Water Usage) Pressure Boost Time | Set the time of F_084 (Pressure Boost for Water Usage Detection) to detect if the water is used. | 0.1~25.0 | — | 0.6 |
| F_116 | Parameter Selection | 0: F_000 ~ F_134<br>1: F_000 ~ F_194 | 0,1 | — | 0 |
| F_117 | PID Start Range | In constant pressure control mode (F_103≠0), drive will activate PID control when the feedback signal exceeds the dead band. | 0.0~10.0 | bar | 0.3 |
| F_118 | (Water Shortage Detection) Auto-restart Selection | 0: Disable<br>1: Trip (Fb Lo): Press “RESET” key to reset.<br>2: Trip (Fb Lo): Power ON again to reset.<br>3: Trip (Fb Lo): Drive will auto-restarts according to the setting of F_122 (Drive Shutdown Time for Water Shortage) | 0~3 | — | 1 |
| F_119 | (Water Shortage Detection) Pressure Level | Set the pressure level to detect if pump suffers from water shortage conditions.<br>(0: Disable) | 0~100% of pressure command | % | 40 |
| F_120 | (Water Shortage Detection) Current Level | Set the current level to detect if pump suffers from water shortage conditions.<br>(0: Disable) | 0~100% of motor rated current | % | 0 |
| F_121 | (Water Shortage Detection) TimeDetection | Set the detection time for F_119 and F_120 to detect if a pump suffers from water shortage. | 0~250 | sec | 60 |
| F_122 | (Water Shortage) Drive Shutdown Time | Drive will auto-restart after the time setting, when a pump suffers from water shortage. F_118 =3.<br>(0:off) | 0~200 | min | 5 |
| F_123 | Analog Input Selection | F_103=0: 0 Vin+Iin; 1 Vin-Iin; 2 Iin-Vin; 3 Vin or Iin(switch by multi-function input Terminal X1~X4)<br>F_103≠0: Vin: Frequency command, Iin: Feedback signal | 0~3 | — | 0 |
| F_124 | Proportion Type of Pressure Transducer | 0: Direct proportion signal.<br>1: Inverse proportion signal. | 0,1 | — | 0 |
| F_125 | Speed Command Source Selection under Open- Loop Condition | In the closed-loop control, select the speed command source when PID is disabled by multi-function input terminal.[ multi-function input terminal= ±13 (F_103≠0)or press HAND ON]<br>0: Analog input terminal(Vin).<br>1: Keypad ⩓ or ⩔ key setting<br>2: Keypad knob<br>3: RS-485 Communication interface | 0~3 | — | 1 |
| F_126 | Iin Range Selection | 0: 4~20mA (2~10V)<br>1: 0~20mA (0~10V) | 0,1 | — | 0 |
| F_127 | Iin Gain (Analog Input) | The gain ratio of analog input terminal Iin. | 0.00~2.00 | — | 1.00 |
| F_128 | Iin Bias (Analog Input) | The bias ratio of analog input terminal Iin. | -1.00~ 1.00 | — | 0.00 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_129 | AM+ Analog Output Signal Selection | 0: Output frequency.<br>1: Frequency command.<br>2: Output current.<br>3: Vin frequency command.<br>4: Iin frequency command. | 0~4 | — | 2 |
| F_130 | Gain (AM+) | AM+ analog output adjustment ratio. | 0.00~2.00 | 0.01 | 1.00 |
| F_131 | Constant Speed Detection Range | Set the bandwidth of constant speed detection range. | 0.0~10.0 | 0.1Hz | 2.0 |
| F_132 | DC Braking Frequencyat Stop | Active frequency level of DC braking at stop. | 0.1~60.0 | 0.1Hz | 0.5 |
| F_133 | (Water Usage Detection) Drive Standby level | When the frequency during the operation is lower than the setting value, drive will decelerate to 0Hz and entering stand by status. | 0~120 | Hz | 10 |
| F_134 | Default Setting | 0: Disable<br>CLF: Clear fault records<br>dEF60: Restore the default value of drive for 60Hz.<br>dEF50: Restore the default value of drive for constant pressure setting (single pump)<br>dEF51: Restore the default value of drive for for constant pressure setting (machine tool)<br>SAv: Save the setting value.<br>rES: Restore the setting value.<br>rd_EE: Read the parameters from drive to digital keypad<br>Wr_EE: Write the parameters from digital keypad to drive<br>Cpy: In multi-pump control system, copy lead drive's parameter. | — | — | 0 |
| F_135 | Set Standby Drives | In multi-pump control systems, setting the drives standby numbers. | 0~7 | — | 0 |
| F_136 | Noise Prevention | 0: Disable. 1: Enable. | 0,1 | — | 0 |
| F_137 | Delay Time at Pump Shift Operation | The delay time setting is to remain the stable pressure of the system at the interchanging of the pump operation. | 0~250 | sec | 10 |
| F_138 | 200% Current Limit | 0: Disable. 1: Enable. | 0,1 | — | 0 |
| F_139 | Analog input selection (Vin) | 0: Frequency command<br>1: PTC temperature | 0,1 | — | 1 |
| F_140 | NTC Thermistor | 0: Disable. 1: Enable. | 0,1 | — | 1 |
| F_141 | Drive Overheating Warning Selection | 0: Disable<br>1: Warning (Ht): Continue operation.<br>2: Warning (Ht): Drive de-rates the switching frequency automatically per 5 minutes.<br>3: Warning (Ht): Stop operation. | 0~3 | — | 0 |
| F_142 | Drive Overheating Warning Level | Set the warning level to prevent drive overheating. | 45~85 | 1℃ | 70 |
| F_143 | Drive Overheating Dead Band | Set the temperature dead band of F_142 and F_145. | 2.0~10.0 | 0.1℃ | 3.0 |
| F_144 | Fan Control Selection | 0: Forced air: Start the fan at power ON.<br>1: Operation air: Start the fan at running.<br>2: Temperature level setting: Start the fan according to the setting of F_145. | 0~2 | — | 1 |
| F_145 | Temperature Level of Fan Activation | Set the temperature level of fan activation. | 25~60 | 1℃ | 50 |
| F_146 | Minimum Operation Time of Fan | Set the minimum operation time of fan when the fan stops. | 0.1~25.0 | 0.1min | 0.5 |
| F_147 | Over Pressure Disposal | 0: Disable<br>1: Alarm: Drive keeps operation.<br>2: Alarm: Drive stops output.<br>3: Error trip: Drive trips to stop. | 0~3 | — | 0 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_148 | Over Pressure Level | According to the setting value of F_007 (Pressure Transmitter Setting) to set the over pressure level. | 0~100 | % | 100 |
| F_149 | Over Pressure of Detection Time | When the actual pressure exceeds over pressure level (F_007*F_148) with duration (F_149), the detection is activation. | 0.0~25.5 | sec | 2.0 |
| F_150 | Continuous Water Supply Control | 0:Disable<br>1:Enable | 0,1 | — | 0 |
| F_151 | Set the Minimum Pumps during Operation | In parallel control system, set the minimum quantity of pumps during operation. | 1~8 | — | 1 |
| F_152 | PTC Overheat Alarm Level | Set the alarm level of PTC Overheat.(OH1) | 0.0~10.0 | V | 1.2 |
| F_153 | PTC Overheat Alarm Selection | 0: Keep running<br>1: Stop running | 0,1 | — | 0 |
| F_154 | PTC Overheat Trip Leve | Set the trip level of PTC Overheat.(OH2) | 0.0~10.0 | V | 2.4 |
| F_155 | Comm. Address | The host uses the address to send and receive messages from the drive.(0: Disable) | 0~254 | — | 0 |
| F_156 | Baud Rate | 0: 4800bps 2: 19200bps<br>1: 9600bps 3: 38400bps | 0~3 | — | 1 |
| F_157 | Comm. Protocol | 0: 8,N,2 2: 8,O,1<br>1: 8,E,1 3: 8,N,1 | 0~3 | — | 1 |
| F_158 | Comm. Overtime (Cot) | When the data transmission during communication transmission is interrupted, has no data transmitting, or delays, drive displays “Cot” message<br>(0.0: Communication overtime disable) | 0~1000 | sec | 0.0 |
| F_159 | Comm. Overtime Disposal | 0: Warning (Cot): Continue operation.<br>1: Warning (Cot): Ramp to stop<br>2: Warning (Cot): Coast to stop | 0~2 | — | 0 |
| F_160 | Multi-Function Input Selection | 0: Multi-function inputs from multi-function terminals<br>1: Multi-function inputs from communication control | 0,1 | — | 0 |
| F_162 | Frequency Upper Limitation by Manual Mode | Setting manual mode for upper limit of frequency command | 0~100% maximum of output frequency | % | 100 |
| F_163 | Frequency Lower Limitation by Manual Mode | Setting manual mode for lower limit of frequency command | 0~100% maximum of output frequency | % | 0 |
| F_165 | Pump Delay Start Time | In the PID control, when the feedback signal exceed the dead band, pump will start after the setting time. | 0~9999 | sec | 0 |
| F_166 | K Value of Flow Sensor | Setting value accord with specification of flow sensor | 0.1~100.0 | L/Pulse | 10.0 |
| F_167 | Rate of Flow Sensor | Setting rate of flow sensor | 0.00~2.00 | — | 1.00 |
| F_168 | Unit of Flow Sensor | 0: LPS 1: CMH | 0,1 | — | 0 |
| F_170 | Flow Switch Dectect time | When the multiple-input terminal is set to ±23, and the trigger time is longer than the setting value. The drive will enter to ON/OFF mode automatically. | 0~600 | sec | 15 |
| F_171 | Shutoff Head(H) | Setting shutoff head of pump | 0~160 | bar | 12.0 |
| F_172 | Maximum Flow (Q) | Setting maximum flow of pump | 0.0~ 6000.0 | L/min | 300.0 |
| F_173 | Compensation for Pipe Friction Loss | 0:Disable<br>1:Enable | 0,1 | — | 0 |
| F_174 | The Current in Maximum Flow ($I_{Qmax}$) | Setting current in maximum flow($I_{Qmax}$) | 1~200% of drive rated current | % | 100 |
| F_175 | The Current in Minimum Flow ($I_{Qmin}$) | Setting current in minimum flow($I_{Qmin}$) | 0~200% of drive rated current | % | 30 |
| F_176 | Pump Flow Rate Compensation for Pipe Friction Loss ($H_{COMP\ max}$) | Setting maximum flow for pipe friction loss | 0.1~160 | bar | 0.0 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_177 | Response Time Compensation of Pipe Friction Loss | Setting pump for response time compensation of friction loss | 1~255 | — | 40 |
| F_180 | Sequetial Operation for Start Control | 0: Disable<br>1: Enable | 0~1 | — | 0 |
| F_181 | Date/ Time Setting | Y: Year | 2000~2099 | — | — |
| | | M: Month | 1~12 | | |
| | | d :Day | 1~31 | | |
| | | W: Week | Sun.7~SAt.6 | | |
| | | H: Hour | 0~23 | | |
| | | MM: Minute | 0~59 | | |
| F_182 | Date/ Time Display | Y: Year<br>M: Month<br>d: Day<br>W: Week<br>H: Hour<br>MM: Minute<br>-----: Reserved | — | — | — |
| F_183 | Sequential Operation Mode | 0: Every week<br>1: Every day | 0,1 | — | 0 |
| F_184 | Sector 1 Sequential Operation | S: Level selection | OFF,ON | — | OFF |
| | | W: Week<br>Sun.7: Sunday<br>Mon.1: Monday<br>TUE.2:Tuesday<br>Wed.3:Wednesday<br>THU.4:Thursday<br>Fri.5:Friday<br>SAt.6:Saturday | Sun.7~SAt.6 | — | Sun.7 |
| | | H: Hour | 0~23 | hour | 0 |
| | | MM: Minute | 0~59 | min | 0 |
| | | C: Pressure command | 0.1~160.0 | bar | 0.0 |
| | | SL: Inclined time | 0.1~600.0 | sec | 0.0 |
| F_185 | Sector 2 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_186 | Sector 3 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_187 | Sector 4 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_188 | Sector 5 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_189 | Sector 6 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_190 | Sector 7 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_191 | Sector 8 of Sequencial Operation | Refer to F_184 setting descrption | — | — | — |
| F_192 | Unit of pressure setting | 0: bar<br>1: %<br>Note: only work in F_084 and F_117 | 0~1 | — | 0 |
| F_193 | Reduce the Switching Frequency during overloading | 0: If the drive is overloaded, the swithing frequency can not be adjusted with amount of current.<br>1: If the drive is overloaded, the switching frequency can be adjusted with amount of current. | 0~1 | — | 1 |

| Func. | Name | Description | Range of Setting | Unit | Default |
|---|---|---|---|---|---|
| F_194 | Default Setting | 0: Disable<br>CLF: Clear error records<br>dEF60: Restore the default value of drive for 60Hz.<br>dEF50: Restore the default value of 60Hz single pump constant pressure control application<br>dEF52: Restore the default value of 60Hz multi-pump constant pressure control application.<br>dEF53: Restore the default value of 50Hz single pump constant pressure control application<br>dEF57: Restore the default value of 60Hz multi-pump constant pressure control (S-mode)application<br>SAv: Save the setting value.<br>rES: Restore the setting value.<br>rd_EE: Read the parameters from drive to digital keypad<br>Wr_EE: Write the parameters from digital keypad to drive<br>CPy: In multi-pump control system, copy lead drive's parameter. | — | — | 0 |

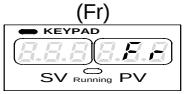
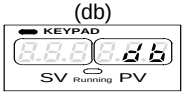
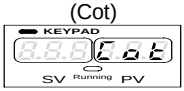
The color as [ ] means the functions can be set during operation.

Note:
1. Specification of 200V series.
2. Specification of 400V series.
3. ＋: Represents a contact (N.O) －: Represents b contact (N.C)

**Error Trip Messages of Drive**

| Display | Description | Display | Description |
|---|---|---|---|
| (EEr)   | EEPROM error | (OLO)   | System overload |
| (AdEr)   | A/D converter error | (thr)   | External fault |
| (SC)   | Fuse open | (PAdF)   | Keypad interruption during copy |
| (LE1)   | Under voltage during operation | (OH)   | Drive overheating |
| (OC)   | Drive over current | (OL)   | Motor overload |
| (GF)   | Grounding fault | (OL1)   | Drive overload |
| (OE)   | Over voltage | (ntCF)   | NTC thermistor sensor fault |
| (no Fb)   | PID feedback signal error | (OP)   | Over pressure |

**Warning Messages of Drive**

| Display | Description | Display | Description |
|---|---|---|---|
| (LE)   | Power source under voltage | (Err_00)   | Err_00: Keypad cable trip.(before connecting) |
| (bb)   | Drive output interruption | (Err_01)   | Err_01: Keypad cable trip.(connected) |
| (Fr)   | Coast to stop | (Wr_F)   | Different software version inter-copy |
| (db)   | Over voltage at stop | (OP)   | Over pressure |
| (dtF)   | Direction command error | (Ht)   | Drive overheat |
| (PrEr)   | Program fault | (CPy)   | Parameter copy complete |
| (Cot)   | Communication overtime | (CPyF)   | Parameter copy error |