Rexroth Bosch Group

Rexroth Frequency Converter EFC 3600

R912004886
Edition 02

Instruction Manual

Record of Revision

Edition	Release Date	Notes
DOK-RCON03-EFC-3600***-IN02-EN-P	2013.12	First release

Introduction of this Documentation

This **Instruction Manual** is derived from the **Operating Instructions** which includes the product data in details.

Never work with or control the product before reading through the **Safety Instructions** in the standard delivery and the safety related chapters in the **Operating Instructions**.

Reference

For documentations available in other type or language, please consult your local sales partner or check www.boschrexroth.com/EFC3600.

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1 Mechanical Installation

1.1 Visual Check

After unpacking the frequency converter, perform a thorough visual check.

Check the following:

- **Has the right device been supplied?**
- **Is the device damaged?**
- **Check the case for transport damage such as scratches, cracks or dents.**

  If you find any deviation from one of the above points, please contact your **Bosch Rexroth** sales partner.

1.2 Ambient Conditions

If it is to function perfectly, the frequency converter must be installed in an environment matching the data provided below.

Ambient temperature	-10 °C ~ +50 °C①
Maximum altitude	Up to 1,000 m (No derating)
	1,000 ~ 4,000 m (1 % / 100 m)
Relative humidity	< 90 %
Degrees of protection	IP 20 (Mounting on the metal wall in control cabinet)

①: Refer to "10.3: Derating of Electrical Data" in the **Operating Instructions**.

Tab. 1-1: Ambient conditions

1.3 Installation Conditions

Depending on rating, the frequency converters are available in different frames. For perfect heat dissipation, the minimum installation spacing above and below the devices shown in the drawing must be observed.

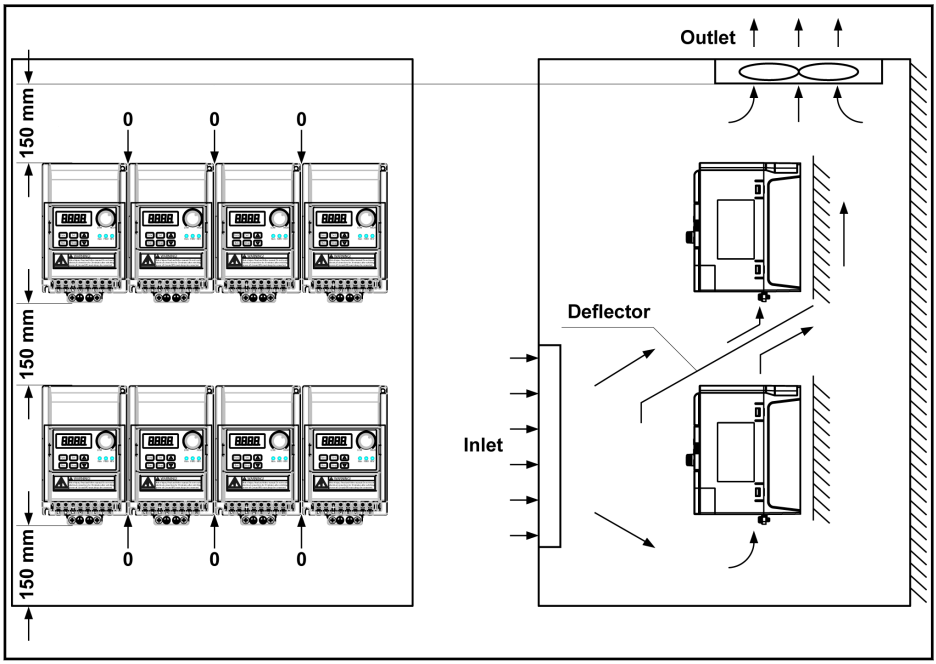

Fig. 1-1: Installation conditions

- The frequency converter shown above is Frame 1 to Frame 3. The minimum installation spacing stated applies to Frame 1 to Frame 4.
- The frequency converter must be vertically installed.
- If one frequency converter is arranged above another, make sure the upper limit of air temperature into the inlet is not exceeded (see chapter 1.2 "Ambient Conditions" on page 1). A baffle plate is recommended between the frequency converters to prevent the rising hot air being drawn into the upper frequency converter if the upper limit of air temperature is exceeded.

1.4 Dimensions

Frame	EFC 3600 model①	Dimensions [mm]									Screw size②③	Net weight [kg]
		B	b	H	h	h1	Ød	D	T	t		
1	0K40-1P2	90	80	135	125	146	4.5	113	105	5	M4	0.96
2	0K40-3P4	95	85	145	135	156	4.5	128	120	5	M4	1.18
	0K75-1P2											1.24
	0K75-3P4											1.26
3	1K50-1P2	95	85	185	175	196	4.5	133	125	5	M4	1.61
	1K50-3P4											1.52
4	2K20-1P2	120	110	210	200	221	4.5	138	130	5	M4	2.35
	2K20-3P4											2.25
	4K00-3P4											2.36

Tab. 1-2: EFC 3600 dimensions

①: The complete type code for frequency converter is: EFC3600-xKxx-xPx-xDA-7P-NNNN, for details please see "17.3 Appendix 3: Type Coding" in the **Operating Instructions**.

②: 2 screws are needed for mounting of EFC 3600 frame 1, 2 and 3.

③: 4 screws are needed for mounting of EFC 3600 frame 4.

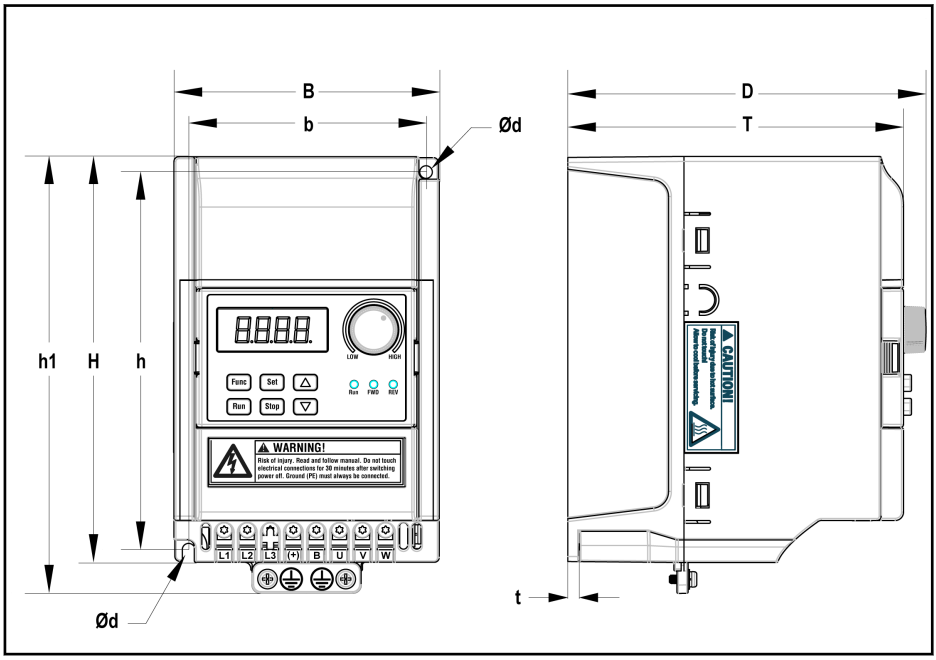

Fig. 1-2: Frame 1, 2, 3

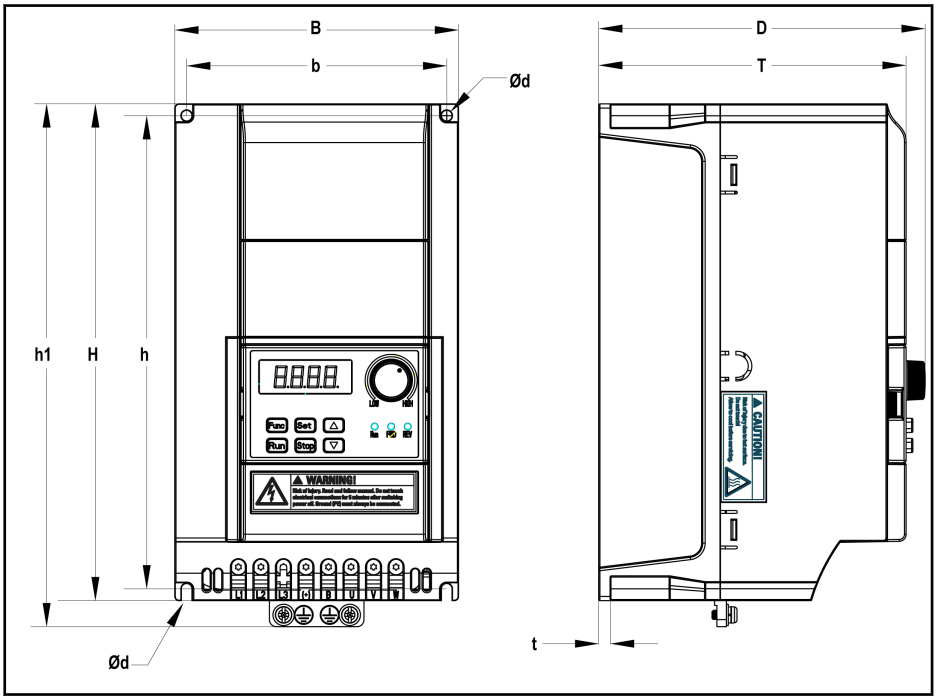

Fig. 1-3: Frame 4

2 Electric Installation

2.1 Cable Specifications

2.1.1 Power Connection

Depending on rating, the frequency converters are available in different sizes. For the device to function perfectly, flexible cables with corresponding wire end sleeves must be used during the electric installation. The fuses, cable cross-sections and tightening torques required for the mounting screws are listed below.

Model	Input side		Output side	Screw torque for power cable terminals [Nm / lb-in] (screw size)	PE	
	Nominal current of Fuse [A]	Cable size [mm² / AWG]	Cable size [mm² / AWG]		Cable size [mm² / AWG]	Torque [Nm / lb-in] (screw size)
1-phase 200 VAC class						
0K40	10	2.0 / 14	2.0 / 14	0.8 / 7 (M3)	6 / 8	0.8 / 7 (M3)
0K75	16	2.0 / 14	2.0 / 14	0.8 / 7 (M3)	6 / 8	0.8 / 7 (M3)
1K50	20	3.5 / 12	2.0 / 14	0.8 / 7 (M3)	6 / 8	0.8 / 7 (M3)
2K20	25	5.3 / 10	3.5 / 12	1.2 / 10 (M4)	6 / 8	0.8 / 7 (M3)
3-phase 400 VAC class						
0K40	6	2.0 / 14	2.0 / 14	0.8 / 7 (M3)	6 / 8	0.8 / 7 (M3)
0K75	10	2.0 / 14	2.0 / 14	0.8 / 7 (M3)	6 / 8	0.8 / 7 (M3)
1K50	10	2.0 / 14	2.0 / 14	0.8 / 7 (M3)	10 / 8	0.8 / 7 (M3)
2K20	16	2.0 / 14	2.0 / 14	1.2 / 10 (M4)	10 / 8	0.8 / 7 (M3)
4K00	20	2.0 / 14	2.0 / 14	1.2 / 10 (M4)	10 / 8	0.8 / 7 (M3)

Tab. 2-1: Fuse and cable dimensions

1. The cable dimensions for inputs and outputs are based on supply voltages of 1P 200 VAC / 3P 380 VAC.
2. For wiring, please use clamp terminals which have passed UL certification.
3. Please use wires of 75 ℃ and above.

2.1.2 Signal Connection

The following requirements are applicable to the signal connection wiring:

- flexible cables with wire end sleeves
- cable cross-section: 0.2 ~ 1.5 mm^2
- cable length: max. 20 m
- analog inputs ±10 V, Vr1, +I and GND: use shielded cables
- analog inputs +I and GND: to eliminate interference from external influences, connect +I and GND on the transducer with a 22 nF capacitor (50 V) and run the signal cable two or three times through a ferrite ring.

2.1.3 Overview of Electric Connections

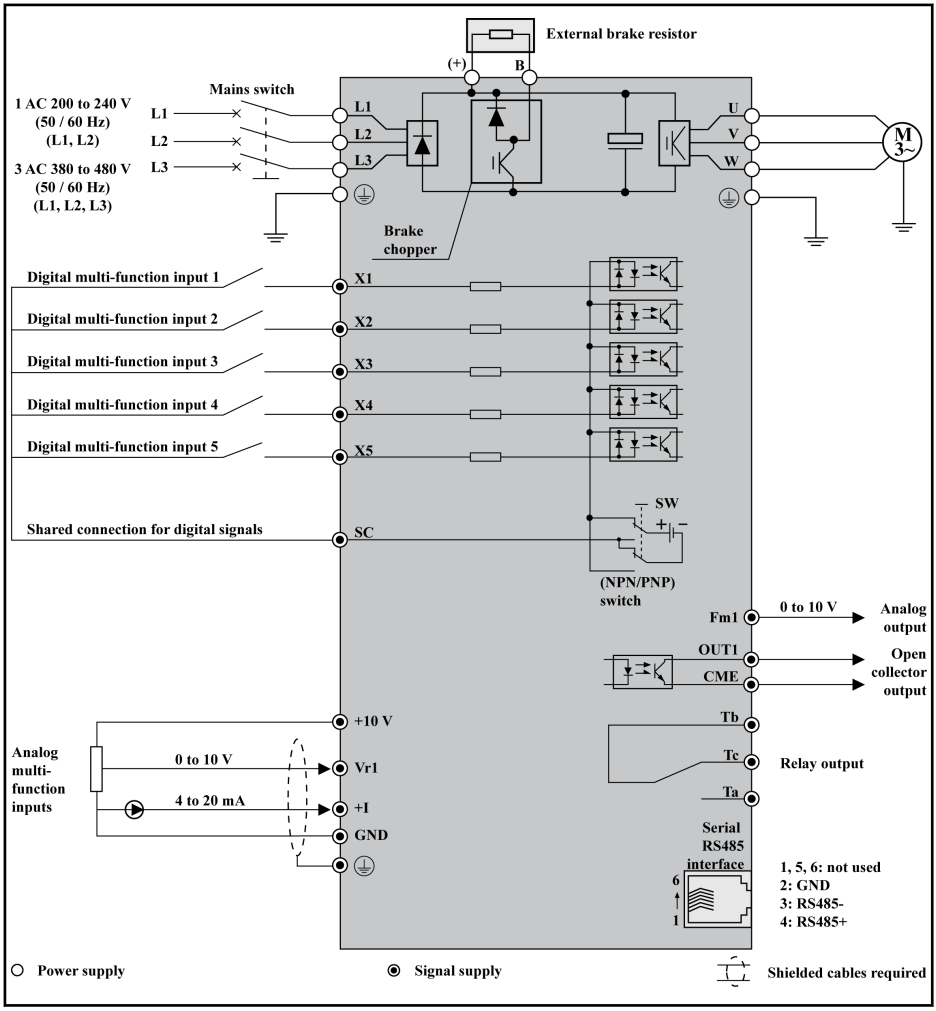

Fig. 2-1: Block diagram

- It is recommended to use shielded cable to connect the motor.
- The communication interface shown in the figure above is RJ11 for ModBus communication; for PROFIBUS communication interface DB9, see "13.2: PROFIBUS Protocol" in the **Operating Instructions**.

2.2 Power Terminals

The table below describes the symbols on the frequency converter's power connection terminals and their function.

Terminal	Description
1-phase AC 200 V class	
L1, L2	Mains power supply inputs
U, V, W	Frequency converter outputs (to be connected to the motor)
B	Reserved terminal for external brake resistor
(+)	DC positive bus output
⏚	Input PE (located at bottom left of the heat sink)
⏚	Grounding (located at bottom right of the heat sink)
3-phase AC 400 V class	
L1, L2, L3	Mains power supply inputs
U, V, W	Frequency converter outputs (to be connected to the motor)
B	Reserved terminal for external brake resistor
(+)	DC positive bus output
⏚	Input PE (located at bottom left of the heat sink)
⏚	Grounding (located at bottom right of the heat sink)

Tab. 2-2: Main circuit terminals description

☞ **Do not** use terminal L3 for 1P 200 VAC class models!

Depending on size, the position and sequence of the power terminals on the individual frequency converter may differ. Refer to the graphics below for the exact connection terminal position and order.

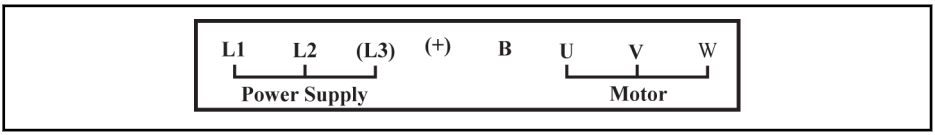

Fig. 2-2: Power terminals (1x200 VAC)

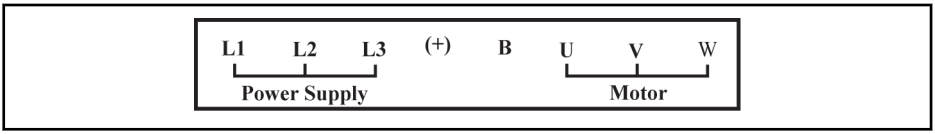

Fig. 2-3: Power terminals (3x400 VAC)

2.3 Interface Connection for Signals

2.3.1 NPN/PNP Mode Selection

Switch SW

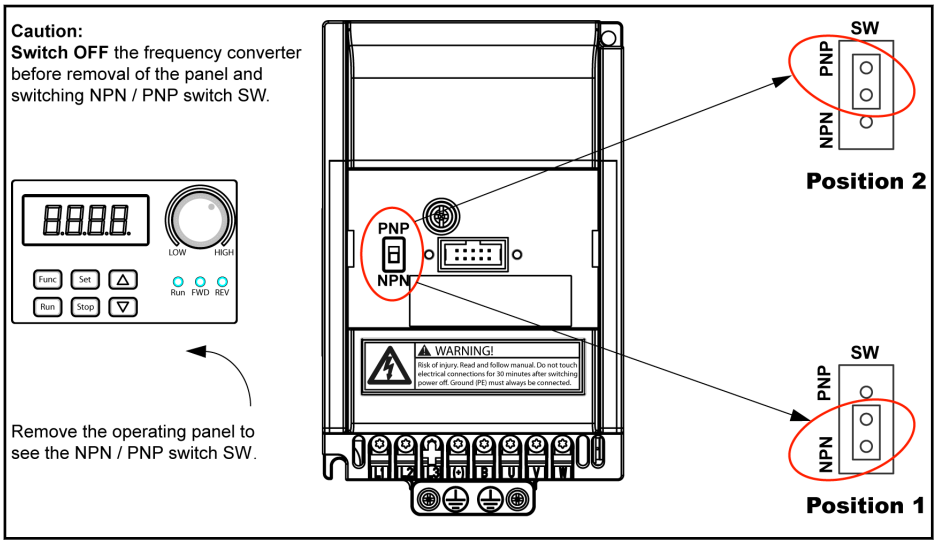

Fig. 2-4: NPN / PNP wwitch SW for the digital inputs

As shown in the figure above, the factory default setting is NPN.

2.3.2 Analog Input Terminals (+10 V, Vr1, GND, +I)

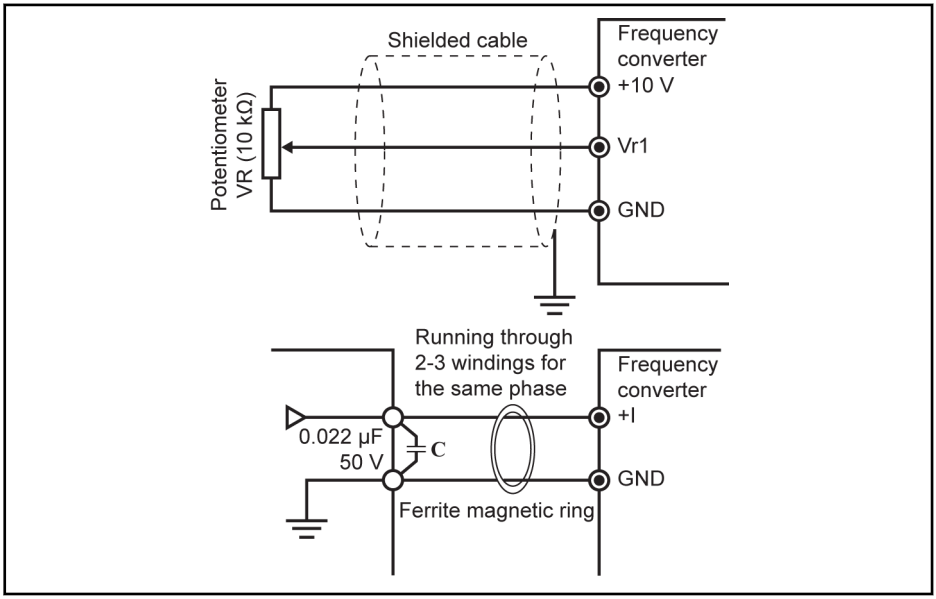

Fig. 2-5: Analog input terminals (+10 V, Vr1, GND,+I)

- For connections of low level analog signals, which are easily affected by external interference, the wiring length should be as short as possible (less than 20 m). Shielded cables must be used.
- Incorrect operation may occur due to interference on the analog signal. In such cases, connect a capacitor and ferrite core at the output side of the analog signal, as shown above.

2.3.3 Control Circuit Terminals

Control circuit terminals figure

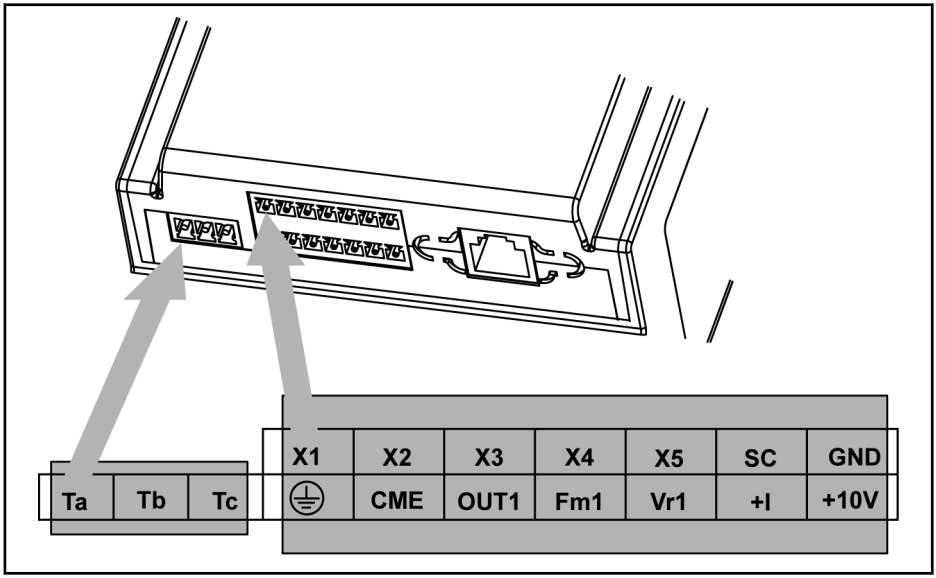

Fig. 2-6: Control circuit terminals

The sequence of the label and the terminals is as indicated by arrows in the above figure.

Control Circuit Terminals Description

Type	Terminal	Signal function	Description	Signal requirement
Digital inputs	X1 ~ X5	Multiple speed commands	Activated with “closed” see parameters E0.01 ~ E0.05, chapter 8.6 in the **Operating Instructions**	24 VDC 8 mA inputs via opto-electric couplers
	SC	Shared connection for digital signals	Isolated from GND	
Analog inputs	+10 V	Supply voltage for external frequency setpoint value specified	Power supply for speed commands	+10 V (Max. current 30 mA)
	Vr1	Analog frequency commands	Analog voltage input	Input voltage range: 0 ~ 10 V Input resistance: 40 kΩ Resolution: 1/1000
	+I		Analog current input	Input current range: 4 ~ 20 mA Input resistance: 499 Ω Resolution: 1/800
	GND	Shared connection for analog signals	Isolated from SC	–
	Earth	Shielding terminal	–	–
Digital outputs	OUT1-CME	Open collector output 1	Programmable digital output with multiple functions, see parameter E1.00	Open collector outputs: DC 30 V, 50 mA
	Ta	Relay changeover contacts	Programmable relay output, see parameter E1.02	Rated capacity of contact transmitter: AC 250 V 3 A DC 30 V 3 A
	Tc			
	Tb	Relay shared contact		
Analog outputs	Fm1-GND	Analog multi-function output 1	Programmable analog output with multiple functions, see parameter E1.30	Output voltage: 0 ~ 10 V Max. output current: 5 mA

Tab. 2-3: Control circuit terminals description

3 Parameter Settings

3.1 Operating Panel

The operating panel is removable and composed of two areas: display and keys. The display shows mode settings and operation state of the frequency converter. The keys allow the user to program the frequency converter.

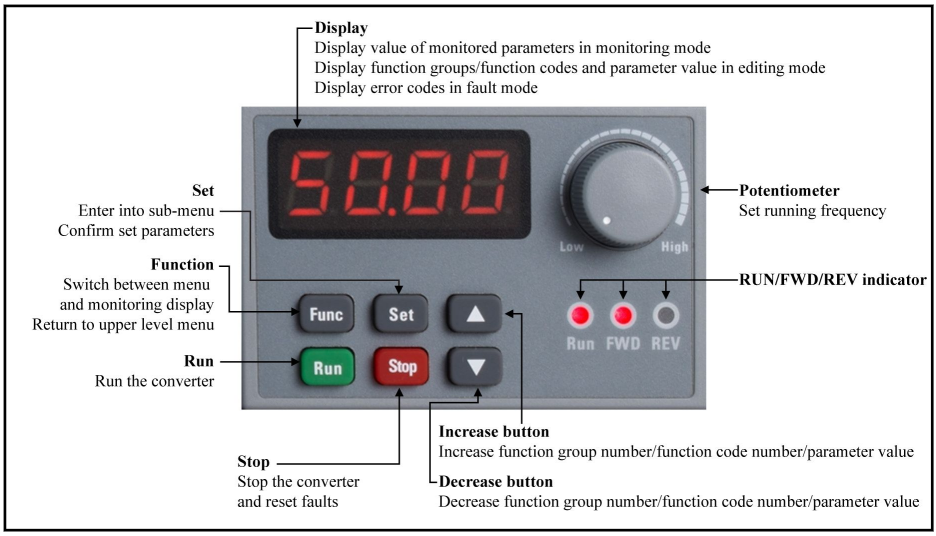

Fig. 3-1: Operating panel

3.2 Start-up

The diagram below shows the standard start-up procedure for the frequency converter.

- White boxes: check whether all the work listed has been performed correctly before beginning the start-up
- Light grey boxes: start-up (described on the following pages)
- Dark grey boxes: to prevent damage, proceed as is described after the start-up

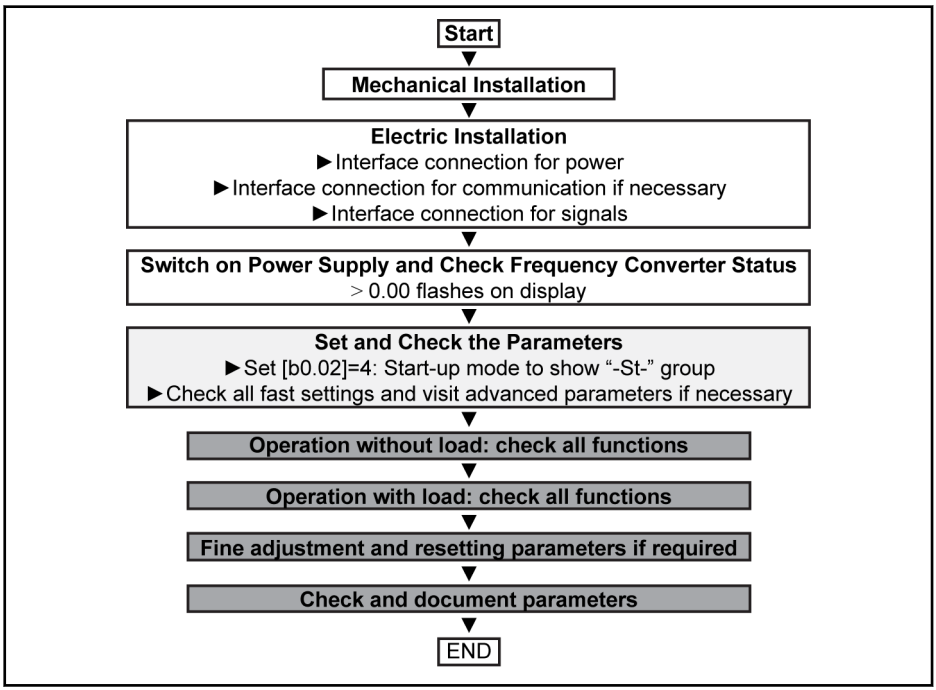

Fig. 3-2: Start-up procedure

3.3 Operating Descriptions

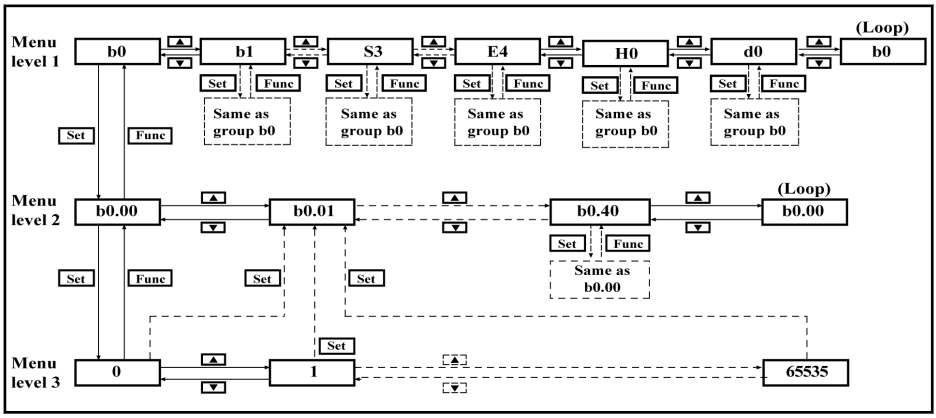

Fig. 3-3: Operating mode

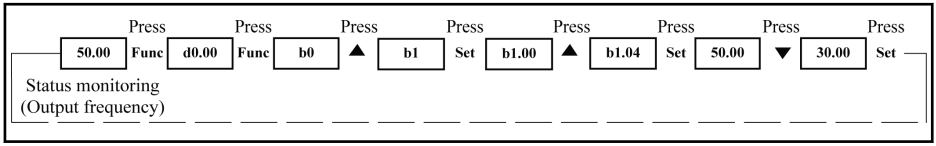

Fig. 3-4: Operating example

3.4 Parameters

3.4.1 Description of Attribute Symbols in Parameter Tables

Parameter attribute	Description
RUN/STOP	Parameter setting can be modified when the frequency converter is in RUN or STOP mode.
STOP	Parameter setting can only be modified when the frequency converter is in STOP mode.
mpwd	Parameter setting can only be modified when the manufacturer password protection is disabled.
read only	Parameter setting is read-only and can't be modified.

Tab. 3-1: Description of attribute symbols in parameter tables

- Code: means function / parameter code, written in bx.xx, Ex.xx, Sx.xx, Hx.xx and dx.xx.
- Value of function / parameter code: written in [bx.xx], [Ex.xx], [Sx.xx], [Hx.xx], and [dx.xx].
- Default: values that correspond to the factory default upon initialization at 50 Hz.
- Attrb.: means attribute.

3.4.2 Quick Start Parameters

Access & motor nameplate parameters

Code	Name	Setting range	Min. unit	Default	Attri.
b0.02	Access authority setting	0: Basic parameters 1: Standard parameters 2: Extended parameters 3: Advanced parameters 4: Start-up mode	1	0	RUN/STOP
S2.00	Rated motor frequency	5.00 ~ 400.00 Hz	0.01 Hz	50.00 Hz	STOP
S2.01	Rated motor rotation speed	1 ~ 30,000 rpm	1 rpm	Depends on model	STOP
S2.02	Rated motor power	0.1 ~ 1,000.0 kW	0.1 kW	Depends on model	STOP
S2.03	Rated motor voltage	0 ~ 480 V	1 V	Depends on model	STOP
S2.04	Rated motor current	0.01 ~ 655.00 A	0.01 A	Depends on model	STOP

Start-up parameters

Code	Name	Setting range	Min. unit	Default	Attri.
b1.30	Starting mode	0: Start directly 1: Braking before start 2: Start with speed capture	1	0	STOP
b1.40	Stopping mode	0: Deceleration to stop 1: Freewheeling to stop 2: Freewheeling under STOP-command, decelerating under direction changes	1	0	STOP
S0.00	V/F curve mode	0: Linear curve 1: Square curve 2: User-defined multipoint curve	1	0	STOP
S3.35	Stopping with **Stop** key	0: Only valid for control with keyboard 1: Valid for all control means	1	1	RUN/ STOP
b1.00	First frequency setting source	0: Given by panel potentiometer 1: Given by panel digital setting 2: Given by external analog AIV 3: Given by external analog AIC 4: Set by external UP/DOWN terminals 5: Given by communication 6: Given by multi-speed	1	0	STOP
b1.02	First RUN command source	0: Inputting commands with panel 1: Inputting commands via external terminals 2: Inputting commands via communication	1	0	STOP
b1.20	Acceleration time 1	0.1 ~ 6,000.0s	0.1s	5.0s	RUN/ STOP
b1.21	Deceleration time 1	0.1 ~ 6,000.0s	0.1s	5.0s	RUN/ STOP

Input / Output terminal functions

Code	Name	Setting range	Min. unit	Default	Attri.
E0.00	2-wire/3-wire running control	0: Forward/stop, reverse/stop 1: Forward/reverse, run/stop 2: 3-wire control	1	0	STOP
E0.01	Terminal X1	0 ~ 28	1	0	STOP
E0.02	Terminal X2		1	0	STOP
E0.03	Terminal X3		1	0	STOP
E0.04	Terminal X4		1	0	STOP
E0.05	Terminal X5		1	0	STOP
E1.00	OUT1 output	0 ~ 18	1	1	STOP
E1.02	Relay output		1	1	STOP
E1.30	FM1 analog output selection	0: Running frequency 1: Set frequency 2: Output current 3: Reserved 4: Output voltage 5: Output power 6: Analog input voltage 7: Analog input current	1	0	RUN/ STOP
E1.31	FM1 channel mode	0: 0 ~ 10 V; 1: 2 ~ 10 V	1	0	RUN/ STOP
E1.32	FM1 gain setting	0.00 ~ 10.00	0.01	1.00	RUN/ STOP

Setting range of E0.01 ~ E0.05 is as below:

0: No action (multiple choices allowed)
1: Multi-speed control terminal 1
2: Multi-speed control terminal 2
3: Multi-speed control terminal 3
4: Reserved
5: Acceleration/deceleration time terminal 1
6: Acceleration/deceleration time terminal 2
7: 3-wire running control
8: Freewheeling to stop enabled
9: Frequency increment UP command
10: Frequency decrement DOWN command

11: Zeroing of external terminal frequency setting
12: Reserved
13: Stopping DC braking enabled
14: Reserved
15: Simple PLC prohibited
16: Simple PLC paused
17: Reserved
18: Second frequency command source enabled
19: External fault N.O. contact input
20: External fault N.C. contact input
21: External RESET input
22: Second run command source enable
23: Forward (FWD)
24: Reverse (REV)
25: Forward jog
26: Reverse jog
27: Counting input
28: Counting clear

Fault message and diagnosis

Code	Name	Setting range	Min. unit	Default	Attri.
E4.20	Last fault type	0 ~ 51	1	0	read only
E4.21	Second last fault type		1	0	read only
E4.22	Third last fault type		1	0	read only
E4.30	Output frequency at latest fault	0.00 Hz ~ [b1.05]	0.01 Hz	0.00 Hz	read only
E4.31	Setting frequency at latest fault	0.00 Hz ~ [b1.05]	0.01 Hz	0.00 Hz	read only
E4.32	Output current at latest fault	0.0 ~ 1000.0 A	0.1 A	0.0 A	read only
E4.33	Output voltage at latest fault	0 ~ 1,000 V	1 V	0 V	read only
E4.34	DC bus voltage at latest fault	0 ~ 1,000 V	1 V	0 V	read only
E4.35	Module temperature at latest fault	–	1	0	read only
b0.05	Parameter initialization	0: No action 1: Restore factory default 2: Remove error record Note: The value is automatically set to be 0 after the operation.	1	0	STOP

Setting range of E4.20 ~ E4.22 is as below:

- 0: No error
- 1: OC-1, overcurrent happens at constant speed
- 2: OC-2, overcurrent happens during acceleration
- 3: OC-3, overcurrent happens during deceleration
- 4: OE-1, overvoltage happens at constant speed
- 5: OE-2, overvoltage happens during acceleration
- 6: OE-3, overvoltage happens during deceleration
- 7: OL-1, frequency converter overload
- 8: OL-2, motor overload
- 9: EEP-, read/write EEP error, when read and write EEP/flash, error happens
- 10: SPI-, internal communication error
- 11: E-St, external fault
- 12: RS-, external communication error
- 13: CF, circuit fault, when there is something wrong with current detection

- 14: Reserved
- 15: Ot, motor over temperature
- 16: CPUd, CPU is disturbed by external signal and program run to illegal address
- 17: SC, short circuit of IGBT happens; 18: Reserved
- 19: IPH.L, input phase loss; 20: OPH.L, output phase loss
- 21: OH, frequency converter over temperature; 22: Reserved
- 23: CPUC, I/O board trap error
- 24: CPUE, operating panel trap error
- 25: CE3-, SPI problem between operating panel board and I/O board
- 26: CE4-, internal problem on operating panel
- 27: FFE-, firmware does not match
- 28: PSr-, problem with power supply on the main board
- 31: ESS-, soft start error
- 32: CE5-, internal problem on main board
- 33: UE-1, undervoltage during run
- 34: UH, frequency converter under temperature
- 35: FHE-, manufacturer parameter defect or dismatch to hardware
- 36: CE7-, 15 V power supply error
- 37: dir1, rotation direction error 1
- 38: dir2, rotation direction error 2
- 39: CE8-, communication problem on I/O board (No communication frames received from I/O board)
- 40: CE0-, communication problem on main board (The communication frames received from main board are checksum erroneous)
- 41: CE1-, communication problem on operating panel (The communication frames received from removable panel are checksum erroneous)
- 42: CE2-, communication problem on main board (There is no communication data from main board received in general)
- 43: CE6-, communication problem on removable board (There is no communication data from removable received in general)
- 44: CE9-, firmware version error
- 45: EEPr, EEPROM error on operating panel
- 47: OE-4, overvoltage during stop
- 50: t-Er, motor parameter identification error
- 51: SEr-, service data handling error (the main board does not receive the answer after the retry limit)

4 Fault Indication

Error code	Error name	Possible reason	Solution
OC-1	over current at constant speed	Sudden change in run mode	Reduce occurrence and scale of sudden change
		Low mains voltage	Check the input power supply
		Motor power and frequency converter power do not match	Motor power has to match with frequency converter power
		Too large inertia or load	Check motor power, converter power, load
		The motor cable is too long	• Decrease the carrier frequency • Select a frequency converter of larger power
		Excessive torque compensation	• Check the amount of voltage boost • Reduce the amount of voltage boost until the current decreases
OC-2	overcurrent during acceleration	The acceleration time is too short	Increase the acceleration time
		Too large start frequency	Reduce the start frequency
		Too large load rotation inertia, too large impact load	Increase the acceleration time, reduce sudden load change
		Running command applied while motor is coasting	Restart after motor stop, or start with tracing speed ([b1.30]=2)
		Improper V/F curve setting	Adjust V/F curve
		Motor power and frequency converter power do not match	Motor power has to match with frequency converter power
		Excessive torque compensation	• Check the amount of voltage boost • Reduce the amount of voltage boost until the current decreases
		Improper motor parameter setting	Set correct motor parameters
OC-3	overcurrent during deceleration	The deceleration time is too short	Increase the deceleration time
		Too large load rotation inertia	Use suitable brake component
		Motor power and frequency converter power do not match	Motor power has to match with frequency converter power
		Over excitation	Reduce [b1.45]
		Improper motor parameter setting	Set correct motor parameters

Error code	Error name	Possible reason	Solution
OE-1	overvoltage at constant speed	Surge voltage from power supply	Check the input power supply
		Motor to earth short circuit causes DC bus capacitors overcharged	Check the motor connection
		Too large load rotation inertia	Use suitable brake component
		Noise interference	Check the wiring of control circuit, main circuit and grounding
OE-2	overvoltage during acceleration	Surge voltage from power supply	Check the input power supply
		Motor to earth short circuit causes DC bus capacitors overcharged	Check the motor connection
		Direct start during motor running	Restart after motor stop, or start with tracing speed (b1.30)
		Too short acceleration time	Increase the acceleration time (b1.20) or use S-curve (b1.22~b1.24)
OE-3	overvoltage during deceleration	Surge voltage from power supply	Check the input power supply
		Motor to earth short circuit causes DC bus capacitors overcharged	Check the motor connection
		Too large load rotation inertia	Use suitable brake component
		Too short deceleration time	• Increase the deceleration time (b1.21) • Use a brake resistor or a dynamic brake resistor unit • Enable stall overvoltage prevention during deceleration ([E4.01]=1)
		Incorrect wiring of brake resistor	Check the wiring
		The brake chopper is damaged	Contact with service

Error code	Error name	Possible reason	Solution
OL-1	frequency converter overload	Long time over load	Reduce over load time, reduce load
		Too large proportion of V/F curve	Adjust V/F proportion and torque increase settings
		Motor power and frequency converter power do not match	Motor power has to match with frequency converter power
		Overload happens in case of lower speed	• Reduce the load in case of lower speed • Lower the carrier frequency (b0.21) • Increase the frequency converter capacity
		Too large load, too short acceleration/deceleration time or cycle	• Adjust the load, acceleration/deceleration time or cycle • Increase the frequency converter capacity
		Low mains voltage	Check the input power supply
		Too much torque boost setting	Decrease the value of S0.21
OL-2	motor overload	Motor locked	Prevent motor lock
		Normal motor runs long time with large load at low speed	• Increase frequency converter output frequency (b1.04 or potentiometer) • Reduce load • Use variable frequency motor or set zero speed load (E4.05) to a higher value • Set correct thermal motor time constant (S2.23)
		Low mains voltage	Check the input power supply
		Too large proportion of V/F curve	Adjust V/F proportion and torque increases
		Too large sudden load change	Check load
		Wrong input of motor rated current	Set correct motor rated current to S2.04
		Multiple motors are running under same frequency converter	Do not connect more than one motor to the frequency converter
		Over excitation	Reduce [b1.45]
		Wrong motor overload curve at low speed	Set parameters S2.23, E4.04 and E4.05 correctly according to motor actual situations

Error code	Error name	Possible reason	Solution
EEP-	flash read/ write error	Flash memory in a bad condition	Try to backup the data from the operating panel, and then contact with service
SPI-	SPI communication problem	EMC problem on the main board	Check the wiring of control circuit, main circuit and grounding to find out the source of interference
		Internal error on I/O board	Remove the EMC problem, if it happens again, contact with service
E-St	external fault	External fault caused by input signals via external terminals	Check external terminal status, check respective reason to fault
		Wrong wiring/ setting of multi-function external terminals	Ensure the right external signals have been connected correctly to the right multi-function external terminals which are assigned for external fault input ([E0.01]~[E0.05]=19, 20)
		Converter stop caused by E-Stop active command via ModBus communication	Check the stop command via ModBus communication (0X0088: stop according to parameter setting; 0X0090: E-stop active).If converter receives 0X0090 , E-St will be displayed
RS-	external communication error	Device connection problem	Check device communication connection
		Improper baud rate setting	Set proper baud rate
CF	circuit fault (from current detection)	The offset is out of range due to EMC or defect of current detection	Remove the EMC problem; if it happens again, contact with service
Ot	motor over temperature	Motor over heat	• Provide a better cooling condition • Check the load
		Temperature sensor defect	Replace the motor
		Improper protection level	Different motor with different maximum temperature, configure the external division circuit and choose protection level (S2.22)
CPUd	main board CPU trap error	CPU is disturbed by external noise and program run to illegal address	Check the wiring of control circuit, main circuit and grounding to find out the source of interference
		Improper parameters setting	Set [b0.05] = 1 for parameters initialization

Error code	Error name	Possible reason	Solution
SC	short circuit of IGBT	External short circuit of motor phase-phase	Check the motor
		Earth surge	Remove the short circuit and check the motor
		Internal fault of IGBT	Contact with service
IPH.L	input phase loss (for 3p frequency converter)	Abnormal, omitted or broken connection of frequency converter power supply	Follow operating procedures to check power supply connections, remove omitted or broken connection
		Broken fuse	Check fuse
		Imbalance in the three phases of input power supply	Check if the imbalance situation exceeds requirements
		Main circuit capacitor deterioration	Contact with service
OPH.L	output phase loss	Abnormal, omitted or broken connection of frequency converter outputs	Check the connections of frequency converter outputs, remove omitted or broken connections
		Imbalance in the three phases of outputs	Check the motor
OH	frequency converter over temperature	Frequency converter (heat sink) temperature is higher than max. allowable temperature 85°C	• Reduce ambient temperature, improve ventilation and heat dissipation; clear dust, cotton wadding in air ducts; check fan and its power supply connection (if available) • Reduce the load if it is too heavy • Reduce the carrier frequency (b0.21)
		Temperature detection circuit fault	Contact with service
CPUC	I/O board trap error	Fatal error with CPU on I/O board	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • If it happens again, contact with service
CPUE	operating panel trap error	Fatal error with CPU on operating panel	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • If it happens again, contact with service

Error code	Error name	Possible reason	Solution
CE3-	SPI problem between operating panel board and I/O board	Problem with operating panel	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • If it happens again, replace the operating panel or contact with service
CE4-	internal problem on operating panel	Problem with operating panel	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • If it happens again, replace the operating panel or contact with service
FFE-	firmware does not match	Operating panel may be placed to the frequency converter with older/newer firmware	Contact with service
		I/O board may be removed to another device	Contact with service
PSr-	problem with power supply on the main board	10 V overload on I/O board	Remove the overload
		EMC problems at customer I/O interface	Remove the environmental interference or EMI
		Internal problem	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • Contact with service
EEPr	EEPROM error on operating panel	Power failure while write / read	Parameter initialization
		Error happens at normal power on, means problem with operating panel	Replace the operating panel
		Panel firmware version does not match with that of the main board	Contact with service
ESS-	soft start error	Soft start resistor value has been changed due to over temperature	Contact with service
		Mains input is unstable	Check the input power supply
		Mains input is weak	Increase the power capacity
		Input phase loss occurs during start up (3 phase)	Remove the input phase loss
		Main circuit capacitor deterioration	Contact with service

Error code	Error name	Possible reason	Solution
CE5-	internal problem on main board	Problem with CPU on main board	• Check the wiring • If it fails again, contact with service
UE-1	undervoltage during run	Power failure during running	Check the input power supply
		Main circuit capacitor deterioration	Contact with service
UH	frequency converter under temperature	Ambient temperature is lower than -15°C	• Check the surrounding temperature of the frequency converter • Provide a reasonable ambient temperature that frequency converter requires
		Defect of temperature sensor	Contact with service
FHE-	manufacturer parameter defect or unmatches with hardware	Parameter corruption	Contact with service
CE7-	15 V power supply error	Internal circuit failure	Contact with service
		EMC problem	Remove the environmental interference or EMI
dir1	rotation direction error 1	Parameter [b1.10], direction control=1, forward only. Direction command is reverse	Set the parameter correctly
dir2	Rotation direction error 2	Parameter [b1.10], direction control=2, reverse only. Direction command is forward	Set the parameter correctly

Error code	Error name	Possible reason	Solution
CE8-	communication problem on I/O board (No communication frames received)	EMC problem	Remove the environmental interference or EMI
		Defect on I/O board	Replace the I/O board or drive
CE0-	communication problem on main board (The communication frames are checksum erroneous)	EMC problem	Remove the environmental interference or EMI
		Defect on main board	Replace the frequency converter
CE1-	communication problem on operating panel (The communication frames are checksum erroneous)	EMC problem	Remove the environmental interference or EMI
		Defect on operating panel	Replace the operating panel or frequency converter
CE2-	communication problem on main board (No communication data from main board received)	EMC problem	Remove the environmental interference or EMI
		Defect on main board	Replace the frequency converter

Error code	Error name	Possible reason	Solution
CE6-	communication problem on operating panel (No communication data from operating panel received)	EMC problem	Remove the environmental interference or EMI
		Defect on operating panel	Replace the operating panel or frequency converter
CE9-	firmware version error	Firmware version of I/O board does not match with others in the system	Contact with service
OE-4	overvoltage during stop	Power supply voltage is too high	Check the input power supply
		Surge voltage from the power supply	Check the input power supply
		Noise interference	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • Too much inertia on the load
t-Er	motor parameter identification error	Motor power and frequency converter power do not match	Motor power has to match with frequency converter power
		Improper setting of motor parameters	Set parameters according to motor nameplate
		No connection of converter and motor	Check motor cable connections
SEr-	service data handling error (the main board does not receive the answer after the retry limit)	EMC problem	Remove the environmental interference or EMI
		Problem with operating panel	• Check the wiring of control circuit, main circuit and grounding to find out the source of interference • If remote cable is be used, please use shielded cable • If it happens again, replace the operating panel or the frequency converter

Tab. 4-1: Error description and solution

Notes

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