RevoTrans®

YVF Motor Series Operating Manual

Langham Automatic Co., Ltd.

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RevoTrans® YVF Integrated Servo Motor System Operation Manual

Chapter I Product Introduction

I Summary

RevoTrans® YVF80-4 motor series are integrated servo motor system including servo motor, drive and control units designed for automatic control purpose. The YVF motor series is based on PMSM structure and developed and manufactured by Langham Automatic Co., Ltd. with international IP under the brand name of RevoTrans® and NoviMotors®. YVF motor series have achieved first-ever breakthrough in the field of mechanical power transmission which saves all the peripheral protection devices and circuits on the secondary control loop and are featured with multiple reliable protections such as starting, overload, stalling, over-voltage, over-current, over-phase, and temperature-rise protections. More importantly, the YVF motor series have intelligent functions of torque and speed adjustment, advanced vector position control, time and circulation control both through local integrated control panel and remote PC/PLC via network. With miniaturization design and compact structure, the YVF motor series represents high cost performance and can be widely applied in various industrial automatic control fields.

II Operating Environment

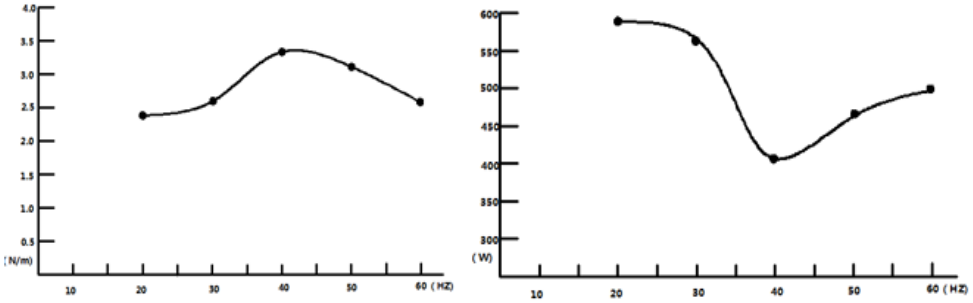
1. The elevation above sea level < 2000m
2. The ambient temperature >-15°C & <+40°C
3. No risk of dust explosion
4. No vibration or turbulence
5. No corrosive or conductive gas
6. No rain or saturated steam

III Main Technical Parameters

1. Full-load Power: 750W, Input Voltage Range: AC 342V~475V, Input Power Frequency Range: 50Hz~60Hz

Rated Power	Rated Voltage	Rated Current	Rated Current	Rated Rotation Speed	Range of Frequency Modulation
550W	460V	2.0A	3.2N/m	1500r/min	10Hz ~ 60Hz

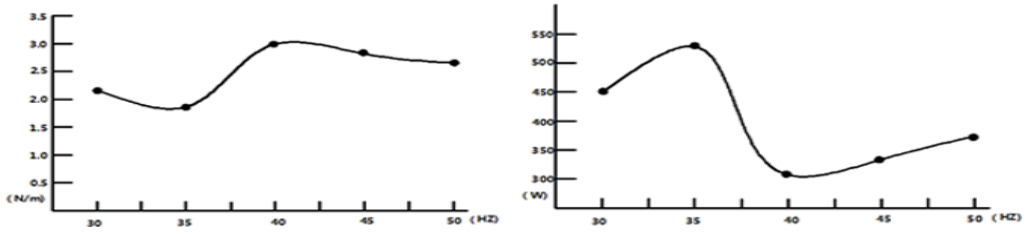
550W Constant Power Speed Regulating Property 3.2N/m Constant Current Speed Regulating Property



2. Full-load Power: 550W, Input Voltage Range: AC 198V~275V, Input Power Frequency Range: 50Hz~60Hz

Rated power	Rated voltage	Rated current	Rated current	Rated rotation speed	Range of frequency modulation
400W	230V	4.0A	2.4N/m	1500r/min	10Hz ~ 60Hz

400W constant power speed regulating property 2.4N/m constant current speed regulating property



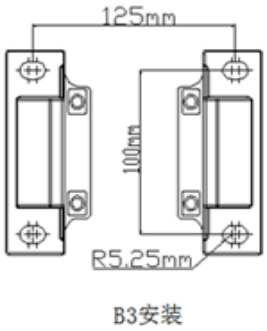
3. Motor starting power parameters

(Motor full load power: 750W – Top Table / 550W – Bottom Table)

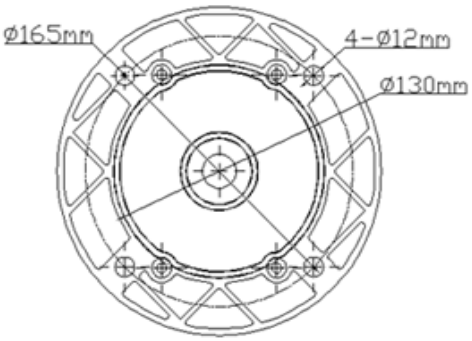
Controller Drive Mode	Test Frequency	Load Starting Power	Load Starting Torque
Program Control (Open-loop)	50Hz	400W	2.6N/m
Servo Control (Closed-loop)	30Hz	120W	1.3N/m

Controller Drive Mode	Test Frequency	Load Starting Power	Load Starting Torque
Program Control (Open-loop)	50Hz	350W	2.2N/m
Servo Control (Closed-loop)	30Hz	100W	1.1N/m

4. Factory default motor phase sequence: the shaft rotates clockwise when facing the shaft
5. Insulation class: F
6. Protection class: IP55
7. Work mode: continuous (under rated power)
8. Mounting size



B3 Mounting



B5 Mounting

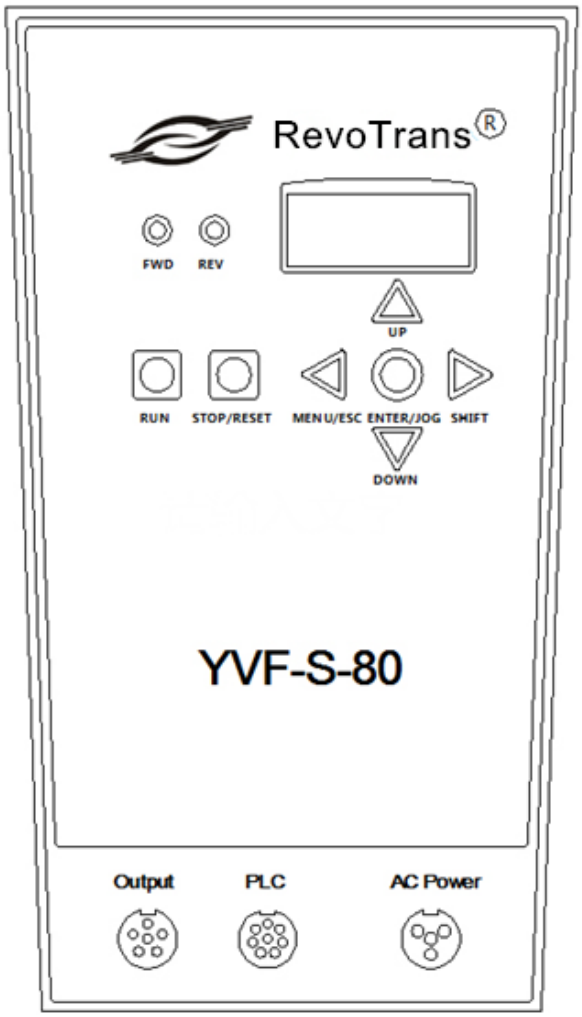
IV Safety Warning

1. Do not touch the motor shell during operation, high temperature may cause serious injuries
2. Avoid physical impacts to any part of the motor and the control box
3. Do not randomly press the control buttons on the panel, pull out cables, plug/unplug connectors during motor operation to prevent safety incidents or loss of motor control
4. When over-current failure occurs in the motor drive, the LED display on the control panel demonstrates one of the following error messages E-1, E-2, E-3, and E-14, users are **STRONGLY RECOMMENDED** to shut down the motor power and wait at least 20 seconds to restart the motor. Frequently and repeatedly pressing the control buttons under error mode without shutting down the motor power are **STRICTLY PROHIBITED** to prevent impact current damage on the motor drive module
5. Under servo position control mode, when motor starting out-of-step failure occurs, the LED display on the control panel demonstrates error message E-37, users are **STRONGLY RECOMMENDED** to adjust the motor original point position **PROMPTLY**. Continued motor operation and frequent control button pressing are **STRICTLY PROHIBITED** to prevent controller servo drive damage

6. Under servo control mode, when the power is cut off unintentionally, the original point of encoder will become invalid if users manually rotate the motor shaft or move the load. Users are **REQUIRED** to reset the original point to prevent motor operation failure
7. Physical contact with the motor shaft and the coupler is prohibited during operation, rotating shaft and coupling may cause serious injuries
8. Do not open the upper cover of the control box to avoid product warranty being invalid

Chapter II Instructions for Use

I Panel Diagram



	Forward Rotation / Motor Running Display (**LEFT** light)
	Reverse Rotation / Error Indication Display (**RIGHT** light)
	Function / Parameter Display Window
	Input Parameter / Data Increase (+)
	Enter / Jog
	Run / Start (**LEFT** button)

	Digit Shift / Motor Status Display
	Stop / Reset (**RIGHT** button)
	Menu/Function Select/Escape
	Input Parameter / Data Decrease (-)

II Panel Basic Operation

1. Press “MENU/ESC” to enter function selection menu as shown on the display window
2. Use Input Parameter (+) / (-) and Shift buttons to select wanted function
3. Press Enter to select the required function
4. Use Input Parameter (+) / (-) and Shift buttons to select wanted parameters associated with the function
5. Press Enter to confirm the wanted parameters associated with the required function
6. Repeat step 1 – 5 if more functions and associated parameters are required
7. After all functions and parameters are set, press “MENU/ESC” button to leave function selection menu
8. Press “STOP/RESET” button to enter motor standby mode
9. Press “RUN” button to start the motor
10. During motor operation, press “STOP/RESET” button to stop the motor
11. Press “SHIFT” button to demonstrate current motor status on the display window when not in the function and parameter setting mode

III Operation

1. Control Mode

1. The YVF servo motor can be operated via either local control or remote control (PLC/PC). In addition, end-users can select either program control mode or servo control mode, wherein the program control (suitable for most of application scenarios) is based on the V/F variable frequency technology, and the servo control mode (specifically for position and time setting) is based on the vector variable frequency technology.

2. Selecting drive mode with 3-step-setting (Refer to Function Parameter Table in the manual)

2.1 Program control mode: function parameter F00.24 is selected as 0.

2.2 Servo control mode: function parameter F00.24 is selected as 2.

2.3 Keyboard lock: long press the Menu key to lock/unlock the keyboard (press for 3 seconds).

3. When select Program control mode, set the function parameter F00.25 as 0.

4. When select Servo control mode, set the function parameter F00.25 as 1.

IV Program control

1. Power supply voltage: 3-phase AC input voltage <= 460V, single-phase AC input voltage <= 275V

2. It is **STRONGLY RECOMMENDED** to operate the motor with reducer when the load is heavier than the values in the motor starting power parameter table (III Main Technical Parameter 3.)

3. Start Accelerating Timing

3.1 Corresponding to the function F01.17, the parameter setting range is 0.1~6000.0S with the factory default setting as 5.0S.

4. Stop Decelerating Timing

4.1 Corresponding to the function parameter F01.18, the setting range is 0.1~6000.0S with the factory default setting as 5.0S.

5. Jog Running Control

5.1 The “ENTER/JOG” button is applicable as the jog command key under the motor standby state as well as the enter command key under the function parameter interface.

5.2 JOG Running Accelerating/Decelerating Timing;

5.2.1 The accelerating timing function is F01.28, the parameter setting range is 0.1~6000.0S, and the factory default value is 5S.

5.2.2 The decelerating timing function is F01.29, the parameter setting range is 0.1~6000.0S, and the factory default value is 5S.

6. Rotation Direction Setting

6.1 The default rotation direction for startup running is assumed to be forward, and if reversal rotation is required, the second parameter digit to the right of function F00.15 shall be set as 1 under the motor static status, and when start up again, the motor is in reversal rotation (factory

default value is 0).

6.2 The default rotation direction for jog running is assumed to be forward, and if reversal rotation is required, the second parameter digit to the right of function F01.16 shall be set as 1 under the motor static status, and when jog running starts again, the motor is in reversal rotation (factory default value is 0).

7. Circulation Time Setting

7.1 No circulation time control: set the second parameter digit to the right of function F10.00 as 0, and the parameter is the factory default value.

7.2 Single circulation time control: set the second parameter digit to the right of function F10.00 as 1 (motor stops after one circulation).

7.3 Continuous circulation time control: set the second parameter digit to the right of function F10.00 as 4 (motor stops after circulation reaches preset cycle times).

8. Circulation Running Control

8.1 The factory default values of the first parameter digit to the right of functions from F10.01 to F10.15 for one single circulation cycle are all set as 0s (single circulation cycle can be divided into 15 phases or stages and each phase may have a different rotation speed / frequency).

8.1.1 Corresponding to the functions from F10.01 to F10.15 for single circulation cycle (15 phases or stages), the rotation speed or frequency values required by each phase or stage can be set via function F10.31 to F10.45. The setting range is 0～50HZ, and the factory default value is 0Hz.

8.1.2 Corresponding to the functions from F10.01 to F10.15 for single circulation cycle (15 phases or stages), the running time period required by each phase or stage can be set via function F10.16 to F10.30. The setting range is 0～6000S, and the factory default value is 10S.

8.1.3 The number of circulation cycle times can be set with function F14.00, the setting range is 1 to 60000 times, and the factory default value is 1.

8.2 For single circulation, the rotation direction of each phase (15 stages) can be set by the second digit to the right in functions from F10.01 to F10.15.

8.3 In the single circulation cycle, the acceleration and deceleration time of start and stop of each phase (15 stages) can be set by the third digit to the right in functions from F10.01 to F10.15,

and if only one or a few phases are used, the running time of the other phases shall be set as 0.

9. Motor Rotation Speed Setting (Frequency Setting)

9.1 As a given frequency is corresponding to a specific motor rotation speed, setting the motor rotation speed is to set the frequency. The frequency can be set through three frequency input channels via function F01.00 including the keyboard input mode, the analog input mode and the communication input mode.

9.2 When set as the keyboard input mode, the required frequency can be set with function F01.01, the setting range is from 0Hz to upper limit frequency, and the factory default value is 50Hz.

9.3 When set as the keyboard input mode, the upper limit frequency can be set with function F01.11, the setting range is from low limit frequency to 75Hz, and the factory default value is 50Hz.

10. Direct Current Brake Control

Under the program control mode, the DC brake functions under motor start phase and stop phase are supported. The brake control function under motor start phase can be applied with function setting F02.00, whereas the brake function under motor stop phase can be applied with function setting F02.11 respectively.

11. Over-current Protection

Current tolerance can be set through function setting F19.14 – F19.16 according to specific current requirement, the default factory value is 150%.

V Servo Control

1. Position Control

1.1 Power supply input voltage: 3-phase AC input voltage <= 460V, single-phase AC input voltage <= 275V

1.2 When operating with position control, servo drive's maximum output power corresponds to the frequency of 30Hz

1.3 It is **STRONGLY RECOMMENDED** to operate the motor with reducer when the load is heavier than the values in the motor starting power parameter table (III Main Technical Parameter 3.)

1.4 Set the function F17.08 as 3 (set position control as valid)

1.5 Select function F17.09 and set 0 for local control or 1 for external/remote control

1.6 The local control mode supports the position circulation control in two stages (forward and reversal rotation stages)

2. Starting/Original Point Setting

2.1 Manual settings of motor starting/original point

With power switch-on, under program control (low frequency/speed) mode, operate the motor with jogging function (the motor shaft rotates as long as the jogging button is pressed and the shaft stops rotating when the jogging button is released). End-users use jogging and shaft rotation direction function (F01.16) to find the required starting position. When required starting position is found, switch to servo control mode to set other relevant functions with associated parameters for position control. Manual setting of starting point is only suitable for low-accuracy position control scenarios.

2.2 Automatic Starting Point Setting

Firstly, socket P2 Pin5 is required to be connected with user's external equipment (transducer)'s connector. With power switch-on and under program control mode, set function F08.19 as 25 and function F17.08 as 0, operate motor under low speed. The starting point is set by users' external equipment (transducer)'s arrival signal. Motor will automatically stop with the arrival of external equipment's signal, whereas the stop position is the starting point. Secondly, set function F08.19 back to factory default value as 2 and function F17.08 back to value 3, switch to servo control mode to set other relevant functions with associated parameters for position control. Automatic starting point setting is suitable for high-accuracy position control scenarios.

2.3 Saving Starting Point

2.3.1 With uninterrupted power supply, if unexpected shaft movement occurs after motor stops, the control system will automatically reinstate the starting point.

2.3.2 With sudden loss of motor power, the motor automatically saves last position control commands. When motor power is reinstated, motor will continue to run according to last position control settings (heavy load may cause potential position deviations, users are suggested to reset starting point if position deviation happens)

2.3.3 If unexpected shaft movement occurs after sudden loss of motor power supply, user are **REQUIRED** to **RESET** the starting point with either manual or automatic methods described above

3. Position Function Settings (Local Control)

3.1 Users should set position control functions according to various load and working conditions. The calculation of total pulses: 4 x 2500 x N (N is number of rounds which is calculated by users)

3.2 First forward stage high-order function F17.19 setting: Total pulses / 65535 (take integer only); first forward stage low-order function F17.20 setting: (Total pulses – 65535) x high-order function value (the round-off quotient of total pulses / 65535)

3.3 The direction of shaft rotation is set through function F17.17 in the first forward stage; the waiting time period after the wanted position is reached is set through function F14.01 in the first forward stage

3.4 Second backward stage high-order function is set via F14.03 with the quotient of total pulses / 64435 (take integer only); second backward stage low-order function is set via F14.04 with the value of (total pulses – 65535) x high-order function value (the round-off quotient of total pulses / 65535). The total pulses in the second backward stage is calculated by users and may not be the same value as the total pulses in the first forward stage

3.5 The direction of shaft rotation is set through function F14.02 in the second backward stage; the waiting time period after the wanted position is reached is set through function F14.05 in the second backward stage

3.6 The number of circulation of position control is set through function F14.06. The position control will continue to run indefinitely if the value is set as 0

3.7 If only first forward stage is required in the position control, all second backward stage functions should be set as 0 (F14.03, F14.04, F14.05)

4. Setting of Output Torque

4.1 Output torque can ONLY be set under servo control mode through function F16.00 with value being 1. The factory default value is 0

4.2 The torque control direction is set through function F16.11 with forward rotation as 0 and reversal rotation as 1

4.3 The output torque limit is set through functions F16.14 and F16.15 with the limit range of 0% - 200% and the factory default value of 180%

5. Velocity Control of Displacement

Velocity control is supported under servo control mode. As each frequency corresponds to a specific velocity hence the velocity can be set through function F17.10 with the frequency range of 0 – 30Hz. Velocity setting has to be carried out when the motor is in the stop mode. The factory default value is 30Hz

VI Real-time Display Function

During motor operation, the parameters such as the rotation speed, current, etc., can be monitored at real time, and different parameters can be monitored in both stop and running modes.

1. In the running mode, the parameters to be monitored can be chosen by selecting functions from F00.01 to F00.06 corresponding to monitored contents C-00 to C-05
2. In the stop mode, the parameters to be monitored can be chosen by selecting functions from F00.07 to F00.12 corresponding to monitored contents C-00 to C-05
3. Query of failure log can be made through functions F26.00 – F26.17

Chapter III List of Functions and Associated Parameters

I Functions

1. Symbols in the table

× ----the parameter cannot be altered in motor running mode

○ ---- the parameter can be altered in motor running mode

*---- read only parameter, cannot be altered

Remarks: contact the manufacturer for tailor-made requirements if more functions need to be added or open for change.

2. Table of function parameters

F00 - System Parameter Set					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F00.00	Reserve				
F00.01	In running, C-00 shows parameter selection.	0: main set frequency (0.01Hz) 1: reserve 2: set frequency (0.01Hz) 3: output frequency (0.01Hz) 4: output current (0.1A) 5: output voltage (1V) 6: DC bus voltage (0.1V) 7: rotation speed of motor with load (1RPM) 8: linear velocity of motor with load 9: temperature of frequency converter (1DEG) 10: running time (0.1 minute) 11: current accumulated running time (1 hour) 12: current accumulated power-on time (1 hour) 13: status of frequency converter 14: status of input terminal 15: status of output terminal 16～19: reserve 20: simulated input AI1(corrected)(0.01V or 0.01mA) 21～33: reserve 34～45: current section number of simple PLC 46: rated current of frequency converter(0.1A) 47: rated voltage of frequency converter(1V) 48: rated power of frequency converter(0.1KW) 49: given torque of frequency converter (relative to rated output torque percentage with rotation direction) 50: output torque of frequency converter (1NM) 51～65: reserve	1	3	○
F00.02	In running, C-01 shows parameter selection.	Same as above	1	2	○
F00.03	In running, C-02 shows parameter selection.	Same as above	1	4	○
F00.04	In running, C-03 shows parameter selection.	Same as above	1	5	○
F00.05	In running, C-04 shows parameter selection.	Same as above	1	6	○
F00.06	In running, C-05 shows parameter selection.	Same as above	1	9	○
F00.07	In stop, C-00 shows parameter selection.	Same as above	1	2	○

F00.08	In stop, C-01 shows parameter selection.	Same as above	1	6	○
F00.09	In stop, C-02 shows parameter selection.	Same as above	1	48	○
F00.10	In stop, C-03 shows parameter selection.	Same as above	1	14	○
F00.11	In stop, C-04 shows parameter selection.	Same as above	1	20	○
F00.12	In stop, C-05 shows parameter selection.	Same as above	1	9	○
F00.13	Power-on default monitoring parameters	0～5	1	0	○
F00.14	Parameter operation control	Single digit: parameter altering operation 0: all of the parameters are allowed to be altered 1: all of the parameters cannot be altered except function F00.14 (current one) 2: all of the parameters cannot be altered except functions F01.01, F01.04 and F00.14 (current one); Ten's digit: restore the factory default value 0: no action 1: restore all the factory default values (excluding the parameters of failure record parameter set (F26 set)) 2: restore all the factory default values (excluding the parameters of functions F15 and F26); 3: reserve; 4: reserve; 5: restore the factory default values of the failure records (only restore the factory default values of function (F26 set)). Hundred's digit: key operation 0: lock all buttons 1: lock all buttons except 2: lock all buttons except 3: lock all buttons except 4: lock all buttons except	1	000	×
F00.15	Selection of button functionality	Single digit: reserve Ten's digit: selection of running direction 0: forward rotation 1: reversal rotation 2～9: reserve Hundred's digit: local control co s invalid 1: button is valid Thousand's digit: remote control (PLC/PC) command 0: button is invalid 1: button is valid	1	0001	○
F00.16 ～F00.23	Reserve				
F00.24	Motor control mode	0: V/F control 1: reserve 2: Vector control	1	1	×
F00.25	Motor type selection	0: synchronous motor 1 (supports V/F control only) 1: synchronous motor 2 (supports vector control only)	1	1	×
F00.26 ～ F00.27	Reserve				

F01—Basic Running Function Parameter Set					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F01.00	Selection of main frequency input channel	0: local control setting 1: reserve 2: reserve 3: reserve 4: remote control setting 5～14: reserve	1	0	○
F01.01	Main frequency setting	0.00Hz～upper-limit frequency	0.01Hz	50.00Hz	○

F01.02 ～ F01.10	Reserve				
F01.11	Upper-limit frequency	lower-limit frequency ～600.00Hz	0.01Hz	50.00Hz	×
F01.12 ～ F01.14	Reserve				
F01.15	Selection of command channel	0: local control 1: local control via terminal 2: remote control	1	0	○
F01.16	Rotation direction setting	Single digit: forward and reversal rotation setting (only valid with the jog command) 0: forward rotation 1: reversal rotation Ten's digit: forbidden forward and reversal rotation (applicable to all command channels excluding the jog function) 0: forward and reversal rotation is available; 1: reversal rotation is forbidden (when reversal running is applied, rotation stops automatically); 2: forward operation is forbidden (when forward running is applied, rotation stops automatically).	1	00	○
F01.17	Acceleration time 1	0.1～6000.0（acceleration time is the time period required for the speed associated with zero frequency takes up to the max speed associated with the upper-limit frequency）	0.1	Confirm according to the model	○
F01.18	Deceleration time 1	0.1～6000.0（deceleration time is the time period required for the speed associated with the upper-limit frequency takes down to the speed associated with the zero frequency）	0.1	Confirm according to the model	○
F01.19	Reserve				
F01.20	Selection of acceleration and deceleration methods	0: linear acceleration and deceleration 1: S curve acceleration and deceleration	1	0	×
F01.21	Time period of S-curve accelerating starting section	10.0%～50.0% (acceleration and deceleration time) Time period of S-curve acceleration starting section+ time period of S-curve acceleration ascent section≤90%	0.1%	20.0%	○
F01.22	Time period of S-curve accelerating ascent section	10.0%～70.0% (acceleration and deceleration time) Time period of S-curve acceleration starting section+ time period of S-curve acceleration ascent section≤90%	0.1%	60.0%	○
F01.23	Time period of S-curve decelerating starting section	10.0%～50.0% (acceleration and deceleration time) Time period of S-curve deceleration starting section+ time period of S-curve deceleration ascent section≤90%	0.1%	20.0%	○
F01.24	Time period of S-curve decelerating ascent section	10.0%～70.0% (acceleration and deceleration time) Time period of S-curve deceleration starting section+ time period of S-curve deceleration ascent section≤90%	0.1%	60.0%	○
F01.25	Keyboard jog running frequency	0.00Hz～upper-limit frequency	0.01Hz	5.00Hz	○
F01.26	Reserve				
F01.27	Jog interval time setting	0.0～100.0s	0.1s	0.0s	○
F01.28	Jog acceleration time setting	0.1～6000.0s	0.1s	20.0s	○
F01.29	Jog deceleration time setting	0.1～6000.0s	0.1s	20.0s	○

F02—Startup, Stop, Forward and Reversal Rotation, Brake Function Parameter Sets					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F02.00	Startup Mode	0: start from the startup frequency 1: brake first and then start up from the startup frequency (invalid under vector control) 2: reserve	1	0	×
F02.01	Startup delay time	0.0～60.0s	0.1s	0.0s	×
F02.02	Startup frequency	0.0～10.00Hz	0.01Hz	0.00Hz	×
F02.03	Lasting time duration of startup frequency	0.0～60.0s	0.1s	0.0s	×
F02.04	DC brake current in startup mode	0.0～100.0%	0.1%	30.0%	×

F02.05	DC brake time duration in startup	0.0～30.0s	0.1s	0.0s	×
F02.06 ～ F02.10	Reserve				
F02.11	Shut down mode	0: decelerating shut down 1: free shut down 2: deceleration + DC brake shut down (invalid in vector mode)	1	0	×
F02.12	Decelerating shut down maintaining frequency	0.00Hz～upper-limit frequency (only effective to the shut down mode 0)	0.01Hz	0.00Hz	×
F02.13	Decelerating shut down maintaining time period	0.00～10.00s	0.01s	0.00s	×
F02.14	starting frequency of DC brake shut down	0.00～15.00Hz	0.01Hz	0.00Hz	×
F02.15	DC brake waiting time of shut down	0.00～30.00s	0.01s	0.00s	×
F02.16	DC brake current of shut down	0.0～100.0%	0.1%	0.0%	×
F02.17	DC brake time duration of shut down	0.0～30.0s	0.1s	0.0s	×
F02.18	Shut down auxiliary brake current	0.0～100.0%	0.1%	0.0%	×
F02.19	Shut down auxiliary brake time duration	0.0～100.0s	0.1s	0.0s	×
F02.20	Dead-zone time duration of forward and reversal rotations	0.0～3600.0s	0.1s	0.1s	×
F02.21	Switching mode of forward and reversal rotations	0: zero-crossing frequency switching 1: startup-crossing frequency switching	1	0	×
F02.22 ～ F02.26	Reserve				

F04 - Auxiliary Running Parameter Set					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F04.00 ～F04.13	Reserve				
F04.14	Switching frequency of acceleration time 2 and 1	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	×
F04.15	Switching frequency of deceleration time 2 and 1	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	×
F04.16	Acceleration time 2	0.1～6000.0	0.1	20.0	o
F04.17	Deceleration time 2	0.1～6000.0	0.1	20.0	o
F04.18	Acceleration time 3	0.1～6000.0	0.1	20.0	o
F04.19	Deceleration time 3	0.1～6000.0	0.1	20.0	o
F04.20	Acceleration time 4	0.1～6000.0	0.1	20.0	o
F04.21	Deceleration time 4	0.1～6000.0	0.1	20.0	o
F04.22	Acceleration time 5	0.1～6000.0	0.1	20.0	o
F04.23	Deceleration time 5	0.1～6000.0	0.1	20.0	o
F04.24	Acceleration time 6	0.1～6000.0	0.1	20.0	o
F04.25	Deceleration time 6	0.1～6000.0	0.1	20.0	o
F04.26	Acceleration time 7	0.1～6000.0	0.1	20.0	o
F04.27	Deceleration time 7	0.1～6000.0	0.1	20.0	o
F04.28	Acceleration time 8	0.1～6000.0	0.1	20.0	o
F04.29	Deceleration time 8	0.1～6000.0	0.1	20.0	o
F04.30	Acceleration time 9	0.1～6000.0	0.1	20.0	o
F04.31	Deceleration time 9	0.1～6000.0	0.1	20.0	o
F04.32	Acceleration time 10	0.1～6000.0	0.1	20.0	o
F04.33	Deceleration time 10	0.1～6000.0	0.1	20.0	o
F04.34	Acceleration time 11	0.1～6000.0	0.1	20.0	o
F04.35	Deceleration time 11	0.1～6000.0	0.1	20.0	o
F04.36	Acceleration time 12	0.1～6000.0	0.1	20.0	o
F04.37	Deceleration time 12	0.1～6000.0	0.1	20.0	o
F04.38	Acceleration time 13	0.1～6000.0	0.1	20.0	o
F04.39	Deceleration time 13	0.1～6000.0	0.1	20.0	o
F04.40	Acceleration time 14	0.1～6000.0	0.1	20.0	o
F04.41	Deceleration time 14	0.1～6000.0	0.1	20.0	o
F04.42	Acceleration time 15	0.1～6000.0	0.1	20.0	o
F04.43	Deceleration time 15	0.1～6000.0	0.1	20.0	o

F05 - Communication Control Parameter Set

Function Code	Name	Range of Setting	Minimum Unit	Factory Default	Alterable
F05.00	Protocol selection	0: Modbus protocol 1～6: reserve	1	0	×
F05.01	Baud rate configuration	Single digit: selection of Modbus Baud rate 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS Ten's digit: reserve Hundred's digit: reserve	1	005	×
F05.02	Data format	Single digit: Modbus protocol data format 0: 1-8-1 format，no check，RTU 1: 1-8-1 format，even check，RTU 2: 1-8-1 format，odd check，RTU 3: 1-7-1 format，no check，ASCII 4: 1-7-1 format，even check，ASCII 5: 1-7-1 format，odd check，ASCII Ten's digit: reserve		00	×
F05.03	Local host address	0～247， In Modbus protocol, 0 is the broadcasting address which only receives and executes commands from the upper computer but not to reply to the upper computer; and in the free protocol, 0 is the host address.	1	1	×
F05.04	Communication overtime inspection time period	0.0～1000.0s	0.1s	0.0s	○
F05.05	Communication mistake inspection time period	0.0～1000.0s	0.1s	0.0s	○
F05.06	Response delay of the main host	0～200ms（Modbus is valid）	1ms	5ms	○
F05.07	Given proportion of communication frequencies between host and slave hosts	0～500%	1%	100%	○
F05.08 ～ F05.39	Reserve				

F09 - Relevant Function Parameter Setting of Output Terminal					
Function Code	Name	Range of Setting	Minimum Unit	Factory Default	Alterable
F09.00 ～ F09.03	reserve				
F09.04	Output setting of programmable relay	0: idle terminal function 1: frequency converter is in running mode (RUN) 2: frequency converter runs with forward rotation 3: frequency converter runs with reversal rotation 4: DC braking is applied with frequency converter 5: frequency converter is ready for running (the bus is in the status of normal voltage, with no failure, no forbidden running mode and can receive the running command); 6: stop command instruction 7～14: reserve 15: output frequency reaches the high limit (FHL) 16: output frequency reaches the low limit (FLL) 17: reserve 18: reserve 19: overload and alarming signals of frequency converter (OL) 20: indication of under voltage and locked-up of frequency converter (LU) 21: reserve 22: failure of frequency converter 23: alarming of frequency converter 24: indication of running process of simple PLC	1	22	×

		25: indication of periodic running of simple PLC ends 26: indication of one running cycle of simple PLC ends 27: indication of running of simple PLC pauses 28～31: reserve 32: internal timer ends — with output of 0.5s effective signal 33: indication of reaching the running stop time 34: indication of reaching the running arrival time 35: setting running time arrival 36: setting power-on time arrival 37～40: reserve 41: given communication 42～60: reserve			

F10—Simple PLC/Multi-section Speed Function Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F10.00	Running setting of simple PLC	Single digit: selection of running modes 0: no action 1: pauses after single circulation 2: keep the final value after single circulation 3: continuous circulation 4: stop after N times of continuous circulations (N is decided by F14.00) Ten's digit: interrupt the running, and then select the startup mode 0: restart from the first section 1: continuously run with the periodic frequency after the interruption 2: continuously run with the running frequency after the interruption Hundred's digit: PLC running time unit 0: sec 1: min Thousand's digit: selection of power-failure storage 0: no storage 1: store the status of PLC when power-failure occurs including running section, frequency, and passed running period	1	0000	×
F10.01	Setting of stage 1	000H～E22H Single digit: frequency setting 0: multi-stage frequency I (i=1～15) 1: frequency is decided by the main and auxiliary synthetic frequencies 2: reserve Ten's digit: selection of running direction 0: forward rotation 1: reversal rotation 2: rotation set by the operating instructions Hundred's digit: selection of acceleration and deceleration time 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4 4: acceleration and deceleration time 5 5: acceleration and deceleration time 6 6: acceleration and deceleration time 7 7: acceleration and deceleration time 8 8: acceleration and deceleration time 9 9: acceleration and deceleration time 10 A: acceleration and deceleration time 11 B: acceleration and deceleration time 12 C: acceleration and deceleration time 13 D: acceleration and deceleration time 14 E: acceleration and deceleration time 15	1	000	○
F10.02	Setting of stage 2	000H～E22H	1	000	○
F10.03	Setting of stage 3	000H～E22H	1	000	○
F10.04	Setting of stage 4	000H～E22H	1	000	○

F10.05	Setting of stage 5	000H～E22H	1	000	o
F10.06	Setting of stage 6	000H～E22H	1	000	o
F10.07	Setting of stage 7	000H～E22H	1	000	o
F10.08	Setting of stage 8	000H～E22H	1	000	o
F10.09	Setting of stage 9	000H～E22H	1	000	o
F10.10	Setting of stage 10	000H～E22H	1	000	o
F10.11	Setting of stage 11	000H～E22H	1	000	o
F10.12	Setting of stage 12	000H～E22H	1	000	o
F10.13	Setting of stage 13	000H～E22H	1	000	o
F10.14	Setting of stage 14	000H～E22H	1	000	o
F10.15	Setting of stage 15	000H～E22H	1	000	o
F10.16	Running time of stage 1	0～6000.0	0.1	10.0	o
F10.17	Running time of stage 2	0～6000.0	0.1	10.0	o
F10.18	Running time of stage 3	0～6000.0	0.1	10.0	o
F10.19	Running time of stage 4	0～6000.0	0.1	10.0	o
F10.20	Running time of stage 5	0～6000.0	0.1	10.0	o
F10.21	Running time of stage 6	0～6000.0	0.1	10.0	o
F10.22	Running time of stage 7	0～6000.0	0.1	10.0	o
F10.23	Running time of stage 8	0～6000.0	0.1	10.0	o
F10.24	Running time of stage 9	0～6000.0	0.1	10.0	o
F10.25	Running time of stage 10	0～6000.0	0.1	10.0	o
F10.26	Running time of stage 11	0～6000.0	0.1	10.0	o
F10.27	Running time of stage 12	0～6000.0	0.1	10.0	o
F10.28	Running time of stage 13	0～6000.0	0.1	10.0	o
F10.29	Running time of stage 14	0～6000.0	0.1	10.0	o
F10.30	Running time of stage 15	0～6000.0	0.1	10.0	o
F10.31	Multi-stage frequency 1	Lower-limit frequency ～upper-limit frequency	0.01Hz	5.00Hz	o
F10.32	Multi-stage frequency 2	Lower-limit frequency ～upper-limit frequency	0.01Hz	10.00Hz	o
F10.33	Multi-stage frequency 3	Lower-limit frequency ～upper-limit frequency	0.01Hz	20.00Hz	o
F10.34	Multi-stage frequency 4	Lower-limit frequency ～upper-limit frequency	0.01Hz	30.00Hz	o
F10.35	Multi-stage frequency 5	Lower-limit frequency ～upper-limit frequency	0.01Hz	40.00Hz	o
F10.36	Multi-stage frequency 6	Lower-limit frequency ～upper-limit frequency	0.01Hz	45.00Hz	o
F10.37	Multi-stage frequency 7	Lower-limit frequency ～upper-limit frequency	0.01Hz	50.00Hz	o
F10.38	Multi-stage frequency 8	Lower-limit frequency ～upper-limit frequency	0.01Hz	5.00Hz	o
F10.39	Multi-stage frequency 9	Lower-limit frequency ～upper-limit frequency	0.01Hz	10.00Hz	o
F10.40	Multi-stage frequency 10	Lower-limit frequency ～upper-limit frequency	0.01Hz	20.00Hz	o
F10.41	Multi-stage frequency 11	Lower-limit frequency ～upper-limit frequency	0.01Hz	30.00Hz	o
F10.42	Multi-stage frequency 12	Lower-limit frequency ～upper-limit frequency	0.01Hz	40.00Hz	o
F10.43	Multi-stage frequency 13	Lower-limit frequency ～upper-limit frequency	0.01Hz	45.00Hz	o
F10.44	Multi-stage frequency 14	Lower-limit frequency ～upper-limit frequency	0.01Hz	50.00Hz	o
F10.45	Multi-stage frequency 15	Lower-limit frequency ～upper-limit frequency	0.01Hz	50.00Hz	o

F14—Circulation Control Auxiliary Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F14.00	Setting of circulation times of simple PLC	1～60000	1	1	×
F14.01	Waiting time period of position control for section 1	0～900s	1s	10s	×
F14.02	Direction selection of position control for section 2	0: forward; 1: reversal;	1	0	×
F14.03	H position of internal position instruction for section 2	0～65535	1	0	×
F14.04	L position of internal position instruction for section 2	0～65535	1	0	×
F14.05	Waiting time period of position control for section 2	0～900s	1s	10s	×
F14.06	Setting of circulation times for position control	0～60000 (0 means infinite loops)	1	0	×
F14.07～ F14.25	Reserve				

F15 — Motor Parameter Setting 1					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F15.00	Rated power of motor	0.1～999.9KW	0.1KW	Confirm according to the model	×
F15.01	Rated voltage of motor	1～690V	1V	Confirm according to the model	×

F15.02	Rated current of motor	0.1～6553.5A	0.1A	Confirm according to the model	×
F15.03	Rated frequency of motor	0.00～400.00Hz	0.01Hz	Confirm according to the model	×
F15.04	Rated rotation speed of the motor shaft	0～60000r/min	1r/min	Confirm according to the model	×
F15.05	Motor pole pairs	1～80	1	2	×
F15.06	Stator resistance of asynchronous motors	0.0000～6.5535 ohms	0.0001	Confirm according to the model	×
F15.07	Rotor resistance of asynchronous motors	0.000～6.5535 ohms	0.0001	Confirm according to the model	×
F15.08	Leakage inductance of asynchronous motors	0.00～655.35 milli-Henry	0.01mH	Confirm according to the model	×
F15.09	Mutual inductance of asynchronous motors	0.00～655.35 milli-Henry	0.01mH	Confirm according to the model	×
F15.10	Idle current of asynchronous motors	0.01～655.35A	0.01A	Confirm according to the model	×
F15.11	Parameter self-setting of motors	0: no action 1: static self setting 2: rotation idle self setting 3: reserve	1	0	×

F16 — Vector Control Parameter Setting

Function Code	Name	Range of Setting	Minimum Unit	Factory Default	Alterable
F16.00	Speed/current control selection for synchronous motors	0: speed control 1: current control	1	0	×
F16.01	Proportional gain of high speed for speed loop of synchronous motors	0.0～200.0	0.1	20.0	○
F16.02	Integral time period of high speed for speed loop of synchronous motors	0.000～10.000s	0.001s	1.000s	○
F16.03	Proportional gain of low speed for speed loop of synchronous motors	0.0～200.0	0.1	20.0	○
F16.04	Integral time of low speed for speed loop of synchronous motors	0.000～10.000s	0.001s	1.000s	○
F16.05	Switching frequency 1 for speed loop of synchronous motors	0.00Hz～F16.06	0.01Hz	5.00Hz	○
F16.06	Switching frequency 2 for speed loop of synchronous motors	F16.05～F01.11	0.01Hz	10.00Hz	○
F16.07	Filtering time for speed loop of synchronous motors	0.0～500.0ms	0.1ms	0.3ms	○
F16.08	Proportional gain for flux weakening of synchronous motors	0.0～200.0	0.1	50.0	○
F16.09	Proportional gain for current loop of synchronous motors	0.000～5.000	0.001	0.650	○
F16.10	Integral time for current loop of synchronous motors	0.000～5.000	0.001	0.150	○
F16.11	Setting of torque direction control of synchronous motors	0: positive 1: negative	1	0	○
F16.12	Selection of given torque for synchronous motors	0: digital keyboard setting 1: AI1 analog setting 2: AI2 analog setting 3: setting of terminal UP/DOWN adjustment 4: given communication (Modbus and the external bus share same memory storage) 5: analog setting of EAI1 (expansion is valid) 6: analog setting of EAI2 (expansion is valid) 7: setting of high-speed pulse (X8 terminal needs to be set with corresponding function) 8: setting of terminal pulse width (X8 terminal needs to be set with corresponding function) 9: multi-stage given (utilize the multi-stage speed function, upper-limit frequency corresponds to the 200% rated torque) 10: reserve	1	0	×

F16.13	Digital setting for torque control of synchronous motors	0.0～200.0%	0.1%	20.0%	○
F16.14	Electric torque digital limit under the speed mode	0.0～200.0%	0.1%	180.0%	×
F16.15	Brake torque digital limit under the speed mode	0.0～200.0%	0.1%	180.0%	×
F16.16	Speed limit of torque control for forward rotation of synchronous motors	0.00Hz～F01.11	0.01Hz	50.00Hz	×
F16.17	Speed limit of torque control for reversal rotation of synchronous motors	0.00Hz～F01.11	0.01Hz	50.00Hz	×
F16.18	Detection of current coefficient for magnetic poles of synchronous motors	1～50	1	5	×
F16.19	Selection of detection of initial magnetic pole positions of synchronous motors	0: no detection; 1: use the pulse response detection 2: use the forcing zero detection	1	1	×
F16.20	Pull-in current 1 of synchronous motors	0.0～100.0%	0.1%	20.0%	×
F16.21	Pull-in current 2 of synchronous motors	0.0～100.0%	0.1%	10.0%	×
F16.22	Switching frequency of pull-in current of synchronous motors	5.00Hz～F01.11	0.01Hz	10.00Hz	×
F16.23	Low-frequency compensation coefficient of synchronous motors	0～50	1	30	×
F16.24	Pre-excitation time of synchronous motors	0.000s～5.000s	0.001s	0.300s	×
F16.25	Flux-weakening coefficient of synchronous motors	0.0～2.0	0.1	0.3	×
F16.26	Proportional gain of speed loop of asynchronous motors	0.010～6.000	0.001	0.700	○
F16.27	Calculus time constant of speed loop of asynchronous motors	0.010～9.999	0.001	0.360	○
F16.28	Depressing oscillation compensation gain of asynchronous motors	100.0～130.0%	0.1%	100.0%	○
F16.29	Stability coefficient of asynchronous motors	10～300	1	100	○

F17 — Motor Parameter Setting 2					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F17.00	Stator resistance of synchronous motors	0.000～65.535Ω	0.001Ω	Confirm according to the motor model	○
F17.01	D-axis inductance of synchronous motors	0.00～655.35mH	0.01mH	Confirm according to the motor model	○
F17.02	Q-axis inductance of synchronous motors	0.00～655.35mH	0.01mH	Confirm according to the motor model	○
F17.03	Back electromotive force constant of synchronous motors	0～10000	1	Confirm according to the motor model	○
F17.04	Encoder wire number	1～10000	1	1024	×
F17.05	AB phase sequence of encoder	0: forward 1: reverse	1	0	×
F17.06	Mounting angle of encoder	0.0～359.9 DEG	0.1 DEG	0.0 DEG	×
F17.07	Encoder filtering coefficient	5～100	1	15	○
F17.08	Position control selection	0: position control invalid 3: position control valid	1	0	×
F17.09	Position given selection	0: internal given instruction 1: communication given instruction (the direction is controlled by the 1-section instruction direction) 2: reserve	1	0	×
F17.10	Maximum frequency of position control	0.01～200.00HZ	0.01HZ	30.00HZ	×
F17.11	Minimum frequency of position control	0.01～5.00HZ	0.01HZ	0.01HZ	×
F17.12	Creeping pulse number of position control	0～60000	1	30	○

F17.13	Range of pulse for position arrival	1～255	1	2	○
F17.14	Gain of position control	1～5000	1	100	○
F17.15	PSG alternation point	0.01～30.00HZ	0.01HZ	5.00HZ	○
F17.16	Acceleration and deceleration time of position control	1～60000	1	200	○
F17.17	Selection of 1-section direction for position control	0: forward；1: reverse；	1	0	×
F17.18	Reserve				
F17.19	H bit for internal 1-section position instruction	0～65535	1	0	×
F17.20	L bit for internal 1-section position instruction	0～65535	1	10000	×

F19 — Protection Relevant Function Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F19.00 ～ F19.13	reserve				
F19.14	Automatic current limiting level	110～200%	1%	150%	×
F19.15	Frequency decreasing rate under automatic current limiting	0.00～99.99Hz/s	0.01Hz/s	10.00Hz/s	×
F19.16	Action selection of automatic current limiting	0: constant speed invalid 1: constant speed valid	1	0	×
F19.17 ～ F19.44	reserve				

F26 — Failure Record Function Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F26.00	Record of the previous failure	0: no failure 1: over-current during acceleration of frequency converter 2: over-current during deceleration of frequency converter 3: over-current during constant speed of frequency converter 4: over-voltage during acceleration of frequency converter 5: over-voltage during deceleration of frequency converter 6: over-voltage during constant speed of frequency converter 7: over-voltage during the pause of frequency converter 8: under-voltage during running 9: overload protection of frequency converter 10: overload protection of motor 11: under-load protection of motor 12: input open-phase 13: output open-phase 14: inverter module protection 15: short circuit to ground during running 16: power-on short circuit to ground 17: overheat of frequency converter 18: failure of external equipment 19: failure of current detection circuit 20: external disturbance 21: internal disturbance — main clock, etc. 22～24: reserve 25: start terminal protection 26: communication failure 27～29: reserve 30: E^2PROM read and write error 31: disconnection of temperature detection 32: self-setting failure 33: reserve 34: factory failure 1	1	0	*

		35: factory failure 2 36: reserve 37: out-of-step during startup 38～50: reserve			
F26.01	Record of the one failure before last	Same as above	1	0	*
F26.02	Record of the one failure before the last two	Same as above	1	0	*
F26.03	Record of the one failure before the last three	Same as above	1	0	*
F26.04	Setting frequency of the last failure	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	*
F26.05	Output frequency of the last failure	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	*
F26.06	output current of the last failure	0.0～6553.5A	0.1A	0.0A	*
F26.07	DC bus voltage of the last failure	0.0～6553.5V	0.1V	0.0V	*
F26.08	Module temperature of the last failure	0～125℃	1℃	0℃	*
F26.09	Input terminal status of the last failure			0	*
F26.10	Running time period of the last failure	0～65535min	1min	0min	*
F26.11	Setting frequency of the failure before the last one	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	*
F26.12	Output frequency of the failure before the last one	0.00Hz～upper-limit frequency	0.01Hz	0.00Hz	*
F26.13	Output current of the failure before the last one	0.0～6553.5A	0.1A	0.0A	*
F26.14	DC bus voltage of the failure before the last one	0.0～6553.5V	0.1V	0.0V	*
F26.15	Module temperature of the failure before the last one	0～125℃	1℃	0℃	*
F26.16	Input terminal status of the failure before the last one			0	*
F26.17	Running time of the failure before the last one	0～65535h	1h	0h	*

F27 — Password and Manufacturer Function Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
F27.00	User password	00000～65535	1	00000	○
F27.01	Manufacturer password	00000～65535	1	00000	○

C — Monitoring Function Parameter Setting					
Function Code	**Name**	**Range of Setting**	**Minimum Unit**	**Factory Default**	**Alterable**
C-00	Display the parameters defined by F00.01 and F00.07				
C-01	Display the parameters defined by F00.02 and F00.08				
C-02	Display the parameters defined by F00.03 and F00.09				
C-03	Display the parameters defined by F00.04 and F00.10				
C-04	Display the parameters defined by F00.05 and F00.11				
C-05	Display the parameters defined by F00.06 and F00.12				

Chapter IV Communication Protocol

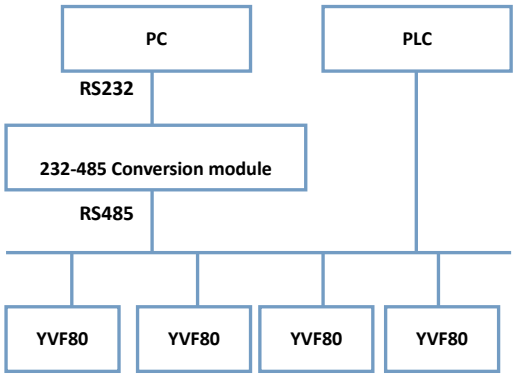
I Modbus communication

1. Summary

The control box provides the universal RS485 communication ports for end-users. The communication ports can communicate with the host computer equipment (such as the human-machine interface, PCs, PLC controllers, etc.) with the corresponding ports, hence realizing the centralized monitoring and controlling of the internal frequency converter (such as setting the parameters, controlling the running status, reading the working mode of the frequency converter, etc).

The communication protocol is the specific interface documentation to realize the above functionalities. End-users shall read and program carefully for the remote and network control of the internal frequency converter.

2. Networking Mode of Communication Network



3. Communication Mode

The internal frequency converter is used as a slave computer in the RS485 network, and the host computer could be PCs, PLCs or human-machine interfaces. The specific communication method is as follows:

PCs or PLCs, etc., are the host computers, the internal frequency converter is the slave computer, and the host computer and the slave computer communicates via the point-to-point communication.

When the host computer uses the broadcasting address to send the commands, the slave computer doesn't answer.

The end-user can set the local address, baud rate, data format, etc., of the internal frequency converter through the keyboard of the slave computer.

The internal frequency converter provides a RS485 port.

Default mode: asynchronous serial and half-duplex transmission pattern, RTU mode and ASCII mode. The default format and transmission rate: 8-N-1, 9600bps.

4. Communication Pattern and Structure of the Communication Data

4.1 Data Frame Format

When in the RTU mode, the information shall be sent from at least the time pause interval of 3.5 characters. The first domain for transmission is the equipment address, and the character of hexadecimal 0x00～0xFF can be transmitted. The network equipment continuously monitors the bus, including the pause time. When received the address domain, all equipment on the bus judge if the address is meant for itself. When the last character of the data packet is transmitted, the pause of the time of at least 3.5 characters means the information ends. A new piece of information can be transmitted after the pause.

The whole information frame must be a continuous data stream transmission. If a new piece of information starts to transmit by following the last information frame in the time period less than 3.5 characters, and the receiving equipment regards it as the continuation of the previous information frame, which will cause an error, because the value in the last CRC domain is incorrect.

The RTU frame format is defined as follows:

Frame head	Time pause of 3.5 characters
Slave address	Slave address : 0～247
Communication command code	03H: read the slave computer parameter
	06H: write the slave computer parameter
Data content DATA	Data content in the data packet: Parameter address（16bit） Parameter quantity or the bit number of the parameter value parameter value (16 bit)
Data content DATA	
.....	
.....	
Low byte of CRC verification	16 bit no-symbol verification value
High byte of CRC verification value	
Frame end	Time pause of 3.5 characters

ASCII frame format:

Frame head	': '(0x3A)
Slave address Hi	Slave computer address : comprising of 2 ASCII codes
Slave address Lo	8bit slave computer address 0～247
Command code Hi Command code Lo	Command code: two ASCII codes form the 8-bit command code 03H: read the salve computer parameter, 06H: write the salve computer parameter
Data content DATA	Data content in the data packet:
Data content DATA	The N 8bit data content comprises of 2*N ASCII codes
LRC CHK Hi LRC CHK Lo	LRC verification value comprises of 2 ASCII codes.
Frame end Hi	Frame end Hi = CR（0x0D）
Frame end Lo	Frame end Lo = LF（0x0A）

4.2 Host Computer Reading Slave Computer Parameter

Command code 03H. When the host computer initiates one communication transmission, at least one and at most 10 parameters can be read, i.e., 2 parameter values from the 0000H memory address of the internal frequency converter with the address of 01 are continuously read. The content of the command packet of the host computer is comprised of:

ADR	01H
CMD	03H
high byte of parameter starting address	00H
low byte of parameter starting address	00H
High byte of parameter quantity	00H
Low byte of parameter quantity	02H
Low byte of CRC verification value	Obtained by calculation
High byte of CRC verification value	Obtained by calculation

The content of the slave computer answer packet is comprised of:

ADR	01H
CMD	03H
Byte quantity of parameter value	04H
Address 0000H Content high byte	00H
Address 0000H Content low byte	00H
Address 0001H Content high byte	00H
Address 0001H Content low byte	03H
Low byte of CRC verification value	Obtained by calculation
High byte of CRC verification value	Obtained by calculation

4.3 Host Computer Writing the Slave Computer Parameter

Command code 06H. When the host computer initiates one communication transmission, one parameter can be written, write the decimal 5000 (1388H) into the 0101H memory address of the internal frequency converter of which the salve address is 02, and the command, the content of the command packet of the host computer is comprised of:

ADR	02H
CMD	06H
Parameter address high byte	01H
Parameter address low byte	01H
High byte of parameter value	13H
Low byte of parameter value	88H
Low byte of CRC verification value	Obtained by calculation
High byte of CRC verification value	Obtained by calculation

The content of the salve computer answer packet:

ADR	02H
CMD	06H
Parameter address high byte	01H
Parameter address low byte	01H
Address 0101H content high byte	13H
Address 0101H content low byte	88H
Low byte of CRC verification value	Obtained by calculation
High byte of CRC verification value	Obtained by calculation

5. Address Distribution of Data Communication

5.1 Communication Addresses of Function Code F00～F26 Sets

The MODBUS communication address encoding method of the function code parameter obeys the PPnn rule: PP means the address high byte, and corresponds to the set number of the function parameter; and nn means the address low byte, and corresponds to the internal-set number of the function code parameter, such as the communication address of the function codes F3.21 is 0315H, and 03H is the hexadecimal form of the set number 3 as well as 15H for the internal-set serial number 21.

5.2 Control Command and Status Word Communication Address

Variable Name	Communication Address	Read and Write Attributes	Command Data or Meaning of Answer Value
Operation command word	1E00H	Read and write	1: reserve
			2: reserve
			3: forward rotating jog running
			4: reversal rotating jog running
			5: running
			6: stop
			7: forward rotating running
			8: reversal rotating running
			9: failure resetting
			10: reserve
Setting of serial port value	1E01H	Read and write	0～10000(correspond 0～maximum value)
Status of frequency converter	1E02H	read only	BIT0: establishment of bus voltage BIT1: valid common running command BIT2: valid jog running command
			BIT3: running BIT4: current running direction as reverse BIT5: running instruction direction as reverse BIT6: deceleration brake
			BIT8: decelerating BIT9: alarming BIT10: failure BIT11: current limiting BIT12: automatic failure restoration BIT13: self setting BIT14: free stop status BIT15: rotation speed following startup
Alarming code	1E 03H	read only	0: no alarm 1～50: showing the current alarming code
			BIT7: accelerating

5.3 Communication Address of Monitoring Parameters

Variable Name	Communication Address	Read and write Attributes	Command Data or Meaning of Answer Value
C-00	1C00H	Read only	Monitoring parameter 1
C-01	1C01H	Read only	Monitoring parameter 2
C-02	1C02H	Read only	Monitoring parameter 3
C-03	1C03H	Read only	Monitoring parameter 4
C-04	1C04H	Read only	Monitoring parameter 5
C-05	1C05H	Read only	Monitoring parameter 6

5.4 Internal Hidden Parameter Set

Variable Name	Communication Address	Read and write Attributes	Command Data or Meaning of Answer Value
Low byte of position instruction	1D00H	read and write	Range : 0～65535
High byte of position instruction	1D01H	read and write	Range : 0～65535
Communication A01 given value	1D02H	read and write	Range : 0～4000
Communication A02 given value	1D03H	read and write	Range : 0～4000
Communication EA01 given value	1D04H	read and write	Range : 0～4000
Communication EA02 given value	1D05H	read and write	Range : 0～4000
Communication HD0 given value	1D06H	read and write	Range : 0～4000
Communication EHD0 given value	1D07H	read and write	Range : 0～4000
Communication output terminal given value	1D08H	read and write	BIT0:Y1 BIT1:Y2 BIT2:Y3 BIT3: Y4 BIT4: RLY BIT5: EY1 BIT6: EY2 BIT7: EY3 BIT8: EY4

			BIT9: ERLY1 BIT10: ERLY2
Communication virtual output terminal given value	1D09H	read and write	BIT0: CX1 … BIT7: CX8
Reserve	1D0AH	/	
Reserve	1D0BH	/	
Reserve	1D0CH	/	
Reserve	1D0DH	/	

6. Processing during Communication Error

When the detection result of the receiving frequency converter is wrong, and the read and write parameter address is illegal or the parameter value is illegal, etc., the responding communication error packet is sent to the host computer. The responding communication error packet takes the (command code of host computer+80H) as the command code, and 1 byte of error code is attached. The format of the responding communication error packet is as follows:

ADR	01H
CMD	83H/86H
Communication error code	01H～06H (the meaning is as follows)
Low byte of CRC verification value	Obtained by calculation
High byte of CRC verification value	Obtained by calculation

The meaning of the communication error code is as follows:

Communication Error Code Value	Communication Error Type	Priority
0x01	CRC verification is false	1
0x02	Command code is illegal	2
0x03	The address of the visited register is illegal	3
0x04	The numerical value of writing register is illegal	4
0x05	The parameter is forbidden to be altered	5
0x06	The quantity of reading register is illegal	6

7. Example of Data Frame

7.1 RTU mode

1. Start to operate #1 internal frequency converter

Data Domain	Slave Computer Address	Command Code	High Byte of Register Address	Low Byte of Register Address	High Byte of Data	Low Byte of Data	CRC Low Byte	CRC High Byte
Command frame (host computer)	**01**	**06**	**1E**	**00**	**00**	**05**	**4F**	**E1**
Answer frame (slave computer)	**01**	**06**	**1E**	**00**	**00**	**05**	**4F**	**E1**

2. Stop to operate #1 internal frequency converter

Data Domain	Slave Computer Address	Command Code	High Byte of Register Address	Low Byte of Register Address	High Byte of Data	Low Byte of Data	CRC Low Byte	CRC High Byte
Command frame (host computer)	01	06	1E	00	00	05	4F	E1
Answer frame (slave computer)	01	06	1E	00	00	05	4F	E1

3. Set the frequency given value of #1 internal frequency converter as 25.00Hz (the upper-limit frequency is 50.00Hz)

Data Domain	Slave Computer Address	Command Code	High Byte of Register Address	Low Byte of Register Address	High Byte of Data	Low Byte of Data	CRC Low Byte	CRC High Byte
Command frame (host computer)	01	06	1E	01	13	88	D3	74
Answer frame (slave computer)	01	06	1E	01	13	88	D3	74

4. Read the status of #1 internal frequency converter

Data Domain	Slave Computer Address	Command Code	High Byte of Register Address	Low Byte of Register Address	High Byte of Data	Low Byte of Data	CRC Low Byte	CRC High Byte
Command frame (host computer)	01	03	1E	02	00	01	23	E2
Answer frame (slave computer)	01	03	(Byte quantity of the answer value) 02		00	01	79	84

7.2 ACSII mode

Start to operate #1 internal frequency converter

Data Domain	Frame Starting Character	Slave Computer Address	Command Code	High Byte of Register Address	Low Byte of Register Address	High Byte of Data	Low Byte of Data	LRC Verification Byte	End Character
Command frame (host computer)	:	01	06	1E	00	00	05	D6	CR (enter) LF (newline)
Answer frame (slave computer)	:	01	06	1E	00	00	05	D6	CR LF

Generation of LRC verification code:

Verification code = complement of hexadecimal sum of（Slave address +Command code +high byte of register address+ low byte of register address+ high byte of data + low byte of data）

The process of generating the LRC code of to start operating #1 internal frequency converter as above:

0xD6 = 0x100 – (0x01+0x06+0x1E+0x00+0x00+0x05)

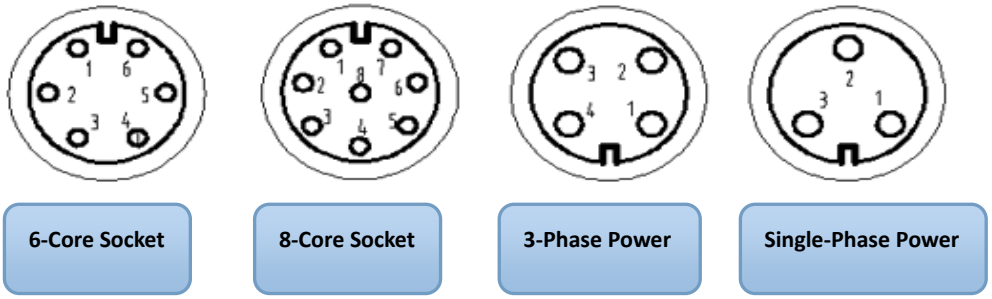
The calculation of the CRC verification value written by programming language C as follows:

```
unsigned int cal_crc_value (unsigned char *pval, unsigned char len)
{
unsigned int crc_value=0xFFFF; unsigned int i;
while(len--)
{
crc_value ^= *pval++; for (i=0; i<8; i++)
{
if(crc_value & 0x0001)
{
crc_value >>= 1; crc_value ^= 0xA001;
}
else
{
crc_value >>= 1;
}
}
}
return (crc_value);
```

Chapter V Description of Communication Port

I Wiring Standards

Communication and Power Supply Port Diagram



II Code of Communication and Power Supply Port

1. 6-core socket

PIN1 (corresponding to the black wire in the plug cable): encoder output reference ground GND

PIN2 (corresponding to the grey wire in the plug cable): reserved for spare

PIN3 (corresponding to the purple wire in the plug cable): reserved for spare

PIN4 (corresponding to the blue wire in the plug cable): encoder B phase output

PIN5 (corresponding to the orange wire in the plug cable): encoder A phase output

PIN6 (corresponding to the brown wire in the plug cable): encoder Z phase output

2. 8-core socket corresponds

PIN1 (corresponding to the black wire in the plug cable): analog data reference ground GND

PIN2 (corresponding to the grey wire in the plug cable): analog data AI input, reference ground GND, analog data range 0 – 10v

PIN3 (corresponding to the white wire in the plug cable): external transducer position control input port, effective to GND low electrical level (setting motor starting / original position in the position control)

PIN4 (corresponding to the purple wire in the plug cable): public contact point TC of failure relay

PIN5 (corresponding to the orange wire in the plug cable): output of normal open contact point

TA of failure relay

PIN6 (corresponding to the blue wire in the plug cable): communication protocol 485 port B

PIN7 (corresponding to the red wire in the plug cable): communication protocol 485 port A

PIN8 (corresponding to the brown wire in the plug cable): reference ground GND

3. 3-phase Power Supply (Corresponding to 380v/460v YVF Models)

PIN1 (corresponding to the green wire in the power cable): phase line

PIN2 (corresponding to the red wire in the power cable): phase line

PIN3 (corresponding to the yellow wire in the power cable): ground / earth wire

PIN4 (corresponding to the black wire in the power cable): phase line

4. Single-phase Power Supply (Corresponding to 220v/240v YVF Models)

PIN1 (corresponding to the green wire in the power cable): null line

PIN2 (corresponding to the yellow wire in the power cable): ground / earth wire

PIN3 (corresponding to the red wire in the power cable): phase line