Catalog

1. Overview

1.1 Safety Precautions

To ensure safe, reliable and reasonable use of this product, please use the product only after fully understanding the safety precautions described in this manual.

Warning signs and meaning

The following marks are used in this manual to indicate that the place is important regarding safety. Failure to observe these precautions may result in personal injury or death, damage to this product and associated systems.

Danger	**Danger:** If operated incorrectly, it may cause death or major safety accidents.
Warning	**Warning** If operated incorrectly, it may result in death or a major safety accident.
Caution	**Note:** If done incorrectly, minor injuries may result.
Tips	**Tip:** If operated incorrectly, this product and the associated system may be damaged.

Operating Qualifications

This product must be installed, wired, operated, and maintained by trained professionals. By "trained professionals" in this manual, we mean that the personnel working on this equipment must be trained in the installation, wiring, running, and maintenance of the equipment, and must be able to respond properly to emergencies that occur during use.

Security Guidance

Safety rules and warning signs are provided for your safety and to prevent personal injury to the operator and damage to the product and associated systems; please read this manual carefully before use and operate in strict accordance with the safety rules and warning signs in this manual. The safety rules and warning signs are divided into the following categories: general instructions, instructions for transportation and storage, instructions for installation and wiring, instructions for running, instructions for maintenance, and instructions for disassembly and disposal of waste products.

● Routine guidance

Warning	● This product carries a hazardous voltage and it controls a potentially hazardous motion mechanism. Failure to comply with the regulations or operate it in accordance with this manual may result in personal injury or death, damage to this product and associated systems. ● Only trained professionals are allowed to operate this product, and be familiar with all the safety instructions and regulations for running in this manual before using this product; proper running and maintenance are a reliable guarantee for achieving safe and stable running of this product. Do not perform wiring work while the power is on, as there is a risk of death by electric shock. When performing wiring, inspection, maintenance, etc., cut off the power to all associated equipment and make sure that the DC voltage of the main circuit has dropped to a safe level, and wait 5 minutes before performing the related work.
Caution	● Prevent children and the public from coming in contact with or near this product. ● This product can only be used in accordance with the manufacturer's specified purpose, and cannot be used in special fields related to emergency, rescue, ship, medical, aviation, nuclear facilities, etc. without permission. ● Unauthorized modifications, use of parts not sold or recommended by the manufacturer of this product may cause malfunction.

Important	● Be sure to deliver this manual to the actual user and ensure that the actual user reads it carefully before using it. ● Before installing and commissioning the inverter, make sure you read and fully understand these safety rules and warning signs.

● Transportation and storage guidance

⚠ Warning	Proper transportation, storage, installation, and careful running and maintenance are essential for safe running of the inverter.
⚠ Caution	During transportation and storage, the inverter must be protected from shock and vibration and must be stored in a dry place free of corrosive gases, conductive dust and ambient temperature less than 60°C.

● Guidance for installation of wiring

⚠ Warning	● Only trained professionals should operate this product. ● The power line, motor line and control line must be connected tightly, and the grounding terminal must be grounded, and the grounding resistance is less than 10Ω. Before turning on the inverter panel, disconnect the power to all associated equipment and make sure that the main circuit DC voltage has dropped to a safe level, and wait 5 minutes before performing related running. ● Human static electricity can seriously damage the internal sensitive devices. Before performing related running, please observe the measures and methods specified in the electrostatic preventive measures (ESD), otherwise the inverter may be damaged. ● Since the output voltage of the inverter is a pulse waveform, if there are capacitors or varistors for lightning protection installed on the output side to improve the power factor, be sure to remove or modify them on the input side of the inverter. ● Do not add switching devices such as circuit breakers and contactors on the output side of the inverter (if switching devices must be connected on the output side, the control must ensure that the output current of the inverter is zero when the switch is operated).

● Guidance for running

⚠ Warning	● The inverter is operated at high voltage, and dangerous voltages are inevitable on some parts of the product. Regardless of where the fault occurs in the control equipment, it may cause a major accident or even personal injury, i.e., a potentially dangerous fault exists; therefore, additional external precautions or other devices to ensure safe running must be taken, such as the installation of independent current-limiting switches, mechanical guards, etc. ● In order to ensure that the motor overload protection can operate correctly, the motor parameters input to the inverter must be exactly the same as the actual motor used.

● Guidance on maintenance

⚠ Warning	● Maintenance of this product should only be performed by the company's service department, by a company-authorized repair center, or by company-trained and authorized professionals who are thoroughly familiar with the safety warnings and operating instructions presented in this manual. ● Any defective device must be replaced promptly. ● Before opening the equipment for maintenance, be sure to disconnect the power and confirm that the main circuit DC voltage has dropped to a safe level, and wait 5 minutes before performing the related running.

● Guidance on disassembly and scrap disposal

⚠ Caution	● The box of the inverter is reusable. Please keep the box for future use or please return it to the manufacturer. ● The disassembled metal parts are recyclable.

	● Some of the devices can have an adverse effect on the environment, such as electrolytic capacitors, so please dispose of such devices in accordance with the requirements of the environmental protection department.

1.2 Technical specifications

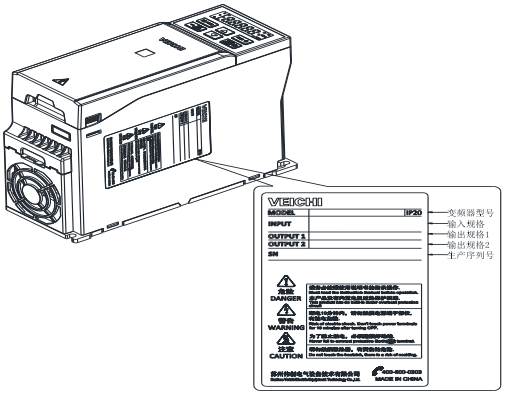
Item		Specifications
Power input	Voltage, frequency	Three-phase 380V-480V 50/60Hz Three-phase 660V-690V 50/60Hz
	Allowed to fluctuate	Voltage fluctuation: T3: -15%~10%; T6: -10%~10% Voltage imbalance: <3%. Frequency fluctuation: ±5% Distortion rate: Meet IEC61800-2 requirements
	Closing inrush current	Less than rated current
	Power Factor	≥0.94(with DC reactor)
	Inverter efficiency	≥96%
Output	Output Voltage	Output under rated conditions: 3 phases, 0 to input voltage, error less than 2%. May be overmodulated.
	Output Frequency Range	0 ~ 320Hz (more than 320Hz can be customized)
	Output frequency accuracy	Error not more than 0.01Hz (digital setting) or 0.2% of maximum frequency (analogue giving)
	Overload capacity	150% of rated current for 1 minute; 180% of rated current for 10 seconds; 200% of rated current for 0.5 seconds.
Main Control Performance	Motor control mode	Asynchronous motors: without PG vector control, with PG vector control, VF control Permanent magnet synchronous: without PG vector control, with PG vector control
	Modulation method	Optimized space vector PWM modulation, continuous adjustment, discontinuous adjustment automatic switching Overmodulation can be performed to increase the output voltage
	Carrier frequency	0.6 to 15.0 kHz, random carrier modulation
	Speed control range	With PG vector control (synchronous and asynchronous): 1:1000 Without PG vector control (asynchronous): 1:100 Without PG vector control (synchronous): 1:50
	Steady-state speed accuracy	Without PG vector control (asynchronous and synchronous): ≤ 1% of rated synchronous speed With PG vector control (asynchronous and synchronous): ≤ 0.02% of rated synchronous speed
	Starting torque	Without PG vector control (asynchronous): 0.5 Hz provides 180% of rated torque Without PG vector control (synchronous): 2Hz provides 100% of rated torque With PG vector control (synchronous and asynchronous): 200% of rated torque at 0Hz
	Torque Response	Without PG vector control (synchronous and asynchronous): ≤20ms With PG Vector control (synchronous and asynchronous): ≤10ms
	Frequency accuracy	Without PG vector control (synchronous and asynchronous): ≤20ms With PG Vector control (synchronous and asynchronous): ≤10ms
	Frequency resolution	Digital setting: 0.01Hz; Analog setting: Max. frequency × 0.05%
Products Basic Function	DC braking capacity	Starting frequency：0.00～50.00Hz Braking time：0.0～60.0s Braking current: 0.0～150.0% rated current
	Torque boost	Automatic torque boost 0.0% to 100.0%

		Manual torque boost 0.0% to 30.0%
	V/F curve	Straight VF curves, custom multi-point VF curves, square VF curves. 1.1 - 1.9 arbitrary power VF curves.
	Acceleration and deceleration curves	Two types: linear acceleration and deceleration, S-curve acceleration and deceleration. Four sets of acceleration and deceleration times in 0.01s, up to 650.00s, with optional benchmarks.
	Rated output voltage	Using the power supply voltage compensation function, it can be set in the range of 50-100% with the rated voltage of the motor as 100% (the output cannot exceed the input voltage)
	Automatic voltage adjustment	When the grid voltage fluctuates, it can automatically keep the output voltage constant
	Automatic energy-saving running	Automatically optimize the output voltage according to the load condition to achieve energy-saving running
	Automatic current limiting	Automatic current limitation during running to prevent frequent overcurrent fault tripping
	Instantaneous power-down handling	Uninterrupted running by bus voltage control in case of transient power failure
	Standard Features	Frequency source primary and secondary superposition, run command bundle, start frequency start, vector pre-excitation start, start/stop DC braking, speed tracking and power down restart, reverse disable and forward/reverse dead time setting, zero speed torque hold, point running, frequency jump, emergency stop time individual setting, FDT detection, timer function, torque control, flux braking and energy braking, fault self-reset, recent three fault logging, process PID controller, multi-step speed and PLC program control, 485 communication interface.
	Frequency setting channel	Keypad digital setting, keypad potentiometer, analog voltage/current terminal AI1 and AI2, communication feed and multi-channel terminal selection, primary and secondary channel groups
	Feedback input channel	Voltage current terminal AI1 and AI2, communication feed, pulse input PUL
	Run command channel	Operator panel feed, external terminal feed, communication feed
	Input command signal	Start, stop, forward and reverse rotation, jogging, multi-speed, free stop, reset, acceleration and deceleration time selection, frequency setting channel selection, external fault alarm
	External output signal	1 relay outputs, 1 OC output. 0 to 10V output, 4 to 20mA/0 to 20mA output. Pulse frequency output.
Protection function		Bus overvoltage, grid undervoltage, inverter overcurrent, module fault, inverter overload, motor overload, current detection zero drift fault, Hall fault, E2ROM fault, motor short circuit to ground fault, input phase loss, output phase loss, inverter overheat, communication fault, PG card fault, PG disconnection fault, motor parameter self-tuning fault
Functions	Motor control mode	Two vector modes are supported, one providing high performance speed control and the other providing lower Performance but only easy debugging methods.
	Parameter self-learning	Static parameter learning and rotational parameter learning for asynchronous motors and synchronous motors. Static self-learning of all parameters for asynchronous motors; self-learning of encoders with PG vector control.
	Support for multiple encoders	Frequency and voltage can be given and adjusted independently, supporting multi-channel giving mode.
	VF Separation Function	Frequency and voltage can be given and adjusted independently, supporting multi-channel giving

		mode.	
	Terminal, analog	Provide 4-way virtual X terminal and 4-way virtual Y terminal; support terminal rising edge and falling edge delay adjustment. 4 X terminals for analog expansion are available. Provision of two multi-point analog curves for analog calibration.	
	Motor short circuit detection to ground	Detects whether the motor is short-circuited to ground and can be automatically detected on power-up.	
	Servo Control	Support synchronous and asynchronous servo control, pulse tracking, zero servo, indexing positioning, etc. Servo basic functions, supporting quadrature pulse feeding.	
	Communication Networking	Support for 485/Modbus protocol, CANOPEN protocol, Profibus-DP protocol, Ethercat protocol, Profinet protocol. Support Modbus free protocol, support CAN custom protocol, which can realize networking and linkage control among VEICHI inverters.	
	Remote and monitoring functions	Support remote program upgrade, remote monitoring, remote lock function, can connect to VEICHI 3G model Support for VEICHI virtual oscilloscope monitoring and debugging.	
Keyboard display	LED Display	Single-line 4-digit digital tube display	1 Inverter status quantity can be monitored
		Two-line 5-digit digital tube display	2 Inverter status quantities can be monitored
	Parameter Copy	Upload and downlink inverter function code information for fast parameter copying	
	Status Monitoring	Output frequency, given frequency, output current, input voltage, output voltage, motor speed, PID feedback amount, PID feed amount, module temperature, input and output terminal condition, etc.	
Environment	Installation site	Indoor, not more than 1000m above sea level, no corrosive gas and direct sunlight	
	Temperature, humidity	-10 ~ +40℃ 20%-95%RH (no condensation)	
	Vibration	Less than 0.5g below 20Hz	
	Storage temperature	-25-+60℃	
	Installation method	Wall-mounted, standing cabinet type	
	Protection level	IP20	
	Cooling method	Forced air cooling	

2. Model description and installation

2.1 Model description



AC310 - T 3 - 022 G / 030 J - B

Inverter series
AC310

Code	Phase
T	Three phase

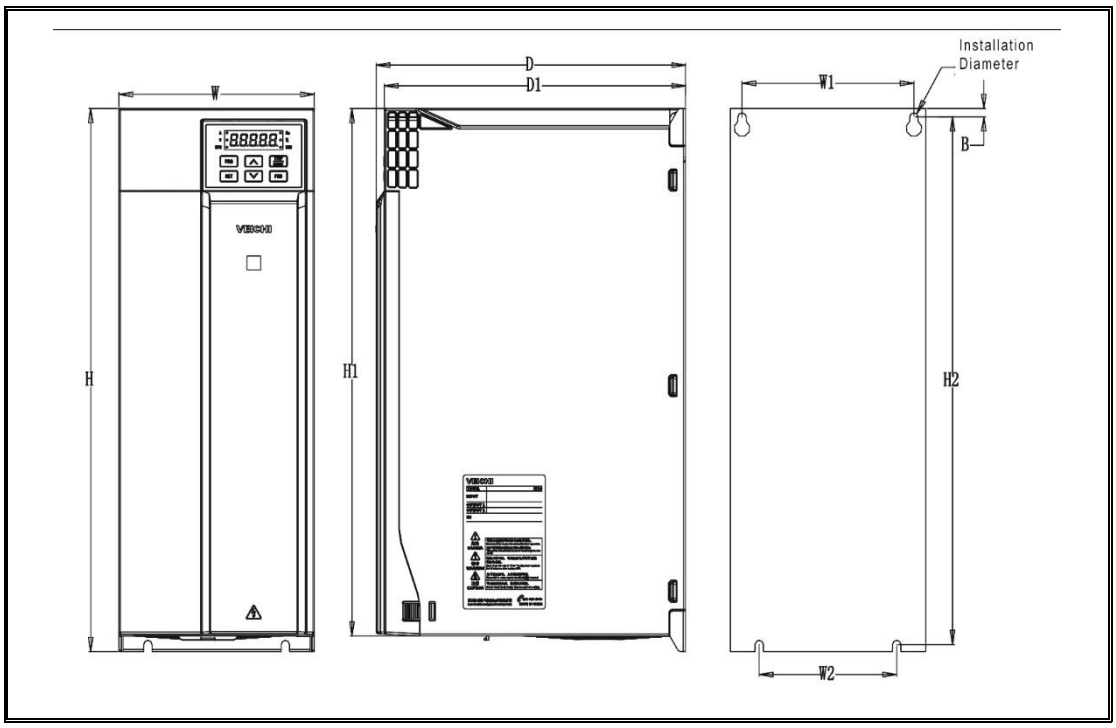
Code	Voltage
3	380Vac
6	660Vac

Code	Power
022	22kw
030	30kw
045	45kw
055	55kw
075	75kw

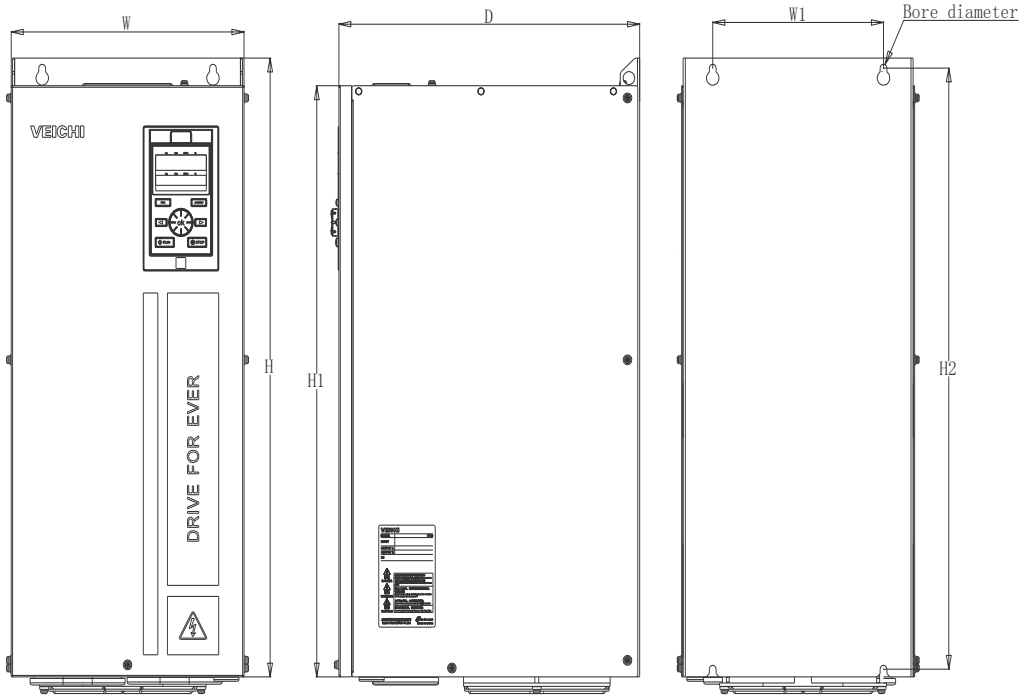
Code	Type
G	General
J	Beam pump
B	Brake unit

Input voltage	380V	660V
Rated power(kW)	Rated output current (A)	
22	45	28
30	60	35
37	75	45
45	90	52
55	110	63
75	150	86

2.2 Mounting dimensions

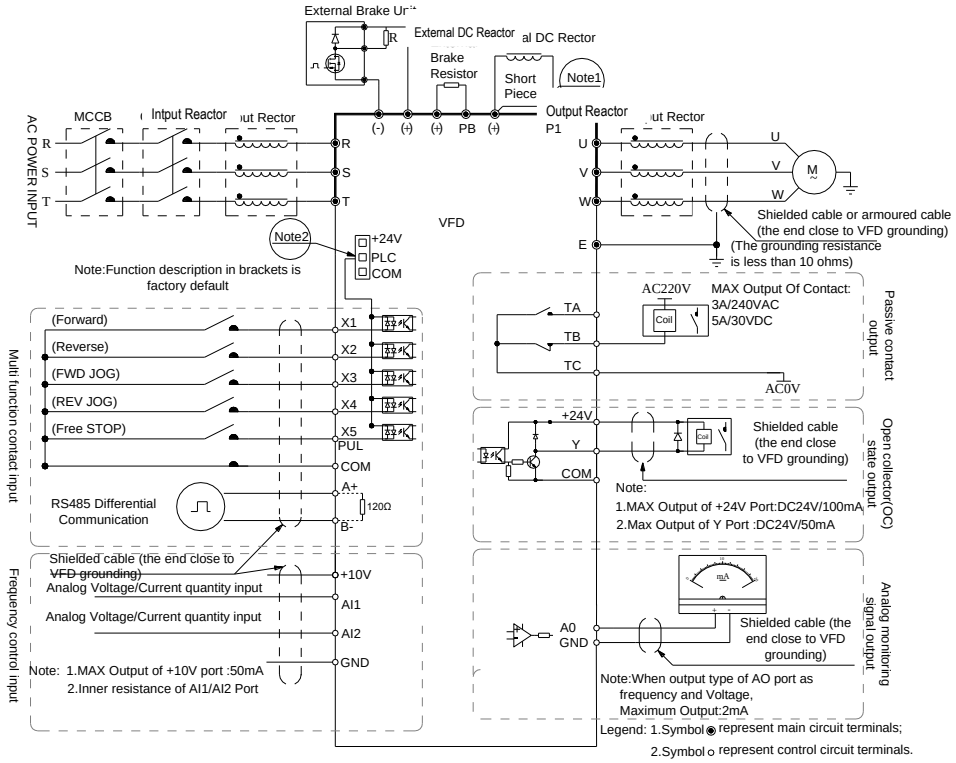


Model	Dimension(mm)					Installation Dimension(mm)				Installation Aperture
	W	H	H1	D	D1	W1	W2	H2	B	
AC310-T3-022G/030J-B	142	383	372	225	219	125	100	372	6	4-M5
AC310-T3-030G/037J-B	172	430	/	225	219	150	150	416.5	7.5	4-M5
AC310-T3-037G/045J-B										



Model	Dimension(mm)				Installation Dimension(mm)		Installation Aperture
	W	H	H1	D	W1	H2	
AC310-T3-045G/055J-B	240	560	520	310	176	544	4-M6
AC310-T3-055G/075J-B							
AC310-T3-075G/095J-B							
AC310-T6-022G/030J-B							
AC310-T6-030G/037J-B							
AC310-T6-037G/045J-B							
AC310-T6-045G/055J-B							
AC310-T6-055G/075J-B							
AC310-T6-075G/090J-B							

Standard Connection Diagram



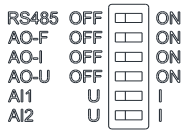
Note: 1. When installing the DC reactor, be sure to remove the shorting tab between the P1 and (+) terminals.

2. The terminal (X1~X5/PUL) can select the NPN or PNP transistor signal as the input, and the bias voltage can select the internal power supply (**+24V** terminal) or external power supply (PLC terminal) of the inverter.

● Auxiliary Terminal Output Capacity

Terminal	Function Definition	Max Output
+10V	10V auxiliary power supply output, constitutes loop with	50mA
A0	Analog monitor output, constitutes loop with GND.	Max output 2mA as voltage signal
+24V	24V auxiliary power supply output, constitutes loop with	100mA
Y	Collector open circuit output; can set the action-object by program.	DC24V/50mA
TA/TB/TC	Passive connector output; can set the action-object by program.	3A/240VAC; 5A/30VDC

● Function Specification of Switch Terminals

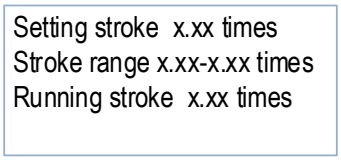
Switch Terminal	Selecting Position	Function Specification
	RS485 Terminal Resistor	RS485 Communication: connect with 120Ω terminal resistor
	AO Output- frequency	AO2: 0.0～100kHz frequency output
	AO Output- Current	AO2: 0～20mA current output or 4～20mA current output
	AO Output- Voltage	0～10V voltage output
	AI1 Input- Current/Voltage	AI1: Input 0～20mA or 0～10V
	AI2 Input- Current/Voltage	AI2: Input 0～20mA or 0～10V

3. Keyboard running instructions

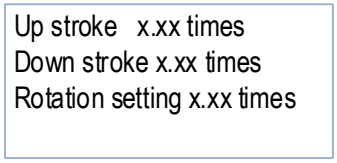
3.1 Specific interface types

AC310-J beam pumping machine more special interface are **quick menu interface**, **set stroke interface**, **up and down stroke variable interface**, **constant speed (variable speed) mode interface**, **work mode 0 ~ 6 interface** and **monitoring interface**, in these interfaces on the keyboard whether the keys and knobs are effective and the effect of some differences, the main buttons and knobs are "PRG" , "OK", "left", "right", knob clockwise rotation, and the knobs rotate counterclockwise and counterclockwise. The special screens are named according to the first line of each screen, and the following is a diagram of each special screen.

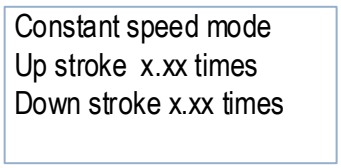
Shortcut menu interface



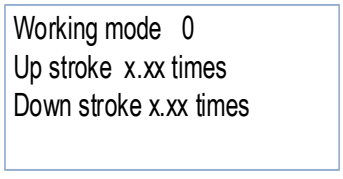
Setting the stroke interface



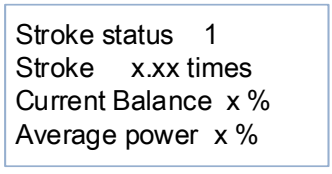
Variable interface for up and down stroke times



Constant speed (variable speed) mode

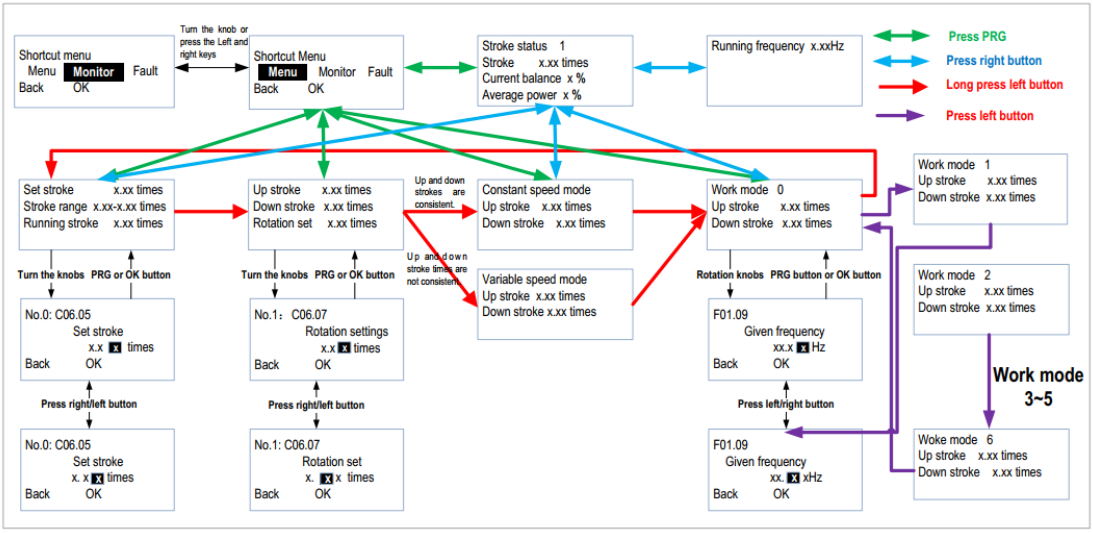


Working mode 0~6 interface



Example of monitoring interface

3.2 Basic running diagram for switching between specific interfaces



As can be seen from the above figure, the set stroke interface, the up and down stroke variable interface, the constant speed (variable speed) mode interface and the working mode 0~6 interface are cyclically displayed by long press of the left button, so even in the monitoring interface long press of the left button can jump to the next specific interface.

For example, if you press the right button in the setting stroke interface to jump to the monitoring interface, and press the left button for (3s), you can jump to the up and down stroke variable interface correctly. In addition to the up and down stroke variable interface, the other three interfaces can be jumped to the monitoring interface by pressing the right button. The working mode 0~6 interface is displayed cyclically by pressing the left button briefly. After entering the parameter modification interface, the function of the left and right button is to select the number of digits to be modified, so as to quickly modify the value, and the function of the PRG and OK button is to confirm the value and return to the corresponding specific interface.

3.3 Introduction and running details of each interface

3.3.1 Shortcut menu interface

The shortcut menu interface is the interface for setting stroke times, variable up and down stroke times, constant speed (variable speed) mode, working mode 0~6 and monitoring interface after pressing the PRG button. When the keyboard is not operated for a long time, the keyboard interface will switch to one of the other five interfaces.

1. PRG button is valid, the function is to switch the interface between the interface of the shortcut menu and one of the other five interfaces with each other; the default is to set the stroke interface, but if it is modified after power-on, it will change to the modified interface.
2. OK button is valid, the function is to determine the selected option, enter the corresponding secondary menu interface.
3. The left button is valid and functions to move left in the options until the leftmost option.
4. The right button is valid and functions to move to the right in the options until the rightmost option.
5. The knob is effective when rotated clockwise and functions to move to the right in the options until the rightmost option.
6. The knob is effective to rotate counterclockwise, and the function is to move to the left in the options until the leftmost option.

3.3.2 Setting the stroke interface

In addition to switching to this interface, it is also possible to switch back to the stroke setting interface by pressing and holding the left button (3s) while in the up and down stroke variable interface, the constant speed (variable speed) mode interface, and the working mode 0-6 interface, or by pressing the

right button to switch between the stroke setting interface and the monitoring interface. Press the right button to switch between the setting stroke interface and the monitoring interface.

1. The PRG button is valid, the function is to make the interface switch between this interface and the shortcut menu interface.

2. The left button short press invalid, long press (3s) is to make the interface switch to the up and down stroke variable interface.

3. The right button does not distinguish between long and short presses, and its function is to make the interface switch between this interface and the monitoring interface.

4. The knob clockwise rotation to increase the number of times to set the stroke, the knob counterclockwise rotation to reduce the number of times to set the stroke. The interface is also switched to the interface for setting the number of strokes. In this interface, the function of left and right keys is changed to select the number of digits. The number of strokes is set to cycle between the hundredth and the hundredth. When the number of strokes is set, press the OK button or PRG button to save the number of strokes and jump back to the interface for setting the number of strokes.

5. OK button is invalid.

3.3.3 Up and down stroke variable interface

The upper and lower stroke variable interface can be switched to this interface by pressing and holding (3s) the left button in the constant speed (variable speed) mode interface, the working mode 0~6 interface, and the setting stroke interface respectively.

1. The PRG button is valid, the function is to make the interface switch between this interface and the shortcut menu interface.

2. The left button is valid, the function is when the number of rotation setting and the number of upstroke are different, short press the left button, then modify the number of upstroke as the number of rotation setting; when long press the left button the interface is switched to constant speed (variable speed) mode interface. When the number of upstroke and the number of downstroke are the same, the switched interface is the constant speed mode interface, otherwise it is the variable speed mode interface.

3. The right button is valid, the function is when the number of rotation setting and the number of down stroke times are different, press the right button, then modify the number of down stroke times for the number of rotation setting.

4. Rotate the knob clockwise to increase the number of rotations set, rotate the knob counterclockwise to reduce the number of rotations set, the interface also switches to the interface of the number of rotations set, and in the interface of the number of rotations set, the function of the left button and right button becomes to select the number of digits, the number of rotations set is cycled between the hundredth and the hundredth digit, when the number of rotations set press the OK button or PRG button to save the number of rotations.

5. OK button is invalid

3.3.4 Constant speed (variable speed) mode interface

The constant speed (variable speed) mode interface can be switched to this interface by pressing and holding the left button (3s) respectively during the three interfaces of working mode 0~6 interface, setting stroke interface and up stroke interface; or pressing the right button to make the interface switch between this interface and monitoring interface. When the number of upstrokes and downstrokes are the same, the switched interface is the constant speed mode interface, otherwise it is the variable speed mode interface.

1. PRG button is effective, Its function is to switch between this interface and the shortcut menu interface.

2. Short press on the left button is invalid, long press is to make the interface switch to work mode 0~6 interface.

3. The right button does not distinguish between long and short presses, and its function is to make the interface switch between this interface and the monitoring interface.

4. The knob clockwise and counterclockwise rotation are invalid

5. OK button is invalid

3.3.5 Working mode 0~6 interface

The working mode 0~6 interface can be switched to this interface by pressing and holding the left button (3s) respectively during the three interfaces of

setting stroke interface, up stroke interface and constant speed (variable speed) mode interface; or pressing the right button to switch the interface between this interface and monitoring interface.

1. PRG button is effective, Its function is to switch between this interface and the shortcut menu interface.

2. Short press on the left button is to make the interface cyclic display between working mode 0~6. The up and down strokes corresponding to working mode 1~6 are set by F20.25~F20.36, while the up and down strokes of working mode 0 are determined by the knob rotation under the working mode 0 interface to modify the given frequency of F01.09; long press on the left button is to make the interface switch to the interface of setting strokes.

3. The right button does not distinguish between long and short presses, and its function is to make the interface switch between this interface and the monitoring interface.

4. The knob clockwise and counterclockwise rotation in the work mode 1 to 6 invalid, in the work mode 0 effective, the function is to modify the value of the given frequency of F01.09, clockwise rotation to increase the given frequency, counterclockwise rotation to reduce the given frequency. At this time, the number of upstrokes and downstrokes varies from 20.00Hz to 60.00Hz with the given frequency of F01.09, that is, from 2.00 to 6.00, 2.00 below 20.00Hz and 6.00 above 60.00Hz. When modifying the F01.09 frequency, the function of the left and right button becomes to select the modified digit; after the modification is finished, press the PRG button or OK button to determine the frequency and the number of up and down strokes.

5. OK button is invalid

3.3.6 Monitoring interface

The monitoring interface is to display the values of the monitoring parameters represented by each bit of the six parameters from F22.14 to F22.19 for a total of 24 monitoring parameters. You can set whether each monitoring parameter is displayed to change the displayed monitoring parameters. The monitoring interface can display four monitoring parameters on one page, if more than four monitoring parameters are displayed, press the right button in the monitoring interface to turn the page.

1. PRG button is effective, its function is to switch between this interface and the shortcut menu interface.

2. Short press of the left button is invalid, long press will continue to set the cycle of stroke times interface, upper stroke times interface, constant speed (variable speed) mode interface, and working mode 0~6 interface.

3. The right button does not distinguish between long and short press, the function is to turn the page and make the interface in this interface and set the stroke interface or constant speed (variable speed) mode or work mode 0 ~ 6 interface switch between each other

4. Knob clockwise and counterclockwise rotation is invalid

5. OK button is invalid

3.3.7 Interface display settings

The interface display can be determined by setting F23.13. By factory default, there is only stroke times interface and up and down stroke variable interface.

4. List of parameters

4.1 Safety Precautions

Danger
Please note all the information about safety in this manual.
Please note that failure to comply with the warnings may result in death or serious injury. We will not be held responsible for injuries and damage to equipment caused by your company or your customers' failure to comply with the contents of this book.

4.2 Parameter groups

4.2.1 Types of parameters of this product

Parameters		Name
Group F01 acceleration and deceleration time	F01.22～F01.29	Acceleration time [1-4], deceleration time [1-4]
Group F16 peak, off-peak and Flat parameters	F16.00	Daily production classification
	F16.01 to F16.36	Run and swing time
	F16.37~F16.42	Start and end time of Flat time period
	F16.43~F16.48	Start and end time of Peak time period
	F16.49~F16.54	Start and end time of off-peak time period
Group F19 Intermittent pumping swing frequency parameters	F19.15~F19.21	Time calibration parameters
	F19.22 ~ F19.41	Setting of the way to start intermittent pumping
	F19.43~F19.59	Intermittent pumping parameters
Group F20 dynamometer and working mode	F20.00～F20.23	Dynamometer calculation parameters
	F20.25 ~ F20.38	Up and down stroke parameters
	F20.41~F20.54	Position switch fault determination
	F20.40, F20.55 to F20.80	Time division and speed-related parameters
Group F21 pumping unit Dedicated integrated parameter group 1	F21.05～F21.07	Voice broadcast parameters
	F21.09	Voice broadcast parameters
	F21.25	Downstroke position offset
	F21.32	Deviation of action stroke
	F21.42 to F21.47	Bus over-voltage and under-voltage parameters
	F21.48~F21.55	Stroke times setting and self-learning
Group F22 pumping unit Dedicated integrated parameter group 2	F22.00～F22.08	Parameter Selection
	F22.[14 to 19, 45 to 47]	Monitoring parameter selection
	F22.[21-25, 33]	Filtering time
	F22.26~F22.32	Downstroke time learning value

	F22.34~F22.39	Power balance rate limit
	F22.50 ~ F22.51	Proximity switch effective pulse
	F22.52 to F22.53	Stage power monitoring with output delay
	F22.54~F22.55	Expansion card 485 parameters
Group F23 pumping unit Dedicated integrated parameter group 3	F23.00	Special parameter password input
	F23.01 to F23.03	Frequency modification setting
	F23.04～F23.10	Key parameter calibration
	F23.11	Communication access options
	F23.12 to F23.15	Intermittent pumping and running mode

4.2.2 Detailed list of parameters

Acceleration and deceleration time			
Function Code	**Name**	**Setting range and description**	**Factory value**
F01.22	Acceleration time 1	Setting range: 0.00~650.00s Constant speed mode, mode 0 acceleration time	Motor rated power less than or equal to 37kW time is 12s, 45kW ~ 55kW is 18s, 75KW is 24s
F01.23	Deceleration time1	Setting range: 0.00~650.00s Constant speed mode, mode 0 deceleration time	Motor rated power less than or equal to 37kW time is 12s, 45kW ~ 55kW is 18s, 75KW is 24s
F01.24	Acceleration time 2	Setting range: 0.00~650.00s Variable speed mode, mode 1 acceleration time	Factory value: same as above
F01.25	Deceleration time2	Setting range: 0.00~650.00s Variable speed mode, mode 1 deceleration time	Factory value: same as above
F01.26	Acceleration time 3	Setting range: 0.00~650.00s Mode 2 acceleration time	Factory value: same as above
F01.27	Deceleration time3	Setting range: 0.00~650.00s Mode 2 deceleration time	Factory value: same as above
F01.28	Acceleration time 4	Setting range: 0.00~650.00s Mode 3 acceleration time	Factory value: same as above
F01.29	Deceleration time4	Setting range: 0.00~650.00s Mode 3 deceleration time	Factory value: same as above
The above function codes F1.22~F1.29 are available in AC310 general purpose Inverter			
Peak, off-peak and Flat parameters group			
F16.00	Daily output grading setting	Setting range: 1~6	Factory value: 3
F16.01	Level 1 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30 minutes
F16.02	Level 1 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30 minutes
F16.03	Level 1 peak running time	1~1440 minutes	Factory value: 30 minutes

F16.04	Level 1 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.05	Level 1 off-peak running time	1~1440 minutes	Factory value: 30 minutes
F16.06	Level 1 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.07	Level 2 Flat running time	1~1440 minutes	Factory value: 30 minutes
F16.08	Level 2 Flat swing time	1~1440 minutes	Factory value: 30 minutes
F16.09	Level 2 peak running time	1~1440 minutes	Factory value: 30 minutes
F16.10	Level 2 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.11	Level 2 off-peak running time	1~1440 minutes	Factory value: 30 minutes
F16.12	Level 2 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.13	Level 3 Flat running time	1~1440 minutes	Factory value: 30 minutes
F16.14	Level 3 Flat swing time	1~1440 minutes	Factory value: 30 minutes
F16.15	Level 3 peak running time	1~1440 minutes	Factory value: 30 minutes
F16.16	Level 3 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.17	Level 3 off-peak running time	1~1440 minutes	Factory value: 30 minutes
F16.18	Level 3 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.19	Level 4 Flat running time	1~1440 minutes	Factory value: 30 minutes
F16.20	Level 4 Flat swing time	1~1440 minutes	Factory value: 30 minutes
F16.21	Level 4 peak running time	1~1440 minutes	Factory value: 30 minutes
F16.22	Level 4 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.23	Level 4 off-peak running time	1~1440 minutes	Factory value: 30 minutes
F16.24	Level 4 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.25	Level 5 Flat running time	1~1440 minutes	Factory value: 30 minutes
F16.26	Level 5 Flat swing time	1~1440 minutes	Factory value: 30 minutes
F16.27	Level 5 peak running time	1~1440 minutes	Factory value: 30 minutes
F16.28	Level 5 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.29	Level 5 off-peak running time	1~1440 minutes	Factory value: 30 minutes
F16.30	Level 5 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.31	Level 6 Flat running time	1~1440 minutes	Factory value: 30 minutes
F16.32	Level 6 Flat swing time	1~1440 minutes	Factory value: 30 minutes
F16.33	Level 6 peak running time	1~1440 minutes	Factory value: 30 minutes
F16.34	Level 6 peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.35	Level 6 off-peak running time	1~1440 minutes	Factory value: 30 minutes

F16.36	Level 6 off-peak swing time	1~1440 minutes	Factory value: 30 minutes
F16.37	Flat start 1	Setting range：0000～2359	Factory value: 0500
F16.38	Flat end 1	Setting range：0000～2359	Factory value: 0730
F16.39	Flat start 2	Setting range：0000～2359	Factory value: 1130
F16.40	Flat end 2	Setting range：0000～2359	Factory value: 1700
F16.41	Flat start 3	Setting range：0000～2359	Factory value: 2100
F16.42	Flat end 3	Setting range：0000～2359	Factory value: 2200
F16.43	Peak start 1	Setting range：0000～2359	Factory value: 0730
F16.44	Peak end 1	Setting range：0000～2359	Factory value: 1130
F16.45	Peak start 2	Setting range：0000～2359	Factory value: 1700
F16.46	Peak end 2	Setting range：0000～2359	Factory value: 2100
F16.47	Peak start 3	Setting range：0000～2359	Factory value: 0000
F16.48	Peak end 3	Setting range：0000～2359	Factory value: 0000
F16.49	Off-peak start 1	Setting range：0000～2359	Factory value: 2200
F16.50	Off-peak end 1	Setting range：0000～2359	Factory value: 0500
F16.51	Off-peak start 2	Setting range：0000～2359	Factory value: 0000
F16.52	Off-peak end 2	Setting range：0000～2359	Factory value: 0000
F16.53	Off-peak start 3	Setting range：0000～2359	Factory value: 0000
F16.54	Off-peak end 3	Setting range：0000～2359	Factory value: 0000
Intermittent pumping swing frequency parameters group			
F19.00～F19.14	Reserved		
F19.15	Calibration time (year)	Setting range：2000～2099 Year	Factory value: 2020
F19.16	Calibration time (month)	Setting range: 1~12 month	Factory value: 1 month
F19.17	Calibration time (date)	Setting range：1～31 date	Factory value: 1 date
F19.18	Calibration time (hour)	Setting range: 0 to 23 hours	Factory value: 0 hour
F19.19	Reserved		
F19.20	Calibration time (minutes)	Setting range: 0 to 59 minutes	Factory value: 0 minutes
F19.21	Calibration time (sec)	Setting range：0～59 seconds Time calibration steps: first set the year, month, date, hour, minutes, in the last set seconds, F19.15 ~ F19.21 does not increment with the increment of real-time time, only to provide real-time time correction. From C04.21 to C04.26, the current year, month, date, hour, minute and second data are monitored and used to calibrate the current time.	Factory value: 0 seconds

F19.22	Running mode at startup	0: Running / Intermittent pumping / Well stopping 1: Running / Well stopping / Intermittent pumping 2: Intermittent pumping / well stopping/running	Factory value: 0
F19.23	Intermittent pumping time (low)	Setting range: 0 to 65535 minutes	Factory value: 10 minutes
F19.24	Intermittent pumping time (high)	Setting range：0～8 The actual time is calculated as: F19.24x65536+F19.23 (minutes)	Factory value: 0 Unit: 65536 minutes
F19.26	Running time day	Setting range: 1 to 1000 (days)	Factory value: 0
F19.27	Running time hours	Setting range: 0 to 23 (hours)	Factory value: 0
F19.28	Running time minutes	Setting range: 2 to 59 (minutes)	Factory value: 30 points
F19.29	Current running time day	Read Only	
F19.30	Current running time hour	Read Only	
F19.31	Current running time minutes	Read Only	
F19.32	Intermittent pumping/well stopping time (days)	Setting range: 1 to 1000 (days)	Factory value: 0
F19.33	Intermittent pumping/well stopping time (hours)	Setting range: 0 to 23 (hours)	Factory value: 0
F19.34	Intermittent pumping/well stopping time (minutes)	Setting range: 2 to 59 (minutes)	Factory value: 30 points
F19.35	Current Intermittent pumping/well stopping time (days)	Read Only	
F19.36	Current Intermittent pumping/well stopping time (hours)	Read Only	
F19.37	Current Intermittent pumping/well stopping time (minutes)	Read Only	
F19.38	Voice prompt time	Setting range: 25～60S Oil pump from standstill to turn to Intermittent pumping or turn to running, there will be voice prompt output.	Factory value: 25S
F19.39	Current intermittent pumping time (low)	Read Only	Unit: minutes
F19.40	Current Intermittent pumping time (high)	Read Only The actual time is calculated as: F19.40x65536+F19.39 (minutes)	Unit: 65536 minutes
F19.41	Intermittent pumping execution time while well stopping	Setting range：0～3600 S If a stop is performed during a well stop, the next restart will be based on this setting to determine whether to perform an Intermittent pumping first (non-0 setting) or to continue the well stop (0)	Factory value: 120S
F19.43	Start running time	Setting range: 1 to 65500 min	Factory value: 10min
F19.44	Start intermittent pumping time	Setting range: 1 to 65500 min	Factory value: 10min
F19.45	Intermittent pumping running frequency	Setting range: 2.00～50.00Hz	Factory value: 5.00Hz

F19.46	Running mode selection	0: Center running 1: Forward running 2: Reverse running	0
F19.47	Intermittent pumping running angle	Setting range: 5 to 180 degrees	Factory value: 20 degrees
F19.48	Time Source	0: Internal timing (only supports F19.59 selection 0 and 1) 1: External clock card timing (supports all F19.59 selections)	0
F19.49	Sensor signal selection	0: Upper position (corresponds to the lower dead center of the crank) 1: Lower position (corresponding to the upper dead center of the crank)	Factory value: 1
F19.50	Center running angle offset	Setting range: -50 to 50 degrees If the crank swing is not symmetrical to the center of the position switch when F19.46 is selected as 0 center running intermittent pumping, make appropriate adjustment.	Factory value: 0
F19.51	Swing front center position finding frequency	5.00～50.00Hz	Factory value: 10.00Hz
F19.53	Sensor signal loss action selection	Selection of running method after disconnection of swing center proximity switch 0: lower frequency running (low stroke invalid) 1: Set frequency running (low stroke invalid) 2: Fault stop (report E.SWING swing switch disconnection) 3: Reserved 4: Reserved 5: No positioning intermittent pumping running Note: F19.57 is set to 1, which is valid in the case of intermittent swing.	Factory value: 2
F19.55	Swing acceleration time	2.00s - 20.00s	10.00s
F19.56	Swing deceleration time	2.00s - 20.00s	5.00s
F19.57	Intermittent pumping mode selection	0: Invalid 1: Intermittent pumping mode 2: Intermittent pumping stationary mode 3: Reserved 4: No positioning Intermittent pumping running	0
F19.59	Intermittent pumping running mode	0: Run at startup 1: During startup, intermittent pumping running 2: Specified the stage intermittent pumping running 3: Specified the stage running 4: Continuous running and intermittent pumping 5: Peak, off-peak, Flat intermittent pumping The selection 0 and 1 are set by F19.43/F19.44, and these two settings are opposite execution processes. 3 and 4 are set by multi-speed, and the two settings are also opposite execution processes.	0

F19.60	Start time 1	Range: 0 to 2359 (hour/minute) For example: 0823 means 8:23	Factory value: 0000
F19.61	Duration time 1	Range: F19.60 to 2359 (hour/minute) or 0 lower limit if non-0 must be greater than or equal to F19.60.	Factory value: 0000
F19.62	Start time 2	Range：F19.61～2359 or 0	Factory value: 0000
F19.63	Duration time 2	Range：F19.62～2359 or 0	Factory value: 0000
F19.65	Start time 3	Range：F19.63～2359 or 0	Factory value: 0000
F19.66	Duration time 3	Range：F19.65～2359 or 0	Factory value: 0000
F19.67	Start time 4	Range：F19.66～2359 or 0	Factory value: 0000
F19.68	Duration time 4	Range：F19.67～2359 or 0	Factory value: 0000
F19.70	Start time 5	Range：F19.68～2359 or 0	Factory value: 0000
F19.71	Duration time 5	Range：F19.70～2359 or 0	Factory value: 0000
F19.72	Start time 6	Range：F19.71～2359 or 0	Factory value: 0000
F19.73	Duration time 6	Range：F19.72～2359 or 0	Factory value: 0000
F19.75	Start time 7	Range：F19.73～2359 or 0	Factory value: 0000
F19.76	Duration time 7	Range：F19.75～2359 or 0	Factory value: 0000
F19.77	Start time 8	Range：F19.76～2359 or 0	Factory value: 0000
F19.78	Duration time 8	Range：F19.77～2359 or 0	Factory value: 0000
F19.80	Start time 9	Range：F19.78～2359 or 0	Factory value: 0000
F19.81	Duration time 9	Range：F19.80～2359 or 0	Factory value: 0000
F19.82	Start time 10	Range：F19.81～2359 or 0	Factory value: 0000
F19.83	Duration time 10	Range：F19.82～2359 or 0	Factory value: 0000
F19.85	Start time 11	Range：F19.83～2359 or 0	Factory value: 0000
F19.86	Duration time 11	Range：F19.85～2359 or 0	Factory value: 0000
F19.87	Start time 12	Range：F19.86～2359 or 0	Factory value: 0000
F19.88	Duration time 12	Range：F19.87～2359 or 0	Factory value: 0000
F19.90	Voice output time	Read-only (read by the screen to write this parameter to the controller) non-zero voice annunciation.	0x95A
F19.91	End of voice announcement	Write (read by the screen controller and then write to RAM)	0x95B
F19.93	Current well stoppage time (low)	Read Only	Unit: minutes
F19.94	Current well stoppage time (high)	Read Only The actual time is calculated as: F19.94x65536+F19.93 (minutes)	Unit: 65536 points
F19.95	Sensor disconnection delay	Setting range：1～600min Instructions: set F19.57 to 1 intermittent pumping, F19.53 set to 2 (fault stop), run for 10 minutes if the sensor signal is not detected to report E.SWING switch disconnection fault	10min

F19.96	Non-positioning intermittent pumping running angle	5~30s Angle determined by time	5s
F19.98	Well stopping time (low)	Setting range: 0 to 65535 minutes	Unit: 10 minutes
F19.99	Well stopping time (high)	Setting range：0～8 The actual time is calculated as: F19.99x65536+F19.98 (minutes)	Unit: 65536 minutes
Dynamometer and working mode			
F20.00	Maximum load	0-1000.0kN	50.0kN
F20.01	Stroke range setting	0-6.00m	4.50m
F20.02	Dynamometer hold time	0-3600s	10s
F20.03	Leading balance weight mass	0-10000Kg	1390
F20.04	Leading balance weight length	0-2.00m	1.05
F20.05	Leading balance weight position	0.10-5.00m	0.85
F20.06	Lagging balance weight mass	0-10000Kg	1116
F20.07	Lagging balance weight length	0-2.00m	1.05
F20.08	Lagging balance weight position	0.10-5.00m	0.85
F20.09	Crank mass	1-10,000Kg Refers to single block crank mass	1840Kg
F20.10	Crank center position	0.20-5.00m	1.31m
F20.11	Forearm length	0.20-6.00m	5.00m
F20.12	Rear arm length	0.20-6.00m	3.07m
F20.13	Horizontal distance	0.20-5.00m	3.50m
F20.14	HG Distance	0.20-6.00m	4.26m
F20.15	Connection rod length	0.10-5.00m	4.30m
F20.16	Structural imbalance weight	0-6000Kg	507Kg
F20.17	Motor efficiency	0 - 100.0% Efficiency of conversion of electromagnetic torque to mechanical torque	97.0%
F20.18	Deceleration efficiency	0 - 100.0% Refers to the efficiency of the reduction system, i.e. the total efficiency of belt drive efficiency and gearbox drive efficiency	85.0%
F20.19	Crank drive efficiency (Four-link efficiency)	0 - 100.0%	95.0%
F20.20	Reduction ratio	1.0-5000.0	145.0
F20.21	Crank radius	0.20-4.00m	1.24m
F20.22	Lower dead center limit	0.5-50.0%	8.0%
F20.23	Upper dead center limit	60.0% - 100.0%	93.0%
F20.24	Reserved		

F20.25	Mode 1 upstroke times	Setting range：F20.37～F20.38	Factory value: 5.50 times When the maximum and minimum operating frequencies of the system are adjusted, the actual limits will be based on the range F20.37 and F20.38.
F20.26	Mode 1 down stroke times	Setting range：F20.37～F20.38	Factory value: 4.50 times Instructions as above
F20.27	Mode 2 upstroke times	Setting range：F20.37～F20.38	Factory value: 5.00 times Instructions as above
F20.28	Mode 2 down stroke times	Setting range：F20.37～F20.38	Factory value: 4.00 times Instructions as above
F20.29	Mode 3 upstroke times	Setting range：F20.37～F20.38	Factory value: 4.50 times Instructions as above
F20.30	Mode 3 down stroke times	Setting range：F20.37～F20.38	Factory value: 3.50 times Instructions as above
F20.31	Mode 4 upstroke times	Setting range：F20.37～F20.38	Factory value: 4.00 times Instructions as above
F20.32	Mode 4 down stroke times	Setting range：F20.37～F20.38	Factory value: 3.00 times Instructions as above
F20.33	Mode 5 upstroke times	Setting range：F20.37～F20.38	Factory value: 3.50 times Instructions as above
F20.34	Mode 5 down stroke times	Setting range：F20.37～F20.38	Factory value: 2.50 times Instructions as above
F20.35	Mode 6 upstroke times	Setting range：F20.37～F20.38	Factory value: 6.00 times Instructions as above
F20.36	Mode 6 down stroke times	Setting range：F20.37～F20.38	Factory value: 5.00 times Instructions as above
F20.37	Stroke times lower limit (read only)	The first power-on running will automatically enter the range of stoke times self-learning. After the learning is completed, set the corresponding upper and lower limit of stroke into these two parameters.	Factory value: 2.00 times
F20.38	Stroke times upper limit (read only)		Factory value: 6.00 times
F20.39	Reserved		
F20.40	Time-division and speed-sharing running options	0: Close 1: Open Note: If you choose to turn on, you need to set the segment time F20.55~F20.70, and the segment running time F20.71~F20.78. You must install a clock card to choose this function.	Factory value: 0
F20.41	Mode 1 upstroke time	Setting range: 0.00~6500.0s As the basis time for judging the position switch fault.	Factory value: 30.0s
F20.42	Mode 1 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s

F20.43	Mode 2 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.44	Mode 2 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.45	Mode 3 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.46	Mode 3 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.47	Mode 4 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.48	Mode 4 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.49	Mode 5 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.50	Mode 5 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.51	Mode 6 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.52	Mode 6 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.53	Other mode upstroke times	Setting range: 0.00~6500.0s Other modes refer to mode 0.	Factory value: 30.0s
F20.54	Stroke correction time in other modes	Setting range: -5.0 to 5.0s	Factory value: 0.0s
F20.55	Time and speed division start time1	Setting range：0000～2359 Note: The first two bits mean hours and the last two bits mean minutes	Factory value: 0000
F20.56	Time and speed division duration time 1	Setting range：0000～2359 Note: If the Beijing time falls within the range of this setting, then run according to the stroke set in F20.71. Otherwise, operate according to the running stroke before F20.40 is not started. **Note: The setting is only valid under the stroke times screen.**	Factory value: 0000
F20.57	Time and speed division start time 2	Setting range：0000～2359	Factory value: 0000
F20.58	Time and speed division duration time 2	Setting range：0000～2359	Factory value: 0000
F20.59	Time and speed division start time 3	Setting range：0000～2359	Factory value: 0000
F20.60	Time and speed division duration time 3	Setting range：0000～2359	Factory value: 0000
F20.61	Time and speed division start time 4	Setting range：0000～2359	Factory value: 0000
F20.62	Time and speed division duration time 4	Setting range：0000～2359	Factory value: 0000
F20.63	Time and speed division start time 5	Setting range：0000～2359	Factory value: 0000
F20.64	Time and speed division duration time 5	Setting range：0000～2359	Factory value: 0000
F20.65	Time and speed division start time 6	Setting range：0000～2359	Factory value: 0000
F20.66	Time and speed division duration time 6	Setting range：0000～2359	Factory value: 0000
F20.67	Time and speed division start time 7	Setting range：0000～2359	Factory value: 0000
F20.68	Time and speed division duration time 7	Setting range：0000～2359	Factory value: 0000
F20.69	Time and speed division start time 8	Setting range：0000～2359	Factory value: 0000
F20.70	Time and speed division duration time 8	Setting range：0000～2359	Factory value: 0000
F20.71	Time and speed division stroke times 1	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.72	Time and speed division stroke times 2	Setting range：F20.37～F20.38	Factory value: 3.00 times

F20.73	Time and speed division stroke times 3	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.74	Time and speed division stroke times 4	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.75	Time and speed division stroke times 5	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.76	Time and speed division stroke times 6	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.77	Time and speed division stroke times 7	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.78	Time and speed division stroke times 8	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.79	Special interface upper frequency (read-only)	Setting range: 0.00 to maximum frequency	Factory value: 30.00Hz
F20.80	Special interface down frequency (read-only)	Setting range: 0.00 to maximum frequency	Factory value: 30.00Hz
Comprehensive parameter group 1 for beam pump			
F21.05	The time before the voice broadcast.	Setting range：0.0～300.0s	Factory value:6.0s
F21.06	The time after the voice broadcast.	Setting range：0.0～300.0s	Factory value:16.0s
F21.07	Voice announcement switch	Setting range：0～1 0: Turn off voice output 1: Turn on voice output	Factory value:1
F21.09	Downstroke position offset	Setting range: -90° to 90° If there is a deviation in the position when the downstroke turns to the upstroke, it can be corrected by this parameter. If the panel "current status" shows that the donkey head has not reached the lower dead center when it has changed from the upper stroke to the lower stroke, this parameter can be set to a negative value, or to a positive value if the opposite is true.	Factory value: 0
F21.25	Total power clearing	0: No zeroing 1: Zeroing	Factory value: 0
F21.32	Deviation of action stroke	Setting range: 0.00 to 0.50 times The actual number of strokes is guaranteed to be less than the set deviation value without automatic adjustment of the number of strokes, with the aim of making the number of strokes stable.	Factory value: 0.01 times
F21.42	Bus overvoltage detection switch	0: off 1: on	Factory value: 1
F21.43	Bus overvoltage detection time	0～3600S	Factory value: 10S
F21.44	Bus overvoltage setting value	0～2000V	Factory value: 700V T3:700V T6:1150V Set according to the brake unit action point 20V higher.
F21.45	Bus undervoltage detection switch	0: off 1: on	Factory value: 0
F21.46	Bus undervoltage detection time	0～3600S	Factory value: 10S

F21.47	Bus undervoltage setting value	0~1000V	Factory value: 350V T3:350V T6:560V Based on 60% setting of the bus voltage
F21.48	Auto-stroke times setting	Setting range：F20.37～F20.38 Stroke setting by flywheel rotation under the stroke screen.	Factory value: 4.00 times
F21.50	Grid stroke times	1.00-15.00 times/min	5.00
F21.52	Self-learning completion (oilfield-specific study)	Range: 0 to 1 Read only 0: Learning not performed or not completed 1: Learning completion	0
F21.53	Self-learning direction	Range: 0 to 1 Read only 0: Forward 1: Reverse	0
F21.54	Self-learning angle	Read only	
F21.55	Restart self-learning	Range: 0~1 0: No implementation 1: Re-learn and clear F21.52, reset F21.52 to F21.54 after learning is completed, when the stroke range is not accurate, you can set this parameter to open the re-learning function.	0
Comprehensive parameter group 2 for beam pump			
F22.00	Working mode	Setting range：0～8 0: General VFD mode 1 to 6: Corresponding to mode 1 to mode 6 7: Intermittent power supply mode 8: Flexible mode	Factory value: 0
F22.01	Type of travel switch	0: Pulse type 1: Level type	Factory value: 0
F22.02	Output frequency selection in case of pulse travel switch failure	0: given by F0.03 1: Take the current mode smaller frequency 2: Take the larger frequency of the current mode 3: Upper and lower frequency averaging running	Factory value: 3
F22.06	Whether negative power is involved in the calculation	Whether negative power is used in the calculation of electrical parameters 0: Negative power is not involved in the calculation 1: Negative power involved in the calculation	Factory value: 1
F22.08	Output terminal logic selection	0: Positive logic 1: Negative logic “0”: Y terminal “00”: Relay 1 “000”: Relay 2	Factory value: 0000

F22.14~ F22.19 F22.45~F22.49	Monitoring parameter selection	0: Turn off the display 1: Turn on the display F22.14 Monitoring parameter selection1 Group 1: Stroke state Group 2: Stroke times Group 3: Current balance rate Group 4: Average power balance rate F22.15 Monitoring parameter selection2 Group 1: Running frequency Group 2: Average running frequency Group 3: Output voltage Group 4: Average output voltage F22.16 Monitoring parameter selection3 Group 1: Output current Group 2: Average output current Group 3: Apparent power Group 4: Average apparent power F22.17 Monitoring parameter selection4 Group 1: Output power Group 2: Average power Group 3: Reactive power Group 4: Average reactive power F22.18 Monitoring parameter selection5 Group 1: Power Factor Group 2: Average power factor Group 3: Maximum power balance rate Group 4: Cumulative power balance rate F22.19 Monitoring parameter selection6 Group 1: Current running power Group 2: Current running time Group 3: Cumulative electricity consumption (low) Group 4: Cumulative electricity consumption (high) F22.45 Monitoring parameter selection7 Group 1: Current balance rate Group 2: Upper stroke maximum current Group 3: Downstroke maximum current Group 4: Power balance rate F22.46 Monitoring parameter selection8 Group 1: Upper stroke maximum power Group 2: Downstroke maximum power Group 3: Average power balance Group 4: Average power on the upper stroke	Factory value: F22.14 = 0010 F22.15 = 0101 F22.16 = 0001 F22.17 = 0000 F22.18 = 0000 F22.19 = 0000 F22.45 = 0000 F22.46 = 0000

F22.47~F22.49	Monitoring parameter selection	F22.47 Monitoring parameter selection9 Group 1: Downstroke average power Group 2: Stage electricity (low) Group 3: Stage Electricity (High) Group 4: Reserved F22.48 Monitoring parameter selection 10 Group 1: Reserved Group 2: Reserved Group 3: Reserved Group 4: Reserved F22.49: Monitoring parameter selection 11 Group 1: Reserved Group 2: Reserved Group 3: Reserved Group 4: Reserved	F22.47 = 0000 F22.48 = 0000 F22.49 = 0000
F22.20	Reserved		
F22.21	Active power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.22	Apparent power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.23	Reactive power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.24	Power Factor Filtering Time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.25	Current filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.26	Mode 1 downstroke time learning value	Read Only	Factory value: 8.0s
F22.27	Mode 2 downstroke time learning value	Read Only	Factory value: 8.0s
F22.28	Mode 3 downstroke time learning value	Read Only	Factory value: 8.0s
F22.29	Mode 4 downstroke time learning value	Read Only	Factory value: 8.0s
F22.30	Mode 5 downstroke time learning value	Read Only	Factory value: 8.0s
F22.31	Mode 6 downstroke time learning value	Read Only	Factory value: 8.0s
F22.32	Stroke learning time in other modes	Read Only	Factory value: 8.0s
F22.33	Travel switch filter time	Setting range: 0.1~10.0s	Factory value: 3.0s
F22.34	Power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.35	Power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%
F22.36	Average power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.37	Average power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%
F22.38	Cumulative power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.39	Cumulative power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%

F22.40	Fault Self-reset	0: Invalid Fault self-reset function is disabled. The keypad run command must be reset after pressing "run" again to start. the terminal run command must have a stop signal before starting again. The communication run command must be sent again to start. 1: Valid The startup method after fault self-reset is selected by F22.43.	Factory value: 0
F22.41	Instantaneous power failure and restart	“0” bit: 0: Invalid, do not perform the function 1: Valid, execute the function “00” bits: Start method 0: No start The keypad must be reset after the "run" key is pressed. The terminal must have a stop signal before it can be started again. The communication must be sent again to start the command when it is run. 1: Selected by F22.43.	Factory value: 0000
F22.42	Instantaneous power failure and restart delay	Setting range: 0.1 to 6500.0s	Factory value: 0.5s
F22.43	Re-start execution selection	0: Speed tracking start running 1: Start frequency running	Factory value: 0
F22.44	Display Mode	0: Oi pump mode 1: General mode	Factory value: 0
F22.50	Proximity switch effective pulse number	Setting range: 1-10 The detection of the “n” proximity switch signal is considered the end of a stroke, and the function is valid when F22.51 = 1.	Factory value: 1
F22.51	Proximity switch active pulse count enable	0: Non-enabling 1: Enabling The first proximity switch signal is used as the end signal of the stroke when F22.51=0.	Factory value: 0
F22.52	Phase power monitoring	0: Close 1: Open	Factory value: 0
F22.53	Output Delay	0.0s～10.0s	Factory value: 1.0s
F22.54	Expansion card 485 address	1 to 127	Factory value: 1
F22.55	Expansion card 485 baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps	Factory value: 3

Oilfield-specific manufacturer parameter group (not open to customers)			
F23.00	Special parameter password input	0～65536	Factory value: 0
F23.01	Frequency range change setting	0: The lower frequency (F1.12 is not lower than F23.02 and the maximum frequency (F1.10) is not higher than F23.03. 1: No restrictions	Factory value: 0
F23.02	Lower limit frequency target value	0.00～F23.02	Factory value: 20.00Hz
F23.03	Maximum frequency target value	F23.01~320.00Hz	Factory value: 60.00Hz
F23.04	Power factor correction	Setting range: -0.50～0.50	Factory value: 0.0
F23.05	Stroke correction	Setting range: -5.00～5.00	Factory value: 0.0
F23.06	Current balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.07	Maximum power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.08	Power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.09	Cumulative power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.10	Power balance correction	Setting range: -100% to 100%	Factory value: 0%
F23.11	Communication access options	LED: Individual Address mapping Selection 0: No address insinuation 1: Perform address insinuation, for compatibility with the original AC100J address access. LED: 10-digit RS485 access 0: Regular visits 1: C0 specifies dedicated monitoring parameters from C0.48 to C0.69, group C1 is the dynamometer parameters, and group C2 is the torque factor and balance torque parameters.	Factory value: 0x11
F23.12	Intermittent pumping validity selection	0: Prohibit the use of Intermittent pumping 1: Intermittent pumping selection is effective (F19.57 selection valid) 2: Prohibit continuous running with Intermittent pumping (F19.59 option 4 is invalid or force F19.57 to 0)	1
F23.13	Running mode setting	0: Stroke interface with mode 0 1: Stroke interface and variable speed mode 2: Stroke interface with 6+1 3: Show all	1
F23.14	Up and down keys to change the stroke	0: Not enable 1: Enabling When enabled, you can change the stroke number in the stroke number screen by using the up and down keys.	0

F23.15	Intermittent pumping external device lost options	0: Normal Intermittent pumping running 1: Continuous running 2: No swing Intermittent pumping 3: Fault stop E.EXT Intermittent wire break Note: When 3 is selected, the line break fault will be reported only when the Intermittent pumping is turned on and F19.57 is set to 1.	0

5. Details of parameters

5.1 Safety Precautions

Danger
Please note all the information about safety in this manual. Please note that failure to comply with the warnings may result in death or serious injury. We will not be held responsible for injuries and damage to equipment caused by your company or your customers' failure to comply with the contents of this book.

5.2 Group F01: Running mode acceleration and deceleration setting

F01 group parameter [running mode acceleration/deceleration setting] is used to set the acceleration/deceleration time for different running modes of the inverter-controlled oil wells. The running mode of the pumping unit is divided into "6+1" mode and special mode, in the "6+1" mode, the pumping unit running stroke times of the up and down strokes in the 6 variable speed modes can be set individually to adjust the pumping unit running speed; the special mode divides the pumping unit running mode into constant speed mode (the upper frequency is equal to the lower frequency) and variable speed mode (the upper frequency is not equal to the lower frequency).

◆ **F01.22 to F01.23 group: acceleration and deceleration time [1 ~ 4]**

There are 4 groups of acceleration and deceleration times that can be set, among which F01 group parameters F01.22 to F01.29 can set acceleration and deceleration times [1 to 4], which can be selected by switching between acceleration and deceleration time selection terminals 1 and 2.

Set acceleration and deceleration time by F01.22 to F01.29 [1 ~ 4]

Function Code	Name	Setting range and description	Factory value
F01.22	Acceleration time 1	Setting range: 0.00~650.00s Constant speed mode, mode 0 acceleration time	8s when the rated power of the motor is less than 37KW (excluding 37Kw), 12s when it is greater than 55KW, and 10s when it is 37KW-55KW
F01.23	Deceleration time1	Setting range: 0.00~650.00s Constant speed mode, mode 0 deceleration time	8s when the rated power of the motor is less than 37KW, 12s when it is more than 55KW, 10s when it is 37KW-55KW
F01.24	Acceleration time 2	Setting range: 0.00~650.00s Variable speed mode, mode 1 acceleration time	Factory value: same as above
F01.25	Deceleration time2	Setting range: 0.00~650.00s Variable speed mode, mode 1 deceleration time	Factory value: same as above
F01.26	Acceleration time 3	Setting range: 0.00~650.00s Mode 2 acceleration time	Factory value: same as above
F01.27	Deceleration time3	Setting range: 0.00~650.00s Mode 2 deceleration time	Factory value: same as above

F01.28	Acceleration time 4	Setting range: 0.00~650.00s Mode 3 acceleration time	Factory value: same as above
F01.29	Deceleration time4	Setting range: 0.00~650.00s Mode 3 deceleration time	Factory value: same as above

5.3 Group F16: Peak, off-peak and Flat parameters group

We design the peak, off-peak and Flat time period interface according to the requirements of the oil production plant: divide the day into 3 time periods (Flat period, peak period and off-peak period), divide the fluid production classification into 6 levels, and set different running time and swing time for the 3 time periods according to the requirements of the oil production plant. By setting the actual daily fluid production, the time period (Flat period, peak period, off-peak period) and execution time (running time, swing time) are automatically matched. The peak, off-peak, Flat parameters set is only valid when the intermittent pumping running mode is peak, off-peak, Flat intermittent pumping (F19.59 = 5).

◆ **Group F16.00: Daily production classification**

Set up via F16.00 - Daily Production Rating

F16.00	Daily output grading setting	Setting range: 1~6	Factory value: 3

Description: The daily output is divided into 6 levels as the basis for automatically matching the execution time (running time, swing time) and time period (Flat period, peak period, off-peak period) of the beam pump. When using the system, you only need to input the actual daily output, and the system will automatically divide the daily output classification according to the input actual output and automatically match the running mode of the response.

◆ **Group F16.01 to F16.36: Running and swing time**

Set via F16.01 to F16.06 – Level 1 run time and swing time

F16.01	First-class Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.02	Level 1 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.03	Level 1 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.04	Level 1 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.05	Level 1 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.06	Level 1 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The first output level corresponds to the running time and swing time of the time period. If the setting time is both 30min, then when the actual daily liquid production volume of 2t/d is input, it belongs to the first output level, then the response running and swing running are executed according to the parameters of the current system time automatically matching the time period (Flat period, peak period and off-peak period) and execution time (running time and swing time).

Notes.

◎ The set run time and swing time, one of them is 0 to skip, and both parameters are 0 at the same time to execute continuous running. This decision is made to meet the requirement of sometimes keeping continuous running without swing or swing only without continuous running in this time period.

◎ Stopped when followed by the previous state, power off and start again. If the running time of the current period is 30 minutes and the swing time is 30 minutes, the beam pump is in swing running at this time, and the swing timing reaches 20 minutes, it stops at this time, but there is no power failure, and when the beam pump is started again next time, it will continue to execute swing running and continue timing from the 20 minutes.

◎ If re-enter a time period, the continuous run and swing time determined for another time period are started. For example, suppose the current time is exactly in the Flat period 1 [5:00~8:00], and the [run time, swing time] = [40min, 25min] is set according to the "target liquid level". Then the total

minutes of the Flat period 1 is 3x60 = 180 minutes, each cycle 65 minutes, then in the third cycle of swing time timing to the 10th minute, that is, 8:00 Beijing time will enter the peak hour 1 [8:00 ~ 12:00], the continuous running time and swing time will become 30 and 20, then will continue to perform swing until the 20th minute, then turn to continuous running.

◎ Liquid yield grade and target liquid yield grade. The liquid production volume is set according to 1 to 6 levels, and the specific grading is determined according to the actual liquid production volume, and the target liquid production volume level is set.

Set via F16.07 to F16.12 – Level 2 running time and swing time

F16.07	Level 2 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.08	Level 2 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.09	Level 2 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.10	Level 2 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.11	Level 2 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.12	Level 2 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The same principle as the level 1 run time and swing time parameters, not elaborated here, please refer to the F16.01 to F16.36 group: F16.01 to F16.06 setting instructions for running and swing time.

Set by F16.13 to F16.18 – Level 3 running time and swing time

F16.13	Level 3 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.14	Level 3 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.15	Level 3 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.16	Level 3 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.17	Level 3 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.18	Level 3 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The same principle as the level 1 running time and swing time parameters, not elaborated here, please refer to the F16.01 to F16.36 group: F16.01 to F16.06 setting instructions for run and swing time.

Set via F16.19 to F16.24 – Level 4 run time and swing time

F16.19	Level 4 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.20	Level 4 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.21	Level 4 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.22	Level 4 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.23	Level 4 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.24	Level 4 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The same principle as the Level 1 running time and swing time parameters, not elaborated here, please refer to the F16.01 to F16.36 group: F16.01 to F16.06 setting instructions for run and swing time.

Set via F16.25 to F16.30 – Level 5 running time and swing time

F16.25	Level 5 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.26	Level 5 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.27	Level 5 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.28	Level 5 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.29	Level 5 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.30	Level 5 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The same principle as the level 1 run time and swing time parameters, not elaborated here, please refer to the F16.01 to F16.36 group: F16.01 to F16.06 setting instructions for run and swing time.

Set via F16.31 to F16.36 – Level 6 running time and swing time

F16.31	Level 6 Flat running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.32	Level 6 Flat swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.33	Level 6 peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.34	Level 6 peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.35	Level 6 off-peak running time	Setting range: 1 to 1440 minutes	Factory value: 30
F16.36	Level 6 off-peak swing time	Setting range: 1 to 1440 minutes	Factory value: 30

Description.

The same principle as the level 1 running time and swing time parameters, not elaborated here, please refer to the F16.01 to F16.36 group: F16.01 to F16.06 setting instructions for run and swing time.

◆ **F16.37 ~ F16.42 group: the beginning and end of the Flat period**

The start and end times are set according to the peak and off-peak time periods (Flat time period, peak time period and off-peak time period) to achieve more flexible peak and off-peak intermittent pumping function, the purpose of this parameter group is to freely set the start and end times of different time periods and flexibly adjust the peak and off-peak time of electricity consumption. The parameter settings are shown below.

	Flat period		**Peak period**		**Off-peak period**	
Time Period	**Start time**	**Ending time**	**Start time**	**Ending time**	**Start time**	**Ending time**
1	5:00	8:00	8:00	12:00	22:00	23:59
2	12:00	14:00	20:00	22:00	00:00	5:00
3	18:00	20:00	14:00	18:00		

Notes.

◎ Judgment sequence of Flat, peak and off-peak time periods. It is better to keep the continuity between time periods when setting the time periods. If there is an interruption in the middle, it will be considered as "out of time", and then the beam pump will perform continuous running.

◎ Correctness of period setting.

①If there is a time period that is not in the continuous time period, the system will perform continuous running. If the Beijing time between 4:00 and 5:00 is not in the peak-to-off-peak time period set for the time period, then the system will perform continuous running.

②Start and end note that the end time must be greater than the start time, to ensure the correct time setting

③At the beginning of the execution, there will be an error of up to 1 minute in the running time. The reason is that the timing is based on minutes, such as the current time seconds in 30S then the first minute timing will be executed in only 30S will be considered 1 minute, and its later will be normal, the error depends on the current value of seconds when the system is running.

Set via F16.37 to F16.38 – Flat period start and end times1

F16.37	Flat time start 1	Setting range：0000～2359	Factory value: 0500
F16.38	Flat time ending 1	Setting range：0000～2359	Factory value: 0730

Description.

This parameter is used in conjunction with the running and swing time (F16.01 to F16.36,) and the daily production classification (F16.00), and is only used to set the start time and end time of the flat period. After setting, if the system is running in the flat period, the peak, off-peak, Flat intermittent pumping setting of flat period will be executed.

Set via F16.39 to F16.40 – Flat period start and end times 2

F16.39	Flat time start 2	Setting range：0000～2359	Factory value: 1130
F16.40	Flat time ending 2	Setting range：0000～2359	Factory value: 1700

Description.

The same principle as the Flat start and end time 1 parameters, not to be elaborated here, please refer to F16.37 to F16.38 parameter settings for details.

Set via F16.41 to F16.42 – Flat period start and end times 3

F16.41	Flat time start 3	Setting range：0000～2359	Factory value: 2100
F16.42	Flat time ending 3	Setting range：0000～2359	Factory value: 2200

Description.

The same principle as the Flat start and end time 1 parameters, not to be elaborated here, please refer to F16.37 to F16.38 parameter settings for details.

◆ **Group F16.43 to F16.48: Start and end time of peak period**

Set via F16.43 to F16.44 - Peak period start and end times1

F16.43	Peak time start 1	Setting range：0000～2359	Factory value: 0730
F16.44	Peak time ending 1	Setting range：0000～2359	Factory value: 1130

Description.

This parameter is used in conjunction with running and swing time (F16.01 to F16.36,) and daily production classification (F16.00), and is only used to set the start time and end time of the peak period. After setting, if the system is running in the peak period, the peak, off-peak, Flat intermittent pumping setting of peak period will be executed.

Set via F16.45 to F16.46 – Peak period start and end times2

F16.45	Peak time start 2	Setting range：0000～2359	Factory value: 1700
F16.46	Peak time ending 2	Setting range：0000～2359	Factory value: 2100

Description.

The same principle as the peak period start and end time 1 parameters, not to be elaborated here, please refer to F16.43 to F16.44 parameter settings for details.

Set via F16.47 to F16.48 - Peak period start and end times3

F16.47	Peak time start 3	Setting range：0000～2359	Factory value: 0000
F16.48	Peak time ending 3	Setting range：0000～2359	Factory value: 0000

Description.

The same principle as the period time start and end time 1 parameters, not to be elaborated here, please refer to F16.43 to F16.44 parameter settings for details.

◆ **Group F16.49 to F16.54: Start and end time of the off-peak period**

Set via F16.49 to F16.50 - Off-peak period start and end time 1

F16.49	Off-peak time starts 1	Setting range：0000～2359	Factory value: 2200
F16.50	Off-peak time ending 1	Setting range：0000～2359	Factory value: 0500

Description.

This parameter is used in conjunction with running and swing time (F16.01 to F16.36,) and daily output classification (F16.00), and is only used to set the start time and end time of the off-peak hours. After setting, if the system is running in the peak time period, the peak, off-peak, flat intermittent pumping setting of off-peak period will be executed.

Set via F16.51 to F16.52 - Off-peak period start and end time2

F16.51	Off-peak time starts 2	Setting range：0000～2359	Factory value: 0000
F16.52	Off-peak time ending 2	Setting range：0000～2359	Factory value: 0000

Description.

The same principle as the Off-peak period start and ending time 1 parameter, not to be elaborated here, please refer to F16.49 to F16.50 parameter settings for details.

Set via F16.53 to F16.54 - Off-peak period start and end time 3

F16.53	Off-peak time starts 3	Setting range：0000～2359	Factory value: 0000
F16.54	Off-peak ending time 3	Setting range：0000～2359	Factory value: 0000

Description.

The same principle as the Off-peak period start and end time 1 parameter, not to be elaborated here, please refer to F16.49 to F16.50 parameter settings for details.

5.4 Group F19: Intermittent pumping swing parameters group

F19.15 to F19.21 group: time calibration parameters

When the pumping unit is selected for intermittent pumping running, it is necessary to set the intermittent pumping or running time when selecting [Specified stage Intermittent pumping running], [Specified Stage Running], [Continuous Running with Intermittent pumping], or [Peak, Off-peak, Flat Intermittent pumping], and the current time of the pumping unit is the reference time for setting the running time, so the current time parameter of the well should be calibrated first before setting the intermittent pumping running.

Calibration by F19.15 to F19.21 - Current time parameter

Intermittent pumping swing parameters group			
F19.15	Calibration time (year)	Setting range：2000～2099	Factory value: 2020
F19.16	Calibration time (month)	Setting range: 1 to 12	Factory value: 1
F19.17	Calibration time (day)	Setting range: 1 to 31	Factory value: 1
F19.18	Calibration time (hours)	Setting range：0～23	Factory value: 0
F19.19	Reserved		
F19.20	Calibration time (minutes)	Setting range：0～59	Factory value: 0

F19.21	Calibration time (sec)	Setting range：0～59 seconds Time calibration steps: first set the year, month, day, hour, minutes in the last set seconds, F19.15 ~ F19.21 does not increment with the increment of real-time time, only to provide real-time time correction. From C04.21 to C04.26, the current year, month, day, hour, minute and second data are monitored and used to calibrate the current time.	Factory value: 0

Description.

Oil well time parameters calibration steps should be in order: [year → month → day → hour → minute → second], all written to complete the time calibration, if the equipment suddenly power off for a long time (beyond the battery can continue to power the time), the current time is retained. Calibration is still required when the equipment is powered on again.

F19.22 ~ F19.41 group: Setting of starting intermittent pumping mode

For l Low productivity oil well, the running mode is set according to manual experience at start-up, and the running mode is reasonably adjusted to help save power loss and increase well production.

Set the running mode when the well starts intermittent pumping via F19.22

F19.22	Running mode at startup	0: Running/intermittent pumping/well stop 1: Running / Stopping Well / Intermittent Pumping 2: Intermittent pumping/well stopping/running	Factory value: 0

0: Running/intermittent pumping/well stop

This running mode is run according to the set running time, intermittent pumping/well stopping time, intermittent pumping time, and well stopping time. For example, if you set the running time [day: hour: minute] = [0:0:30], intermittent pumping/well stopping time [day: hour: minute] = [0:0:30], intermittent pumping time = 10 minutes, well stopping time = 10 minutes, the actual running mode is {[running: (intermittent pumping: well stopping: intermittent pumping)]: [Run: (intermittent: well stop: intermittent)]: ...} = {[30:(10:10:10)]: [30:(10:10:10)]: ...}.

If you set the running time [day: hour: minute]=[0:0:10], intermittent/well stopping time [day: hour: minute]=[0:0:20], intermittent time=10 minutes, well stopping time=5 minutes, the actual running mode is {[running: (intermittent: well stopping: intermittent)]: [running: (intermittent: well stopping: intermittent)]:...}={[10:(10:5:5)]:[10:(10:5:5)]:...}.

1: Running/ Well stopping /Intermittent Pumping

This running method is approximately the same as the running/intermittent pumping/stop well running method, except that the internal cycle time is changed from [intermittent pumping: stop well] in method 0 to [stop well: intermittent pumping], and its actual running is exactly the same.

2: Intermittent pumping/well stopping/running

This running differs slightly from the previous two in that it operates as {intermittent pumping/well stopping: running} = {[(intermittent pumping: well stopping: intermittent pumping: well stopping: ...): running]: [(intermittent pumping: well stopping: intermittent pumping: well stopping: ...): running]: ...}

Notes.

◎ The actual running mode at start-up is [Run time: Intermittent pumping/stop time: Run time: Intermittent pumping/stop time: ...], but the actual running mode at intermittent pumping/stop time is [Intermittent pumping time: Stop time: Intermittent pumping time: Stop time: ...]. Therefore the two can be understood as a nested relationship.

Set the well-intermittent pumping time parameters via F19.23 to F19.24

F19.23	Intermittent pumping time (low)	Setting range: 0 to 65535 minutes	Factory value: 10 points

F19.24	Intermittent pumping time (high)	Setting range：0～8 The actual time is calculated as: F19.24*65536+F19.23 (minutes)	Factory value: 0 Unit: 65536 points

Description.

◎ Calculation method for inter-tap time setting: Inter-tap time = F19.24 * 65536 + F19.23 Unit: minutes

◎ Set the intermittent pumping time according to the actual operating conditions of the well, and set the upper and lower limits should meet [lower limit: upper limit] = [0 : 58 9823].

Set the well-running time via F19.26 to F19.28

F19.26	Running time day	Setting range: 1 to 1000 (days)	Factory value: 0
F19.27	When running time	Setting range: 0 to 23 (hours)	Factory value: 0
F19.28	Running time second	Setting range: 2 to 59 (minutes)	Factory value: 30 points

Description.

◎ Oil well start-up running time is set as follows: [day: hour: minute], this parameter indicates the running time when the pumping unit starts Intermittent pumping running mode, and the running time can be adjusted downward appropriately for low-producing wells with weak fluid supply from the formation.

◎ When actually used, it can be adjusted at any time according to the actual operating status of the well.

Read well-current running time via F19.29 to F19.31

F19.29	Current running time day	Read Only	
F19.30	Current running time hour	Read Only	
F19.31	Current running time minutes	Read Only	

Description.

This parameter property is read-only, cannot be modified, and is only used to display the current well runtime execution progress.

Set well-intermittent pumping/stopping time via F19.32 to F19.34

F19.32	Intermittent pumping/well stop time (days)	Setting range: 1 to 1000 (days)	Factory value: 0
F19.33	Intermittent pumping/well stop time (hours)	Setting range: 0 to 23 (hours)	Factory value: 0
F19.34	Intermittent pumping/well stop time (minutes)	Setting range: 2 to 59 (minutes)	Factory value: 30 points

Description.

◎ Intermittent pumping/well stopping time is set in order: [Day: Hour: Minute], this parameter indicates the sum of intermittent pumping and well stopping time when the beam pump starts intermittent pumping running mode, i.e. intermittent pumping/well stopping time = intermittent pumping time + well stopping time, the actual running mode is: [Intermittent pumping/well stopping time] = [Intermittent pumping time: Well stopping time: Intermittent pumping time: Well stopping time: ... ...].

Read well-current intermittent pumping/stopping time via F19.35 to F19.37

F19.35	Current intermittent pumping/well shutdown time (days)	Read Only	
F19.36	Current intermittent pumping/well stopping time (hours)	Read Only	

F19.37	Current intermittent pumping/well stopping time (minutes)	Read Only	

Description.

This parameter property is read-only, cannot be modified, and is only used to display the current well intermittent/stop time execution progress.

Set-voice prompt time via F19.38

F19.38	Voice prompt time	Setting range: 25～60S Beam pump from standstill to turn to intermittent pumping or turn to running, there will be voice prompt output.	Factory value: 25S

Description.

The default state of the beam pump is stationary, and when the state changes, the relay output terminal of the APC controller outputs a voice prompt signal, and the parameter is set to determine the duration of the voice prompt.

Read via F19.39, F19.40 - Current intermittent pumping time

F19.39	Current intermittent draw time (low)	Read Only	Unit: minutes
F19.40	Current intermittent draw time (high)	Read Only The actual time is calculated as: F19.40*65536+F19.39 (minutes)	Unit: 65536 points

Description.

Calculation of the current intermittent pumping time: Current intermittent time = F19.40 * 65536 + F19.39 Unit: minutes

Read via F19.41 – Well stop start intermittent pumping execution time

F19.41	Pumping execution time between stop-well starts	Setting range：0～3600 S If a shutdown is performed during a well stop, the next restart will be based on this setting to determine whether to perform an intermittent pumping first (non-0 setting) or to continue the well stop (0)	Factory value: 120S

Description.

◎ This parameter indicates the beam pump well stop time, after which the intermittent pumping will be started. If the execution time of well stopping and starting intermittent pumping is set to 120S, then the beam pump will be started again 120S after well stopping, and start intermittent pumping.

◎ If a stop command is executed during well stopping due to an unexpected situation, when the beam pump starts again it will decide whether to continue the well stopping (0) or run the intermittent pumping (non-0 setting) directly according to the well stopping start intermittent pumping execution time set before stop.

Group F19.43 to F19.59: intermittent pumping parameters

Setting via F19.43, F19.44 - Well start-up running/intermittent pumping time

F19.43	Start-up running time	Setting range: 1 to 65500 min	Factory value: 10min
F19.44	Start-up intermittent pumping time	Setting range: 1 to 65500 min	Factory value: 10min

Description.

Start-up run time and start-up intermittent pumping time are the basic parameters of intermittent running mode and are valid in intermittent running mode when no intermittent mode is set. For example

F19.57 = 1; //Select intermittent mode

F19.43 = 10; //Set the start-up run time to 10 minutes

F19.44 = 10; //Set the start intermittent pumping time to 10 minutes

Then at this time the well is run according to [Start-up run time: Start-up intermittent pumping run time: .....] = [10: 10: .....].

Setting via F19.45 - Well start-up run/intermittent pumping time

F19.45	Intermittent pumping running frequency	Setting range: 2.00～50.00Hz	Factory value: 5.00Hz

Description.

When the beam pump is intermittent pumping running, the running frequency of the motor determines the stroke speed of the beam pump.

Setting via F19.46, F19.47, F19.49 – oil intermittent pumping running mode, running angle, home position selection

F19.46	Running mode selection	0: Center running 1: Forward running 2: Reverse running	Factory value: 0
F19.47	Intermittent pumping running angle	Setting range: 5 to 180 degrees	Factory value: 20 degrees
F19.49	Sensor signal selection	0: Upper position (corresponds to the lower dead center of the crank) 1: Lower position (corresponding to the upper dead center of the crank)	Factory value: 1

Description.

If F19.47 = 20 is set; //Setting the intermittent running angle to 20 degrees, there is

	F19.49 = 0	F19.49 = 1
F19.46=0	The lower dead center is used as the origin, and the crank swings 20 degrees clockwise around the origin, then returns to the origin and swings 20 degrees counterclockwise, then returns to the origin, and so on.	The upper dead point is used as the origin, and the crank swings 20 degrees clockwise around the origin, then returns to the origin and swings 20 degrees counterclockwise, then returns to the origin, and so on.
F19.46=1	The lower dead center is used as the home point, and the crank rotates 20 degrees clockwise from the home point and then returns to the home point, in a continuous cycle.	The upper dead point is used as the origin, and the crank rotates 20 degrees clockwise from the origin, then returns to the origin, in a continuous cycle.
F19.46=2	The lower dead center is used as the home point, and the crank rotates 20 degrees counterclockwise from the home point and then returns to the home point, in a continuous cycle.	The upper dead point is used as the origin, and the crank rotates 20 degrees counterclockwise from the origin, then returns to the origin, in a continuous cycle.

Set-Time Source via F19.48

F19.48	Time Source	0: Internal timing (only supports F19.59 selection of 0 and 1) 1: External clock card timing (supports all F19.59 selections)	Factory value: 0

Description.

This parameter is used for the reference clock source of F19.59.

Set-center run angle offset via F19.50

F19.50	Center running angle offset	Setting range: -50 to 50 degrees If the crank swing is not symmetrical to the center of the position switch when F19.46 is selected as 0 center running intermittent pumping, make appropriate adjustment.	Factory value: 0

Description.

When F19.46 = 0 (center running is selected as the running mode), if the crank deviates from the home position by a certain angle after returning to the home position, the angle offset can be compensated by setting this parameter to write the deviation angle to this parameter.

Frequency search by F19.51 setting-center position before swing

F19.51	Oscillation front center position finding frequency	5.00～50.00Hz	Factory value: 10.00Hz

Description.

The frequency of running when the Beam pump starts in search of the center position (upper dead center, lower dead center).

Setting via F19.53 - Sensor signal loss action selection

F19.53	Sensor signal loss action selection	Selection of running method after disconnection of swing center proximity switch 0: lower frequency running (low stroke low stroke invalid) 1: Set frequency running (low stroke low stroke invalid) 2: Fault stop (report E.SWING swing switch disconnection) 3: Reserved 4: Reserved 5: No positioning intermittent pumping running Note: F19.57 is set to be valid under 1 intermittent pumping swing.	Factory value: 2

0: Lower frequency running (invalid for low-stroke, low-stroke sub-stroke running)

If the center proximity switch of the Beam pump is suddenly shorted during the running of the Beam pump, the Beam pump will run at the lowest lower frequency set in advance, and if the Beam pump is running at the ground stroke and low stroke state, the running frequency will not be changed.

1: Set frequency running (invalid for low-stroke, low-stroke sub-stroke running)

When the swing center proximity switch is suddenly shorted during the running of the Beam pump, the Beam pump is running at the set frequency at this time, and if the Beam pump is running with low stroke and low strokes, the running frequency is not changed.

2: Fault stop (report E.SWING swing switch disconnection)

The swing center proximity switch suddenly shorted during the running of the Beam pump, and the inverter directly controlled the Beam pump to stop running and issued the fault code E.SWING (swing switch shorted).

5: No positioning intermittent pumping running

Knockout machine running in the swing center proximity switch suddenly short, then keep the knockout machine continue to run, at this time will not have the origin reference source, belong to unsupervised (no positioning) between the pumping running.

Setting via F19.55, F19.56 - Oscillation acceleration and deceleration time

F19.55	Oscillation acceleration time (Reserve)	Setting intermittent: 2.00s-20.00s	Factory value: 10.00s
F19.56	Swing deceleration time (Reserve)	Setting intermittent: 2.00s-20.00s	Factory value: 5.00s

Description.

Set this parameter to adjust the acceleration and deceleration of the head knocker when it swings to avoid overloading the motor.

Select via F19.57 Settings - Intermittent pumping mode

F19.57	Intermittent pumping mode selection	0: Invalid 1: Intermittent pumping mode 2: Intermittent pumping stationary mode 3: Reserve 4: No positioning intermittent pumping running	Factory value: 0

0: Invalid

All interdigitated parameter settings are invalid.

1: Intermittent pumping mode

Intermittent parameters are valid, and intermittent running is executed according to the settings of intermittent mode and intermittent parameters.

2: Intermittent pumping stationary mode

When the Beam pump is in the center of swing (upper dead center and lower dead center position), the motor stops rotating so that the Beam pump remains stationary.

4: No positioning intermittent pumping running

The head knocker swing does not start swinging at the upper dead point or lower dead point as the origin, i.e., it is not in the swing angle calibration according to the origin information, which is equivalent to unsupervised (no positioning) inter-jump running.

Set-up via F19.59 - Inter-extraction running method

F19.59	Intermittent pumping running mode	0: Run at startup 1: Start time pumping running 2: Designated interphase pumping run 3: Specify the stage to run 4: Continuous running with Intermittent pumping 5: Peak-to-off-peak Flat intermittent pumping The selection 0 and 1 are set by F19.43/F19.44, and the two settings are opposite execution processes. 3 and 4 are set by 12-segment speed, and the two settings are also opposite execution processes.	Factory value: 0

0: Run at startup

In the effective state of intermittent mode, the running status of the Beam pump is executed according to the start run time and start run time set in F19.43 and F19.44, and the running mode in this mode is [start run time: start intermittent time: start run time: .....].

1: Start time pumping running

In the effective state of intermittent mode, the running status of the Beam pump is executed according to the start running time and start running time set in F19.43 and F19.44, and the running mode in this mode is [start intermittent time: start running time: start intermittent time: .....].

2: Designated interphase pumping run

In the valid state of intermittent mode, make the Beam pump intermittent running according to the start time x and duration x set in F19.60 and F19.88. If the calibration time = the set start time x, the intermittent running time = duration x, otherwise start the running.

3: Specify the stage to run

In the valid state of intermittent mode, start the Beam pump running according to the start time x and duration x set in F19.60 and F19.88. If the calibration time = the set start time x, the start running time = duration x, otherwise the intermittent runs.

4: Continuous running with Intermittent pumping

The intermittent mode setting is valid, i.e., group F19.22 to F19.41: the mode setting for starting intermittent is meaningful, and the Beam pump operates in accordance with the parameter setting of F19.22 to F19.41. Please refer to "Group F19.22 to F19.41: Mode setting for starting intermittent" for details.

5: Peak-to-off-peak Flat intermittent pumping

The peak and off-peak level time setting is valid, and the Beam pump runs according to the set stroke when it runs to the set time in this mode, otherwise it runs normally.

Notes.

◎ Mode 0 and mode 1, mode 2 and mode 3 are executed opposite to each other.

Set via F19.60 to F19.88 - Start and duration x

F19.60	Start time 1	Range: 0 to 2359 (hour/minute) For example: 0823 means 8:23 pm	Factory value: 0000
F19.61	Duration1	Range: F19.60 to 2359 (hour/minute) or 0 lower limit if non-zero must be greater than or equal to F19.60.	Factory value: 0000
F19.62	Start time 2	Range：F19.61～2359 or 0	Factory value: 0000
F19.63	Duration 2	Range：F19.62～2359 or 0	Factory value: 0000
F19.65	Start time 3	Range：F19.63～2359 or 0	Factory value: 0000
F19.66	Duration3	Range：F19.65～2359 or 0	Factory value: 0000
F19.67	Start time 4	Range：F19.66～2359 or 0	Factory value: 0000
F19.68	Duration 4	Range：F19.67～2359 or 0	Factory value: 0000
F19.70	Start time 5	Range：F19.68～2359 or 0	Factory value: 0000
F19.71	Duration 5	Range：F19.70～2359 or 0	Factory value: 0000
F19.72	Start time 6	Range：F19.71～2359 or 0	Factory value: 0000
F19.73	Duration 6	Range：F19.72～2359 or 0	Factory value: 0000
F19.75	Start time 7	Range：F19.73～2359 or 0	Factory value: 0000
F19.76	Duration 7	Range：F19.75～2359 or 0	Factory value: 0000
F19.77	Start time 8	Range：F19.76～2359 or 0	Factory value: 0000
F19.78	Duration 8	Range：F19.77～2359 or 0	Factory value: 0000
F19.80	Start time 9	Range：F19.78～2359 or 0	Factory value: 0000
F19.81	Duration 9	Range：F19.80～2359 or 0	Factory value: 0000
F19.82	Start time 10	Range：F19.81～2359 or 0	Factory value: 0000
F19.83	Duration 10	Range：F19.82～2359 or 0	Factory value: 0000
F19.85	Start time 11	Range：F19.83～2359 or 0	Factory value: 0000
F19.86	Duration 11	Range：F19.85～2359 or 0	Factory value: 0000
F19.87	Start time 12	Range：F19.86～2359 or 0	Factory value: 0000

F19.88	Duration 12	Range：F19.87～2359 or 0	Factory value: 0000

Description.

This parameter setting is valid only when F19.59 = 2; or F19.59 = 3; otherwise it is invalid.

via F19.90, F19.91 - Voice output time and end of voice announcement

F19.90	Voice output time	Read-only (read by the screen to write this parameter to the controller) non-zero voice announcements.	0x95A
F19.91	End of voice announcement	Write (read by screen controller then write to RAM)	0x95B

Voice output time.

The screen reads the inverter internal parameter F19.38 (voice prompt time), which is then written to the APC controller by the touch screen.

End of voice announcement.

The APC controller voice broadcast status is read by the screen and its end-of-broadcast flag is written to RAM.

Pass F19.93, F19.94 - Current well stoppage time

F19.93	Current well stoppage time (low)	Read Only	Unit: minutes
F19.94	Current well stoppage time (high)	Read Only The actual time is calculated as: F19.94x65536+F19.93 (minutes)	Unit: 65536 points

Description.

Calculation of current actual well stoppage time: Current intermittent pumping time = F19.94 * 65536 + F19.93 Unit: minutes

Set via F19.93, F19.94 - Current well stop time

F19.95	Sensor disconnection delay	Setting range：1～600min Instructions: set F19.57 to 1 between pumping, F19.53 set to 2 (fault stop), run for 10 minutes if the sensor signal is not detected to report E.SWING switch disconnection fault	10min

Description.

The main function is to delay the fault reporting time and to eliminate the problem of jitter causing a brief loss of signal.

◎ Valid conditions: ① Intermittent pumping mode running (F19.57 setting); ② Sensor signal loss action selection for fault stop (F19.53 setting).

Setting via F19.96 - No positioning intermittent pumping running angle

F19.96	Non-positioning intermittent pumping running angle	5~30s Angle determined by time	5s

Description.

When the intermittent pumping running is selected, the running angle is calculated by θ= w*t; where, w: crank rotation angular speed; t: rotation time.

Setting via F19.98, F19.99 - Well stopping time

F19.98	Well downtime (low)	Setting range: 0 to 65535 minutes	Unit: 10 points

F19.99	Stop well time (high)	Setting range：0～8 The actual time is calculated as: F19.99x65536+F19.98 (minutes)	Unit: 65536 points

Description.

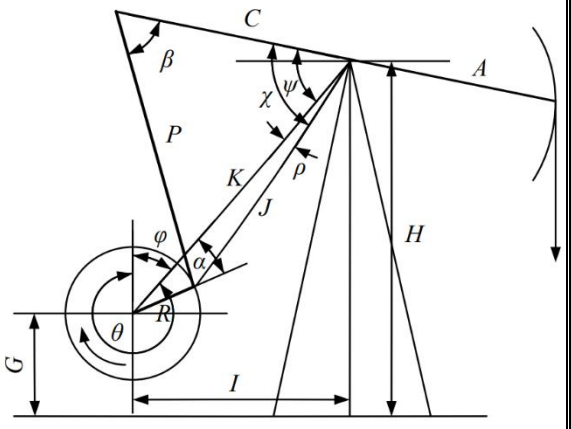
◎ Calculation of well stoppage time: Current intermittent pumping time = F19.94 * 65536 + F19.93 Unit: minutes

Â- Different from the current well stop time (F19.93, F19.94), the current well stop time refers to the well stop time from the start of the well stop to the current run already. And the stop time is the time to let the well stop. If you set the fixing time to 10 minutes, the well will automatically go to the next running session after 10 minutes of stopping.

5.5 F20 group: Dynamometer and working mode

F20.00 ~ F20.23 group: Dynamometer calculation parameters

Diagram of oil pumping machine



Equivalent structure diagram of oil pumping machine

Setting - Maximum load parameter via F20.00

F20.00	Maximum load	0-1000.0kN	50.0kN

Description.

Maximum load: The load carried at the suspension point on the upper stroke. In the upstroke, the increased suspension point load of the liquid column acting on the plunger due to the closing of the tour valve, plus the original weight of the pumping rod column in the air, constitute the maximum load.

Setting via F20.01 - Stroke range setting

F20.01	Stroke range setting	0-6.00m	4.50m

Description.

Set stroke range 0-6m, system default 4.5m.

Setting via F20.02 - Power map hold time

F20.02	Dynamometer hold time	0-3600s	10s

Description.

The duration of the Dynamometer display can be set in the time range of 0-3600s, and the system default is 10s.

Set the balance block parameters via F20.03 to F20.08

F20.03	Overrunning balance block mass	0-10000Kg	1390
F20.04	Over-balance block length	0-2.00m	1.05
F20.05	Overrun balancing block position	0.10-5.00m	0.85
F20.06	Hysteresis balance block mass	0-10000Kg	1116
F20.07	Hysteresis balance block length	0-2.00m	1.05
F20.08	Hysteresis balance block position	0.10-5.00m	0.85

Description.

The counterbalance blocks are mating blocks distributed on both sides of the crank shaft, i.e., the crank shaft and the center of gravity of the counterweight blocks will form a certain angle, which also constitutes the overrun and lag offset angle. These two counterbalance blocks follow the crank angle change in the calculation, the angle involved in the overrun and lag load calculation is ± offset angle.

Balancing block mass: The weight of the balancing block creates a vertical downward gravitational force on the crank shaft.

Balance block length: The length of the balance block itself, used to calculate the position of the center of gravity of the balance block.

Balance block position: Generally indicates the distance from the crank shaft to the balance block and is used to calculate the balance block center of gravity position.

Setting via F20.09 - Crank Quality

F20.09	Crank quality	1-10,000Kg Refers to single block crank mass	1840Kg

Description.

Crank mass: the weight of the crank itself, this parameter refers to the weight of a single piece of crank, generally knockers will use two pieces of crank.

Setting via F20.10 - Crank center position

F20.10	Crank center position	0.20-5.00m	1.31m

Description.

Crank center position: The coordinate system is constructed with the crank shaft as the center of the circle, indicating the length from the origin to the center of gravity of the crank.

Setting of mechanical parameters of the head knocker via F20.11-F20.23

F20.11	Forearm length	0.20-6.00m	5.00m
F20.12	Rear arm length	0.20-6.00m	3.07m
F20.13	Horizontal distance	0.20-5.00m	3.50m
F20.14	HG Distance	0.20-6.00m	4.26m
F20.15	Linkage length	0.10-5.00m	4.30m
F20.16	Structural imbalance weight	0-6000Kg	507Kg
F20.17	Motor efficiency	0 - 100.0% Efficiency of conversion of electromagnetic torque to mechanical torque	97.0%
F20.18	Deceleration efficiency	0 - 100.0% Refers to the efficiency of the reduction system, i.e. the total efficiency of belt drive efficiency and gearbox drive efficiency	85.0%

F20.19	Crank drive efficiency (Four-link efficiency)	0 - 100.0%	95.0%
F20.20	Reduction ratio	1.0-5000.0	145.0
F20.21	Crank radius	0.20-4.00m	1.24m
F20.22	Lower dead center limit	0.5-50.0%	8.0%
F20.23	Upper dead center limit	60.0% - 100.0%	93.0%

Forearm length: the structure diagram is expressed as A, which is the length of the forearm of the swim beam, in meters (m).

Rear wall length: denoted as C in the structure drawing, is the length of the rear arm of the swim beam in meters (m).

Horizontal distance: expressed as I in the structure drawing, is the horizontal distance from the point of the travel beam support to the center of the output shaft of the reducer, in meters (m).

HG distance: H is the height of the swim beam support point to the bottom of the base in meters (m); G is the height of the reducer module output shaft centerline to the bottom of the base in meters (m); HG then indicates the vertical distance between the two.

Connecting rod length: expressed as P in the structure drawing, is the length of the connecting rod, the distance from the center of the cross member bearing to the center of the crank pin bearing, in meters (m).

Structural unbalance weight: is the structural unbalance value of the pumping machine, equal to the force loaded on the light rod in order to keep the swim beam in a horizontal position when the connecting rod is disconnected from the crank pin.

Motor efficiency: the ratio of motor output power to input power.

Reduction efficiency: equal to the ratio of crank input power (motor output power minus gearbox, belt drive power consumption) to motor input power.

Crank transmission efficiency (four-link efficiency): the ratio of crank shaft input power to suspension point output power, mainly for bearing friction loss.

Reduction ratio: The transmission ratio of reduction device refers to the ratio of instantaneous input speed and output speed in the reduction mechanism, expressed by the symbol "i". The ratio of input speed and output speed of the connection, such as input speed of 1500r/min, output speed of 25r/min, then its reduction ratio is: i = 60:1.

Crank radius: denoted as R in the structure drawing, is the crank radius in meters (m).

Lower dead point limit: When the rope suspension is closest to the sky, it is called "upper dead point". The upper current = the highest current value between "lower dead point" and "upper dead point".

Upper dead point limit: When the rope suspension is closest to the wellhead, it is called "lower dead point". Lower current = "upper dead point" to "lower dead point" between is the highest current value.

F20.25 ~ F20.38 group: upper and lower stroke parameters

Setting via F20.25-F20.36 - Mode x up and down stroke times

F20.25	Mode 1 upstroke times	Setting range：F20.37～F20.38	Factory value: 5.50 times When the maximum and minimum operating frequencies of the system are adjusted, the actual limits will be based on the range F20.37 and F20.38.
F20.26	Mode 1 down stroke times	Setting range：F20.37～F20.38	Factory value: 4.50 times Instructions as above
F20.27	Mode 2 upstroke sub	Setting range：F20.37～F20.38	Factory value: 5.00 times Instructions as above

F20.28	Mode 2 down stroke times	Setting range：F20.37～F20.38	Factory value: 4.00 times Instructions as above
F20.29	Mode 3 upstroke sub	Setting range：F20.37～F20.38	Factory value: 4.50 times Instructions as above
F20.30	Mode 3 down stroke times	Setting range：F20.37～F20.38	Factory value: 3.50 times Instructions as above
F20.31	Mode 4 upstroke sub	Setting range：F20.37～F20.38	Factory value: 4.00 times Instructions as above
F20.32	Mode 4 down stroke times	Setting range：F20.37～F20.38	Factory value: 3.00 times Instructions as above
F20.33	Mode 5 upstroke sub	Setting range：F20.37～F20.38	Factory value: 3.50 times Instructions as above
F20.34	Mode 5 down stroke times	Setting range：F20.37～F20.38	Factory value: 2.50 times Instructions as above
F20.35	Mode 6 upstroke sub	Setting range：F20.37～F20.38	Factory value: 6.00 times Instructions as above
F20.36	Mode 6 down stroke times	Setting range：F20.37～F20.38	Factory value: 5.00 times Instructions as above

Description.

The upper and lower strokes of the Beam pump are set separately, corresponding to the upper and lower frequencies of the Beam pump, expressed as [lower stroke, lower stroke] = K[minimum working frequency, maximum working frequency], with a linear relationship between the strokes and the frequency.

Set the upper and lower limits of the stroke times via F20.37-F20.38

F20.37	Punch down limit (read only)	The first time the Beam pump is powered on, it will automatically enter the self-learning range of strokes, and set the corresponding upper and lower limits of strokes to these two parameters after the learning is completed.	Factory value: 2.00 times
F20.38	Punch limit (read only)		Factory value: 6.00 times

Description.

This parameter is the first time the system is powered up and running according to the current mode settings of the upper and lower strokes and the maximum and minimum working frequency to carry out self-learning, learn the relationship between the frequency and the number of strokes, when the working frequency changes, automatically follow the frequency to change the number of upper and lower strokes.

F20.41 ~ F20.54 group: Position switch fault judgment

Set – mode X up and down stroke time and correction time by F20.41 to F20.54

F20.41	Mode 1 upstroke time	Setting range: 0.00~6500.0s Time as the basis for position switch fault determination	Factory value: 30.0s
F20.42	Mode 1 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.43	Mode 2 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.44	Mode 2 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s

F20.45	Mode 3 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.46	Mode 3 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.47	Mode 4 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.48	Mode 4 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.49	Mode 5 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.50	Mode 5 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.51	Mode 6 upstroke time	Setting range: 0.00~6500.0s	Factory value: 30.0s
F20.52	Mode 6 downstroke correction time	Setting range: -5.0 to 5.0s	Factory value: 0.5s
F20.53	Other mode upstroke times	Setting range: 0.00~6500.0s Other modes refer to mode 0.	Factory value: 30.0s
F20.54	Stroke correction time in other modes	Setting range: -5.0 to 5.0s	Factory value: 0.0s

Description.

This parameter is used as the basis for determining the fault of the position switch disconnection. If [mode x upstroke time, downstroke correction time] = [30s, 0.5s], the position switch disconnection fault is reported when the Beam pump does not detect the position switch signal when it runs to the time intermittent [29.5s, 30.5s].

F20.40, F20.55 to F20.80 groups: time-sharing and speed-related parameters

Setting via F20.40 - Upper and lower stroke limits

F20.40	Time-sharing and speed-sharing running options	0: Close 1: Open Note: If you choose to turn on, you need to set the segment time F20.55~F20.70, and the segment running time F20.71~F20.78. You must install a clock card to choose this function.	Factory value: 0

Description.

If this parameter is enabled, the Beam pump operates according to the time division start, duration x and time division stroke x. If this parameter is enabled, the Beam pump operates according to the time division start, duration x and time division stroke x. However, a card must be installed to use this function.

Set by F20.55 to F20.70 - Time division start and duration x

F20.55	Split time and speed start time1	Setting range：0000～2359 Note: The first two hours and the last two minutes	Factory value: 0000
F20.56	Time-sharing speed duration1	Setting range：0000～2359 Note: If the Beijing time falls within the range of this setting, then run according to the stroke set in F20.71, otherwise run according to the stroke before F20.40 was selected to open (similar to restoring the previous stroke). **Note: The setting is only valid under the Punch Sub screen.**	Factory value: 0000

F20.57	Split time and speed start time2	Setting range：0000～2359	Factory value: 0000
F20.58	Split time and speed duration2	Setting range：0000～2359	Factory value: 0000
F20.59	Split time and speed start time3	Setting range：0000～2359	Factory value: 0000
F20.60	Split time and speed duration3	Setting range：0000～2359	Factory value: 0000
F20.61	Split time and speed start time4	Setting range：0000～2359	Factory value: 0000
F20.62	Split time split speed duration 4	Setting range：0000～2359	Factory value: 0000
F20.63	Split time and speed start time 5	Setting range：0000～2359	Factory value: 0000
F20.64	Split time and speed duration 5	Setting range：0000～2359	Factory value: 0000
F20.65	Split time and speed start time 6	Setting range：0000～2359	Factory value: 0000
F20.66	Minute split speed duration 6	Setting range：0000～2359	Factory value: 0000
F20.67	Split time and speed start time 7	Setting range：0000～2359	Factory value: 0000
F20.68	Split time split speed duration 7	Setting range：0000～2359	Factory value: 0000
F20.69	Split time and speed start time 8	Setting range：0000～2359	Factory value: 0000
F20.70	Minute split speed duration time 8	Setting range：0000～2359	Factory value: 0000

Description.

◎ The split time split speed start and duration x is only valid for setting under the punch screen.

◎ If F20.40=1, turn on the time-sharing split-speed running mode, and when the time is in the time-sharing split-speed [start time x, duration x], the kowtowers run according to the time-sharing split-speed stroke x set in (F20.71 to F20.78), otherwise, the kowtowers run according to the running stroke before (F20.40=0) is not selected to turn on (the stroke resumes the last running setting).

Set by F20.71 to F20.78 - Minute by minute speed stroke x

F20.71	Minute and minute stroke times1	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.72	Minute and minute stroke times2	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.73	Minute and minute speed stroke times3	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.74	Minute and minute stroke times 4	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.75	Minute speed stroke times 5	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.76	Minute and minute speed rushing times 6	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.77	Minute and minute speed rushing times 7	Setting range：F20.37～F20.38	Factory value: 3.00 times
F20.78	Minute time minute speed stroke times 8	Setting range：F20.37～F20.38	Factory value: 3.00 times

Description.

Time division and speed x: Set the stroke times of different modes. When the time meets the time intermittent set by the parameter [F20.55~F20.70], the corresponding stroke times of [F20.71~F20.78] are executed.

The setting is invalid when F20.40=0.

Setting by F20.79 to F20.80 - Special interface upper and lower frequencies

F20.79	Special interface on frequency (read-only)	Setting range: 0.00 to maximum frequency	Factory value: 30.00Hz

F20.80	Frequency under special interface (read-only)	Setting range: 0.00 to maximum frequency	Factory value: 30.00Hz

Description.

The frequency is a read-only attribute and is a self-learning frequency generated by the system.

5.6 Group F21: pumping-specific integrated parameter group 1

F21.05 ~ F21.07 group: voice broadcast parameters

Setting via F21.05 to F21.06 - Voice announcement time

F21.05	First half time of voice broadcast	Setting range：0.0～300.0s	Factory value:6.0s
F21.06	Half time after the voice broadcast	Setting range：0.0～300.0s	Factory value:16.0s

Description.

Divide the whole voice broadcast time into two parts before and after setting, the APC will output the fixed time voice broadcast signal through the relay terminal.

Set-voice announcement switch via F21.07

F21.07	Voice announcement switch	Setting range：0～1 0: Turn off voice output 1: Turn on voice output	Factory value:1

Description.

Voice announcement switch: switch to enable voice announcement, such as F21.07=1, voice announcement is valid, F21.05, F21.06 setting is valid, otherwise the setting is invalid.

F21.09: Downstroke position offset

Set via F21.09 - Downstroke position offset

F21.09	Downstroke position offset	Setting range: -90° to 90° If there is a deviation in the position when the downstroke turns to the upstroke, it can be corrected by this function code. If the panel "current status" shows that the donkey head has not reached the lower dead center when it has changed from the upper stroke to the lower stroke, the function code can be set to a negative value, or to a positive value if the opposite is true.	Factory value: 0

Description.

◎ Setting range is -90° to 90°

◎ If the logical position of the dead point on the crank overtakes the physical position, the offset value = physical position - logical position. In this case, the offset value is negative. If the logical position of the dead point on the crank lags behind the physical position, the offset value is positive at this time.

F21.25: Total power clearing

Set up via F21.25 - Total power clearing

F21.25	Total power clearing	0:No zeroing 1:Zeroing	Factory value: 0

F21.32: Deviation of action stroke

Setting via F21.32 - Action stroke deviation

F21.32	Deviation of action stroke	Setting range: 0.00 to 0.50 times The actual number of strokes is guaranteed to be less than the set deviation value without automatic adjustment of the number of strokes, with the aim of making the number of strokes stable.	Factory value: 0.01 times

Description.

The parameter setting range is to ensure that the stroke is stable so that the stroke error does not act within the offset range. Otherwise, the error is self-adjusted according to the offset.

F21.42 ~ F21.47 group: bus over-voltage, under-voltage parameters

Setting via F21.42 - Busbar overvoltage detection switch

F21.42	Busbar overvoltage detection switch	0: off 1: on	Factory value: 1

Description.

Detection switch: F21.42=1 (detection switch on), then the bus over-voltage detection setting is valid, otherwise there is no over-voltage detection.

Setting via F21.43 - Busbar overvoltage detection time

F21.43	Busbar overvoltage detection time	0～3600S	Factory value: 10S

Description.

If the bus over-voltage lasts for more than 10s, the bus over-voltage response setting is executed; otherwise, there is no action.

Setting via F21.44 - Busbar overvoltage setting

F21.44	Busbar overvoltage setting value	0～2000V	Factory value: 700V T3:700V T6:1150V Set according to the brake unit action point 20V higher.

Description.

When the bus over-voltage detection switch is opened, if the actual value > the set value and the duration exceeds 10s, an over-voltage fault is reported and a response action is performed; otherwise, there is no action.

Setting via F21.45 - Busbar overvoltage detection switch

F21.45	Busbar undervoltage detection switch	0: off 1: on	Factory value: 0

Description.

Detection switch: F21.45=1 (detection switch on), then the bus undervoltage detection setting is valid, otherwise there is no undervoltage

detection.

Setting via F21.46 - Busbar overvoltage detection time

F21.46	Busbar undervoltage detection time	0～3600S	Factory value: 10S

Description.

If the bus undervoltage lasts for more than 10s, the bus undervoltage response setting is executed; otherwise, there is no action.

Setting via F21.47 - Busbar overvoltage setting

F21.47	Bus undervoltage setting value	0~1000V	Factory value: 350V T3:350V T6:560V Based on 60% setting of the undervoltage point

Description.

When the bus undervoltage detection switch is open, if the actual value < the set value and the duration exceeds 10s, an undervoltage fault is reported and a response action is performed; otherwise, no action is performed.

Group F21.48 to F21.55: Stroke setting and self-learning

Set up via F21.48 - Auto Punch

F21.48	Auto stroke setting	Setting range：F20.37～F20.38 Stroke setting by flywheel rotation under the Stroke screen.	Factory value: 4.00 times

Description.

◎ The parameter must obey the relation: automatic stroke ∈ [stroke lower limit, stroke upper limit] ([F20.37, F20.38]).

◎ The stroke must be set by flywheel rotation under the stroke screen.

Set up via F21.50 - Work frequency strokes

F21.50	Power frequency stroke times	1.00-15.00 times/min	5.00

Description.

When the proximity switch is not installed, the running impulse at power frequency (50.00Hz) can be manually calibrated and set to this parameter to ensure that the set impulse is close to the actual running.

Read by F21.52 - Self-learning completion flag

F21.52	Self-study completion (oilfield-specific study)	Range: 0 to 1 Read only 0: Learning not performed or not completed 1: Study completion	0

Description.

This parameter is a read-only attribute and indicates the self-learning state only.

Read via F21.53 - Self-learning direction

F21.53	Self-learning direction	Range: 0 to 1 Read only 0: Positive 1: Reverse	0

Description.

This parameter is a read-only attribute, which only indicates the flag parameter of the self-learning direction, such as F21.53=0, which means the self-learning direction is forward self-learning, otherwise it is reverse self-learning.

Read via F21.54 - Self-learning angle

F21.54	Self-learning perspective	Read only	

Description.

This parameter is a read-only attribute and indicates only the self-learning angle parameter.

Self-learning via F21.55 setup-restart

F21.55	Restart self-learning	Range: 0~1 0: No implementation 1: Re-learn and clear F21.52, reset F21.52 to F21.54 after learning is completed, when the stroke range is not accurate, you can set this parameter to open the re-learning function.	0

Description.

This parameter resets self-learning. After the device self-learns, if F21.55 = 1; the system automatically clears the F21.52 self-learning flag, and F21.52 to F21.54 are reset to perform self-learning again.

5.7 Group F22: pumping-specific integrated parameter group 2

F22.00 to F22.08 group: parameter selection

The current operating mode can be viewed through F22.00 (read-only parameter modification is not valid)

F22.00	Working mode	0: Stroke time mode 10: Mode 0 11～16: Mode 1～Mode 6 1: variable up and down stroke times 2: Constant speed mode 3: Variable speed mode	Factory value: 0

0: Stroke time mode

This mode allows you to adjust the stroke with the middle knob of the keyboard.

10: Mode 0

The stroke in this mode is modified by the F1.02 selection item.

11～16：Mode 1～Mode 6

The upper and lower strokes can be set separately, and the **different strokes for** mode 1 **to mode 6** can be set by [F20.25 to F20.36].

1: variable up and down stroke times

This mode allows you to adjust the up and down strokes with the middle knob of the keyboard.

2: Constant speed mode

The upper and lower strokes are equal.

3: Variable speed mode

The upper and lower strokes are not equal.

Setting via F22.01 - Type of travel switch

F22.01	Type of travel switch	0: Pulse type 1: Level type (reserved)	Factory value: 0

0: Pulse type

The pulse has a narrow range of variation, recovers for a short time after a sudden change, and the duration of the pulse is extremely short, and to some extent it can be suddenly raised or suddenly lowered.

1: Level type (function reserved)

The level as a voltage range with a large relative change of high and low, with two states of 0 and 1 representing low and high potentials respectively.

Notes.

◎ The type of travel switch can choose pulse type and level type, with pulse type travel switch abnormality detection function.

◎ For pulse type travel switches, the first running requires 3 to 4 valid signals before the stroke times and electrical parameters are calculated for correct display. The configuration of the travel switch is not related to the selection of the operating mode.

Set-up-working mode via F22.02

F22.02	Output frequency selection in case of pulse travel switch failure	0: given by F0.03 specified frequency 1: Take the current mode smaller frequency 2: Take the larger frequency of the current mode 3: Upper and lower frequency averaging running	Factory value: 3

0: given by F0.03 specified frequency

When a fault occurs in the pulse type travel switch, the output frequency specified by F0.03 is selected as the fault output signal.

1: Take the current mode smaller frequency

When a fault occurs in the pulse type travel switch, the output frequency selects the smaller frequency of the current mode as the fault output signal.

2: Take the larger frequency of the current mode

When a fault occurs in the pulse type travel switch, the output frequency selects the greater frequency of the current mode as the fault output signal.

3: Upper and lower frequency averaging running

When the pulse type travel switch fails, the output frequency selects the upper and lower frequencies to operate at an even value.

Set via F22.06 - whether negative power is involved in the calculation

F22.06	Whether negative power is involved in the calculation	Whether negative power is used in the calculation of electrical parameters 0: Negative power is not involved in the calculation 1: Negative power involved in the calculation	Factory value: 1

Select whether to set the statistics for negative power in the calculation of average power.

0: Negative power is not involved in the calculation

Calculations involving average power and average power balance will round off the negative power.

1: Negative power involved in the calculation

Calculations involving average power and average power balance will be involved along with negative power.

Set via F22.06 - whether negative power is involved in the calculation

F22.08	Output terminal logic selection	0: Positive logic 1: Negative logic Individual position: Y terminal Decimal: Relay 1 Hundredth place: Relay 2	Factory value: 0000

0: positive logic

The high level corresponds to logic 1 and the low level corresponds to logic 0.

1: Negative logic

The high level corresponds to logic 0 and the low level corresponds to logic 1.

Individual position: Y terminal

When the output is valid, the Y terminal outputs a signal.

Decimal: Relay 1

Relay 1 is active when the output is valid. If F22.08 = 0x0000; then relay 1 state is valid when relay is active.

Hundredth place: Relay 2

Relay 2 is active when the output is valid. If F22.08 = 0x0000; then relay 2 is active when relay is active.

F22. [14 to 19, 45 to 47] group: Monitoring parameter selection

Setting via F22. [14 to 19, 45 to 47] - Monitoring parameter selection

0: Turn off the display

Disables the group of monitoring parameters that currently need to be displayed.

1: Turn on the display

Open the group of monitoring parameters that currently needs to be displayed.

Stroke times**:** the number of cycles that the Beam pump runs in a minute, i.e. 5 cycles in a minute, the stroke times are 5.

Current balance.

The balance ratio is calculated by dividing the maximum current value when the lower dead center is running upward by the maximum current value when the upper dead center is running downward, and the ratio is the balance ratio. The ratio is the balance ratio, which describes the difference in current between the upper and lower dead ends of the pumping unit.

Power balance.

The pumping machine balance condition is equal work done in the upper and lower strokes, equal peak motor current, and equal peak crank shaft torque, that is, the power balance degree can be obtained by the difference of work done in the upper and lower strokes.

Power Factor: Power Factor = Active Power / Apparent Power.

Maximum upstroke current: The maximum current output from the inverter during the upward movement of the pumping rod column.

Downstroke maximum current: The maximum current output from the inverter during the downward movement of the pumping rod column.

Upstroke average power: The average of all the power collected by the system during the upstroke of the pumping rod column.

Downstroke average power: The average of all power collected by the system during the downward movement of the pumping rod column.

F22.14: Monitoring parameter selection 1

Monitoring parameter display selection	**Description**
F22.15 = 0001	Stroke status
F22.15 = 0010	Stroke times
F22.15 = 0100	Current balance rate
F22.15 = 1000	Average power balance ratio

F22.15: Monitoring parameter selection 2

Monitoring parameter display selection	Description
F22.15 = 0001	Running frequency
F22.15 = 0010	Average Running frequency
F22.15 = 0100	Output voltage
F22.15 = 1000	Average output voltage

F22.16: Monitoring parameter selection 3

Monitoring parameter display selection	Description
F22.16 = 0001	Output current
F22.16 = 0010	Average output current
F22.16 = 0100	Apparent power
F22.16 = 1000	Average apparent power

F22.17: Monitoring parameter selection 4

Monitoring parameter display selection	Description
F22.17 = 0001	Output power
F22.17 = 0010	Average power
F22.17 = 0100	Reactive power
F22.17 = 1000	Average reactive power

F22.18: Monitoring parameter selection5

Monitoring parameter display selection	Description
F22.18 = 0001	Power Factor
F22.18 = 0010	Average Power Factor
F22.18 = 0100	Maximum power balance ratio
F22.18 = 1000	Cumulative power balance ratio

F22.19: Monitoring parameter selection6

Monitoring parameter display selection	Description
F22.19 = 0001	Current operating power
F22.19 = 0010	Current running time
F22.19 = 0100	Cumulative electricity consumption (low)
F22.19 = 1000	Cumulative electricity consumption (high)

F22.45: Monitoring parameter selection7

Monitoring parameter display selection	Description
F22.45 = 0001	Current balance
F22.45 = 0010	Maximum current on the upper stroke
F22.45 = 0100	Maximum current for downstroke
F22.45 = 1000	Power balance

F22.46: Monitoring parameter selection8

Monitoring parameter display selection	Description
F22.46 = 0001	Maximum power on the upper stroke
F22.46 = 0010	Downstroke maximum power
F22.46 = 0100	Average power balance
F22.46 = 1000	Average power on the upper stroke

F22.47: Monitoring parameter selection 9

Monitoring parameter display selection	Description
F22.47 = 0001	Downstroke average power
F22.47 = 0010	Stage electrical energy (low)
F22.47 = 0100	Stage electrical energy (high)
F22.47 = 1000	Reserved

F22.21 to F22.25, F22.33 group: filtering time

Setting via F22.21 - Active power filtering time

F22.21	Active power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.22	Visual power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.23	Reactive power filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.24	Power Factor Filtering Time	Setting range: 0.00~10.00s	Factory value: 0.10s
F22.25	Current filtering time	Setting range: 0.00~10.00s	Factory value: 0.10s

Description.

Set the filtering time for calculated power, power factor, and current, respectively.

Setting via F22.33 - Travel switch filter time

F22.33	Travel switch filter time	Setting range: 0.1~10.0s	Factory value: 3.0s

Description.

This parameter is only valid for pulse type travel switches. Due to the unevenness of some transmission shaft ends, multiple pulses will be generated when approaching the travel switch. According to the filtering time setting, the nth pulse will take effect within this time, and other pulses will be filtered out. The default takes effect on the first pulse.

Group F22.26 to F22.32: Downstroke time learning value

Reading by F22.26 to F22.32 - Downstroke time learning value

F22.26	Mode 1 downstroke time learning value	Read Only	Factory value: 8.0s
F22.27	Mode 2 downstroke time learning value	Read Only	Factory value: 8.0s
F22.28	Mode 3 downstroke time learning value	Read Only	Factory value: 8.0s
F22.29	Mode 4 downstroke time learning value	Read Only	Factory value: 8.0s
F22.30	Mode 5 downstroke time learning value	Read Only	Factory value: 8.0s
F22.31	Mode 6 downstroke time learning value	Read Only	Factory value: 8.0s
F22.32	Stroke learning time in other modes	Read Only	Factory value: 8.0s

Description.

When the equipment is powered on for the first start, the first pumping self-learning is performed to get the real-time position of the drive shaft end, and the pumping automatically turns to the upper stroke when the drive shaft end reaches the upper limit, and the lower stroke learning value is obtained at the same time, and this parameter is used to view the lower stroke time learning value for different modes.

Other modes refer to the downstroke learning time in constant speed mode.

F22.34 to F22.39 group: power balance rate limit

Power balance ratio: the maximum power of the downstroke over the maximum power of the upstroke, in 1%.

Average power balance rate: the average power of the downstroke is higher than the average power of the upstroke, in 1%.

Cumulative power balance ratio: the cumulative power of the lower stroke over the cumulative power of the upper stroke, in 1%.

Set the power balance rate limit by F22.34 to F22.39

F22.34	Power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.35	Power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%
F22.36	Average power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.37	Average power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%
F22.38	Cumulative power balance rate lower limit amplitude	Setting range：0%～F22.35	Factory value: 50%
F22.39	Cumulative power balance rate upper limit amplitude	Setting range：F22.34～1000%	Factory value: 150%

Group F22.50 to F22.51: Proximity switch valid pulse

Setting via F22.50 - Proximity switch active pulse

F22.50	Proximity switch effective pulse number	Setting range: 1-10	Factory value: 1

Description.

The detection of the nth proximity switch signal is considered the end of a stroke, and the function is valid when F22.51 = 1.

Setting via F22.51 - Proximity switch active pulse count enable

F22.50	Proximity switch active pulse count enable	0: No enablement 1: Enabling	Factory value: 0

Description.

When F22.51 = 0, the first proximity switch signal closure signal is used as a rotation cycle, otherwise the value set by F22.50 is received to determine each rotation cycle.

Group F22.52 to F22.53: Stage power monitoring and output delay

Set-phase power monitoring via F22.52

F22.52	Phase power monitoring	0: Close 1: Open	Factory value: 0

Description.

Monitors the current electrical energy according to the set electrical energy monitoring period.

Setting via F22.53 - Output Delay

F22.53	Output delay	0.0s～10.0s	Factory value: 1.0s

Description.

After the inverter performs start-up, the output frequency needs to pass the time set in F22.53 before there is an output (this setting prevents the motor to inverter end contactor from not sucking in time when the synchronous machine starts running and causes a fault).

F22.54 to F22.55 group: expansion card 485 parameters

Set-Expansion card address via F22.54, set-Expansion card baud rate via F22.55

F22.54	Expansion card 485 address	1 to 127	Factory value: 1
F22.55	Expansion card 485 baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps	Factory value: 3

Description.

To ensure proper communication, the expansion card address needs to correspond correctly with the baud rate, otherwise it cannot communicate.

5.8 Group F23: Beam pump-specific comprehensive parameters group

F23.00: Specific parameters password input

Enter the -specific parameter password via F23.00

F23.00	Specific parameter password input	0～65536	Factory value: 0

Description.

◎ **Enter the password provided by the manufacturer to access the F23 special parameters to modify the parameter group.**

◎ Reserved item, function to be implemented.

Group F23.01 to F23.03: Frequency modification setting

Modified via F23.01 - Frequency range

F23.01	Frequency range modification setting	0: The modification of the lower frequency (F1.12) is changed to not lower than F23.02, and the modification of the maximum frequency (F1.10) is not higher than F23.03. 1: No restrictions	Factory value: 0

0: Frequency modification range

Lower frequency target value (F23.02) < Frequency modified value (F23.01) < Maximum frequency target value (F23.03)

1: No restrictions

There are no restrictions on frequency modification.

Setting via F23.01 - Frequency modification range

F23.02	Lower limit frequency target value	0.00～F23.02	Factory value: 20.00Hz
F23.03	Maximum frequency target value	F23.01~320.00Hz	Factory value: 60.00Hz

Description.

F23.02, F23.03 are used to set the lower and maximum frequency target values respectively for limiting the frequency modification range (F23.01)

Group F23.04 to F23.10: Key parameter correction

Correction by F23.04 - Power Factor

F23.04	Power Factor Correction	Setting range: -0.50～0.50	Factory value: 0.0

Description.

When F22.18 = 0001, the LCD keypad will display the power factor, while F23.04 is used to calibrate this parameter, which displays the power factor on the output side of the inverter.

Pass F23.05 calibration - punch

F23.05	Stroke calibration	Setting range: -5.00～5.00	Factory value: 0.0

Description.

Stroke correction is completed based on the stroke proximity switch position status signal.

Calibration by F23.06 - Current Balance Rate

F23.06	Current balance rate correction	Setting range: -100% to 100%	Factory value: 0%

Description.

Based on the collected upstroke and downstroke peak currents, the current balance rate is calculated and combined with the system current balance rate to complete the current balance rate correction.

Correction by F23.07 to F23.10 - Power balance ratio

F23.07	Maximum power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.08	Power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.09	Cumulative power balance rate correction	Setting range: -100% to 100%	Factory value: 0%
F23.10	Power balance correction	Setting range: -100% to 100%	Factory value: 0%

Description.

Power balance ratio: the maximum power of the downstroke over the maximum power of the upstroke, in 1%.

Average power balance rate: the average power of the downstroke is higher than the average power of the upstroke, in 1%.

Cumulative power balance ratio: the cumulative power of the lower stroke over the cumulative power of the upper stroke, in 1%.

F23.11: Communication access options

Access via F23.11 Select-Communications

F23.11	Communication access options	LED "0" bit: Address mapping Selection 0: No address insertion 1: Address mapping is performed, for compatibility with the original AC100J address access. LED "00" bit: RS485 access 0: Regular visits 1: C0 specifies dedicated monitoring parameters from C0.48 to C0.69, group C1 is the Dynamometer parameters, and group C2 is the torque factor and balance torque parameters.	Factory value: 0x11

Description.

Set Bit \ Set Value	0	1
LED: Single digit (address mapping selection)	Invalid	Valid and compatible with AC100J address access
LED: Decimal (485 access)	485 regular visits	Add the following visits. Special monitoring parameters: C0.48 to C0.69 Dynamometer parameters: C1 group, torque factor and balance torque parameters: C2 group

F23.12 ~ F23.15: Intermittent pumping and operation mode

Select Intermittent pumping validity via F23.12

F23.12	Intermittent pumping validity selection	0: Prohibit the use of intermittent pumping 1: Intermittent pumping selection is effective (F19.57 selection valid) 2: Prohibit continuous running with Intermittent pumping (F19.59 option 4 is invalid or force F19.57 to 0)	1

0: Prohibit the use of intermittent pumping

In this mode, all settings related to oil-well intermittent pumping are invalid, i.e., normal running.

1: Intermittent pumping selection is effective

In this mode, the parameters related to oil-well intermittent pumping are set to be valid, and various Intermittent pumping running modes can be set to run.

2: Prohibit continuous running with Intermittent pumping

In this mode, all parameters related to oil-well intermittent pumping are valid (except for the parameters related to continuous running and Intermittent pumping), and any Intermittent pumping running mode other than continuous running and Intermittent pumping mode can be set to run.

Setting-running mode via F23.13

F23.13	Running mode setting	0: Stroke times interface & mode 0 1: Stroke times interface and variable speed (constant speed) mode 2: Stroke times interface with 6+1 3: Display all	1

0: Stroke times interface & mode 0

The stroke screen is displayed and the running mode is selected as mode 0. At this time, the mode 0 stroke setting is determined by the F1.02 setting.

1: Stroke interface and variable speed (constant speed) mode

The strokes screen is displayed and the running mode is selected as variable speed mode (variable speed mode: upper and lower strokes are not equal, constant speed mode: upper and lower strokes are equal).

2: Stroke sub interface with "6+1"

Displays the punch screen with the "6+1" mode, i.e., mode 0 to mode 6.

3: Show all

That is, the display shows the stroke interface and all operating modes (including mode 0, variable speed (constant speed) mode, and "6+1" mode).

Lost through F23.15 selection-intermittent pumping external device

F23.15	Intermittent pumping external communication device lost selection	0: Normal intermittent pumping running 1: Continuous running 2: No swing between pumps 3: Fault stop E.EXT Intermittent wire break Explanation: When selecting 3 only open between pumping F19.57=1 setting will report a disconnection fault.	0

0: Normal intermittent pumping running

If the communication with the external party is interrupted during the intermittent mode running, the intermittent mode running is still allowed.

1: Continuous running

If the communication with the external party is interrupted during the Intermittent pumping running, the system stops the Intermittent pumping running mode and changes directly to the continuous running mode.

2: No swing between pumps

The intermittent mode interrupts communication with the outside during running, and when the intermittent time period is executed, no more pendulum running is performed.

3: Failure to stop E.EXT

The external communication is interrupted during the intermittent pumping mode running, the system control forces a shutdown and reports an E.EXT disconnection fault.

Notes.

◎ When selecting 3 only open the intermittent pumping F19.57!=1 setting will report a disconnection fault.

C00.xx: Basic monitoring

Parameter Code (Address)	Name	Minimum Unit	Description

C00.00 (0x2100)	Given frequency	0.01Hz/ 0.1Hz	Display the absolute value of given frequency of the inverter.
C00.01 (0x2101)	Output frequency	0.01Hz/ 0.1Hz	Display the output frequency of the inverter.
C00.02(0x2102)	Output current	0.1A	Display the output current of the inverter.
C00.03 (0x2103)	Input voltage	0.1V	Display the input voltage of the inverter.
C00.04 (0x2104)	Output voltage	0.1V	Display the output voltage of the inverter.
C00.05 (0x2105)	Mechanical speed	1rpm	Display the mechanical speed of the motor.
C00.06 (0x2106)	Given torque	0.1%	Display the set torque of the inverter. Effective when vector is selected as the control mode.
C00.07 (0x2107)	Output torque	0.1%	Display the output torque of the inverter.
C00.08 (0x2108)	PID given	0.1%	Display the set value of PID. Effective when PID is selected for the frequency setting channel.
C00.09 (0x2109)	PID feedback value	0.1%	Display the feedback value of PID . Effective when PID is selected for the frequency setting channel.
C00.10 (0x210A)	Output power	0.1%	Display the current output power of the inverter.
C00.11 (0x210B)	DC-Bus voltage	0.1V	Display the current bus voltage of the inverter.
C00.12 (0x210C)	Module temperature 1	0.1°C	The internal temperature of the inverter.
C00.13 (0x210D)	Module temperature 2	0.1°C	--
C00.14 (0x210E)	Input terminal X connection status	--	The status of the multi-function input terminals is displayed as 1 (ON) or 0 (OFF). For example, when terminals X1 and X2 are ON, C00.14 is displayed as 
C00.15 (0x210F)	Output terminal Y connection status	--	The status of the multi-function output terminals is displayed as 1 (ON) or 0 (OFF). For example, when terminal Y and relay are ON, C00.15 is displayed as 
C00.16 (0x2110)	Analog AI1 input value	0.001V/0.001mA	F05.41 is used to select voltage or current input. F05.41 set to "0" indicates voltage input, while "1" indicates current input.
C00.17 (0x2111)	Analog AI2 input value	0.001V/0.001mA	F05.42 is used to select voltage or current input. F05.42 set to "0" indicates voltage input, while "1" indicates current input.
C00.18 (0x2112)	Reserved	--	--
C00.19 (0x2113)	Pulse signal PUL input value	0.001kHz/ 0.01kHz	The decimal point is determined by the selection in F05.30. There are 3 decimal digits when F05.30 is 0, and there are 2 decimal digits in other cases.
C00.20 (0x2114)	Analog output AO	0.01V/0.01mA/0.01kHz	F06.00 is used to select 0 V - 10 V or 0 mA - 20 mA, or pulse output.

C00.21 (0x2115)	Expanded AO output	0.01V/0.01mA	It is possible to select 0 V - 10 V or 0 mA - 20 mA, for use with an option card.
C00.22 (0x2116)	Counter value	1	--
C00.23 (0x2117)	Running time after power-on	0.1 hours	--
C00.24 (0x2118)	Cumulative running time of this inverter	Hours	--
C00.25 (0x2119)	Inverter capacity	0.1kVA	Capacity of the inverter.
C00.26 (0x211A)	Rated voltage of inverter	1V	The rated voltage of the inverter.
C00.27 (0x211B)	Rated current of inverter	0.1A	The rated current of the inverter.
C00.28 (0x211C)	Software version	00.00	The version of the inverter software.
C00.29 (0x211D)	PG feedback frequency	0.01Hz	The PG card detects the feedback signals from the encoder and converts them into a frequency values.
C00.30 (0x211E)	Timer time	1 second/ minute/hour	The unit is determined by parameter F08.07.
C00.31 (0x211F)	PID output value	0.00%	The output value of the process PID control and regulation.
C00.32 (0x2120)	Inverter Software Sub-Version	1	The time for updating the inverter software.
C00.33 (0x2121)	Encoder feedback angle	1	The angle of the encoder feedback.
C00.34 (0x2122)	Z pulse cumulative error	1	The ABZ encoder detects A and B signals with Z pulses to judge whether the encoder has lost pulses.
C00.35 (0x2123)	Z pulse count	1	The count value of ABZ encoder passing Z pulses.
C00.36 (0x2124)	Fault warning code	1	The number corresponding to the fault code is displayed, and "0" indicates no fault.
C00.37 (0x2125)	Cumulative Power Consumption (low level)	1	Total power consumption = [C00.37 + C00.38 * 10,000]°
C00.38 (0x2126)	Cumulative power consumption (high level)	1	
C00.39 (0x2127)	Power factor angle	1°	--

Note: Communication access to the above parameters requires setting the LED “00” bit of F23.11 to 0.

C04.xx: Oil well monitoring parameters

Parameters code (Address)	Naming	Minimum unit	Description
C04.00~C04.08	Reserved		
C04.09 (0x2509)	Setting stroke times	0.01time/min	As stroke interface, mode 0 and constant speed mode display the current set strokes. Note: There is no reference significance in variable speed mode.
C04.10 (0x250A)	Intermittent pumping status	0 or 1	0: Continuous operation 1: Swing or no swing
C04.14 (0x250E)	Crank position angle	0.1°	The crank is facing up at 12 o'clock (bottom dead center position) at 0 ° or the origin. Explanation: Only valid if a proximity switch is installed.

C04.19 (0x2513)	Rotation angle	0.1°	The angle is calculated from the origin of the proximity switch position.
C04.21 (0x2515)	Clock card time “year”		Note: It is only valid if dedicated expansion cards C04.21 to C04.26 are configured.
C04.22 (0x2516)	Clock card time “month”		
C04.23 (0x2517)	Clock card time “date”		
C04.24 (0x2518)	Clock card time “hour”		
C04.25 (0x2519)	Clock card time “min”		
C04.26 (0x251A)	Clock card time “second”		
C04.27 (0x251B)	Upper limit frequency	0.01Hz	The maximum frequency of system operation output
C04.28 (0x251C)	Lower limit frequency	0.01Hz	The minimum frequency of system operation output
C04.29 (0x251D)	Maximum running stroke times	0.01 times/min	The maximum stroke times for system operation depends on the upper limit frequency.
C04.30 (0x251E)	Minimum running stroke times	0.01 times/min	The maximum stroke times for system operation depends on the upper limit frequency.
C04.34 (0x2522)	Proximity switch failure	0～2	0: The proximity switch is normal or has not yet reached the detection time (30s) 1 or 2: Proximity switch failure
C04.37 (0x2525)	Upstroke given stroke times	0.01 times/min	Indicates the given stroke times on the upstroke in the current mode.
C04.38 (0x2526)	Downstroke given stroke times	0.01 times/min	Indicates the given stroke times on the downstroke in the current mode.
C04.45 (0x252D)	Negative power percentage	0.1%	The ratio of the accumulated negative power of a rotation cycle to the rated power of a frequency converter for one cycle, which indicates the ability of the oil well to generate negative power.