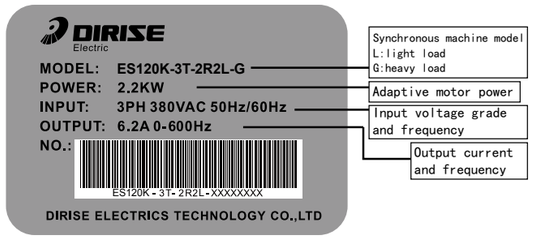
ES120K Special Synchronous Inverter For Air Compressor User Manual

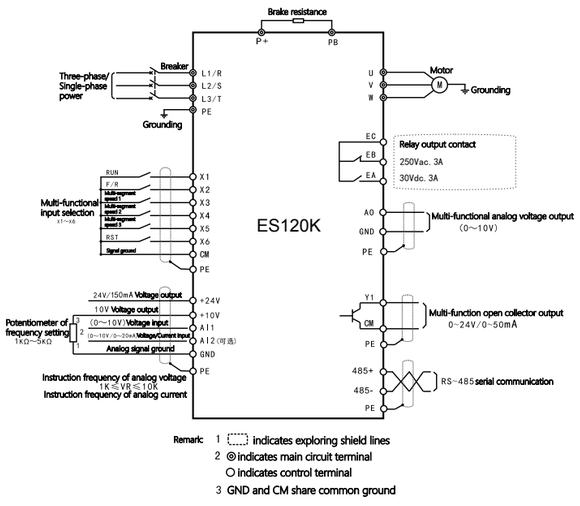
1 ES120K nameplate description

Below the right side plate of housing , Nameplate marked with ES120K inverter model and rated value is pasted up on it. The contents of nameplate is shown as follow:



2 Wiring diagram of main circuit terminal and control circuit terminal

Standard wiring diagram of ES120K inverter main circuit and control circuit is shown as follow:



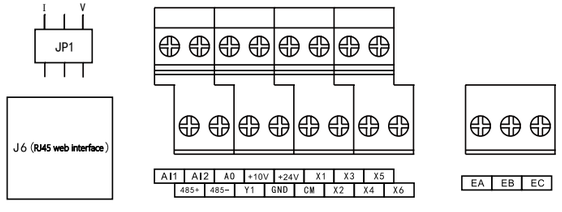
3 Main circuit terminal’s functions

ES120K main circuit terminals are shown as follow:

R	S	T	PE	PB	P+	P−	U	V	W

4 Control circuit terminal’s functions

ES120K control circuit terminals are shown as follow:



Lifting dial switching means current I ;pulling down dial switching means voltage V

5 Functional parameter table

“ ○ ” : Indicate code parameter can be modified when driver is on ;
“ ◎ ” : Indicate code parameter can not be modified when driver is on ;
“ × ” : Indicate code parameter can be read only and can not be modified.

P00 Group: Basic parameter

Function codes	Name	Range set	Unit	Defaults	Property
P00.00	Control methods	0:open loop vector		0	◎
P00.01	Command source choosing	0：Native keyboard 1：External terminals 2：Computer communication		0	◎
P00.02	Main frequency source choosing	0：Main digital frequency 1：Keyboard potentiometer 2：AI1 3：AI2		1	◎
P00.03	Auxiliary main frequency source choosing	0：Auxiliary digital frequency 1：Keyboard potentiometer 2：AI1 3：AI2 4：PLC 5：PLD		0	◎
P00.04	output frequency source choosing	0：Main frequency source 1：Auxiliary frequency source 2：Main + auxiliary 3：Main - auxiliary 4：MAX (Main frequency source, auxiliary frequency source) 5：MIN (Main frequency source, auxiliary frequency source)		0	◎
P00.05	Auxiliary frequency source range during the superposition	0：Compared to maximum frequency 1：Compared to main frequency		0	◎
P00.06	Auxiliary frequency source proportion during the superposition	0.00 ～ 200.00	%	100.00	○
P00.07	output frequency source control	0：Output frequency source 1：AI1*Output frequency source 2：AI2*Output frequency source		0	◎
P00.08	Main digital frequency	0.00 ～ max frequency	Hz	0.00	○
P00.09	Auxiliary digital frequency	0.00 ～ max frequency	Hz	0.00	○
P00.10	Setting rotation direction	0：Forward rotation 1：Reverse rotation		0	○
P00.11	Acceleration time1	0.00 ～ 600.00	S	20.00	○
P00.12	Deceleration time1	0.00 ～ 600.00	S	20.00	○
P00.13	Carrier frequency	2.000 ～ 10.000	KHz	4.000	○
P00.14	Max frequency	20.00 ～ 600.00	Hz	50.00	◎
P00.15	Upper frequency	Lower frequency ～ Max frequency	Hz	50.00	◎
P00.16	Lower frequency	0.00 ～ upper frequency	Hz	0.00	◎
P00.17	Lower frequency control	0：Operate at the lower frequency 1：When lower frequency's running time is over, the frequency inverter operates at zero speed.		0	◎
P00.18	Lower frequency's operation time	0.00 ～ 600.00	S	60.00	◎
P00.19	Reverse rotation's control	0：Forward/reverse rotation is allowed. 1：Reverse rotation is forbidden.		0	◎
P00.20	Forward/reverse rotation's dead zone time	0.00 ～ 600.00	S	0.00	◎
P00.21	Load speed factor	0.01 ～ 300.00		30.00	○
P00.22	Factory defaults' resetting	0：Invalid 1：Factory reset		0	◎

P01 Group: Start–stop Control

Function codes	Name	Range set	Unit	Defaults	Property
P01.00	Acceleration/deceleration mode	0：Linear mode 1：S curve mode		0	◎
P01.01	Starting mode	0: direct starting		0	◎
P01.02	Start DC braking current	0.00 ～ 150.00	%	0.00	◎
P01.03	Start DC braking time	0.00 ～ 30.00	S	0.00	◎
P01.04	Stopping method	0：Stop via deceleration 1：Stop without control		0	◎
P01.05	Stop DC braking frequency	0.10~upper limiting frequency	Hz	2.00	◎
P01.06	Stop DC braking current	0.00 ～ 150.00	%	0.00	◎
P01.07	DC braking waiting time	0.01 ～ 30.00	S	0.50	◎
P01.08	Stop DC braking time	0.00 ～ 30.00	S	0.00	◎

P02 Group: Motor 1 Parameters

Function codes	Name	Range set	Unit	Defaults	Property
P02.00	Motor's rated power	0.10 ～ 600.00	KW	XX.XX	◎
P02.01	Motor's rated voltage	50 ～ 660	V	XXX	◎
P02.02	Motor's rated current	0.01 ～ 600.00	A	XX.X	◎
P02.03	Motor's rated frequency	20.00 ～ 600.00	Hz	XX.XX	◎
P02.04	Motor's rated rotation speed	1 ～ 60000	rpm	XXXX	◎
P02.05	Motor's connection method	0：Y 1：△		X	◎
P02.06	Power factor	0.600 ～ 1.000		X.XX	◎
P02.07	Motor's efficiency	30.0 ～ 100.0	%	XX.XX	◎
P02.08	Synchronous motor stator resistance	1 ～ 60000	mΩ	X	◎
P02.09	Synchronous motor d spindle inductance	0.01 ～ 600.00	mH	XX.X	◎
P02.10	Synchronous motor q spindle inductance	0.01 ～ 600.00	mH	XX.X	◎
P02.11	Synchronous motor back electromotive force	10.0 ～ 2000.0	V	XXX.X	◎
P02.12	Reserve				◎
P02.13	Parameter's self-identification	0：None identification 1：Synchronous motor's stationary state's auto-identification 2：Synchronous motor's rotational state ’ s auto-identification		0	◎

P03 Group: V/F Control Parameters

Function codes	Name	Range set	Unit	Defaults	Property
P03.00	V/F curve setting	0：V/F straight line 1：Multi-point V/F curve 2：Fan curve 1 3：Fan curve 2 4：Fan curve 3 5：Fan curve 4		0	◎
P03.01	Reserve				
P03.02	V/F voltage value V0	0.00 ～ 100.00	%	1.00	○
P03.03	V/F voltage value V1	0.00 ～ 100.00	%	4.00	○
P03.04	V/F voltage value V2	0.00 ～ 100.00	%	10.00	○
P03.05	V/F voltage value V3	0.00 ～ 100.00	%	16.00	○
P03.06	V/F frequency value F0	0.00 ～ frequency value F1	%	1.00	○
P03.07	V/F frequency value F1	frequency value F0 ～ frequency value F2	%	4.00	○
P03.08	V/F frequency value F2	frequency value F1 ～ frequency value F3	%	10.00	○
P03.09	V/F frequency value F3	frequency value F2 ～ 100.00	%	16.00	○

P04 Group: Input Terminal Control

Function codes	Name	Range set	Unit	Defaults	Property
P04.00	DI terminal filter	0 ～ 100		10	◎
P04.01	DI Input logic	Bit5 Bit4 Bit3 Bit2 Bit1 Bit0 X6 X5 X4 X3 X2 X1 0：Effective when connected 1：Effective when disconnected		000000	◎
P04.02	X1 Delay Time	0.000 ～ 30.000	S	0.000	○
P04.03	X2 Delay Time	0.000 ～ 30.000	S	0.000	○
P04.04	Multi-functional input X1	0：No functions 1：Operate RUN 2：Forward rotation and reverse rotation F/R 3：Three-wire operation's stopping control 4：Normal inching turning FJOG 5：Reverse inching turning RJOG 6：Terminal UP 7：Terminal DOWN 8：UP/DOWN zero clearing 9：Stopping without control (FRS) 10：Failure Reset (RST) 11：External fault (EXT) 12：No acceleration and deceleration 13：Terminal 1 with multiple sections of frequency 14：Terminal 2 with multiple sections of frequency 15：Terminal 3 with multiple sections of frequency 16：Switch between acceleration time and deceleration time 17：Run command to switch to the terminal 18：Switch to auxiliary speed 19：DC injection braking time when stopping 20：Program operation reset 21：Reserve 22：Reserve 23：PID parameter switching		1	◎
P04.05	Multi-functional input X2			2	◎
P04.06	Multi-functional input X3			13	◎
P04.07	Multi-functional input X4			14	◎
P04.08	Multi-functional input X5			15	◎
P04.09	Multi-functional input X6			10	◎
P04.10	Terminals command mode	0：Two-wire control1 1：Two-wire control2 2：Three-wire control1 3：Three-wire control2		1	◎
P04.11	Keyboard potentiometer filteringTime	0.00 ～ 10.00	S	0.10	○
P04.12	AI1 filtering time	0.00 ～ 10.00	S	0.10	○
P04.13	AI2 filtering time	0.00 ～ 10.00	S	0.10	○
P04.14	Keyboard potentiometer's minimum input	0.0 ～ 100.0	%	1.0	○
P04.15	Keyboard potentiometer's maximum input	0.0 ～ 100.0	%	98.0	○
P04.16	AI1 output bias 0	- 100.0 ～ 100.0	%	0.0	○
P04.17	AI1 output bias 1	- 100.0 ～ 100.0	%	25.0	○
P04.18	AI1 output bias 2	- 100.0 ～ 100.0	%	75.0	○
P04.19	AI1 output bias 3	- 100.0 ～ 100.0	%	100.0	○
P04.20	AI1 input bias 0	0.0 ～ AI1 Input bias1	%	0.0	○
P04.21	AI1 input bias 1	AI1 input bias0 ～ AI1 input bias2	%	25.0	○
P04.22	AI1 Input bias 2	AI1 input bias1 ～ A1 1input	%	75.0	○
P04.23	AI1 Input bias 3	AI1 Input bias2 ～ 100.0	%	100.0	○
P04.24	AI2 output bias 0	- 100.0 ～ 100.0	%	0.0	○
P04.25	AI2 output bias 1	- 100.0 ～ 100.0	%	25.0	○
P04.26	AI2 output bias 2	- 100.0 ～ 100.0	%	75.0	○
P04.27	AI2 output bias 3	- 100.0 ～ 100.0	%	100.0	○
P04.28	AI2 input bias 0	0.0 ～ AI2 Input bias1	%	0.0	○
P04.29	AI2 input bias 1	AI2 input bias 0 ～ A12 Input bias 2	%	25.0	○
P04.30	AI2 input bias 2	AI2 input bias1 ～ AI2 input bias3	%	75.0	○
P04.31	AI2 Input bias 3	AI2 Input bias 2 ～ 100.0	%	100.0	○
P04.32	X1 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.33	X2 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.34	X3 valid delay time	0.000 ～ 30.000	S	0.000	○
P04.35	X3 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.36	X4 valid delay time	0.000 ～ 30.000	S	0.000	○
P04.37	X4 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.38	X5 valid delay time	0.000 ～ 30.000	S	0.000	○
P04.39	X5 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.40	X6 valid delay time	0.000 ～ 30.000	S	0.000	○

P04.41	X6 invalid delay time	0.000 ～ 30.000	S	0.000	○
P04.42	AD Hysteresis	0 ～ 200		2	○
P04.43	Terminal inching priority	0: invalid 1: valid		0	○

P05 Group: Output Terminal Control

Function codes	Name	Range set	Unit	Defaults	Property
P05.00	Multi-functional output Y1	0：frequency inverter's operation 1：Operate in reverse rotation 2：Frequency arrival (FAR) 3：Frequency degree inspection (FDT)		0	◎
P05.01	Relay output R1	4：Frequency inverter's fault 5：Upper frequency's arrival 6：Lower frequency's arrival 7：Operation readiness 8：Frequency degree inspection FDT,JOG invalid 9：overload pre-alarm		4	◎
P05.02	Analog output AO	0：Operation frequency 1：Setting frequency 2：Output current 3：Output voltage 4：Busbar voltage 5：AI1 6：AI2 7：+10V 8：Reservation		0	◎
P05.03	AO output lower limit	0.00 ～ 100.00	%	0.00	○
P05.04	AO output upper limit	0.00 ～ 100.00	%	100.00	○
P05.05	AO output gain	0.00 ～ 300.00	%	100.00	○
P05.06	FDT upper limit	0.00 ～ max frequency	Hz	30.00	◎
P05.07	FDT lower limit	0.00 ～ max frequency	Hz	30.00	◎
P05.08	FAR frequency arrival	0.00 ～ 20.00	Hz	2.50	◎

P06 Group: Auxiliary Parameters

Function codes	Name	Range set	Unit	Defaults	Property
P06.00	Inching digital frequency	0.00 ～ max frequency	Hz	5.00	○
P06.01	Inching acceleration time	0.00 ～ 600.00	S	20.00	○
P06.02	Inching deceleration time	0.00 ～ 600.00	S	20.00	○
P06.03	Acceleration time 2	0.00 ～ 600.00	S	20.00	○
P06.04	Deceleration time 2	0.00 ～ 600.00	S	20.00	○
P06.05	Multiple sections of speed 1	0.00 ～ max frequency	Hz	0.00	○
P06.06	Multiple sections of speed 2	0.00 ～ max frequency	Hz	5.00	○
P06.07	Multiple sections of speed 3	0.00 ～ max frequency	Hz	10.00	○
P06.08	Multiple sections of speed 4	0.00 ～ max frequency	Hz	15.00	○
P06.09	Multiple sections of speed 5	0.00 ～ max frequency	Hz	20.00	○
P06.10	Multiple sections of speed 6	0.00 ～ max frequency	Hz	25.00	○
P06.11	Multiple sections of speed 7	0.00 ～ max frequency	Hz	30.00	○
P06.12	UP/DOWN velocity	0.00 ～ 100.00 0.00（automatic velocity）		1.00	○
P06.13	Power down data storage	0：frequency no storage before power down 1：frequency storage before power down 2：UP/DOWN auto returning to zero when power-off		0	◎

P07 Group: Communication Functions

Function codes	Name	Range set	Unit	Defaults	Property
P07.00	Local address	0：Broadcast address 1 ～ 247		1	◎
P07.01	Communication baud rate	0：4800 1：9600 2：19200 3：38400	bps	1	◎
P07.02	Communication format	0: no parity 1+8+1 1: even parity check 1+8+1+1 2: odd parity check 1+8+1+1		0	◎
P07.03	Communication overtime time	0.0 ～ 60.0 0.0 Function invalid when communication overtime	S	0.0	◎
P07.04	Master-slave communication way	0:Current machine is slave 1:Current machine is master		0	◎
P07.05	Master writing slave address	0:Main digital frequency 1:Auxiliary digital frequency		0	◎
P07.06	Received proportion coefficient of local machine	0.00 ～ 300.00	%	100.00	○
P07.07	Master communication sending data	0:Output frequency 1:Set frequency 2:Main digital frequency 3:Keypad potentiometer 4：AI1 5：AI2		0	◎

P08 group: PID control function

Function codes	Name	Range set	Unit	Defaults	Property
P08.00	PID given source	0：Digital given 1：AI1 2：AI2		0	◎
P08.01	PID digital given	0.0 ～ P08.03PID maximum range	%	50.0	○
P08.02	PID feedback source	0：AI1 1：AI2		0	◎
P08.03	PID maximum range	0.1 ～ 6000.0		100.0	○
P08.04	PID effect direction	0:Positive effect 1:Negetive effect		0	◎
P08.05	PID output gain	0.00 ～ 100.00	%	100.00	○
P08.06	Proportion gain Kp	0.00 ～ 100.00		0.40	○
P08.07	Integral time Ti	0.000 ～ 30.000，0.000：no integral	S	2.000	○
P08.08	Differential time Td	0.000 ～ 30.000，0.000：no differential	mS	0.000	○
P08.09	Integral effect range	0.00 ～ 100.00	%	100.00	○
P08.10	PID deviation limiting	0.00 ～ 100.00	%	0.00	○
P08.11	PID output upper limiting	PID output lower limiting ～ 100.0	%	100.0	○
P08.12	PID output lower limiting	-100.0 ～ PID output upper limiting	%	0.0	○
P08.13	PID feedback disconnection detection value	0.00 ～ 100.00	%	0.00	○
P08.14	PID feedback disconnection detection time	0.0 ～ 30.0	S	1.0	○
P08.15	Start threshold	0.00~sleep threshold	%	0.00	○
P08.16	Start delay time	0.0 ～ 30.0	S	0.0	○
P08.17	Sleep threshold	Start threshold ～ 100.00	%	100.00	○
P08.18	Sleep delay time	0.0 ～ 30.0	S	0.0	○
P08.19	PID given time of change	0.000 ～ 30.000	S	0.000	◎
P08.20	PID feedback filtering time	0.000 ～ 30.000	S	0.000	◎
P08.21	PID output filtering time	0.000 ～ 30.000	S	0.000	◎
P08.22	Proportion gain 2	0.00 ～ 100.00		0.40	◎
P08.23	integral time 2	0.000 ～ 30.000，0.000:no integra	S	10.000	◎
P08.24	Differential time 2	0.000 ～ 30.000	MS	0.000	◎
P08.25	PID parameter switching conditions	0: Do not switch 1: Switch through digital input terminal 2: Automatic switching according to deviation		0	◎
P08.26	PID parameter switching deviation 1	0.00 ～ P08.27	%	20.00	◎
P08.27	PID parameter switching deviation 2	P08.26 ～ 100.00	%	80.00	◎
P08.28	PID initial value	0.00 ～ 100.00	%	0.00	◎
P08.29	PID initial value holding time	0.00 ～ 650.00	S	0.00	◎

P09 group: simple PLC function

Function codes	Name	Range set	Unit	Defaults	Property
P09.00	PLC operation way	0:Downtime after finishing single operation 1:Downtime after finishing limiting operation 2:Operation according to segment 7 after finishing single operation 3:Cycle operation		0	◎
P09.01	PLC operation control	0:Begin operation from interruption time 1:Start from the beginning		0	◎
P09.02	PLC operation direction	Bit6 Bit5 Bit4 Bit3 Bit2 Bit1 Bit0 T7 T6 T5 T4 T3 T2 T1 0:Forward rotation 1:Reverse rotation		0000000	◎
P09.03	Section 1 operation time T1	0 ～ 60000	S	30	○
P09.04	Section 2 operation time T2	0 ～ 60000	S	30	○
P09.05	Section 3operation time T3	0 ～ 60000	S	30	○
P09.06	Section 4 operation time T4	0 ～ 60000	S	30	○
P09.07	Section 5 operation time T5	0 ～ 60000	S	30	○
P09.08	Section 6 operation time T6	0 ～ 60000	S	30	○
P09.09	Section 7operation time T7	0 ～ 60000	S	30	○
P09.10	Limited cycle times	1 ～ 30000		1	○

P10 group :Fault and protection

Function codes	Name	Range set	Unit	Defaults	Property
P10.00	Motor overload protection	0:Invalid 1:Valid		0	◎
P10.01	Reserve				
P10.02	Over-current stall protection	0:Invalid 1:Mode 1 2:Mode 2		2	◎
P10.03	Current limiting level	50.0 ～ 180.0	%	150.0	◎
P10.04	Over-voltage stall protection	0：Invalid 1: Over-voltage stall is effective		1	◎
P10.05	Stall over-voltage point	380V：640 ～ 800 220V：370 ～ 400	V	720 390	◎
P10.06	Fault retry control	0: Invalid for fault retry 1~3:Fault retry 1,2,3times 4: Infinite fault retry		0	◎
P10.07	Fault output option during Fault retry	0:no action 1:action		0	◎
P10.08	Fault retry internal	0.01 ～ 30.00	S	0.50	◎
P10.09	No fault internal	0.01 ～ 30.00	S	10.00	◎
P10.10	Fault retry option	Bit4 Bit3 Bit2 Bit1 Bit0 ER07 ER05 ER04 ER03 ER02 0:Invalid for fault retry 1:valid for fault retry		00000	◎
P10.11	Fault screening	Bit7 Bit6 Bit5 Bit4 * ERR15 ERR12 ERR07 Bit3 Bit2 Bit1 Bit0 ERR10 ERR06 ERR05 ERR04 0:Protection is invalid 1:Protection is valid		1111 1101	◎
P10.12	Overload pre-alarm option	0: Y terminal output and continuous operation 1:Fault be alarmed and inverter stops （ERR07）		0	◎
P10.13	Overload pre-alarm detection level	20.00 ～ 200.00	%	130.00	◎
P10.14	Overload pre-alarm detection time	0.0 ～ 60.0	S	5.0	◎
P10.15	Power compensation factor	50.00 ～ 300.00	%	110.00	◎

P11 group :Control parameter

Function codes	Name	Range set	Unit	Defaults	Property
P11.00	Fan control	0:Operation in power on 1:Start operation		1	◎
P11.01	Carrier way	0:Fixed carrier 1:Random carrier		0	◎
P11.02	Carrier upper limiting	2.000 ～ 15.000	KHz	6.000	○
P11.03	Carrier lower limiting	2.000 ～ 15.000	KHz	2.000	○
P11.04	Automatic voltage regulator AVR	0:Invalid 1:Valid		1	◎
P11.05	Energy consumption braking control	0:Invalid 1:Valid		1	◎
P11.06	Braking usage rate	5.00 ～ 100.00	%	100.00	◎
P11.07	Energy braking voltage	380V:640 ～ 800 220V:350 ～ 400	V	690 380	◎
P11.08	Reserve				
P11.09	Over modulation function	0:Invalid 1:Valid		0	◎
P11.10	Concussion inhibition gain	0 ～ 100		15	○
P11.11	V/F Slip compensation coefficient	0.00 ～ 200.00	%	100.00	○
P11.12	V/F Stator pressure drop compensation gain	0.00 ～ 200.00	%	100.00	○
P11.13	dead zone compensation	0:Invalid 1:Valid		1	◎
P11.14	Flux braking gain	100 ～ 150（100：No magnetic flux brake）		100	◎
P11.15	Reserve				
P11.16	V/F Slip gain filtering time	0.00 ～ 10.00	S	1.00	◎
P11.17	Shock suppression cutoff frequency	0.00 ～ 600.00	Hz	0.50	◎
P11.18	Synchronizer initial pole search mode	0: invalid 1: Mode 1 2: Mode 2		0	◎

P12 group :Keypad and display

Function codes	Name	Range set	Unit	Defaults	Property
P12.00	User password	0 ～ 65535		XXXXX	◎
P12.01	Parameter setting control	0:Parameter setting allowed 1:Parameter locking 0 2：Parameter locking 1		0	◎
P12.02	Parameter modification method	0:Keypad and communication are valid at the same time 1:Keypad is valid 2:Communication is valid		0	◎
P12.03	Definition of multi-function key	0:Invalid 1:Inching operation 2:Switching between forward/reverse rotation		1	◎
P12.04	Code selected of stop monitoring	0 ～ 17： P13.00 ～ P13.17		0	◎
P12.05	Monitoring code selection	0 ～ 17： P13.00 ～ P13.17		1	◎
P12.06	Driver operation time	0 ～ 65535	HOUR	XXXXX	×
P12.07	Driver operation time	0 ～ 59	Min	XX	×
P12.08	Operation time control	0:Invalid 1:Valid		0	◎
P12.09	Set operation time	0 ～ 65535	HOUR	XXXXX	◎
P12.10	Control password of operation time	0 ～ 65535		XXXXX	◎
P12.11	Frequency inverter rate power		kW	XXXX	×