

Rexroth Frequency Converter Fv

R912004885
Edition 03

Instruction Manual (Quick Start)



Record of Revision

Edition	Release Date	Notes
DOK-RCON02-FV*****-IN02-EN-P	2014.02	First release
DOK-RCON02-FV*****-IN03-EN-P	2014.07	Added encoder adapter information

About this Documentation

This **Instruction Manual (Quick Start)** is derived from the **Instruction Manual** 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 chapter in the **Instruction Manual**.

Reference

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

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Table of Contents

	Page
1 Mechanical Installation.....	1
1.1 Visual Check.....	1
1.2 Ambient Conditions.....	1
1.3 Installation Conditions.....	2
1.4 Dimensions.....	3
2 Electric Installation.....	7
2.1 Cable Specifications.....	7
2.2 Power Terminals.....	12
2.3 Interface Connection for Signals.....	13
3 Parameter Settings.....	22
3.1 Operating Panel.....	22
3.2 Start-up.....	22
3.3 Operating Descriptions.....	24
3.4 Parameters.....	25
4 Error Indication.....	31

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 a 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.

Rated ambient temperature	-10...40 °C (No derating)
Derating / ambient temperature	Derating ^① (40...50 °C)
Rated altitude	≤ 1,000 m (No derating)
Derating / ambient temperature	1 % / 100 m (1,000...4,000 m)
Relative humidity	≤ 90 %
Degrees of protection	IP 20 (Control cabinet mounting)

① : Refer to "9.3: Derating of Electrical Data" in the Instruction Manual.

Tab. 1-1: Ambient conditions

1.3 Installation Conditions

Depending on rating, the frequency converters are available in different sizes. In order not to affect device cooling, the frequency converter must always be installed upright. For perfect heat dissipation, the minimum installation spacing above and below the devices shown in the drawing must be observed.

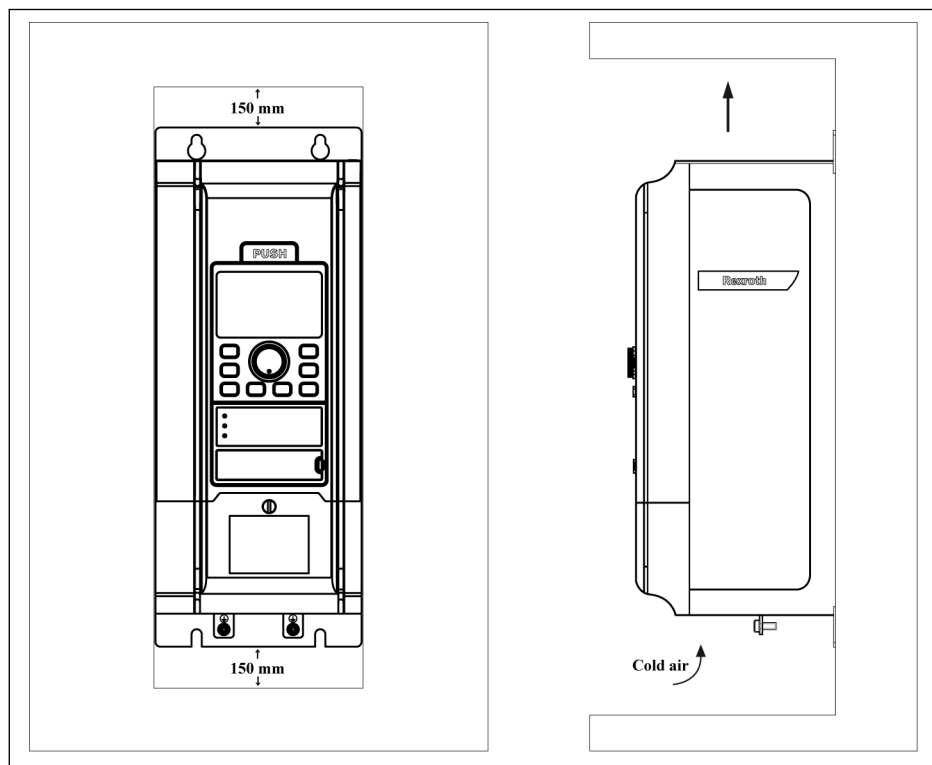


Fig. 1-1: Installation conditions



- The frequency converter shown above is Frame 1. The minimum installation spacing stated applies to Frame 1 to Frame 7.
- Frequency Converter Fv has no side ventilation hole, which enables parallel mounting of Fv with zero distance.
- 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 "Mechanical Installation" on page 1](#)). A baffle plate is recommended between the frequency converters to prevent the rising hot air being drawn into the upper converter if the upper limit of air temperature is exceeded.

1.4 Dimensions

Frame	Fv model	Dimensions [mm]										Screw size	Net weight [kg]
		B	b	T	t	H	h	h1	d	D	L1		
1	OK40	125	75	122	1.5	275	300	315	5.5	127	5.5	M5	2.7
	OK75												
	1K50												2.8
	2K20												
2	4K00	150	100	157	1.5	330	365	380	6.5	162	6.5	M6	4.8
	5K50												4.9
	7K50												
3	11K0	175	100	199	2	398	432	448	6.5	204	6.5	M6	8.8
	15K0												9.0
4	18K5 22K0	225	125	227	3.5	440	482	500	9	232	9	M8	16.5
5	30K0 37K0	250	150	251.5	3.5	525	567	585	9	256.5	9	M8	22.0
6	45K0	325	200	265	3.5	650	690	712.5	9	270	9	M8	37.0
	55K0												39.0
7	75K0	450	300	302.5	4	700	754	779	11	307	11	M10	56.7
	90K0												58.0

Tab. 1-2: Dimensions

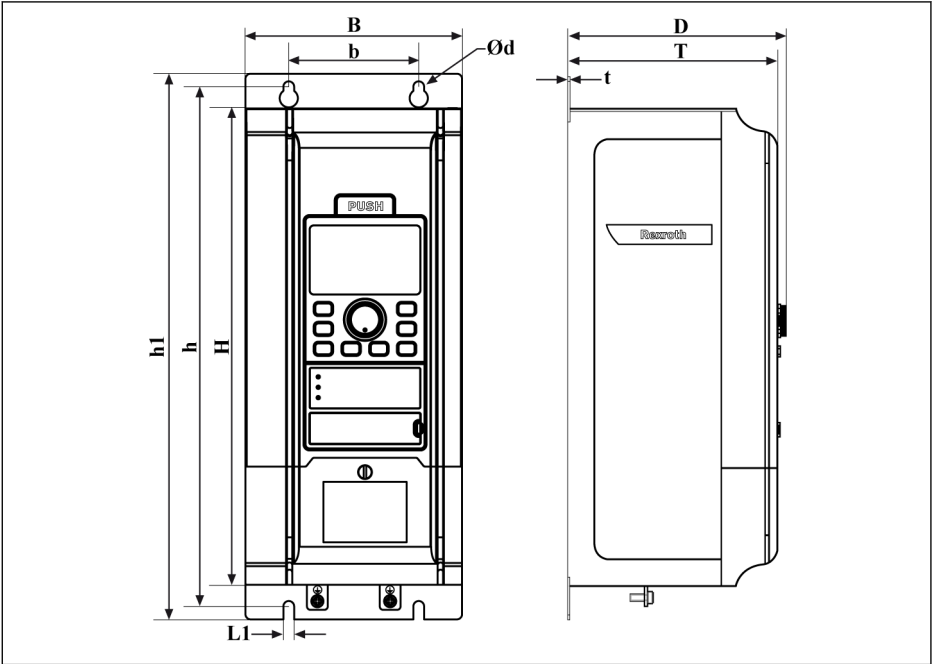


Fig. 1-2: Frame 1, 2, 3

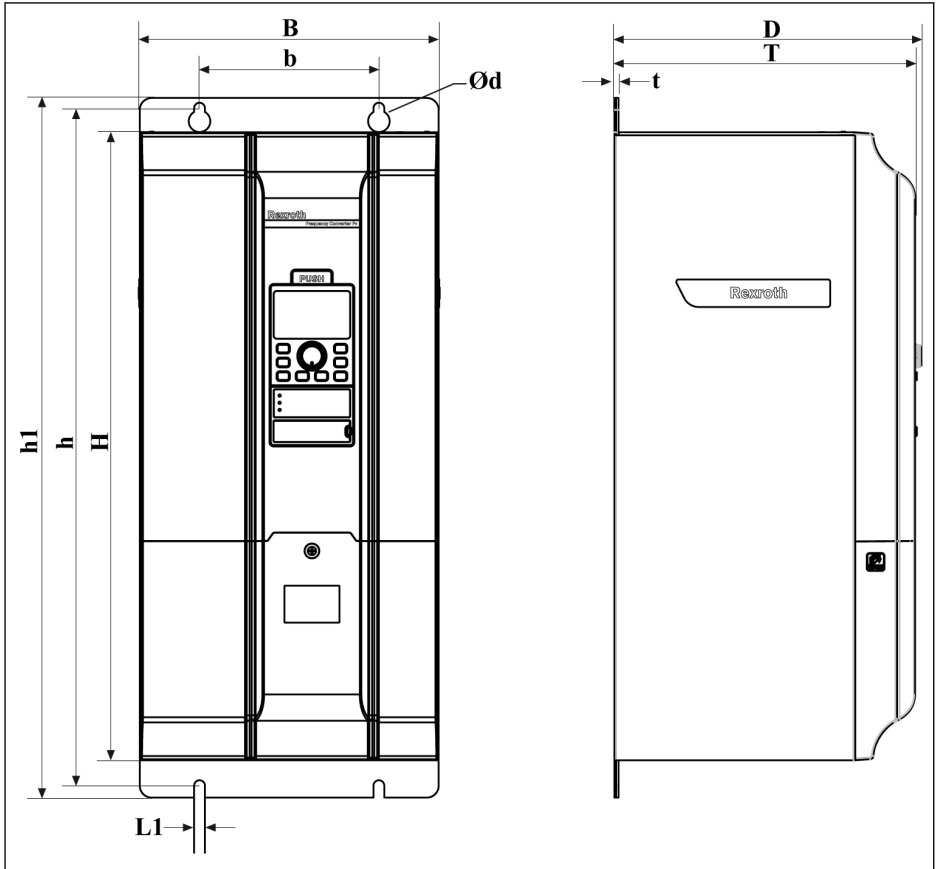


Fig. 1-3: Frame 4, 5

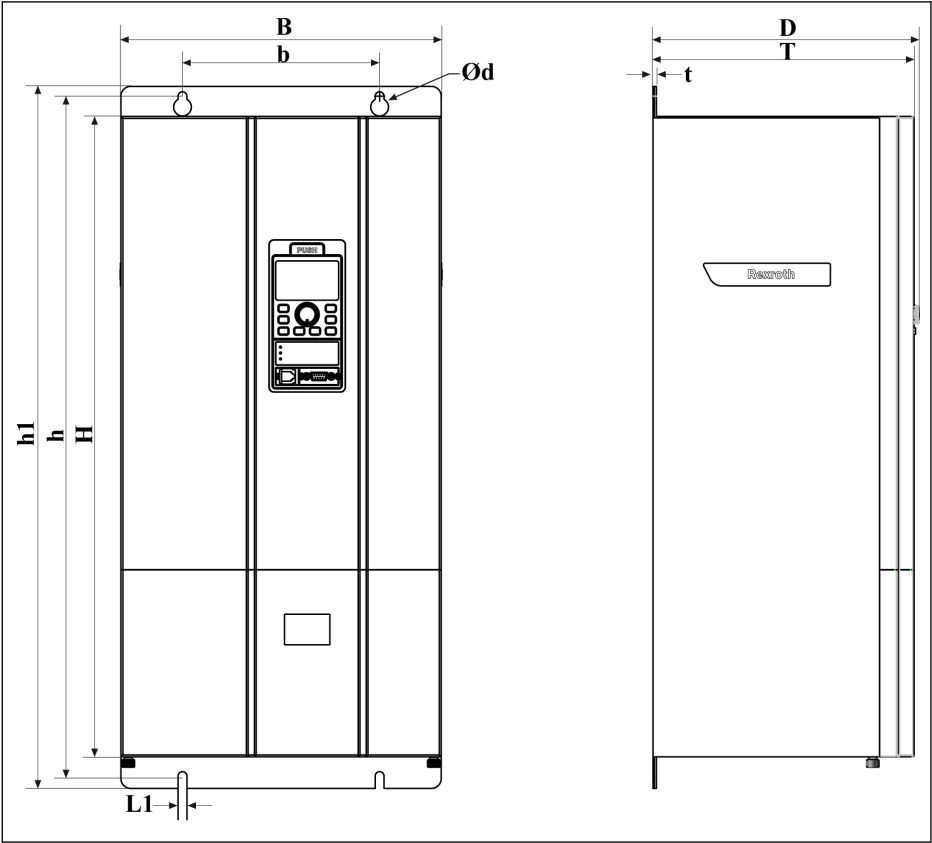


Fig. 1-4: Frame 6, 7

2 Electric Installation

2.1 Cable Specifications

2.1.1 Connecting to the Mains

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.

Fv Model	Input Side			
	International without USA / Canada			
	Nominal current of fuse in [A]	Installation mode B1	Installation mode B2	Installation mode E
		Cable size in [mm ²]	Cable size in [mm ²]	Cable size in [mm ²]
0K40	6	1.5	0.75	0.75
0K75	10	1.5	1	1
1K50	10	1.5	1	1
2K20	16	1.5	1	1
4K00	20	1.5	1.5	1.5
5K50	25	2.5	2.5	2.5
7K50	25	4	4	2.5
11K0	40	6	6	6
15K0	50	10	10	10
18K5	63	16	16	10
22K0	80	16	16	10
30K0	100	25	25	25
37K0	125	35	35	25
45K0	160	50	50	35
55K0	200	50	70 / 2*35	50
75K0	250	95 / 2*50	120 / 2*50	70 / 2*35
90K0	315	120 / 2*50	150 / 2*70	95 / 2*50

Tab. 2-1: Recommended cable dimensions_input side_international without USA/Canada



1. Input Side and Output Side: The dimensioning is based on the supply voltage of 3P 380 VAC.
2. For screw torque information, please refer to the following tables.

Fv Model	Input Side				
	USA / Canada				
	Nominal current of fuse in [A]	Cable size in [AWG]	Screw torque for power cable terminals in [Nm / lb-in] (screw size)	Input PE ^②	
				Cable size in [mm²/AWG]	Torque in [Nm / lb-in] (screw size)
0K40	6	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
0K75	6	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
1K50	10	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
2K20	16	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
4K00	25	AWG12	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
5K50	40	AWG10	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
7K50	40	AWG10	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
11K0	70	AWG8	2.7 / 24 (M5)	10 / 8	2.0 / 18 (M5)
15K0	80	AWG6	2.7 / 24 (M5)	10 / 6	2.0 / 18 (M5)
18K5	80	AWG6	2.5/22 (M6)	10 / 6	2.5/22 (M6)
22K0	80	AWG6 ^①	2.5/22 (M6)	10 / 6	2.5/22 (M6)
30K0	100	2*AWG6	2.5/22 (M6)	16 / 6	2.5/22 (M6)
37K0	125	2*AWG6	2.5/22 (M6)	25 / 4	2.5/22 (M6)
45K0	150	AWG1	8/71 (M8)	35 / 1	8/71 (M8)
55K0	175	AWG1/0	8/71 (M8)	50 / 1/0	8/71 (M8)
75K0	225	AWG3/0 / 2*AWG1	15...20 / 133...177 (M10)	70/2*35 / 2/0 / 2*1	15...20 / 133...177 (M10)
90K0	300	250 kcmil / 2*AWG1/0	15...20 / 133...177 (M10)	95/2*50 / 3/0 / 2*1/0	115...20 / 133...177 (M10)

Tab. 2-2: Recommended cable dimensions_input side_USA/Canada



①: For 22K0 (22 kW) frequency converters, only the copper 75 °C and above AWG6 cable can be used.

②: The cables connecting to PE terminal should assemble the UL certified wire connector which has suitable rating for wire gauge!

2.1.2 Connecting to the Motor

Fv Model	Output Side				
	International without USA/Canada	USA/Canada			
	Cable size in mm ²	Cable size in AWG	Screw torque for power cable terminals in [Nm / lb-in] (screw size)	Output PE ^③	
				Cable size in [mm ² /AWG]	Torque in [Nm / lb-in] (screw size)
0K40	0.75 ^①	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
0K75	1 ^①	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
1K50	1 ^①	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
2K20	1 ^①	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
4K00	1 ^①	AWG14	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
5K50	1 ^①	AWG12	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
7K50	2.5 ^①	AWG10	1.7 / 15 (M4)	6 / 8	1.7 / 15 (M4)
11K0	6 ^①	AWG8	2.7 / 24 (M5)	10 / 8	2.0 / 18 (M5)
15K0	6 ^①	AWG8	2.7 / 24 (M5)	10 / 6	2.0 / 18 (M5)
18K5	10 ^①	AWG6	2.5 / 22 (M6)	10 / 6	2.5/22 (M6)
22K0	10 ^①	AWG6	2.5 / 22 (M6)	10 / 6	2.5/22 (M6)
30K0	16 ^①	2*AWG6	2.5 / 22 (M6)	16 / 6	2.5/22 (M6)
37K0	25 ^①	2*AWG6	2.5 / 22 (M6)	25 / 2x6	2.5/22 (M6)
45K0	35 ^②	AWG1	8 / 71 (M8)	35 / 1	8/71 (M8)
55K0	35 ^②	AWG1/0	8 / 71 (M8)	50 / 1/0	8/71 (M8)
75K0	70 / 2*35 ^②	AWG3/0 / 2*AWG1	15...20 / 133...177 (M10)	70/2*35 / 2/0 / 2*1	15...20 / 133...177 (M10)
90K0	95 / 2*50 ^②	250 kcmil / 2*AWG1/0	15...20 / 133...177 (M10)	95/2*50 / 3/0 / 2*1/0	115...20 / 133...177 (M10)

Tab. 2-3: Recommended cable dimensions_output side



①: Installation Mode E

②: Installation Mode B2

③: The cables connecting to PE terminal should assemble the UL certified wire connector which has suitable rating for wire gauge!

2.1.3 Signal Connection

The following requirements apply for the signal connection wiring:

- flexible cables with wire end sleeves
- cable cross-section: 0.3...0.75 mm²
- cable length: max. 20 m
- analog inputs ± 10 V, VR1, VR2, VR3, +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.

2.1.4 Overview of Electric Connections

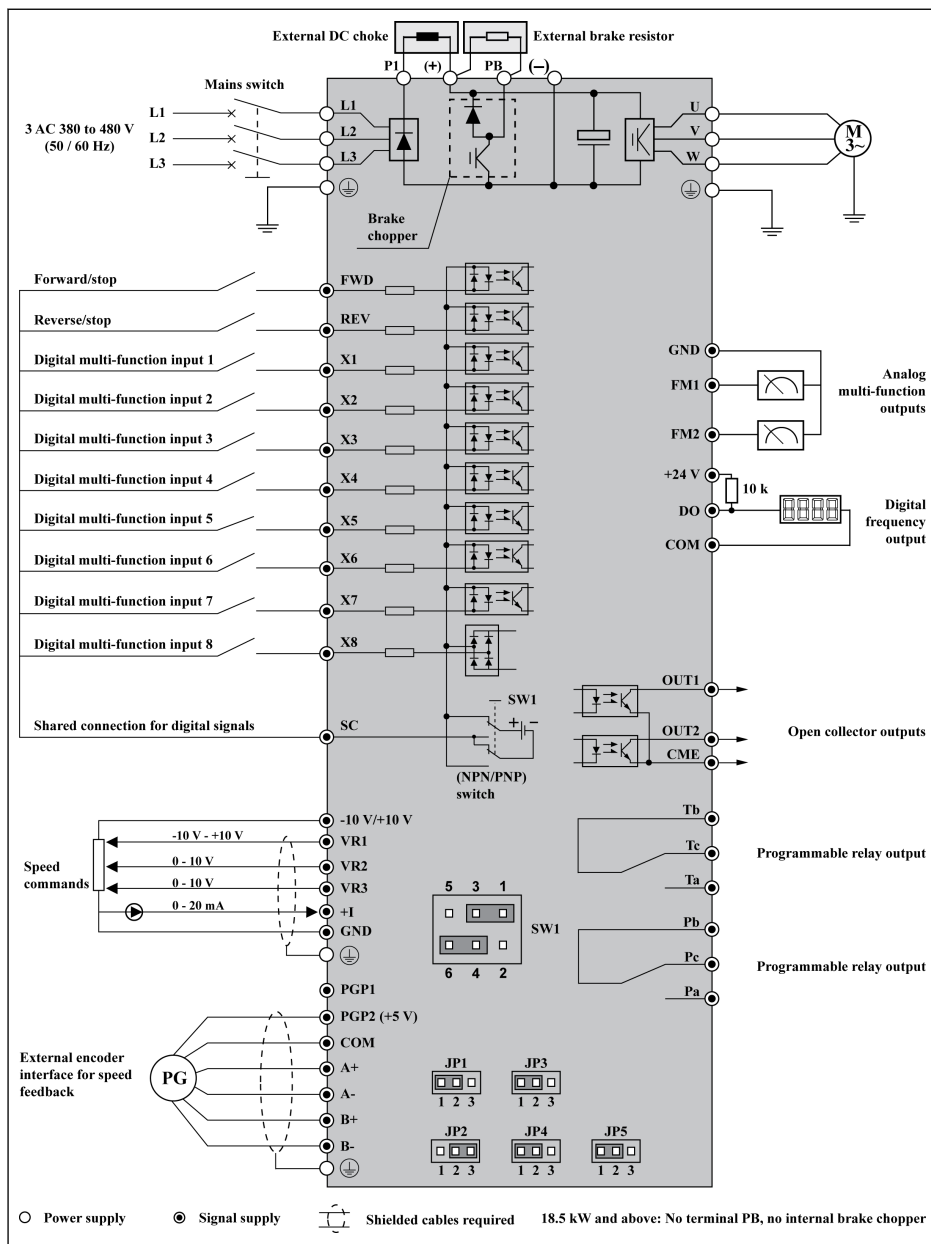


Fig. 2-1: Circuit diagram

2.2 Power Terminals

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

Terminal	Description
L1, L2, L3	Mains supply input terminals
U, V, W	Frequency converter output terminals
PB	External brake resistor terminal (Only applicable to 0K40...15K0 models)
P1, (+)	DC choke input or DC positive bus output terminal
(-)	DC negative bus output terminal
	Grounding terminal

Tab. 2-4: Power terminals description

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

0K40...15K0

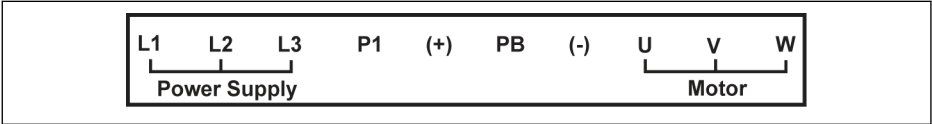


Fig. 2-2: Frame 1, 2, 3

18K5...90K0

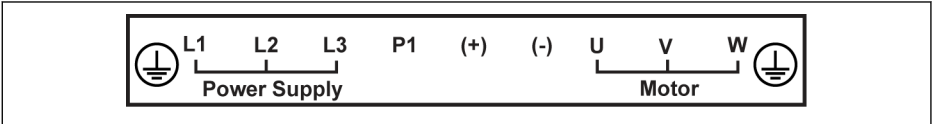


Fig. 2-3: Frame 4, 5, 6, 7

2.3 Interface Connection for Signals

2.3.1 Jumper Wiring

JP1		(Programming jumper, can not be modified by users)
JP2		(Programming jumper, can not be modified by users)
JP3		1-2 short, external voltmeter at FM1 side 2-3 short, external ammeter at FM1 side
JP4		1-2 short, external voltmeter at FM2 side 2-3 short, external ammeter at FM2 side

Fig. 2-4: Jumper description



Shown are factory defaults.

2.3.2 NPN/PNP Jumper SW1

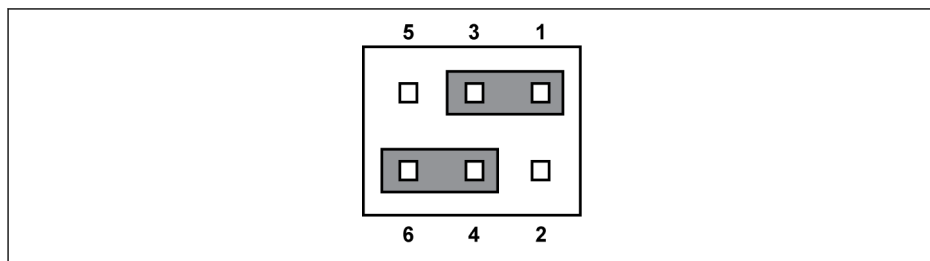


Fig. 2-5: NPN/PNP jumper SW1



The factory default for the jumper is NPN (Jumper contact at 1-3, 4-6).

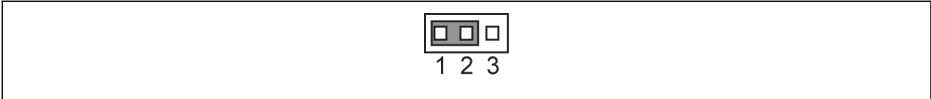
The jumper SW1 determines:

1. The internal 24 V power supply or an external 24 V power supply is used for the inputs.
2. The inputs are activated by connection of 24 V to an input (PNP / active input) or connection of 0 V to an input (NPN / passive input).

Modes and signal inputs:

The jumper SW1 can switch between 0 V (NPN / passive input) and +24 V (PNP / active input) inputs, respective external +24 V power supply is also available, which improves the flexibility of signal input mode.

2.3.3 Encoder Signal Selection



Default position: 1-2

Fig. 2-6: Encoder signal selection jumper JP5

Encoder input signals are set by jumper JP5:

Position 1-2: 5 V encoder power supply is provided by PGP2.

Position 2-3: 12 V encoder power supply is provided by PGP2.

Encoder power supply		Encoder signal	Fv terminal wiring		Refer- ence
Supply op- tion	Voltage		Encodersignal wire	Other connection	
Internal	PGP1 (+24 V)	A, B	A-, B-	Connect encoder adapter between Fv terminals and encod- er signals	Wiring 1
		A+, A-, B+, B-	A+, A-, B+, B-		Wiring 2
	PGP2 (+12 V)	A, B	A-, B-		Wiring 3
		A+, A-, B+, B-	A+, A-, B+, B-		Wiring 4
	PGP2 (+5 V)	A, B	A-, B-	Connect A+, B+ to PGP2	Wiring 5
		A+, A-, B+, B-	A+, A-, B+, B-	-	Wiring 6
External	+24 V	A, B	A-, B-	Connect encoder adapter between Fv terminals and encod- er signals	Wiring 7
		A+, A-, B+, B-	A+, A-, B+, B-		Wiring 8
	+12 V	A, B	A-, B-		Wiring 9
		A+, A-, B+, B-	A+, A-, B+, B-		Wiring 10
	+5 V	A, B	A-, B-	Connect A+, B+ to external supply	Wiring 11
		A+, A-, B+, B-	A+, A-, B+, B-	-	Wiring 12

Tab. 2-5: Encoder wiring description

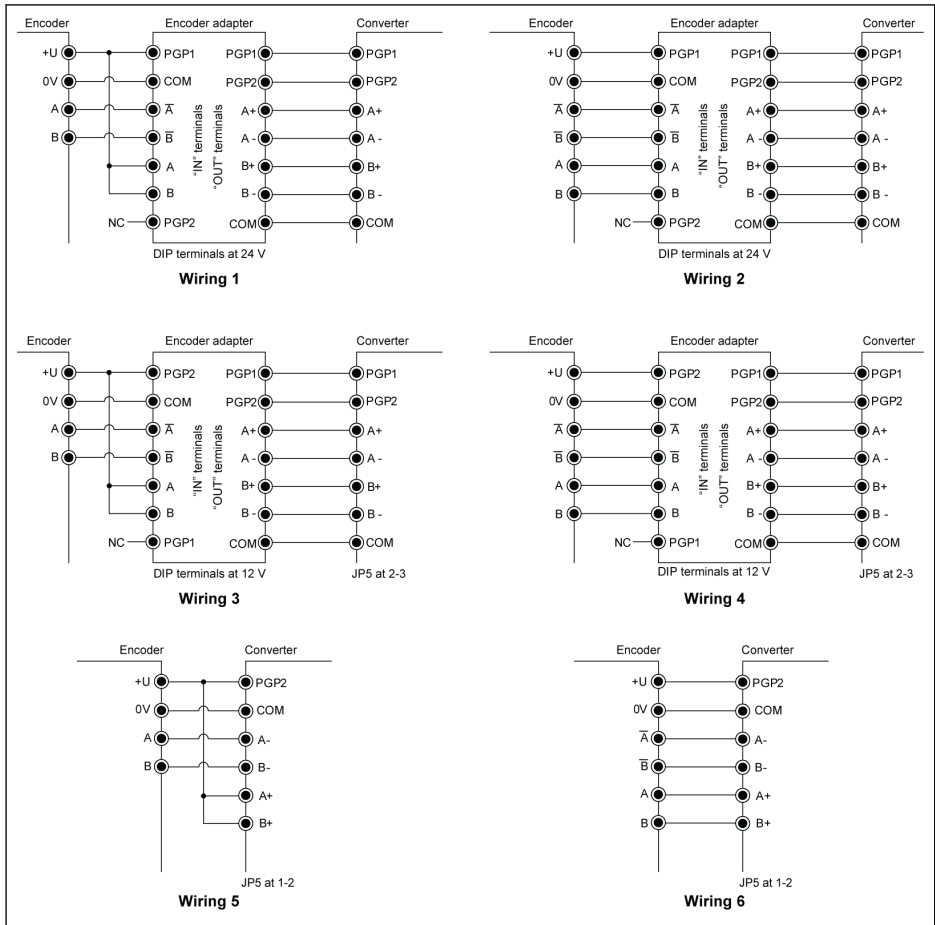


Fig. 2-7: Encoder wiring 1...6

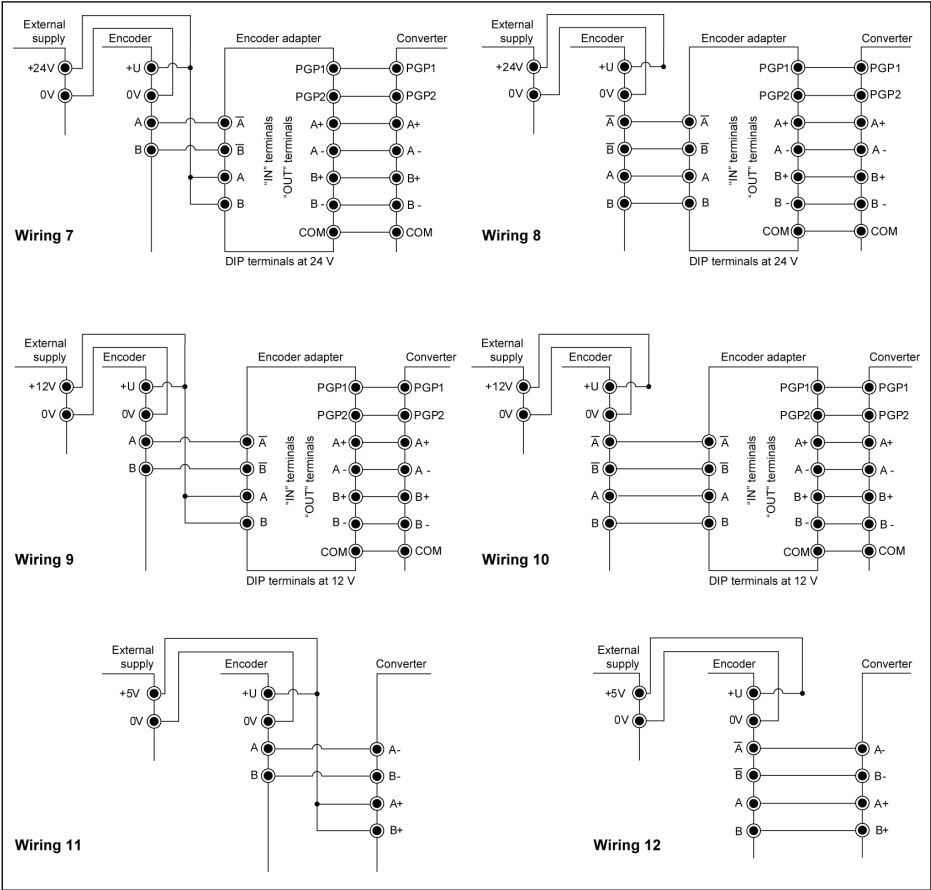


Fig. 2-8: Encoder wiring 7...12

2.3.4 Encoder Adapter

The Function of Encoder Adapter

The encoder adapter is used to improve the precision of speed sampling when +12 V or +24 V supply voltage is used for the encoder, no matter internal or external supply.

Encoder Adapter Dimensions

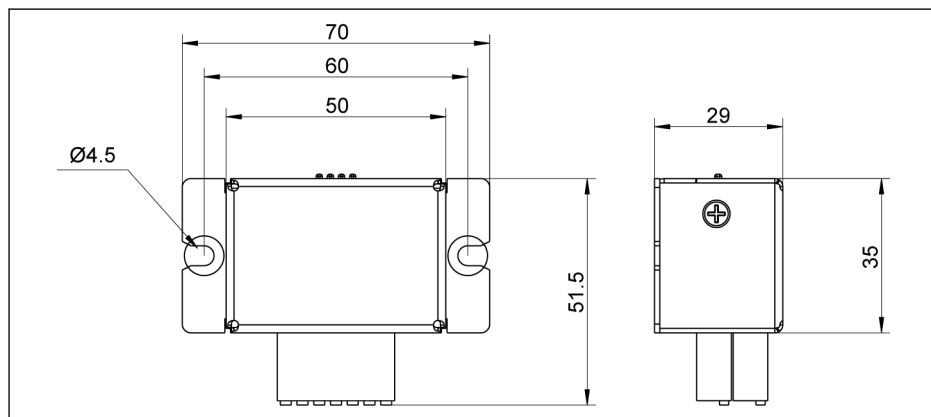


Fig. 2-9: Encoder adapter dimensions

Encoder Adapter Terminals

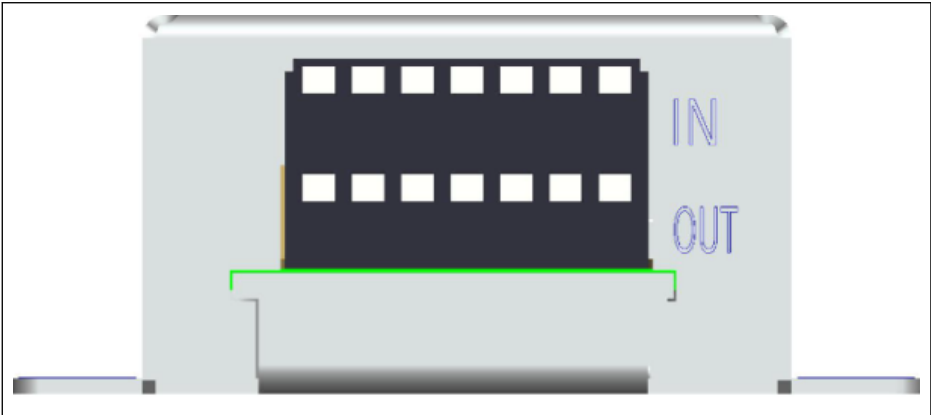
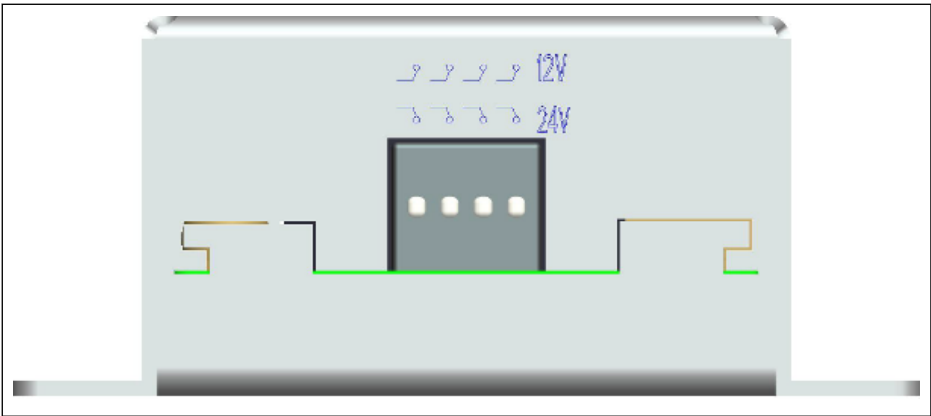


Fig. 2-10: Encoder adapter IN and OUT terminals

IN (Used to connect with motor encoder signals)						
PGP2	A	$\bar{A}$	COM	B	$\bar{B}$	PGP1
OUT (Used to connect with CPU board of the frequency converter)						
PGP2	A+	A-	COM	B+	B-	PGP1

Tab. 2-6: Encoder adapter IN and OUT terminals description



Switches down (by default) Supports 24 V power supply, corresponding to PGP1-COM
Switches up Supports 12 V power supply, corresponding to PGP2-COM

Fig. 2-11: Encoder adapter DIP terminals

2.3.5 Control circuit terminals (Description/function)

Control circuit terminals figure

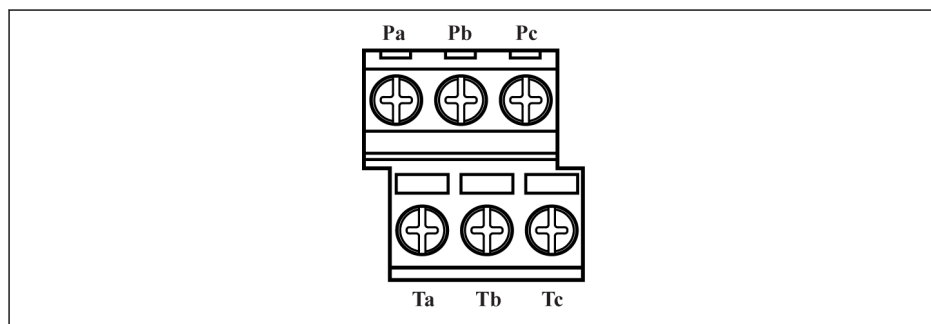


Fig. 2-12: Control circuit terminals_1

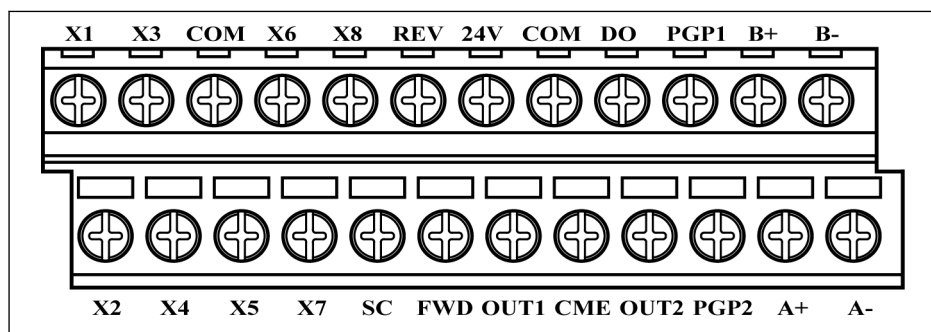


Fig. 2-13: Control circuit terminals_2

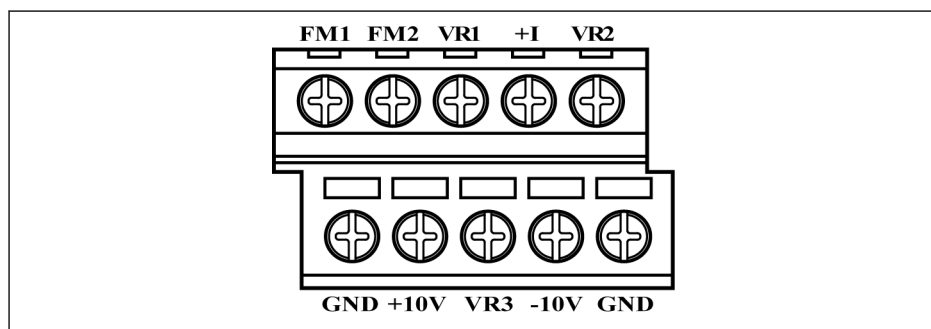


Fig. 2-14: Control circuit terminals_3

Control circuit terminals description

Terminal	Signal function	Description	Signal requirement
Digital inputs			
FWD	Forward/Stop	See parameters	24 VDC 8 mA inputs via opto-electric couplers Depends on the position of NPN/PNP jumper SW1
REV	Reverse/Stop	b1.02, E0.00	
X1...X8	Multiple speed commands	Activated with “closed”, see parameter E0.01...E0.08	
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 10 mA)
VR1	Analog frequency commands	Analog voltage frequency input 1	Input voltage range: -10...10 V Input resistance: 100 kΩ Resolution: 1 / 2000
VR2		Analog voltage frequency input 2	Input voltage range: 0...10 V Input resistance: 100 kΩ Resolution: 1/ 2000
VR3		Analog voltage frequency input 3	
+I		Analog current frequency input	Input current range: 0...20 mA Input resistance:165 Ω Resolution: 1 / 1000
GND	Frame potential (0 V)	Isolated from COM	–
Digital outputs			
OUT1-CME	Open collector output 1	Can be programmed as multiple function digital outputs, see parameters E1.00, E1.01	Open collector outputs: Max. output voltage: +24 VDC Max. current: 50 mA
OUT2-CME	Open collector output 2		
DO-COM	Digital frequency output	Can be programmed as multiple function pulse outputs, see E1.16	Open collector outputs via opto-couplers: Max. output frequency 50 kHz (set by E1.17) Max. output voltage: 24 VDC

Terminal	Signal function	Description	Signal requirement
Ta	Relay changeover 1	Programmable multi-function relay outputs, see parameter E5.04 Ta-Tb always open Tb-Tc always closed (Tb is the shared terminal)	Rated capacity of contact transmitter: 250 VAC 3 A 30 VDC 3 A
Tc	contacts		
Tb	Relay 1 shared contact		
Pa	Relay changeover 2	Programmable multi-function relay outputs, see parameter E1.02 Pa-Pb always open Pb-Pc always closed (Pb is the shared terminal)	Rated capacity of contact transmitter: 250 VAC 3 A 30 VDC 3 A
Pc	contacts		
Pb	Relay 2 shared contact		
+24 V	DC 24 V power supply positive	COM is DC 24 V power supply negative	—
Analog outputs			
FM1-GND	Analog multi-function output 1	Programmable analog output with multiple functions. See parameters E1.10, E1.12, E1.13, E1.15 and E5.05...E5.12	Output voltage / current can be set via JP3 for FM1 and JP4 for FM2: FM1 output voltage: -10...10 V FM2 output voltage: 0...10 V Output current: 0...20 mA
FM2-GND	Analog multi-function output 2		
Encoder signals			
PGP1-COM	Supply voltage +24 V	Voltage supply 1 for the encoder Needs encoder adapter	Max. output current: 100 mA
PGP2-COM JP5: 2-3	Supply voltage +12 V	Voltage supply 2 for the encoder Needs encoder adapter	Max. output current: 200 mA
PGP2-COM JP5: 1-2 (Default)	Supply voltage +5 V	Voltage supply 2 for the encoder Needs encoder adapter	Max. output current: 200 mA
A+	Encoder signal A	See fig. 2-6 "Encoder signal selection jumper JP5" on page 14	Encoder supply voltage of differential inputs: +5 V, +12 V, and +24 V +12 V or +24 V encoder supply needs encoder adapter
A-			
B+	Encoder signal B		
B-			

Tab. 2-7: Control circuit terminals description

Before switching on the frequency converter, the removed contact covers and case front have to be refitted.

3 Parameter Settings

3.1 Operating Panel

When setting parameters, the integrated operating panel is used for all navigation, data input and modification and to display all operating parameters and parameter values. The diagram below shows the operating panel and the function of the individual operating elements.

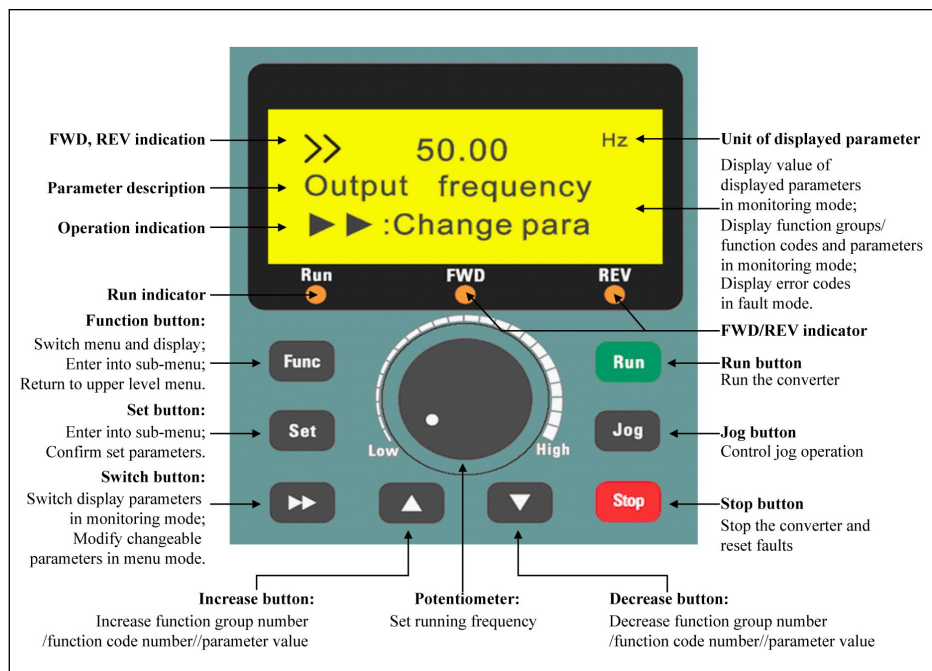


Fig. 3-1: Fv operating panel

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

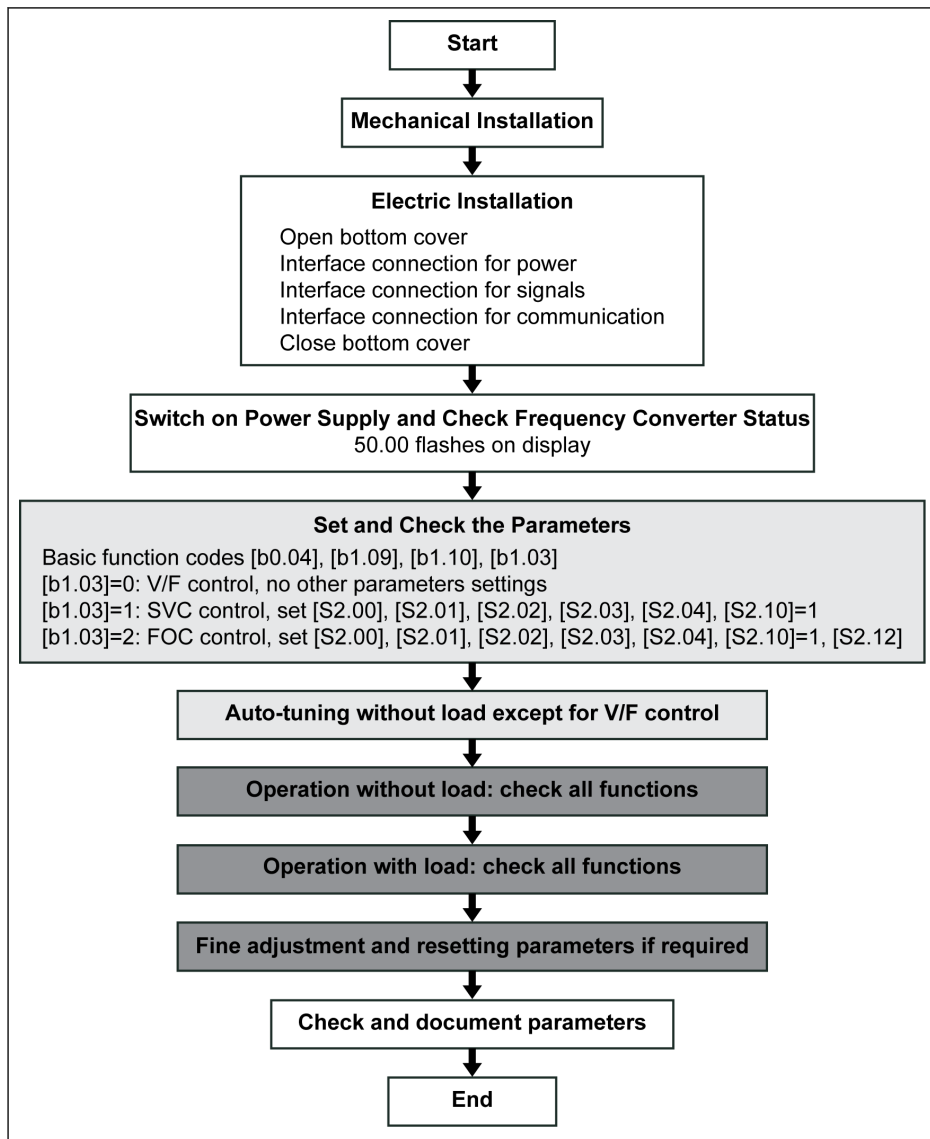


Fig. 3-2: Start-up procedure

3.3 Operating Descriptions

3.3.1 Navigation and parameter settings

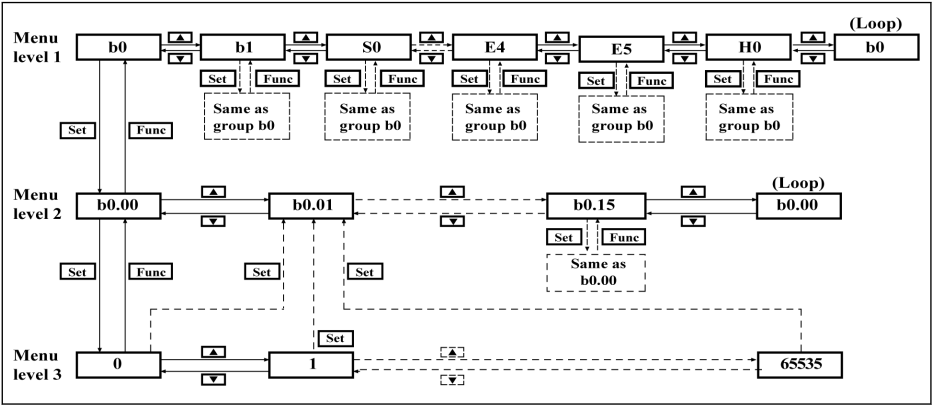


Fig. 3-3: Operation mode description

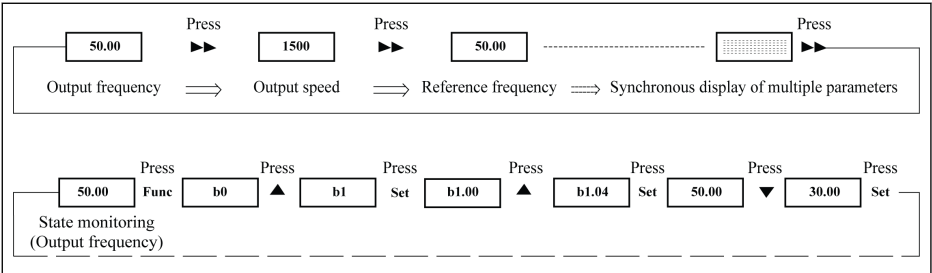


Fig. 3-4: Example of operating panel operation

3.4 Parameters

3.4.1 Description of Attribute Symbols in Parameter Tables

Parameter attribute	Description
◇	Parameter setting can be modified when the frequency converter is in run or stop mode.
◆	Parameter setting cannot be modified when the frequency converter is in run mode.
◎	Parameter setting is a calculated, measured or recorded value which cannot be modified.

Tab. 3-1: Parameter attributes and descriptions



Code: means function / parameter code, written in bx.xx, Sx.xx, Ex.xx and Hx.xx.

Value of function / parameter code: written in [bx.xx], [Sx.xx], [Ex.xx] and [Hx.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	Attrb.
b0.11	Parameter filter setting	0: b Parameters 1: b, S Parameters 2: b, S, E Parameters 3: b, S, E, H Parameters	1	0	◇
S2.00	Rated motor frequency	8.00...400.00 Hz	0.01	50.00	◆
S2.01	Rated motor rotation speed	1...24,000 rpm	1	1,440	◆
S2.02	Rated motor power	0.4...1,000.0 kW	0.1	Depends on model	◆
S2.03	Rated motor voltage	0...900 V	1		◆
S2.04	Rated motor current	0.1...1,000.0 A	0.1		◆

Start-up parameters

Code	Name	Setting range	Min. unit	Default	Attrib.
b1.16	Start mode	0: Start mode 1; 1: Start mode 2 2: Rotation speed capture mode	1	0	◆
b1.19	Stop mode	0: Decelerate to stop 1: Freewheel to stop	1	0	◆
S0.00	V/f mode	0: Linear mode; 1: Square mode 2: User-defined multipoint mode	1	0	◆
S3.15	Stop key validity	0: Valid only for operating panel control 1: Valid for all control means	1	1	◆
b1.00	Frequency setting mode	0: Set by operating panel potentiometer 1: Set by operating panel 2: Set by analog inputs 3: Set by pulse frequency 4: Set by digital inputs Up/Down 5: Set by communication	1	0	◆
b1.02	Frequency converter control commands	0: Set control commands by operating panel 1: Set control commands by digital inputs 2: Set control commands by communication	1	0	◆
E0.09	Source of analog frequency setting	0...7	1	0	◆
b1.09	Acceleration time 1	0.1...3,600.0 s	0.1	10.0	◇
b1.10	Deceleration time 1	0.1...3,600.0 s	0.1	10.0	◇

E0.09 setting range:

0: $k_1 \times VR_1$

1: $k_2 \times VR_2$

2: $k_3 \times (+I)$

3: $k_1 \times VR_1 + k_2 \times VR_2$

4: $k_1 \times VR_1 + k_3 \times (+I)$

5: $k_2 \times VR_2 + k_3 \times (+I)$

6: $k_1 \times VR_1$ (only valid for -10...+10 V forward / reverse control)

7: $k_4 \times VR_3$

Input / Output terminal functions

Code	Name	Setting range	Min. unit	Default	Attrib.
E0.01	Digital input X1	0...29	1	0	◆
...	...				
E0.08	Digital input X8				
E1.00	Open collector output OUT1	0...14	1	1	◆
E1.01	Open collector output OUT2		1	1	◆
E1.02	Relay outputs Pa, Pb and Pc		1	1	◆
E1.10	FM1 analog output	0: Output frequency / rotation speed 1: Set frequency / rotation speed 2: Output current 3: Torque current 4: Output voltage 5: Output frequency / rotation speed (including direction) 6: Set frequency / rotation speed (including direction)	1	0	◇
E1.11	FM1 negative gain setting	0.00...10.00	0.01	1.00	◇
E1.12	FM1 positive gain setting	0.00...10.00	0.01	1.00	◇
E1.13	FM2 analog output	0: Output frequency / rotation speed 1: Set frequency / rotation speed 2: Output current 3: Torque current 4: Output voltage	1	1	◇
E1.15	FM2 gain setting	0.00...10.00	0.01	1.00	◇
E1.16	Pulse outputs	0: Output frequency 1: Output voltage 2: Output current	1	0	◇
E1.17	Maximum output pulse frequency	1.0...50.0 kHz	0.1	10.0	◇

E0.00...E0.08 setting range:

- 0: Inactive (allows multiple selection)
- 1: Multi-speed control 1
- 2: Multi-speed control 2
- 3: Multi-speed control 3
- 4: Multi-speed control 4
- 5: Acceleration/deceleration time 1
- 6: Acceleration/deceleration time 2
- 7: 3-wire control
- 8: Freewheel to stop
- 9: Frequency increment **Up**
- 10: Frequency decrement **Down**
- 11: Set frequency to 0
- 12: Reserved
- 13: Activate shutdown DC brake
- 14: Switch between operating panel and digital inputs control
- 15: Logic control deactivated
- 16: Logic control paused
- 17: Switch between speed and torque control
- 18: Switch between VR1 analog reference and +I analog reference
- 19: External error N.O. contact input
- 20: External error N.C. contact input
- 21: External **Reset** input
- 22: Activate communication control
- 23: Torque limit set by VR1 enabled
- 24: Torque limit set by VR2 enabled
- 25: Forward jogging
- 26: Reverse jogging
- 27: Process PID deactivated
- 28: Speed limit set by VR1 enabled
- 29: Speed limit set by VR2 enabled

E1.00...E1.02 setting range:

- 0: Frequency converter is ready to run
- 1: Frequency converter is running
- 2: DC brake active

- 3: Frequency converter runs at zero speed
- 4. Frequency/speed arrival signal
- 5. Frequency level detection signal (FDT1)
- 6. Frequency level detection signal (FDT2)
- 7: Logic control phase completed
- 8: 8: Under voltage stop
- 9: Frequency converter over load pre-warning 1
- 10: Motor over load pre-warning
- 11: Over torque
- 12: Frequency converter in error
- 13: Error auto reset signal output
- 14: Frequency converter over load pre-warning 2

Error message and diagnosis

Code	Name	Setting range	Min.unit	Default	Attrib.
E4.13	Last error	0...24	1	0	⊙
E4.14	2 nd last error		1	0	⊙
E4.15	3 rd last error		1	0	⊙
E4.16	Delete error record	0: Inactive 1: Delete error record Note: The value is automatically set to 0 after the operation.	1	0	◆
b0.02	Restore factory default	0: No action 1: Restore parameter to factory default Note: The value is automatically set to 0 after restoring factory default.	1	0	◆

E4.13...E4.15 setting range:

0: No error record

- 1: Over current at constant speed (O.C.-1)
- 2: Over current during acceleration (O.C.-2)
- 3: Over current during deceleration (O.C.-3)
- 4: Over voltage at constant speed (O.E.-1)
- 5: Over voltage during acceleration (O.E.-2)
- 6: Over voltage during deceleration (O.E.-3)
- 7: Frequency converter over load (O.L.-1)
- 8: Motor over load (O.L.-2); 9: CPU read/write error (R.E.)
- 10: Operating panel read/write error (KEY-)
- 11: External device error (E.-St)
- 12: Communication error (R.S.)
- 13: Circuit disconnection (C.F.)
- 14: Pulse encoder speed detection error (PULS)
- 15: Motor overheat (M.O.H.); 16: EMI error (CPU-)
- 17: Short circuit (S.C.) ;18: Reserved
- 19: L1, L2, L3 input phase loss (IPH.L)
- 20: U, V, W output phase loss (OPH.L)
- 21: Frequency converter overheat (C.O.H.)
- 22: Parameter setting error (PRSE)
- 23: Parameter auto-tuning error (TUNE)
- 24: Frequency converter over load pre-warning 2 (O.L.-3)

4 Error Indication

Error No.	Error name and code	Possible reason	Solution
1	Over current at constant speed (O.C.-1)	1. Discontinuous or abnormal load in run mode	1. Check load
		2. Low mains voltage	2. Check voltage of input power supply: 3P 380...480 VAC (-15 % / +10 %)
		3. Motor power and converter power do not match	3. Motor power has to match with converter power
		4. Too large inertia or load	4. Check motor power, converter power, load
		5. Pulse encoder error	5. Check pulse encoder and its connection
2	Over current during acceleration (O.C.-2)	1. Too large start frequency	1. Reduce start frequency
		2. Too large load rotation inertia, too large impact load	2. Increase acceleration time, reduce sudden load change
		3. Improper motor parameter setting	3. Set motor parameters properly or auto tune motor parameters (group S2)
		4. Direct start during motor running	4. Restart after motor stop, or start with rotation speed capture (group b1)
		5. Too short acceleration time	5. Increase acceleration time
		6. Motor power and converter power do not match	6. Motor power has to match with converter power
		7. Pulse encoder error	7. Check pulse encoder and its connection
		8. Improper V/f curve	8. Adjust V/f curve setting and torque increase
3	Over current during deceleration (O.C.-3)	1. Improper motor parameter setting	1. Set motor parameters properly or auto tune motor parameters (group S2)
		2. Too large load rotation inertia	2. Use suitable brake components
		3. Too short deceleration time	3. Increase deceleration time
		4. Motor power and converter power do not match	4. Motor power has to match with converter power
		5. Pulse encoder error	5. Check pulse encoder and its connection
4	Over voltage at constant speed (O.E.-1)	1. Acceleration / deceleration time is too short	1. Increase acceleration/ deceleration time
		2. Abnormal input power supply	2. Check input power supply
		3. Too much load change	3. Use suitable brake components
		4. Improper speed loop parameter setting in vector control	4. Adjust PI parameters of speed loop (group S1)

Error No.	Error name and code	Possible reason	Solution
5	Over voltage during acceleration (O.E.-2)	1. Acceleration time is too short	1. Increase acceleration time
		2. Abnormal input power supply	2. Check input power supply
		3. Direct start during motor running	3. Restart after motor stop, or start with rotation speed capture (group b1)
6	Over voltage during deceleration (O.E.-3)	1. Too large load rotation inertia	1. Use suitable brake components
		2. Too short deceleration time	2. Increase deceleration time
7	Converter over load (O.L.-1)	1. Long time over load	1. Reduce over load time, reduce load Overload capability: 150 % of rated current for 60 s 180 % of rated current for 10 s
		2. Improper V/f curve settings	2. Adjust V/f curve settings
		3. Motor power and converter power do not match	3. Motor power has to match with converter power
		4. Improper motor parameters setting	4. Set motor parameters properly or auto tune motor parameters (group S2)
		5. Direct start during motor running	5. Restart after motor stop, or start with rotation speed capture (group b1)
		6. Low mains voltage	6. Check input power supply
		7. Too short acceleration time	7. Increase acceleration time
8	Motor over load (O.L.-2)	1. Motor locked	1. Prevent motor lock
		2 Normal motor runs long time with heavy load at low speed	2. Use variable frequency motor or increase converter output frequency
		3. Low voltage of input power supply	3. Check input power supply
		4. Improper V/f curve settings	4. Adjust V/f curve setting and torque increase
		5. Locked-rotor or sudden load increase	5. Check load
		6. Improper setting of motor over load protection factor	6. Adjust setting of motor over load protection factor (group E4)

Error No.	Error name and code	Possible reason	Solution
9	CPU read/write error (R.E.)	Error or illegal data in control board read/write	Contact with technical service
10	Operating panel read/write error (KEY-)	Error or illegal data in operating panel read/write	Contact with technical service
11	External device error (E-St)	External error caused by input signals via external terminals	Check external terminals status, check respective reason to error
12	Communication error (R.S.)	1. Device connection problem	1. Check device communication connection
		2. Improper baud rate setting	2. Set proper baud rate
13	Circuit disconnection (C.F.)	Current detection channel abnormal	Contact with technical service
14	Pulse encoder speed detection error (PULS)	1. Pulse encoder error	1. Check operations of mechanical part and electrical part of encoder, power supply and connections
		2. Pulse encoder connection problem	2. Replace encoder connection cable
		3. Improper setting of pulse encoder	3. Set parameters related to pulse encoder properly
15	Motor overheat (M.O.H.)	1. Continuous low speed running for a long time	1. Use a special motor
		2. Over load	2. Reduce over load time, reduce load
		3. Temperature sensor error	3. Replace the temperature sensor or contact with technical service
16	EMI error (CPU-)	CPU malfunction due to external interference	Remove environmental interference or EMI

Error No.	Error name and code	Possible reason	Solution
17	Short circuit (S.C.)	1. Too large output current	1. Check if motor short circuit, motor to earth short circuit, over load exists
		2. Power component error	2. Contact with technical service
18		Reserved	
19	L1, L2, L3 input phase loss (IPH.L)	1. Abnormal, omitted or broken connection of converter power supply	1. Follow operating procedures to check power supply connections, remove omitted or broken connections
		2. Broken fuse	2. Check fuse
		3. Imbalance in the three phases of input power supply	3. Check installation wiring and input voltage
20	U, V, W output phase loss (OPH.L)	1. Abnormal, omitted or broken connection of converter outputs	1. Check connections of frequency converter outputs, remove omitted or broken connections
		2. Imbalance in the three phases of outputs	2. Check motor
21	Fv over heat (C.O.H.)	1. Converter over heat	1. Reduce ambient temperature, improve ventilation and heat dissipation; clear dust, cotton wadding in air ducts; check fan and its power supply connection
		2. Temperature detection circuit error	2. Contact with technical service
22	Parameter setting error (PRSE)	Improper setting of parameters	Check set values of parameters
23	Parameter auto-tuning error (TUNE)	1. Power of special or normal motor does not match with converter power	1. Check if the motor is special motor, check if the motor power matches with converter power
		2. Improper setting of motor parameters	2. Set parameters according to motor nameplate
		3. No connection of converter with motor	3. Check motor cable connections
24	Frequency converter over load pre-warning 2	See descriptions of option 14 of parameters E1.00...E1.02	Reduce over load time, reduce load

Tab. 4-1: Error types and solutions

Notes

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