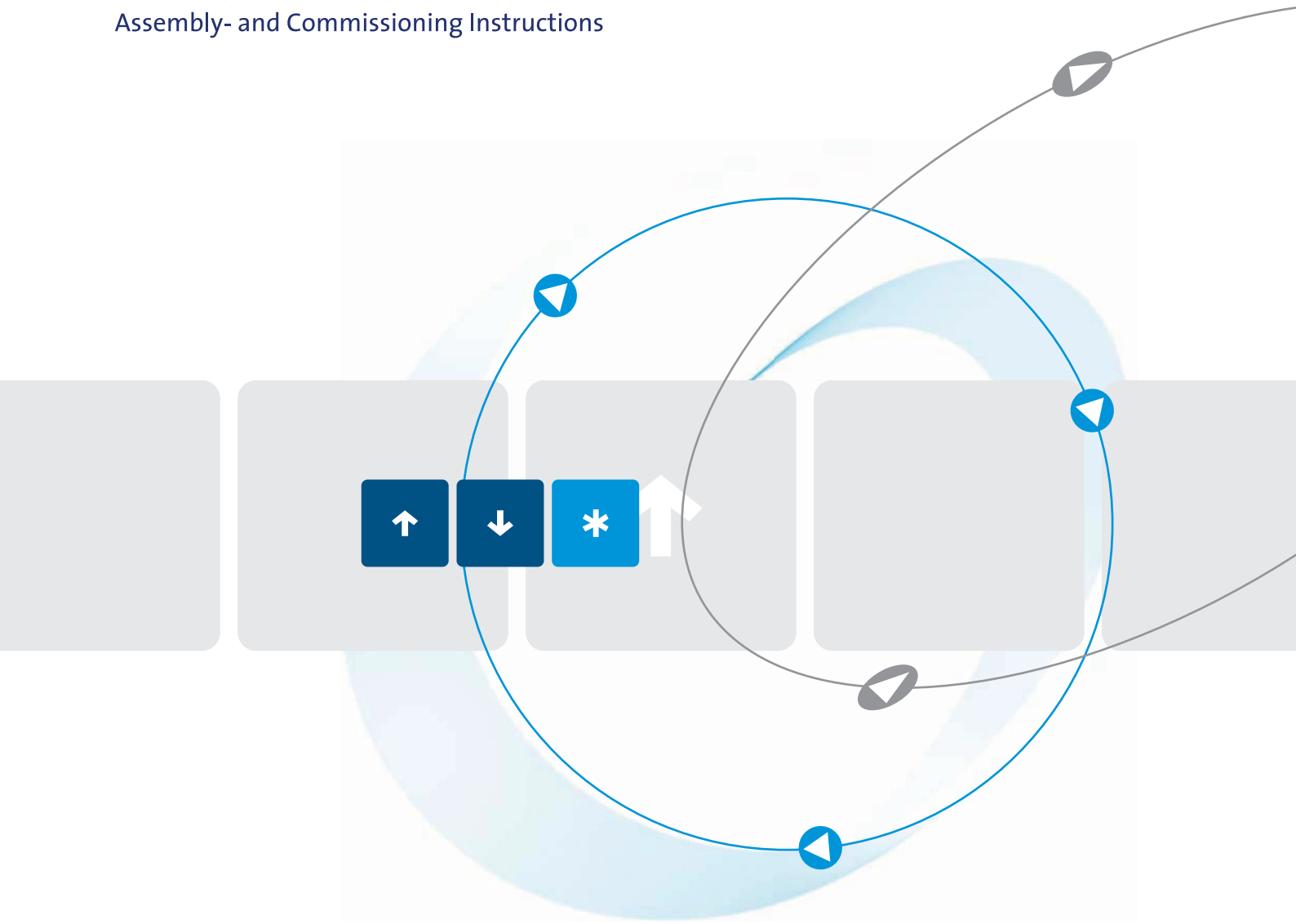
PETER electronic

AC Motor Drive
VersiDrive i C2
Assembly- and Commissioning Instructions



Quality is our motivation.

Thank you for choosing this VersiDrive i C2

This manual provides instructions for advanced use of the VersiDrive i C2 series. Incorrect handling might cause an unexpected fault. Before using the inverter, always read this manual to use the equipment to its optimum.

Safety instructions

Do not attempt to install, operate, maintain or inspect the inverter until you have read through this manual and appended documents carefully and can use the equipment correctly. Do not use the inverter until you have a full knowledge of the equipment, safety information and instructions.

Installation, operation, maintenance and inspection must be performed by qualified personnel. Here, qualified personnel means personnel who meets all the conditions below.

- A person who took a proper engineering training.
- A person who can access operating manuals for the protective devices (e.g. light curtain) connected to the safety control system. A person who has read and familiarized himself/ herself with the manuals.

In this manual, the safety instruction levels are classified into “DANGER” and “CAUTION”.

DANGER:

Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION:

Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that even the CAUTION level may lead to a serious consequence according to conditions. Please follow strictly the instructions of both levels because they are important to personnel safety.

General safety information and precautions

In this manual special warnings that are important for the proper and safe use of the products are clearly identified as follows:

DANGER:

- AC input power must be disconnected before any wiring to the AC motor drive is made.
- Even if the power has been turned off, a charge may still remain in the DC-link capacitors with hazardous voltages before the POWER LED is OFF. Please do not touch the internal circuit and components.
- There are highly sensitive MOS components on the printed circuit boards. These components are especially sensitive to static electricity. Please do not touch these components or the circuit boards before taking anti-static measures.
- Never reassemble internal components or wiring.
- Ground the AC motor drive using the ground terminal. The grounding method must comply with the laws of the country where the AC motor drive is to be installed.
- DO NOT install the AC motor drive in a place subjected to high temperature, direct sunlight and inflammables.

CAUTION:

- Never connect the AC motor drive output terminals U/T1, V/T2 and W/T3 directly to the AC mains circuit power supply.
- After finishing the wiring of the AC motor drive, check if U/T1, V/T2, and W/T3 are short-circuited to ground with a multimeter. Do NOT power the drive if short circuits occur. Eliminate the short circuits before the drive is powered.
- The rated voltage of power system to install motor drives is listed below. Ensure that the installation voltage is in the correct range when installing a motor drive.
  For 230 V models, the range is between 170–264 V
  Bei den 460 V models, the range is between 323–528 V.
- Refer to the table below for short circuit rating:

Model (Power)	Short circuit rating
230 V/460 V	100 kA

- Only qualified persons are allowed to install, wire and maintain the AC motor drives.
- Even if the three-phase AC motor is stopped, a charge with hazardous voltages may still remain in the main circuit terminals of the AC motor drive.
- The performance of electrolytic capacitor will degrade if it is not charged for a long time. It is recommended to charge the drive which is stored in no charge condition every 2 years for 3–4 hours to restore the performance of electrolytic capacitor in the motor drive. Note: When power up the motor drive, use adjustable AC power source (ex. AC autotransformer) to charge the drive at 70%–80% of rated voltage for 30 minutes (do not run the motor drive). Then charge the drive at 100% of rated voltage for an hour (do not run the motor drive). By doing these, restore the performance of electrolytic capacitor before starting to run the motor drive. Do NOT run the motor drive at 100% rated voltage right away.
- Pay attention to the following precautions when transporting and installing this package (including wooden crate and wood stave)
  - If you need to deworm the wooden crate, do NOT use fumigation or you will damage the drive. Any damage to the drive caused by using fumigation voids the warranty.
  - Use other methods, such as heat treatment or any other non-fumigation treatment, to deworm the wood packaging material.
  - If you use heat treatment to deworm, leave the packaging materials in an environment of over 56 °C for a minimum of thirty minutes.
- Connect the drive to a three-phase three-wire or three-phase four-wire Wye system to comply with UL standards.
- If the motor drive generates leakage current over AC 3.5 mA or over DC 10 mA on a grounding conductor, compliance with local grounding regulations or IEC 61800-5-1 standard is the minimum requirement for grounding.

NOTE

The content of this manual may be revised without prior notice. Please consult our distributors or download the latest version at
https://www.peter-electronic.com/de/service/dokumentencenter/.

Symbols used in the manual

Use of instructions

Instructions concerning important information are marked separately and are displayed as follows:

NOTE Text of instruction

Use of numbering in the figures

Numbering within the figures is displayed by white numbers within black circles and is explained in a table following it using the same number, e.g.:

❶ ❷ ❸ ❹

Use of handling instructions

Handling instructions are steps that must be carried out in their exact sequence during startup, operation, maintenance and similar operations.

They are numbered consecutively (black numbers in white circles):

① Text.

② Text.

③ Text.

Use of footnotes in tables

Instructions in tables are explained in footnotes underneath the tables (in superscript). There is a footnote character at the appropriate position in the table (in superscript).

If there are several footnotes for one table then these are numbered consecutively underneath the table (black numbers in white circle, in superscript):

① Text.

② Text.

③ Text.

Contents

1 Introduction

1.1 Receiving and inspection

After receiving the AC motor drive, please check for the following:

① Please inspect the unit after unpacking to assure it was not damaged during shipment. Make sure that the part number printed on the package corresponds with the part number indicated on the nameplate.

② Make sure that the voltage for the wiring lies within the range as indicated on the nameplate. Please install the AC motor drive according to this manual.

③ Before applying the power, please make sure that all the devices, including power, motor, control board and digital keypad, are connected correctly.

④ When wiring the AC motor drive, please make sure that the wiring of input terminals “R/L1, S/L2, T/L3” and output terminals “U/T1, V/T2, W/T3” is correct to prevent drive damage.

⑤ When power is applied, select the language and set parameter groups via the digital keypad (Versi-KP-LCD). When executes trial run, please begin with a low speed and then gradually increases the speed until the desired speed is reached.

1.2 Nameplate information

230 V/460 V Model

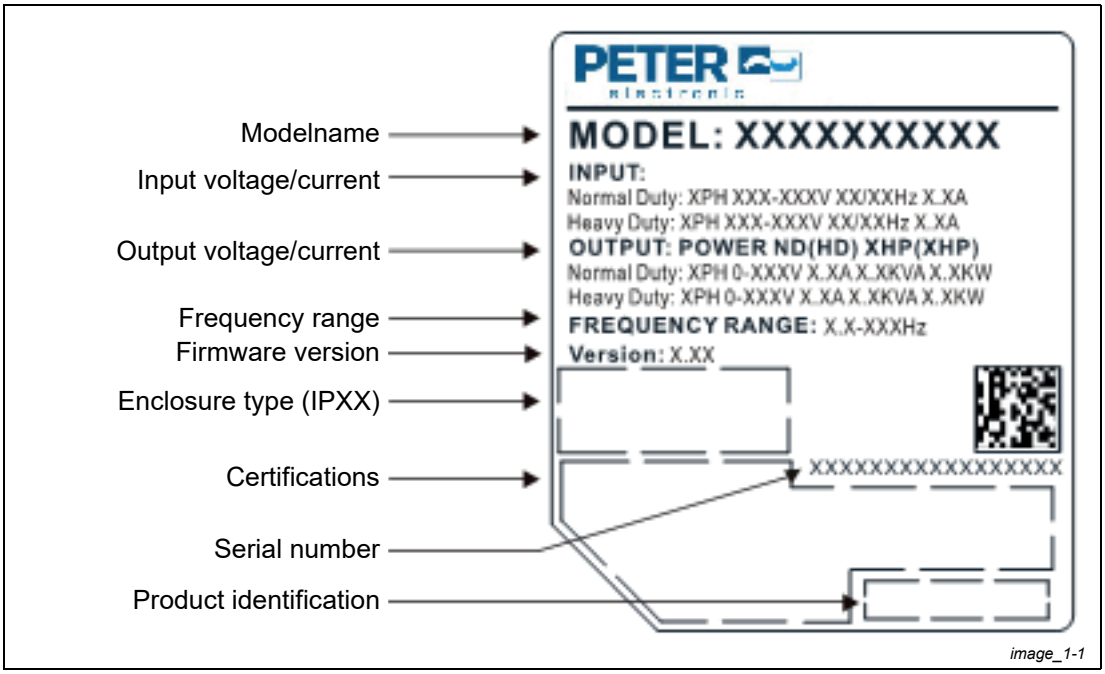


Fig. 1-1: Description of the nameplate

1.3 Model name

230 V/460 V Model

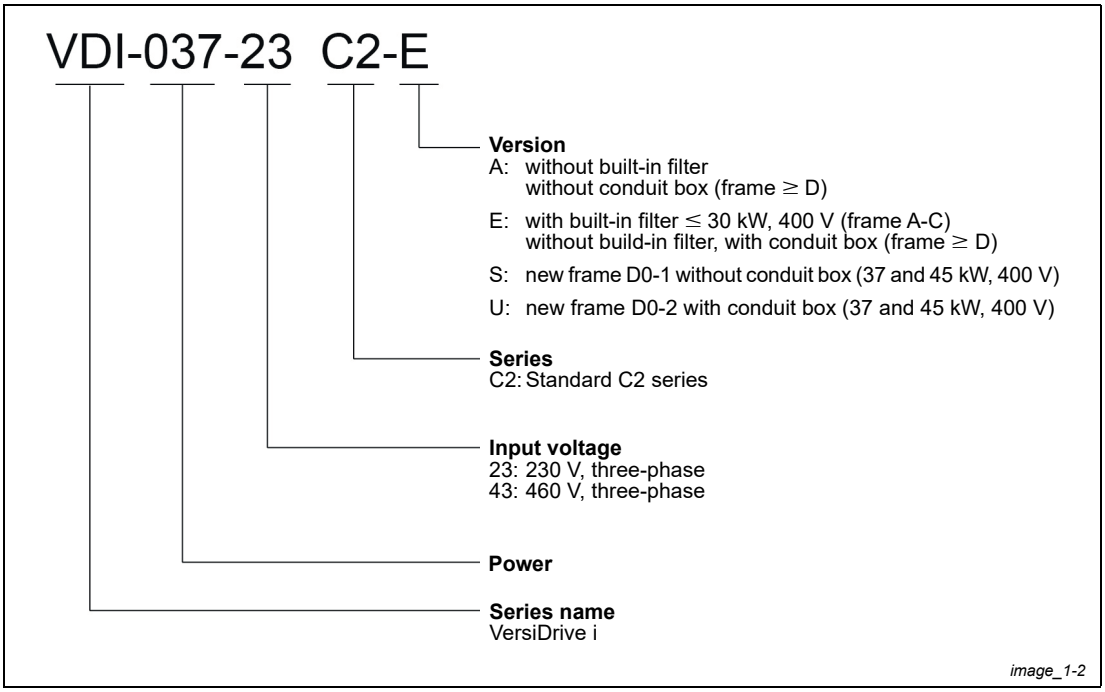


Fig. 1-2: Description of the model name

1.4 Serial number

230 V/460 V Model

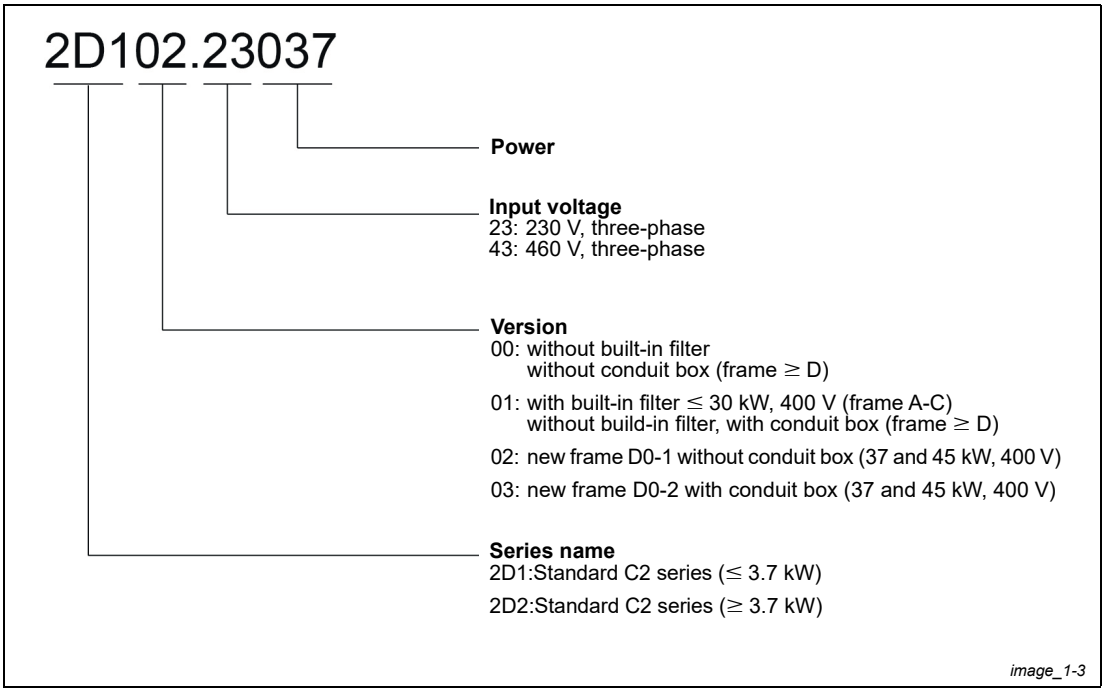


Fig. 1-3: Description of the serial number

1.5 RFI jumper

- In the drive there are Varistor/MOVs, which are connected from phase to phase and from phase to ground, to protect the drive against mains surges or voltage spikes. Because the Varistors/MOVs from phase to ground are connected to ground via the RFI jumper, the protection will be ineffective when the RFI jumper is removed.
- In the models with built-in EMC filter the RFI jumper connects the filter capacitors to ground from a return path for high frequency noise to isolate the noise from contaminating the mains power. Removing the RFI jumper strongly reduces the effect of the built-in EMC filter. Although a single drive complies with the international standards for leakage current, an installation with several drives with built-in EMC filter can trigger the RCD. Removing the RFI jumper helps, but the EMC performance of each drive would be no longer guaranteed.

Frame A–C

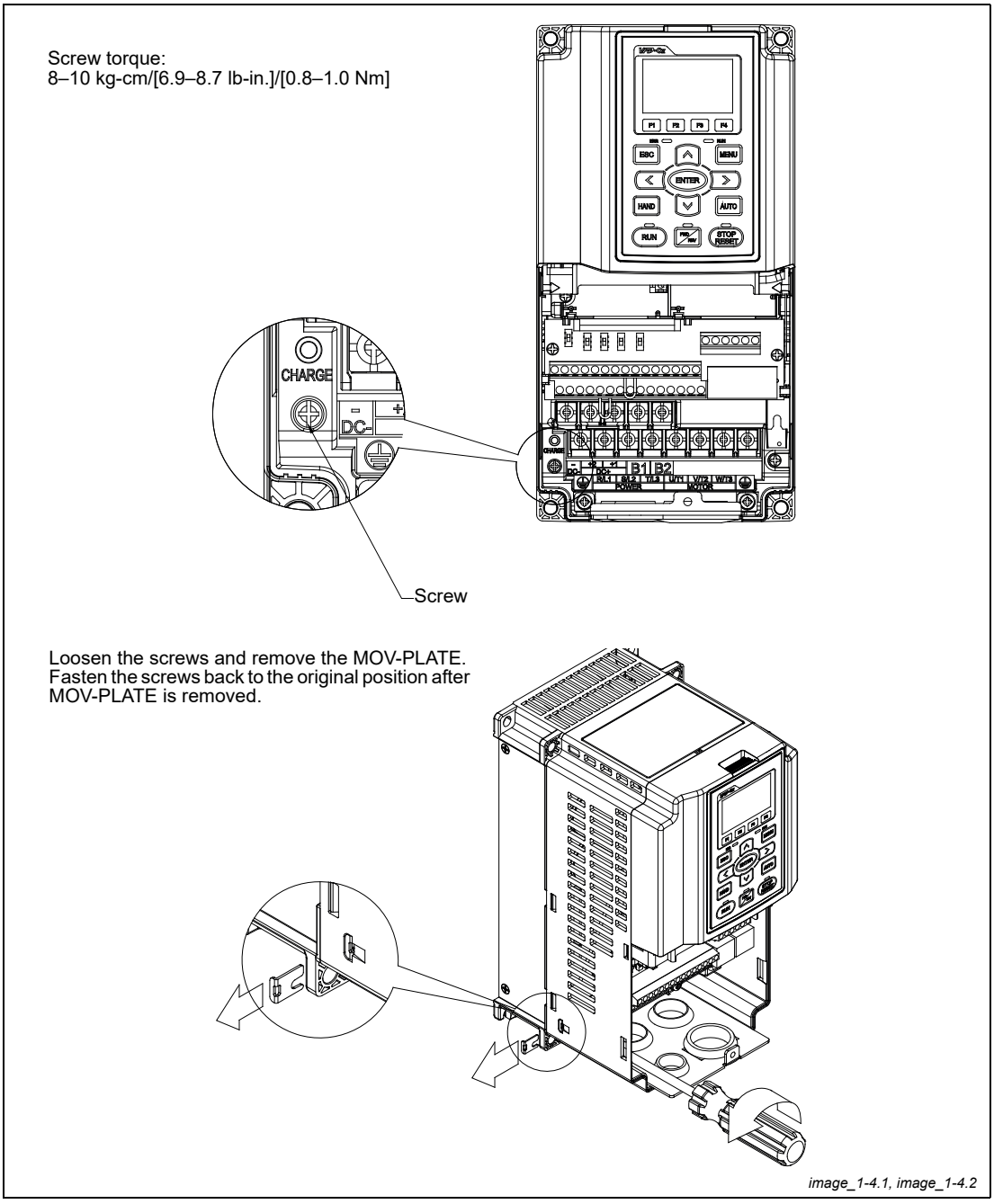


Fig. 1-4: Removal of the MOV-PLATE (frame A–C)

Frame D0–E

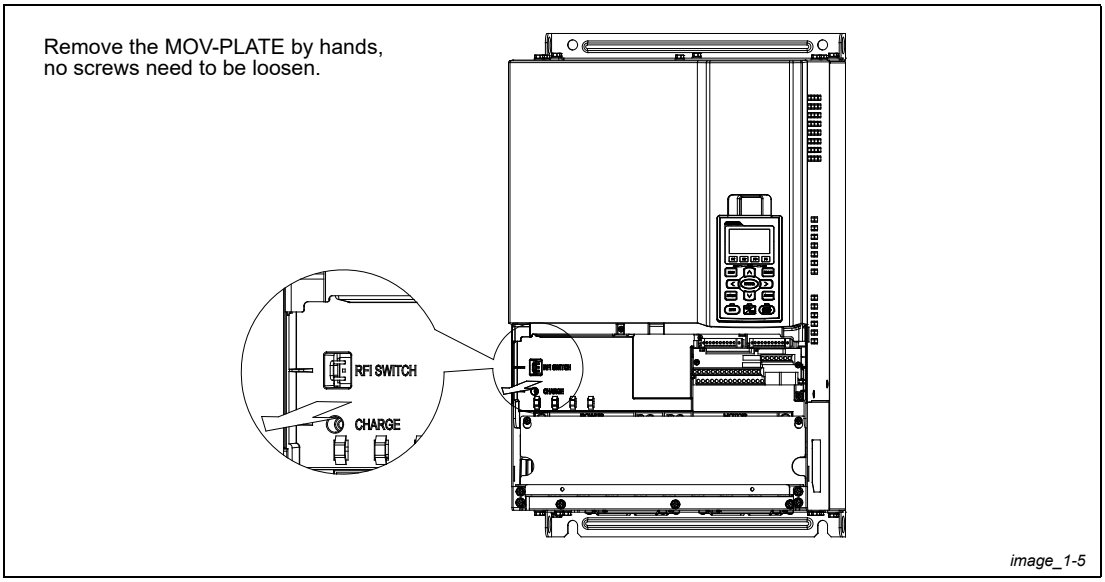


Fig. 1-5: Removal of the MOV-PLATE (frame D0–E)

Isolating main power from ground

When the power distribution system of the drive is a floating ground system (IT Systems) or an asymmetric ground system (Corner Grounded TN Systems), you must remove the RFI jumper. Removing the RFI jumper disconnects the internal capacitors from ground to avoid damaging the internal circuits and to reduce the ground leakage current.

Important points regarding ground connection:

- To ensure the safety of personnel, proper operation, and to reduce electromagnetic radiation, the drive must be properly grounded during installation.
- The diameter of the cables must comply with the local safety regulations.
- The shield of shielded cables must be connected to the ground of the drive to meet safety regulations.
- The shield of shielded power cables can only be used as the ground for equipment when the aforementioned points are met.
- When installing more drives, do not connect the grounds of the drives in series but connect each drive to ground. The following pictures show the correct and wrong ways to connect the grounds.

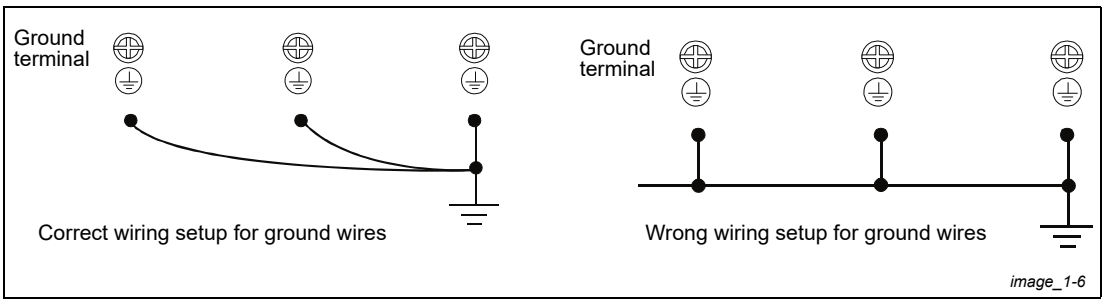


Fig. 1-6: Grounding more than one drive

Pay particular attention to the following points:

- Do not remove the RFI jumper while the power is on.
- Removing the RFI jumper also disconnects the built-in EMC filter capacitors. Compliance with the EMC specifications is no longer guaranteed.
- Do not remove the RFI jumper if the mains power is a symmetrical grounded power system in order to maintain the efficiency for EMC circuit.
- Do not remove the RFI jumper while conducting high voltage tests. When conducting a high voltage test to the entire facility, you must disconnect the mains power and the motor if the leakage current is too high.

Floating Ground System (IT Systems)

A floating ground system is also called IT system, ungrounded system, or high impedance/resistance (greater than 30 Ω) grounding system.

- Disconnect the ground cable from the internal EMC filter.
- In situations where EMC is required, check whether there is excess electromagnetic radiation affecting nearby low-voltage circuits. In some situations, the adapter and cable naturally provide enough suppression. If in doubt, install an extra electrostatic shielded cable on the power supply side between the main circuit and the control terminals to increase security.
- Do not install an external RFI/EMC filter, the EMC filter will pass through a filter capacitor, thus connecting power input to ground. This is very dangerous and can easily damage the Power Regenerative Unit.

Asymmetric ground system (Corner grounded TN systems)

CAUTION:
Do not remove the RFI jumper while the input terminal of the Power Regenerative Unit carries power.

In the following four situations, the RFI jumper must be removed. This is to prevent the system from grounding through the RFI capacitor and damaging the Power Regenerative Unit.

RFI jumper must be removed

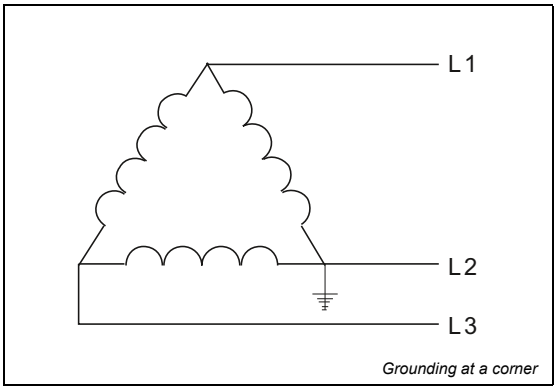


Fig. 1-7: Grounding at a corner in a triangle configuration

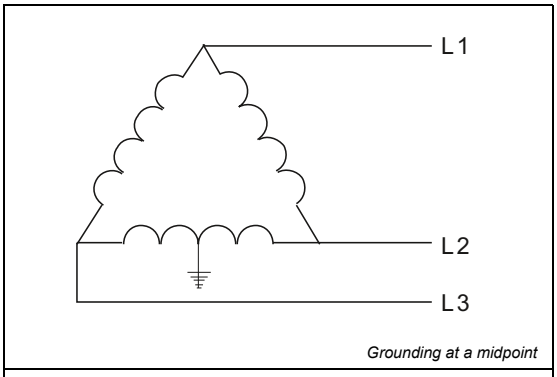


Fig. 1-8: Grounding at a midpoint in a polygonal configuration

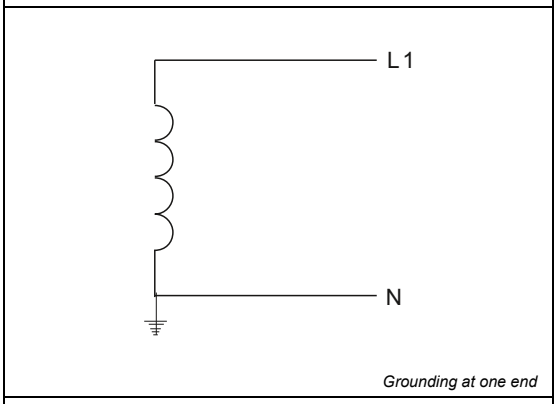


Fig. 1-9: Grounding at one end in a single-phase configuration

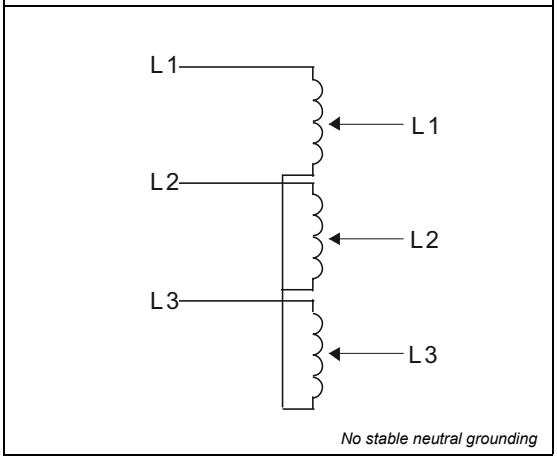


Fig. 1-10: No stable neutral grounding in a three-phase autotransformer configuration

RFI jumper can be used

Internal grounding through RFI capacitor, which reduces electromagnetic radiation. In a situation with higher requirements for electromagnetic compatibility, and using a symmetrical grounding power system, an EMC filter can be installed. As a reference, the diagram on the right is a symmetrical grounding power system.

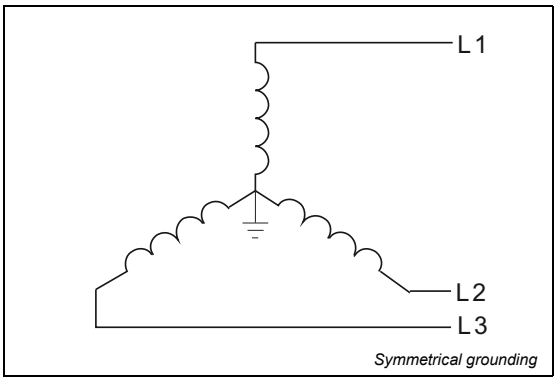


Fig. 1-11: Symmetrical grounding power system (star configuration)

2 Dimensions

2.1 Frame A

VD i 075-23C2-A; VD i 075-43C2-A/E; VD i 150-23C2-A; VD i 150-43C2-A/E; VD i 220-23C2-A; VD i 220-43C2-A/E; VD i 370-23C2-A; VD i 370-43C2-A/E; VD i 400-43C2-A/E; VD i 550-43C2-A/E

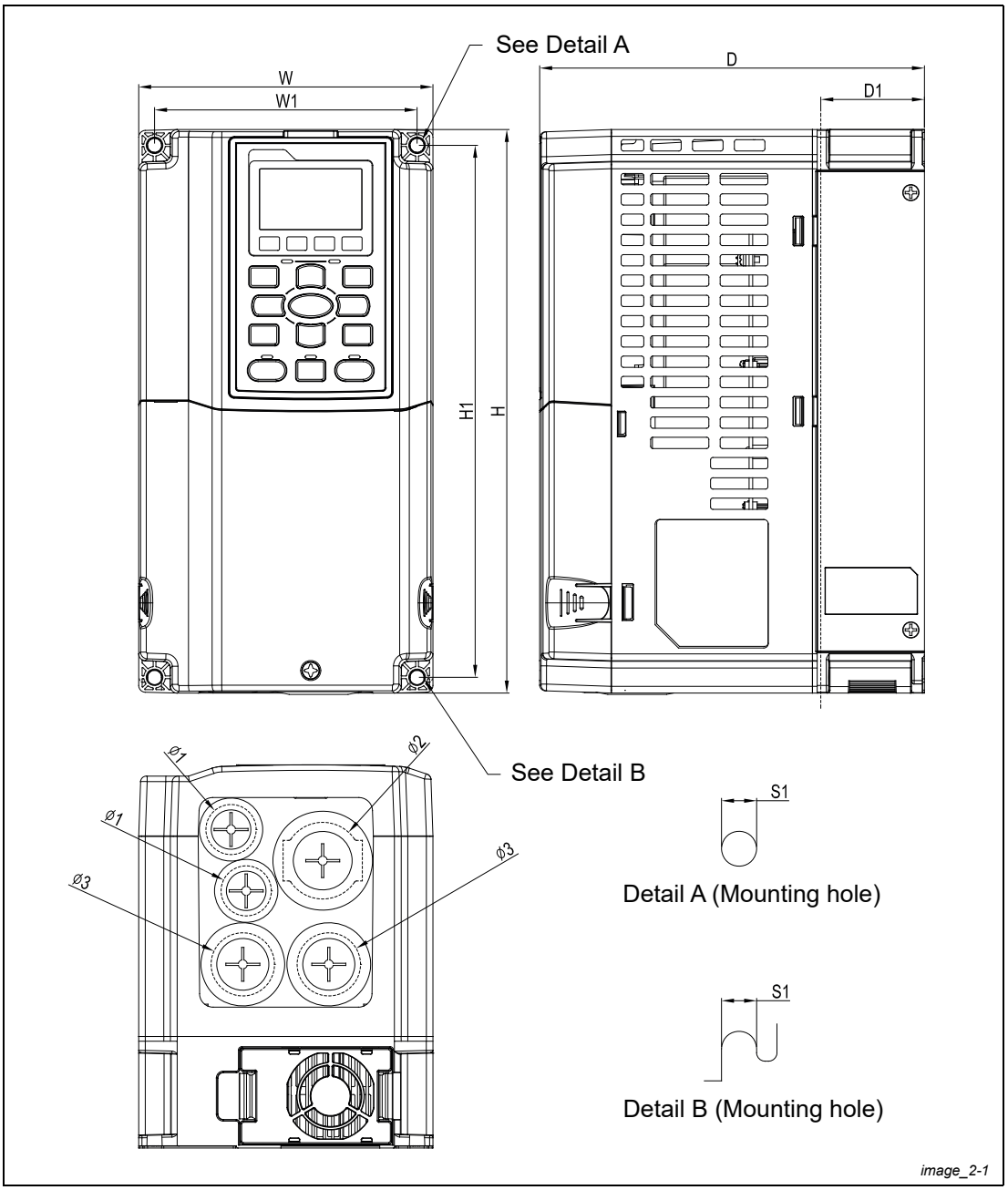


Fig. 2-1: Dimensions frame A

Unit: mm [inch]

Frame	W	H	D	W1	H1	D1*	S1	Ø1	Ø2	Ø3
A1	130.0 [5.12]	250.0 [9.84]	170.0 [6.69]	116.0 [4.57]	236.0 [9.29]	45.8 [1.80]	6.2 [0.24]	22.2 [0.87]	34.0 [1.34]	28.0 [1.10]

D1*: Flange mounting

2.2 Frame B

VD i 550-23C2-A; VD i 750-23C2-A; VD i 750-43C2-A/E; VD i 1100-23C2-A; VD i 1100-43C2-A/E; VD i 1500-43C2-A/E

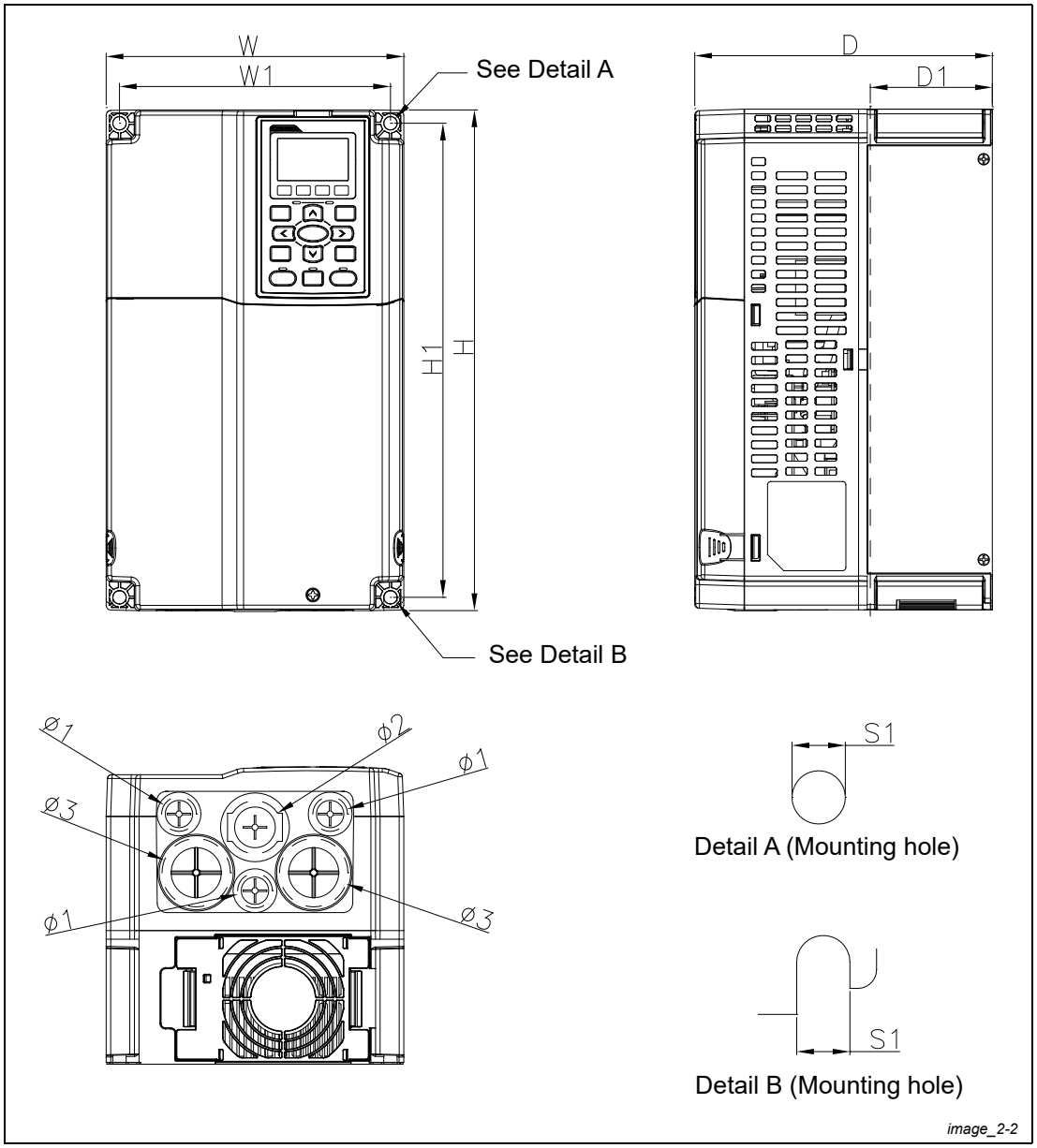


Fig. 2-2: Dimensions frame B

Unit: mm [inch]

Frame	W	H	D	W1	H1	D1*	S1	Ø1	Ø2	Ø3
B1	190.0 [7.48]	320.0 [12.60]	190.0 [7.48]	173.0 [6.81]	303.0 [11.93]	77.9 [3.07]	8.5 [0.33]	22.2 [0.87]	34.0 [1.34]	43.8 [1.72]

D1*: Flange mounting

2.3 Frame C

VD i 1500-23C2-A; VD i 1850-23C2-A; VD i 1850-43C2-A/E; VD i 2200-23C2-A; VD i 2200-43C2-A/E; VD i 3000-43C2-A/E

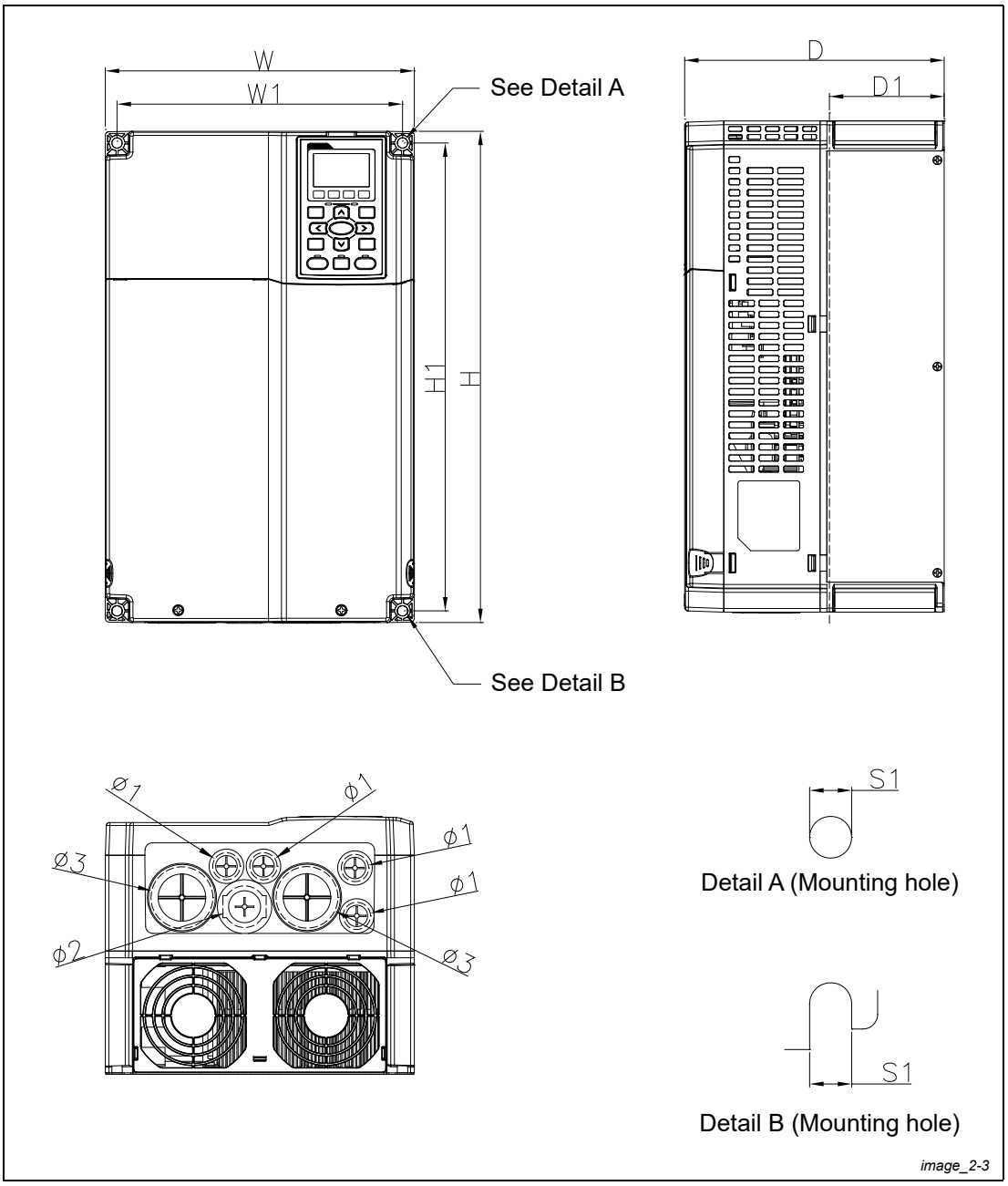


Fig. 2-3: Dimensions frame C

Unit: mm [inch]

Frame	W	H	D	W1	H1	D1*	S1	∅1	∅2	∅3
C1	250.0 [9.84]	400.0 [15.75]	210.0 [8.27]	231.0 [9.09]	381.0 [15.00]	92.9 [3.66]	8.5 [0.33	22.2 [0.87]	34.0 [1.34]	50.0 [1.97]

D1*: Flange mounting

2.4 Frame D0

D0-1: VD i 3700-43C2-S; VD i 4500-43C2-S

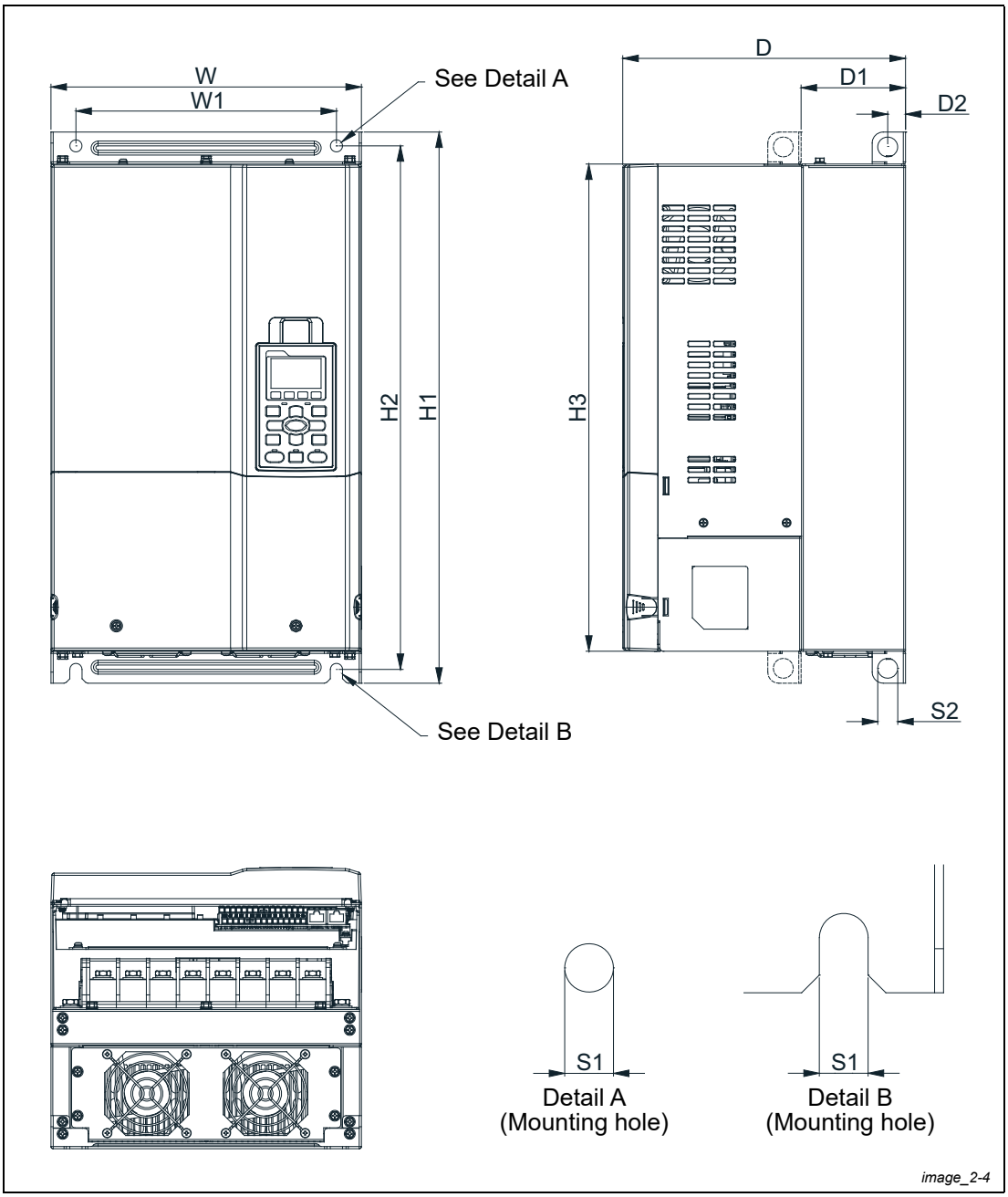


Fig. 2-4: Dimensions frame D0-1

Unit: mm [inch]

Frame	W	H1	D	W1	H2	H3	D1*	D2	S1	S2
D0-1	280.0 [11.02]	500.0 [19.69]	255.0 [10.04]	235.0 [9.25]	475.0 [18.70]	442.0 [17.40]	94.2 [3.71]	16.0 [0.63]	11.0 [0.43]	18.0 [0.71]

D1*: Flange mounting

2.5 Frame D0

D0-2: VD i 3700-43C2-U; VD i 4500-43C2-U

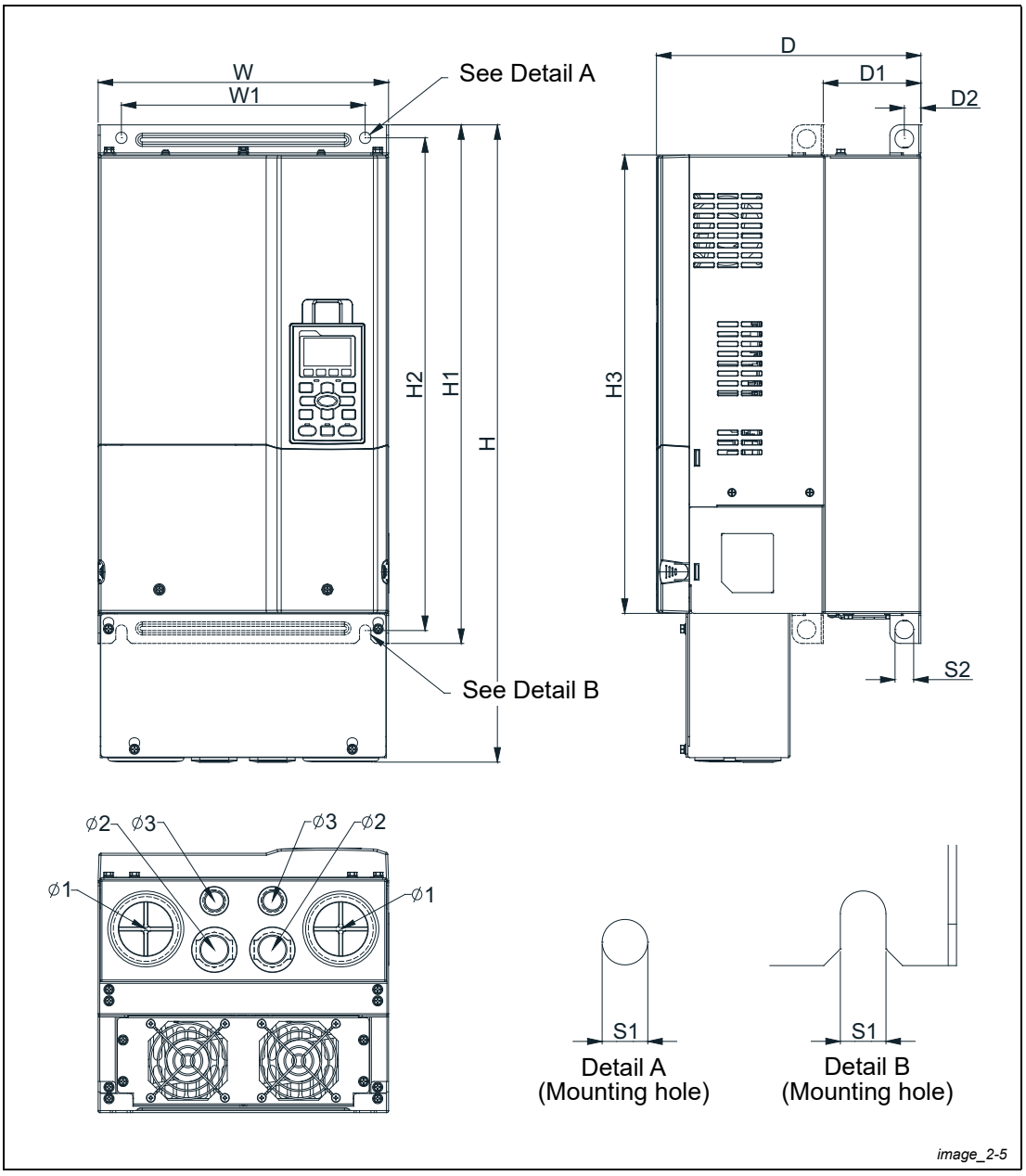


Fig. 2-5: Dimensions frame D0-2

Unit: mm [inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D0-2	330.0 [12.99]	—	275.0 [10.83]	285.0 [11.22]	550.0 [21.65]	525.0 [20.67]	492.0 [19.37]	107.2 [4.22]	16.0 [0.63]	11.0 [0.43]	18.0 [0.71]	—	—	—

D1*: Flange mounting

2.6 Frame D

D1: VD i 3000-23C2-A; VD i 3700-23C2-A; VD i 5500-43C2-A; VD i 7500-43C2-A

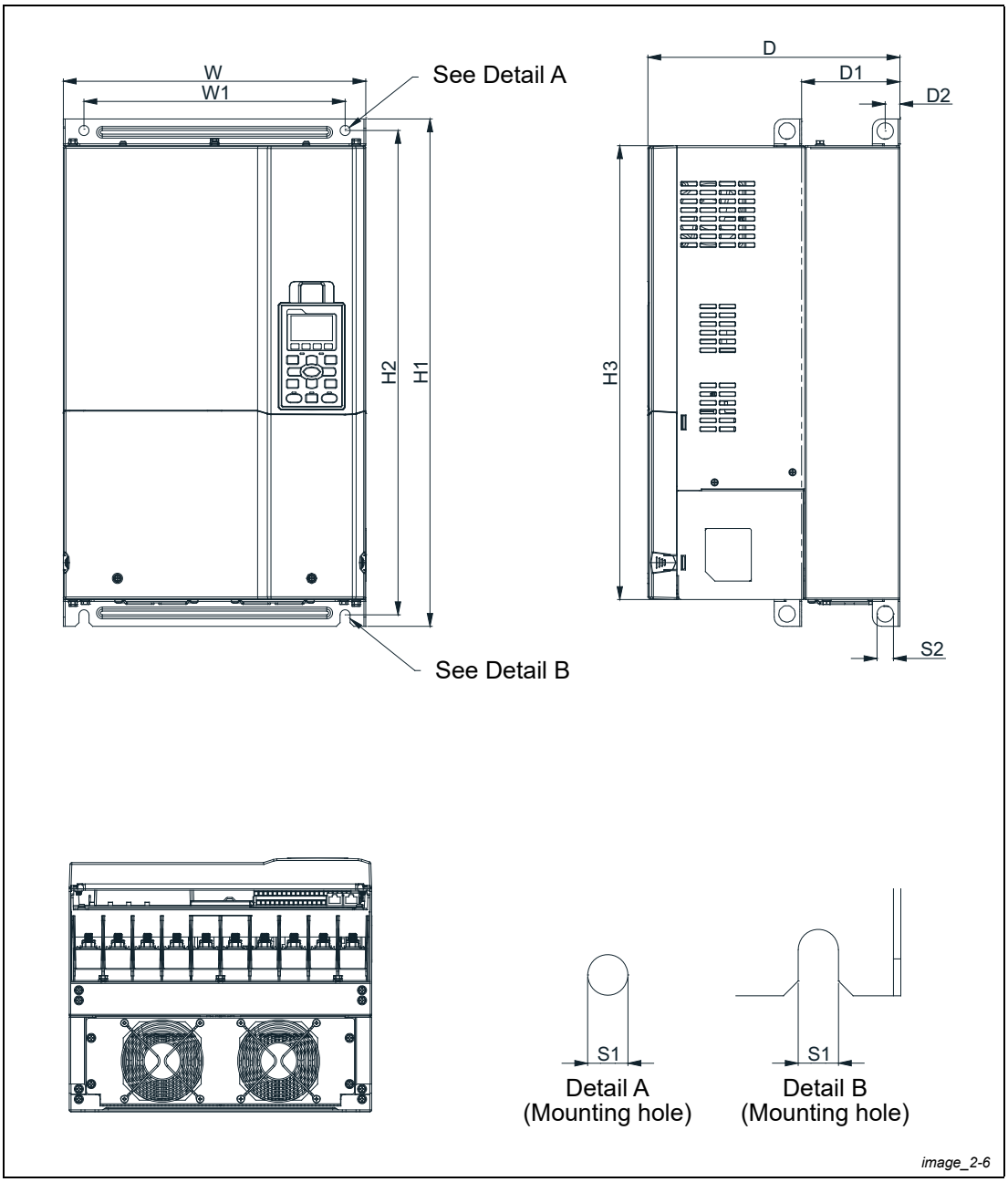


Fig. 2-6: Dimensions frame D1

Unit: mm [inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D1	330.0 [12.99]	688.3 [27.10]	275.0 [10.83]	285.0 [11.22]	550.0 [21.65]	525.0 [20.67]	492.0 [19.37]	107.2 [4.22]	16.0 [0.63]	11.0 [0.43]	18.0 [0.71]	76.2 [3.00]	34.0 [1.34]	22.0 [0.87]

D1*: Flange mounting

2.7 Frame D

D2: VD i 3000-23C2-E; VD i 3700-23C2-E; VD i 5500-43C2-E; VD i 7500-43C2-E

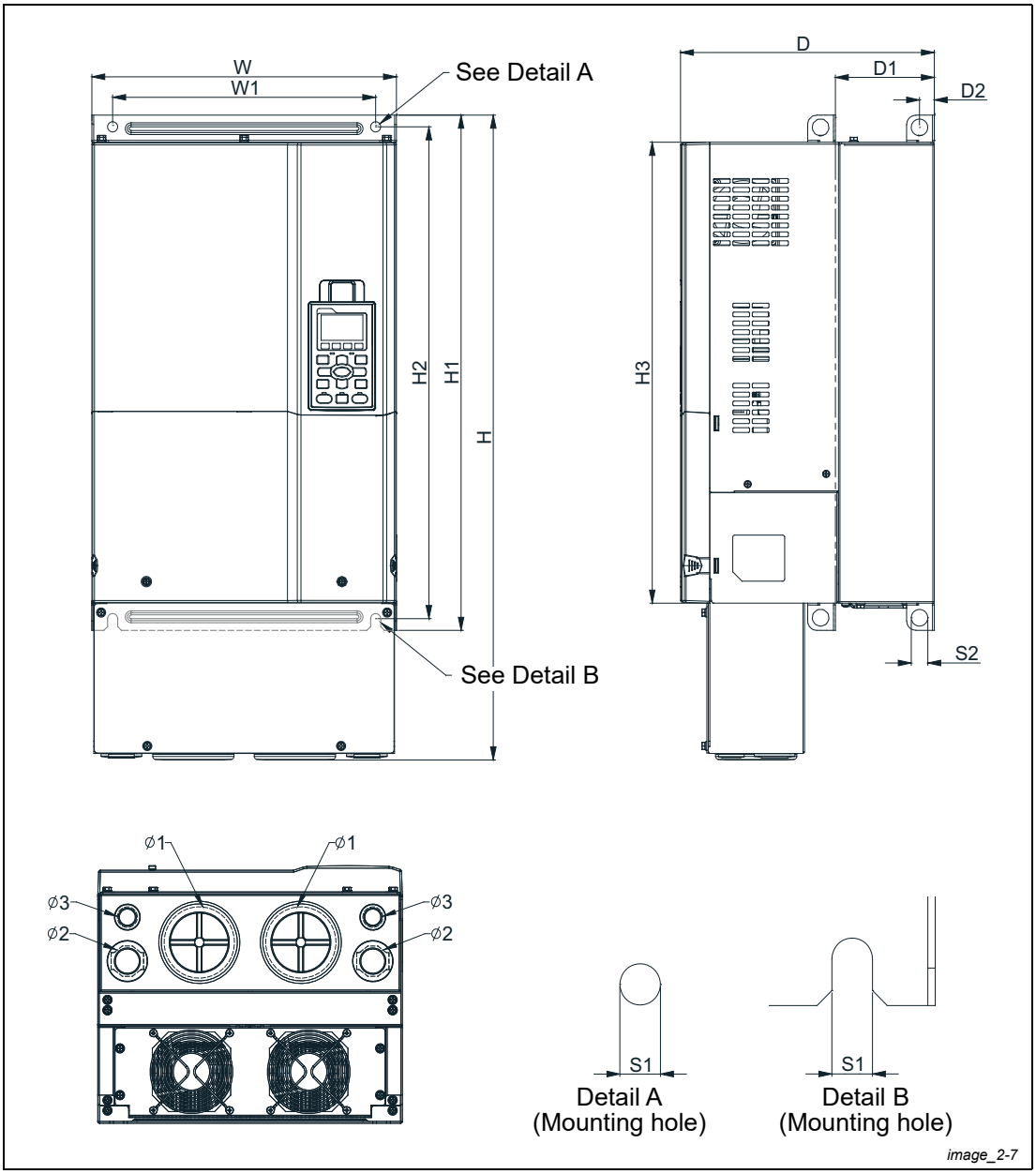


Fig. 2-7: Dimensions frame D2

Unit: mm [inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	Ø1	Ø2	Ø3
D2	330.0 [12.99]	688.3 [27.10]	275.0 [10.83]	285.0 [11.22]	550.0 [21.65]	525.0 [20.67]	492.0 [19.37]	107.2 [4.22]	16.0 [0.63]	11.0 [0.43]	18.0 [0.71]	76.2 [3.00]	34.0 [1.34]	22.0 [0.87]

D1*: Flange mounting

2.8 Frame E

E1: VD i 4500-23C2-A; VD i 5500-23C2-A; VD i 7500-23C2-A; VD i 9000-43C2-A; VD i 11000-43C2-A

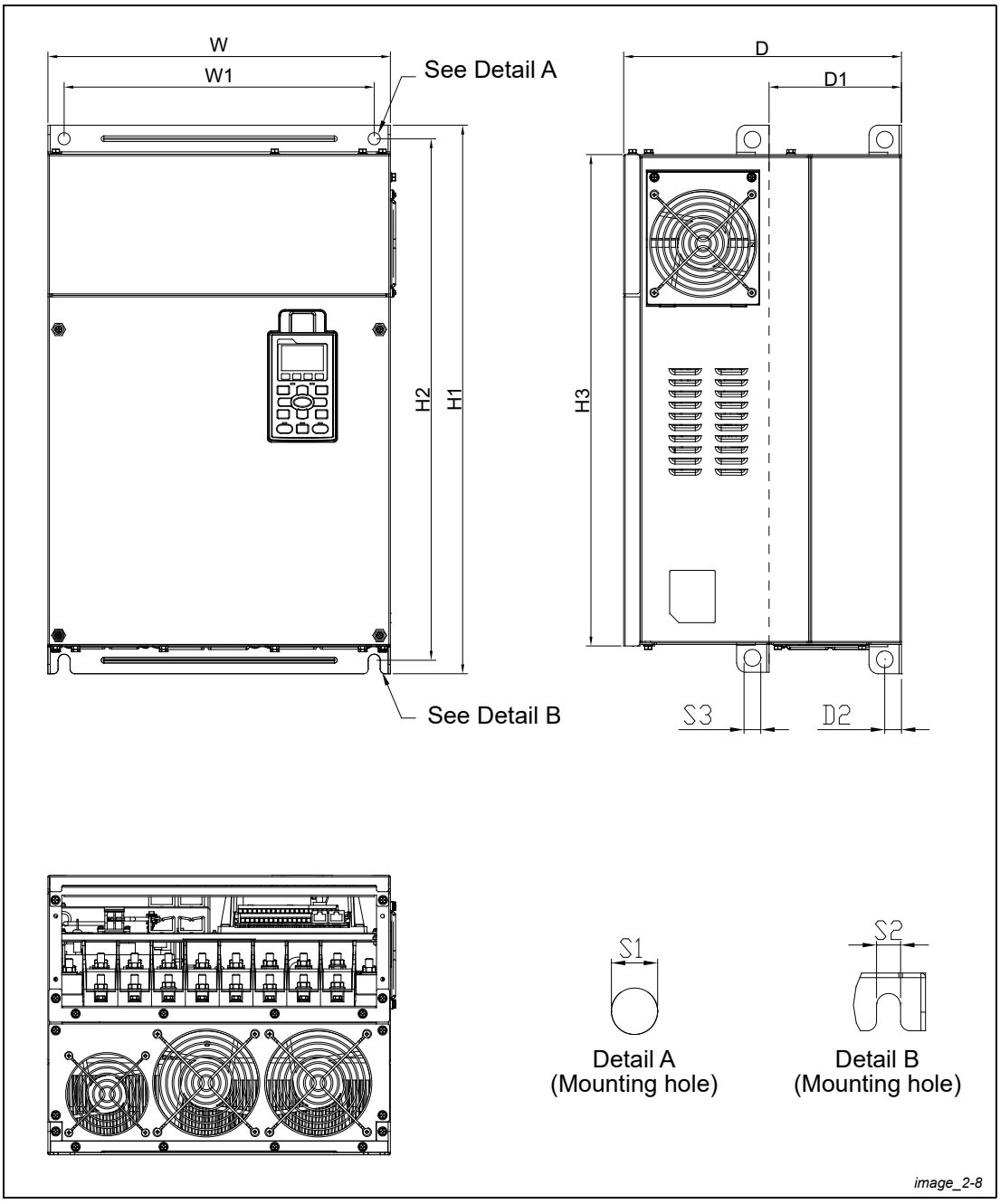


Fig. 2-8: Dimensions frame E1

Unit: mm [inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1,S2	S3	Ø1	Ø2	Ø3
E1	370.0 [14.57]	—	300.0 [11.81]	335.0 [13.19	589 [23.19]	560.0 [22.05]	528.0 [20.80]	143.0 [5.63]	18.0 [0.71]	13.0 [0.51]	18.0 [0.71]	—	—	—

D1*: Flange mounting

2.9 Frame E

E2: VD i 4500-23C2-E; VD i 5500-23C2-E; VD i 7500-23C2-E; VD i 9000-43C2-E; VD i 11000-43C2-E

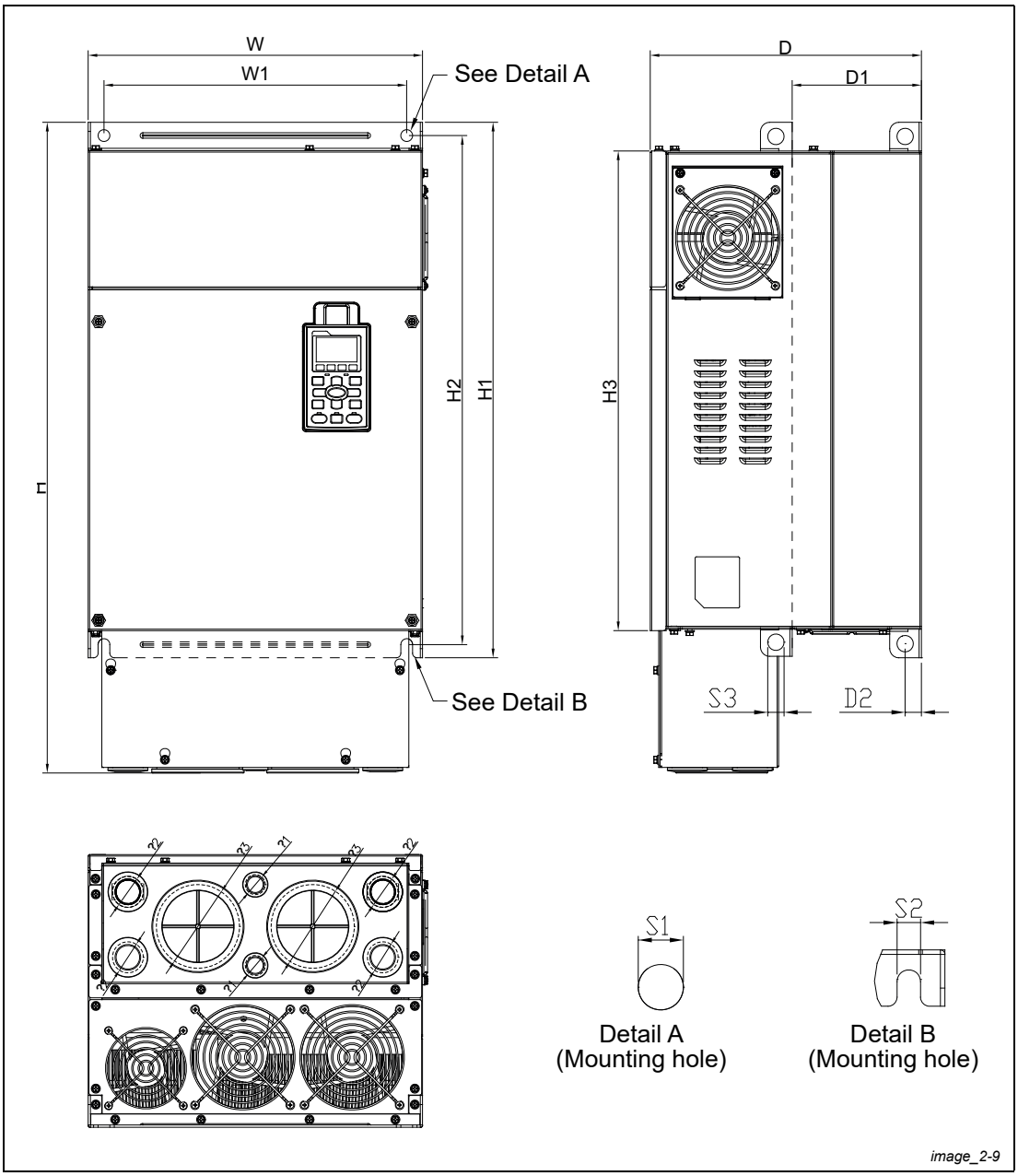


Fig. 2-9: Dimensions frame E2

Unit: mm [inch]

Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1,S2	S3	Ø1	Ø2	Ø3
E2	370.0 [14.57]	715.8 [28.18]	300.0 [11.81]	335.0 [13.19	589 [23.19]	560.0 [22.05]	528.0 [20.80]	143.0 [5.63]	18.0 [0.71]	13.0 [0.51]	18.0 [0.71]	22.0 [0.87]	34.0 [1.34]	92.0 [3.62]

D1*: Flange mounting

2.10 Digital keypad

Versi-KP-LCD

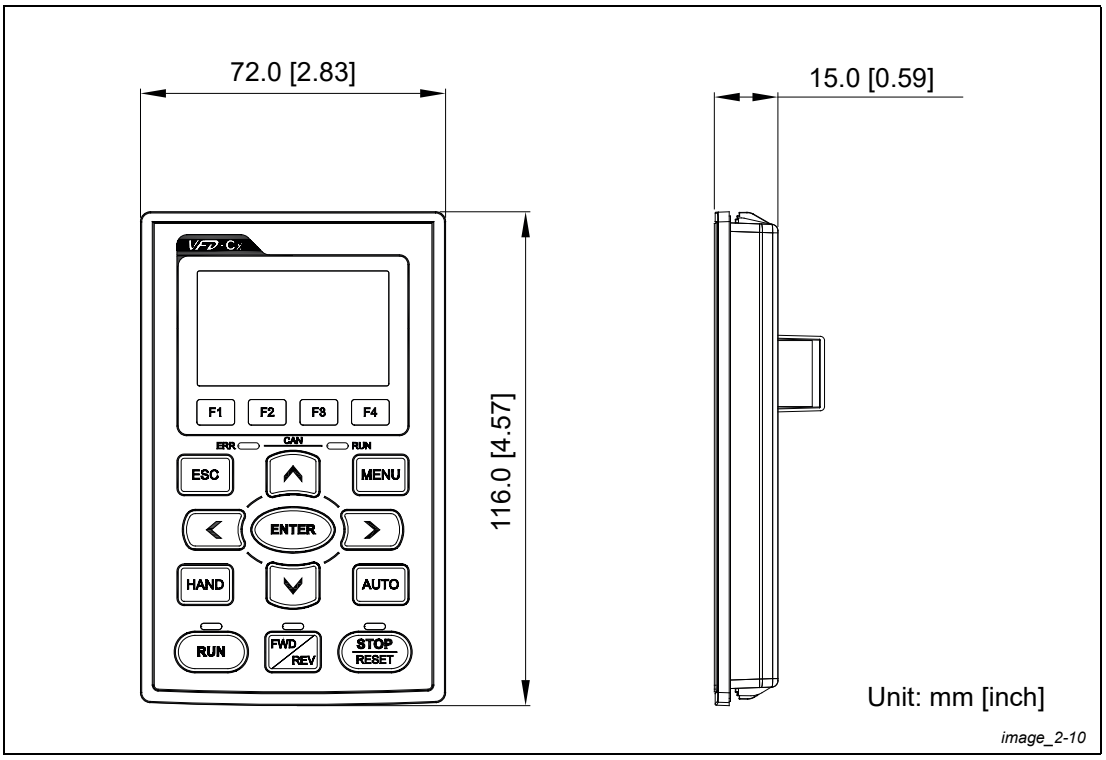


Fig. 2-10: Digital keypad Versi-KP-LCD

3 Installation

3.1 Mounting Clearance

- Prevent fiber particles, scraps of paper, shredded wood saw dust, metal particles, etc. from adhering to the heat sink.
- Install the AC motor drive in a metal cabinet. When installing one drive below another one, use a metal separation between the AC motor drives to prevent mutual heating and to prevent the risk of fire accident.
- Install the AC motor drive in Pollution Degree 2 environments only: Normally only nonconductive pollution occurs and temporary conductivity caused by condensation is expected.

The appearances shown in the following figures are for reference only.

Airflow direction: (Blue arrow) inflow (Red arrow) outflow Distance

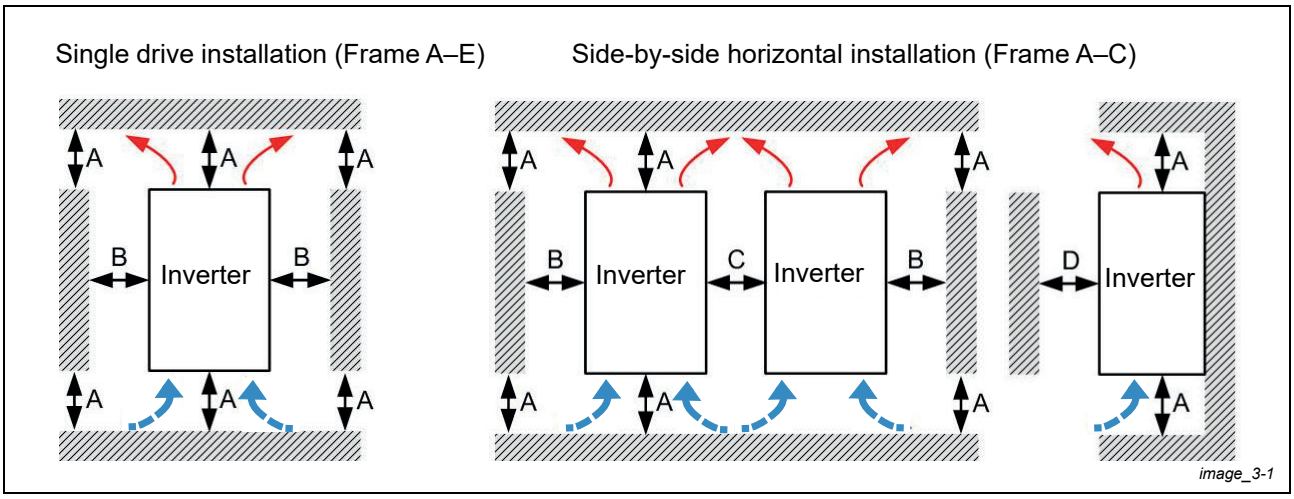


Fig. 3-1: Mounting clearances (1)

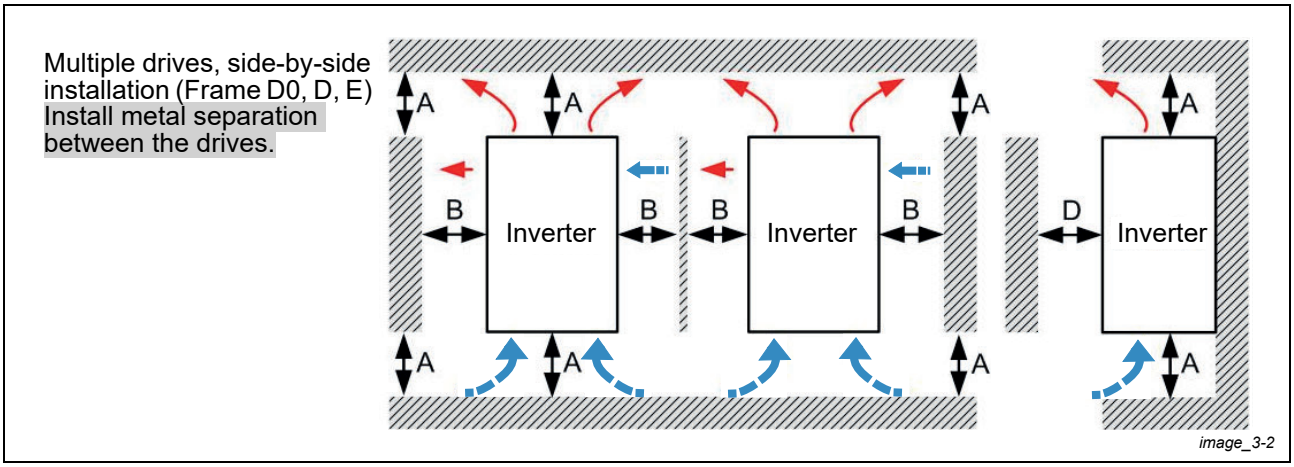


Fig. 3-2: Mounting clearances (2)

Multiple drives side-by-side vertical installation (Frame A–E)

When installing one AC motor drive below another one (top-bottom installation), use a metal separation between the drives to prevent mutual heating. The temperature measured at the fan's inflow side must be lower than the temperature measured at the operation side. If the fan's inflow temperature is higher, use a thicker or larger size of metal separation. Operation temperature is the temperature measured at 50 mm away from the fan's inflow side. (As shown in the figure below)

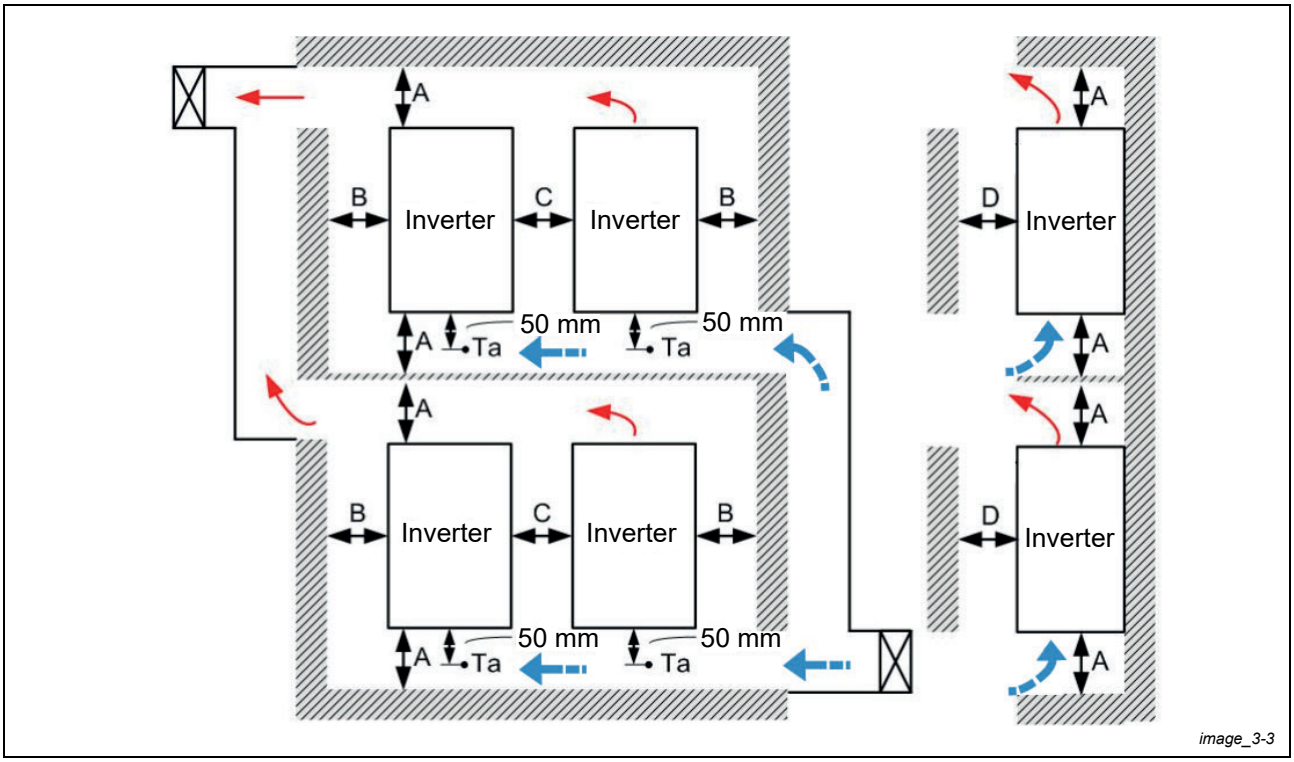


Fig. 3-3: Mounting clearances (3)

Frame	A [mm]	B [mm]	C [mm]	D [mm]
A–C	60	30	10	0
D0–E	100	50	—	0

Frame A	VD i 075-23C2-A; VD i 075-43C2-A/E; VD i 150-23C2-A; VD i 150-43C2-A/E; VD i 220-23C2-A; VD i 220-43C2A/E; VD i 370-23C2-A; VD i 370-43C2-A/E; VD i 400-43C2-A/E; VD i 550-43C2-A/E
Frame B	VD i 550-23C2-A; VD i 750-23C2-A; VD i 750-43C2-A/E; VD i 1100-23C2-A; VD i 1100-43C2-A/E; VD i 1500-43C2-A/E
Frame C	VD i 1500-23C2-A; VD i 1850-23C2-A; VD i 1850-43C2-A/E; VD i 2200-23C2-A; VD i 2200-43C2-A/E; VD i 3000-43C2-A/E
Frame D0	VD i 3700-43C2-S; VD i 4500-43C2-S; VD i 3700-43C2-U; VD i 4500-43C2-U
Frame D	VD i 3000-23C2-A/E; VD i 3700-23C2-A/E; VD i 5500-43C2-A/E; VD i 7500-43C2-A/E
Frame E	VD i 4500-23C2-A/E; VD i 5500-23C2-A/E; VD i 7500-23C2-A/E; VD i 9000-43C2-A/E; VD i 11000-43C2-A/E

Tab. 3-1: Minimum mounting clearances

NOTE

The minimum mounting clearances stated in the table above applies to AC motor drives frame A to D. A drive fails to follow the minimum mounting clearances may cause the fan to malfunction and heat dissipation problem.

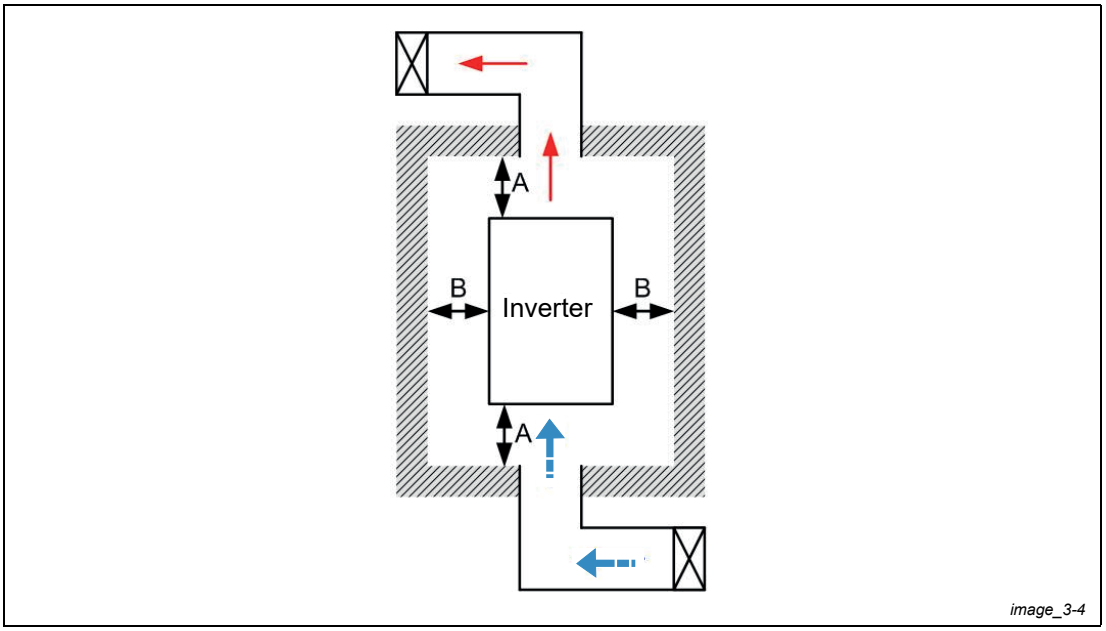


Fig. 3-4: Mounting clearances (4)

- The mounting clearances stated in the figure is for installing the drive in an open area. To install the drive in a confined space (such as cabinet or electric box), please follow the following three rules:
  - ① Keep the minimum mounting clearances.
  - ② Install a ventilation equipment or an air conditioner to keep surrounding temperature lower than operation temperature.
  - ③ Refer to parameter setting and set up Pr. 00-16, Pr. 00-17, and Pr. 06-55.
- The following table shows the heat dissipation and the required air volume when installing a single drive in a confined space. When installing multiple drives, the required air volume shall be multiplied by the number of the drives.
- Refer to the chart (Air flow rate for cooling) for ventilation equipment design and selection.
- Refer to the chart (Power dissipation) for air conditioner design and selection.
- Different control mode will affect the derating. See Pr. 06-55 for more information.
- Ambient temperature derating curve shows the derating status in different temperature in relation to different protection level.
- If UL Type 1 models need side by side installation, please remove top cover of Frame A–C, and please do not install conduit box of Frame D and above.
- Suitable for Installation in a Compartment Handling Conditioned Air (Plenum).

3.2 Air flow and power dissipation

Model No.	Air flow rate for cooling						Power dissipation of AC motor drive		
	Flow Rate [cfm]			Flow Rate [m^3/hr]			Power Dissipation [W]		
	External	Internal	Total	External	Internal	Total	External	Internal	Total
VD i 075-23C2-A	—	—	—	—	—	—	33	27	61
VD i 150-23C2-A	14	—	14	24	—	24	56	31	88
VD i 220-23C2-A	14	—	14	24	—	24	79	36	115
VD i 370-23C2-A	10	—	10	17	—	17	113	46	159
VD i 550-23C2-A	40	14	54	68	24	92	197	67	264
VD i 750-23C2-A	66	14	80	112	24	136	249	86	335
VD i 1100-23C2-A	58	14	73	99	24	124	409	121	529
VD i 1500-23C2-A	166	12	178	282	20	302	455	161	616
VD i 1850-23C2-A	166	12	178	282	20	302	549	184	733
VD i 2200-23C2-A	166	12	178	282	20	302	649	216	865
VD i 3000-23C2-A/E	179	30	209	304	51	355	913	186	1099
VD i 3700-23C2-A/E	179	30	209	304	51	355	1091	220	1311
VD i 4500-23C2-A/E	228	73	301	387	124	511	1251	267	1518
VD i 5500-23C2-A/E	228	73	301	387	124	511	1401	308	1709
VD i 7500-23C2-A/E	246	73	319	418	124	542	1770	369	2139
VD i 9000-23C2-A/E	224	112	336	381	190	571	2304	484	2788
VD i 075-43C2-A/E	—	—	—	—	—	—	33	25	59
VD i 150-43C2-A/E	—	—	—	—	—	—	45	29	74
VD i 220-43C2-A/E	14	—	14	24	—	24	71	33	104
VD i 370-43C2-A/E	10	—	10	17	—	17	103	38	141
VD i 400-43C2-A/E	10	—	10	17	—	17	116	42	158
VD i 550-43C2-A/E	10	—	10	17	—	17	134	46	180
VD i 750-43C2-A/E	40	14	54	68	24	92	216	76	292
VD i 1100-43C2-A/E	66	14	80	112	24	136	287	93	380
VD i 1500-43C2-A/E	58	14	73	99	24	124	396	122	518
VD i 1850-43C2-A/E	99	21	120	168	36	204	369	138	507
VD i 2200-43C2-A/E	99	21	120	168	36	204	476	158	635
VD i 3000-43C2-A/E	126	21	147	214	36	250	655	211	866
VD i 3700-43C2-S/U	179	30	209	304	51	355	809	184	993
VD i 4500-43C2-S/U	179	30	209	304	51	355	929	218	1147

Tab. 3-2: Air flow and power dissipation (1)

Model No.	Air flow rate for cooling						Power dissipation of AC motor drive		
	Flow Rate [cfm]			Flow Rate [m^3/hr]			Power Dissipation [W]		
	External	Internal	Total	External	Internal	Total	External	Internal	Total
VD i 5500-43C2-A/E	179	30	209	304	51	355	1156	257	1413
VD i 7500-43C2-A/E	186	30	216	316	51	367	1408	334	1742
VD i 9000-43C2-A/E	257	73	330	437	124	561	1693	399	2092
VD i 11000-43C2-A/E	223	73	296	379	124	503	2107	491	2599

- The required airflow shown in chart is for installing single drive in a confined space.
- When installing the multiple drives, the required air volume should be the required air volume for single drive X the number of the drives.

- The heat dissipation shown in the chart is for installing single drive in a confined space.
- When installing the multiple drives, volume of heat dissipation should be the heat dissipated for single drive X the number of the drives.
- Heat dissipation for each model is calculated by rated voltage, current and default carrier.

Tab. 3-2: Air flow and power dissipation (2)

4 Unpacking

The AC motor drive should be kept in the shipping carton or crate before installation. In order to retain the warranty coverage, the AC motor drive should be stored properly when it is not to be used for an extended period of time.

4.1 Unpacking

The AC motor drive is packed in the crate. Follows the following step for unpack:

4.1.1 Frame D

Crate 1 (VD i XXXX-XXC2-A)

① Loosen the 12 cover screws to open the crate.

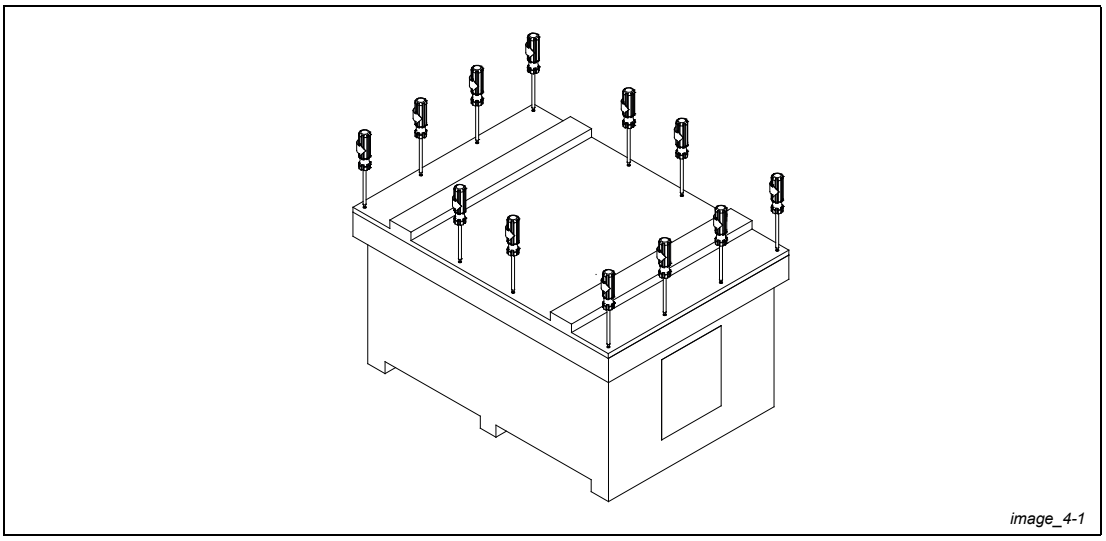


Fig. 4-1: Unpacking inverters of frame size D, Crate 1 (1)

② Remove the EPEs and manual

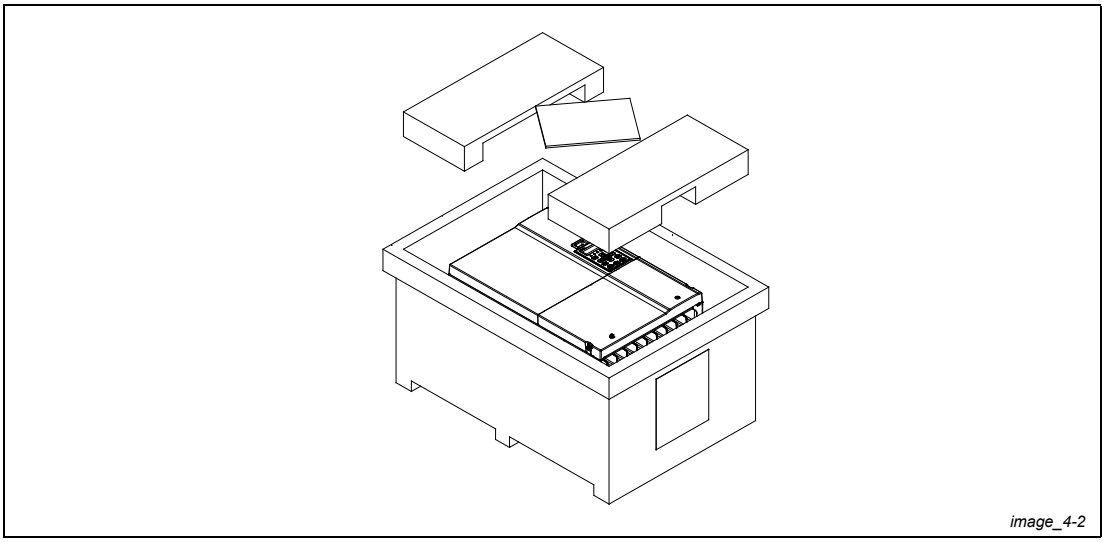


Fig. 4-2: Unpacking inverters of frame size D, Crate 1 (2)

③ Loosen the 8 screws that fastened on the pallet and remove the wooden plate.

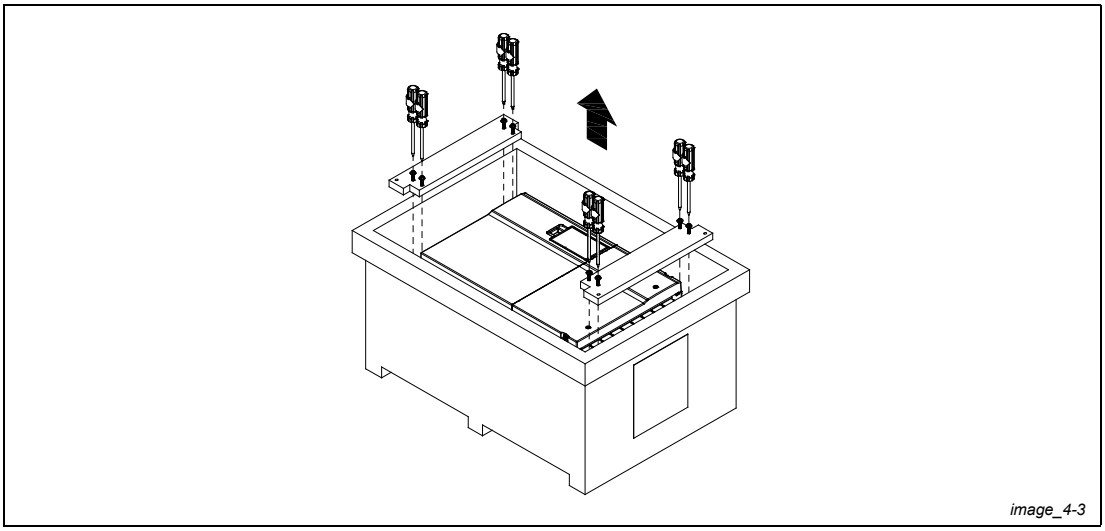


Fig. 4-3: Unpacking inverters of frame size D, Crate 1 (3)

④ Lift the drive by hooking the lifting hole. It is now ready for installation.

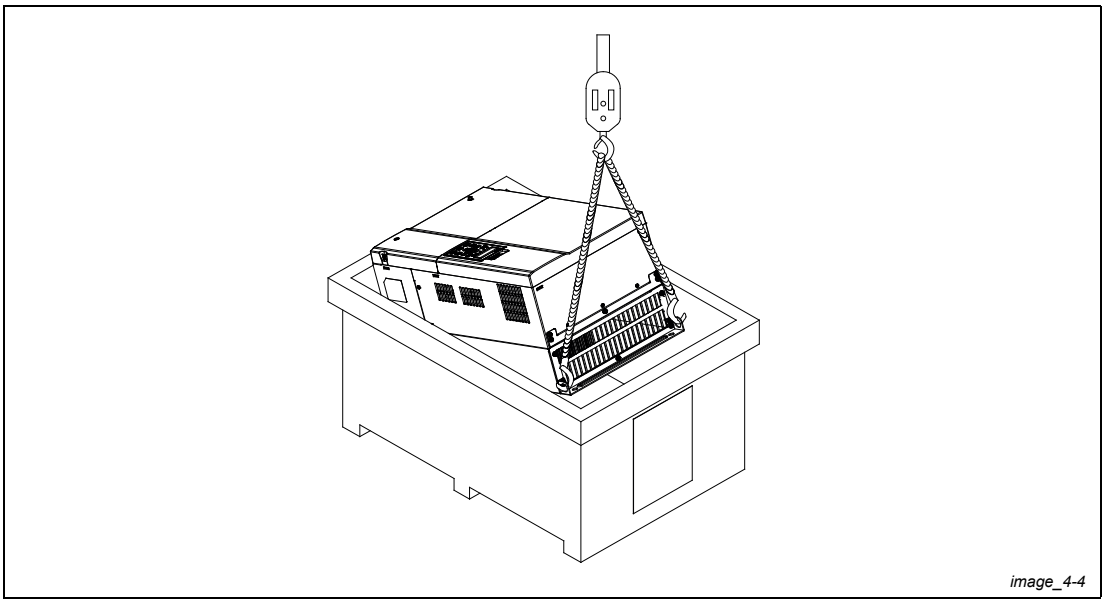


Fig. 4-4: Unpacking inverters of frame size D, Crate 1 (4)

Crate 2 (VD i XXXX-XXC2-E)

① Loosen the 4 screws on the iron plates. There are 4 iron plates and in total of 16 screws.

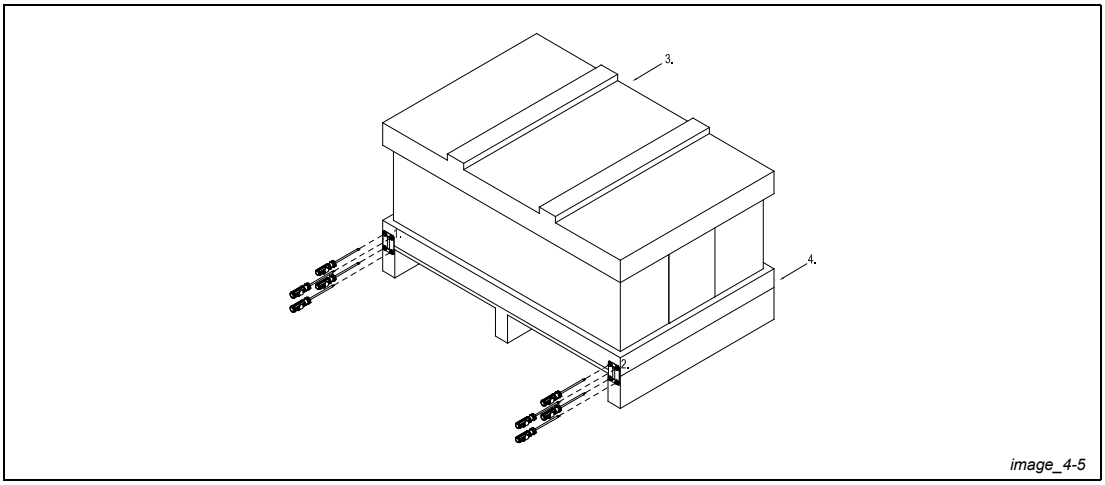


Fig. 4-5: Unpacking inverters of frame size D, Crate 2 (1)

② Remove the crate cover, EPEs, rubber and manual.

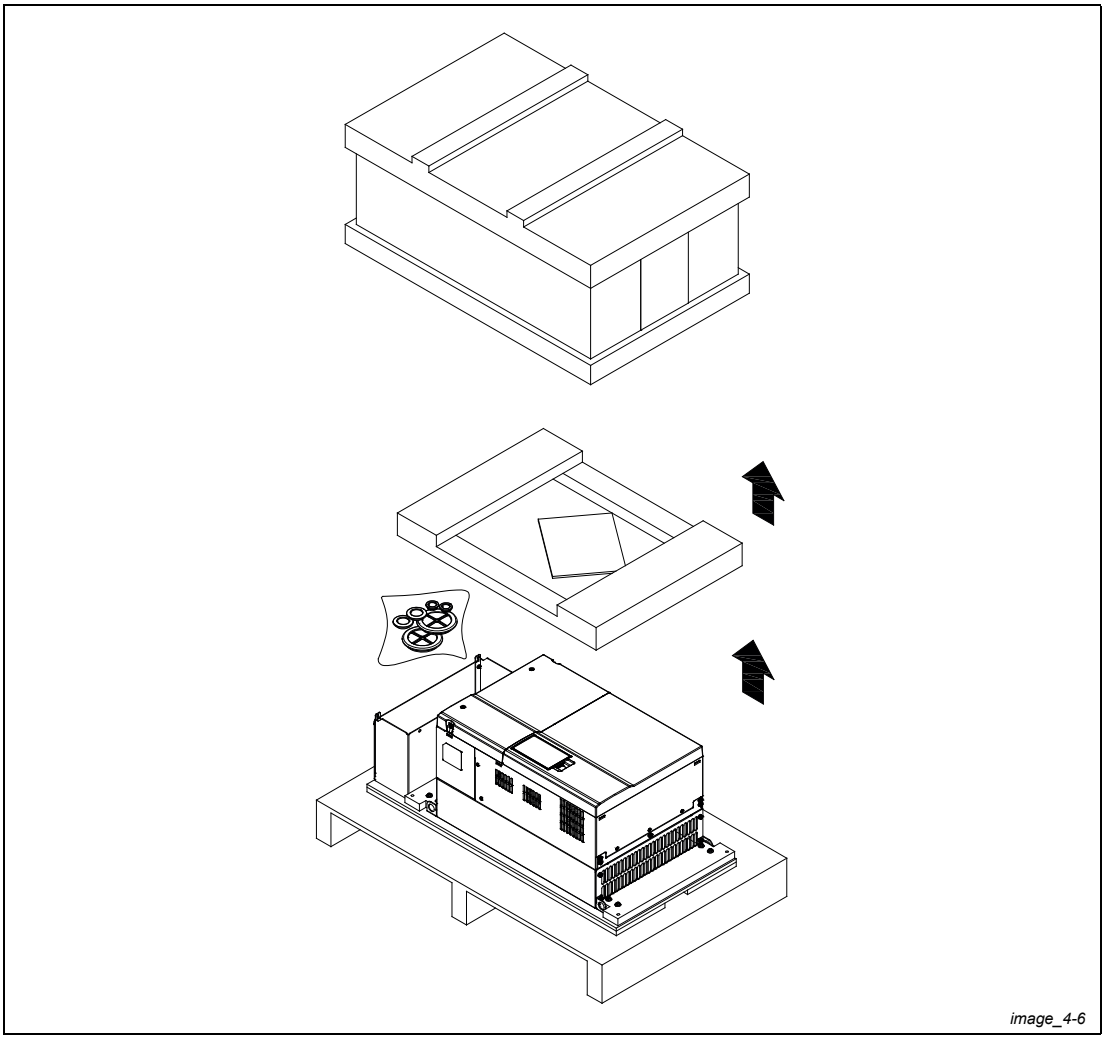


Fig. 4-6: Unpacking inverters of frame size D, Crate 2 (2)

③ Loosen the 10 screws on the pallet, remove the wooden plate.

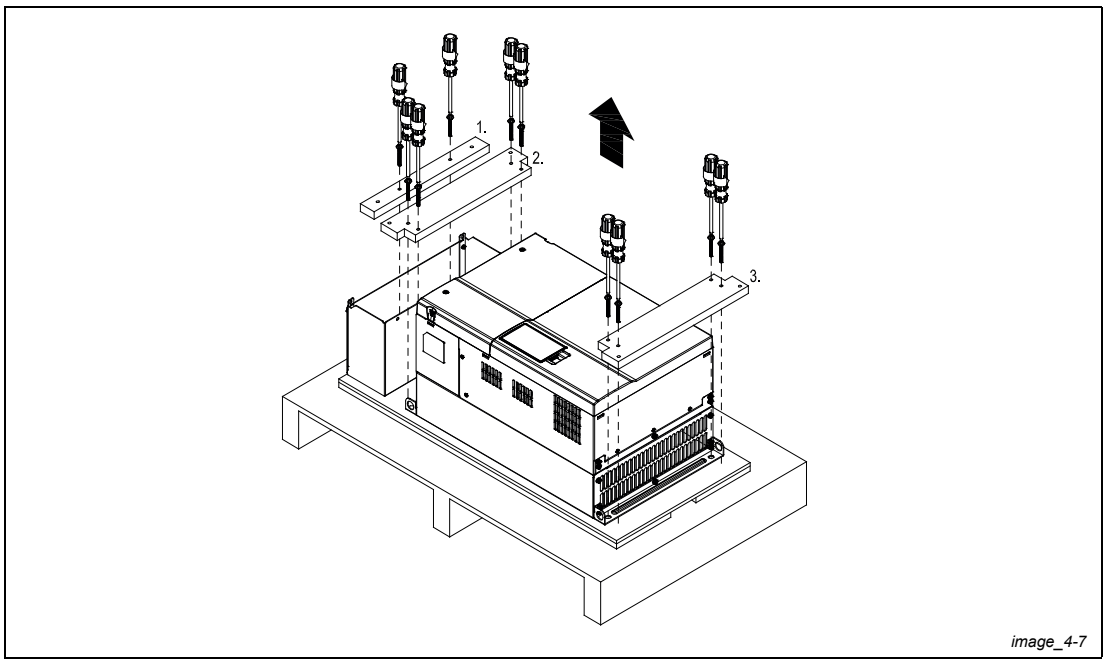


Fig. 4-7: Unpacking inverters of frame size D, Crate 2 (3)

④ Lift the drive by hooking the lifting hole. It is now ready for installation.

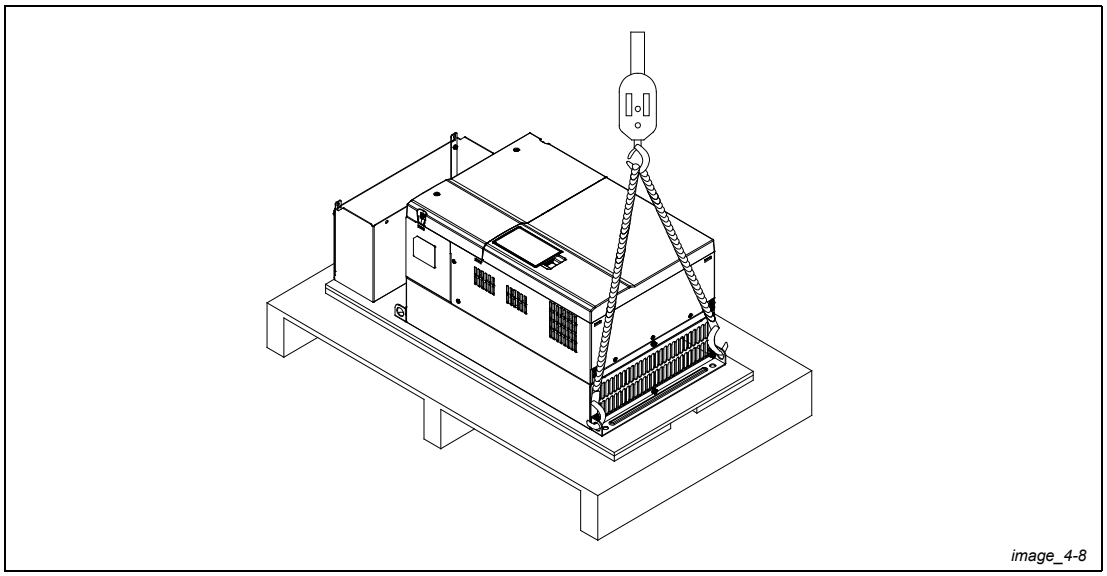


Fig. 4-8: Unpacking inverters of frame size D, Crate 2 (4)

4.1.2 Frame E

Crate 1 (VD i XXXXX-XXC2-A)

① Loosen the 4 screws on the iron plates. There are 4 iron plates and in total of 16 screws.

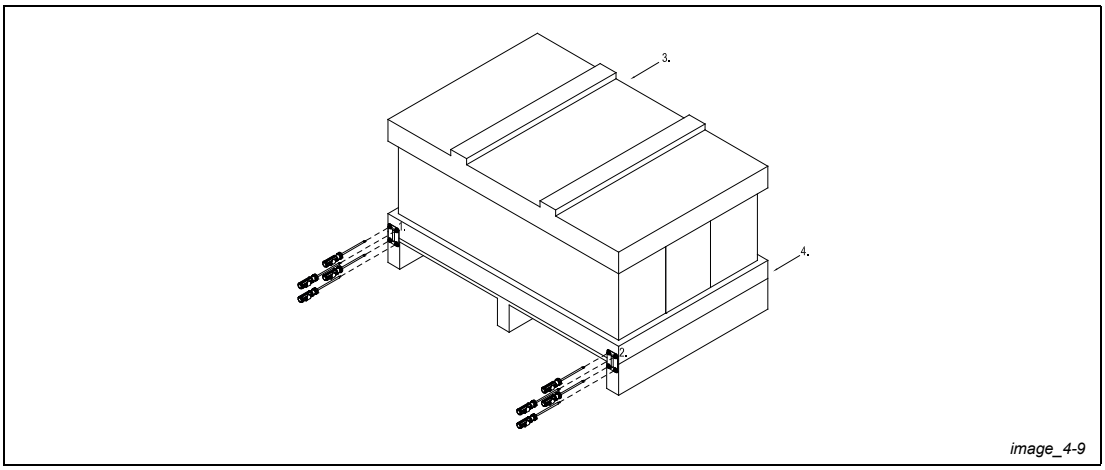


Fig. 4-9: Unpacking inverters of frame size E, Crate 1 (1)

② Remove the crate cover, EPEs and manual.

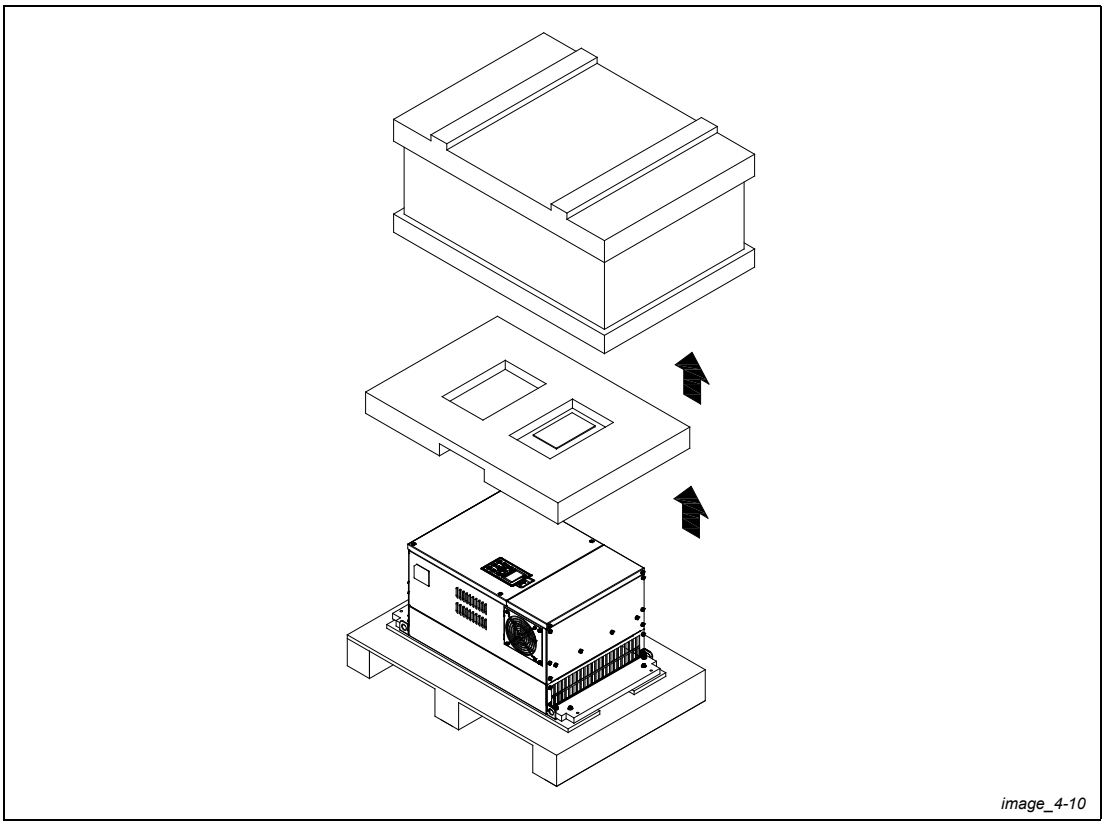


Fig. 4-10: Unpacking inverters of frame size E, Crate 1 (2)

③ Loosen the 8 screws on the pallet as shown in the following figure.

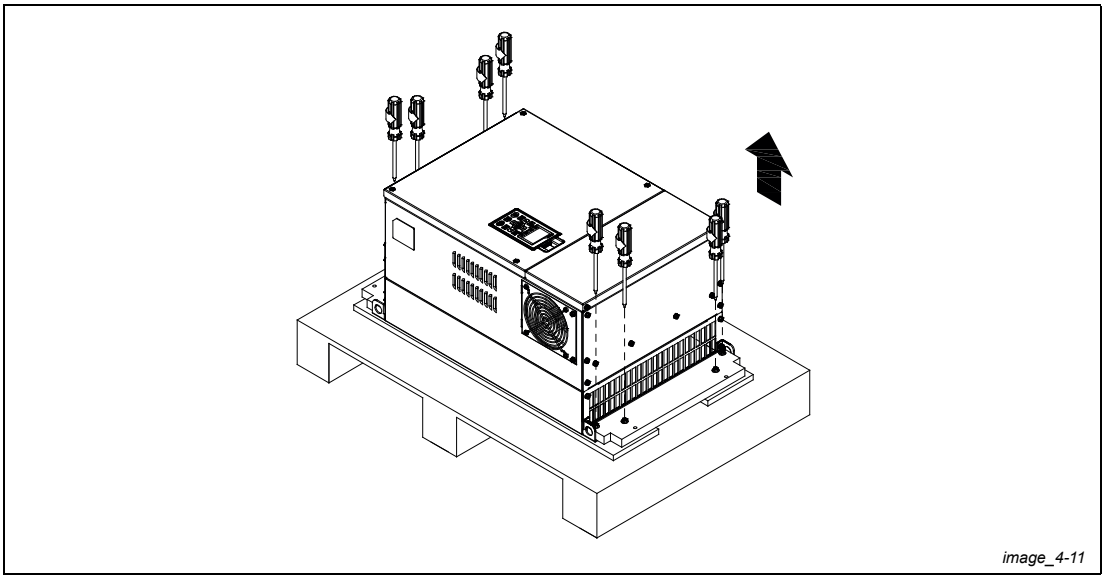


Fig. 4-11: Unpacking inverters of frame size E, Crate 1 (3)

④ Lift the drive by hooking the lifting hole. It is now ready for installation.

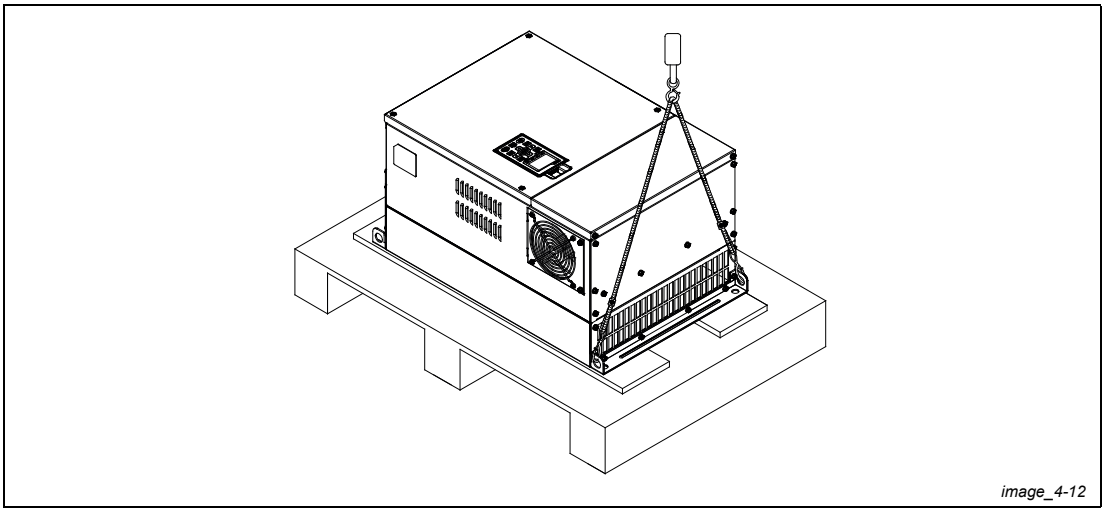


Fig. 4-12: Unpacking inverters of frame size E, Crate 1 (4)

Crate 2 (VD i XXXXX-XXC2-E)

① Loosen the 4 screws on the iron plates. There are 4 iron plates and in total of 16 screws.

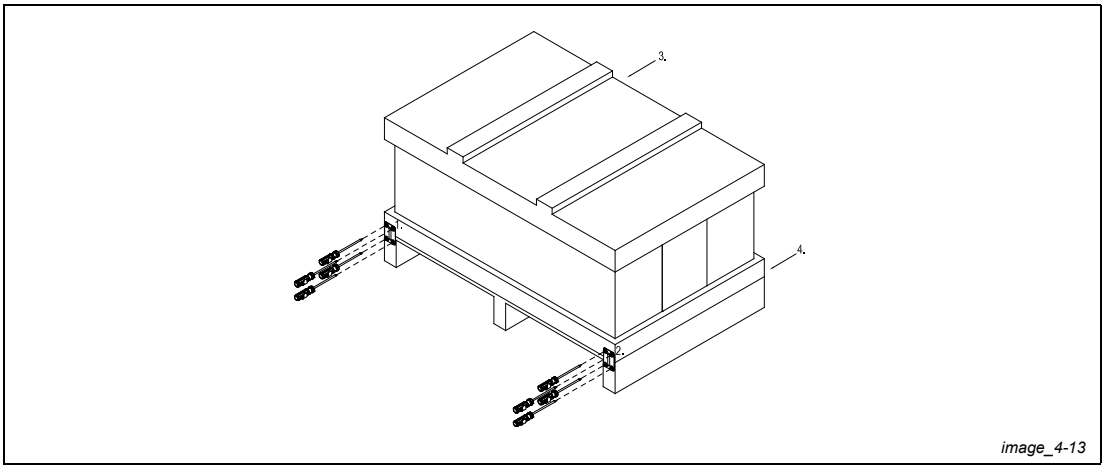


Fig. 4-13: Unpacking inverters of frame size E, Crate 2 (1)

② Remove the crate cover, EPEs, rubbers and manual.

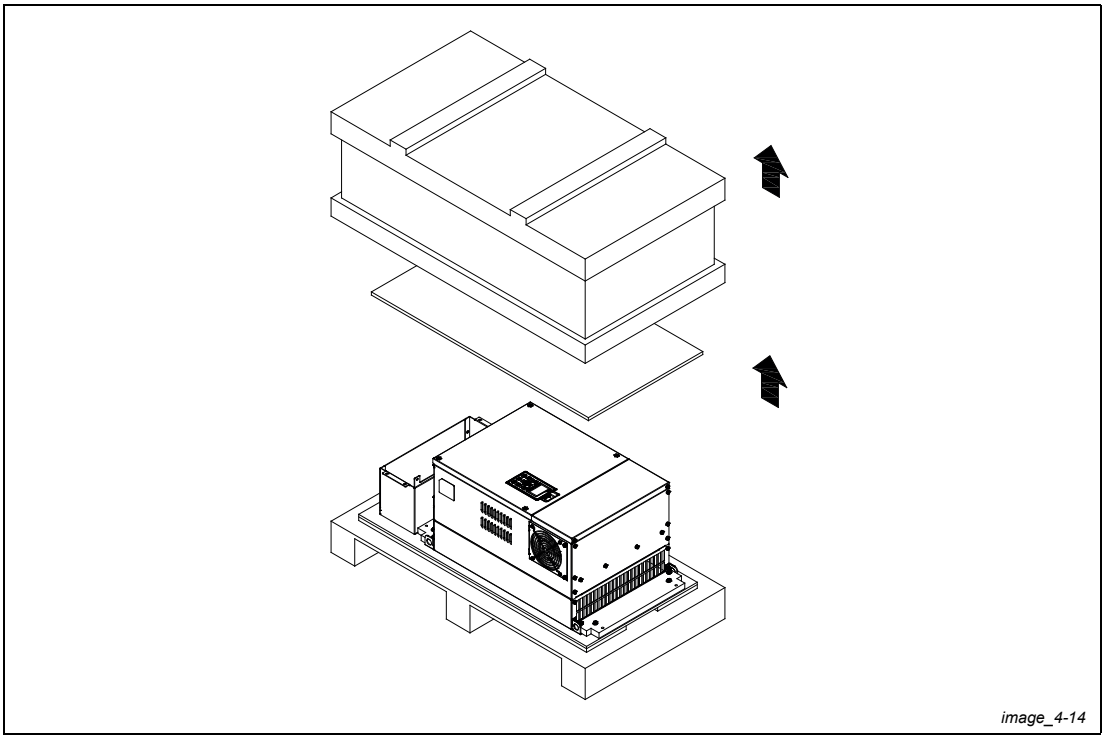


Fig. 4-14: Unpacking inverters of frame size E, Crate 2 (2)

③ Loosen the 10 screws on the pallet and remove the wooden plate.

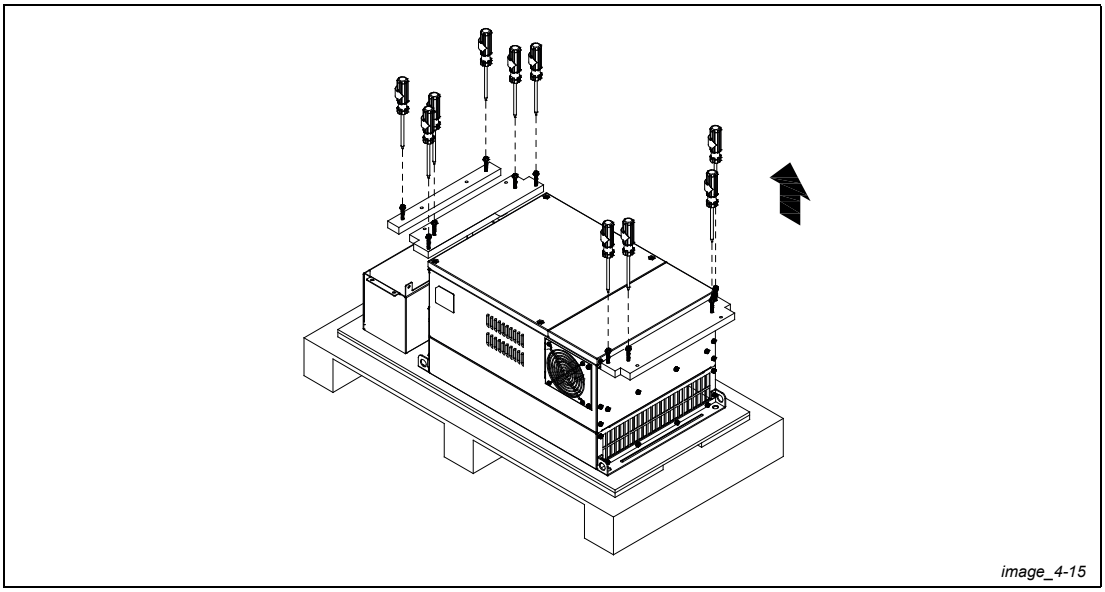


Fig. 4-15: Unpacking inverters of frame size E, Crate 2 (3)

④ Lift the drive by hooking the lifting hole. It is now ready for installation.

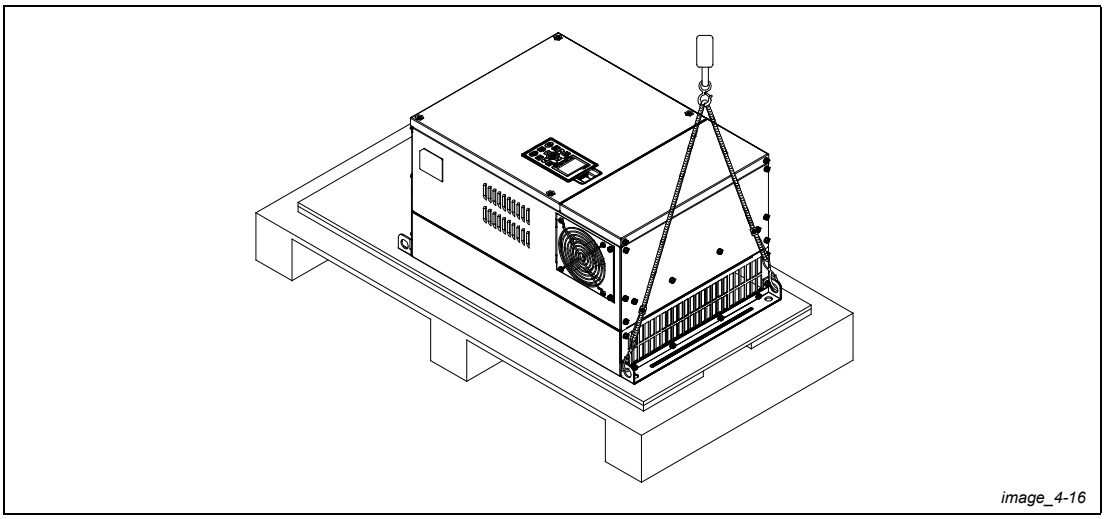


Fig. 4-16: Unpacking inverters of frame size E, Crate 2 (4)

4.2 The Lifting Hook

The arrows indicate the location of the lifting holes of frame D and E, as shown in figure below:

Frame D0

Applicable models: VD i 3700-43C2-S; VD i 4500-43C2-S; VD i 3700-43C2-U; VD i 4500-43C2-U

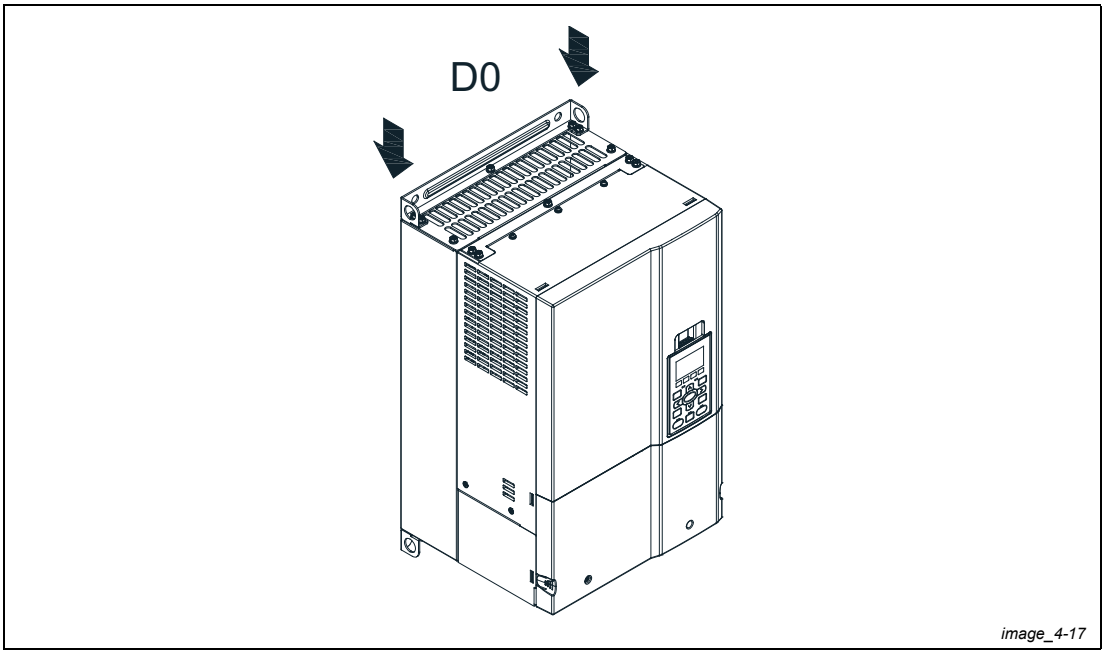


Fig. 4-17: Location of the lifting holes of frame D0

Frame D

Applicable models: VD i 3000-23C2-A; VD i 3700-23C2-A; VD i 5500-43C2-A; VD i 3000-23C2-E; VD i 3700-23C2-E; VD i 5500-43C2-E; VD i 7500-43C2-E

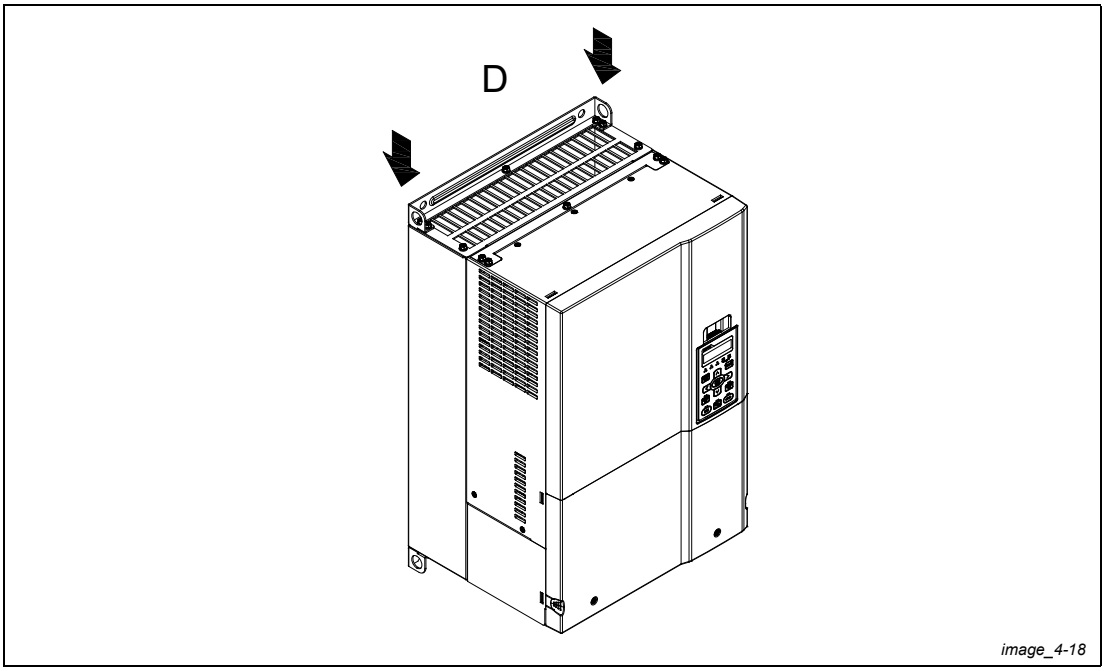


Fig. 4-18: Location of the lifting holes of frame D

Frame E

Applicable models: VD i 3000-23C2-A; VD i 3700-23C2-A; VD i 5500-43C2-A; VD i 11000-43C2-A; VD i 3000-23C2-E; VD i 3700-23C2-E; VD i 5500-43C2-E; VD i 7500-43C2-E; VD i 11000-43C2-E

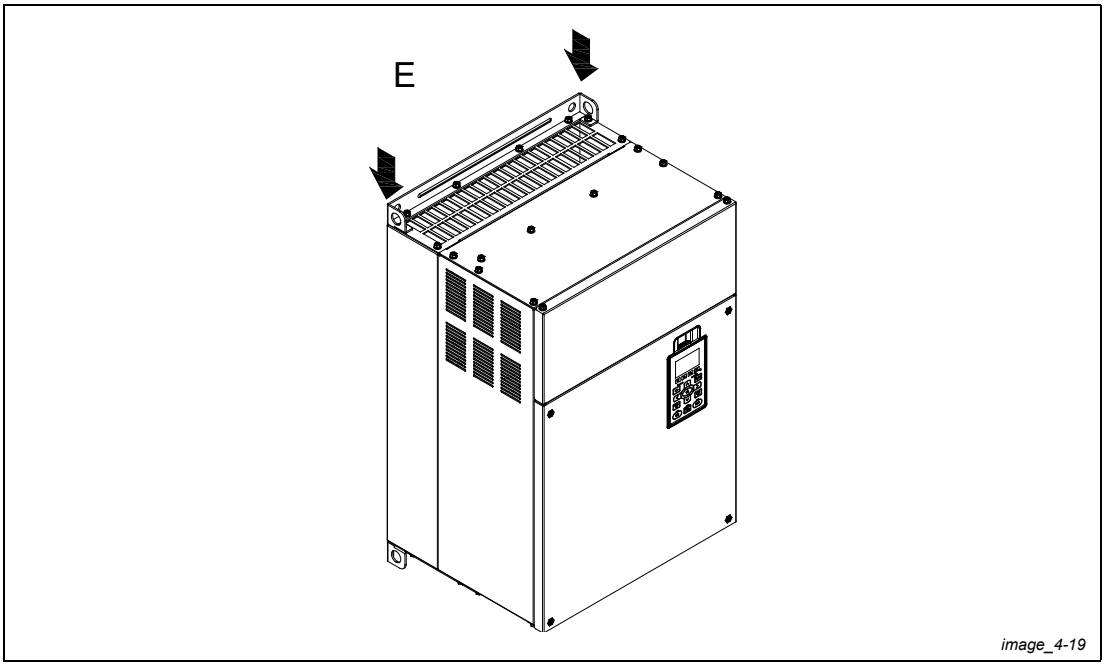


Fig. 4-19: Location of the lifting holes of frame E

Ensure the lifting hook properly goes through the lifting hole, as shown in the following diagram.

Applicable to Frame D0–E

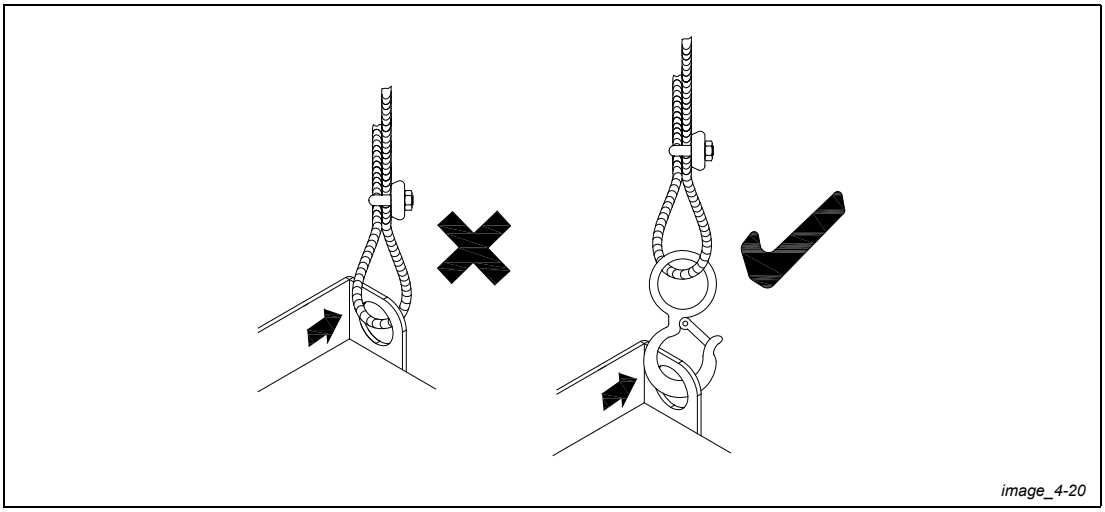


Fig. 4-20: Proper use of the lifting hook

Ensure the angle between the lifting holes and the lifting device is within the specification, as shown in the following figure.

Applicable to Frame D0–E

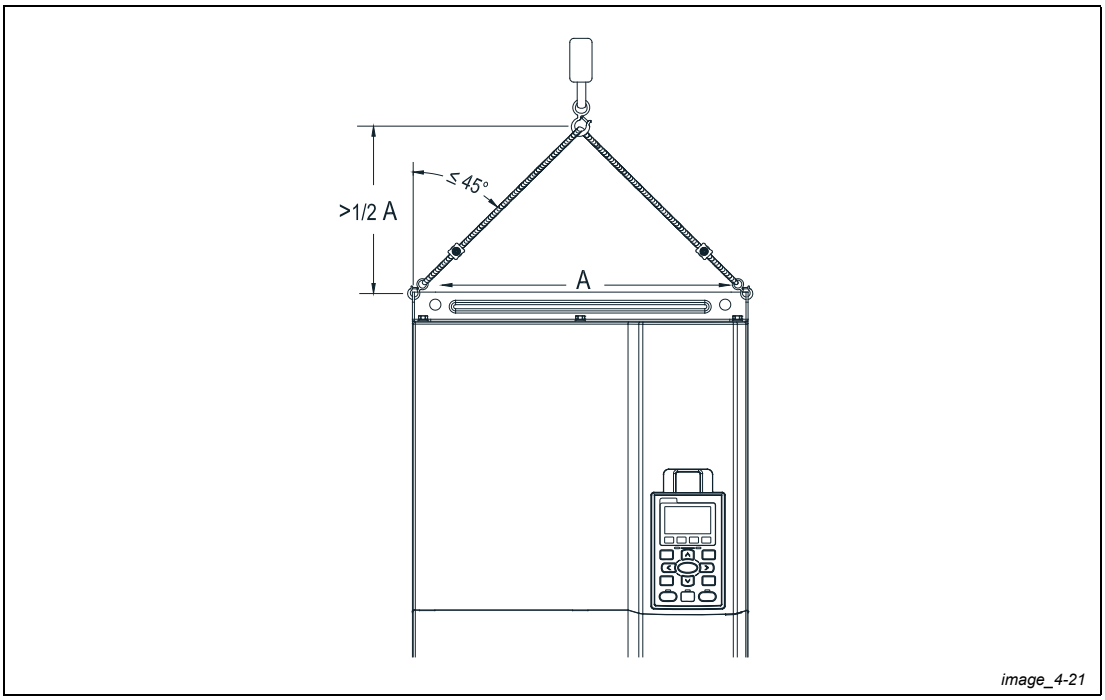
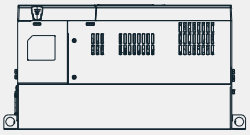
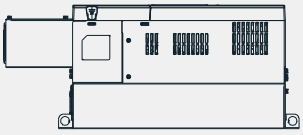
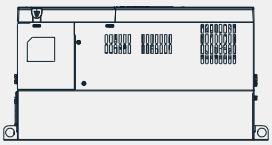
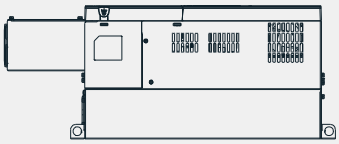
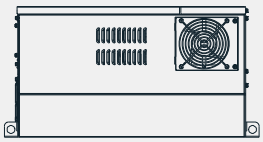
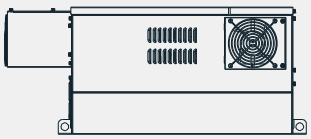


Fig. 4-21: Correct lifting method

4.3 Weight

Frame	Models	Models
D0	VD i XXXXX-XXC2-A: 27 kg/[59.5 lbs]	VD i XXXXX-XXC2-E: 29 kg/[63.9 lbs]
		
D	VD i XXXXX-XXC2-A: 37.6 kg/[82.9 lbs]	VD i XXXXX-XXC2-E: 40 kg/[88.2 lbs]
		
E	VD i XXXXXX-XXC2-A: 63.6 kg/[140.2 lbs]	VD i XXXXXX-XXC2-E:: 66 kg/[145.5 lbs]
		

Tab. 4-1: Weight of the AC motor drives

5 Wiring

After removing the front cover, examine if the power and control terminals are clearly noted. Please read following precautions before wiring.

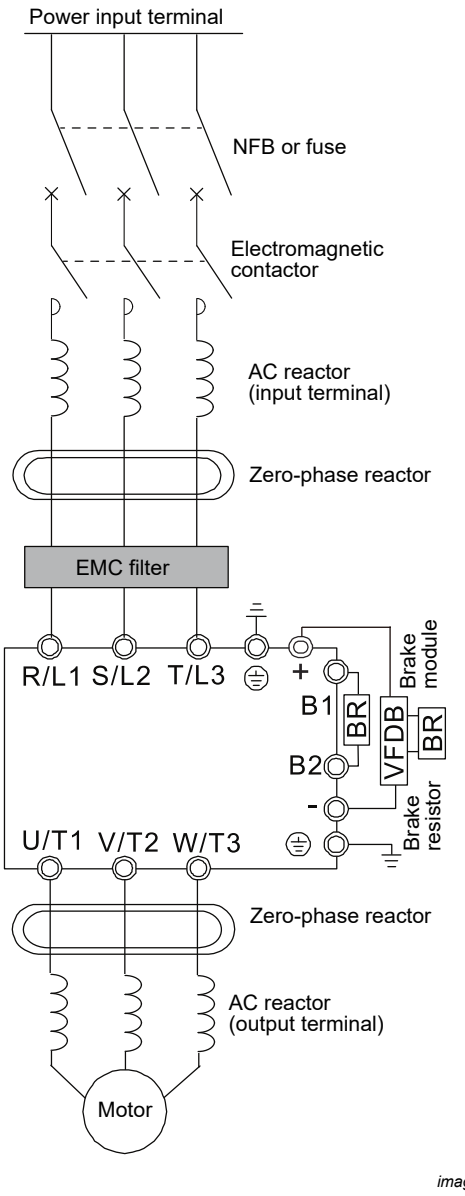
DANGER:

- It is crucial to cut off the AC motor drive power before any wiring installation are made. A charge may still remain in the DCBUS capacitors with hazardous voltages even if the power has been turned off. Therefore, it is suggested for users to measure the remaining voltage by DC voltage meter before wiring. For your personnel safety, please do not perform any wiring before the voltage drops to a safe level <25 V DC. Wiring installation with remaining voltage condition may cause sparks and short circuit.
- Only qualified personnel familiar with AC motor drives is allowed to perform installation, wiring and commissioning. Make sure the power is turned off before wiring to prevent electric shock.
- Make sure that power is only applied to the R/L1, S/L2, T/L3 terminals. Failure to comply may result in damage to the equipment. The voltage and current should lie within the range as indicated on the nameplate (Section 1.2 “Nameplate information”).
- All the units must be grounded directly to a common ground terminal to prevent lightning strike or electric shock.
- Please make sure to fasten the screw of the main circuit terminals to prevent sparks which is made by the loose screws due to vibration.

CAUTION:

- When wiring, please choose the wires with specification that complies with local regulation for your personnel safety.
- Check following items after finishing the wiring:
  - Are all connections correct?
  - Any loosen wires?
  - Any short-circuits between the terminals or to ground?

5.1 System wiring diagram



Power input terminal	Please refer to specification tables for details. Please contact your supplier for more information about the power input terminal.
NFB or fuse	There may be a large inrush current during power on. Please contact your supplier for more information about the selection of a suitable NFB or fuse.
Electromagnetic contactor	Switching the power ON/OFF before the magnetic contactor more than once an hour can cause damage to the drive.
AC reactor (input terminal)	When the mains power capacity exceeds 500 kVA, or when the drive is preceded by a capacitor bank, the instantaneous peak voltage and current generated may destroy the drive. In that case it is recommended to install an AC input reactor which will also improve the power factor and harmonics. The cable length between reactor and drive should be within 10 m. Please contact your supplier for more information about the AC reactor.
Zero-phase reactor	Used to reduce radiated emission, especially in environments with audio devices, and reduce input and output side interference. The effective range is AM band to 10 MHz. Please contact your supplier for more information about the zero-phase reactor.
EMC filter	Can be used to reduce electromagnetic interference. Please contact your supplier for more information about the EMC filter.
Brake module and Brake resistor (BR)	Used to shorten the deceleration time of the motor. Please contact your supplier for more information about the selection of brake resistors and units.
AC reactor (output terminal)	The motor cable length will affect switching current peaks. Please contact your supplier for more information about the cable length.

Fig. 5-1: System wiring diagram

5.2 Wiring

Wiring Diagram for Frame A–C

Input: 3-phase power

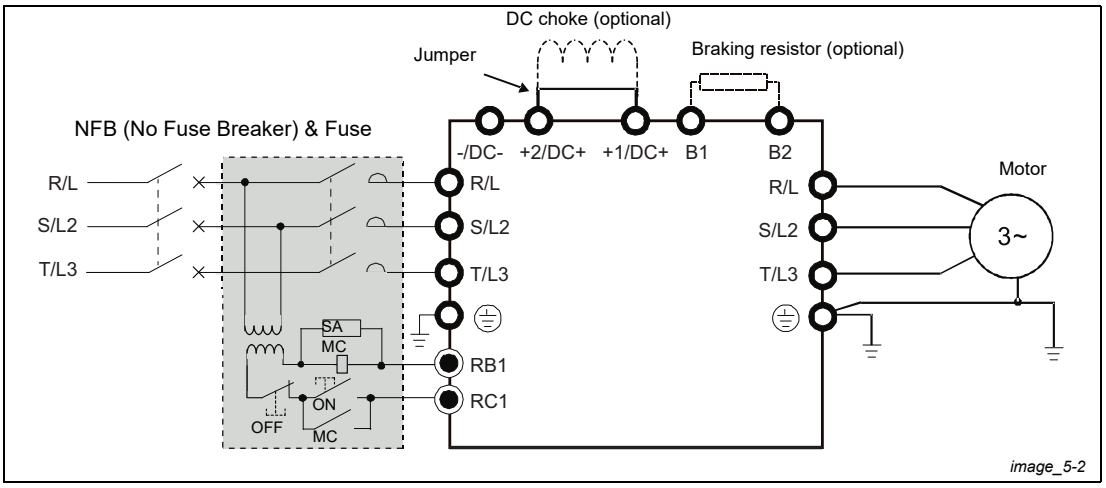


Fig. 5-2: Wiring Diagram for Frame A–C

NOTES

- It is recommended to install a protective circuit at RB1-RC1 to protect it from system damage.
- When a fault occurs, the multi-function output terminals will switch ON to shut the power and protect the power system.
- RB1-RC1 are multi-function output terminals.

Wiring Diagram for Frame D–E

Input: 3-phase power

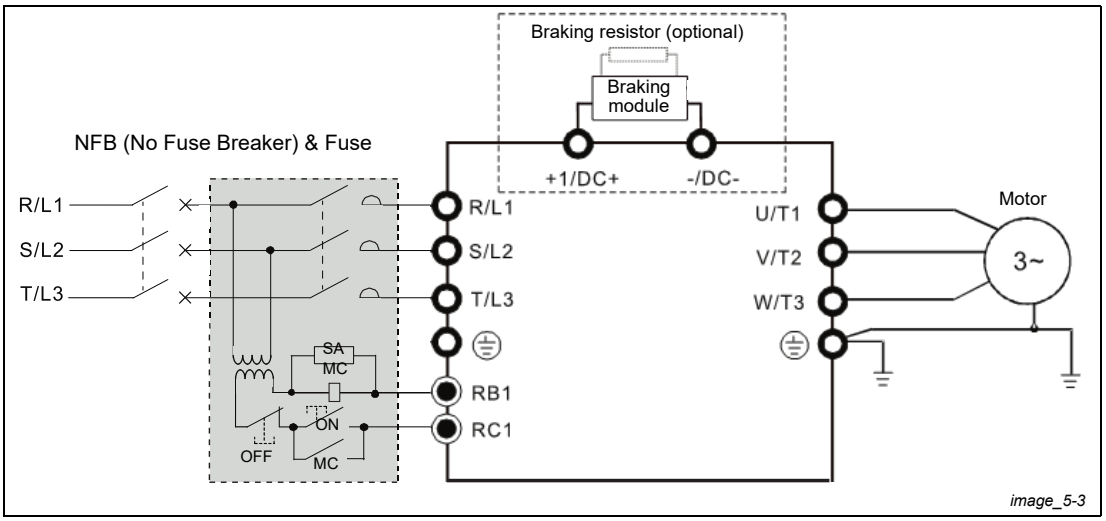


Fig. 5-3: Wiring Diagram for Frame D–E

NOTES

- It is recommended to install a protective circuit at RB1-RC1 to protect it from system damage.
- When a fault occurs, the multi-function output terminals will switch ON to shut the power and protect the power system.
- RB1-RC1 are multi-function output terminals.

5.2.1 Wiring of the input/output terminals

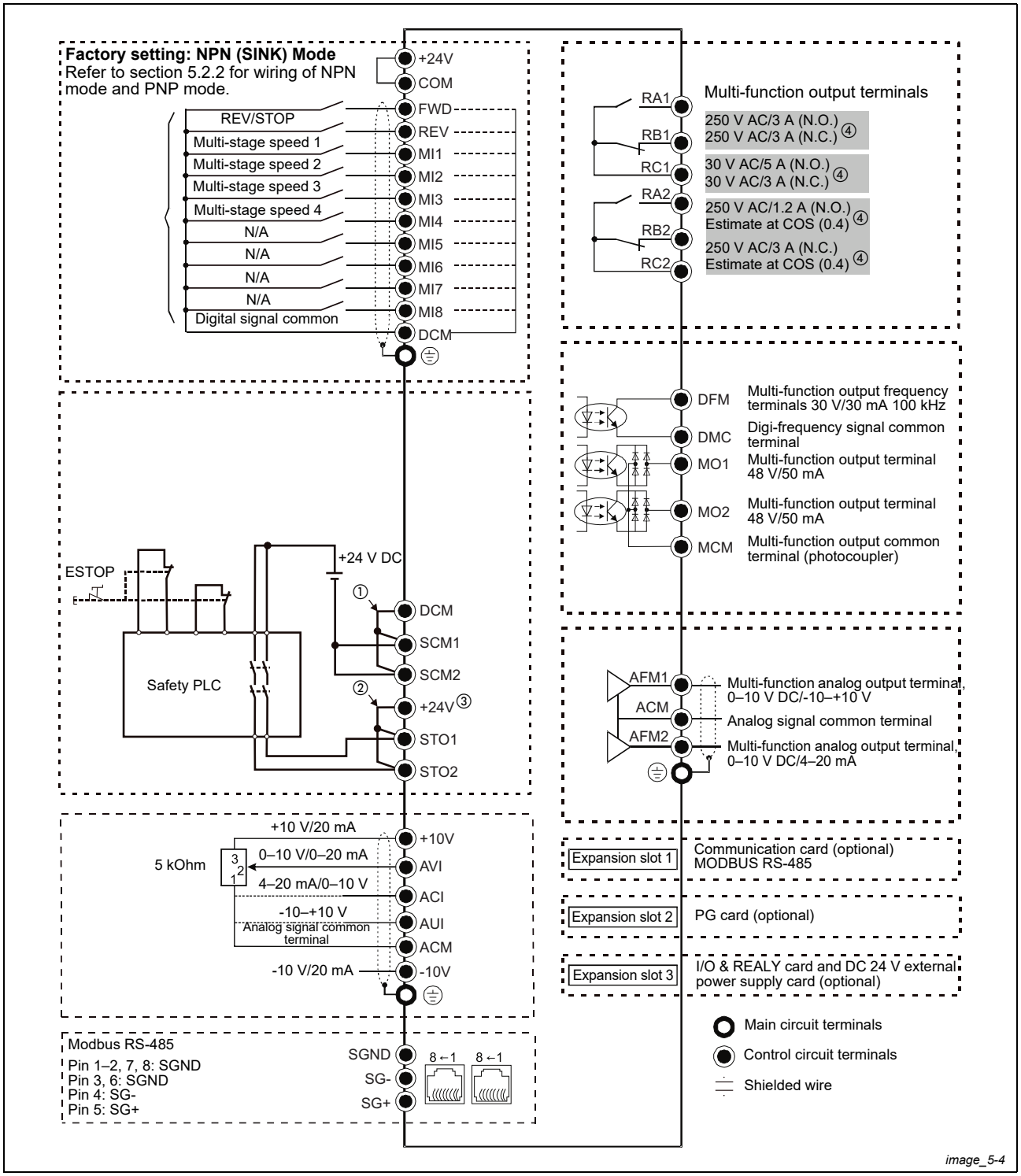


Fig. 5-4: Wiring of the control circuit terminals

① It´s a jumper between DCM, SCM1 and SCM2 as factory setting. Remove the jumper before using the safety function.

② It´s a jumper between +24 V, STO1 and STO2 as factory setting. Remove the jumper before using the safety function.

③ The +24 V is for STO only, and can not be used for other purposes.

④ N.O. = Normally Open N.C. = Normally Closed

NOTES

- MI8 can input 33 kHz pulse.
- Do NOT supply the mains voltage directly to these terminals.

5.2.2 SINK (NPN)/SOURCE (PNP) mode

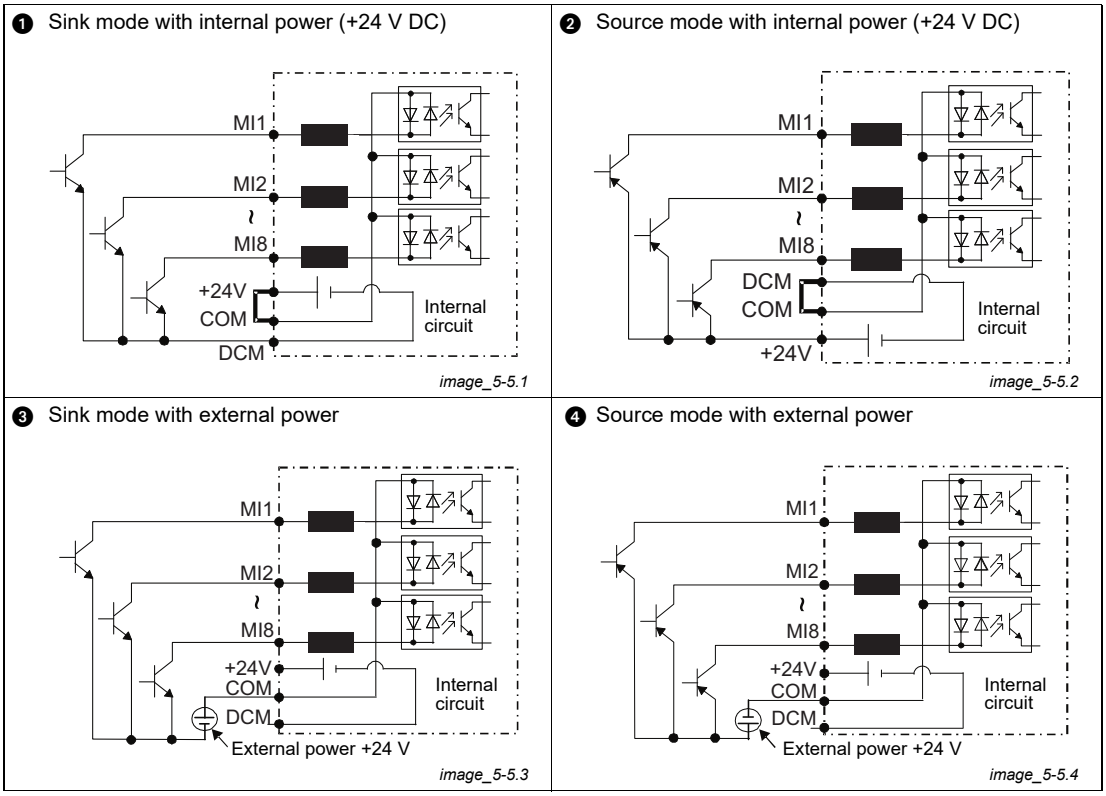


Fig. 5-5: Sink (NPN)/source (PNP) mode

6 Main Circuit Terminals

DANGER:

- Fasten the screws in the main circuit terminal to prevent sparks condition made by the loose screws due to vibration.
- When it needs to install the filter at the output side of terminals U/T1, V/T2, W/T3 on the AC motor drive. Please use inductance filter. Do not use phase-compensation capacitors or L-C (Inductance-Capacitance) or R-C (Resistance-Capacitance), unless approved by Peter Electronic.
- DO NOT connect phase-compensation capacitors or surge absorbers at the output terminals of AC motor drives.
- DO NOT connect [+1, -], [+2, -], [+1/DC+, -/DC-] or brake resistor directly to prevent drive damage.
- Ensure the insulation of the main circuit wiring in accordance with the relevant safety regulations.

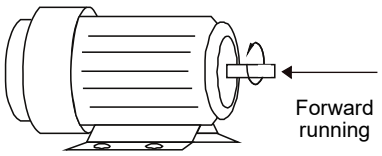
CAUTION:

Main power terminals

- Do not connect 3-phase model to one-phase power. R/L1, S/L2 and T/L3 has no phase-sequence requirement, it can be used upon random selection.
- It is recommended to add a magnetic contactor (MC) to the power input wiring to cut off power quickly and reduce malfunction when activating the protection function of the AC motor drive. Both ends of the MC should have an R-C surge absorber.
- Please use voltage and current within the specification.
- When using a general GFCI (Ground Fault Circuit Interrupter), select a current sensor with sensitivity of 200 mA or above and not less than 0.1-second operation time to avoid nuisance tripping.
- Please use the shielded wire or tube for the power wiring and ground the two ends of the shield wire or tube.
- Do NOT run/stop AC motor drives by turning the power ON/OFF. Run/stop AC motor drives by RUN/STOP command via control terminals or keypad. If you still need to run/stop AC motor drives by turning power ON/OFF, it is recommended to do so only ONCE per hour.
- Connect the drive to a 3-phase three-wire or 3-phase four-wire Wye system to comply with UL standards.

Output terminals for main circuit

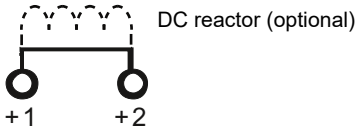
- Use well-insulated motor, suitable for inverter operation.
- When the AC drive output terminals U/T1, V/T2, and W/T3 are connected to the motor terminals U/T1, V/T2, and W/T3 respectively, the motor will rotate counterclockwise (as viewed on the shaft end of the motor, see the figure below) upon a forward operation command is received. To permanently reverse the direction of motor rotation, switch over any of the two motor leads:



image_caution_6-1

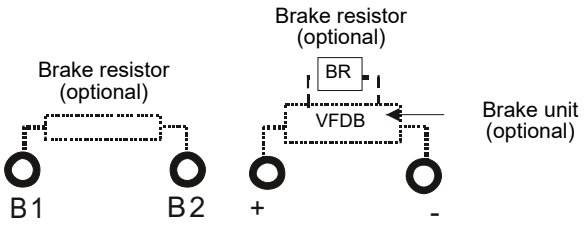
Terminals for connecting DC reactor, external brake resistor, external brake resistor and DC circuit

- This is the terminals used to connect the DC reactor to improve the power factor. For the factory setting, it connects the short-circuit object. Please remove this short-circuit object before connecting to the DC reactor.



image_caution_6-2

- Connect a brake resistor or brake unit in applications with frequent deceleration ramps, short deceleration time, too low brake torque or requiring increased brake torque.



image_caution_6-3

- The external brake resistor of Frame A, B and C should connect to the terminals (B1, B2) of AC motor drives.
- For those models without built-in brake resistor, please connect external brake unit and brake resistor (both of them are optional) to increase brake torque.
- When the terminals +1, +2 and - are not used, please leave the terminals open.
- DC+ and DC- are connected by common DCBUS, please refer to section 6.2 “Main circuit terminals” (Main Circuit Terminal) for the wiring terminal specification and the wire gauge information.
- For more information about the wire gauge for installing the brake unit please ask your distributor.

6.1 Main circuit diagram

Wiring Diagram for Frame A–C

Input: 3-phase power

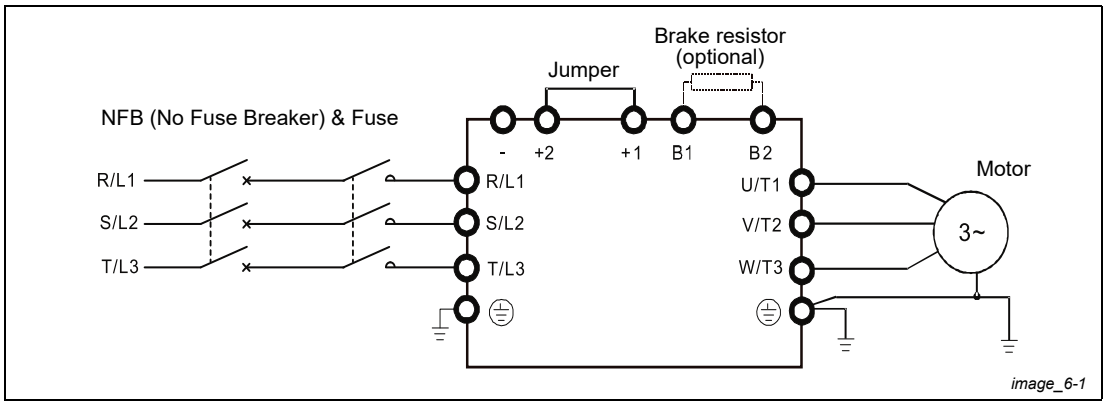


Fig. 6-1: Main circuit wiring diagram for frame A–C

Wiring Diagram for Frame A–C

Input: 3-phase power

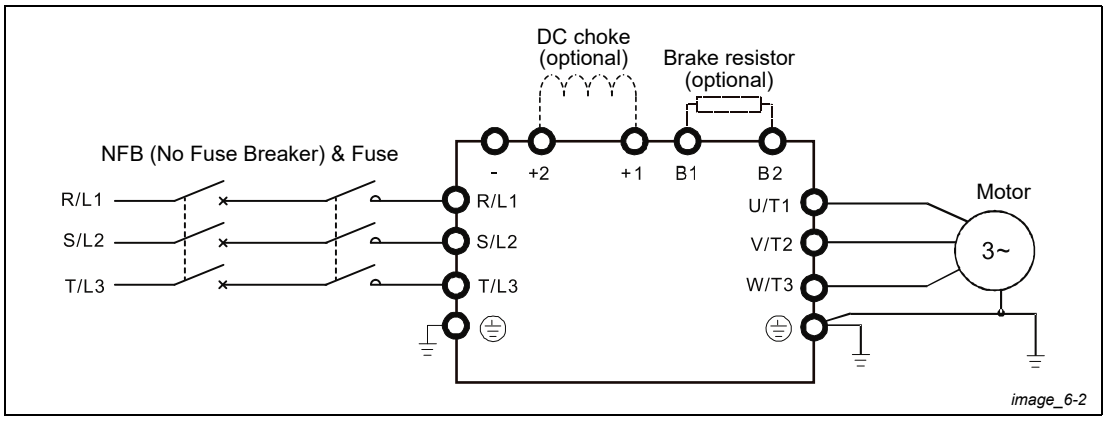


Fig. 6-2: Main circuit wiring diagram for frame A–C with DC choke

Wiring Diagram for Frame D–E

Input: 3-phase power

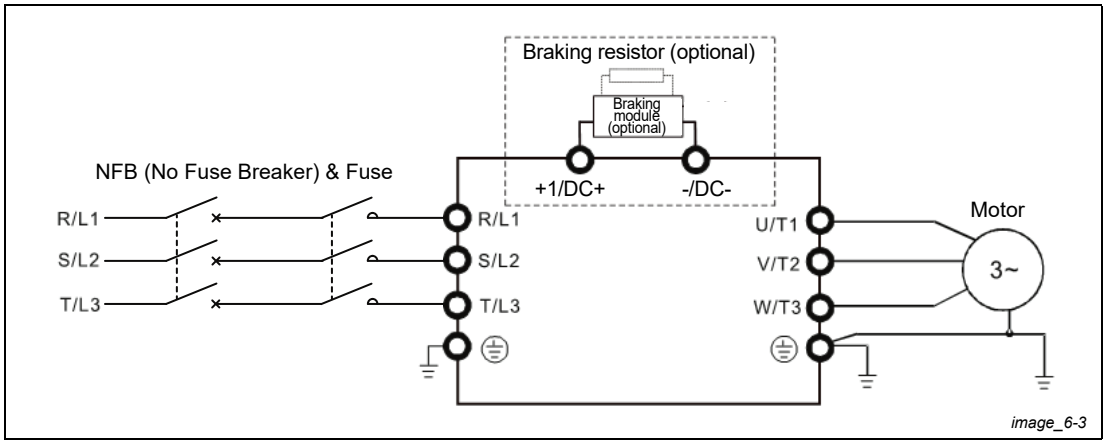


Fig. 6-3: Main circuit wiring diagram for frame D–E

NOTE

If the wiring between motor drive and motor is over 75 meters, please refer to the specifications of limits for motor cable length in section 8.3.

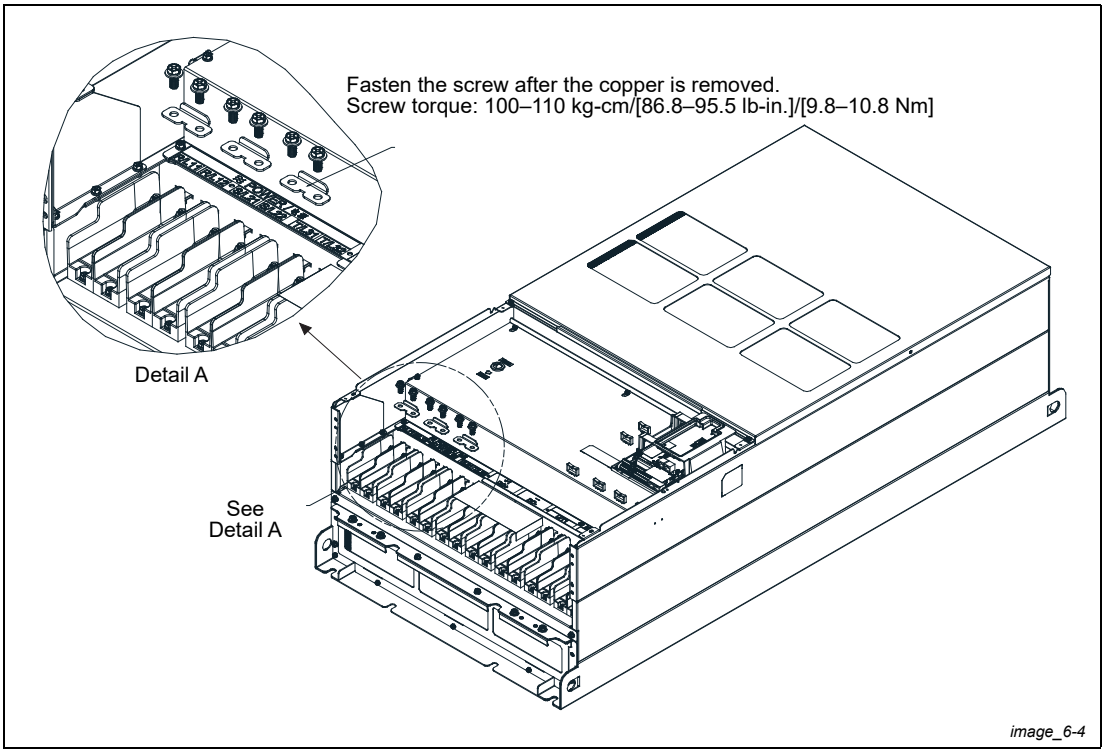


Fig. 6-4: Short circuit plate removement

Terminals	Description
R/L1, S/L2	Mains input terminals one-phase
R/L1, S/L2, T/L3	Mains input terminals three-phase
U/T1, V/T2, W/T3	Motor output terminals for connecting three-phase IM and PM motors.
+1, +2	Connections for DC reactor to improve the power factor and harmonics. Remove the jumper when using a DC reactor.
DC+, DC-	Connections for brake unit Common DC BUS
B1, B2	Connections for brake resistor (optional)
⏚	Ground connection; comply with local regulations.

Tab. 6-1: Main power terminals

6.2 Main circuit terminals

- Use the specified ring lug for main circuit terminal wiring. See “Figure 1” and “Figure 2” in fig. 6-5 for ring lug specifications. For other types of wiring use the wires that comply with the local regulations.
- After crimping the wire to the ring lug (must be UL approved), UL and CSA approved recognized component (YDPU2), install heat shrink tubing rated at a minimum of 600 V AC insulation over the live part. Refer to “Figure 2” in fig. 6-5 below.

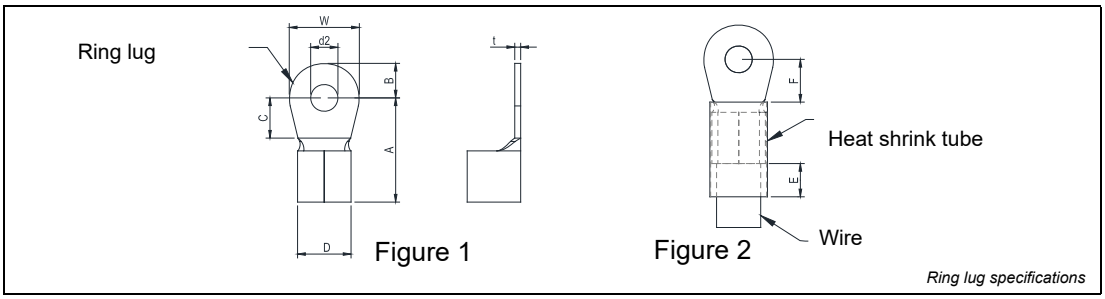


Fig. 6-5: Ring lug and insulated heat shrink tubing (UL compliant) specifications

Terminal specification

The part number of the ring lugs (produced by K.S. Terminals Inc.) in the table below are for reference only. You can buy other ring lugs of your choice to match with different frame sizes.

Frame	AWG	Kit P/N	A (MAX)	B (MAX)	C (MIN)	D (MAX)	d2 (MIN)	E (MIN)	F (MIN)	W (MAX)	t (MAX)
A	16	RNBL2-4	20.0	5.0	5.5	9.0	4.3	8.0	5.5	10.0	1.5
	14										
	12	RNBL5-4									
	10										
	8	RNBS8-4									
B	8	RNBM8-5	28.0	7.0	7.5	14.0	5.2	13.0	12.0	14.0	1.5
	6	RNB14-5									
	4	RNBS22-5									
C	6	RNB14-8	40.0	12.0	12.5	22.0	8.3	13.0	12.5	24.0	2.5
		RNB22-8									
	2	RNBS38-8									
	1/0	RNB60-8									
D0	4	RNB22-8	44.0	13.0	10.0	15.0	8.3	13.0	17.0	26.0	3.0
	2	RNBS38-8									
	1/0	SQNBS60-8	40.0	11.0	10.0	23.0	8.3	13.0	14.0 ①	24.0	4.5
	2/0	SQNBS80-8									
D	4	RNB22-8	50.0	16.0	10.0	27.0	8.3	13.0	14.0	28.0	6.0
	2	RNBS38-8									
	1/0	RNB60-8									
	2/0	RNB70-8									
	3/0	RNB80-8									
	4/0	SQNBS100-8									
	250MCM	SQNBS150-8									
	300MCM	SQNBS150-8									
E	1/0	RNB60-8	53.0	16.0	17.0	26.5	8.4	13.0	17.0	31.0	5.0
	2/0	RNB70-8									
	3/0	RNB80-8									
	4/0	RNB100-8									

Tab. 6-2: Terminal specification (terminal in Fig. 6-5)

① F(MAX) = 16.5

Frame A

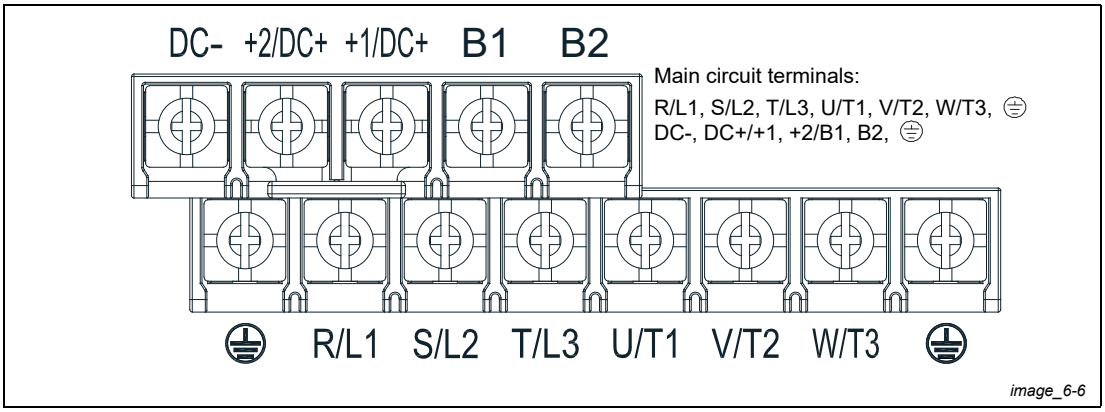


Fig. 6-6: Frame A

- If you install at Ta 50 °C environment, please select copper wire with voltage rating 600 V and temperature resistant 75 °C or 90 °C.
- If you install at Ta 50 °C above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, DC+, DC, B1, B2			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 075-23C2-A	10 mm² [8 AWG]	2.5 mm² [14 AWG]	M4 20 kg-cm [17.4 lb-in.] [1.96 Nm]	2.5 mm² [14 AWG]	2.5 mm² [14 AWG]	M4 20 kg-cm [17.4 lb-in.] [1.96 Nm]
VD i 150-23C2-A		4.0 mm² [12 AWG]		4.0 mm² [12 AWG]	4.0 mm² [12 AWG]	
VD i 220-23C2-A		6.0 mm² [10 AWG]		6.0 mm² [10 AWG]	6.0 mm² [10 AWG]	
VD i 370-23C2-A		10.0 mm² [8 AWG]		10.0 mm² [8 AWG]	10.0 mm² [8 AWG]	
VD i 075-43C2-A		1.5 mm² [16 AWG]		2.5 mm² [14 AWG]	2.5 mm² [14 AWG]	
VD i 150-43C2-A						
VD i 220-43C2-A		2.5 mm² [14 AWG]				
VD i 370-43C2-A		6.0 mm² [10 AWG]		6.0 mm² [10 AWG]	6.0 mm² [10 AWG]	
VD i 400-43C2-A						
VD i 550-43C2-A						
VD i 075-43C2-E		1.5 mm² [16 AWG]		2.5 mm² [14 AWG]	2.5 mm² [14 AWG]	
VD i 150-43C2-E						
VD i 220-43C2-E		2.5 mm² [14 AWG]				
VD i 370-43C2-E		6.0 mm² [10 AWG]		6.0 mm² [10 AWG]	6.0 mm² [10 AWG]	
VD i 400-43C2-E						
VD i 550-43C2-E						

Tab. 6-3: Usable wirings for main circuit terminals frame A

Frame B

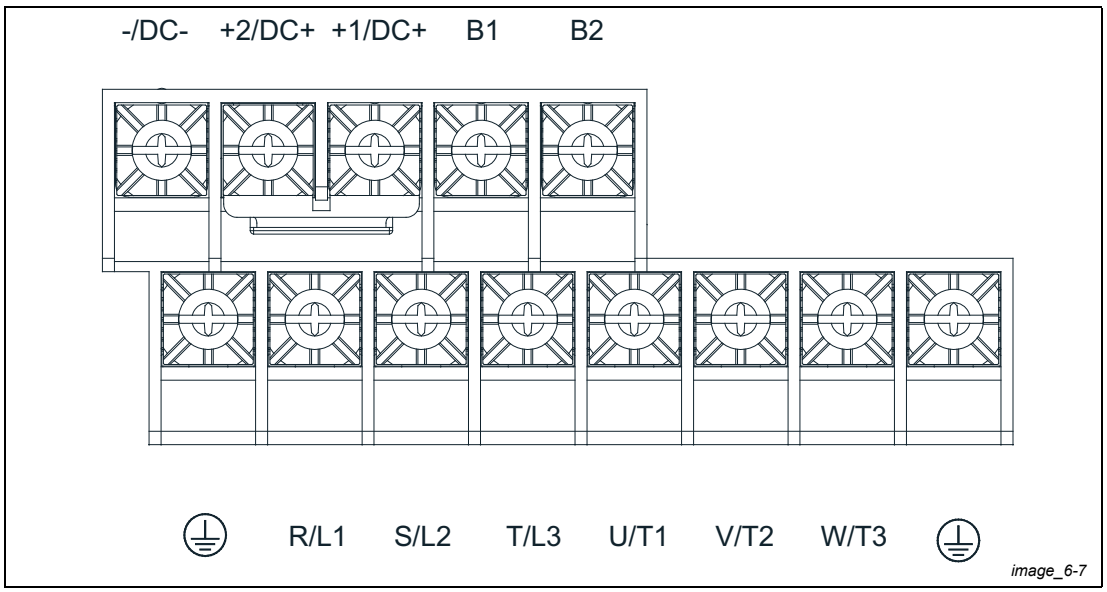


Fig. 6-7: Frame B

- If you install at Ta 50 °C environment, please select copper wire with voltage rating 600 V and temperature resistant 75 °C or 90 °C.
- If you install at Ta 50 °C above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For VD i 1100-23C2-A, if you install at Ta 45 °C above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.
- Wire fix to pole +2/DC+ and +1/DC+ with 45 kg-cm/[39.0 lb-in]/[4.42 Nm] (±10%).

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, -/DC-, +1/DC+, +2/DC+, B1, B2			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 550-23C2-A	25 mm² [4 AWG]	10 mm² [8 AWG]	M5 35 kg-cm [30.4 b-in.] [3.43 Nm]	10 mm² [8 AWG]	10 mm² [8 AWG]	M5 35 kg-cm [30.4 lb-in.] [3.43 Nm]
VD i 750-23C2-A		16 mm² [6 AWG]		16 mm² [6 AWG]	16 mm² [6 AWG]	
VD i 1100-23C2-A		25 mm² [4 AWG]		25 mm² [4 AWG]	25 mm² [4 AWG]	
VD i 750-43C2-A		10 mm² [8 AWG]		10 mm² [8 AWG]	10 mm² [8 AWG]	
VD i 750-43C2E						
VD i 1100-43C2-A						
VD i 1100-43C2-E						
VD i 1500-43C2-A		16 mm² [6 AWG]		16 mm² [6 AWG]	16 mm² [6 AWG]	
VD i 1500-43C2-E						

Tab. 6-4: Usable wirings for frame B

Frame C

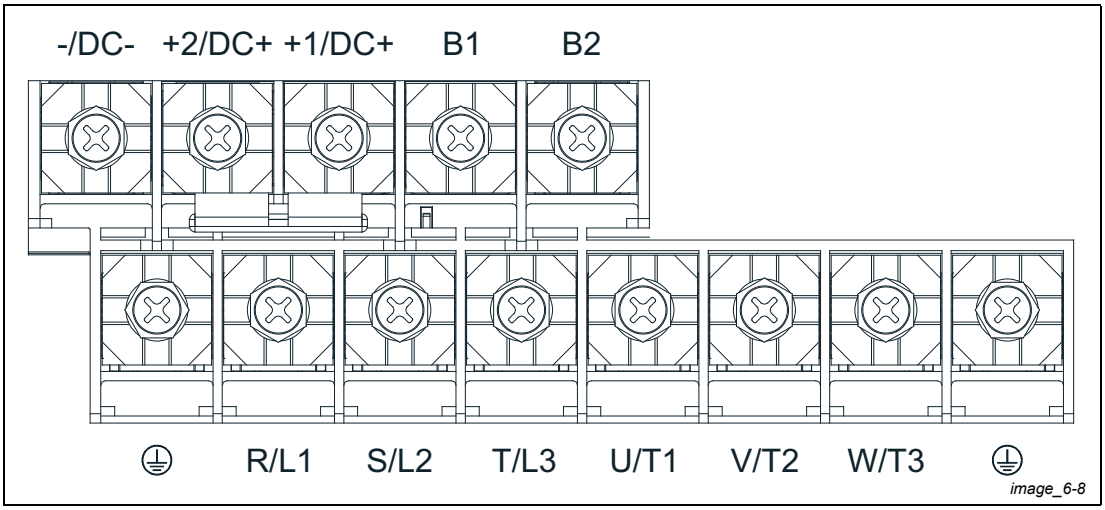


Fig. 6-8: Frame C

- If you install at Ta 50 °C environment, please select copper wire with voltage rating 600 V and temperature resistant 75 °C or 90 °C.
- If you install at Ta 50 °C above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For VD i 2200-23C2-A, if you install at Ta 40 °C above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.
- Wire fix to pole +2/DC+ and +1/DC+ with 90 kg-cm/[78.2 lb-in]/[8.83 Nm] (±10%)

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, -/DC-, +1/DC+, +2/DC+, B1, B2			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 1500-23C2-A	50 mm² [1/0 AWG]	50 mm² [1/0 AWG]	M8 80 kg-cm [69.4 lb-in.] [7.84 Nm]	50 mm² [1/0 AWG]	25 mm² [4 AWG]	M8 80 kg-cm [69.4 lb-in.] [7.84 Nm]
VD i 1850-23C2-A						
VD i 2200-23C2-A						
VD i 1850-43C2-A		25 mm² [4 AWG]		25 mm² [4 AWG]	16 mm² [6 AWG]	
VD i 2200-43C2-A						
VD i 3000-43C2-A		35 mm² [2 AWG]		35 mm² [2 AWG]		
VD i 1850-43C2-E		25 mm² [4 AWG]		25 mm² [4 AWG]		
VD i 2200-43C2-E						
VD i 3000-43C2-E		35 mm² [2 AWG]		35 mm² [2 AWG]		

Tab. 6-5: Usable wirings for frame C

Frame D0

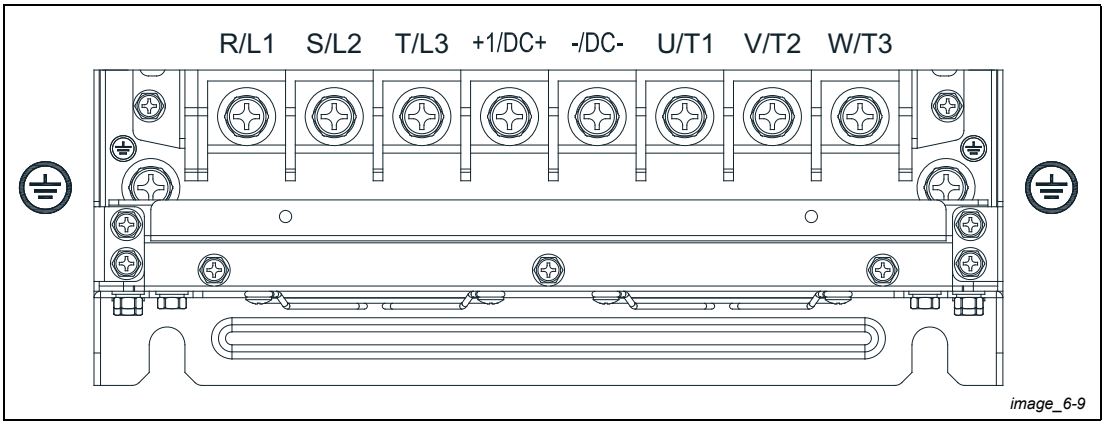


Fig. 6-9: Frame D0

- If you install at Ta 40 °C (for model names with last digit U)/50 °C (for model names with last digit S) environment, please select copper wire with voltage rating 600 V and temperature resistant at 75 °C or 90 °C.
- If you install at Ta 40 °C (for model names with last digit U)/50 °C (for model names with last digit S) above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, DC+, DC-			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 3700-43C2-U	70 mm^2 [2/0 AWG]	50 mm^2 [1/0 AWG]	M8 80 kg-cm [69.4 lb-in.] [7.84 Nm]	35 mm^2 [2 AWG]	25 mm^2 [4 AWG]	M8 80 kg-cm [69.4 lb-in.] [7.84 Nm]
VD i 4500-43C2-U						
VD i 3700-43C2-S						
VD i 4500-43C2-S		70 mm^2 [2/0 AWG]				

Tab. 6-6: Usable wirings for frame D0

Frame D

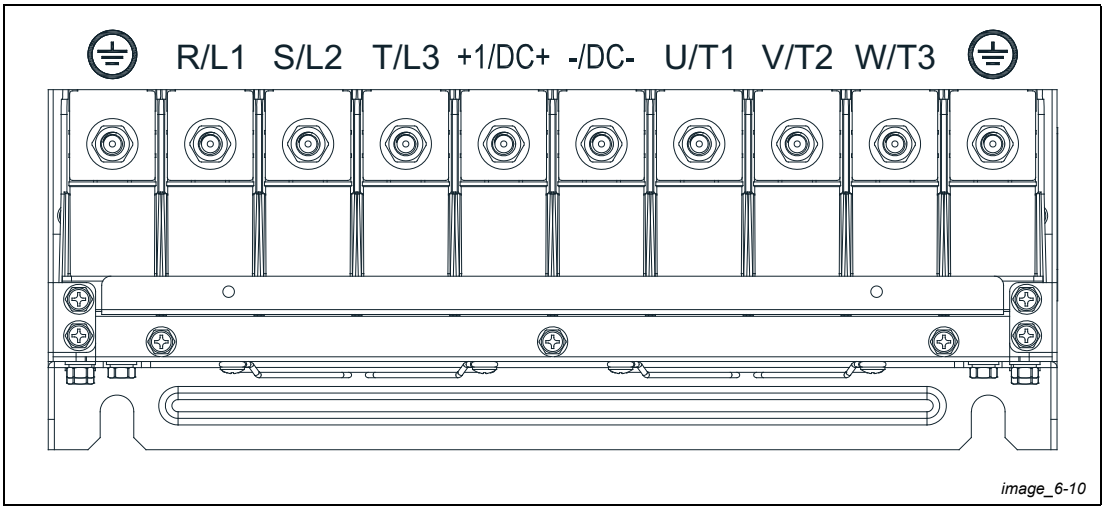


Fig. 6-10: Frame D

- If you install at Ta 50 °C (for 230 V/460 V model names with last digit A)/40 °C (for 230 V/460 V model names with last digit E) environment, please select copper wire with voltage rating 600 V and temperature resistant at 75 °C or 90 °C.
- If you install at Ta 50 °C (for 230 V/460 V model names with last digit A)/40 °C (for 230 V/460 V model names with last digit E) above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C, which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, DC+, DC-			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 3000-23C2-A	150 mm^2 [300 MCM]	120 mm^2 [4/0 AWG]	M8 180 kg-cm [156.2 lb-in.] [17.65 Nm]	120 mm^2 [4/0 AWG]	70 mm^2 [2/0 AWG]	M8 180 kg-cm [156.2 lb-in.] [17.65 Nm]
VD i 3700-23C2-A		120 mm^2 [250 MCM]		120 mm^2 [250 MCM]		
VD i 5500-43C2-A		95 mm^2 [3/0 AWG]		95 mm^2 [3/0 AWG]	50 mm^2 [1/0 AWG]	
VD i 7500-43C2-A		150 mm^2 [300MCM]		150 mm^2 [300 MCM]	95 mm^2 [3/0 AWG]	
VD i 3000-23C2-E	120 mm^2 [4/0 AWG]	95 mm^2 [3/0 AWG]		95 mm^2 [3/0 AWG]	50 mm^2 [1/0 AWG]	
VD i 3700-23C2-E		120 mm^2 [4/0 AWG]		120 mm^2 [4/0 AWG]	70 mm^2 [2/0 AWG]	
VD i 5500-43C2-E		70 mm^2 [2/0 AWG]		70 mm^2 [2/0 AWG]	35 mm^2 [2 AWG]	
VD i 7500-43C2-E		120 mm^2 [4/0 AWG]		120 mm^2 [4/0 AWG]	70 mm^2 [2/0 AWG]	

Tab. 6-7: Usable wirings for frame D

Frame E

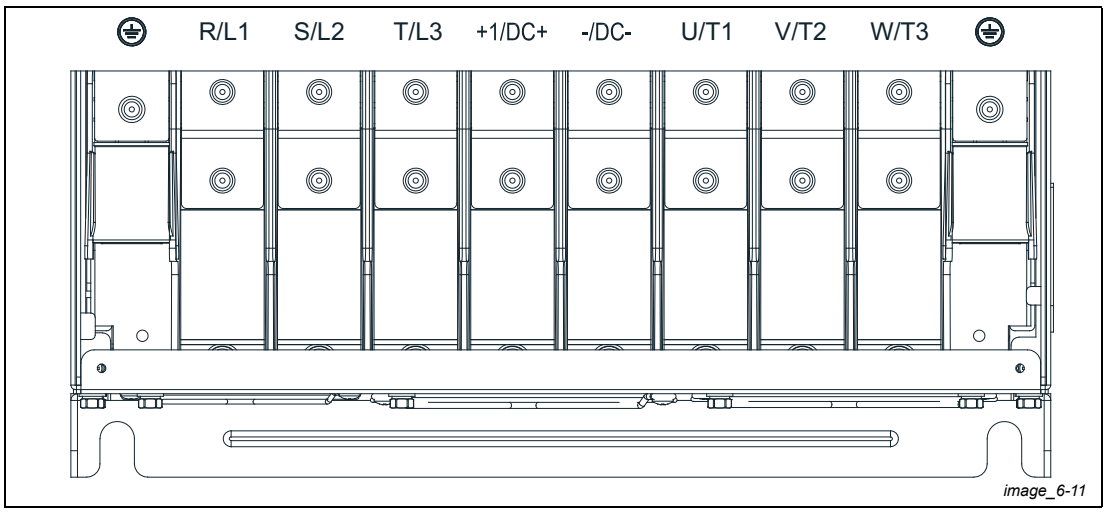


Fig. 6-11: Frame E

- If you install at Ta 50 °C (for 230 V/460 V model names with last digit A)/40 °C (for 230 V/460 V model names with last digit E) environment, please select copper wire with voltage rating 600 V and temperature resistant at 75 °C or 90 °C.
- If you install at Ta 50 °C (for 230 V/460 V model names with last digit A)/40 °C (for 230 V/460 V model names with last digit E) above environment, please select copper wire with voltage rating 600 V and temperature resistant at 90 °C or above.
- For UL installation compliant, please use copper wires for installation, the wire gauge is based on temperature resistant at 75 °C which is requested and recommended from UL. Do not reduce the wire gauge when using higher temperature wire.

Model name	Main circuit terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, -/DC-, +1/DC+			Terminal ⏚		
	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)	Max. wire gauge	Min. wire gauge	Screw spec. and torque (±10%)
VD i 4500-23C2-A	120 mm² x2 [4/0 AWG x2]	50 mm² x 2 [1/0 AWG x 2]	M8 180 kg-cm [156.2 lb-in.] [17.65 Nm]	50 mm² x 2 [1/0 AWG x 2]	50 mm² x 1 [1/0 AWG x 1]	M8 180 kg-cm [156.2 lb-in.] [17.65 Nm]
VD i 5500-23C2-A		95 mm² x 2 [3/0 AWG x 2]		95 mm² x 2 [3/0 AWG x 2]	95 mm² x 1 [3/0 AWG x 1]	
VD i 7500-43C2-A		120 mm² x 2 [4/0 AWG x 2]		120 mm² x 2 [4/0 AWG x 2]	120 mm² x 1 [4/0 AWG x 1]	
VD i 9000-43C2-A		50 mm² x 2 [1/0 AWG x 2]		50 mm² x 2 [1/0 AWG x 2]	50 mm² x 1 [1/0 AWG x 1]	
VD i 11000-43C2-A		95 mm² x 2 [3/0 AWG x 2]		95 mm² x 2 [3/0 AWG x 2]	95 mm² x 2 [3/0 AWG x 2]	
VD i 4500-23C2-E		50 mm² x 2 [1/0 AWG x 2]		50 mm² x 2 [1/0 AWG x 2]	50 mm² x 1 [1/0 AWG x 1]	
VD i 5500-23C2-E		70 mm² x 2 [2/0 AWG x 2]		70 mm² x 2 [2/0 AWG x 2]	70 mm² x 1 [2/0 AWG x 1]	
VD i 7500-43C2-E		95 mm² x 2 [3/0 AWG x 2]		95 mm² x 2 [3/0 AWG x 2]	95 mm² x 1 [3/0 AWG x 1]	
VD i 9000-43C2-E		50 mm² x 2 [1/0 AWG x 2]		50 mm² x 2 [1/0 AWG x 2]	50 mm² x 1 [1/0 AWG x1]	
VD i 11000-43C2-E		70 mm² x 2 [2/0 AWG x 2]		70 mm² x 2 [2/0 AWG x 2]	70 mm² x 2 [2/0 AWG x 2]	

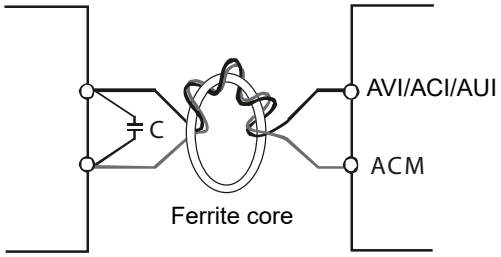
Tab. 6-8: Usable wirings for frame E

7 Control Terminals

CAUTION:

Analog input terminals (AVI, ACI, ACM)

- Analog input signals are easily affected by external noise. Use shielded wiring and keep it as short as possible (<20 m) with proper grounding. If the noise is inductive, connecting the shield to terminal ACM can bring improvement.
- When using analog input signal in the circuit, twisted pair is suggested to use for dealing with weak signal.
- If the analog input signals are affected by noise from the AC motor drive, please connect a capacitor and ferrite core as indicated in the following diagram:



Wind each wire 3 times or more around the core.

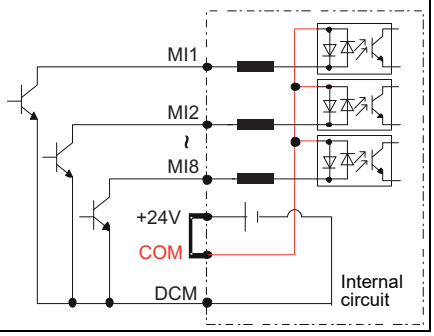
Ferrite core

CAUTION:

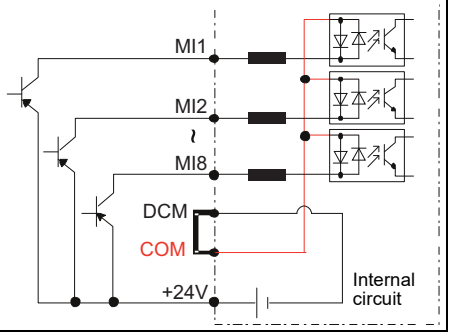
Digital inputs (FWD, REV, MI1–MI8, COM)

- The “COM” terminal is the common side of the photo-coupler. Any of wiring method, the “common point” of all photo-coupler must be the “COM”.

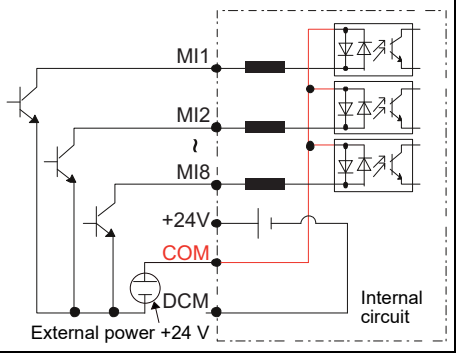
❶ Sink mode with internal power (+24 V DC)



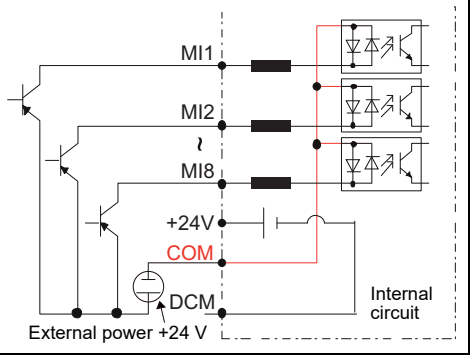
❷ Source mode with internal power (+24 V DC)



❸ Sink mode with external power



❹ Source mode with external power



- When the photo-coupler is using internal power supply, the switch connection for Sink and Source as below:
  MI-DCM: Sink mode
  MI-+24 V: Source mode
- When the photo-coupler is using external power supply, please remove the short circuit cable between the +24 V and COM terminals. The connection mode is Sink mode or Source mode according to the below:
  The “+” of 24 V connecting to “COM”: Sink mode
  The “-“ of 24 V connecting to “COM”: Source mode

Transistor output (MO1, MO2, MCM)

- Make sure to connect the digital outputs to the right polarity.
- When connecting a relay to the digital outputs connect a surge absorber across the coil and check the polarity.

7.1 Remove the Cover for Wiring

Please remove the top cover before wiring the multi-function input and output terminals.

NOTE The drive appearances shown in the figures are for reference only, a real drive may look different.

Frame A & B

Applicable models: VD i 075-23C2-A; VD i 075-43C2-A/E; VD i 150-23C2-A; VD i 150-43C2-A/E; VD i 220-23C2-A; VD i 220-43C2-A/E; VD i 370-23C2-A; VD i 370-43C2-A/E; VD i 400-43C2-A/E; VD i 550-43C2-A/E; VD i 550-23C2-A; VD i 750-23C2-A; VD i 750-43C2-A/E; VD i 1100-23C2-A; VD i 1100-43C2-A/E; VD i 1500-43C2-A/E

Screw torque: 12–15 kg-cm/[10.4–13 lb-in.]/[1.2–1.5 Nm]

Loosen the screws and press the tabs on both sides to remove the cover.

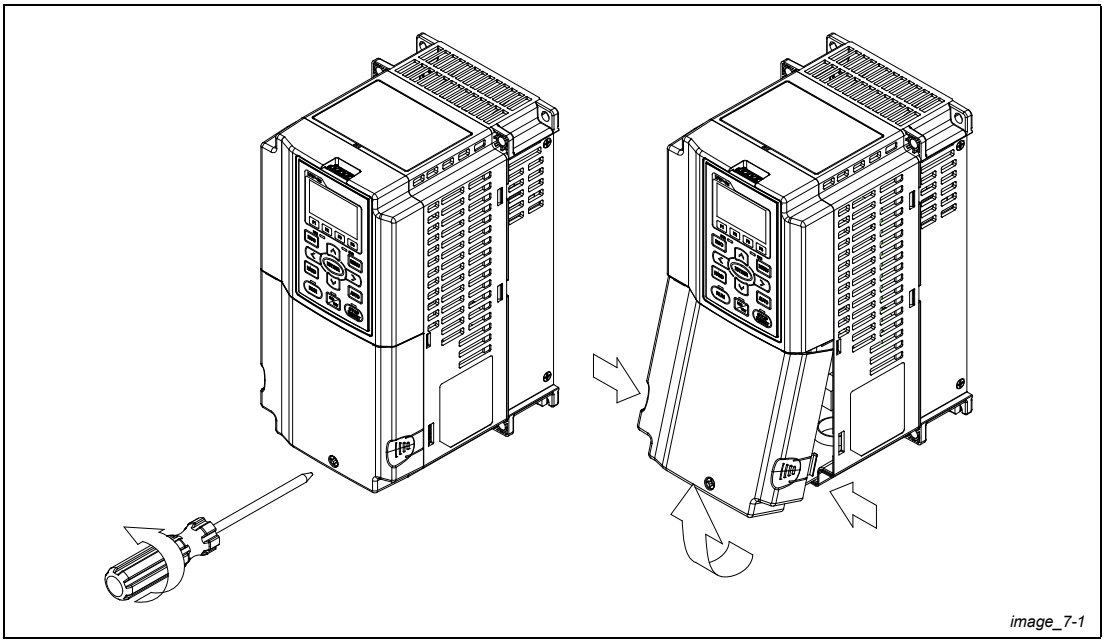


Fig. 7-1: Remove the top cover of frame A and B

Frame C

Applicable models: VD i 1500-23C2-A; VD i 1850-23C2-A; VD i 1850-43C2-A/E; VD i 2200-23C2-A; VD i 2200-43C2-A/E; VD i 3000-43C2-A/E

Screw torque: 12–15 kg-cm/[10.4–13 lb-in.]/[1.2–1.5 Nm]

To remove the cover, lift it slightly and pull outward.

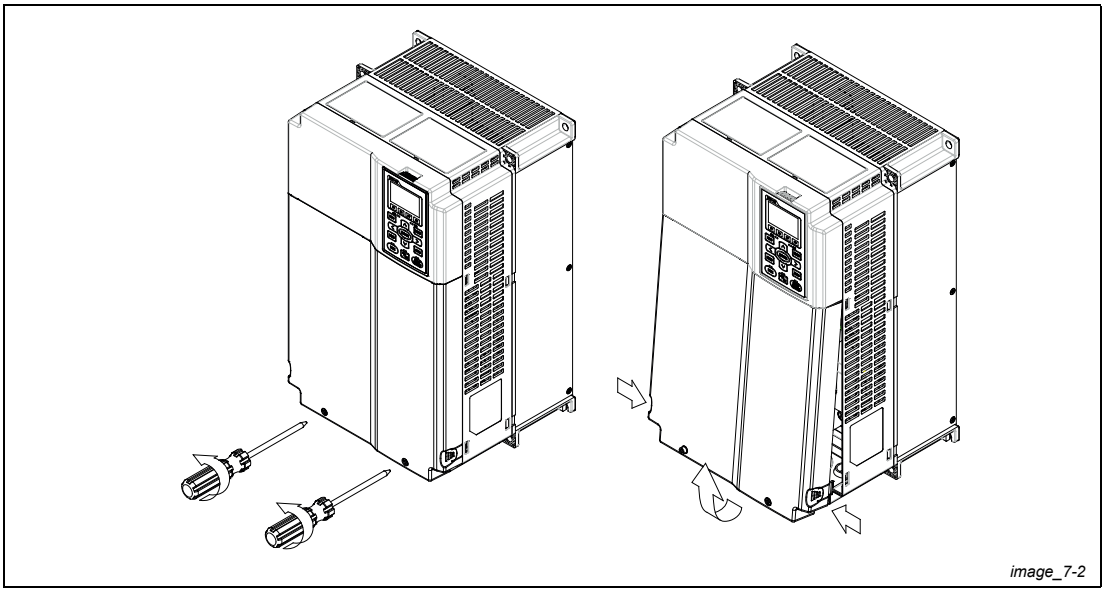


Fig. 7-2: Remove the top cover of frame C

Frame D0 & D

Applicable models: VD i 3700-43C2-S; VD i 4500-43C2-S; VD i 3700-43C2-U; VD i 4500-43C2-U; VD i 3000-23C2-A; VD i 3700-23C2-A; VD i 5500-43C2-A; VD i 7500-43C2-A; VD i 3000-23C2-E; VD i 3700-23C2-E; VD i 5500-43C2-E; VD i 7500-43C2-E

Screw torque: 12–15 kg-cm/[10.4–13 lb-in.]/[1.2–1.5 Nm]

To remove the cover, lift it slightly and pull outward.

Loosen the screws and press the tabs on both sides to remove the cover.

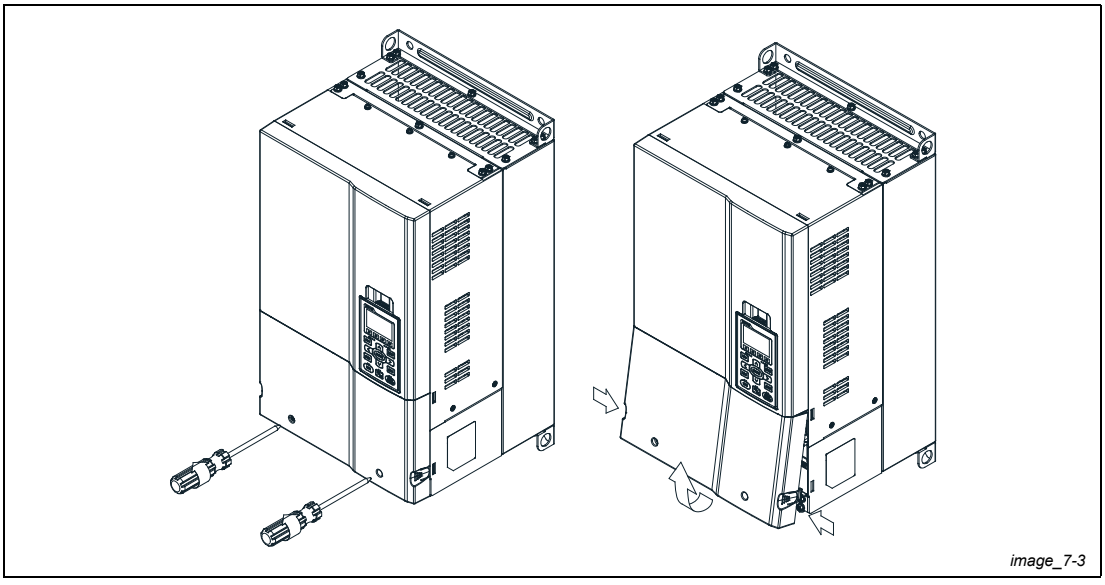


Fig. 7-3: Remove the top cover of frame D0 and D

Frame E

Applicable models: VD i 4500-23C2-A; VD i 5500-23C2-A; VD i 7500-23C2-A; VD i 9000-43C2-A; VD i 11000-43C2-A; VD i 4500-23C2-E; VD i 5500-23C2-E; VD i 7500-23C2-E; VD i 9000-43C2-E; VD i 11000-43C2-E

Screw torque: 12–15 kg-cm/[10.4–13 lb-in.]/[1.2–1.5 Nm]

To remove the cover, lift it slightly and pull outward.

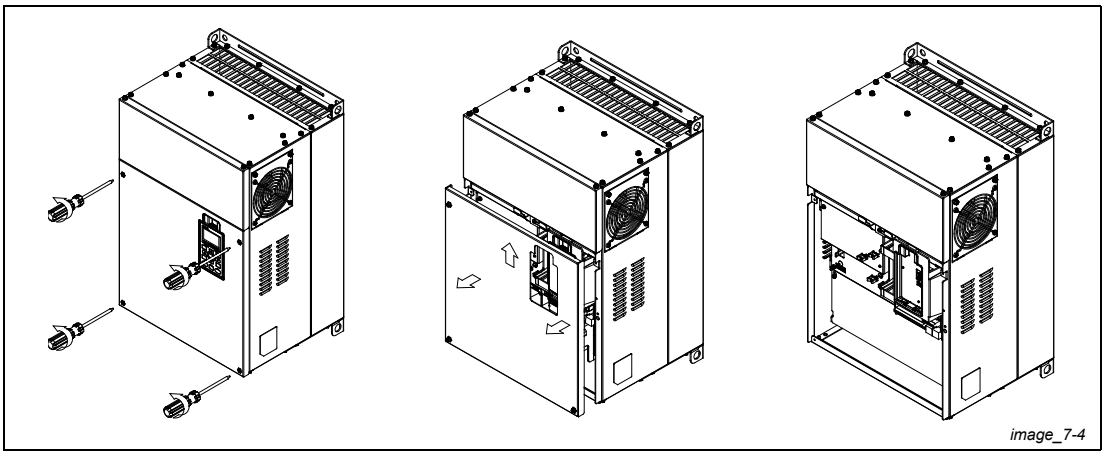


Fig. 7-4: Remove the top cover of frame E

7.2 Specifications of Control Terminal

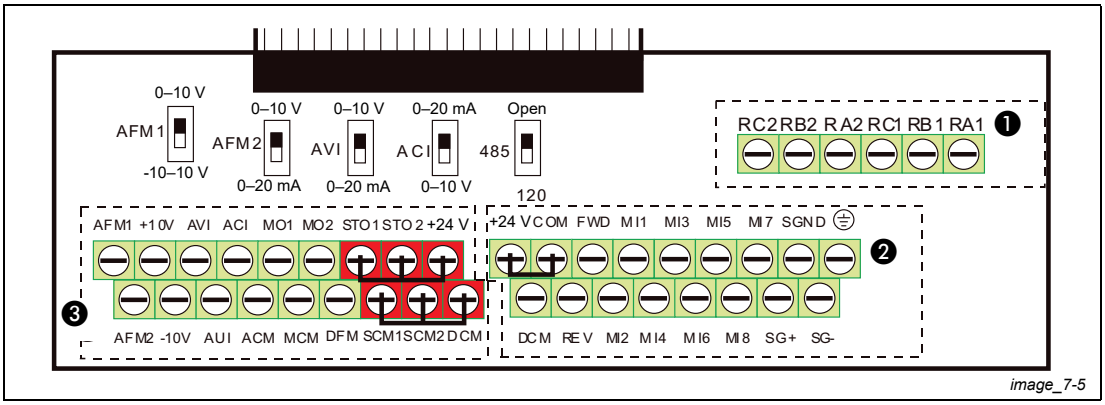


Fig. 7-5: Removable terminal block

Function name	Area	Conductor	Stripping length (mm)	Maximum wire gauge	Minimum wire gauge	Tightening torque (±10)
RELAY Terminals	❶	Conductor cross section solid wire	4–5	1.5 mm² [16 AWG]	0.2 mm² [26 AWG]	5 kg-cm [4.3 lb-in.] [0.49 Nm]
		Conductor cross section stranded wire				
Control Terminals	❷	Conductor cross section solid wire	6–7			8 kg-cm [6.9 lb-in.] [0.78 Nm]
		Conductor cross section stranded wire				
Control Terminals	❸	Conductor cross section solid wire				2 kg-cm [1.7 lb-in.] [0.20 Nm]
		Conductor cross section stranded wire				

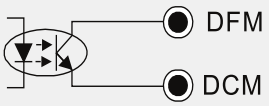
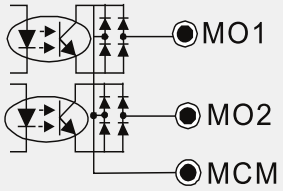
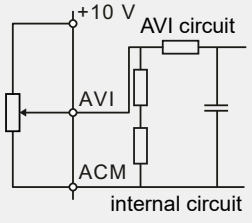
Tab. 7-1: Specification of the control terminal wires

Wiring precautions

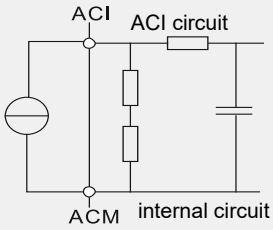
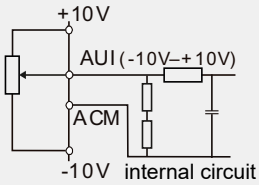
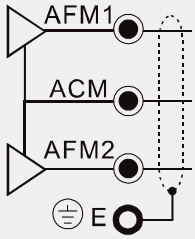
- In the figure above (Fig. 7-5), the factory setting for STO1, STO2, +24V and SCM1, SCM2, DCM are short circuit. The +24V from area ❸ of above figure (Fig. 7-5) is for STO only, and cannot be used for other purposes. The factory setting for +24V-COM is short circuit and SINK mode (NPN); please refer to chapter 5 “Wiring” for more detail.
- Tighten the wiring with slotted screwdriver:
  ❶ and ❷ is 3.5 mm (wide) x 0.6 mm (thick); ❸ is 2.5 mm (wide) x 0.4 mm (thick)
- When wiring bare wires, make sure they are perfectly arranged to go through the wiring holes.

Terminals	Terminal function	Factory setting (NPN mode)
+24V	Digital control signal common (Source)	+24 V +5% 200 mA
COM	Digital control signal common (Sink)	Common for multi-function input terminals
FWD	Forward-stop command	FWD-DCM: ON → forward running OFF → deceleration to stop
REV	Reverse-stop command	REV-DCM: ON → reverse running OFF → deceleration to stop

Tab. 7-2: Description of the control terminals (1)

Terminals	Terminal function	Factory setting (NPN mode)
MI1 – MI8	Multi-function input 1–8	Refer to parameters 02.01–02.08 to program the multi-function inputs MI1–MI8. **Source mode** ON: the activation current is 3.3 mA ≥11 V DC OFF: cut-off voltage ≤ 5 V DC **Sink mode** ON: the activation current is 3.3 mA ≤13 V DC OFF: cut-off voltage ≥ 19 V DC
DFM	Digital frequency meter  *DFM grafic tab*	Regard the pulse as the output monitor signal Duty-cycle: 50% Min. load impedance: 1 kΩ/100 pf Max. current: 30 mA Max. voltage: 30 V DC
DCM	Digital frequency signal common	
MO1	Multi-function output 1 (photocoupler)	The AC motor drive releases various monitor signals, such as drive in operation, frequency attained and overload indication, via transistor (open collector).  *MO1-MO2 grafic tab*
MO2	Multi-function output 2 (photocoupler)	
MCM	Multi-function output common	Max 48 V DC 50 mA
RA1	Multi-function relay output 1 (N.O.) a	**Resistive Load:** 3 A (N.O.)/3 A (N.C.) 250 V AC 5 A (N.O.)/3 A (N.C.) 30 V DC **Inductive Load (COS 0.4):** 1.2 A (N.O.)/1.2 A (N.C.) 250 V AC 2.0 A (N.O.)/1.2 A (N.C.) 30 V DC It is used to output each monitor signal, such as drive is in operation, frequency attained or overload indication
RB1	Multi-function relay output 1 (N.C.) b	
RC1	Multi-function relay common 1	
RA2	Multi-function relay output 2 (N.O.) a	
RB2	Multi-function relay output 2 (N.C.) b	
RC2	Multi-function relay common 2	
+10V	Potentiometer power supply	Analog frequency setting: +10 V DC 20 mA
-10V	Potentiometer power supply	Analog frequency setting: -10 V DC 20 mA
AVI	Analog voltage input  *AVI_grafic_tab1*	Impedance: 20 kΩ Range: 0–20 mA/4–20 mA/0–10 V = 0–Max. output frequency (Pr. 01-00) AVI switch, factory setting is 0–10 V

Tab. 7-2: Description of the control terminals (2)

Terminals	Terminal function	Factory setting (NPN mode)
ACI	Analog current input  *ACI grafic tab*	Impedance: 250 Ω Range: 0–20 mA/4–20 mA/0–10 V = 0 – Max. output frequency (Pr. 01-00) ACI Switch, factory setting is 4–20 mA
AUI	Auxiliary analog voltage input  *AUI grafic tab*	Impedance: 20 kΩ Range: -10–+10 V DC = 0 – max. output frequency (Pr. 01-00)
AFM1	Multi-function analog output  *AFM grafic tab_02*	0–10 V max. output current 2 mA, max. load 5 kΩ -10–10 V maximum output current 2 mA, maximum load 5 kΩ Output current: 2 mA max. Resolution: 0–10 V corresponds to max. operation frequency Range: 0–10 V → -10–+10 V AFM 1 switch, factory setting is 0–10 V
AFM2		0–10 V max. output current 2 mA, max. load 5 kΩ 0–20 mA max. load 500 Ω Output current: 20 mA max Resolution: 0–10 V corresponds to max. operation frequency Range: 0–10 V → 4–20 mA AFM 2 switch, factory setting is 0–10 V
ACM	Analog signal common	Common for analog terminals
STO1 SCM1 STO2 SCM2	Default setting is shorted Power removal safety function for EN 954-1 and IEC/EN 61508 When STO1–SCM1; STO2–SCM2 is activated, the activation current is 3.3 mA ≥11 V DC **NOTE:** Please refer to chapter 14 “Safe Torque Off function”.	
SG+ SG- SGND	Modbus RS485 **NOTE:** Please refer to section 11.10 for more information about the communication parameter settings.	
RJ45	PIN 1,2,7,8: Reserved PIN 3, 6: SGND PIN 4: SG- PIN 5: SG+	

Tab. 7-2: Description of the control terminals (3)

NOTE Wire size of analog control signals: 0.75 mm^2 [18 AWG] with shielded wire

7.3 Remove the Terminal Block

① Loosen the screws by screwdriver. (As shown in figure below).

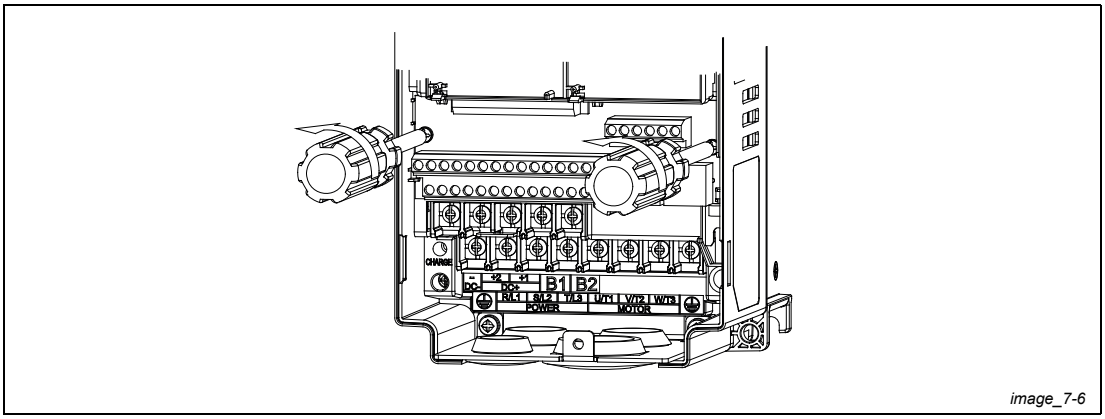


Fig. 7-6: Loosing the screws

② Remove the control board by pulling it out for a distance 6–8 cm (as 1 in the figure) then lift the control board upward (as 2 in the figure).

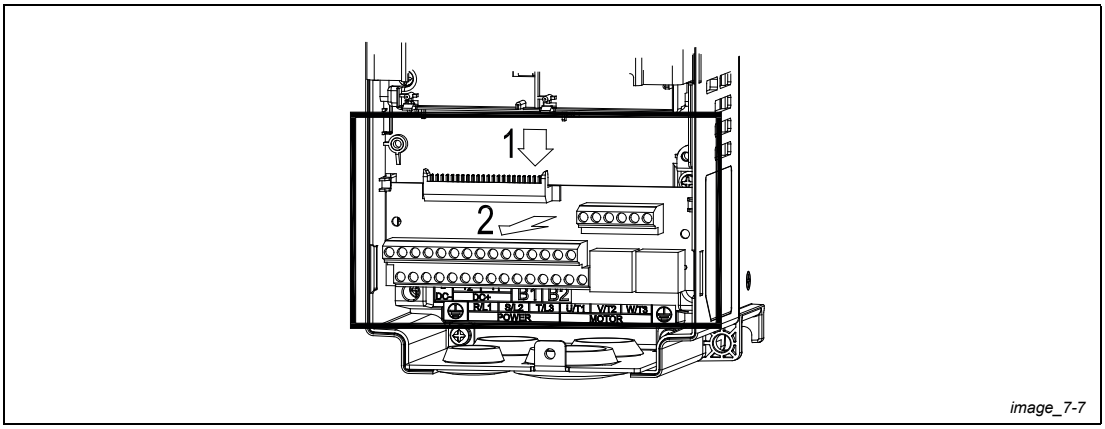


Fig. 7-7: Removing the control board

8 Non-fuse Circuit Breaker, Fuse and Cable Length

8.1 Non-fuse Circuit Breaker

Comply with UL standard: Per UL 508, paragraph 45.8.4, part a.

The rated current of the breaker shall be 1.6–2.6 times of the maximum rated input current of AC motor drive.

3-phase, 230 V	
Model	**Recommended non-fuse breaker [A]**
VD i 075-23C2-A	15
VD i 150-23C2-A	20
VD i 220-23C2-A	30
VD i 370-23C2-A	40
VD i 550-23C2-A	50
VD i 750-23C2-A	60
VD i 1100-23C2-A	100
VD i 1500-23C2-A	125
VD i 1850-23C2-A	150
VD i 2200-23C2-A	200
VD i 3000-23C2-A/E	225
VD i 3700-23C2-A/E	250
VD i 4500-23C2-A/E	300
VD i 5500-23C2-A/E	400
VD i 7500-23C2-A/E	450
VD i 9000-23C2-A/E	600

3-phase, 460 V	
Model	**Recommended non-fuse breaker [A]**
VD i 075-43C2-A/E	5
VD i 150-43C2-A/E	10
VD i 220-43C2-A/E	15
VD i 400-43C2-A/E	20
VD i 370-43C2-A/E	20
VD i 550-43C2-A/E	30
VD i 750-43C2-A/E	40
VD i 1100-43C2-A/E	50
VD i 1500-43C2-A/E	60
VD i 1850-43C2-A/E	75
VD i 2200-43C2-A/E	100
VD i 3000-43C2-A/E	125
VD i 3700-43C2-S/U	150
VD i 4500-43C2-S/U	175
VD i 5500-43C2-A/E	250
VD i 7500-43C2-A/E	300
VD i 9000-43C2-A/E	300
VD i 11000-43C2-A/E	400

Tab. 8-1: Rated current for non-fuse breaker (Models for 230 V and 460 V)

8.2 Fuse Specification Chart

NOTES

- Fuse specifications lower than the table below are allowed.
- For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code (NEC) and any applicable local codes. Use UL classified fuses to fulfil this requirement.
- For installation in Canada, branch circuit protection must be provided in accordance with Canadian Electrical Code and any applicable provincial codes. Use UL classified fuses to fulfil this requirement.

230 V Model	Input Current I [A]		Line Fuse	
	Heavy Duty	Normal Duty	I [A]	Bussmann P/N
VD i 075-23C2-A	6.1	6.4	15	JJN-15 / JJS-15
VD i 150-23C2-A	11	12	25	JJN-25 / JJS-25
VD i 220-23C2-A	15	16	35	JJN-35 / JJS-35
VD i 370-23C2-A	18.5	20	45	JJN-45 / JJS-45
VD i 550-23C2-A	26	28	60	JJN-60 / JJS-60
VD i 750-23C2-A	34	36	80	JJN-80 / JJS-80
VD i 1100-23C2-A	50	52	110	JJN-110 / JJS-110
VD i 1500-23C2-A	68	72	150	JJN-150 / JJS-150
VD i 1850-23C2-A	78	83	175	JJN-175 / JJS-175
VD i 2200-23C2-A	95	99	225	JJN-225 / JJS-225
VD i 3000-23C2-A/E	118	124	250	JJN-250 / JJS-250
VD i 3700-23C2-A/E	136	143	300	JJN-300 / JJS-300
VD i 4500-23C2-A/E	162	171	400	JJN-400 / JJS-400
VD i 5500-23C2-A/E	196	206	450	JJN-450 / JJS-450
VD i 7500-23C2-A/E	233	245	500	JJN-500 / JJS-500
VD i 9000-23C2-A/E	315	331	700	JJN-700 / JJS-700

Tab. 8-2: Line fuses for AC motor drives with 230 V power supply

460 V Model	Input Current I [A]		Line Fuse	
	Heavy Duty	Normal Duty	I [A]	Bussmann P/N
VD i 075-43C2-A/E	4.1	4.3	10	JJS-10
VD i 150-43C2-A/E	5.6	5.9	15	JJS-15
VD i 220-43C2-A/E	8.3	8.7	20	JJS-20
VD i 370-43C2-A/E	13	14	30	JJS-30
VD i 400-43C2-A/E	14.5	15.5	35	JJS-35
VD i 550-43C2-A/E	16	17	40	JJS-40
VD i 750-43C2-A/E	19	20	45	JJS-45
VD i 1100-43C2-A/E	25	26	60	JJS-60
VD i 1500-43C2-A/E	33	35	80	JJS-80
VD i 1850-43C2-A/E	38	40	90	JJS-90
VD i 2200-43C2-A/E	45	47	110	JJS-110
VD i 3000-43C2-A/E	60	63	150	JJS-150
VD i 3700-43C2-S/U	70	74	175	JJS-175
VD i 4500-43C2-S/U	96	101	225	JJS-225
VD i 5500-43C2-A/E	108	114	250	JJS-250
VD i 7500-43C2-A/E	149	157	350	JJS-350
VD i 9000-43C2-A/E	159	167	350	JJN-350
VD i 11000-43C2-A/E	197	207	450	JJS-450

Tab. 8-3: Line fuses for AC motor drives with 460 V power supply

8.3 Motor Cable Length

■ Leakage current to affect the motor and counter measurement

If the cable length is too long, the parasitic capacitance between cables will enlarge and may increase leakage current. It will activate the protection of over current, and increased leakage current will not ensure the correction of current value in display. The worst case is that AC motor drive may damage.

If more than one motor is connected to the AC motor drive, the total wiring length is the sum of the wiring length from AC motor drive to each motor.

For the 460V series AC motor drive, when an overload relay is installed between the drive and the motor to protect motor from overheating, the connecting cable must be shorter than 50m. However, an overload relay malfunction may still occur. To prevent the malfunction, install an output reactor (optional) to the drive or lower the carrier frequency setting (Pr. 00-17).

■ Surge voltage to affect the motor and counter measurement

When motor is driven by a PWM signal of AC motor drive, the motor terminals will experience surge voltages (dv/dt) easily due to power transistors conversion of AC motor drive and cable capacitance. When the motor cable is very long (especially for the 460V series), surge voltages (dv/dt) may reduce insulation quality. To prevent this situation, please follow the rules below:

– Use a motor with enhanced insulation

– Connect an output reactor (optional) to the output terminals of the AC motor drive

– Reduce the motor cable length to suggested value

The suggested motor shielded cable length in the following table complies with IEC 60034-17, which is suitable for the motor with rated voltage under 500 VAC, and the insulation level of peak-to-peak over (including) 1.35 kV.

230 V Model	Rated current (ND) [A_{rms}]	Without AC reactor		With AC reactor	
		Shielded Cable [m]	Non-shielded cable [m]	Shielded Cable [m]	Non-shielded cable [m]
VD i 075-23C2-A	5	50	75	75	115
VD i 150-23C2-A	8	50	75	75	115
VD i 220-23C2-A	11	50	75	75	115
VD i 370-23C2-A	17	50	75	75	115
VD i 550-23C2-A	25	50	75	75	115
VD i 750-23C2-A	33	100	150	150	225
VD i 1100-23C2-A	49	100	150	150	225
VD i 1500-23C2-A	65	100	150	150	225
VD i 1850-23C2-A	75	100	150	150	225
VD i 2200-23C2-A	90	100	150	150	225
VD i 3000-23C2-A/E	120	100	150	150	225
VD i 3700-23C2-A/E	146	100	150	150	225
VD i 4500-23C2-A/E	180	150	225	225	325
VD i 5500-23C2-A/E	215	150	225	225	325
VD i 7500-23C2-A/E	255	150	225	225	325
VD i 9000-23C2-A/E	346	150	225	225	325

Tab. 8-4: Motor cable lengths for 230 V models

460 V Model	Rated current (ND) [A_{rms}]	Without AC reactor		With AC reactor	
		Shielded Cable [m]	Non-shielded cable [m]	Shielded Cable [m]	Non-shielded cable [m]
VD i 075-43C2-A	3	50	75	75	115
VD i 150-43C2-A	4	50	75	75	115
VD i 220-43C2-A	6	50	75	75	115
VD i 370-43C2-A	9	50	75	75	115
VD i 400-43C2-A	10.5	50	75	75	115
VD i 550-43C2-A	12	50	75	75	115
VD i 750-43C2-A	18	100	150	150	225
VD i 1100-43C2-A	24	100	150	150	225
VD i 1500-43C2-A	32	100	150	150	225
VD i 1850-43C2-A	38	100	150	150	225
VD i 2200-43C2-A	45	100	150	150	225
VD i 3000-43C2-A	60	100	150	150	225
VD i 3700-43C2-S/U	73	100	150	150	225
VD i 4500-43C2-S/U	91	150	225	225	325
VD i 5500-43C2-A/E	110	150	225	225	325
VD i 7500-43C2-A/E	150	150	225	225	325
VD i 9000-43C2-A/E	180	150	225	225	325
VD i 11000-43C2-A/E	220	150	225	225	325

Tab. 8-5: Motor cable lengths for 460 V models

460 V Model	Rated current (ND) [A_{rms}]	Without AC reactor		With AC reactor	
EMC Filter built-in model		Shielded Cable [m]	Non-shielded cable [m]	Shielded Cable [m]	Non-shielded cable [m]
VD i 075-43C2-E	3	30	75	30	115
VD i 150-43C2-E	4	30	75	30	115
VD i 220-43C2-E	6	30	75	30	115
VD i 370-43C2-E	9	30	75	30	115
VD i 400-43C2-E	10.5	30	75	30	115
VD i 550-43C2-E	12	30	75	30	115
VD i 750-43C2-E	18	50	150	50	225
VD i 1100-43C2-E	24	50	150	50	225
VD i 1500-43C2-E	32	50	150	50	225
VD i 1850-43C2-E	38	50	150	50	225
VD i 2200-43C2-E	45	50	150	50	225
VD i 3000-43C2-E	60	50	150	50	225

Tab. 8-6: Motor cable lengths for 460 V models with built-in EMC Filter

9 Specifications

9.1 230 V Series

Frame Size			A				B			C			D		E		
Model VD i □23C2-_			075	150	220	370	550	750	1100	1500	1850	2200	3000	3700	4500	5500	7500
Output Rating ①	Normal Duty	Rated Output Capacity [kVA]	2.0	3.2	4.4	6.8	10	13	20	26	30	36	48	58	72	86	102
		Rated Output Current [A]	5	8	11	17	25	33	49	65	75	90	120	146	180	215	255
		Applicable Motor Output [kW]	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		Applicable Motor Output [HP]	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
		Overload Capacity	120% of rated output current: 1 minute for every 5 minutes; 160% of rated output current: 3 seconds for every 30 seconds														
		Max. Output Frequency [Hz]	0.00–599.00														
		Carrier Frequency [kHz]	2–15 (Default: 8)							2–10 (Default: 6)					2–9 (Default: 4)		
	Heavy Duty	Rated Output Capacity [kVA]	1.9	2.8	4.0	6.4	9.6	12	19	25	28	34	45	55	68	81	96
		Rated Output Current [A]	4.8	7.1	10	16	24	31	47	62	71	86	114	139	171	204	242
		Applicable Motor Output [kW]	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	19	22	30	37	45	55
		Applicable Motor Output [HP]	0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
		Overload Capacity	150% of rated output current: 1 minute for every 5 minutes; 180% of rated output current: 3 seconds for every 30 seconds														
		Max. Output Frequency [Hz]	0.00–300.00														
		Carrier Frequency [kHz]	2–15 (Default: 2)							2–10 (Default: 2)					2–9 (Default: 2)		
Rating Input	Input Current [A]	Normal Duty	6.4	12	16	20	28	36	52	72	83	99	124	143	171	206	245
		Heavy Duty	6.1	11	15	18.5	26	34	50	68	78	95	118	136	162	196	233
	Rated Voltage/ Frequency		3-phase AC 200 V–240 V (-15%–+10%), 50/60 Hz														
	Operating Voltage Range		170–264 V AC														
	Frequency Tolerance		47–63 Hz														
Efficiency [%]			97.8												98.2		
Power Factor			>0.98														
Drive Weight [Kg]			2.6 ± 0.3				5.4 ± 1			9.378 ± 1.5			38.5 ± 1.5		64.8 ± 1.5		
Cooling Method			Natural cooling	Fan cooling													
Braking Chopper			Frame A–C: Built-in										Frame D–F: Optional				
DC choke			Frame A–C: Optional										Frame D–F: Built-in				
EMC Filter			Frame A–F: Optional														
EMC-COP01②			Frame A–F: Optional														

Tab. 9-1: Specifications 230 V series

NOTES

- ①: The factory setting is Normal Duty mode.
- ②: CANopen® communication card
- The carrier frequency is default. Increasing the carrier frequency requires a reduction in current. Please refer to section 9.5.1 for the derating curve of ambient temperature.
- The AC motor drive should operate in derating current when its control method is set to FOC Sensorless, TQC+PG, TQC sensorless. PM+PG, PM sensorless Please refer to Pr. 06-55 for more information.
- Select the AC motor drive with capacity one grade larger for the impact load application.
- The rated input current will be affected by not only Power Transformer and the connection of the reactors on input side, but also fluctuates with the impedance of power side.
- For Frame D and above, if the last character of the model is A then it is under IP20 protection level but the wiring terminal is under IP00 protection level; if the last character of the model is E, it is under IP20/NEMA1/UL TYPE1 protection level.

9.2 460 V Series

Frame Size			A						B			C		
Model VD i □43C2-_			075	150	220	370	400	550	750	1100	1500	1850	2200	3000
Output Rating ①	Normal Duty	Rated Output Capacity [kVA]	2.4	3.2	4.8	7.2	8.4	10	14	19	25	30	36	48
		Rated Output Current [A]	3.0	4.0	6.0	9.0	10.5	12	18	24	32	38	45	60
		Applicable Motor Output [kW]	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30
		Applicable Motor Output [HP]	1	2	3	5	5	7.5	10	15	20	25	30	40
		Overload Capacity	120% of rated output current: 1 minute for every 5 minutes; 160% of rated output current: 3 seconds for every 30 seconds											
		Max. Output Frequency [Hz]	0.00–599.00											
		Carrier Frequency [kHz]	2–15 (Default: 8)						2–10 (Default: 6)					
	Heavy Duty	Rated Output Capacity [kVA]	2.3	3.0	4.5	6.5	7.6	9.6	14	18	24	29	34	45
		Rated Output Current [A]	2.9	3.8	5.7	8.1	9.5	11	17	23	30	36	43	57
		Applicable Motor Output [kW]	0.4	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22
		Applicable Motor Output [HP]	0.5	1	2	3	5	5	7.5	10	15	20	25	30
		Overload Capacity	150% of rated output current: 1 minute for every 5 minutes; 180% of rated output current: 3 seconds for every 30 seconds											
		Max. Output Frequency [Hz]	0.00–300.00											
		Carrier Frequency [kHz]	2–15 (Default: 2)						2–10 (Default: 2)					
Rating Input	Input Current [A]	Normal Duty	4.3	5.9	8.7	14	15.5	17	20	26	35	40	47	63
		Heavy Duty	4.1	5.6	8.3	13	14.5	16	19	25	33	38	45	60
	Rated Voltage/Frequency		3-phase AC 380 V–480 V (-15%–+10%), 50/60 Hz											
	Operating Voltage Range		323–528 V AC											
	Frequency Tolerance		47–63 Hz											
Efficiency [%]			97.8											
Power Factor			>0.98											
Drive Weight [Kg]			2.6 ± 0.3						5.4 ± 1			9.8 ± 1.5		
Cooling Method			Natural cooling			Fan cooling								
Braking Chopper			Frame A–C: Built-in											
DC choke			Frame A–C: Optional											
EMC Filter			VD i (X)XXX-43C2-A: Optional; Frame A–C VD i (X)XXX-43C2-E: Built-in											
EMC-COP01 ②			VD i (X)XXX-43C2-A: Optional; VD i (X)XXX-43C2-E: Built-in											

Tab. 9-2: Specifications 460 V series (frame size A to C)

NOTES

- ■ ①: The factory setting is Normal Duty mode.
- ■ ②: CANopen® communication card
- ■ The carrier frequency is default. Increasing the carrier frequency requires a reduction in current. Please refer to section 9.5.1 for the derating curve of ambient temperature.
- ■ The AC motor drive should operate in derating current when its control method is set to FOC Sensorless, TQC+PG, TQC sensorless. PM+PG, PM sensorless Please refer to Pr. 06-55 for more information.
- ■ Select the AC motor drive with capacity one grade larger for the impact load application.
- ■ The rated input current will be affected by not only Power Transformer and the connection of the reactors on input side, but also fluctuates with the impedance of power side.
- ■ For Frame A, B and C, Model VD i (X)XXX-43C2-A is under IP20/NEMA1/UL TYPE1 protection level.
- ■ For Frame D and above, if the last character of the model is A then it is under IP20 protection level but the wiring terminal is under IP00 protection level; if the last character of the model is E, it is under IP20/NEMA1/UL TYPE1 protection level.

Frame Size			D0		D		E	
Model VD i □43C2-_			3700	4500	5500	7500	9000	11000
Output Rating ①	Normal Duty	Rated Output Capacity [kVA]	58	73	88	120	143	175
		Rated Output Current [A]	73	91	110	150	180	220
		Applicable Motor Output [kW]	37	45	55	75	90	110
		Applicable Motor Output [HP]	50	60	75	100	125	150
		Overload Capacity	120% of rated output current: 1 minute for every 5 minutes; 160% of rated output current: 3 seconds for every 30 seconds					
		Max. Output Frequency [Hz]	0.00–599.00					
		Carrier Frequency [kHz]	2–10 (Default: 6)			2–9 (Default: 4)		
	Heavy Duty	Rated Output Capacity [kVA]	55	69	84	114	136	167
		Rated Output Current [A]	69	86	105	143	171	209
		Applicable Motor Output [kW]	30	37	45	55	75	90
		Applicable Motor Output [HP]	40	53	60	75	100	125
		Overload Capacity	150% of rated output current: 1 minute for every 5 minutes; 180% of rated output current: 3 seconds for every 30 seconds					
		Max. Output Frequency [Hz]	0.00–300.00					
		Carrier Frequency [kHz]	2–10 (Default: 2)			2–9 (Default: 2)		
Rating Input	Input Current [A]	Normal Duty	74	101	114	157	167	207
		Heavy Duty	70	96	108	149	159	197
	Rated Voltage/Frequency		3-phase AC 380 V–480 V (-15% +10%), 50/60 Hz					
	Operating Voltage Range		323–528 V AC					
	Frequency Tolerance		47–63 Hz					
Efficiency [%]			97.8				98.2	
Power Factor			>0.98					
Drive Weight [Kg]			27 ± 1.5		38.5 ± 1.5		64.8 ± 1.5	
Cooling Method			Fan cooling					
Braking Chopper			Frame D0–E: Optional					
DC choke			Frame D0–E: Built-in					
EMC Filter			Frame D0–E: Optional					
EMC-COP01 ②			VD i (X)XXX-43C2-A: Optional; VD i (X)XXX-43C2-E: Built-in					

Tab. 9-3: Specifications 460 V series (frame size D0 to E)

NOTES

- ①: The factory setting is Normal Duty mode.
- ②: CANopen® communication card
- The carrier frequency is default. Increasing the carrier frequency requires a reduction in current. Please refer to section 9.5.1 for the derating curve of ambient temperature.
- The AC motor drive should operate in derating current when its control method is set to FOC Sensorless, TQC+PG, TQC sensorless. PM+PG, PM sensorless Please refer to Pr. 06-55 for more information.
- Select the AC motor drive with capacity one grade larger for the impact load application.
- The rated input current will be affected by not only Power Transformer and the connection of the reactors on input side, but also fluctuates with the impedance of power side.
- For Frame A, B and C, VD i (X)XXX-43C2-A is under IP20/NEMA1/UL TYPE1 protection level.
- For Frame D and above, if the last character of the model is A then it is under IP20 protection level but the wiring terminal is under IP00 protection level; if the last character of the model is E, it is under IP20/NEMA1/UL TYPE1 protection level.

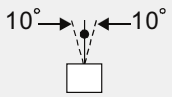
9.2.1 General specifications

Control characteristics	Control Method	1: V/F, 2: SVC, 3: VF+PG, 4: FOC+PG, 5: TQC+PG, 6: PM+PG, 7: FOC sensorless, 8: TQC sensorless, 9: PM sensorless
	Starting Torque	IM: Reach up to 150% of 1/50 rated speed PM: Reach up to 150% of 1/100 rated speed
	V/F Curve	4 point adjustable V/F curve and square curve
	Speed Circuit Response Bandwidth	Open-circuit: 5 Hz Close-circuit: Max. 40 Hz for IM, and Max. 100 Hz for PM
	Torque Limit	Normal duty: a max. of 160% torque current; Heavy duty: a max. of 180% torque current
	Torque Accuracy	TQC + PG: ±5 % TQC Sensorless: ±15%
	Max. Output Frequency (Hz)	Normal duty: 0.01–599.00 Hz; Heavy duty: 0.00–300.00 Hz
	Frequency Output Accuracy	Digital command: ±0.01%, -10 °C–+40 °C; Analog command: ±0.1%, 25 ±10 °C
	Output Frequency Resolution	Digital command: 0.1 Hz, Analog command: 0.05% X max. output frequency (Pr. 01-00)/11 bit
	Overload Tolerance	Normal duty: 120% of rated current can endure for 1 minute during every 5 minutes 160% of rated current can endure for 3 seconds during every 30 seconds Heavy duty: 150% of rated current can endure for 1 minute during every 5 minutes 180% of rated current can endure for 3 seconds during every 30 seconds
	Frequency Setting Signal	-10–+10 V, 0–+10 V, 4–20 mA, 0–20 mA, Pulse input
	Accel./decel. Time	0.00–600.00/0.0–6000.0 seconds
	Main Control Function	Torque control, Speed/torque control switching, Feed forward control, Zero-servo control, Momentary power loss ride thru, Speed search, Over-torque detection, Torque limit, 16-step speed (max), Accel./decel. time switch, S-curve accel./decel., 3-wire sequence, Auto-Tuning (rotational, stationary), Dwell, Slip compensation, Torque compensation, JOG frequency, Frequency upper/lower limit settings, DC injection braking at start/ stop, High slip braking, PID control (with sleep function), Energy saving control, MODBUS communication (RS-485 RJ45, max. 115.2 Kbps), Fault restart, Parameter copy
	Fan Control	230 V model: Models above VD i 1500-23C2-A (including VD i 1500-23C2-A) are PWM control Models below VD i 1100-23C2-A (including VD i 1100-23C2-A) are ON/OFF switch control 460 V model: Models above VD i 1850-43C2-A (including VD i 1850-43C2-A) are PWM control Models below VD i 1500-43C2-A (including VD i 1500-43C2-A) are ON/OFF switch control
Protection Characteristics	Motor Protection	Electronic thermal relay protection
	Over-current Protection	Over-current protection: 240% rated current for normal duty; 250% rated current for heavy duty Current clamp: "Normal duty: 170–175%" "Heavy duty: 175–180%"
	Over-voltage Protection	230 V model: drive will stop when DC-BUS voltage exceeds 410 V 460 V model: drive will stop when DC-BUS voltage exceeds 820 V
	Over-temperature Protection	Built-in temperature sensor
	Stall Prevention	Stall prevention during acceleration, deceleration and running independently
	Restart after Instantaneous Power Failure	Parameter setting up to 20 seconds
	Grounding Leakage Current Protection	Leakage current is higher than 50% of rated current of the AC motor drive
	Short-circuit Current Rating (SCCR)	Per UL 508C, the drive is suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (rms) when protected by fuses given in the fuse table.
Certifications		GB/T12668-2

Tab. 9-4: General specifications of C2 series drives

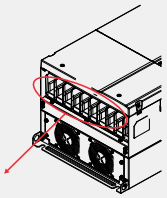
NOTE The setting range of max. output frequency changes as carrier wave and control modes changes. Refer to Pr. 01-00 and Pr. 06-55 for more information.

9.3 Environment for Operation, Storage and Transportation

DO NOT expose the AC motor drive in the bad environment, such as dust, direct sunlight, corrosive/inflammable gasses, humidity, liquid and vibration environment. The salt in the air must be less than 0.01 mg/cm^2 every year.			
Environment	Installation location	IEC60364-1/IEC60664-1 Pollution degree 2, Indoor use only	
	Surrounding Temperature (°C)	Storage/ Transportation	-25–+70
		Non-condensation, non-frozen	
	Rated Humidity	Operation	Max. 95%
		Storage/ Transportation	Max. 95%
		No condense water	
	Air Pressure (kPa)	Operation/Storage	86–106
		Transportation	70–106
	Pollution Level	IEC 60721-3-3	
		Operation	Class 3C3; Class 3S2
		Storage	Class 1C2; Class 1S2
		Transportation	Class 2C2; Class 2S2
		If the AC motor drive is to be used under harsh environment with high level of contamination (e.g. dew, water, dust), make sure it is installed in an environment qualified for IP54 such as in a cabinet.	
	Altitude	Operation	If AC motor drive is installed at altitude 0–1000 m, follow normal operation restriction. If it is installed at altitude 1000–2000 m, decrease 1% of rated current or lower 0.5 °C of temperature for every 100 m increase in altitude. Maximum altitude for Corner Grounded is 2000 m.
Package Drop	Storage	ISTA procedure 1A (according to weight) IEC60068-2-31	
	Transportation		
Vibration	1.0 mm, peak to peak value range from 2 Hz to 13.2 Hz; 0.7G–1.0G range from 13.2 Hz to 55 Hz; 1. 0G range from 55 Hz to 512 Hz. Comply with IEC 60068-2-6		
Impact	IEC/EN 60068-2-27		
Operation Position	Max. allowed offset angle ±10° (under normal installation position)		

Tab. 9-5: Ambient conditions

9.4 Specification for Operation Temperature and Protection Level

Models	Frame	Top cover	Conduit Box	Protection Level	Operation Temperature
VD i (x)xxx-xxC2-A VD i (x)xxx-xxC2-S	Frame A–C 230 V: 0.75–22 kW 460 V: 0.75–30 kW	Top cover removed	Standard conduit plate	IP20/UL Open Type	-10–50 °C
		Standard with top cover		IP20/UL Type1/NEMA1	-10–40 °C
	Frame D–E 230 V: ≥ 22 kW 460 V: ≥ 30 kW	N/A	No conduit box	IP00 IP20/UL Open Type The circled area: IP00 Other than circled area: IP20 	-10–50 °C
VD i (x)xxx-xxC2-E VD i (x)xxx-xxC2-U	Frame A–C 460 V: 0.75–30 kW	Top cover removed	Standard conduit plate	IP20/UL Open Type	-10–50 °C
		Standard with top cover		IP20/UL Type1/NEMA1	-10–40 °C
	Frame D–E 230 V: ≥ 22 kW 460 V: ≥ 30 kW	N/A	Standard conduit box	IP20/UL Type1/NEMA1	-10–40 °C

Tab. 9-6: Protection class and operation conditions

9.5 Derating Curve of Ambient Temperature

Protection level	Operating Environment
UL Type I/IP20	When the AC motor drive operates at the rated current, and the ambient temperature has to be between -10–+40 °C. When the temperature is over 40 °C, the rated current decreases 2% for every increase by 1 °C. The maximum allowable temperature is 60 °C.
UL Open Type/IP20	When the AC motor drive operates a t the rated current, and the ambient temperature has to be between -10–+50 °C. When the temperature is over 50 °C, the rated current decreases 2% for every increase by 1 °C. The maximum allowable temperature is 60 °C.
High Altitude	If AC motor drive is installed at altitude 0–1000 m, follow normal operation restriction. If it is install at altitude 1000–2000 m, decrease 1% of rated current or lower 0.5 °C of temperature for every 100 m increase in altitude. Maximum altitude for Corner Grounded is 2000 m. Contact Peter Electronic for more information, if you need to use this motor drive at an altitude of 2000 m or higher.

Tab. 9-7: Operating conditions

9.5.1 Ambient temperature derating curve

230 V/460 V Normal control ambient temperature derating curve

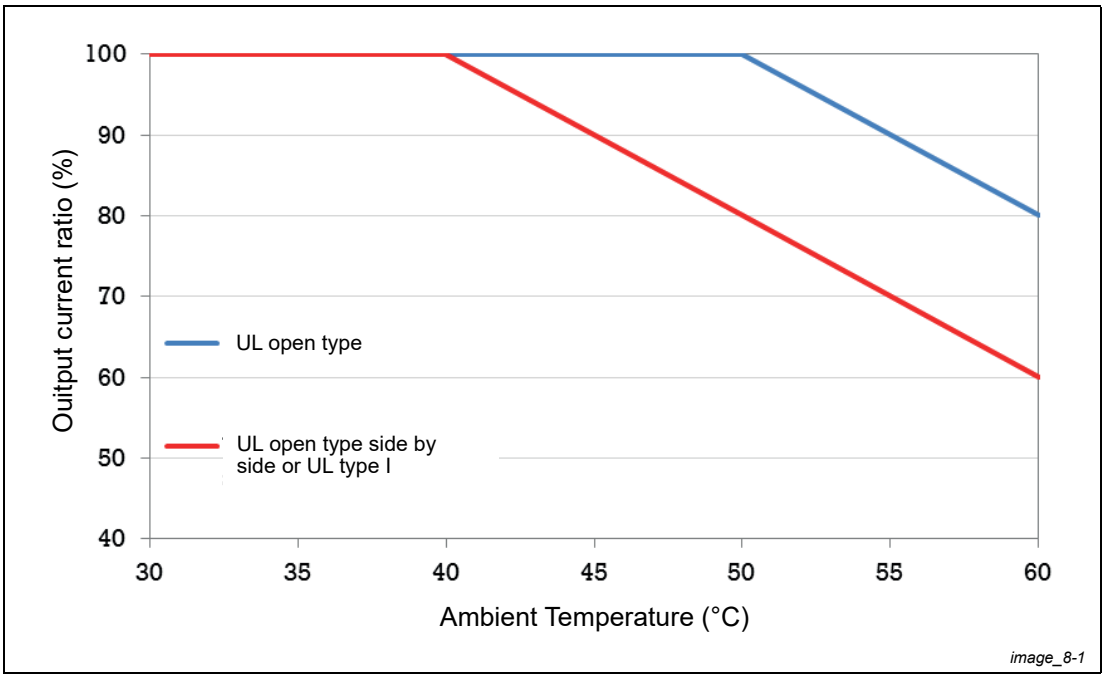


Fig. 9-1: Derating for ambient temperature – normal control

230 V/460 V Advanced control ambient temperature derating curve

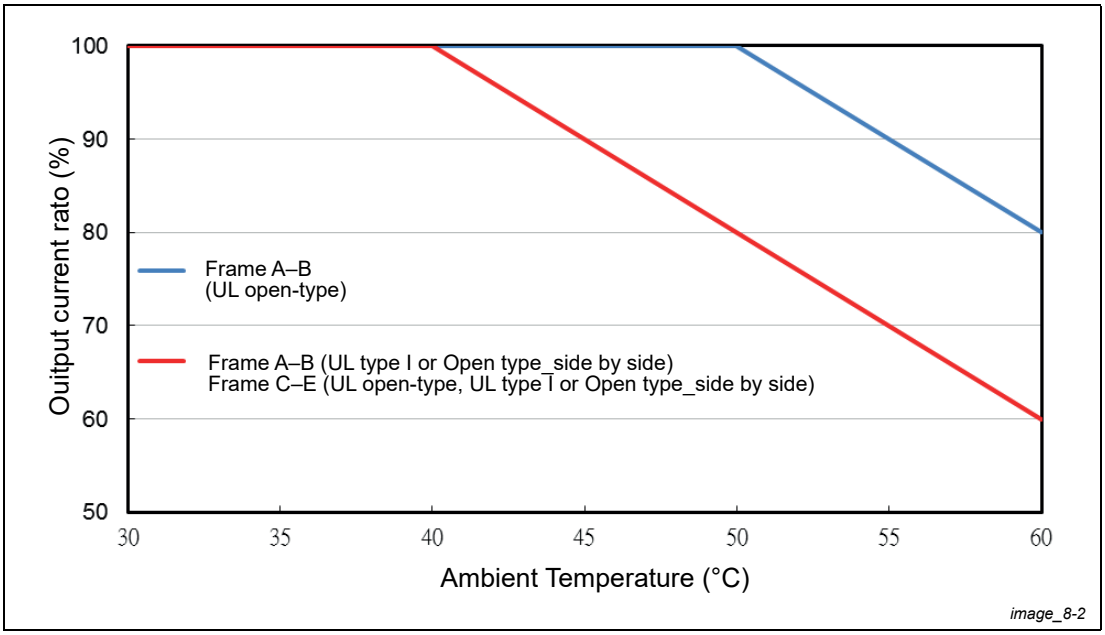


Fig. 9-2: Derating for ambient temperature – advanced control

9.5.2 Current derating at high altitude

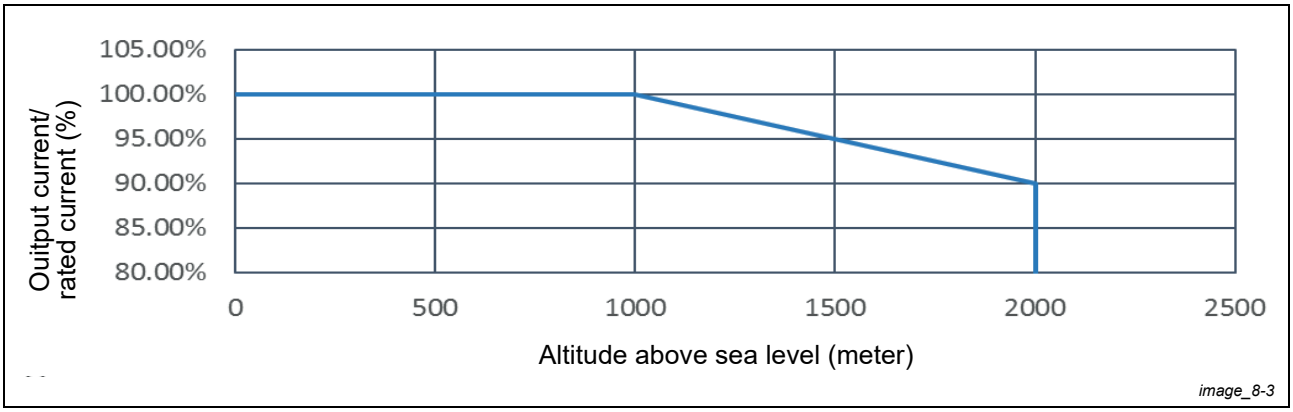


Fig. 9-3: Current derating at high altitude

9.5.3 Carrier wave derating curve

230 V/460 V

General Control Derating Curve (Pr. 00-10=1 and Pr. 00-11=0–3)

In Normal Duty mode (Pr. 00-16=0)

460 V

Setting 1
Setting 0 or 2 (50 °C: UL open-type)
Setting 0 or 2 (40 °C: UL type1 or open type_side by side)

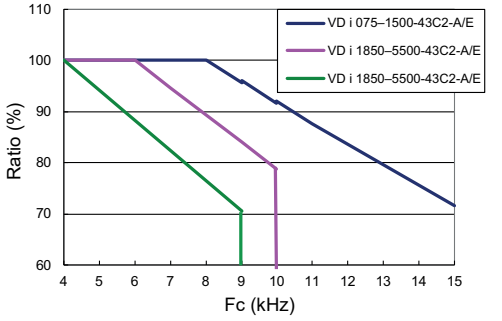


image_8-4.1

230 V

Setting 1
Setting 0 or 2 (50 °C: UL open-type)
Setting 0 or 2 (40 °C: UL type1 or open type_ side by side)

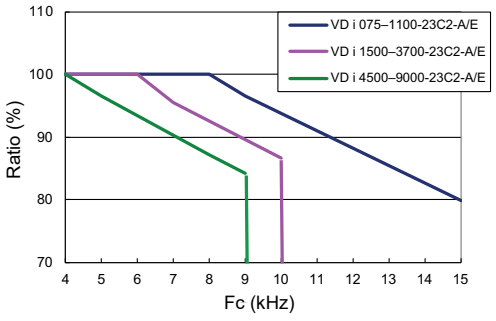


image_8-4.2

Fig. 9-4: Derating at normal load - general control

In Heavy Duty mode (Pr. 00-16=1)

460 V

Setting 1
Setting 0 or 2 (50 °C: UL open-type)
Setting 0 or 2 (40 °C: UL type1 or open type_side by side)

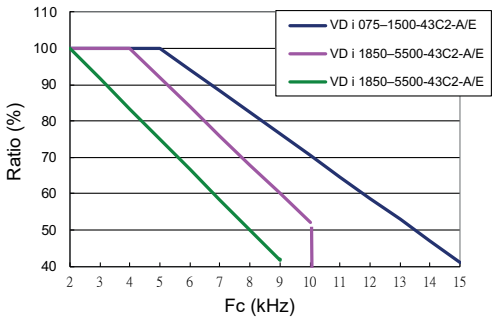


image_8-5.1

230 V

Setting 1
Setting 0 or 2 (50 °C: UL open-type)
Setting 0 or 2 (40 °C: UL type1 or open type_side by side)

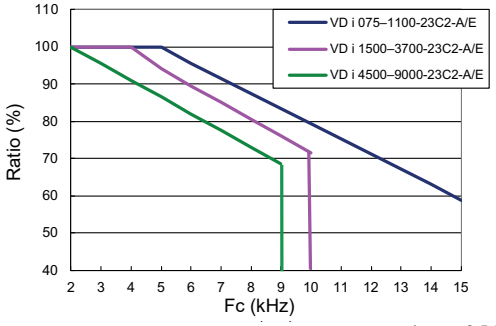


image_8-5.2

Fig. 9-5: Derating at heavy load - general control

Advanced Control Derating Curve (Pr. 00-10=1, and Pr. 00-11=4–7; or Pr. 00-10=3, and Pr. 00-13=1–3)

In Normal Duty mode (Pr. 00-16=0)

460 V

(50 °C: UL open-type, Frame A–B)
(40 °C: UL type1 or open type_ side by side, Frame A–B)
(40 °C: UL open-type, UL type 1 or open type_ side by side, Frame C–E)

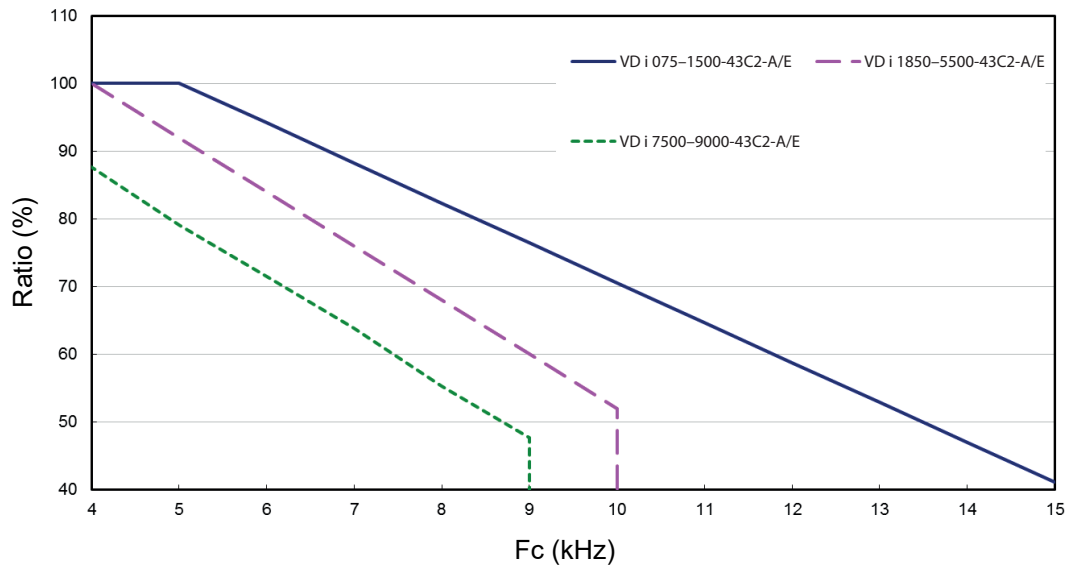


Fig. 9-6: Derating at normal load - advanced control (460 V)

230 V

(50 °C: UL open-type, Frame A–B)
(40 °C: UL type1 or open type_ side by side, Frame A–B)
(40 °C: UL open-type, UL type 1 or open type_ side by side, Frame C–E)

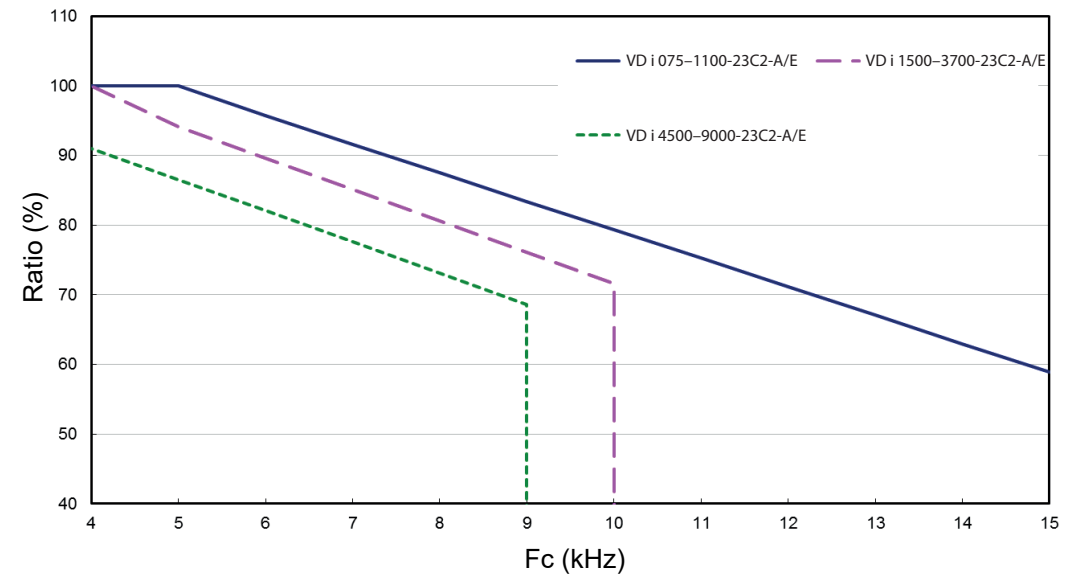


Fig. 9-7: Derating at normal load - advanced control (230 V)

In Heavy Duty mode (Pr. 00-16=1)

460 V

(50 °C: UL open-type, Frame A–B)
(40 °C: UL type1 or open type_ side by side, Frame A–B)
(40 °C: UL open-type, UL type 1 or open type_ side by side, Frame C–E)

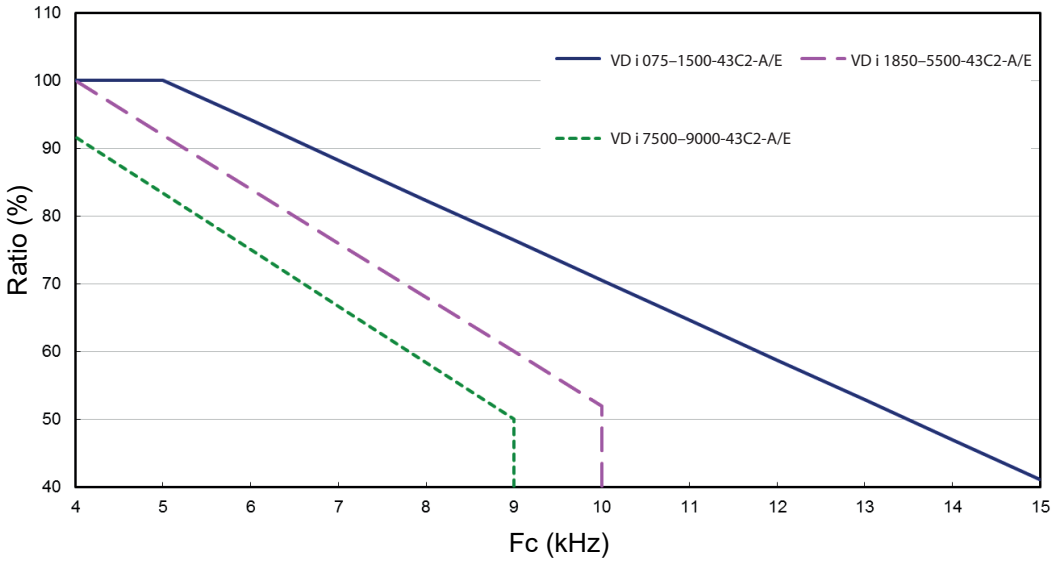


Fig. 9-8: Derating at heavy load - advanced control (460 V)

230 V

(50 °C: UL open-type, Frame A–B)
(40 °C: UL type1 or open type_ side by side, Frame A–B)
(40 °C: UL open-type, UL type 1 or open type_ side by side, Frame C–E)

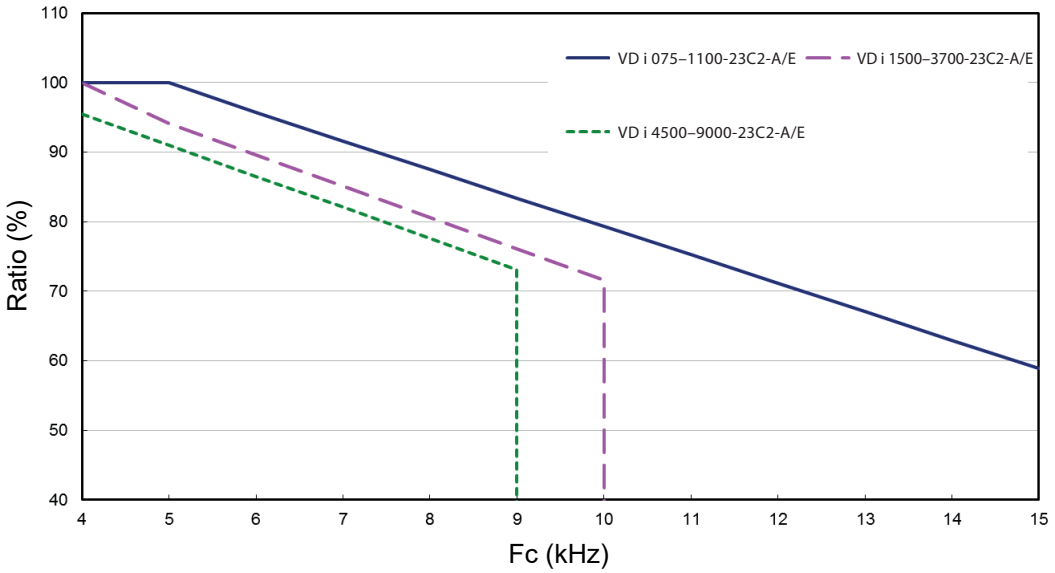


Fig. 9-9: Derating at heavy load - advanced control (230 V)

9.6 Efficiency Curve

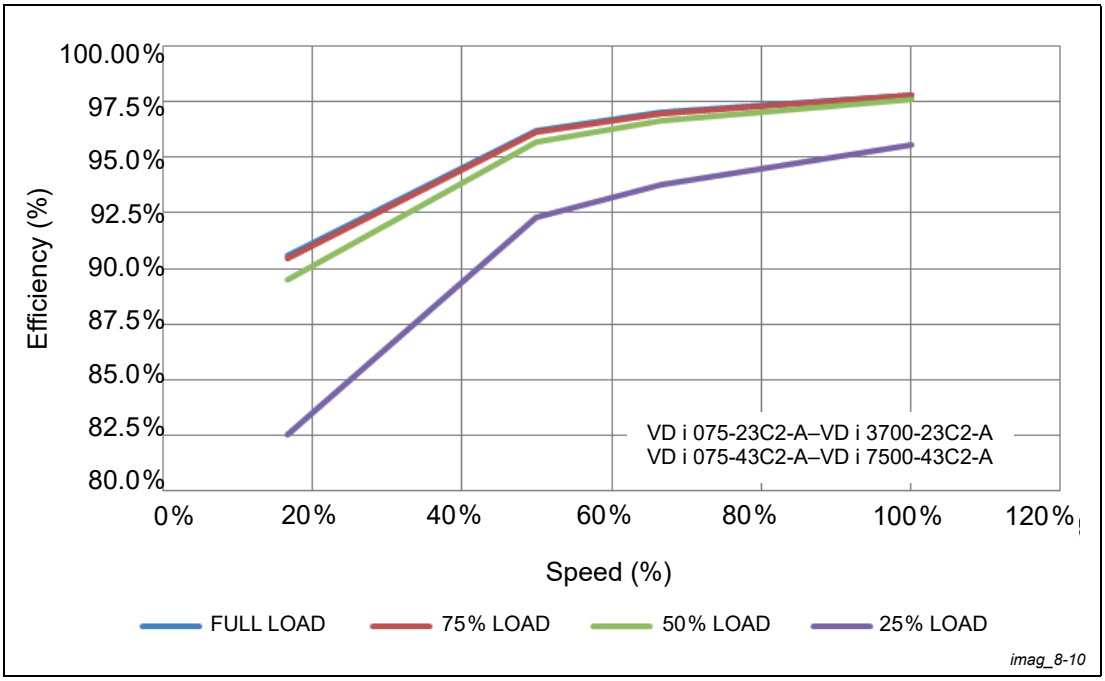


Fig. 9-10: Efficiency depending on model at different loads

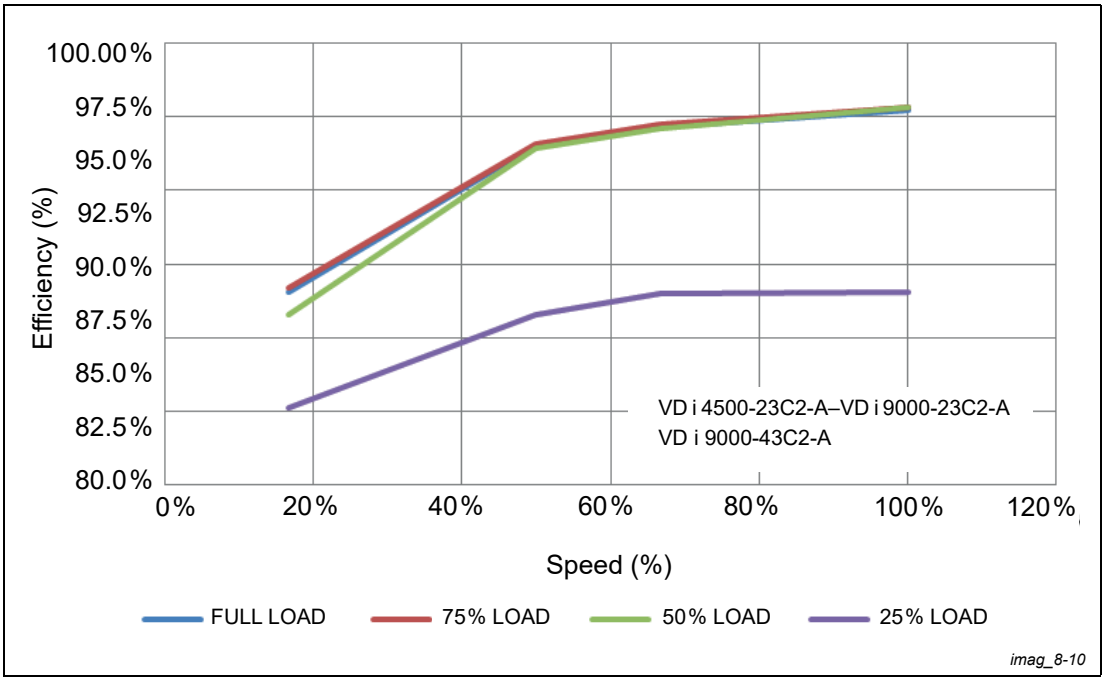


Fig. 9-11: Efficiency depending on model at different loads

10 Digital keypad

10.1 Descriptions of Digital Keypad

The default communication format is ASCII 9600, 7, N, 2 in VersiDrive i C2. But the communication format is RTU 19200, 8, N, 2. To enable the communication between VersiDrive i C2 and Versi-KP-LCD, you need to set up the communication parameters of VersiDrive i C2 before linking the drive and the keypad (Versi-KP-LCD).

Follow the set-up steps below:

- Set Pr. 09-00 = 1 (the communication address)
- Set Pr. 09-01 = 19.2 kbps (the COM1 transmission speed)
- Set Pr. 09-04 = 13 (8, N, 2; RTU) (the COM1 communication protocol)

Versi-KP-LCD

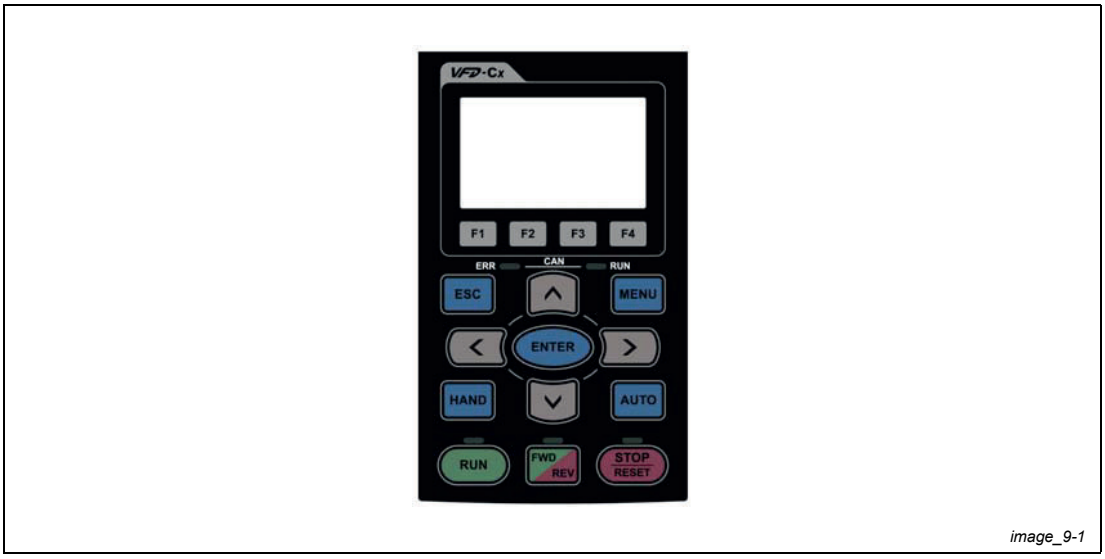


Fig. 10-1: Versi-KP-LCD Communication Interface RJ45 (socket), RS-485 interface

Installation Method:

① Embedded type and can be put flat on the surface of the control box. The front cover is water proof.

② Use the assembly set 29000.2D116 to do wall mounting or embedded mounting. Its protection level is IP66.

③ The maximum RJ45 extension lead is 5 m (16 ft).

④ This keypad can only be used on Peter's motor drive VersiDrive i C2.

10.1.1 Descriptions of keypad functions

Key	Description
	Start operation key – It is only valid when the source of operation command is from the keypad. – It can operate the AC motor drive by the function setting and the RUN LED will be ON. – It can be pressed again and again at stop process.
	Stop command key – When it receives STOP command, no matter if the AC motor drive is in operation or stop status, the AC motor drive needs to execute “STOP” command. – The RESET key can be used to reset the drive after the fault occurs. – The reasons why the error cannot be reset: a. Because the condition which triggers the fault is not cleared. When the condition is cleared, the fault can be reset. b. Because it’s the fault status checking when power-on. When the condition is cleared, re-power again, and the fault can be reset.
	Operation direction key – This key only controls the operation direction, and will NOT activate the drive. FWD: forward, REV: reverse. – Refer to the LED descriptions for more details.
	ENTER key – Press ENTER and go to the next level. If it is the last level then press ENTER to execute the command.
	ESC key – ESC key function is to leave current menu and return to the last menu. It also functions as a return key or cancel key in the sub-menu.
	Press menu to return to main menu. Menu content: 1. Parameter setup 2. Quick Start 3. Application Selection List 4. Changed List 5. Copy Parameter 6. Fault Record 7. Language Setup 8. Time Setup 9. Keypad Locked 10. PLC Function 11. Copy PLC 12. Display Setup
	Direction: Left/Right/Up/Down – In the numeric value setting mode, it is used to move the cursor and change the numeric value. – In the menu/text selection mode, it is used for item selection.
	Function key – The functions keys have factory settings and can be defined by users. The factory settings of F1 and F4 work with the function list below. For example, F1 is JOG function, F4 is a speed setting key for adding/deleting user defined parameters. – Other functions must be defined by TPEditor first (please use version 1.60 or above).
	HAND key – This key is executed by the parameter settings of the source of Hand frequency and hand operation. The factory settings of both source of Hand frequency and hand operation are the digital keypad – Press HAND key at stop status, the setting will switch to hand frequency source and hand operation source. Press HAND key at operation status, it stops the AC motor drive first (display AHSP warning), and switch to hand frequency source and hand operation source.. – Versi-KP-LCD displays HAND mode on the screen.

Tab. 10-1: Descriptions of keypad functions

Key	Description
	AUTO key – This key is executed by the parameter settings of the source of AUTO frequency and AUTO operation. The factory setting is the external terminal (source of operation is 4–20 mA). – Press Auto key at stop status, the setting will switch to hand frequency source and hand operation source. Press Auto key at operation status, it stops the AC motor drive first (display AHSP warning), and switch to auto frequency source and auto operation source. – Versi-KP-LCD displays AUTO mode on the screen

Tab. 10-1: Descriptions of keypad functions

LED	Description
	Steady ON: operation indicator of the AC motor drive, including DC brake, zero speed, standby, restart after fault and speed search. Blinking: drive is decelerating to stop or in the status of base block. Steady OFF: drive doesn't execute the operation command
	Steady ON: stop indicator of the AC motor drive. Blinking: drive is in the standby status. Steady OFF: drive doesn't execute “STOP” command.
	Operation Direction LED – Green light is on, the drive is running forward. – Red light is on, the drive is running backward. – Twinkling light: the drive is changing direction. Operation Direction LED under Torque Mode – Green light is ON: when the torque command ≥ 0, and the motor is running forward. – Red light is ON: when the torque command < 0, and the motor is running backward.. – Twinkling light: when the torque command < 0, and the motor is running forward.

Tab. 10-2: Descriptions of LED functions

LED	LED status	Condition/state
CANopen® – "RUN"	OFF	CANopen® at initial (No LED)
	Blinking	CANopen® at pre-operation (refer to following figure ❶)
	Single flash	CANopen® at stopped (refer to following figure ❷)
	ON	CANopen® at operation status (refer to following figure ❸)

Tab. 10-3: State of the CANopen® RUN LED

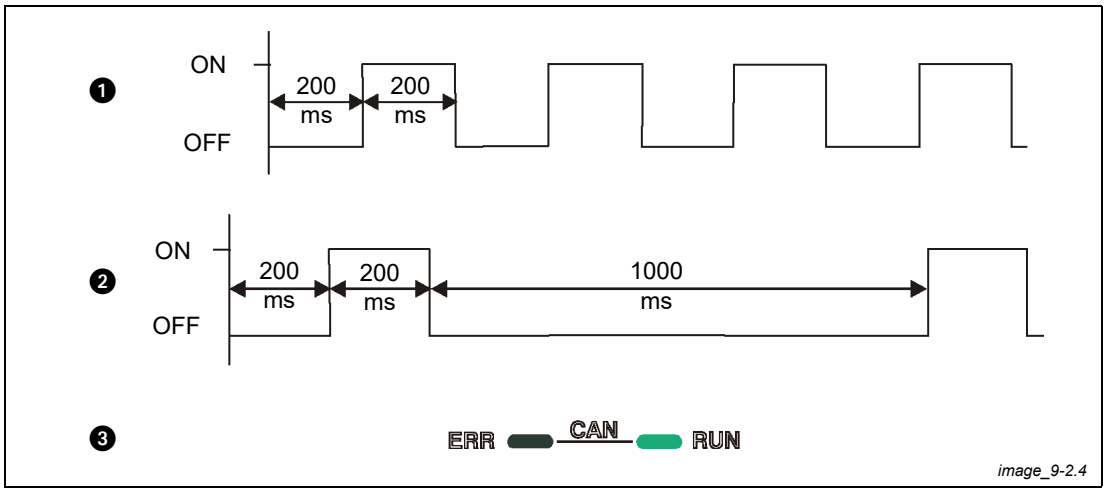


Fig. 10-2: Flashing of the CAN RUN LED

LED	LED status	Condition/state
CANopen® – "ERR"	OFF	No error
	Single flash	One message fail (refer to following figure ❶)
	Double flash	Guarding fail or heartbeat fail (refer to following figure ❷)
	Triple flash	SYNC fail (refer to following figure ❸)
	ON	Bus off (refer to following figure ❹)

Tab. 10-4: State of the CANopen® ERR LED

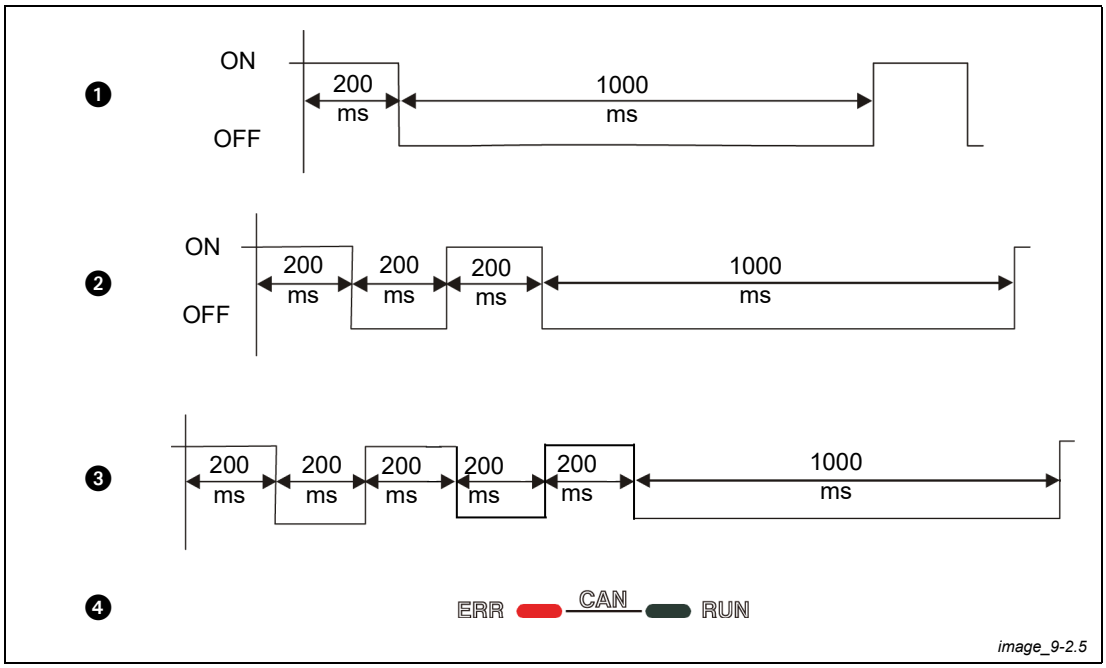


Fig. 10-3: Flashing of the CAN ERR LED

10.2 Function of Digital Keypad Versi-KP-LCD

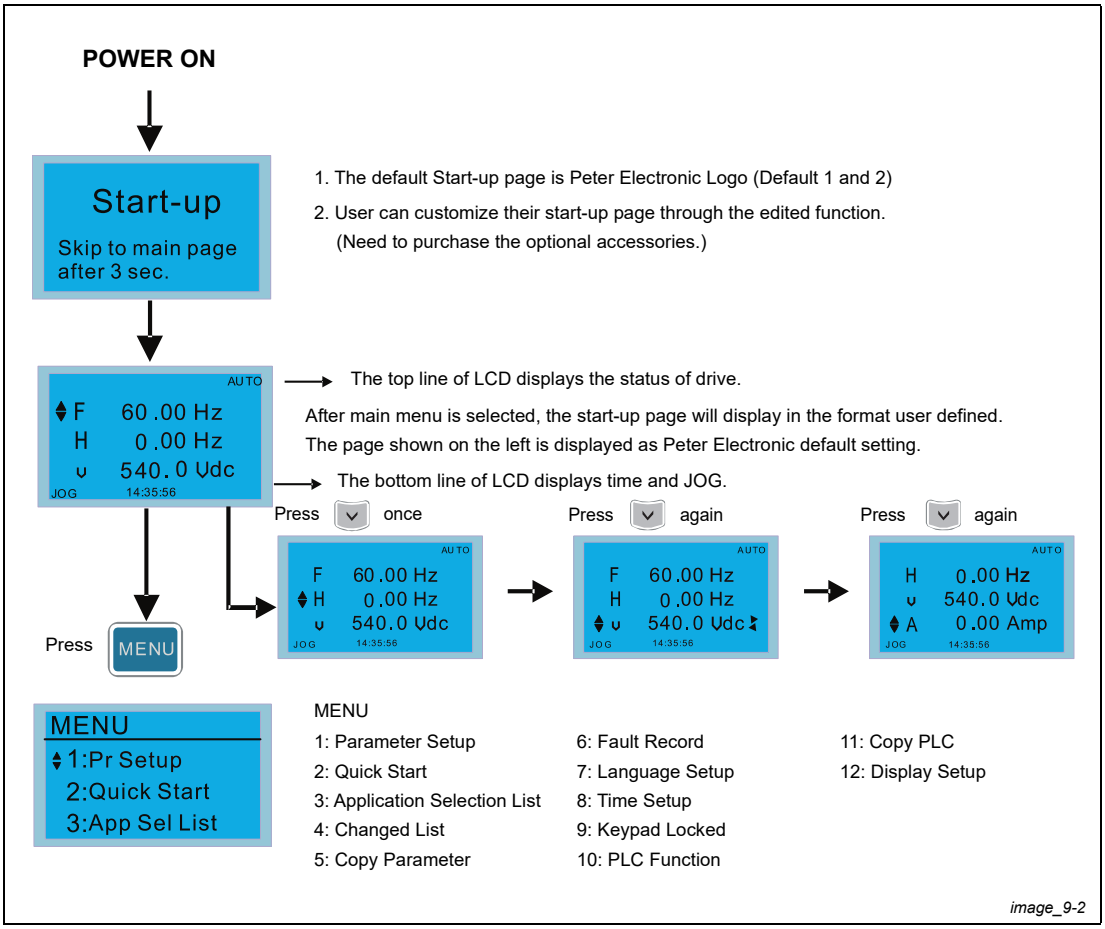


Fig. 10-4: Start screen and main menu selection

NOTES

- Startup page can only display pictures, no flash.
- When Power ON, it will display startup page then the main page.The main page displays Peter Electronic's default setting F/H/A/U, the display order can be set by Pr. 00-03 (Startup display). When the selected item is U page, use left key and right key to switch between the items, the display order of U page is set by Pr. 00-04 (User display).

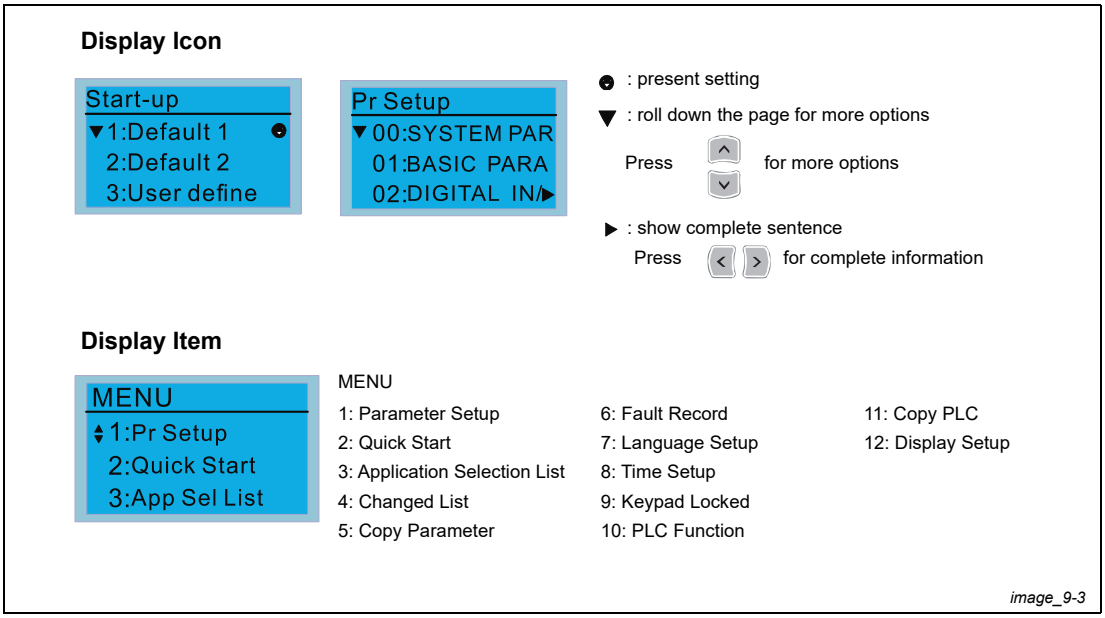


Fig. 10-5: Display symbols and main menu points

10.2.1 Parameter Setup

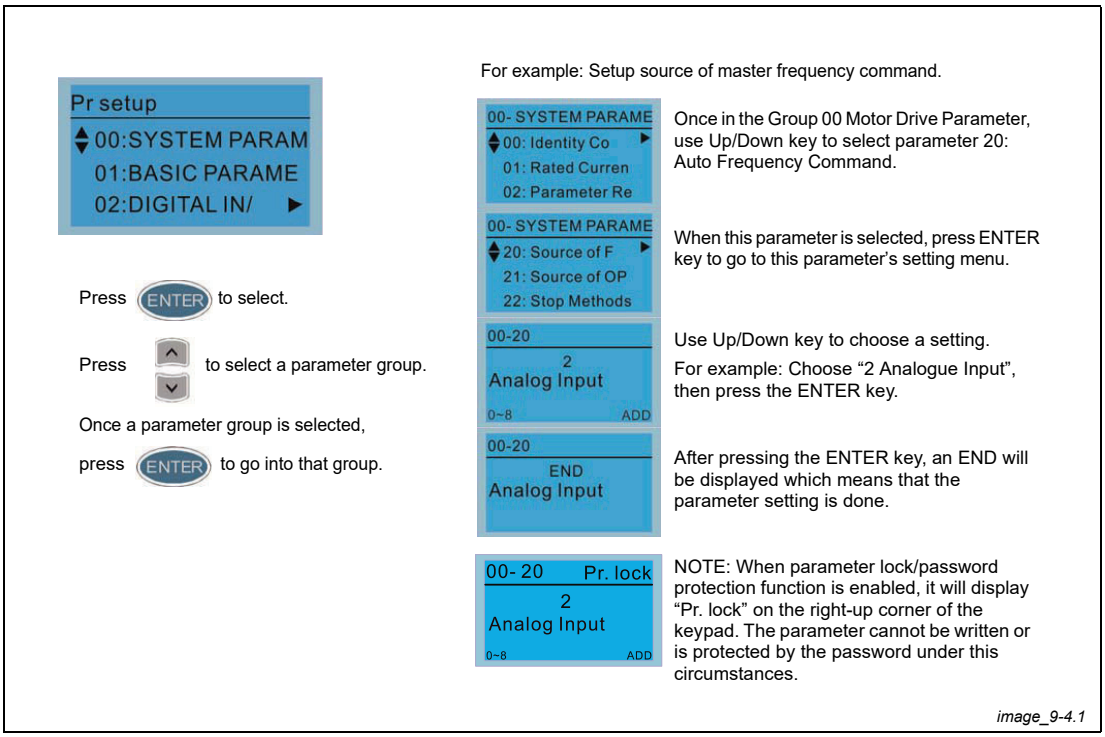


Fig. 10-6: Parameter setup

10.2.2 Quick Start

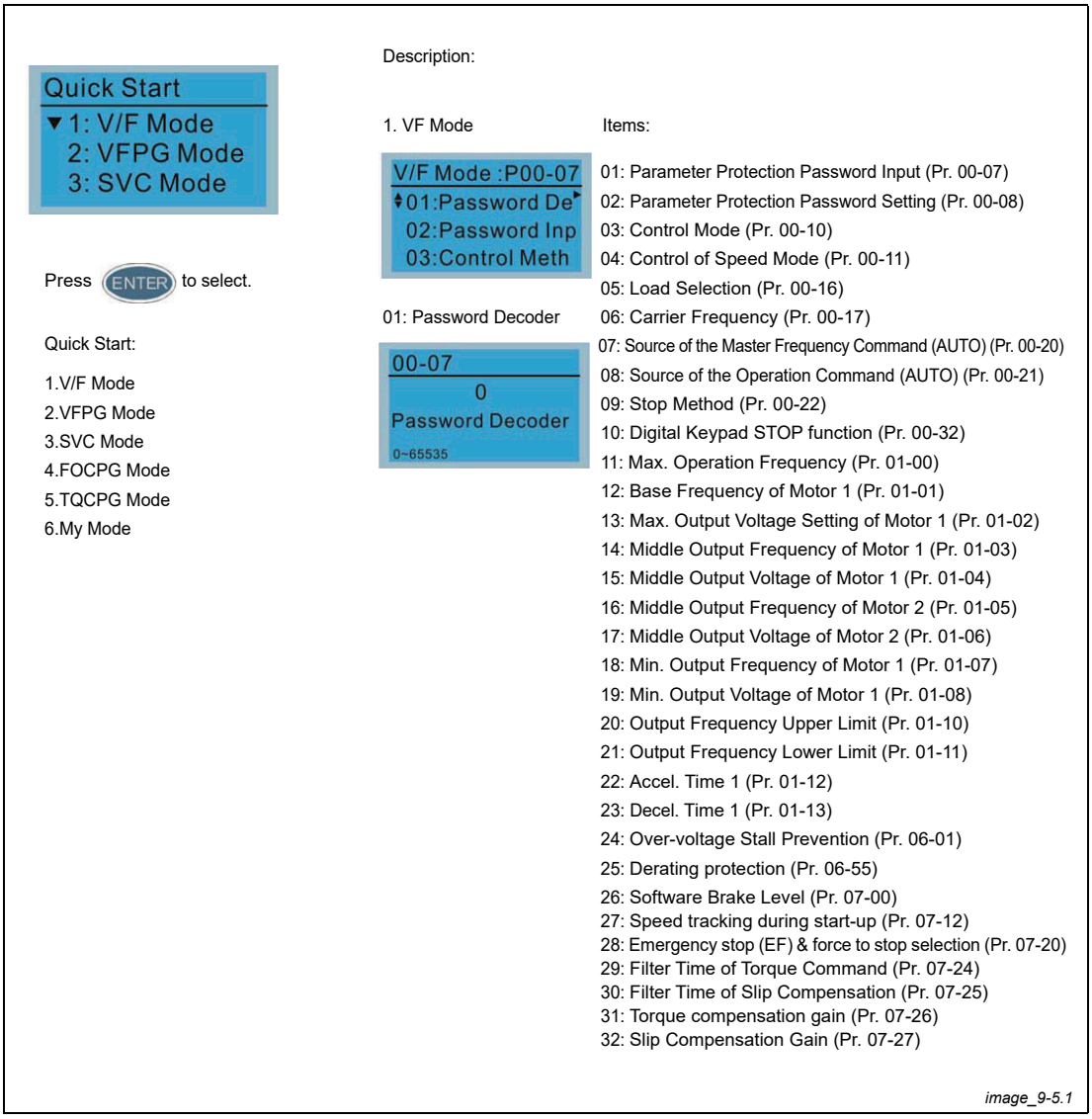


Fig. 10-7: Quick start (VF Mode)

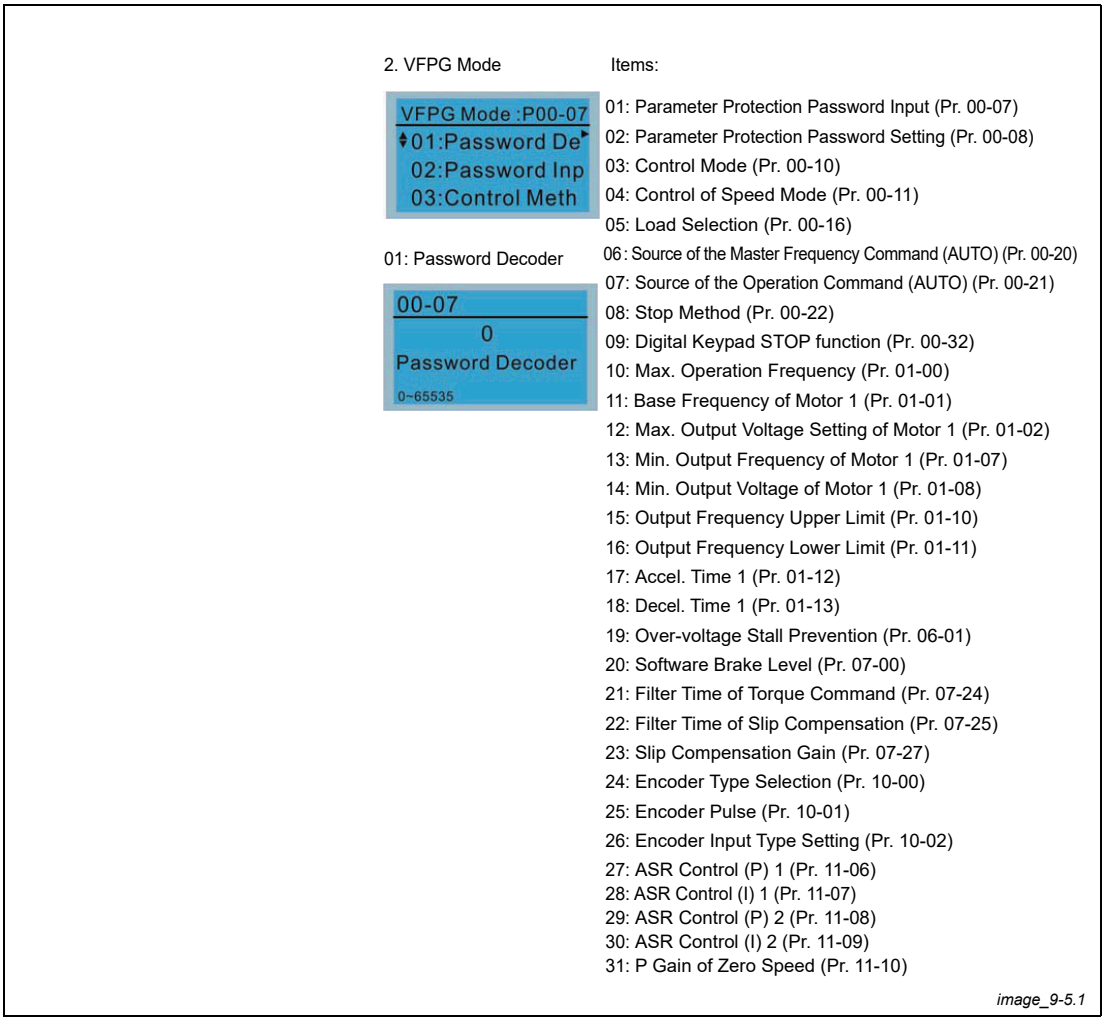


Fig. 10-8: Quick start (VFPG Mode)

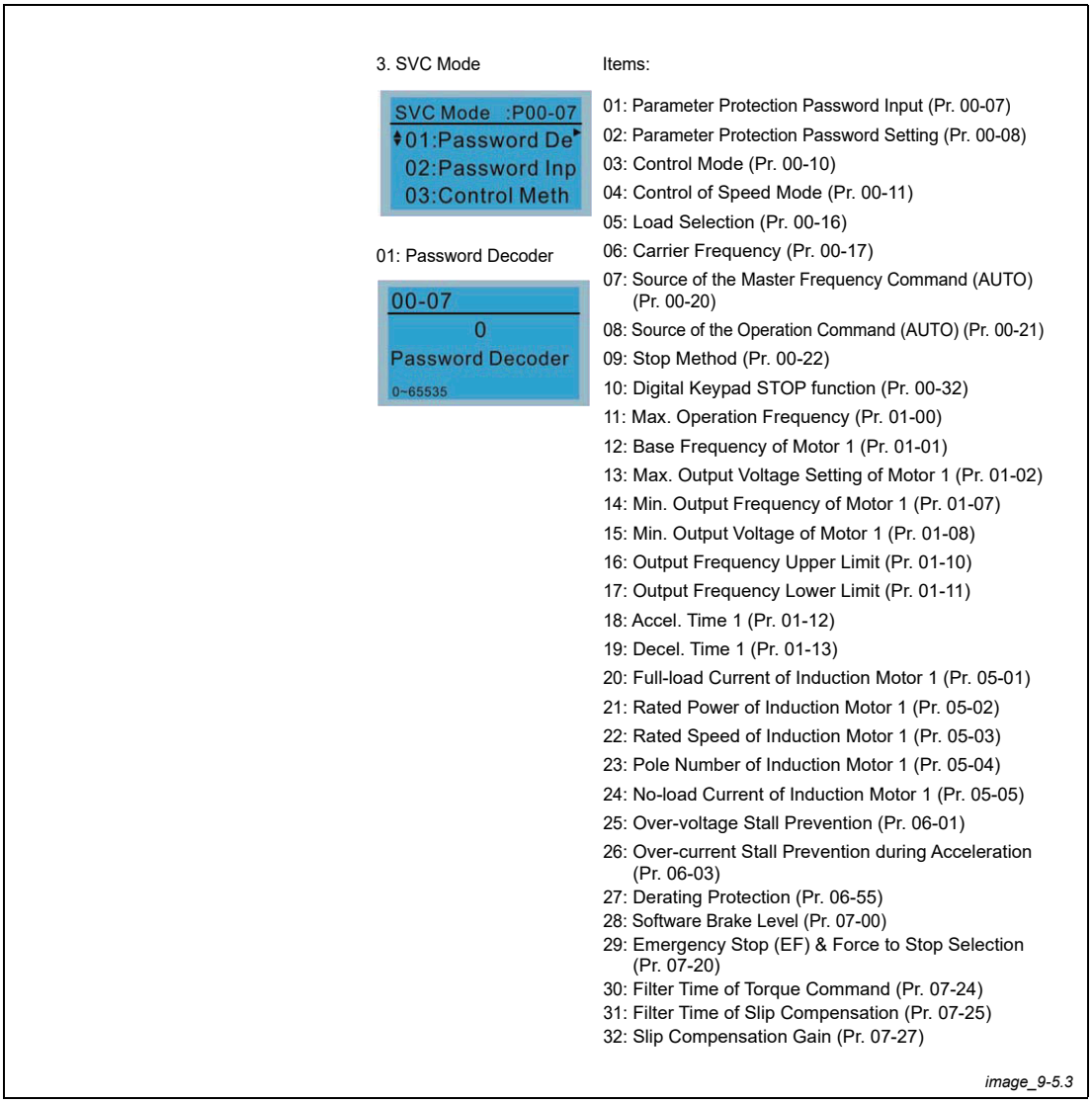


Fig. 10-9: Quick start (SVC Mode)

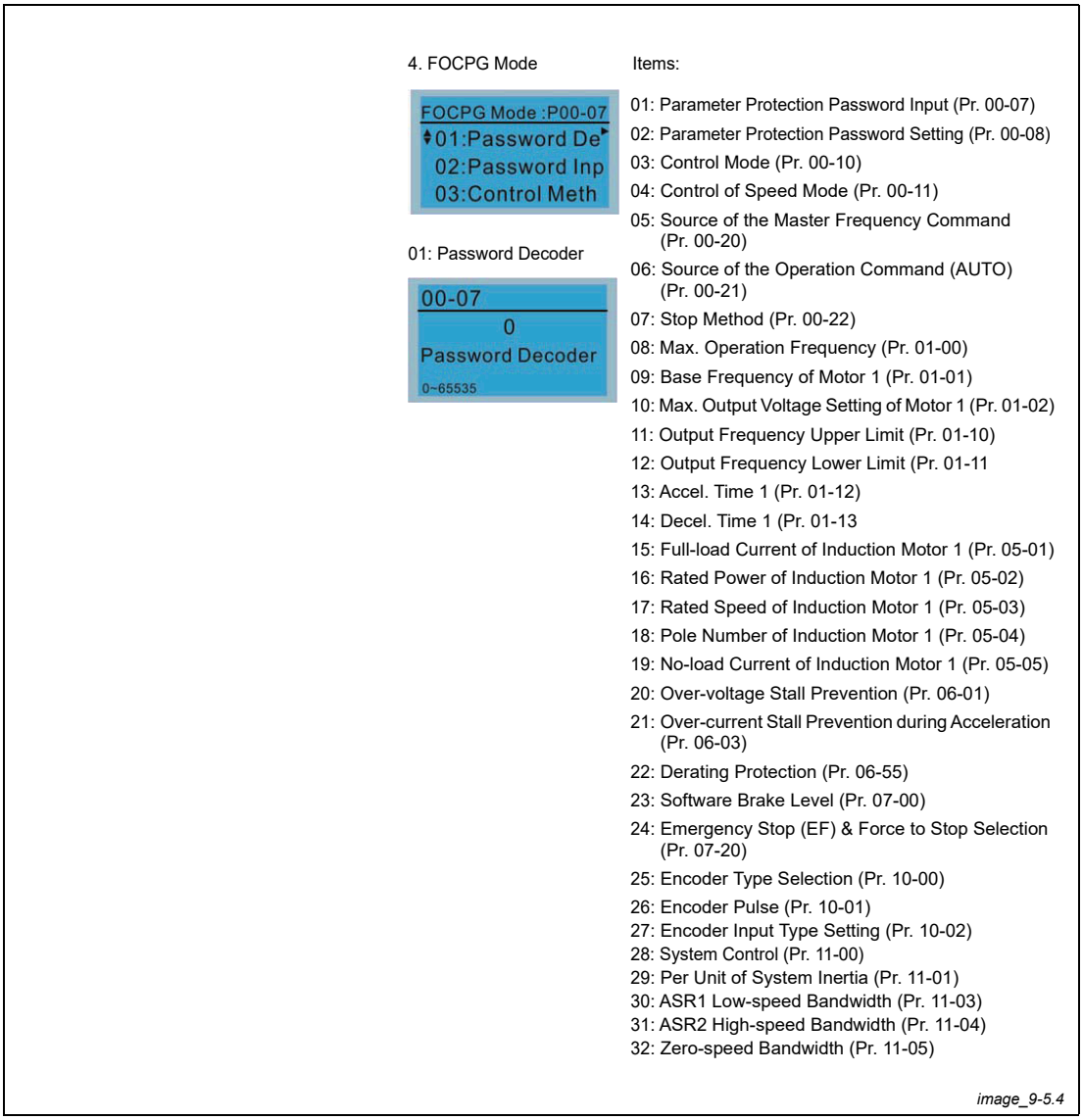


Fig. 10-10: Quick start (FOCPG Mode)

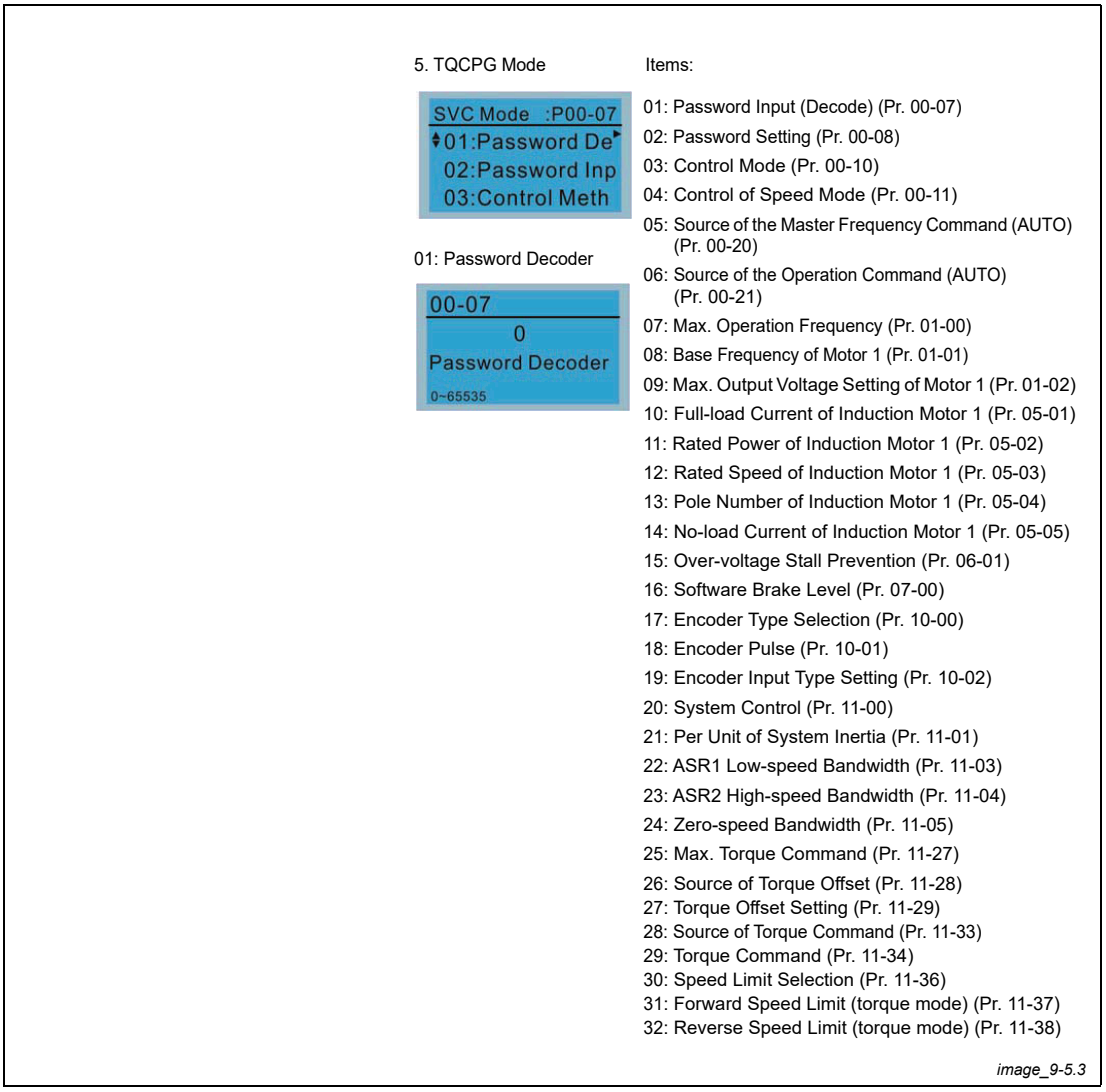
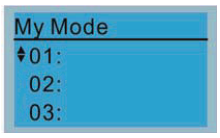


Fig. 10-11: Quick start (TQCPG Mode)

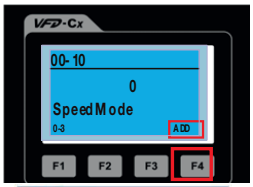
6. My Mode

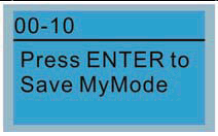


Items:

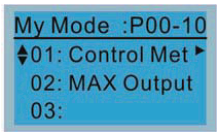
It can save 01–32 sets of parameters (Pr). Setup process

Click F4 in parameter setting page, the parameter will be saved to My Mode. To delete or correct the parameter, enter this parameter and click the “DEL” on the bottom right corner.

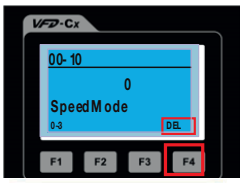


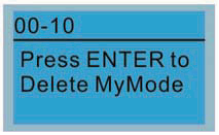


① Go to “Parameter Setup” function.
Press ENTER to go to the parameter which you need to use. There is an ADD on the bottom right-hand corner of the screen. Press F4 on the keypad to add this parameter to My Mode.

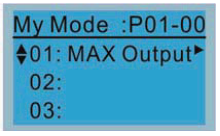


② The parameter (Pr) will be displayed in My mode if it is properly saved.
To correct or to delete this Pr., click DEL.





③ To delete a parameter, go to “My Mode” and select a parameter which you need to delete. Press ENTER to enter the parameter setting screen. There is a DEL on the bottom right hand corner of the screen. Press F4 on the keypad to delete this parameter from My Mode.



④ After pressing ENTER to delete <01 Control Mode>, the <02 Maximum Operating Frequency > will automatically replace <01 Control Mode>.

image_9-5.6

Fig. 10-12: Quick start (My Mode)

10.2.3 Application selection list

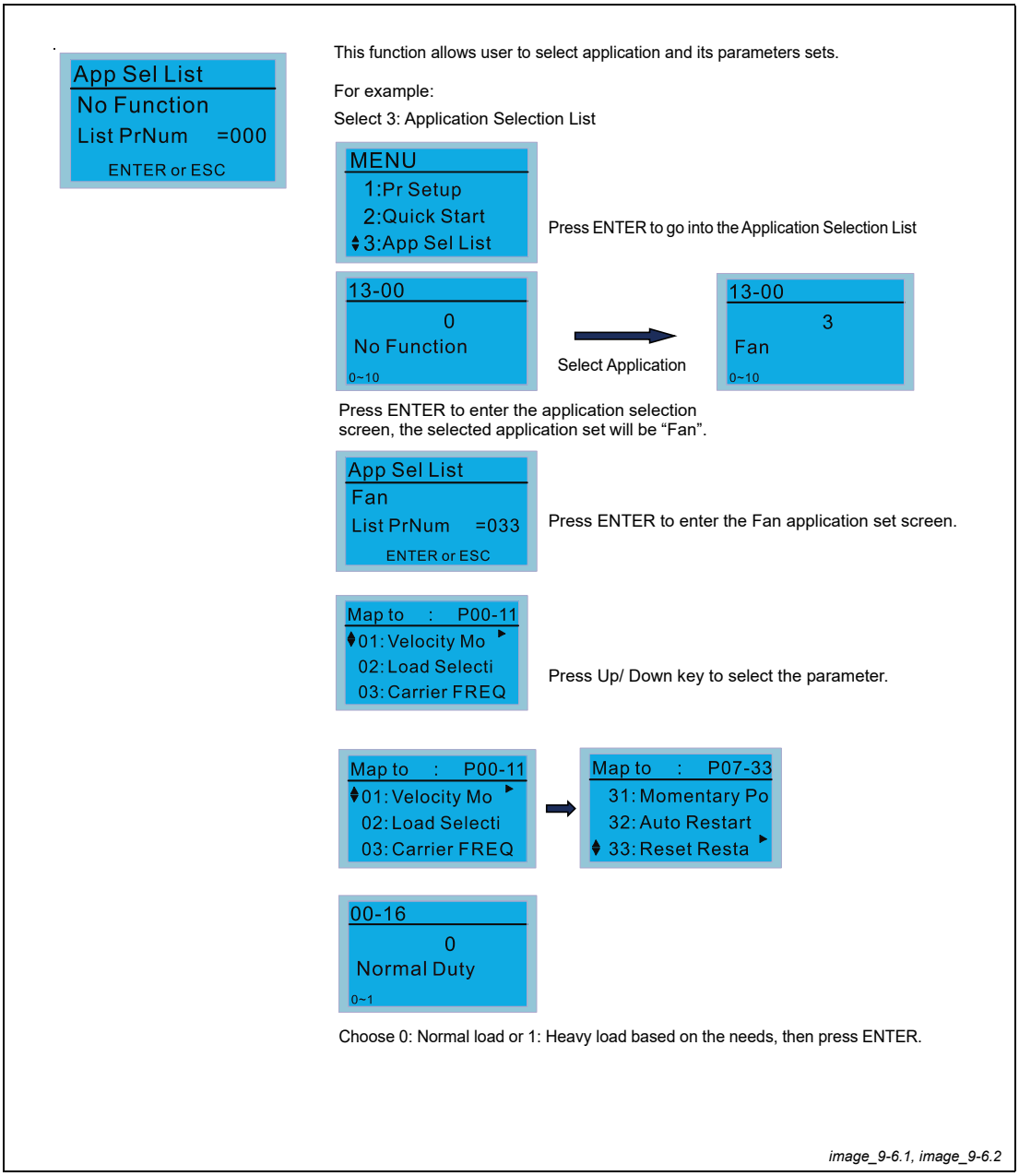


Fig. 10-13: Application selection list

10.2.4 Changed List

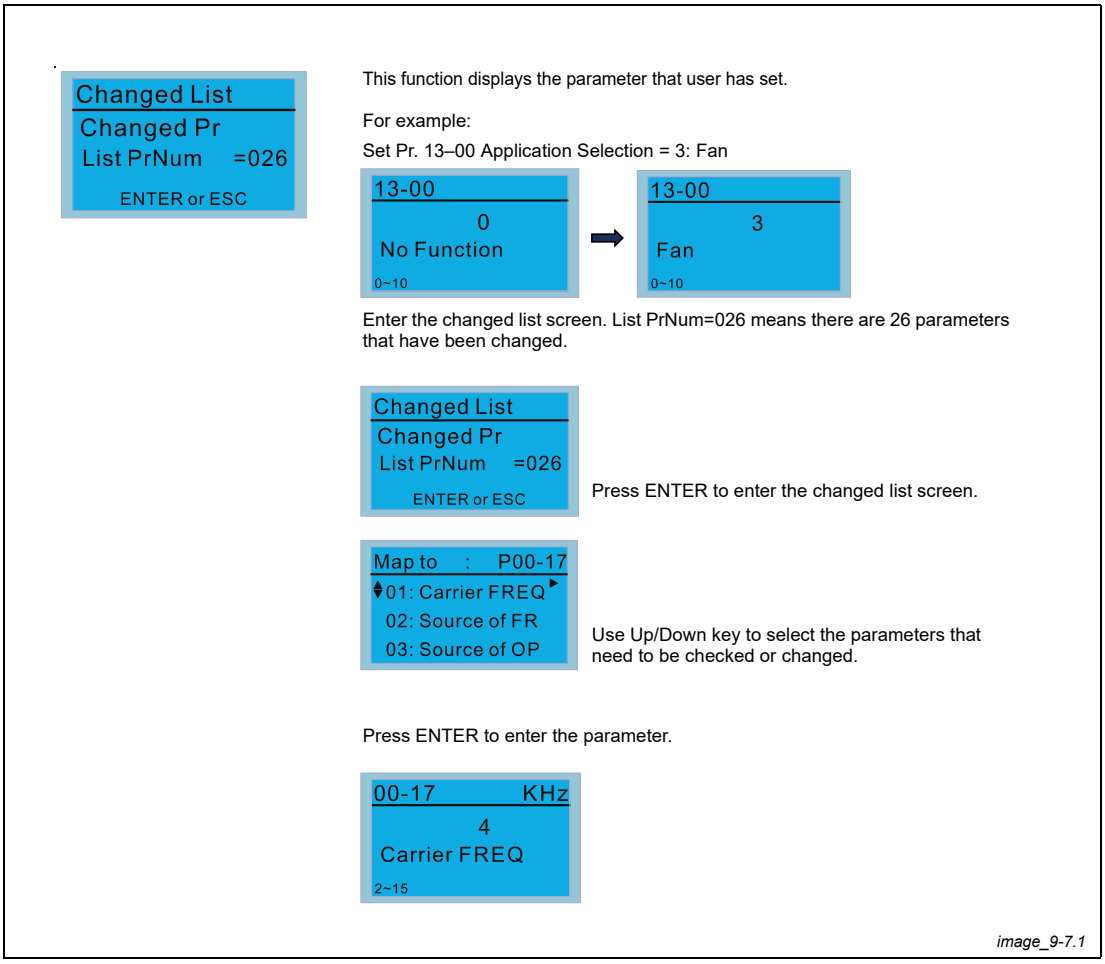
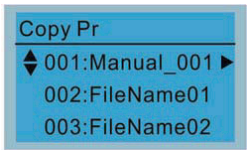


Fig. 10-14: Changed list

10.2.5 Copy Parameter

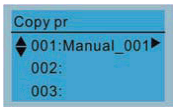


Press ENTER key to go to 001–004: content storage

4 duplicates are provided

The steps are shown in the example below.

Example: Saved in the motor drive.

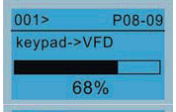


① Go to “Copy Parameter”

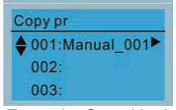
② Select the parameter group which needs to be copied and press ENTER key.

① Select 1: Save in the motor drive.

② Press ENTER key to go to “Save in the motor drive” screen

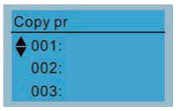


Begin to copy parameters until it is done.



Once copying parameters is done, keypad will automatically go back to this screen.

Example: Saved in the keypad.



① Go to “Copy parameter”

② Select the parameter group which needs to be copied and press ENTER key.

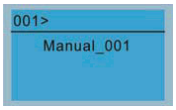
Press ENTER key to go to “Save in the keypad” screen.

Use Up/Down key to select a symbol.

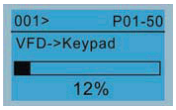
Use Left/Right key to move the cursor to select a file name.

String & Symbol Table:

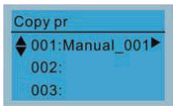
！” ＃＄％＆’ （） ＊＋，－・／０１２３４５６７８９：；＜＝＞？＠
ＡＢＣＤＥＦＧＨＩＪＫＬＭＮＯＰＱＲＳＴＵＶＷＸＹＺ〔＼〕＾＿ ‘
ａｂｃｄｆｇｈｉｊｋｌｍｎｏｐｑｒｓｔｕｖｗｘｙｚ｛｜｝～



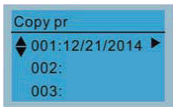
Once the file name is confirmed, press ENTER key.



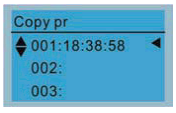
To begin copying parameters until it is done.



When copying parameters is completed, keypad will automatically be back to this screen.



Press Right key to see the date of copying parameters.



Press Right key to see the time of copying parameters.

image_9-8.1, image 9-8.2

Fig. 10-15: Copy Parameter

10.2.6 Fault Record

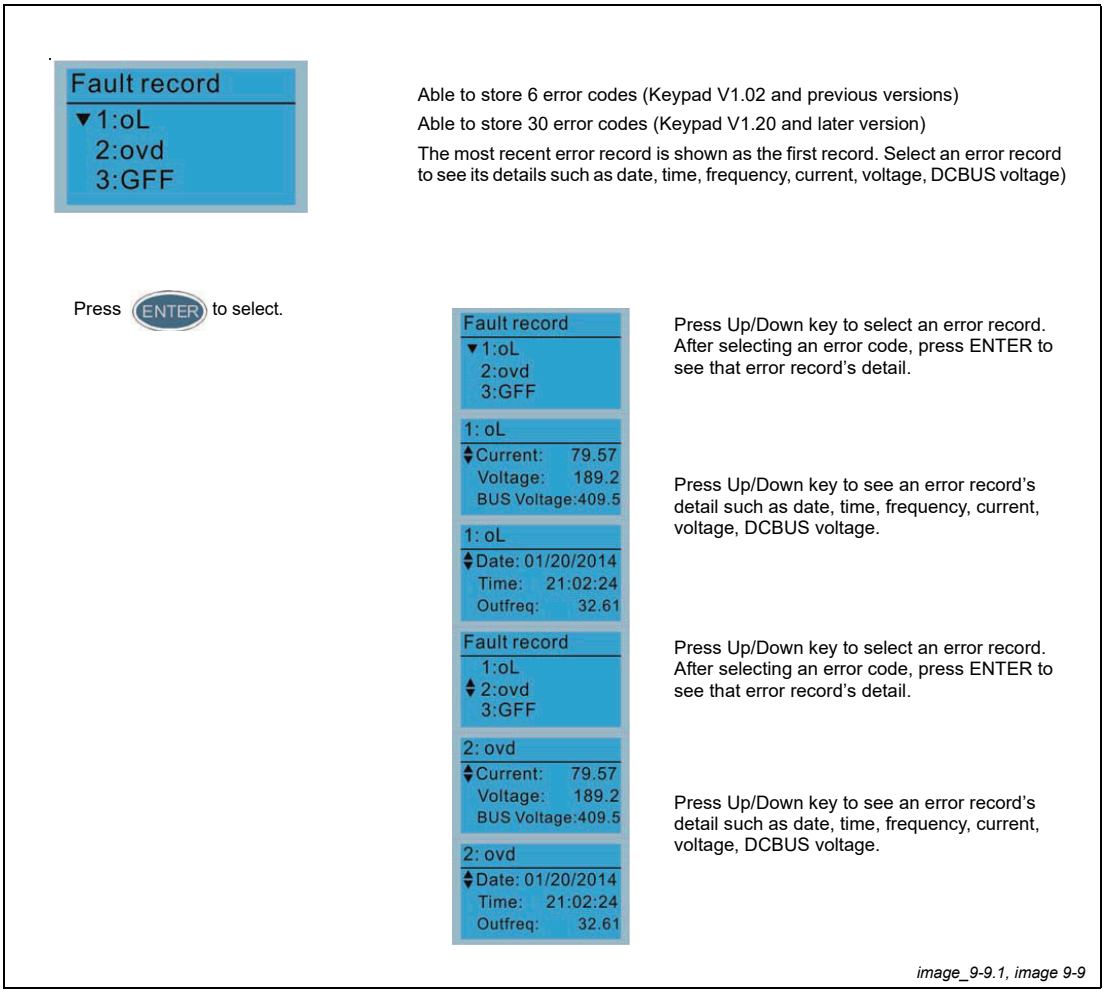


Fig. 10-16: Fault Record

NOTE

Fault actions of AC motor drive are recorded and saved to Versi-KP-LCD.
When Versi-KP-LCD is removed and applied to another AC motor drive, the previous fault records will not be deleted. The new fault records of the present AC motor drive will accumulate to Versi-KP-LCD.

10.2.7 Language Setup

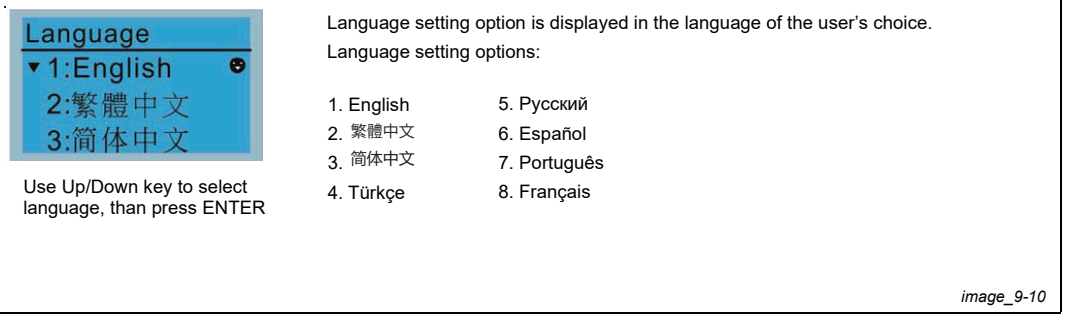


Fig. 10-17: Language Setup

10.2.8 Time Setup

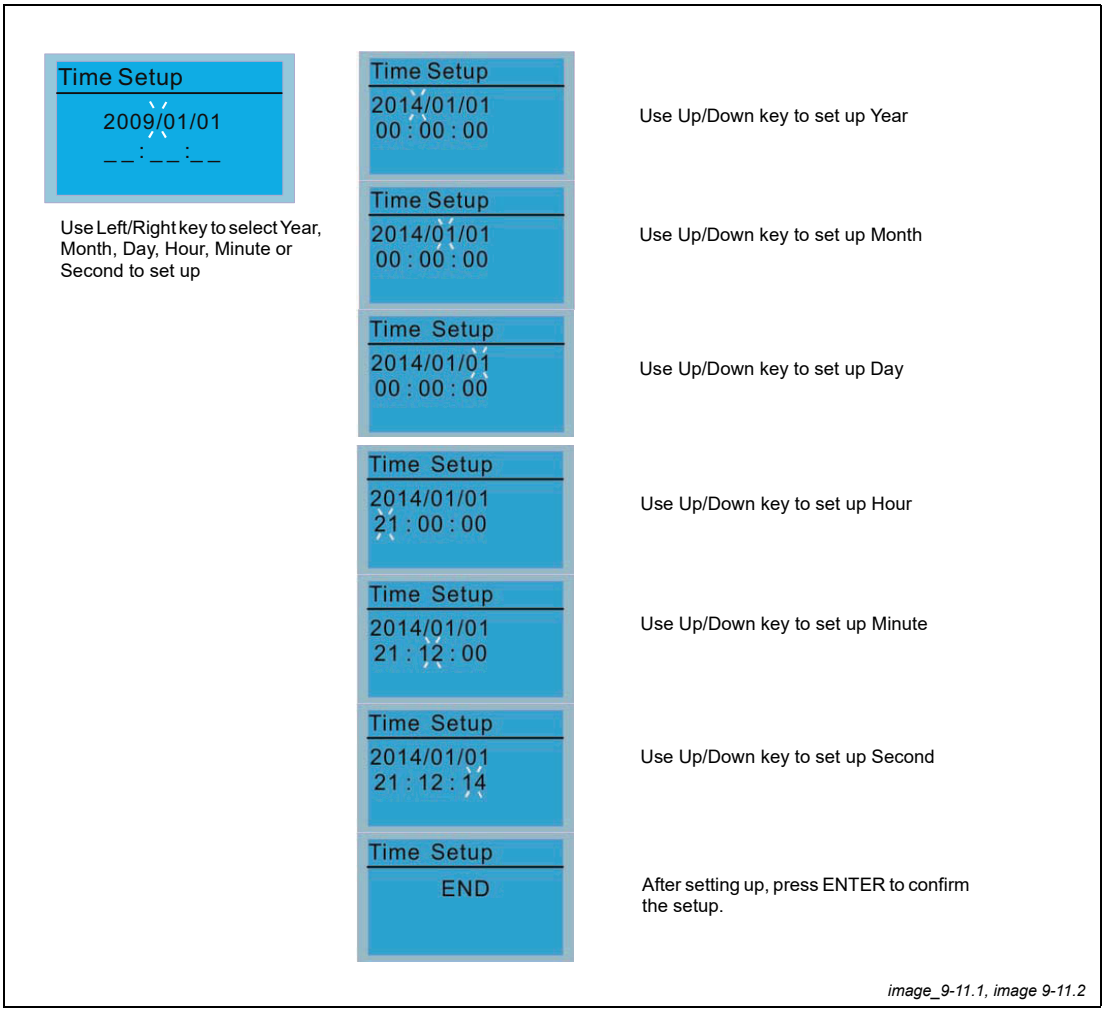


Fig. 10-18: Time Setup

NOTE

Limitation: The charging process of the super capacitor will finish in about 6 minutes. **When the digital keypad is removed, the time setting will be in standby status for 7 days.** After this period, the time needs to be reset.

10.2.9 Keypad Locked

Press ENTER to lock.

Keypad Locked

This function is used to lock the keypad. The main page would not display “keypad locked” when the keypad is locked, however it will display the message ”please press ESC and then ENTER to unlock the keypad” when any key is pressed.

When the keypad is locked, the main screen doesn’t display any status to show that.

Press any key on the keypad; a screen as shown in image on the left will be displayed.

If ESC key is not pressed, the keypad will automatically be back to this screen.

The keypad is still locked at this moment. By pressing any key, a screen as shown in the image on the left will still be displayed.

Press ESC for 3 seconds to unlock the keypad and the keypad will be back to this screen. Then each key on the keypad is functional.

After the above steps, the keypad will not be locked when turning off the power and turning on the power again.

image_9-21.1

Fig. 10-19: Keypad Locked

10.2.10 PLC Function

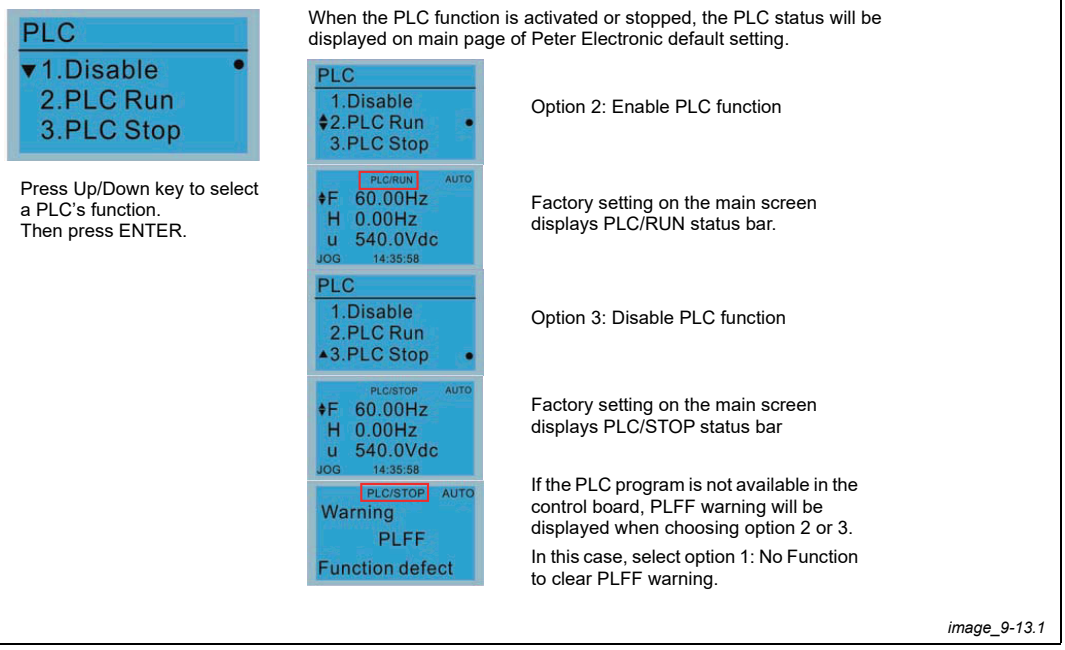


Fig. 10-20: PLC Function

10.2.11 Copy PLC

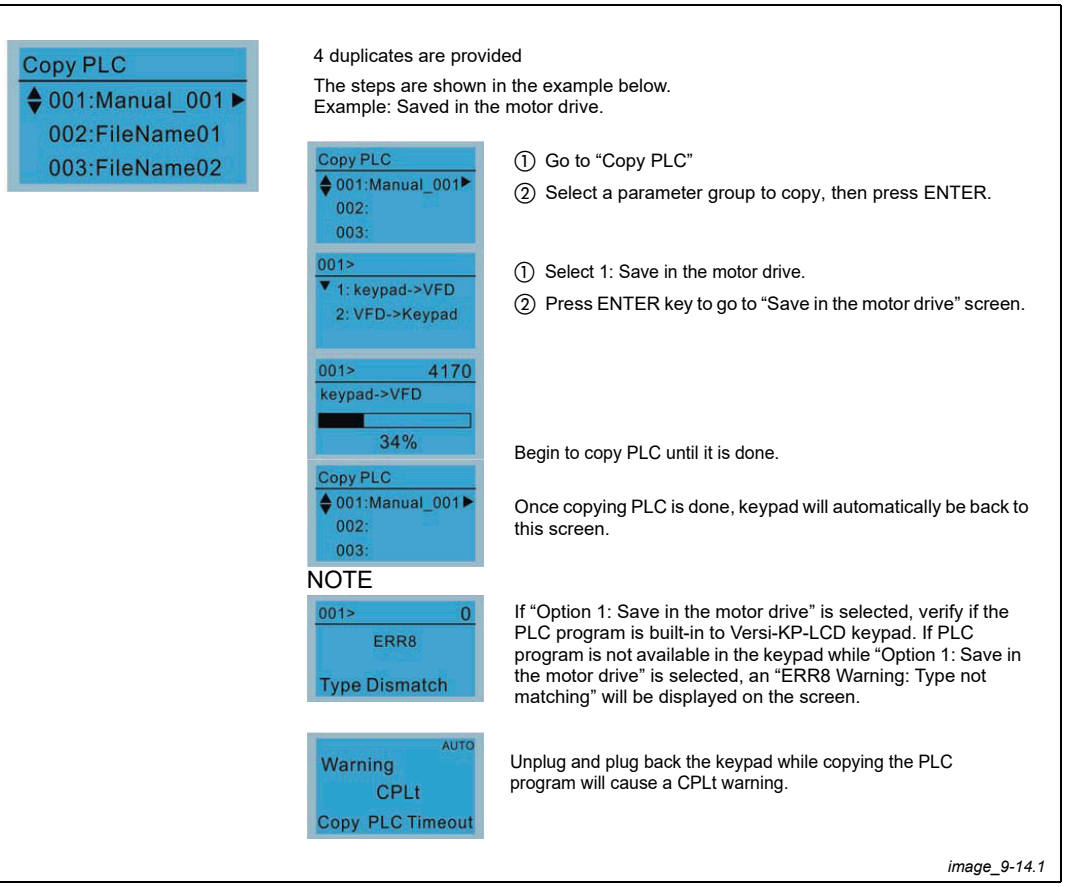


Fig. 10-21: Copy PLC (1)

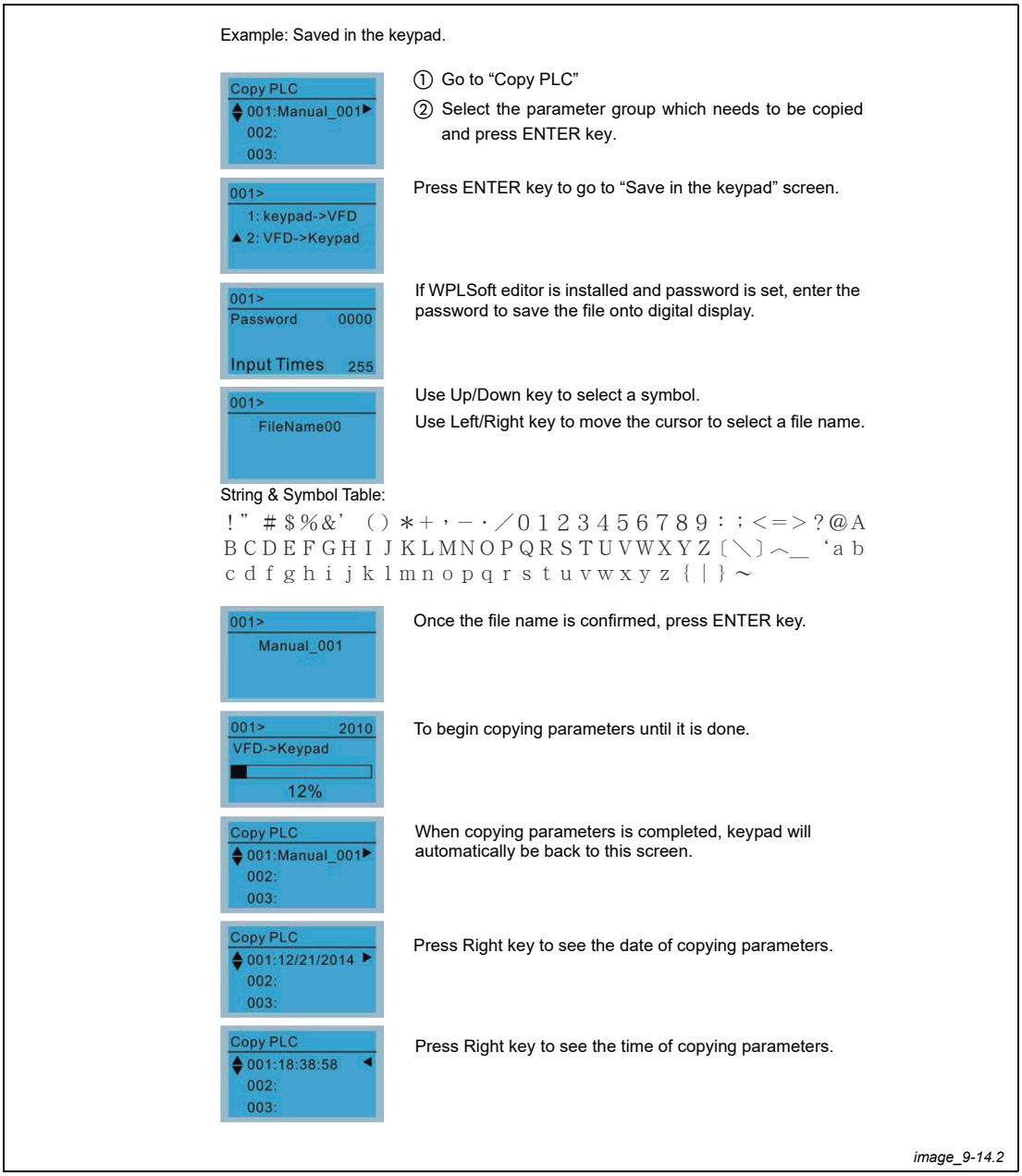


Fig. 10-22: Copy PLC (2)

10.2.12 Display setup

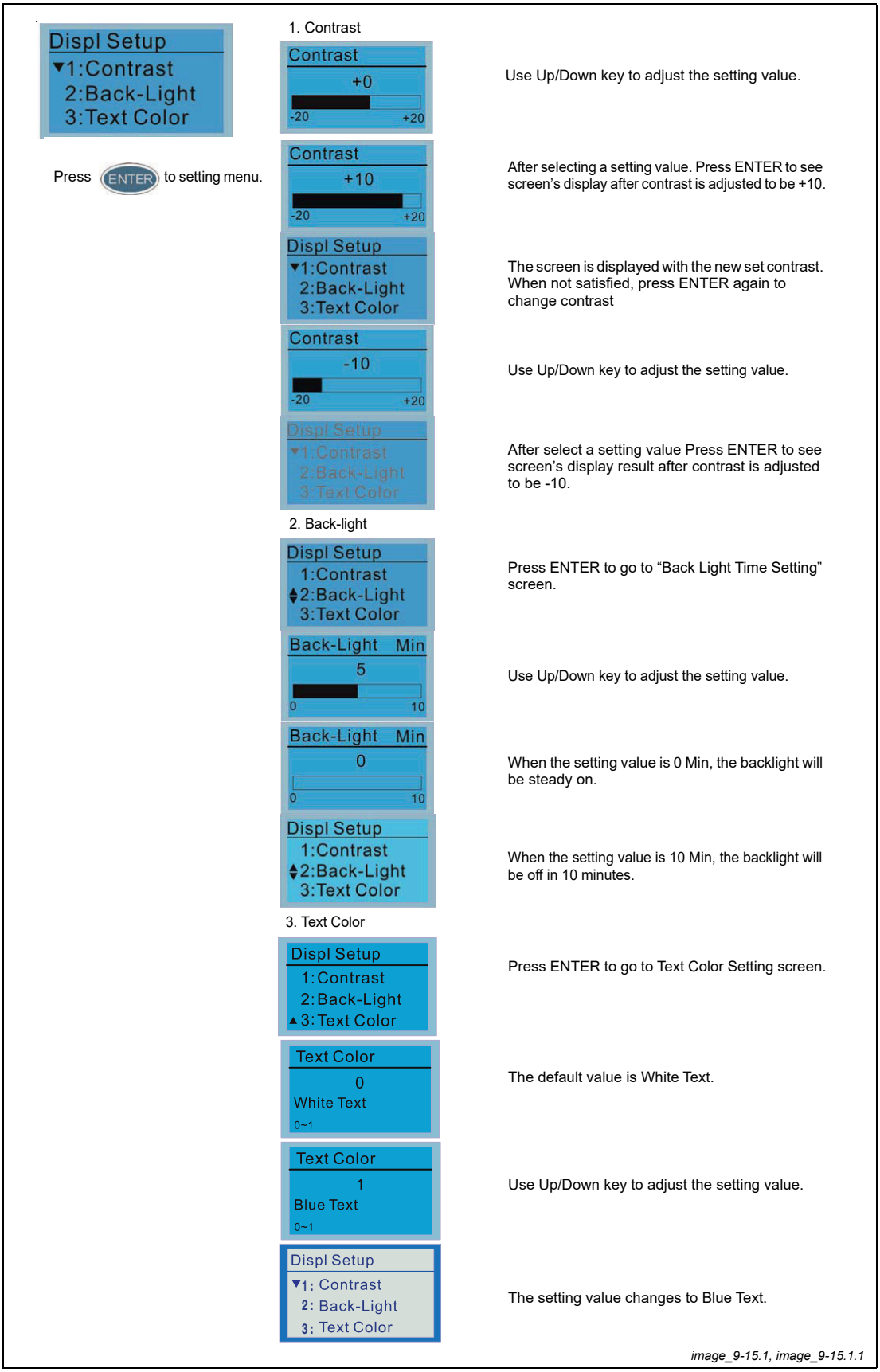
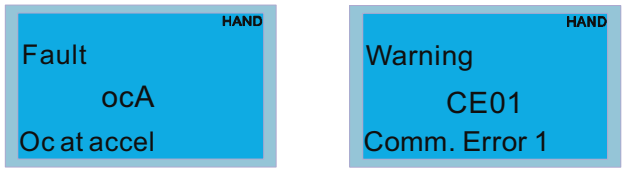


Fig. 10-23: Display setup

10.3 Other display

When a fault occurs, the menu will display:



① Press STOP/RESET button to reset the fault code. If still no response, please contact local distributor or return to the factory. To view the fault DCBUS voltage, output current and output voltage, press “MENU” -> “Fault Record”.

② After resetting, if the screen returns to main page and shows no fault after pressing ESC, the fault is cleared

③ When fault or warning message appears, back-light LED will blink until the fault or the warning is cleared.

image_9-16

Fig. 10-24: Other Display

11 Summary of Parameter Settings

This chapter provides a summary of parameter (Pr.) settings for users to gather the parameter setting ranges, factory settings and set parameters. The parameters can be set, changed and reset by the digital keypad.31

NOTE ↗: You can set this parameter during operation. For more details on the parameters, please refer to chapter 12 “Description of Parameter Settings” of the users manual.

11.1 00: Drive parameters

NOTE IM: Induction Motor; PM: Permanent Magnet Motor

Pr.	Parameter Name	Setting Range	Default
00-00	Identity code of the AC motor drive	4: 230 V, 0.75 kW 5: 460 V, 0.75 kW 6: 230 V, 1.50 kW 7: 460 V, 1.50 kW 8: 230 V, 2.20 kW 9: 460 V, 2.20 kW 10: 230 V, 3.70 kW 11: 460 V, 3.70 kW 12: 230 V, 5.50 kW 13: 460 V, 5.50 kW 14: 230 V, 7.50 kW 15: 460 V, 7.50 kW 16: 230 V, 11.0 kW 17: 460 V, 11.0 kW 18: 230 V, 15.0 kW 19: 460 V, 15.0 kW 20: 230 V, 18.5 kW 21: 460 V, 18.5 kW 22: 230 V, 22.0 kW 23: 460 V, 22.0 kW 24: 230 V, 30.0 kW 25: 460 V, 30.0 kW 26: 230 V, 37.0 kW 27: 460 V, 37.0 kW 28: 230 V, 45.0 kW 29: 460 V, 45.0 kW 30: 230 V, 55.0 kW 31: 460 V, 55.0 kW 32: 230 V, 75.0 kW 33: 460 V, 75.0 kW 34: 230 V, 90.0 kW 35: 460 V, 90.0 kW 37: 460 V, 110.0 kW 39: 460 V, 132.0 kW 41: 460 V, 160.0 kW 43: 460 V, 185.0 kW 45: 460 V, 220.0 kW 47: 460 V, 280.0 kW 49: 460 V, 315.0 kW 51: 460 V, 355.0 kW 55: 460 V, 450.0 kW 93: 460 V, 4 kW	Read only
00-01	Display AC motor drive rated current	Display by models	Read only

Tab. 11-1: Drive parameters (1)

	Pr.	Parameter Name	Setting Range	Default
	00-02	Parameter reset	0: No function 1: Parameter write protect 5: Reset kWh display to 0 6: Reset PLC (including CANopen® Master Index) 7: Reset CANopen® Index (Slave) 9: Reset all parameters to defaults with base frequency at 50 Hz 10: Reset all parameters to defaults with base frequency at 60 Hz	0
↗	00-03	Start-up display selection	0: F (frequency command) 1: H (output frequency) 2: U (multi-function display, see Pr. 00-04) 3: A (output current)	0

Tab. 11-1: Drive parameters (2)

	Pr.	Parameter Name	Setting Range	Default
↗	00-04	Content of multi-function display (user-defined)	0: Display output current (A) (Unit: Amp) 1: Display counter value (c) (Unit: CNT) 2: Display actual output frequency (H.) (Unit: Hz) 3: Display DC BUS voltage (v) (Unit: VDC) 4: Display output voltage (E) (Unit: VAC) 5: Display output power angle (n) (Unit: deg) 6: Display output power in kW (P) (Unit: kW) 7: Display actual motor speed rpm (r) (Unit: rpm) 8: Display estimate output torque % (t) (Unit: %). 9: Display PG feedback (G) (refer to Pr. 10-00 and Pr. 10-01) (Unit: PLS) 10: Display PID feedback (b) (Unit: %) 11: Display AVI in % (1.) (Unit: %) 12: Display ACI in % (2.) (Unit: %) 13: Display AUI in % (3.) (Unit: %) 14: Display the temperature of IGBT (i.) (Unit: °C) 15: Display the temperature of capacitance (c.) (Unit: °C) 16: The status of digital input (ON/OFF) (i) 17: The status of digital output (ON/OFF) (o) 18: Multi-step speed (S) 19: The corresponding CPU pin status of digital input (d) 20: The corresponding CPU pin status of digital output (0.) 21: Actual motor position (PG1 of PG card) (P.) The maximum value is 32 bits display 22: Pulse input frequency (PG2 of PG card) (S.) 23: Pulse input position (PG2 of PG card) (q.) The maximum value is 32 bits display 24: Position command tracing error (E.) 25: Overload count (0.00–100.00%) (o.) (Unit: %) 26: Ground fault GFF (G.) (Unit: %) 27: DC BUS voltage ripple (r.) (Unit: VDC) 28: Display PLC data D1043 (C) 29: Display PM pole section (EMC-PG01U application) (4.) 30: Display output of user defined (U) 31: Display Pr. 00-05 user gain (K) 32: Number of actual motor revolution during operation (PG card plug in and Z phase signal input) (Z.) 33: Motor actual position during operation (when PG card is connected) (q) 34: Operation speed of fan (F.) (Unit: %) 35: Control mode display: 0 = Speed control mode (SPD) 1 = Torque control mode (TQR) (t.) 36: Present operating carrier frequency of drive (Hz) (J.) 38: Display drive status (6.) 39. Display estimated output torque, positive and negative, using Nt-m as unit (t 0.0: positive torqu e; -0.0: negative torque (C.) 40: Torque command (L.) (Unit: %) 41: kWh display (J) (Unit: kWh) 42: PID target value (h.) (Unit: %) 43: PID offset (o.) (Unit: %) 44: PID output frequency (b.) (Unit: Hz) 45: Hardware ID 49: Motor temperature (PTC, PT100, KTY84-130) 51: PMSVC torque offset 52: AI10 % 53: AI11 %	3
↗	00-05	Coefficient gain in actual output frequency	0.00–160.00	1.00
	00-06	Software version	Read only	Read only
↗	00-07	Parameter protection password input	0–65535 0–4 (the number of password attempts allowed)	0

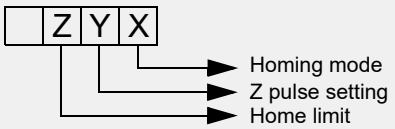
Tab. 11-1: Drive parameters (3)

	Pr.	Parameter Name	Setting Range	Default
↗	00-08	Parameter protection password setting	0–65535 0: No password protection/password entered correctly (Pr. 00-07) 1: Parameter set	0
↗	00-10	Control mode	0: Speed mode 1: Point-to-point position control mode 2: Torque mode 3: Homing mode	0
	00-11	Speed control mode	0: IMVF (IM V/F control) 1: IMVFPG (IM V/F control + Encoder) 2: IM/PM SVC (IM/PM space vector control) 3: IMFOCPG (IM FOC + Encoder) 4: PMFOCPG (PM FOC + Encoder) 5: IMFOC sensorless (IM FOC sensorless) 6: PM sensorless (PM FOC sensorless) 7: IPM sensorless (Interior PM FOC sensorless)	0
	00-12	Point-to-point position mode	0: Relative position 1: Absolute position	0
	00-13	Torque mode control	0: IM TQCPG (IM torque control + Encoder) 1: PM TQCPG (PM torque control + Encoder) 2: IM TQC sensorless (IM sensorless torque control)	0
	00-16	Load selection	0: Normal load 1: Heavy load	1
	00-17	Carrier frequency	**Normal load** VF, VFPG, SVC, IMFOCPG, IMTQCPG / PMFOCPG, PMTQCPG / PMFOC, IPMFOC / IMFOC, IMTQC 0.75–4 kW/1–15 HP: 2–15 kHz / 4–15 kHz / 4–10 kHz / 4–14 kHz 15–37 kW/20–50 HP: 2–10 kHz / 4–10 kHz / 4–10 kHz / 4–10 kHz 45–90 kW/60–125 HP: 2–9 kHz / 4–9 kHz / 4–9 kHz / 4–9 kHz	8 6 4
			Heavy load VF, VFPG, SVC, IMFOCPG, IMTQCPG / PMFOCPG, PMTQCPG / PMFOC, IPMFOC / IMFOC, IMTQC 0.75–4 kW/1–15 HP: 2–15 kHz / 4–15 kHz / 4–10 kHz / 4–14 kHz 15–37 kW/20–50 HP: 2–10 kHz / 4–10 kHz / 4–10 kHz / 4–10 kHz 45–90 kW/60–125 HP: 2–9 kHz / 4–9 kHz / 4–9 kHz / 4–9 kHz	2
	00-19	PLC command mask	Bit 0: Control command by PLC force control Bit 1: Frequency command by PLC force control Bit 2: Position command by PLC force control Bit 3: Torque command by PLC force control	Read only
	00-20	Master frequency command (AUTO) source/source selection of the PID target	0: Digital keypad 1: RS-485 communication 2: External analog input (Pr. 03-00) 3: External UP/DOWN terminal (multi-function input terminal) 4: Pulse input without direction command (Pr. 10-16 without direction), use with PG card 5: Pulse input with direction command (Pr. 10-16), use with PG card 6: CANopen® communication card 8: Communication card (does not include CANopen® card)	0
	00-21	Operation command (AUTO) source	0: Digital keypad 1: External terminals 2: RS-485 communication. 3: CANopen®communication card 5: Communication card (does not include CANopen® card)	0
↗	00-22	Stop method	0: Ramp to stop 1: Coast to stop	0

Tab. 11-1: Drive parameters (4)

	Pr.	Parameter Name	Setting Range	Default
↗	00-23	Control of motor direction	0: Enable forward/reverse 1: Disable reverse 2: Disable forward	0
	00-24	Digital keypad frequency command memory	Read only	Read only
↗	00-25	User defined characteristics	Bit 0–3: user defined decimal place 0000b: no decimal place 0001b: one decimal place 0010b: two decimal places 0011b: three decimal places Bit 4–15: user defined unit 000xh: Hz 001xh: rpm 002xh: % 003xh: kg 004xh: m/s 005xh: kW 006xh: HP 007xh: ppm 008xh: 1/m 009xh: kg/s 00Axh: kg/m 00Bxh: kg/h 00Cxh: lb/s 00Dxh: lb/m 00Exh: lb/h 00Fxh: ft/s 010xh: ft/m 011xh: m 012xh: ft 013xh: °C 014xh: °F 015xh: mbar 016xh: bar 017xh: Pa 018xh: kPa 019xh: mWG 01Axh: inWG 01Bxh: ftWG 01Cxh: Psi 01Dxh: Atm 01Exh: L/s 01Fxh: L/m 020xh: L/h 021xh: m3/s 022xh: m3/h 023xh: GPM 024xh: CFM xxxxh: Hz	0
	00-26	Maximum user-defined value	0: Disable 0–65535 (when Pr. 00-25 set to no decimal place) 0.0–6553.5 (when Pr. 00-25 set to 1 decimal place) 0.00–655.3 (when Pr. 00-25 set to 2 decimal places) 0.000–65.535 (when Pr. 00-25 set to 3 decimal places)	0
	00-27	User-defined value	Read only	Read only

Tab. 11-1: Drive parameters (5)

	Pr.	Parameter Name	Setting Range	Default
	00-29	LOCAL/REMOTE mode	0: Standard HOA function 1: When switching between local and remote, the drive stops. 2: When switching between local and remote, the drive runs with REMOTE settings for frequency and operation status. 3: When switching between local and remote, the drive runs with LOCAL settings for frequency and operation status. 4: When switching between local and remote, the drive runs with LOCAL settings when switched to Local and runs with REMOTE settings when switched to Remote for frequency and operation status.	0
	00-30	Master frequency command (HAND) source	0: Digital keypad 1: RS-485 communication 2: External analog input (Pr. 03-00) 3: External UP/DOWN terminal 4: Pulse input without direction command (Pr. 10-16 without direction) 5: Pulse input with direction command (Pr. 10-16) 6: CANopen® communication card 8: Communication card (does not include CANopen® card)	0
	00-31	Operation command (HAND) source	0: Digital keypad 1: External terminals. 2: RS-485 communication. 3: CANopen® communication card 5: Communication card (does not include CANopen® card)	0
✓	00-32	Digital keypad STOP function	0: Disable STOP key 1: Enable STOP key	0
✓	00-40	Homing mode	 **Note:** Forward run = clockwise (CW) Reverse run = counterclockwise (CCW) X: 0: Forward run to home. Set PL forward limit as check point. 1: Reverse run (CCW) to home. Set NL reverse limit (CCWL) as check point.. 2: Forward run to home. Set ORG: OFF -> ON as check point. 3: Reverse to home. Set ORG: OFF -> ON as check point. 4: Forward run and search for Z-pulse as check point. 5: Reverse run and search for Z-pulse as check point. 6: Forward run to home. Set ORG: ON -> OFF as check point. 7: Reverse run to home. Set ORG: ON -> OFF as check point. 8: Define current position as home. **Set X to 0, 1, 2, 3, 6, 7 first.** Y: 0: Reverse run to Z pulse 1: Continue forward run to Z pulse 2: Ignore Z pulse **When home limit is reached, set X to 2, 3, 4, 5, 6, 7 first** Z: 0: Display the error 1: Reverse the direction	0000h
✓	00-41	Homing by frequency 1	0.00–599.00 Hz	8.00
✓	00-42	Homing by frequency 2	0.00–599.00 Hz	2.00

Tab. 11-1: Drive parameters (6)

	Pr.	Parameter Name	Setting Range	Default
↗	00-48	Display filter time (current)	0.001–65.535 s	0.100
↗	00-49	Display filter time (keypad)	0.001–65.535 s	0.100
	00-50	Software version (date)	Read only	Read only

Tab. 11-1: Drive parameters (7)

11.2 01: Basic Parameters

	Pr.	Parameter Name	Setting Range	Default
✓	01-00	Maximum operation frequency	0.00–599.00 Hz	60.00/ 50.00
	01-01	Output frequency of motor 1	0.00–599.00 Hz	60.00/ 50.00
	01-02	Output voltage of motor 1	230 V: 0.0–255.0 V 460 V: 0.0–510.0 V	200.0 400.0
	01-03	Mid-point frequency 1 of motor 1	0.00–599.0 Hz	3.00
✓	01-04	Mid-point voltage 1 of motor 1	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	11.0 22.0
	01-05	Mid-point frequency 2 of motor 1	0.00–599.00 Hz	1.50
✓	01-06	Mid-point voltage 2 of motor 1	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	5.0 10.0
	01-07	Min. output frequency of motor 1	0.00–599.00 Hz	0.50
✓	01-08	Min. output voltage of motor 1	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	1.0 2.0
	01-09	Start-up frequency	0.00–599.00 Hz	0.50
✓	01-10	Output frequency upper limit	0.00–599.00 Hz	599.00
✓	01-11	Output frequency lower limit	0.00–599.00 Hz	0
✓	01-12	Acceleration time 1	Pr. 01-45 = 0: 0.00–600.00 s Pr. 01-45 = 1: 0.00–6000.0 s The default of motor drive with 22 kW/30 HP and above:	10.00 10.0 60.00 60.0
✓	01-13	Deceleration time 1		
✓	01-14	Acceleration time 2		
✓	01-15	Deceleration time 2		
✓	01-16	Acceleration time 3		
✓	01-17	Deceleration time 3		
✓	01-18	Acceleration time 4		
✓	01-19	Deceleration time 4		
✓	01-20	JOG acceleration time		
✓	01-21	JOG deceleration time		
✓	01-22	JOG frequency	0.00–599.00 Hz	6.00
✓	01-23	First/Fourth acceleration/ deceleration frequency	0.00–599.00 Hz	0.00
✓	01-24	S-curve acceleration begin time 1	Pr. 01-45=0: 0.00–25.00 s Pr. 01-45=1: 0.0–250.0 s	0.20 0.2
✓	01-25	S-curve acceleration arrival time 2		
✓	01-26	S-curve deceleration begin time 1		
✓	01-27	S-curve deceleration arrival time 2		
	01-28	Skip frequency 1 (upper limit)	0.00–599.00 Hz	0.00
	01-29	Skip frequency 1 (lower limit)		
	01-30	Skip frequency 2 (upper limit)		
	01-31	Skip frequency 2 (lower limit)		
	01-32	Skip frequency 3 (upper limit)		
	01-33	Skip frequency 3 (lower limit)		
	01-34	Zero-speed mode	0: Waiting for output 1: Zero-speed operation 2: Minimum frequency (Refer to Pr. 01-07, Pr. 01-41)	0

Tab. 11-2: Basic parameters (1)

	Pr.	Parameter Name	Setting Range	Default
	01-35	Output frequency of motor 2	0.00–599.00 Hz	60.00/ 50.00
	01-36	Output voltage of motor 2	230 V: 0.0–255.0 V 460 V: 0.0–510.0 V	200.0 400.0
	01-37	Mid-point frequency 1 of motor 2	0.00–599.00 Hz	3.00
✓	01-38	Mid-point voltage 1 of motor 2	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	11.0 22.0
	01-39	Mid-point frequency 2 of motor 2	0.00–599.00 Hz	1.50
✓	01-40	Mid-point voltage 2 of motor 2	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	5.0 10.0
	01-41	Min. output frequency of motor 2	0.00–599.00 Hz	0.50
✓	01-42	Min. output voltage of motor 2	230 V: 0.0–240.0 V 460 V: 0.0–480.0 V	1.0 2.0
	01-43	V/F curve selection	0: V/F curve determined by Pr. 01-00–01-08 1: 1.5th V/F curve 2: 2nd V/F curve 3: 60 Hz, voltage saturation in 50 Hz 4: 72 Hz, voltage saturation in 60 Hz 5: 50 Hz, decrease gradually with cube 6: 50 Hz, decrease gradually with square 7: 60 Hz, decrease gradually with cube 8: 60 Hz, decrease gradually with square 9: 50 Hz, medium starting torque 10: 50 Hz, high starting torque 11: 60 Hz, medium starting torque 12: 60 Hz, high starting torque 13: 90 Hz, voltage saturation in 60 Hz 14: 120 Hz, voltage saturation in 60 Hz 15: 180 Hz, voltage saturation in 60 Hz	0
✓	01-44	Auto-acceleration and auto-deceleration setting	0: Linear acceleration and linear deceleration 1: Auto-acceleration and linear deceleration 2: Linear acceleration and auto-deceleration 3: Auto-acceleration and auto-deceleration 4: Stall prevention by auto-acceleration and auto-deceleration (limited by Pr. 01-12–01-21)	0
	01-45	Time unit for accel./decel. and S curve	0: Unit: 0.01 s 1: Unit: 0.1 s	0
✓	01-46	CANopen® quick stop time	Pr. 01-45 = 0: 0.00–600.00 s Pr. 01-45 = 1: 0.0–6000.0 s	1.00
	01-49	Regenerative energy restriction control method	0: Disable 1: Over voltage energy restriction 2: Traction energy control (TEC)	0

Tab. 11-2: Basic parameters (2)

11.3 Digital input/output parameters

Pr.	Parameter Name	Setting Range	Default
02-00	Two-wire/Three-wire operation control	0: Two-wire mode 1, power on for operation control 1: Two -wire mode 2, power on for operation control 2: Three-wire, power on for operation control	0
02-01	Multi-function input command 1 (MI1)	0: No function 1: Multi-step speed command 1/multi-step position command 1 2: Multi-step speed command 2/multi-step position command 2 3: Multi-step speed command 3/multi-step position command 3 4: Multi-step speed command 4/multi-step position command 4 5: Reset 6: JOG command (By Versi-KP-LCD or external control) 7: Acceleration/deceleration speed inhibit 8: 1st and 2nd acceleration/deceleration time selection 9: 3rd and 4th acceleration/deceleration time selection 10: EF input (Pr. 07-20) 11: Base Block (B.B) input from external 12: Output stop 13: Cancel the setting of auto-acceleration/auto-deceleration time 14: Switch between motor 1 and motor 2 15: Rotating speed command from AVI 16: Rotating speed command from ACI 17: Rotating speed command from AUI 18: Forced to stop (Pr. 07-20) 19: Digital up command 20: Digital down command 21: PID function disabled 22: Clear the counter 23: Input the counter value (MI6) 24: FWD JOG command 25: REV JOG command 26: TQC/FOC mode selection 27: ASR1/ASR2 selection 28: Emergency stop (EF1) 29: Signal confirmation for Y-connection 30: Signal confirmation for Δ-connection 31: High torque bias (Pr. 11-30) 32: Middle torque bias (Pr. 11-31) 33: Low torque bias (Pr. 11-32) 34: Switch between multi-step position and multi-step speed control 35: Enable single-point position control 36: Enable multi-step position learning function (valid at stop) 37: Enable full position control pulse command input 38: Disable write EEPROM function 39: Torque command direction 40: Force coasting to stop 41: HAND switch 42: AUTO switch 43: Enable resolution selection (Pr. 02-48) 44: Reverse direction homing (NL) 45: Forward direction homing (PL) 46: Homing (ORG) 47: Enable homing function 48: Mechanical gear ratio switch 49: Enable drive 50: Slave dEb action to execute 51: Selection for PLC mode bit 0 52: Selection for PLC mode bit 1 53: Trigger CANopen® quick stop 55: Brake release 56: Local/Remote selection	1
02-02	Multi-function input command 2 (MI2)		2
02-03	Multi-function input command 3 (MI3)		3
02-04	Multi-function input command 4 (MI4)		4
02-05	Multi-function input command 5 (MI5)		0
02-06	Multi-function input command 6 (MI6)		0
02-07	Multi-function input command 7 (MI7)		0
02-08	Multi-function input command 8 (MI8)		0
02-26	Input terminal of I/O extension card (MI10)		0
02-27	Input terminal of I/O extension card (MI11)		0
02-28	Input terminal of I/O extension card (MI12)		0
02-29	Input terminal of I/O extension card (MI13)		0
02-30	Input terminal of I/O extension card (MI14)		0
02-31	Input terminal of I/O extension card (MI15)		0

Tab. 11-3: Digital input/output parameters (1)

	Pr.	Parameter Name	Setting Range	Default
✓	02-09	UP/DOWN key mode	0: UP/DOWN by acceleration/deceleration time 1: UP/DOWN constant speed (Pr. 02-10)	0
✓	02-10	Constant speed, acceleration/ deceleration speed of the UP/ DOWN key	0.001–1.000 Hz/ms	0.001
✓	02-11	Multi-function input response time	0.000–30.000 s	0.005
✓	02-12	Multi-function input mode selection	0000h–FFFFh (0: N.O.; 1: N.C.)	0000h
✓	02-13	Multi-function output 1 (RLY1)	0: No function 1: Indication during RUN 2: Operation speed reached 3: Desired frequency reached 1 (Pr. 02-22) 4 Desired frequency reached 2 (Pr. 02-24) 5: Zero speed (Frequency command) 6: Zero speed including STOP (Frequency command) 7: Over-torque 1 (Pr. 06-06–06-08) 8: Over-torque 2 (Pr. 06-09–06-11) 9: Drive is ready 10: Low voltage warning (Lv) (Pr. 06-00) 11: Malfunction indication 12: Mechanical brake release (Pr. 02-32) 13: Over-heat warning (Pr. 06-15) 14: Software brake signal indication (Pr. 07-00) 15: PID feedback error (Pr. 08-13, Pr. 08-14) 16: Slip error (oSL) 17: Count value reached, does not return to 0 (Pr. 02-20) 18: Count value reached, returns to 0 (Pr. 02-19) 19: External interrupt B.B. input (Base Block) 20: Warning output 21: Over-voltage 22: Over-current stall prevention 23: Over-voltage stall prevention 24: Operation mode 25: Forward command 26: Reverse command 27: Output when current ≥ Pr. 02-33 28: Output when current < Pr. 02-33 29: Output when frequency ≥ Pr. 02-34 30: Output when frequency < Pr. 02-34 31: Y-connection for the motor coil 32: Δ-connection for the motor coil 33: Zero speed (actual output frequency) 34: Zero speed including stop (actual output frequency) 35: Error output selection 1 (Pr. 06-23) 36: Error output selection 2 (Pr. 06-24) 37: Error output selection 3 (Pr. 06-25) 38: Error output selection 4 (Pr. 06-26) 39: Position reached (Pr. 10-19) 40: Speed reached (including stop) 41: Multi-position reached 42: Crane function 43: Actual motor speed higher than Pr. 02-47 44: Low current output (use with Pr. 06-71–06-73) 45: UVW output electromagnetic valve switch 46: Master dEb output 47: Closed brake output 49: Homing action complete output 50: Output control for CANopen® 51: Analog output control for RS485 interface (InnerCOM/Modbus®) 52: Output control for communication cards 65: Output for both CAN & 485 control 66: SO output logic A 67: Analog input level reached 68: SO output logic B 70: FAN warning output	11
✓	02-14	Multi-function output 2 (RLY2)		1
✓	02-16	Multi-function output 3 (MO1)		66
✓	02-17	Multi-function output 4 (MO2)		0
✓	02-36	Output terminal of I/O extension card (MO10) or (RA10)		0
✓	02-37	Output terminal of I/O extension card (MO11) or (RA11)		0
✓	02-38	Output terminal of I/O extension card (RA12)		0
✓	02-39	Output terminal of I/O extension card (RA13)		0
✓	02-40	Output terminal of I/O extension card (RA14)		0
✓	02-41	Output terminal of I/O extension card (RA15)		0
✓	02-42	Output terminal of I/O extension card (MO16 virtual terminal)		0
✓	02-43	Output terminal of I/O extension card (MO17 virtual terminal)		0
✓	02-44	Output terminal of I/O extension card (MO18 virtual terminal)		0
✓	02-45	Output terminal of I/O extension card (MO19 virtual terminal)		0
✓	02-46	Output terminal of I/O extension card (MO20 virtual terminal)		0
✓	02-18	Multi-function output direction	0000h–FFFFh (0: N.O.; 1: N.C.)	0000h

Tab. 11-3: Digital input/output parameters (2)

	Pr.	Parameter Name	Setting Range	Default
✓	02-19	Terminal counting value reached (returns to 0)	0–65500	0
✓	02-20	Preliminary counting value reached (does not return to 0)	0–65500	0
✓	02-21	Digital output gain (DFM)	1–166	1
✓	02-22	Desired frequency reached 1	0.00–599.00 Hz	60.00/ 50.00
✓	02-23	The width of the desired frequency reached 1	0.00–599.00 Hz	2.00
✓	02-24	Desired frequency reached 2	0.00–599.00 Hz	60.00/ 50.00
✓	02-25	The width of the desired frequency reached 2	0.00–599.00 Hz	2.00
	02-32	Brake delay time	0.000–65.000 s	0.000
✓	02-33	Output current level setting for multi-function output terminal	0–100 %	0
✓	02-34	Output frequency setting for multi-function output terminal	0.00–599.00 Hz (Motor speed when using PG Card)	3.00
✓	02-35	External operation control selection after reset and activate	0: Disable 1: Drive runs if the RUN command remains after reset or reboot	0
✓	02-47	Motor zero-speed level	0–65535 U/min	0
✓	02-48	Maximum frequency of resolution switch	0.00–599.00 Hz	60.00
✓	02-49	Switch delay time of maximum output frequency	0–65.000 s	0.000
	02-50	Display the multi-function input terminal status	Monitor the status of multi-function input terminals	Read only
	02-51	Display the multi-function output terminal status	Monitor the status of multi-function output terminals	Read only
	02-52	Display the external multi-function input terminals used by the PLC	Monitor the status of PLC input terminals	Read only
	02-53	Display the external multi-function output terminals used by the PLC	Monitor the status of PLC output terminals	Read only
	02-54	Display the frequency command executed by the external terminal	0.00–599.00 Hz (Read only)	Read only
	02-56	Brake release check time	0.000–65.000 s	0.000
✓	02-57	Multi-function output terminal: function 42: brake current check point	0–100 %	0
✓	02-58	Multi-function output terminal: function 42: brake frequency check point	0.00–599.00 Hz	0.00
	02-63	Frequency reached detection amplitude	0.00–599.00 Hz	0.00

Tab. 11-3: Digital input/output parameters (3)

Pr.	Parameter Name	Setting Range	Default
02-70	IO card types	1: EMC-BPS01 4: EMC-D611A 5: EMC-D42A 6: EMC-R6AA 11: EMC-A22A	Read only
02-71	DFM output selection	0: Use frequency with speed control as DFM output frequency 1: Use frequency with system acceleration/ deceleration as DFM output frequency	0
02-74	Internal/external multi-function input terminal selection	0000–FFFFh	0000h
02-75	Internal/external multi-function output terminal selection	0000–FFFFh	0000h

Tab. 11-3: Digital input/output parameters (4)

11.4 03: Analog input/output parameters

	Pr.	Parameter Name	Setting Range	Default
✓	03-00	Analog input selection (AVI)	0: No function 1: Frequency command 2: Torque command (Torque limit in speed mode) 3: Torque compensation command 4: PID target value 5: PID feedback signal 6: Thermistor (PTC/KTY-84) input value 7: Positive torque limit 8: Negative torque limit 9: Regenerative torque limit 10: Positive/negative torque limit 11: PT100 thermistor input value 13: PID compensation value	1
✓	03-01	Analog input selection (ACI)		0
✓	03-02	Analog input selection (AUI)		0
✓	03-03	Analog input bias (AVI)	-100.0–100.0%	0.0
✓	03-04	Analog input bias (ACI)	-100.0–100.0%	0.0
✓	03-05	Analog input bias (AUI)	-100.0–100.0%	0.0
✓	03-07	Positive/negative bias mode (AVI)	0: No bias 1: Lower than or equal to bias 2: Greater than or equal to bias 3: The absolute value of the bias voltage while serving as the center 4: Bias serves as the center	0
✓	03-08	Positive/negative bias mode (ACI)		
✓	03-09	Positive/negative bias mode (AUI)		
	03-10	Reverse setting when analog signal input is negative frequency	0: Negative frequency input is not allowed. The digital keypad or external terminal controls the forward and reverse direction. 1: Negative frequency input is allowed. Positive frequency = run in forward direction; negative frequency = run in reverse direction. The digital keypad or external terminal control cannot switch the running direction.	0
✓	03-11	Analog input gain (AVI)	-500.0–500.0%	100.0
✓	03-12	Analog input gain (ACI)	-500.0–500.0%	100.0
✓	03-13	Analog positive input gain (AUI)	-500.0–500.0%	100.0
✓	03-14	Analog negative input gain (AUI)	-500.0–500.0%	100.0
✓	03-15	Analog input filter time (AVI)	0.00–20.00 s	0.01
✓	03-16	Analog input filter time (ACI)	0.00–20.00 s	0.01
✓	03-17	Analog input filter time (AUI)	0.00–20.00 s	0.01
✓	03-18	Analog input addition function	0: Disable (AVI, ACI, AUI) 1: Enable	0
	03-19	Signal loss selection for analog input 4–20 mA	0: Disable 1: Continue operation at the last frequency 2: Decelerate to 0 Hz 3: Stop immediately and display “ACE”	0

Tab. 11-4: Analog input/output parameters (1)

	Pr.	Parameter Name	Setting Range	Default
✓	03-20	Multi-function output 1 (AFM1)	0: Output frequency (Hz) 1: Frequency command (Hz) 2: Motor speed (Hz) 3: Output current (rms) 4: Output voltage 5: DC Bus voltage 6: Power factor 7: Power 8: Output torque 9: AVI 10: ACI 11 AUI	0
✓	03-23	Multi-function output 2 (AFM2)	12: Iq current command 13: Iq feedback value 14: Id current 15: Id feedback value 18: Torque command 19: PG2 frequency command 20: CANopen® analog output 21: RS-485 analog output 22: Communication card analog output 23: Constant voltage output 25: CANopen® and RS485 analog output	0
✓	03-21	Analog output gain 1 (AFM1)	0–500.0%	100.0
✓	03-22	Analog output 1 in REV direction (AFM1)	0: Absolute value of output voltage 1: Reverse output 0 V; forward output 0–10 V 2: Reverse output 5–0 V; forward output 5–10 V	0
✓	03-24	Analog output gain 2 (AFM2)	0–500.0%	100.0
✓	03-25	Analog output 2 in REV direction (AFM2)	0: Absolute value of output voltage 1: Reverse output 0 V; forward output 0–10 V 2: Reverse output 5–0 V; forward output 5–10 V	0
✓	03-27	AFM2 output bias	-100.00–100.00%	0.00
✓	03-28	AVI terminal input selection	0: 0–10 V 1: 0–20 mA 2: 0–20 mA	0
✓	03-29	ACI terminal input selection	0: 4–20 mA 1: 0–10 V 2: 0–20 mA	0
	03-30	PLC analog output terminal status	Monitor the status of PLC analog output terminals	Read only
✓	03-31	AFM2 output selection	0: 0–20 mA output 1: 4–20 mA output	0
✓	03-32	AFM 1DC output setting level	0.00–100.00%	0.00
✓	03-33	AFM 2 DC output setting level	0.00–100.00%	0.00
✓	03-35	AFM1 filter output time	0.00–20.00 s	0.01
✓	03-36	AFM2 filter output time	0.00–20.00 s	0.01
✓	03-44	Multi-function MO output by AI level source	0: AVI 1: ACI 2: AUI	0
✓	03-45	AI upper level	-100.00–100.00%	50.00
✓	03-46	AI lower level	-100.00–100.00%	10.00
✓	03-50	Analog input curve selection	0: Regular curve 1: Three-point curve of AVI 2: Three-point curve of ACI 3: Three-point curve of AVI & ACI 4: Three-point curve of AUI 5: Three-point curve of AVI & AUI 6: Three-point curve of ACI & AUI 7: Three-point curve of AVI & ACI & AUI	0
✓	03-51	AVI lowest point	Pr. 03-28 = 0, 0.00–10.00 V Pr. 03-28 = 1, 0.00–20.00 mA Pr. 03-28 = 2, 0.00–20.00 mA	0.00 0.00 4.00

Tab. 11-4: Analog input/output parameters (2)

	Pr.	Parameter Name	Setting Range	Default
↗	03-52	AVI proportional lowest point	-100.00–100.00 %	0.00
↗	03-53	AVI mid point	Pr. 03-28 = 0, 0.00–10.00 V Pr. 03-28 = 1, 0.00–20.00 mA Pr. 03-28 = 2, 0.00–20.00 mA	5.00 10.00 12.00
↗	03-54	AVI proportional mid point	-100.00–100.00 %	50.00
↗	03-55	AVI highest point	Pr. 03-28 = 0, 0.00–10.00 V Pr. 03-28 = 1, 0.00–20.00 mA Pr. 03-28 = 2, 0.00–20.00 mA	10.00 20.00 20.00
↗	03-56	AVI proportional highest point	-100.00–100.00 %	100.00
↗	03-57	ACI lowest point	Pr. 03-29 = 0, 0.00–20.00 mA Pr. 03-29 = 1, 0.00–10.00 V Pr. 03-29 = 2, 0.00–20.00 mA	4.00 0.00 0.00
↗	03-58	ACI proportional lowest point	-100.00–100.00 %	0.00
↗	03-59	ACI mid point	Pr. 03-29 = 0, 0.00–20.00 mA Pr. 03-29 = 1, 0.00–10.00 V Pr. 03-29 = 2, 0.00–20.00 mA	12.00 5.00 10.00
↗	03-60	ACI proportional mid point	-100.00–100.00 %	50.00
↗	03-61	ACI highest point	Pr. 03-29 = 0, 0.00–20.00 mA Pr. 03-29 = 1, 0.00–10.00 V Pr. 03-29 = 2, 0.00–20.00 mA	20.00 10.00 20.00
↗	03-62	ACI proportional highest point	-100.00–100.00 %	100.00
↗	03-63	Positive AUI voltage lowest point	0.00–10.00 V	0.00
↗	03-64	Positive AUI voltage proportional	-100.00–100.00 %	0.00
↗	03-65	Positive AUI voltage mid-point	0.00–10.00 V	5.00
↗	03-66	Positive AUI voltage proportional mid-point	-100.00–100.00 %	50.00
↗	03-67	Positive AUI voltage highest point	0.00–10.00 V	10.00
↗	03-68	Positive AUI voltage proportional highest point	-100.00–100.00 %	100.00
↗	03-69	Negative AUI voltage highest point	-10.00 V–0.00 V	0.00
↗	03-70	Negative AUI voltage proportional highest point	-100.00–100.00 %	0.00
↗	03-71	Negative AUI voltage mid-point	-10.00 V–0.00 V	-5.00
↗	03-72	Negative AUI voltage proportional mid-point	-100.00–100.00 %	-50.00
↗	03-73	Negative AUI voltage lowest point	-10.00–0.00 V	-10.00
↗	03-74	Negative AUI voltage proportional lowest point	-100.00–100.00 %	-100.00

Tab. 11-4: Analog input/output parameters (3)

11.5 04: Multi-step speed parameters

	Pr.	Parameter Name	Setting Range	Default
✓	04-00	1st step speed frequency	0.00–599.00 Hz	0.00
✓	04-01	2nd step speed frequency		
✓	04-02	3rd step speed frequency		
✓	04-03	4th step speed frequency		
✓	04-04	5th step speed frequency		
✓	04-05	6th step speed frequency		
✓	04-06	7th step speed frequency		
✓	04-07	8th step speed frequency		
✓	04-08	9th step speed frequency		
✓	04-09	10th step speed frequency		
✓	04-10	11th step speed frequency		
✓	04-11	12th step speed frequency		
✓	04-12	13th step speed frequency		
✓	04-13	14th step speed frequency		
✓	04-14	15th step speed frequency		
✓	04-15	Position command 1 (rotation)	-30000–30000	0
✓	04-16	Position command 1 (pulse)	-32767–32767	
✓	04-17	Position command 2 (rotation)	-30000–30000	
✓	04-18	Position command 2 (pulse)	-32767–32767	
✓	04-19	Position command 3 (rotation)	-30000–30000	
✓	04-20	Position command 3 (pulse)	-32767–32767	
✓	04-21	Position command 4 (rotation)	-30000–30000	
✓	04-22	Position command 4 (pulse)	-32767–32767	
✓	04-23	Position command 5 (rotation)	-30000–30000	
✓	04-24	Position command 5 (pulse)	-32767–32767	
✓	04-25	Position command 6 (rotation)	-30000–30000	
✓	04-26	Position command 6 (pulse)	-32767–32767	
✓	04-27	Position command 7 (rotation)	-30000–30000	
✓	04-28	Position command 7 (pulse)	-32767–32767	
✓	04-20	Position command 8 (rotation)	-30000–30000	
✓	04-30	Position command 8 (pulse)	-32767–32767	
✓	04-31	Position command 9 (rotation)	-30000–30000	
✓	04-32	Position command 9 (pulse)	-32767–32767	
✓	04-33	Position command 10 (rotation)	-30000–30000	
✓	04-34	Position command 10 (pulse)	-32767–32767	
✓	04-35	Position command 11 (rotation)	-30000–30000	
✓	04-36	Position command 11 (pulse)	-32767–32767	
✓	04-37	Position command 12 (rotation)	-30000–30000	
✓	04-38	Position command 12 (pulse)	-32767–32767	
✓	04-39	Position command 13 (rotation)	-30000–30000	
✓	04-40	Position command 13 (pulse)	-32767–32767	
✓	04-41	Position command 14 (rotation)	-30000–30000	
✓	04-42	Position command 14 (pulse)	-32767–32767	
✓	04-43	Position command 15 (rotation)	-30000–30000	
✓	04-44	Position command 15 (pulse)	-32767–32767	

Tab. 11-5: Multi-step speed parameters (1)

	Pr.	Parameter Name	Setting Range	Default
↗	04-50	PLC buffer 0	0–65535	0
↗	04-51	PLC buffer 1		
↗	04-52	PLC buffer 2		
↗	04-53	PLC buffer 3		
↗	04-54	PLC buffer 4		
↗	04-55	PLC buffer 5		
↗	04-56	PLC buffer 6		
↗	04-57	PLC buffer 7		
↗	04-58	PLC buffer 8		
↗	04-59	PLC buffer 9		
↗	04-60	PLC buffer 10		
↗	04-61	PLC buffer 11		
↗	04-62	PLC buffer 12		
↗	04-63	PLC buffer 13		
↗	04-64	PLC buffer 14		
↗	04-65	PLC buffer 15		
↗	04-66	PLC buffer 16		
↗	04-67	PLC buffer 17		
↗	04-68	PLC buffer 18		
↗	04-69	PLC buffer 19		
↗	04-70	PLC Application parameter 0	0–65535	0
↗	04-71	PLC Application parameter 1		
↗	04-72	PLC Application parameter 2		
↗	04-73	PLC Application parameter 3		
↗	04-74	PLC Application parameter 4		
↗	04-75	PLC Application parameter 5		
↗	04-76	PLC Application parameter 6		
↗	04-77	PLC Application parameter 7		
↗	04-78	PLC Application parameter 8		
↗	04-79	PLC Application parameter 9		
↗	04-80	PLC Application parameter 10		
↗	04-81	PLC Application parameter 11		
↗	04-82	PLC Application parameter 12		
↗	04-83	PLC Application parameter 13		
↗	04-84	PLC Application parameter 14		
↗	04-85	PLC Application parameter 15		
↗	04-86	PLC Application parameter 16		
↗	04-87	PLC Application parameter 17		
↗	04-88	PLC Application parameter 18		
↗	04-89	PLC Application parameter 19		
↗	04-90	PLC Application parameter 20		
↗	04-91	PLC Application parameter 21		
↗	04-92	PLC Application parameter 22		
↗	04-93	PLC Application parameter 23		

Tab. 11-5: Multi-step speed parameters (2)

	Pr.	Parameter Name	Setting Range	Default
↗	04-94	PLC Application parameter 24	0–65535	0
↗	04-95	PLC Application parameter 25		
↗	04-96	PLC Application parameter 26		
↗	04-97	PLC Application parameter 27		
↗	04-98	PLC Application parameter 28		
↗	04-99	PLC Application parameter 29		

Tab. 11-5: Multi-step speed parameters (3)

11.6 05: Motor parameters

	Pr.	Parameter Name	Setting Range	Default
	05-00	Motor parameter auto-tuning	0: No function 1: Simple rolling auto-tuning for induction motor (IM) 2: Static auto-tuning for induction motor (IM) 4: Dynamic test for PM magnetic pole (with the running in forward direction) 5: Rolling auto-tuning for PM (IPM/SPM) 6: Advanced rolling auto-tuning for IM motor flux curve 12: FOC sensorless inertia estimation 13: Static auto-tuning for PM (IPM/SPM)	0
	05-01	Full-load current for induction motor 1 (A)	Depending on the model power	Depending on the model power
↗	05-02	Rated power for induction motor 1 (kW)	0–655.35 kW	Depending on the model power
↗	05-03	Rated speed for induction motor 1 (rpm)	0–xxxx (Depending on the motor pole number)	Depending on the motor pole number
	05-04	Number of poles for induction motor 1	2–64	4
	05-05	No-load current for induction motor 1 (A)	0.00–Pr. 05-01 default	Depending on the model power
	05-06	Stator resistance (Rs) for induction motor 1	0.000–65.535 Ω	Depending on the model power
	05-07	Rotor resistance (Rr) for induction motor 1	0.000–65.535 Ω	0.000
	05-08	Magnetizing inductance (Lm) for induction motor 1	0.0–6553.5 mH	0.0
	05-09	Stator inductance (Lx) for induction motor 1	0.0–6553.5 mH	0.0
	05-13	Full-load current for induction motor 2 (A)	Depending on the model power	Depending on the model power
↗	05-14	Rated power for induction motor 2 (kW)	0.00–655.35 kW	Depending on the model power
↗	05-15	Rated speed for induction motor 2 (rpm)	0–xxxx (Depending on the model power)	Depending on the motor pole number
	05-16	Number of poles for induction motor 2	2–64	4
	05-17	No-load current for induction motor 2 (A)	0.00–Pr. 05-13 default	Depending on the model power
	05-18	Stator resistance (Rs) for induction motor 2	0.000–65.535 Ω	Depending on the model power
	05-19	Rotor resistance (Rr) for induction motor 2	0.000–65.535 Ω	0.000

Tab. 11-6: Motor parameters (1)

	Pr.	Parameter Name	Setting Range	Default
	05-20	Magnetizing inductance (Lm) for induction motor 2	0.0–6553.5 mH	0.0
	05-21	Stator inductance (Lx) for induction motor 2	0.0–6553.5 mH	0.0
	05-22	Induction motor 1/2 selection	1: Motor 1 2: Motor 2	1
✓	05-23	Frequency for Y-connection/Δ-connection switch for induction motor	0.00–599.00 Hz	60.00
	05-24	Y-connection/Δ-connection switch for an induction motor	0: Disable 1: Enable	0
✓	05-25	Delay time for Y-connection/Δ-connection switch for an induction motor	0.000–60.000 s	0.200
	05-28	Accumulated Watt-hour for a motor (W-hour)	Read only	0.0
	05-29	Accumulated Watt-hour for a motor in low word (kW-hour)	Read only	0.0
	05-30	Accumulated Watt-hour for a motor in high word (MW-hour)	Read only	0
	05-31	Accumulated motor operation time (Min.)	0–1439	0
	05-32	Accumulated motor operation time (Day)	0–65535	0
	05-33	Induction motor (IM) or permanent magnet motor (PM) selection	0: IM 1: SPM (Surface permanent magnet motor) 2: IPM (Interior permanent magnet motor)	0
	05-34	Full-load current for a permanent magnet motor	Depending on the model power	Depending on the model power
✓	05-35	Rated power for a permanent magnet motor	0.00–655.35 kW	Depending on the model power
✓	05-36	Rated speed for a permanent magnet motor	0–65535 rpm	2000
	05-37	Pole number for a permanent magnet motor	0–65535	10
	05-38	System inertia for a permanent magnet motor	0.0–6553.5 kg.cm^2	Depending on the motor power
	05-39	Stator resistance for a permanent magnet motor	0.000–65.535 kΩ	0.000
	05-40	Permanent magnet motor Ld	0.00–655.35 mH	0.00
	05-41	Permanent magnet motor Lq	0.00–655.35 mH	0.00
✓	05-42	PG offset angle for a permanent magnet motor	0.0–360.0 °	0.0
✓	05-43	Ke parameter of a permanent magnet motor	0.0–6553.5 (Unit: V/1000 rpm)	0.0

Tab. 11-6: Motor parameters (2)

11.7 06: Protection parameters <1>

	Pr.	Parameter Name	Setting Range	Default
↗	06-00	Low voltage level	230 V: Frame A–D: 150.0–220.0 V DC Frame E: 190.0–220.0 V DC	180.0 200.0
		Over-voltage stall prevention	460 V: Frame A–D: 300.0–440.0 V DC Frame E: 380.0–440.0 VDC	360.0 400.0
↗	06-01	Selection for over-voltage stall prevention	0: Disabled 230 V: 0.0–450.0 V DC 460 V: 0.0–900.0 V DC	 380.0 760.0
↗	06-02	Over-current stall prevention during acceleration	0: Traditional over-voltage stall prevention 1: Smart over-voltage prevention	0
↗	06-03	Over-current stall prevention during operation	Normal load: 0–160 % (100 % corresponds to the rated current of the drive) Heavy load: 0–180 % (100 % = corresponds to the rated current of the drive)	120 120
↗	06-04	Acceleration/deceleration time selection for stall prevention at constant speed	Normal load: 0–160 % (100 % = corresponds to the rated current of the drive) Heavy load: 0–180 % (100 % = corresponds to the rated current of the drive)	120 120
↗	06-05	Low voltage level	0: By current acceleration/deceleration time 1: By 1st acceleration/deceleration time 2: By 2nd acceleration/deceleration time 3: By 3rd acceleration/deceleration time 4: By 4th acceleration/deceleration time 5: By Auto-acceleration/auto-deceleration	0
↗	06-06	Over-torque detection selection (OT1)	0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN	0
↗	06-07	Over-torque detection level (OT1)	10–250 % (100 % corresponds to the rated current of the drive)	120
↗	06-08	Over-torque detection time (OT1)	0.0–60.0 s	0.1
↗	06-09	Over-torque detection selection (OT2)	0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN	0
↗	06-10	Over-torque detection level (OT2)	10–250 % (100 % corresponds to the rated current of the drive)	120
↗	06-11	Over-torque detection time (OT2	0.0–60.0 s	0.1
↗	06-12	Current limit	0–250 % (100 % corresponds to the rated current of the drive)	170
↗	06-13	Electronic thermal relay selection (motor 1)	0: Inverter motor (with external forced cooling) 1: Standard motor (motor with fan on the shaft) 2: Disabled	2
↗	06-14	Electronic thermal relay action time (motor 1)	30.0–600.0 s	60.0
↗	06-15	Temperature level over-heat (OH) warning	0.0–110.0 °C	105.0
↗	06-16	Stall prevention limit level (Weak magnetic area current stall prevention level)	0–100 % (Pr. 06-03, Pr. 06-04)	100

Tab. 11-7: Protection parameters (1)

Pr.	Parameter Name	Setting Range	Default
06-17	Fault record 1 (Present fault record)	0: No fault record 1: Over-current during acceleration (ocA) 2: Over-current during deceleration (ocd) 3: Over-current during constant speed (ocn) 4: Ground fault (GFF) 5: IGBT short-circuit (occ) 6: Over-current at stop (ocS) 7: Over-voltage during acceleration (ovA) 8: Over-voltage during deceleration (ovd) 9: Over-voltage during constant speed (ovn) 10: Over-voltage at stop (ovS) 11: Low-voltage during acceleration (LvA) 12: Low-voltage during deceleration (Lvd) 13: Low-voltage during constant speed (Lvn) 14: Low-voltage at stop (LvS) 15: Phase loss protection (OrP) 16: IGBT overheat (oH1) 17: Capacitance over-heat (oH2) 18: TH1 open: IGBT overheat protection error (tH1o) 19: TH2 open: capacitance over-heat protection error (tH2o) 21: Drive overload (oL) 22: Electronic thermal relay protection 1 (EoL1) 23: Electronic thermal relay protection 2 (EoL2) 24: Motor PTC overheat (oH3) 26: Over-torque 1 (ot1) 27: Over-torque 2 (ot2) 28: Low current (uC) 29: Home limit error (LMIT) 30: Memory write-in error (cF1) 31: Memory read-out error (cF2) 33: U-phase current detection error (cd1) 34: V-phase current detection error (cd2) 35: W-phase current detection error (cd3) 36: Clamp current detection error (Hd0) 37: Over-current detection error (Hd1) 38: Over-voltage detection error (Hd2) 39: IGBT short-circuit detection error (Hd3) 40: Auto-tuning error (AUE) 41: PID feedback loss (AFE) 42: PG feedback error (PGF1) 43: PG feedback loss (PGF2) 44: PG feedback stall (PGF3) 45: PG slip error (PGF4) 48: Analog current input loss (ACE) 49: External fault input (EF) 50: Emergency stop (EF1) 51: External Base Block (bb) 52: Password error (Pcod) 54: Communication error (CE1) 55: Communication error (CE2) 56: Communication error (CE3) 57: Communication error (CE4) 58: Communication time-out (CE10) 60: Brake transistor error (bF) 61: Y-/Δ-connection switch error (ydc) 62: Deceleration energy backup error (dEb) 63: Slip error (oSL) 64: Electromagnet switch error (ryF) 65: PG card error (PGF5) 68: Sensorless estimated speed have wrong direction 69: Sensorless estimated speed is over speed 70: Sensorless estimated speed deviated 71: Watchdog 72: Channel 1 (STO1–SCM1) safety loop error (STL1) 73: External safety gate (S1) 75: External brake error	0
06-18	Fault record 2		0
06-19	Fault record 3		0
06-20	Fault record 4		0
06-21	Fault record 5		0
06-22	Fault record 6		0

Tab. 11-7: Protection parameters (2)

	Pr.	Parameter Name	Setting Range	Default
		Fault record 1–6 (continued)	76: Safe torque off (STO) 77: Channel 2 (STO2–SCM2) safety loop error (STL2) 78: Internal loop error (STL3) 82: U phase output phase loss (OPHL) 83: V phase output phase loss (OPHL) 84: W phase output phase loss (OPHL) 85: PG-02U ABZ hardware disconnection 86: PG-02U UVW hardware disconnection 87: oL3 Low frequency overload protection 89: RoPd Initial rotor position detection error 90: Inner PLC function is forced to stop 93: CPU error 101: CANopen® software disconnect 1 (CGdE) 102: CANopen® software disconnect 2 (CHbE) 104: CANopen® hardware disconnect (CbFE) 105: CANopen® index setting error (CIdE) 106: CANopen® slave station number setting error (CAdE) 107: CANopen® index setting exceed limit (CFrE) 111: ictE Internal communication overtime error (InrCOM) 112: PM sensorless shaft lock error 142: Auto-tuning error 1 (no feedback current error) (AUE1) 143: Auto-tuning error 2 (motor phase loss error) (AUE2) 144: Auto-tuning error 3 (no-load current I0 measuring error) (AUE3) 148: Auto-tuning error 4 (leakage inductance Lsigma measuring error) (AUE4)	
✓	06-23	Fault output option 1	0–65535 (Further information on the bit table for fault code can be obtained from your supplier.)	0
✓	06-24	Fault output option 2		
✓	06-25	Fault output option 3		
✓	06-26	Fault output option 4		
✓	06-27	Electronic thermal relay selection 2 (motor 2)	0: Inverter motor (with external forced cooling) 1: Standard motor (motor with fan on the shaft) 2: Disabled	2
✓	06-28	Electronic thermal relay action time 2 (motor 2)	30.0–600.0 s	60.0
✓	06-29	PTC detection selection/ PT100 motion	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning	0
✓	06-30	PTC level/KTY84 Level	0.0–100.0%	50.0
	06-31	Frequency command at malfunction	0.00–599.00 Hz	Read only
	06-32	Output frequency at malfunction	0.00–599.00 Hz	Read only
	06-33	Output voltage at malfunction	0.0–6553.5 V	Read only
	06-34	DC voltage at malfunction	0.0–6553.5 V	Read only
	06-35	Output current at malfunction	0.0–6553.5 A	Read only
	06-36	IGBT temperature at malfunction	-3276.7–3276.7 °C	Read only
	06-37	Capacitance temperature at malfunction	-3276.7–3276.7 °C	Read only
	06-38	Motor speed at malfunction	-32767–32767 rpm	Read only
	06-39	Torque command at malfunction	-32767–32767%	Read only
	06-40	Status of the multi-function input terminal at malfunction	0000h–FFFFh	Read only

Tab. 11-7: Protection parameters (3)

	Pr.	Parameter Name	Setting Range	Default
	06-41	Status of the multi-function output terminal at malfunction	0000h–FFFFh	Read only
	06-42	Drive status at malfunction	0000h–FFFFh	Read only
✓	06-44	STO latch selection	0: STO latch 1: STO no latch	0
✓	06-45	Treatment to output phase loss protection (OPHL)	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning	3
✓	06-46	Detection time for output phase loss	0.000–65.535 s	3.000
✓	06-47	Current detection level for output phase loss	0.00–100.00%	1.00
✓	06-48	DC brake time for output phase loss	0.000–65.535 s	0.000
✓	06-49	LvX auto reset	0: Disabled 1: Enabled	0
✓	06-50	Time for input phase loss detection	0.00–600.00 s	0.20
✓	06-51	CAP oH warning level	0.0–110.0 degree	Depending on the motor power
✓	06-52	Ripple of input phase loss	230 V series: 0.0–160.0 V DC 460 V series: 0.0–320.0 V DC	30.0 60.0 75.0 90.0
✓	06-53	Detected input phase loss action (OrP)	0: Warn and ramp to stop 1: Warn and coast to stop	0
✓	06-55	Derating protection	0: Constant rated current and limit carrier wave by load current and temperature 1: Constant carrier frequency and limit load current by setting carrier wave 2: Constant rated current (same as setting 0), but close current limit	0
✓	06-56	PT100 voltage level 1	0.000–10.000 V	5.000
✓	06-57	PT100 voltage level 2	0.000–10.000 V	7.000
✓	06-58	PT100 level 1 frequency protection	0.00–599.00 Hz	0.00
✓	06-59	T100 activation level 1 protect frequency delay time	0–6000 s	60
✓	06-60	Software detection GFF current level	0.0–6553.5	60.0
✓	06-61	Software detection GFF filter time	0.00–655.35 s	0.10
	06-62	dEb reset bias level	230 V: 0.0–100 V DC 460 V: 0.0–200.00 V DC	20.0 40.0
	06-63	Operation time of fault record 1 (Day)	0–65535 days	Read only
	06-64	Operation time of fault record 1 (minutes)	0–1439 min.	Read only
	06-65	Operation time of fault record 2 (days)	0–65535 days	Read only
	06-66	Operation time of fault record 2 (minutes)	0–1439 min.	Read only
	06-67	Operation time of fault record 3 (days)	0–65535 days	Read only
	06-68	Operation time of fault record 3 (minutes)	0–1439 min.	Read only
	06-69	Operation time of fault record 4 (days)	0–65535 days	Read only

Tab. 11-7: Protection parameters (4)

	Pr.	Parameter Name	Setting Range	Default
	06-70	Operation time of fault record 4 (minutes)	0–1439 min	Read only
↗	06-71	Low current setting level	0.0–100.0%	0.0
↗	06-72	Low current detection time	0.00–360.00 s	0.00
↗	06-73	Low current action	0: No function 1: Warn and coast to stop 2: Warn and ramp to stop by 2nd deceleration time 3: Warn and continue operation	0
	06-86	PTC Type	0–1 0: PTC 1: KTY84-130	0

Tab. 11-7: Protection parameters (5)

11.8 07: Special parameters

	Pr.	Parameter Name	Setting Range	Default
✓	07-00	Built-in software brake level	230 V: 350.0–450.0 V DC 460 V: 700.0–900.0 V DC	370.0 740.0
✓	07-01	DC brake current level	0–100%	0
✓	07-02	DC brake time at run	0.0–60.0 s	0.0
✓	07-03	DC brake time at stop	0.0–60.0 s	0.0
✓	07-04	DC brake frequency at stop	0.00–599.00 Hz	0.00
✓	07-05	Voltage increasing gain	1–200%	100
✓	07-06	Restart after momentary power loss	0: Stop operation 1: Speed tracking by the speed before the power loss 2: Speed tracking by the minimum output frequency	0
✓	07-07	Allowed power loss duration	0.0–20.0 s	2.0
✓	07-08	Base block time	0.0–5.0 s	#,#
✓	07-09	Current limit of speed tracking	20–200%	100
✓	07-10	Restart after fault action	0: Stop operation 1: Speed tracking by current speed 2: Speed tracking by minimum output frequency	0
✓	07-11	Number of times of auto-restart after fault	0–10	0
✓	07-12	Speed tracking during start-up	0: Disabled 1: Speed tracking by maximum output frequency 2: Speed tracking by motor frequency at start 3: Speed tracking by minimum output frequency	0
✓	07-13	dEb function selection	0: Disabled 1: dEb with auto-acceleration/auto-deceleration, the drive does not output the frequency after the power is restored. 2: dEb with auto-acceleration/auto-deceleration, the drive outputs the frequency after the power is restored. 3: dEb low-voltage control, then increase to 350 V DC/700 V DC and decelerate to stop 4: dEb high-voltage control of 350 V DC/ 700 V DC and decelerate to stop	0
	07-14	dEb function reset time	0.0–25.0 s	3.0
✓	07-15	Dwell time at acceleration	0.00–600.00 s	0.00
✓	07-16	Dwell frequency at acceleration	0.00–599.00 Hz	0.00
✓	07-17	Dwell time at deceleration	0.00–600.00 s	0.00
✓	07-18	Dwell frequency at deceleration	0.00–599.00 Hz	0.00
✓	07-19	Fan cooling control	0: Fan always ON 1: Fan is OFF after the AC motor drive stops for one minute. 2: Fan is ON when AC motor drive runs; fan is OFF when AC motor drive stops. 3: Fan turns ON when temperature (IGBT) reaches around 60 °C. 4: Fan always OFF	0
✓	07-20	Emergency stop (EF) & force to stop selection	0: Coast to stop 1: Stop by 1st deceleration time 2: Stop by 2nd deceleration time 3: Stop by 3rd deceleration time 4: Stop by 4th deceleration time 5: System deceleration 6: Automatic deceleration	0

Tab. 11-8: Special parameters (1)

	Pr.	Parameter Name	Setting Range	Default
✓	07-21	Automatic energy-saving setting	0: Disable 1: Enable	0
✓	07-22	Energy-saving gain	10–1000%	100
✓	07-23	Automatic voltage regulation (AVR) function	0: Enable AVR 1: Disable AVR 2: Disable AVR during deceleration	0
✓	07-24	Torque command filter time (V/F and SVC control mode)	0.001–10.000 sec.	0.500
✓	07-25	Slip compensation filter time (V/F and SVC control mode)	0.001–10.000 sec.	0.100
✓	07-26	Torque compensation gain (V/F and SVC control mode)	IM: 0–10 (when Pr. 05-33 = 0) PM: 0–5000 (when Pr. 05-33 = 1 or 2)	0
✓	07-27	Slip compensation gain (V/F and SVC control mode)	0.00–10.00 (Default value is 1.00 in SVC mode)	0.00
✓	07-29	Slip deviation level	0.0–100.0% 0: No detection	0
✓	07-30	Over slip deviation detection time	0.0–10.0 sec.	1.0
✓	07-31	Over slip deviation treatment	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning	0
✓	07-32	Motor shock compensation factor	0–10000 0: Disable	1000
✓	07-33	Auto-restart internal of fault	0.0–6000.0 s	60.0
	07-38	PMSVC voltage feedback forward gain	0.50–2.00	1.00
	07-62	dEb gain (Kp)	0–65535	8000
	07-63	dEb gain (Ki)	0–65535	150

Tab. 11-8: Special parameters (2)

11.9 08: High-function PID parameters

	Pr.	Parameter Name	Setting Range	Default
✓	08-00	Terminal selection of PID feedback	0: No function 1: Negative PID feedback: by analog input (Pr. 03-00–03-02) 2: Negative PID feedback: by PG card pulse input, without direction (Pr. 10-02) 3: Negative PID feedback: by PG card pulse input, with direction (Pr. 10-02) 4: Positive PID feedback: by analog input (Pr. 03-00–03-02) 5: Positive PID feedback: by PG card pulse input, without direction (Pr. 10-02) 6: Positive PID feedback: by PG card pulse input, with direction (Pr. 10-02) 7: Negative PID feedback: by communication protocol 8: Positive PID feedback: by communication protocol	0
✓	08-01	Proportional gain (P)	0.0–500.0	1.0
✓	08-02	Integral time (I)	0.00–100.00 sec. 0.0: No integral	1.00
✓	08-03	Differential time (D)	0.00–1.00 s	0.00
✓	08-04	Upper limit of integral control	0.0–100.0%	100.0
✓	08-05	PID output command limit	0.0–110.0%	100.0
✓	08-06	PID feedback value by communication protocol	-200.00–200.00%	Read only
✓	08-07	PID delay time	0.0–35.0 s	0.0
✓	08-08	Feedback signal detection time	0.0–3600.0 s	0.0
✓	08-09	Feedback signal fault treatment	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: Warn and operate at last frequency	0
✓	08-10	Sleep frequency	0.00–599.00 Hz	0.00
✓	08-11	Wake-up frequency	0.00–599.00 Hz	0.00
✓	08-12	Sleep time	0.0–6000.0 s	0.0
✓	08-13	PID deviation level	1.0–50.0%	10.0
✓	08-14	PID deviation time	0.1–300.0 s	5.0
✓	08-15	PID feedback filter time	0.1–300.0 s	5.0
✓	08-16	PID compensation selection	0: Parameter setting (Pr. 08-17) 1: Analog input.	0
✓	08-17	PID compensation	-100.0–100.0%	0.0
	08-18	Sleep mode function setting	0: Refer to PID output command 1: Refer to PID feedback signal	0
✓	08-19	Wake-up integral limit	0.0–200.0%	50.0
	08-20	PID mode selection	0: Serial connection 1: Parallel connection	0
	08-21	Enable PID to change operation direction	0: Operation direction can be changed 1: Operation direction cannot be changed	0
	08-22	Wake-up delay time	0.00–600.00 s	0.00
✓	08-23	PID control flag	Bit 0 = 1: ID running in reverse follows the setting for Pr. 00-23. Bit 0 = 0: PID running in reverse follows PID's calculated value. Bit 1 = 1: second decimal place of PID Kp Bit 1 = 0: first decimal place of PID Kp	0000h

Tab. 11-9: High-function PID parameters

11.10 09: Communication parameters

	Pr.	Parameter Name	Setting Range	Default
↗	09-00	Communication address	1–254	1
↗	09-01	COM1 transmission speed	4.8–115.2 Kbps	9.6
↗	09-02	COM1 transmission fault treatment	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning and continue operation	3
↗	09-03	COM1 time-out detection	0.0–100.0 s	0.0
↗	09-04	COM1 communication protocol	1: 7, N, 2 (ASCII) 2: 7, E, 1 (ASCII) 3: 7, O, 1 (ASCII) 4: 7, E, 2 (ASCII) 5: 7, O, 2 (ASCII) 6: 8, N, 1 (ASCII) 7: 8, N, 2 (ASCII) 8: 8, E, 1 (ASCII) 9: 8, O, 1 (ASCII) 10: 8, E, 2 (ASCII) 11: 8, O, 2 (ASCII) 12: 8, N, 1 (RTU) 13: 8, N, 2 (RTU) 14: 8, E, 1 (RTU) 15: 8, O, 1 (RTU) 16: 8, E, 2 (RTU) 17: 8, O, 2 (RTU)	1
↗	09-09	Communication response delay time	0.0–200.0 ms	2.0
	09-10	Communication main frequency	0.00–599.00 Hz	60.00
↗	09-11	Block transfer 1	0000–FFFFh	0000h
↗	09-12	Block transfer 2		
↗	09-13	Block transfer 3		
↗	09-14	Block transfer 4		
↗	09-15	Block transfer 5		
↗	09-16	Block transfer 6		
↗	09-17	Block transfer 7		
↗	09-18	Block transfer 8		
↗	09-19	Block transfer 9		
↗	09-20	Block transfer 10		
↗	09-21	Block transfer 11		
↗	09-22	Block transfer 12		
↗	09-23	Block transfer 13		
↗	09-24	Block transfer 14		
↗	09-25	Block transfer 15		
↗	09-26	Block transfer 16		
	09-30	Communication decoding method	0: Decoding method 1 (20xx) 1: Decoding method 2 (26xx)	1

Tab. 11-10: Communication parameters (1)

Pr.	Parameter Name	Setting Range	Default
09-31	Internal communication protocol	0: Modbus® 485 -1: Internal communication slave 1 -2: Internal communication slave 2 -3: Internal communication slave 3 -4: Internal communication slave 4 -5: Internal communication slave 5 -6: Internal communication slave 6 -7: Internal communication slave 7 -8: Internal communication slave 8 -10: Internal communication master -12: Internal PLC control	0
09-33	PLC command force to 0	bit0: Before PLC scans, set up PLC target frequency = 0 bit1: Before PLC scans, set up PLC target torque = 0 bit2: Before PLC scans, set up the speed limit of torque control mode = 0	0
09-35	PLC address	1–254	2
09-36	CANopen® slave address	0: Disabled 0–127	0
09-37	CANopen® speed	0: 1 Mbps 1: 500 Kbps 2: 250 Kbps 3: 125 Kbps 4: 100 Kbps (Peter Electronic only) 5: 50 Kbps	0
09-39	CANopen® warning record	bit0: CANopen® Guarding Time out bit1: CANopen® Heartbeat Time out bit2: CANopen® SYNC Time out bit3: CANopen® SDO Time out bit4: CANopen® SDO buffer overflow bit5: Can Bus Off bit6: Error protocol of CANopen® bit8: The setting values of CANopen® indexes are fail bit9: The settin g value of CANopen® address is fail bit10: The checksum value of CANopen® indexes is fail	Read only
09-40	CANopen® decoding method	0: Disable (Peter Electronic-defined decoding method) 1: Enable (CANopen® DS402 standard protocol)	1
09-41	CANopen® communication status	0: Node reset 1: Com reset 2: Boot up 3: Pre-operation 4: Operation 5: Stop	Read only
09-42	Steuerstatus CANopen®	0: Not ready for use 1: Inhibit start 2: Ready to switch on 3: Switched on 4: Enable operation 7: Quick stop active 13: Error reaction activated 14: Error	Read only
09-45	CANopen® master function	0: Disable 1: Enable	0
09-46	CANopen® master address	0–127	100

Tab. 11-10: Communication parameters (2)

	Pr.	Parameter Name	Setting Range	Default
	09-60	Communication card identification	0–12 0: No communication card 1: DeviceNet® slave 2: Profibus DP slave 3: CANopen® slave/master 4: Modbus®/TCP slave 5: EtherNet/IP slave 6: EtherCAT 12: PROFINET	##
	09-61	Firmware version of communication card	Read only	##
	09-62	Product code	Read only	##
	09-63	Error code	Read only	##
↗	09-70	Communication card address (for DeviceNet® or PROFIBUS)	DeviceNet®: 0–63 Profibus DP: 1–125	1
↗	09-71	Communication card speed setting (for DeviceNet®)	• Standard DeviceNet®: 0: 125 Kbps 1: 250 Kbps 2: 500 Kbps 3: 1 Mbps (Peter Electronic only) • Non standard DeviceNet®: (Peter Electronic only) 0: 10 Kbps 1: 20 Kbps 2: 50 Kbps 3: 100 Kbps 4: 125 Kbps 5: 250 Kbps 6: 500 Kbps 7: 800 Kbps 8: 1 Mbps	2
↗	09-72	Other communication card speed setting (for DeviceNet®)	0: Standard DeviceNet® In this mode, baud rate can only be 125 Kbps, 250 Kbps, 500 Kbps, or 1 Mbps in standard DeviceNet® speed. 1: Enable In this mode, DeviceNet® baud rate can only be same as that for CANopen® (0–8).	0
↗	09-75	Communication card IP configuration (for Modbus®/TCP)	0: Static IP 1: Dynamic IP (DHCP)	0
↗	09-76	Communication card IP address 1 (for Modbus®/TCP)	0–65535	0
↗	09-77	Communication card IP address 2 (for Modbus®/TCP)		
↗	09-78	Communication card IP address 3 (for Modbus®/TCP)		
↗	09-79	Communication card IP address 4 (for Modbus®/TCP)		
↗	09-80	Communication card address mask 1 (for Modbus®/TCP)		
↗	09-81	Communication card address mask 2 (for Modbus®/TCP)		
↗	09-82	Communication card address mask 3 (for Modbus®/TCP)		
↗	09-83	Communication card address mask 4 (for Modbus®/TCP)		

Tab. 11-10: Communication parameters (3)

	Pr.	Parameter Name	Setting Range	Default
✓	09-84	Communication card gateway address 1 (for Modbus®/TCP)	0–65535	0
✓	09-85	Communication card gateway address 2 (for Modbus®/TCP)		
✓	09-86	Communication card gateway address 3 (for Modbus®/TCP)		
✓	09-87	Communication card gateway address 4 (for Modbus®/TCP)		
✓	09-88	Communication card password (low word) (for Modbus®/TCP)	0–99	0
✓	09-89	Communication card password (high word) (for Modbus®/TCP)	0–99	0
✓	09-90	Reset communication card (for Modbus®/TCP)	0: Disabled 1: Reset, return to default	0
✓	09-91	Additional settings for communication card (for Modbus®/TCP)	bit 0: Enable IP filter bit 1: Enable internet parameters (1 bit). When IP address is set, this bit is enabled. After updating the communication card parameters, this bit changes to disabled. bit 2: Enable login password (1 bit). When entering the login password, this bit is enabled. After updating the communication card parameters, this bit changes to disabled.	0
	09-92	Communication card status (for Modbus®/TCP)	bit 0: Enable password When the communication card is set with a password, this bit is enabled. When the password is cleared, this bit is disabled.	0

Tab. 11-10: Communication parameters (4)

11.11 10: Feedback control parameters

	Pr.	Parameter Name	Setting Range	Default
	10-00	Encoder type selection	0: Disabled 1: ABZ 2: ABZ (Peter Electronic encoder for Peter Electronic servo motor) 3: Resolver 4: ABZ/UVW 5: MI8 single phase pulse input	0
	10-01	Encoder pulse per revolution	1–20000	600
	10-02	Encoder input type setting	0: Disable 1: Phases A and B are pulse inputs, forward direction if A-phase leads B-phase by 90 degrees 2: Phases A and B are pulse inputs, forward direction if B-phase leads A-phase by 90 degrees 3: Phase A is a pulse input and phase B is a direction input (L = reverse direction, H = forward direction) 4: Phase A is a pulse input and phase B is a direction input (L = forward direction, H = reverse direction) 5: Single-phase input	0
↗	10-03	Frequency division output setting (denominator)	1–255	1
↗	10-04	Electrical gear at load side A1	1–65535	100
↗	10-05	Electrical gear at motor side B1		
↗	10-06	Electrical gear at load side A2		
↗	10-07	Electrical gear at motor side B2		
↗	10-08	Treatment for encoder/speed observer feedback fault	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop	2
↗	10-09	Detection time of encoder/ speed observer feedback fault	0.0–10.0 sec. 0: Disabled	1.0
↗	10-10	Encoder/speed observer stall	0–120% 0: No function	115
↗	10-11	Detection time of encoder/ speed observer stall	0.0–2.0 s	0.1
↗	10-12	Encoder/speed observer stall action	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop	2
↗	10-13	Encoder/speed observer slip range	0–50% 0: No function	50
↗	10-14	Detection time of encoder/ speed observer slip	0.0–10.0 s	0.5
↗	10-15	Encoder/speed observer stall and slip error action	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop	2

Tab. 11-11: Feedback control parameters (1)

	Pr.	Parameter Name	Setting Range	Default
✓	10-16	Pulse input type setting	0: Disabled 1: Phases A and B are pulse inputs, forward direction if A-phase leads B-phase by 90 degrees 2: Phases A and B are pulse inputs, forward direction if B-phase leads A-phase by 90 degrees 3: Phase A is a pulse input and phase B is a direction input (L = reverse direction, H = forward direction). 4: Phase A is a pulse input and phase B is a direction input. (L = forward direction, H = reverse direction). 5: Single-phase pulse input (MI8)	0
✓	10-17	Electrical gear A	1–65535	100
✓	10-18	Electrical gear B	1–65535	100
✓	10-19	Positioning for encoder position	-32767–2400	0
✓	10-20	Error range for encoder position reached	0–65535 pulses	10
✓	10-21	Filter time (PG2)	0.000–65.535 s	0.100
✓	10-24	FOC & TQC function control	bit0: ASR control at sensorless torque (0: use PI as ASR; 1: use P as ASR) bit11: Activate DC braking when executing zero torque command (0: ON; 1: OFF) bit12: FOC Sensorless mode, cross zero means speed goes from negative to positive or reverse direction (0: determined by stator frequency; 1: determined by speed command) bit15: Direction control at open loop status (0: Switch ON direction control; 1: Switch OFF direction control)	0
✓	10-25	FOC bandwidth of speed observer	20.0–100.0 Hz	40.0
✓	10-26	FOC minimum stator frequency	0.0–10.0% fN	2.0
✓	10-27	FOC low-pass filter time constant	1–1000 ms	50
✓	10-28	FOC gain for excitation current rise time	33–100% Tr	100
✓	10-29	Top limit of frequency deviation	0.00–200.00 Hz	20.00
	10-30	Resolver pole pair	1–50 pole pairs	1
✓	10-31	I/F mode, current command	0–150% of motor rated current	40
✓	10-32	PM FOC sensorless speed estimator bandwidth	0.00–600.00 Hz	5.00
✓	10-34	PM sensorless speed estimator low-pass filter gain	0.00–655.35	1.00
✓	10-35	AMR (Kp) gain	0.00–3.00	1.00
✓	10-36	AMD (Ki) gain	0.00–3.00	0.20
✓	10-37	PM sensorless control word	0000–FFFFh	0000
✓	10-39	Frequency point to switch from I/F mode to PM sensorless mode	0.00–599.00 Hz	20.00
✓	10-40	Frequency point to switch from PM sensorless mode to V/F mode	0.00–599.00 Hz	20.00
✓	10-41	I/F mode, Id current low pass-filter time	0.0–6.0 s	0.2

Tab. 11-11: Feedback control parameters (2)

	Pr.	Parameter Name	Setting Range	Default
↗	10-42	Initial angle detection pulse value	0.0–3.0	1.0
	10-43	PG card version	0–655.35	Read only
↗	10-49	Zero voltage time during start-up	00.000–60.000 sec.	0.0000
↗	10-50	Reverse angle limit (Electrical angle)	0.00–30.00 degree	10.00
↗	10-51	Injection frequency	0–1200 Hz	500
↗	10-52	Injection magnitude	0.0–200.0 V 230 V Series: 0.0–100.0 V 460 V Series: 0.0–200.0 V	 15.0 30.0
↗	10-53	PM initial rotor position detection method	0: Disabled 1: Internal 1/4 rated current attracting the rotor to zero degrees 2: High frequency injection 3: Pulse injection	0

Tab. 11-11: Feedback control parameters (3)

11.12 11: Advanced parameters

	Pr.	Parameter Name	Setting Range	Default
	11-00	System control	bit0: Auto-tuning of ASR and APR bit1: Inertia estimate (only in FOCPG mode) bit2: Zero servo bit6: 0 Hz linear-cross bit7: Save or do not save the frequency bit8: Maximum speed for point to point position control	0000h
	11-01	Per-unit value of system inertia	1–65535 (256 = 1 pu)	256
✓	11-02	ASR1/ASR2 switching frequency	5.00–599.00 Hz	7.00
✓	11-03	ASR1 low-speed bandwidth	1–40 Hz (IM)/1–100 Hz (PM)	10
✓	11-04	ASR2 high-speed bandwidth	1–40 Hz (IM)/1–100 Hz (PM)	10
✓	11-05	Zero-speed bandwidth	1–40 Hz (IM)/1–100 Hz (PM)	10
✓	11-06	ASR1 gain	0–40 Hz (IM)/1–100 Hz (PM)	10
✓	11-07	ASR1 integral time	0.000–10.000 s	0.100
✓	11-08	ASR2 gain	0–40 Hz (IM)/1–100 Hz (PM)	10
✓	11-09	ASR2 integral time	0.000–10.000 s	0.100
✓	11-10	ASR gain of zero speed	0–40 Hz (IM)/0–100 Hz (PM)	10
✓	11-11	ASR1 integral time of zero speed	0.000–10.000 s	0.100
✓	11-12	Gain for ASR speed feed forward	0–150%	0
✓	11-13	PDFF gain value	0–200%	30
✓	11-14	ASR output Low-pass filter time	0.000–0.350 s	0.008
✓	11-15	Notch filter depth	0–20 dB	0
✓	11-16	Notch filter frequency	0.00–200.00 Hz	0.00
✓	11-17	Forward motor torque limit Quadrant I	0–500%	500
✓	11-18	Forward regenerative torque limit Quadrant II	0–500%	500
✓	11-19	Reverse motor torque limit Quadrant III	0–500%	500
✓	11-20	Reverse regenerative torque limit Quadrant IV	0–500%	500
✓	11-21	Flux weakening curve for motor 1 gain value	0–200%	90
✓	11-22	Flux weakening curve for motor 2 gain value	0–200%	90
✓	11-23	Flux weakening area speed response	0–150%	65
✓	11-24	APR gain	0.00–40.00 Hz (IM)/0–100.00 Hz (PM)	10.00
✓	11-25	Gain value for the APR feed forward	0–100	30
✓	11-26	APR curve time	0.00–655.35 s	3.00
✓	11-27	Maximum torque command	0–500%	100
✓	11-28	Torque offset source	0: Disabled 1: Analog signal input (Pr. 03-00) 2: Pr. 11-29 3: Controlled by external terminal (Pr. 11-30–11-32)	0

Tab. 11-12: Advanced parameters (1)

	Pr.	Parameter Name	Setting Range	Default
✓	11-29	Torque offset setting	-100.0–100.0%	0.0
✓	11-30	High torque compensation	-100.0–100.0%	30.0
✓	11-31	Middle torque compensation	-100.0–100.0%	20.0
✓	11-32	Low torque compensation	-100.0–100.0%	10.0
✓	11-33	Torque command source	0: Digital keypad 1: RS485 communication (Pr. 11-34) 2: Analog signal input (Pr. 03-00) 3: CANopen® 5: Communication extension card	0
✓	11-34	Torque command	-100.0–100.0% (Pr. 11-27 set value 100%)	0.0
✓	11-35	Torque command filter time	0.000–1.000 s	0.000
	11-36	Speed limit selection	0: Set by Pr. 11-37 (Forward speed limit) and Pr. 11-38 (Reverse speed limit) 1: Set by Pr. 11-37, Pr. 11-38 and Pr. 00-20 (Source of master frequency command) 2: Set by Pr. 00-20 (Source of master frequency command).	0
✓	11-37	Forward speed limit (torque mode)	0–120%	10
✓	11-38	Reverse speed limit (torque mode)	0–120%	10
✓	11-39	Zero torque command mode selection	0: Torque mode 1: Speed mode	0
✓	11-40	Point-to-point position control command source	0: External terminal 2: RS-485 3: CANopen® 5: Communication card	0
✓	11-42	System control flag	0000–FFFFh	0000h
✓	11-43	Point-to-point position control acceleration time	0.00–599.00 Hz	10.00
✓	11-44	Point-to-point position control acceleration time	0.00–655.35 s	1.00
✓	11-45	Point-to-point position control deceleration time	0.00–655.35 s	3.00
	11-46	Torque output filter time	0.000–65.535 s	0.050

Tab. 11-12: Advanced parameters (2)

11.13 13: Application parameters by industry

Pr.	Parameter Name	Setting Range	Default
13-00	Industry Parameters combination	00: Disabled 01: User-defined parameter 02: Compressor (IM) 03: Fan 04: Pump 10: Air Handling Unit, AHU	00

Tab. 11-13: Application parameters by industry

11.14 14: Extension card parameter

	Pr.	Parameter Name	Setting Range	Default
✓	14-00	Extension card Input terminal selection (AI10)	0: Disabled 1: Frequency command 2: Torque command (torque limit under speed mode) 3: Torque compensation command 4: PID target value 5: PID feedback signal 6: Thermistor (PTC/KTY-84) input value 7: Positive torque limit 8: Negative torque limit 9: Regenerative torque limit 10: Positive/negative torque limit 11: PT100 thermistor input value 13: PID compensation amount	0
✓	14-01	Extension card Input terminal selection (AI11)		0
✓	14-08	Analog input filter time (AI10)	0.000–20.00 s	0.01
✓	14-09	Analog input filter time (AI11)	0.000–20.00 s	0.01
✓	14-10	Analog input 4–20 mA signal loss selection (AI10)	0: Disabled 1: Continue operation at the last frequency 2: Decelerate to 0 Hz 3: Stop immediately and display ACE	0
✓	14-11	Analog input 4–20 mA signal loss selection (AI11)		0
✓	14-12	Extension card output terminal selection (AO10)	0: Output frequency (Hz) 1: Frequency command (Hz) 2: Motor speed (Hz) 3: Output current (rms) 4: Output voltage 5: DC BUS voltage 6: Power factor 7: Power 8: Torque 9: AVI 10: ACI 12: q-axis current (Iq) 13: q-axis feedback value (Iq) 14: d-axis current (Id) 15: d-axis feedback value (Id) 18: Torque command 19: PG2 frequency command 20: CANopen® analog output 21: RS-485 analog output 22: Communication card analog output 23: Constant voltage output 25: CANopen® and RS-485 analog output	0
✓	14-13	Extension card output terminal selection (AO11)		0
✓	14-14	Analog output 1 gain output (AO10)	0.0–500.0%	100.0
✓	14-15	Analog output 1 gain output (AO11)	0.0–500.0%	100.0
✓	14-16	Analog output 1 in REV direction (AO10)	0: Absolute value of output voltage 1: Reverse output 0 V; Forward output 0–10 V 2: Reverse output 5–0 V; Forward output 5–10 V	0
✓	14-17	Analog output 1 in REV direction (AO11)		0
✓	14-18	Extension card input selection (AI10)	0: 0–10 V (AVI10) 1: 0–20 mA (ACI10) 2: 4–20 mA (ACI10)	0
✓	14-19	Extension card input selection (AI11)	0: 0–10 V (AVI11) 1: 0–20 mA (ACI11) 2: 4–20 mA (ACI11)	0
	14-20	AO10 DC output setting level	0.00–100.00%	0.00
	14-21	AO11 DC output setting level	0.00–100.00%	0.00
✓	14-22	AO10 filter output time	0.00–20.00 s	0.01
✓	14-23	AO11 filter output time	0.00–20.00 s	0.01
✓	14-36	AO10 output selection	0: 0–10 V 1: 0–20 mA 2: 4–20 mA	0
✓	14-37	AO11 output selection		0

Tab. 11-14: Extension card parameter

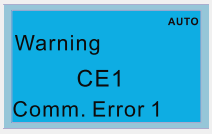
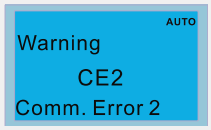
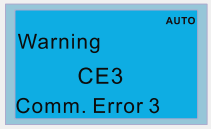
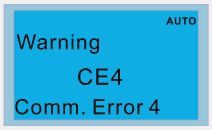
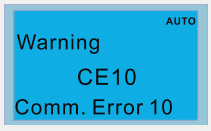
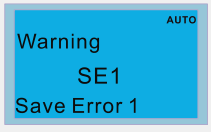
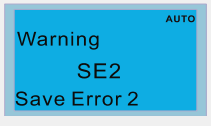
12 Warning Codes

❶ Display error signal

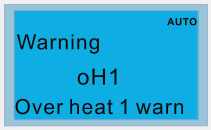
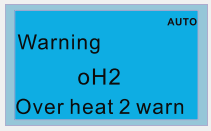
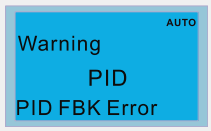
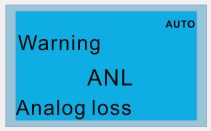
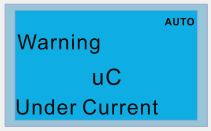
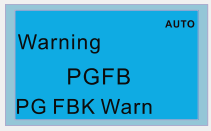
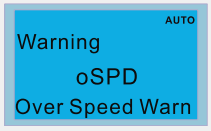
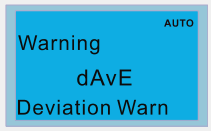
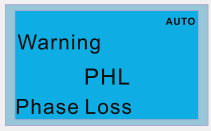
❷ Abbreviate error code

❸ Display error description

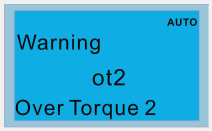
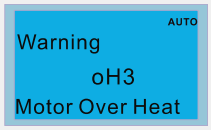
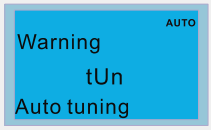
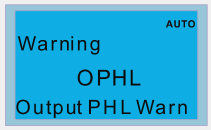
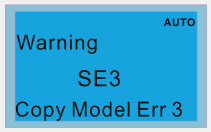
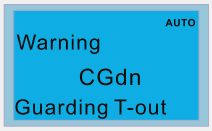
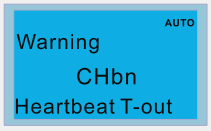
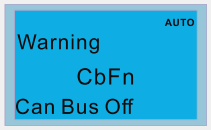
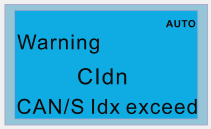
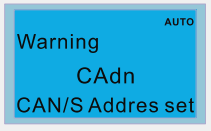
image_11-1

ID no.	Display on LCM Keypad	Descriptions
1		RS-485 Modbus illegal function code **Corrective actions** ■ Check if the function code is correct. (Function code must be 03, 06, 10, 63)
2		RS-485 Modbus illegal data address **Corrective actions** ■ Check if the communication command is correct.
3		RS-485 Modbus illegal data value **Corrective actions** ■ Check if the communication command is correct.
4		RS-485 Modbus data is written to read-only address **Corrective actions** ■ Check if the communication command is correct
5		RS-485 Modbus transmission time-out
7		Keypad COPY error 1: Keypad copy time-out “SE1” warning occurs when the keypad does not transmit the COPY command to the drive, and does not transmit any data to the drive again in 10 ms at the time you copy the parameters to the drive.
8		Keypad COPY error 2: parameter writing error “SE2” warning occurs when writing the parameters incorrectly at the time you copy parameters to the drive. For example, you copy the new firmware version with added parameters to the drive with old firmware version.

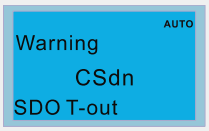
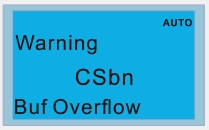
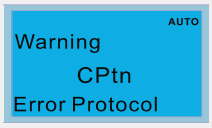
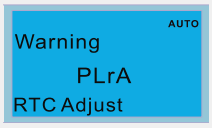
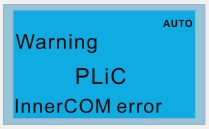
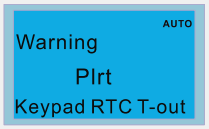
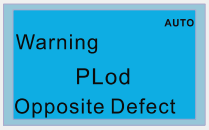
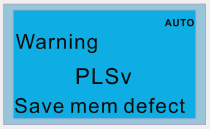
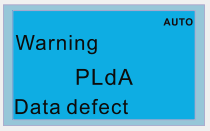
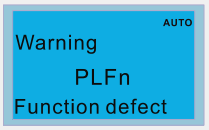
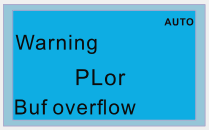
Tab. 12-1: Error codes (1)

ID no.	Display on LCM Keypad	Descriptions
9		The AC motor drive detects over-heating of IGBT, and over the protection level of oH1 warning. **Corrective actions** ■ Check the ambient temperature. ■ Regularly inspect the ventilation hole of the control cabinet. ■ Change the installed place if there are heating objects, such as braking resistors, in the surroundings. ■ Install/add cooling fan or air conditioner to lower the temperature inside the cabinet.
10		The drive has detected over heat of the capacitor **Corrective actions** ■ Check the ambient temperature. ■ Regularly inspect the ventilation hole of the control cabinet. ■ Change the installed place if there are heating objects, such as braking resistors, in the surroundings. ■ Install/add cooling fan or air conditioner to lower the temperature inside the cabinet.
11		PID feedback loss (warning for analog feedback signal; works only when PID enables)
12		Analog input current loss (including all analog 4–20 mA signals) When Pr. 03-19 is set to 1 or 2.
13		Low current
15		PG feedback error warning
17		Over speed warning
18		Over speed deviation warning
19		Input phase loss warning

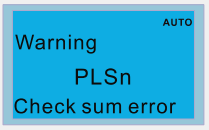
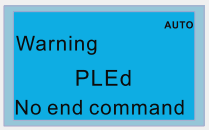
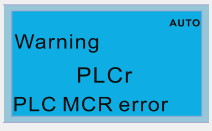
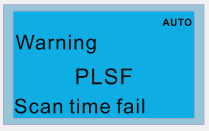
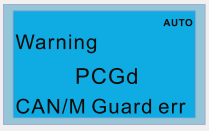
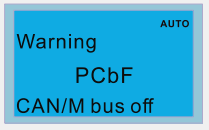
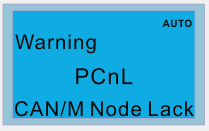
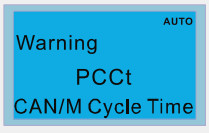
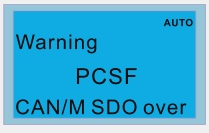
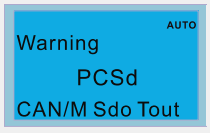
Tab. 12-1: Error codes (2)

ID no.	Display on LCM Keypad	Descriptions
20		When the output current exceeds the over-torque detection level (Pr. 06-07 or Pr. 06-10) and also exceeds Pr. 06-08 or Pr. 06-11, when Pr. 06-06 or Pr. 06-09 is set as 1 or 3, it will display warning without abnormal record; when Pr. 06-06 or 06-09 is set as 2 or 4, it will display error, stop running and there will be an abnormal record. **Corrective actions** ■ Check if motor is overloaded. ■ Increase the accel./decel. time and working cycle. ■ Increase motor capacity.
21		
22		Motor over-heating warning.
24		Over slip warning.
25		Parameter auto-tuning is processing.
28		Output phase loss
30		Keypad COPY error 3: copy model error “SE3” warning occurs when different drive identity codes are found during copying parameters.
36		CANopen® guarding time-out 1
37		CANopen® heartbeat error
39		CANopen® BUS off error
40		CANopen® Index error
41		CANopen® station address error

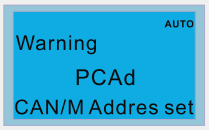
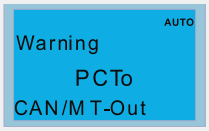
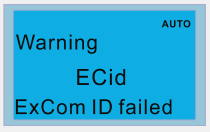
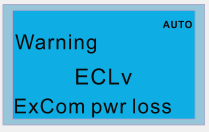
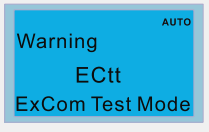
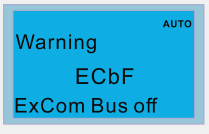
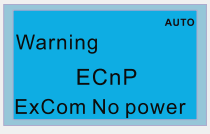
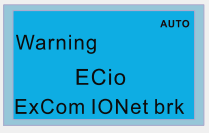
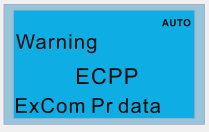
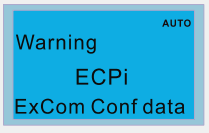
Tab. 12-1: Error codes (3)

ID no.	Display on LCM Keypad	Descriptions
42		CANopen® memory error
43		SDO transmission time-out
44		CANopen® SDO receives register overflow
46		CANopen® protocol format error
47		PLC (RTC) is not adjusted
48		InnerCOM error
49		PLC (RTC) error
50		PLC download error warning, opposite data defect
51		PLC download and save error
52		Data error during PLC operation
53		PLC download function code error
54		PLC register overflow

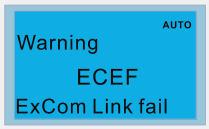
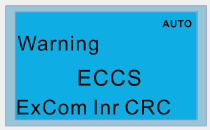
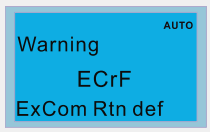
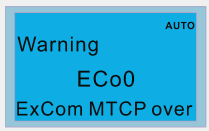
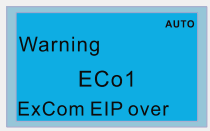
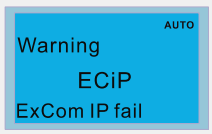
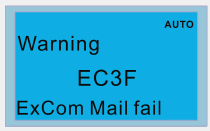
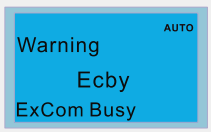
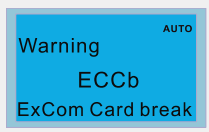
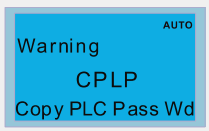
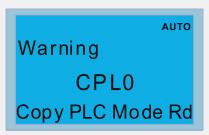
Tab. 12-1: Error codes (4)

ID no.	Display on LCM Keypad	Descriptions
55		Function code error during PLC operation
56		PLC checksum error
57		PLC end command is missing
58		PLC MCR command error
59		PLC download fail
60		PLC scan time exceeds the maximum allowable time
61		CANopen® Master guarding error
62		CANopen® Master BUS off
63		CANopen® Master node error
64		CANopen® Master cycle time-out
65		CANopen® Master SDO overflow
66		CANopen® Master SDO time-out

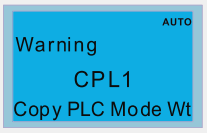
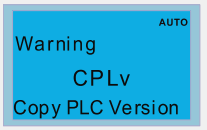
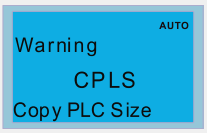
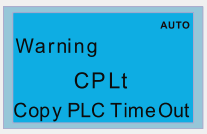
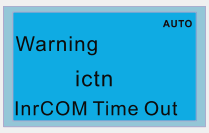
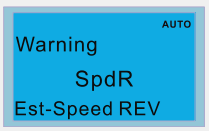
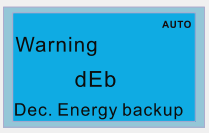
Tab. 12-1: Error codes (5)

ID no.	Display on LCM Keypad	Descriptions
67		CANopen® Master station address error
68		When the drive receives an incorrect packet, it means that there is interference or the command from the upper unit does not meet the CANopen® command format.
70		Duplicate MAC ID error Node address setting error
71		Low voltage of communication card
72		Communication card is in the test mode
73		The communication card detects too much errors in the BUS, then enters the BUS-OFF status and stop communicating.
74		There is no power supply on the DeviceNet®.
75		Factory default setting error
76		Serious internal error
77		IO connection break off
78		Profibus parameter data error
79		Profibus configuration data error

Tab. 12-1: Error codes (6)

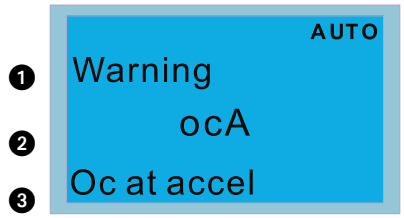
ID no.	Display on LCM Keypad	Descriptions
80		Ethernet cable is not connected
81		Communication time-out for communication card and the upper unit
82		Checksum error for communication card and the drive
83		Communication card returns to the default setting
84		Modbus®/TCP exceeds maximum communication value
85		Ethernet/IP exceeds maximum communication value
86		IP setting error
87		Mail warning: Alarm mail will be sent when the communication card establishes alarm conditions
88		Communication card busy: too much packets are received
89		Communication card break off warning
90		Copy PLC password error When Versi-KP-LCD is processing PLC copy and the PLC password is incorrect, the CPLP warning shows.
91		Copy PLC Read mode error

Tab. 12-1: Error codes (7)

ID no.	Display on LCM Keypad	Descriptions
92		Copy PLC write mode error
93		Copy PLC version error When non-C2 built-in PLC is copied to C2 drive, the CPLv warning shows
94		Copy PLC Capacity size error
95		Versi-KP-LCD Copy PLC function should be executed when PLC is off
96		Copy PLC time out
101		Internal communication time-out
105		Estimated speed is in a reverse direction with motor actual running direction
123		Deceleration energy backup

Tab. 12-1: Error codes (8)

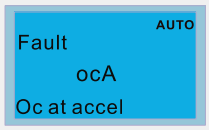
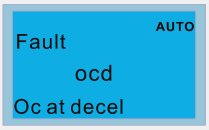
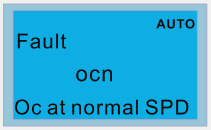
13 Fault codes and descriptions



1. Display error signal
2. Abbreviate error code
3. Display error description

image_11-1

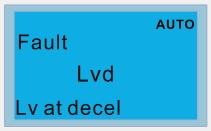
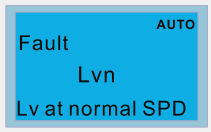
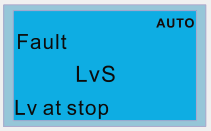
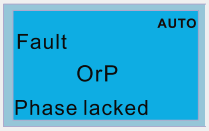
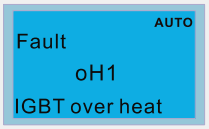
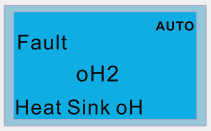
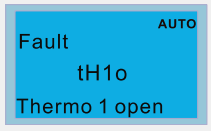
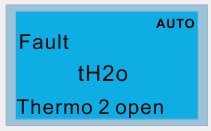
* Refer to setting of Pr. 06-17–Pr. 06-22.

ID no.*	Display on LCM keypad	Descriptions
1		Output current exceeds 2.4 times of rated current during acceleration. When ocA occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocA error. **Corrective actions** ■ Short-circuit at motor output: check for possible poor insulation at the output. ■ Acceleration time too short: Increase acceleration time. ■ AC motor drive output power is too small: Replace the AC motor drive with higher power model.
2		Output current exceeds 2.4 times of rated current during deceleration. When ocd occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocd error. **Corrective actions** ■ Short-circuit at motor output: Check for possible poor insulation at the output. ■ Deceleration time too short: Increase deceleration time. ■ AC motor drive output power is too small: Replace the AC motor drive with higher power model.
3		Output current exceeds 2.4 times of the rated current during constant speed. When ocn occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocn error. **Corrective actions** ■ Short-circuit at motor output: Check for possible poor insulation at the output.. ■ AC motor drive output power is too small: Replace the AC motor drive with higher power model.

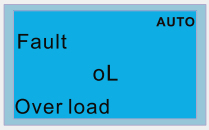
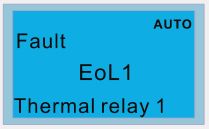
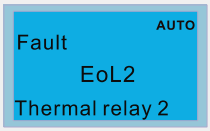
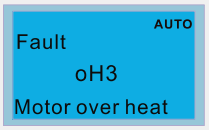
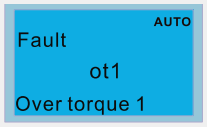
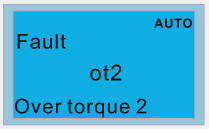
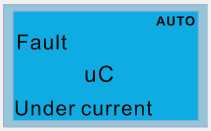
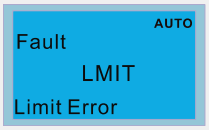
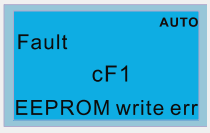
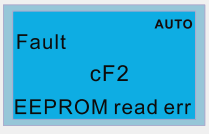
Tab. 13-1: Fault codes (1)

ID no.*	Display on LCM keypad	Descriptions
4	AUTO Fault GFF Ground fault	When (one of) the output terminal(s) is grounded, short circuit current is larger than Pr. 06-60 setting value, and the detection time is longer than Pr. 06-61 time setting, GFF occurs. **NOTE:** The short circuit protection is provided for AC motor drive protection, not to protect the user. **Corrective actions** ■ Check the motor insulation value with megger. Replace the motor if the insulation is poor. ■ Check the wiring connections between the AC motor drive and motor for possible short circuits, also to ground. ■ If the motor cable length exceeds 100 m, decrease the setting value for carrier frequency. Take remedies to reduce stray capacitance.
5	AUTO Fault occ Short Circuit	Short-circuit is detected between upper bridge and lower bridge of the IGBT module. **Corrective actions** ■ Check the motor wiring. Cycle the power, if occ still exists, return to the factory for repair.
6	AUTO Fault ocS Oc at stop	Over-current or hardware failure in current detection at stop. Cycle the power after ocS occurs. If the hardware failure occurs, the display shows cd1, cd2 or cd3. **Corrective actions** ■ Check if other error code such as cd1–cd3 occur after cycling the power. If yes, return to the factory for repair.
7	AUTO Fault ovA Ov at accel	DC BUS over-voltage during acceleration (230 V: 410 V DC; 460 V: 820 V DC) **Corrective actions** ■ Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. ■ If DC BUS over-voltage due to regenerative voltage, please increase the acceleration time.
8	AUTO Fault ovd Ov at decel	DC BUS over-voltage during deceleration (230 V: 410 V DC; 460 V: 820 V DC) **Corrective actions** ■ Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. ■ If the DC BUS is over-voltage due to regenerative voltage, increase the deceleration time or add an optional brake resistor.
9	AUTO Fault ovn Ov at normal SPD	DC BUS over-voltage at constant speed (230 V: 410 V DC; 460 V: 820 V DC) **Corrective actions** ■ Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes.
10	AUTO Fault ovS Ov at stop	DC BUS over-voltage at stop (230 V: 410 V DC; 460 V: 820 V DC) **Corrective actions** ■ Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes.
11	AUTO Fault LvA Lv at accel	DC BUS voltage is lower than Pr. 06-00 setting value during acceleration. **Corrective actions** ■ Check if the input voltage is normal. ■ Check for possible sudden changes in load. ■ Check the setting of Pr. 06-00.

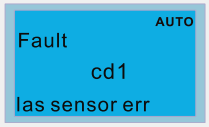
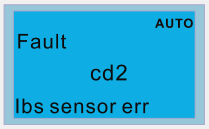
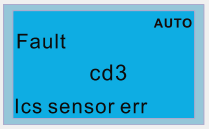
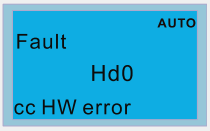
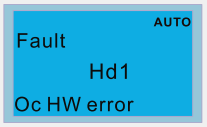
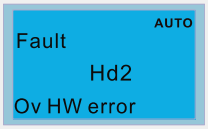
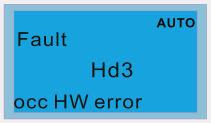
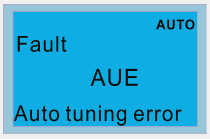
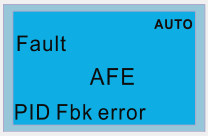
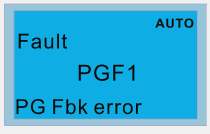
Tab. 13-1: Fault codes (2)

ID no.*	Display on LCM keypad	Descriptions
12		DC BUS voltage is lower than Pr. 06-00 setting value during deceleration. **Corrective actions** ■ Check if the input voltage is normal. ■ Check for possible sudden changes in load. ■ Check the setting of Pr. 06-00.
13		DC BUS voltage is lower than Pr. 06-00 setting value at constant speed. **Corrective actions** ■ Check if the input voltage is normal. ■ Check for possible sudden changes in load. ■ Check the setting of Pr. 06-00.
14		DC BUS voltage is lower than Pr. 06-00 setting value at stop. **Corrective actions** ■ Check if the input voltage is normal. ■ Check the setting of Pr. 06-00.
15		Phase loss of power input. **Corrective actions** ■ Correctly install the wiring of the main circuit power.
16		IGBT temperature exceeds the protection level. **Corrective actions** ■ Ensure that the ambient temperature falls within the specified temperature range. ■ Make sure the ventilation holes are not obstructed. ■ Remove any foreign objects from the heat sink and check for possible dirt in the heat sink. ■ Check the fan and clean it. ■ Provide enough space for adequate ventilation.
17		Capacitance temperature exceeds the protection level. **Corrective actions** ■ Ensure that the ambient temperature falls within the specified temperature range. ■ Make sure the ventilation holes are not obstructed. ■ Remove any foreign objects from the heat sink and check for possible dirt in the heat sink. ■ Check the fan and clean it. ■ Provide enough space for adequate ventilation.
18		IGBT hardware failure in temperature detection. **Corrective actions** ■ Wait for 10 minutes, and then cycle the power. Check if tH1o protection still exists. If yes, return to the factory for repair.
19		Hardware failure in capacitor temperature detection. **Corrective actions** ■ Wait for 10 minutes, and then cycle the power. Check if tH2o protection still exists. If yes, return to the factory for repair.

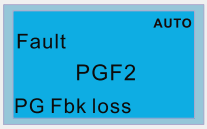
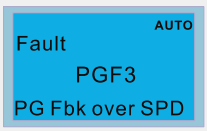
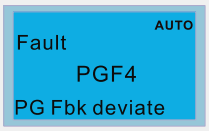
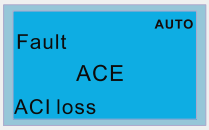
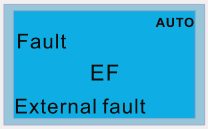
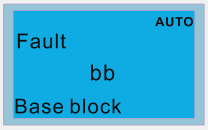
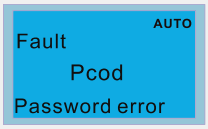
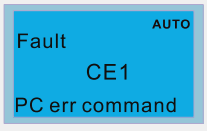
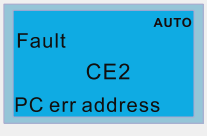
Tab. 13-1: Fault codes (3)

ID no.*	Display on LCM keypad	Descriptions
21		The AC motor drive detects excessive drive output current. **Corrective actions** ■ Check if the motor is overloaded. ■ Change to the next power level with a higher value for the AC motor drive model.
22		Electronic thermal relay 1 protection **Corrective actions** ■ Check the setting of the electronic thermal relay (Pr. 06-14). ■ Change to the next power level with a higher value for the AC motor drive model.
23		Electronic thermal relay 2 protection **Corrective actions** ■ Check the setting of the electronic thermal relay (Pr. 06-28). ■ Change to the next power level with a higher value for the AC motor drive model.
24		Motor overheating: the AC motor drive internal temperature exceeds the setting for Pr. 06-30 (PTC level) or Pr. 06-57 (PT100 level) **Corrective actions** ■ Make sure the motor is not obstructed. ■ Ensure that the ambient temperature falls within the specified temperature range. ■ Change to a higher power motor.
26		When the output current exceeds the over-torque detection level (Pr. 06-07 or Pr. 06-10) and also exceeds Pr. 06-08 or Pr. 06-11; and when Pr. 06-06 or Pr. 06-09 is set as 1 or 3, the keypad displays a warning without an error record; when Pr. 06-06 or Pr. 06-09 is set as 2 or 4, it displays an error, stops running, and displays an error record.
27		**Corrective actions** ■ Check if motor is overloaded. ■ Increase the accel./decel. time and working cycle. ■ Increase motor capacity.
28		Low current detection **Corrective actions** ■ Check Pr. 06-71, Pr. 06-72, Pr. 06-73.
29		When MIx = 45 (forward run limit) or MIx = 44 (backward run limit) act during operation, LMIT error shows. **Corrective actions** ■ Install the limit ON/OFF switch to correct position. ■ Reduce deceleration time. ■ Reset the over-voltage stall prevention.
30		Internal EEPROM cannot be programmed **Corrective actions** ■ Press the RESET key to reset to the default. ■ If the fault code still displays on the keypad, return the unit to the factory.
31		Internal EEPROM cannot be read **Corrective actions** ■ Press the RESET key to reset to the default. ■ If the fault code still displays on the keypad, return the unit to the factory.

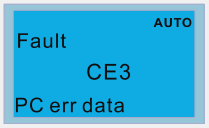
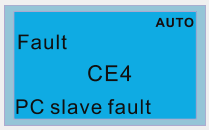
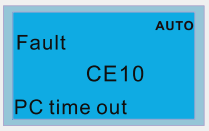
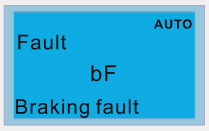
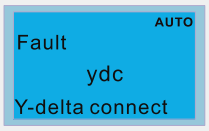
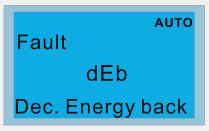
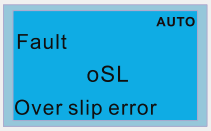
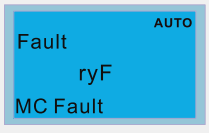
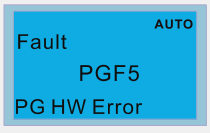
Tab. 13-1: Fault codes (4)

ID no.*	Display on LCM keypad	Descriptions
33		U-phase current detection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
34		V-phase current detection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
35		W-phase current detection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
36		CC (current clamp) hardware protection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
37		OC hardware protection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
38		OV hardware protection error when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory.
39		Protection error of Occ IGBT short-circuit detection when power is ON **Corrective actions** ■ Cycle the power to the drive. ■ If the fault code still displays on the keypad, return the unit to the factory
40		Motor auto-tuning error **Corrective actions** ■ Verify that the motor wiring is correct. ■ Verify that the motor capacity and parameters are correct. ■ Try auto-tuning again.
41		PID loss (ACI) **Corrective actions** ■ Check the wiring for the PID feedback. ■ Check the settings for the PID parameters.
42		PG feedback error **Corrective actions** ■ Check if the setting of the encoder parameter is correct when the drive is in PG feedback close-loop control.

Tab. 13-1: Fault codes (5)

ID no.*	Display on LCM keypad	Descriptions
43		PG feedback loss **Corrective actions** ■ Check the wiring for the PG feedback.
44		PG feedback stall **Corrective actions** ■ Reset ASR parameters. Set correct accel./decel. time. ■ Reset encoder parameter (Pr. 10-01) ■ Reset proper values for Pr. 10-10 and Pr. 10-11.
45		PG slip error **Corrective actions** ■ Reset ASR parameters. Set correct accel./decel. time. ■ Reset encoder parameter (Pr. 10-01) ■ Reset proper setting values for Pr. 06-12 and Pr. 11-17–Pr. 17-20.
48		ACI loss **Corrective actions** ■ Check the wiring for ACI. ■ Check if the ACI signal is less than 4 mA
49		External fault. When the drive decelerates based on the setting of Pr. 07-20, the EF fault displays on the keypad. **Corrective actions** ■ Press RESET key after the fault is cleared.
50		Emergency stop: When the contact of MIx = EF1 is ON, the output stops immediately and displays EF1 on the keypad. The motor is in free running. **Corrective actions** ■ Verify if the system is back to normal condition, and then press “RESET” key to go back to the default.
51		External Base Block: When the contact of MIx = bb is ON, the output stops immediately and displays bb on the keypad. The motor is in free running. **Corrective actions** ■ Verify if the system is back to normal condition, and then press “RESET” key to go back to the default.
52		Entering the wrong password three consecutive times **Corrective actions** ■ Input the correct password after rebooting the motor drive.
54		Communication command is illegal **Corrective actions** ■ Check if the function code is correct (function code must be 03, 06, 10, 63).
55		Data address is illegal **Corrective actions** ■ Check if the data address is correct.

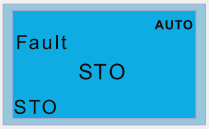
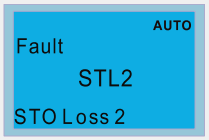
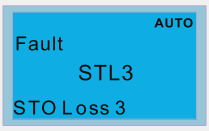
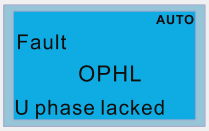
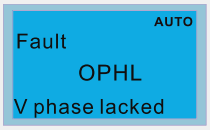
Tab. 13-1: Fault codes (6)

ID no.*	Display on LCM keypad	Descriptions
56		Data value is illegal **Corrective actions** ■ Check if the data value exceeds the maximum or minimum value.
57		Data is written to read-only address **Corrective actions** ■ Check if the communication address is correct.
58		Modbus® transmission time-out occurs **Corrective actions** ■ Check if the upper unit transmits the communication command within the setting time for Pr. 09-03. ■ Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. ■ Check if the setting for Pr. 09-02 is the same as the setting for the upper unit. ■ Check the condition of the communication cable or replace with a new cable.
60		The brake transistor of the motor drive is abnormal. (for the models with built-in brake transistor) **Corrective actions** ■ Press “RESET” key to go back to the default. If bF still exists, return to the factory for repair.
61		An error occurs when Y-Δ switches **Corrective actions** ■ Check the wiring of the Y-connection/Δ-connection. ■ Check if related parameters are all set up and set correctly.
62		When Pr. 07-13 is not 0, and the power is suddenly off, causing the DCBUS voltage lower than the dEb action level, the dEb function acts and the motor ramps to stop. Then dEb displays on the keypad. **Corrective actions** ■ Check the power system. ■ Replace power system with a larger capacity.
63		Motor slip exceeds Pr. 07-29 setting and exceeds Pr. 07-30 time setting. **Corrective actions** ■ Check if the motor parameters are correct and decrease the load if overloaded. ■ Check the settings of Pr. 07-29, Pr. 07-30 and Pr. 10-29.
64		Electric valve switch error when executing Soft Start (Frame D and E) **Corrective actions** ■ Check if the three-phase input power is normal. ■ Cycle the power after checking the power. If ryF error still exists, return to the factory for repair.
65		Hardware error of PG card **Corrective actions** ■ Re-connect the cables correctly. ■ Choose the correct setting of Pr. 10-00.

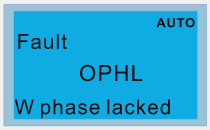
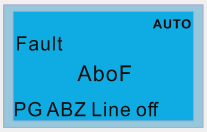
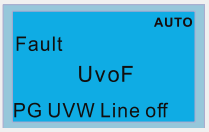
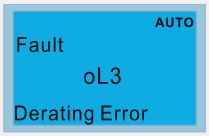
Tab. 13-1: Fault codes (7)

ID no.*	Display on LCM keypad	Descriptions
68	AUTO Fault SdRv SpdFbk Dir Rev	Rotating direction is different from the commanding direction detected by the sensorless. **Corrective actions** ■ Decrease the setting of Pr. 10-25. ■ Reset the motor parameter and execute parameter tuning. ■ Check if the motor cable is well functioned or replace the cable.
69	AUTO Fault SdOr SpdFbk over SPD	Over speed rotation detected by sensorless **Corrective actions** ■ Decrease the setting of Pr. 10-25. ■ Increase the bandwidth of ASR speed controller. ■ Reset motor parameter and execute parameter tuning.
70	AUTO Fault SdDe SpdFbk deviate	A large deviation between the rotating speed and the command detected by the sensorless **Corrective actions** ■ Reset proper setting for Pr. 10-13 and Pr. 10-14. ■ Reset ASR parameters ■ Set proper acceleration/deceleration time ■ Adjust the parameters for torque limit (Pr. 06-12, Pr. 11-17–20).
71	AUTO Fault WDTT Watchdog	Watchdog error **Corrective actions** ■ Verify the wiring of the control circuit and wiring/grounding of the main circuit to prevent interference. If the WDTT fault still exists, return to the factory for repair.
72	AUTO Fault STL1 STO Loss 1	STO1–SCM1 internal loop detection error **Corrective actions** ■ Connect the short circuit line of STO1 and SCM1. ■ After you make sure all the wiring is correct, if STOL fault still exists after cycling the power, please return to the factory for repair. ■ Check if the PIN of IO card is broken. Check if the IO card connects to the control board correctly, and if the screws are tightened well.
73	AUTO Fault S1 S1-emergy stop	Emergency stop for external safety **Corrective actions** ■ Reset the S1 and SCM switch and cycle the power. ■ Connect the short circuit lines of S1 and SCM. ■ If S1 fault still exists after cycling the power, please return to the factory for repair. ■ Check if the PIN of IO card is broken. Check if the IO card connects to the control board correctly, and if the screws are tightened well.
75	AUTO Fault Brk EXT-Brake Error	External mechanical brake error The MO terminal is active when MOx = 12, 42, 47 or 63, but the MIx = 55 does not receive signal for mechanical brake action during the set time of Pr. 02-56. **Corrective actions** ■ Verify if the mechanical brake can work correctly. Replace mechanical brake. ■ If there is no brake-confirming signal to use, set Pr. 02-56 = 0. ■ Check if the signal cable is loose or cut off. Tighten the screws. Replace the signal cable with a new one. ■ Increase the time setting of Pr. 02-56.

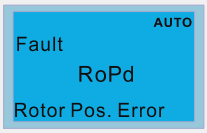
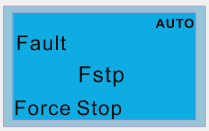
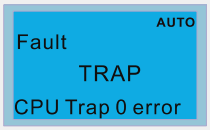
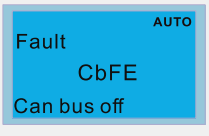
Tab. 13-1: Fault codes (8)

ID no.*	Display on LCM keypad	Descriptions
76		Safety Torque Off function active **Corrective actions** ■ Reset the STO1/SCM1 and STO2/SCM2 switches (ON) and cycle the power. ■ Check if the PIN of IO card is broken Check if the IO card connects to the control board correctly, and if the screws are tightened well ■ Check if the IO card matches the version of the control board.
77		STO2–SCM2 internal loop detection error **Corrective actions** ■ Check the wiring of the STO2 and SCM2 terminals. ■ After you make sure all the wiring is correct, if STL2 fault still exists after cycling the power, please return to the factory for repair. ■ Check if the PIN of IO card is broken Check if the IO card connects to the control board correctly, and if the screws are tightened well ■ Check if the IO card matches the version of the control board.
78		STO1–SCM1 and STO2–SCM2 internal loop detection error **Corrective actions** ■ Check the wiring of the STO1 and SCM1, or STO2 and SCM2 terminals. ■ After you make sure all the wiring is correct, if STL3 fault still exists after cycling the power, please return to the factory for repair. ■ Check if the PIN of IO card is broken Check if the IO card connects to the control board correctly, and if the screws are tightened well ■ Check if the IO card matches the version of the control board.
82		U phase output phase loss **Corrective actions** ■ Replace the motor. ■ Check the cable and replace it if necessary. ■ Check if the current sensor is damaged. Check the flat cable of the control board. Re-do the wiring and test again if the flat cable is loose. If the fault still exists, return the unit to the factory. Verify that the three-phase current is balanced via a current clamp meter. If it is balanced and the OPHL fault still exists, return the unit to the factory ■ Make sure the capacity of the drive and motor match to each other.
83		V phase output phase loss **Corrective actions** ■ Replace the motor. ■ Check the cable and replace it if necessary. ■ Check if the current sensor is damaged. Check if the control board cable is loose. If yes, reconnect the cable and run the drive to test. If the fault still exists, return to the factory for repair. Check if the three-phase current is balanced with a current clamp meter. If the current is balanced and the OPHL fault still exists, return to the factory for repair. ■ Make sure the capacity of the drive and motor match to each other.

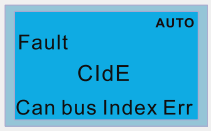
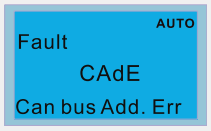
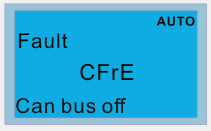
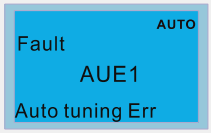
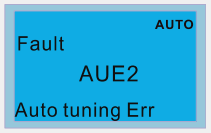
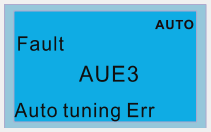
Tab. 13-1: Fault codes (9)

ID no.*	Display on LCM keypad	Descriptions
84		W phase output phase loss **Corrective actions** ■ Replace the motor. ■ Check the cable and replace it if necessary. ■ Check if the current sensor is damaged. Check if the control board cable is loose. If yes, reconnect the cable and run the drive to test. If the fault still exists, return to the factory for repair. Check if the three-phase current is balanced with a current clamp meter. If the current is balanced and the OPHL fault still exists, return to the factory for repair. ■ Make sure the capacity of the drive and motor match to each other.
85		The ABZ line off for protection when using PG02U **Corrective actions** ■ Check the PG signal cable. ■ If the PG card screws are loose, tighten all the screws. ■ Verify the wiring/grounding of the main circuit, control circuit and encoder to prevent interference. ■ After you check the wiring, if AboF fault still exists after cycle the power, return to the factory for repair. ■ Check if the VP power of PG card has no output, or the output voltage level is abnormal. ■ Check if the encoder is broken. ■ If the encoder wiring is too long, causing large voltage drop of PG card VP, decrease the wiring length. ■ Power on the encoder by other power sources.
86		The UVW line off for protection when using PG02U **Corrective actions** ■ Check the PG signal cable. ■ If the PG card screws are loose, tighten all the screws. ■ Verify the wiring/grounding of the main circuit, control circuit and encoder to prevent interference. ■ After you check the wiring, if AboF fault still exists after cycle the power, return to the factory for repair. ■ Check if the VP power of PG card has no output, or the output voltage level is abnormal. ■ Check if the encoder is broken. ■ If the encoder wiring is too long, causing large voltage drop of PG card VP, decrease the wiring length. ■ Power on the encoder by other power sources.
87		Low frequency and high current protection **Corrective actions** ■ Reduce the ambient temperature of the operating drive. ■ Replace the drive with a larger power model. ■ Reset drive parameters or decrease carrier frequency. ■ If the drive operates in V/F control mode, reduce the output voltage for low-frequency operation. ■ If the drive operates in IMVF and PMSVC control mode, decrease the torque compensation gain (Pr. 07-26).

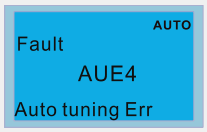
Tab. 13-1: Fault codes (10)

ID no.*	Display on LCM keypad	Descriptions
89		Rotor position detection error protection **Corrective actions** ■ Check the motor cable and replace it if necessary. ■ Replace the motor. ■ If the IGBT is broken, return to the factory for repair. ■ Cycle the power. If RoPd still occurs during operation, return to the factory for repair.
90		Keypad forces PLC to Stop **Corrective actions** ■ Check if it is necessary to set Pr. 00-32 = 0, so the keypad STOP button is invalid. ■ Verify the timing of STOP function.
93		CPU crash **Corrective actions** ■ Verify the wiring of control circuit, and the wiring/grounding of the main circuit to prevent interference. If TRAP fault still exists, return to the factory for repair. ■ Cycle the power. If the TRAP fault still exists, return to the factory for repair.
101		CANopen® guarding error **Corrective actions** ■ Increase the guarding time (Index 100C) and detection times. ■ Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. ■ Make sure the communication circuit is wired in series. ■ Use CANopen® cable or add terminating resistance. ■ Check the communication cable and replace if necessary.
102		CANopen® heartbeat error **Corrective actions** ■ Increase heartbeat time (Index 100C). ■ Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. ■ Make sure the communication circuit is wired in series. ■ Use CANopen® cable or add terminating resistance. ■ Check the communication cable and replace if necessary.
104		CANopen® bus off error **Corrective actions** ■ Make sure the CANopen® card is installed. ■ Reset CANopen® speed (Pr. 09-37). ■ Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. ■ Make sure the communication circuit is wired in series. ■ Use CANopen® cable or add terminating resistance. ■ Check the communication cable and replace if necessary.

Tab. 13-1: Fault codes (11)

ID no.*	Display on LCM keypad	Descriptions
105		CANopen® index error **Corrective actions** ■ Reset CANopen® Index (Pr. 00-02 = 7).
106		CANopen® station address error **Corrective actions** ■ Disable CANopen® (Pr. 09-36 = 0) ■ Reset CANopen® (Pr. 00-02 = 7) ■ Reset CANopen® station address (Pr. 09-36).
107		CANopen® memory error **Corrective actions** ■ Disable CANopen® (Pr. 09-36 = 0) ■ Reset CANopen® (Pr. 00-02 = 7) ■ Reset CANopen® station address (Pr. 09-36).
111		Internal communication time-out **Corrective actions** ■ Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. ■ Verify the setting of Pr. 09-02 is the same as the setting of upper unit. ■ Check the communication cable and replace if necessary.
112		The drive has RUN command with output frequency, but the permanent magnetic motor does not turn. **Corrective actions** ■ Increase the setting value of the speed observer bandwidth. ■ If the motor shaft is locked, remove causes of the motor shaft lock. ■ Replace the motor with a new one.
142		Auto-tune error 1: No feedback current error when motor parameter automatically detects **Corrective actions** ■ Wire the motor correctly. ■ Verify that the electromagnetic valve on the output side of the drive (U/V/W) is closed.
143		Auto-tune error 2: Motor phase loss error when motor parameter automatically detects **Corrective actions** ■ Wire the motor correctly. ■ Check if the motor works normally. ■ Verify that the three phases (U/V/W) of the electromagnetic valve on the output side of the drive are all closed. ■ Check if the wires (U/V/W) are broken.
144		Auto-tune error 3: No load current I_0 measurement error when motor parameter automatically detects **Corrective actions** ■ Check the settings of the motor parameters (rated current) Pr. 05-01/Pr. 05-13/Pr. 05-34. ■ Check if the motor works normally.

Tab. 13-1: Fault codes (12)

ID no.*	Display on LCM keypad	Descriptions
148		Auto-tune error 4: Leakage inductance Lsigma measurement error when motor parameter automatically detects **Corrective actions** ■ Check if the motor works normally. ■ Check the setting of the motor parameters (base frequency) in Pr. 01-01
170		Control board matching error **Corrective actions** ■ If the control board is incorrect, replace with the correct control board. If the CBM still exists, contact your service representative for further confirmation.

Tab. 13-1: Fault codes (13)

14 Safe Torque Off function

14.1 The drive safety function failure rate

Item	Definition	Standard	Performance
SFF	Safe Torque Off	IEC61508	Channel 1: 80.08% Channel 2: 68.91%
HFT (Type A subsystem)	Hardware Fault Tolerance	IEC61508	1
SIL	Safety Integrity Level	IEC61508	SIL 2
		IEC62061	SILCL 2
PFH	Average frequency of dangerous failure [h-1]	IEC61508	9.56×10^{-10}
PFD_{av}	Probability of Dangerous Failure on Demand	IEC61508	4.18×10^{-6}
Category	Category	ISO13849-1	Category 3
PL	Performance level	ISO13849-1	d
$MTTF_d$	Mean time to dangerous failure	ISO13849-1	High
DC	Diagnostic coverage	ISO13849-1	Low

Tab. 14-1: Features of the functional safety

14.2 Safety torque Off terminal function description

The Safety Torque Off function is to cut off the power supply to motor through the hardware, thereby the motor couldn't produce torque.

The Safety Torque Off function is respectively by two independent hardware to control the motor current drive signal, and thus cut off the inverter power module output in order to achieve the status of safety stop.

The operation principle is described in the table below:

Signal	Channel	Photo-coupler status			
STO signal	STO1–SCM1	ON (High)	ON (High)	OFF (Low)	OFF (Low)
	STO2–SCM2	ON (High)	OFF (Low)	ON (Low)	OFF (Low)
Driver Output status		Ready	STL2 mode (Torque output off)	STL1 mode (torque output off)	STO mode (Torque output off)

Tab. 14-2: Terminal operation description

- STO means Safe Torque Off
- STL1–STL3 means Safety Torque Off internal hardware error.
- STL3 means STO1–SCM1 and STO2–SCM2 internal circuit error.
- STO1–SCM1 ON (High): means STO1–SCM1 is connected to a +24 V DC power supply.
- STO2–SCM2 ON (High): means STO2–SCM2 is connected to a +24 V power supply.
- STO1–SCM1 OFF (Low): means STO1–SCM1 is not connected to a +24 V DC power supply.
- STO2–SCM2 OFF (Low): means STO2–SCM2 is not connected to a +24 V DC power supply.

14.3 Wiring diagram

14.3.1 Internal STO circuit

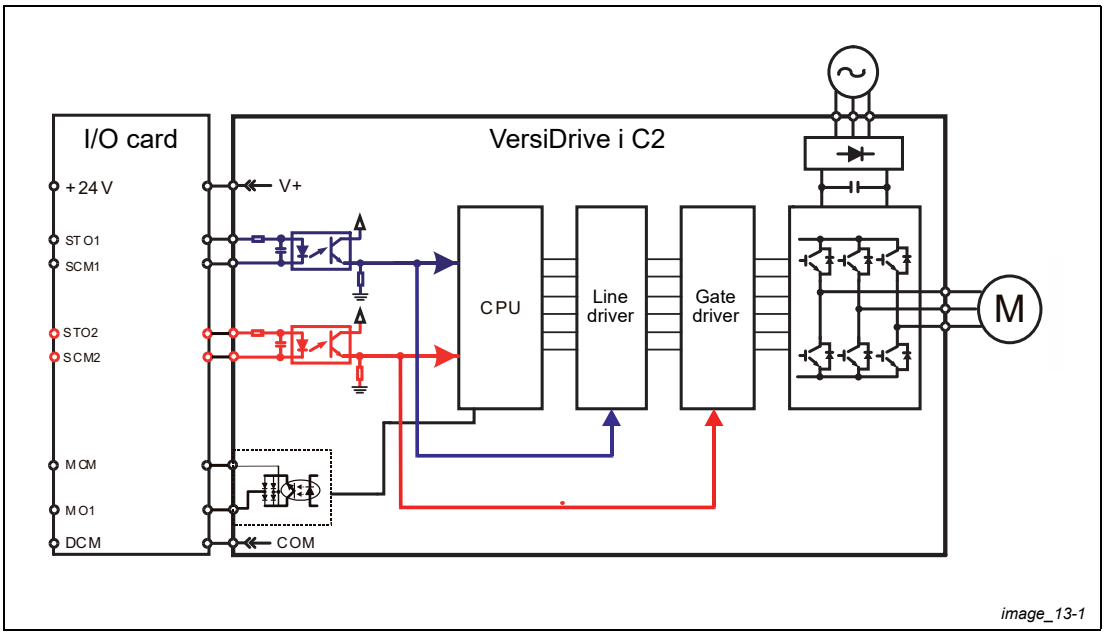


Fig. 14-1: Block diagram of the internal STO circuit

14.3.2 Factory wiring of the terminals STO1, STO2, SCM1 and SCM2

In the figure below, the factory setting for +24 V-STO1-STO2 and SCM1-SCM2-DCM is short circuit:

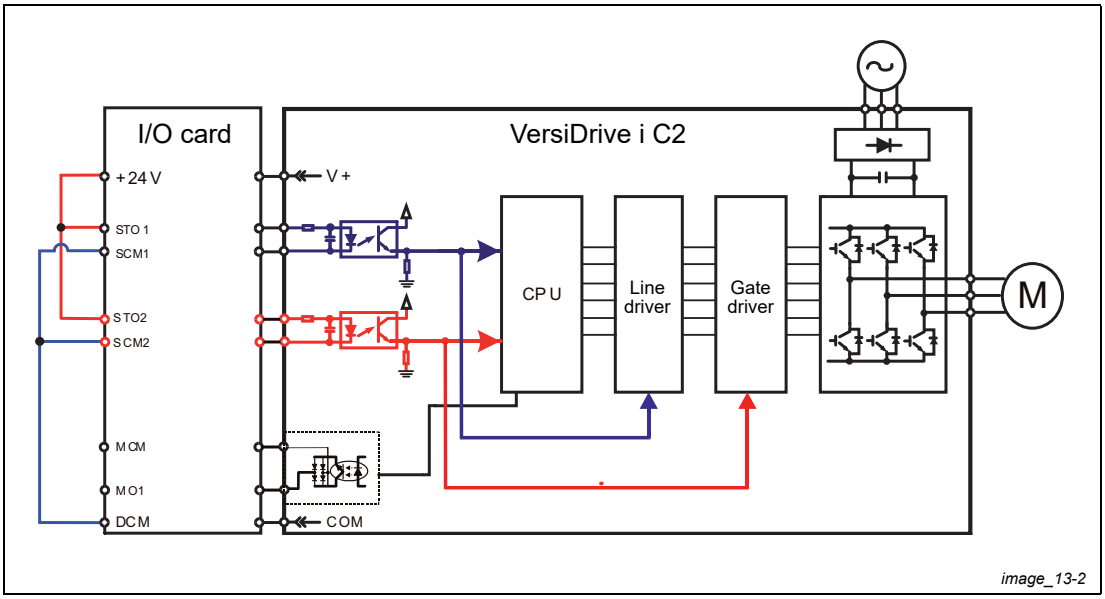


Fig. 14-2: Wiring of STO1/STO2 with +24 V and SCM1/SCM2 with DCM

14.3.3 The control loop wiring diagram

① Remove the short-circuit of +24 V-STO1-STO2 and DCM-SCM1-SCM2.

② The wiring is shown in fig. 14-3. The ESTOP switch must be at Close status in normal situation and drive will be able to Run.

③ STO mode, switch ESTOP open. Drive output stop and keypad display STO.

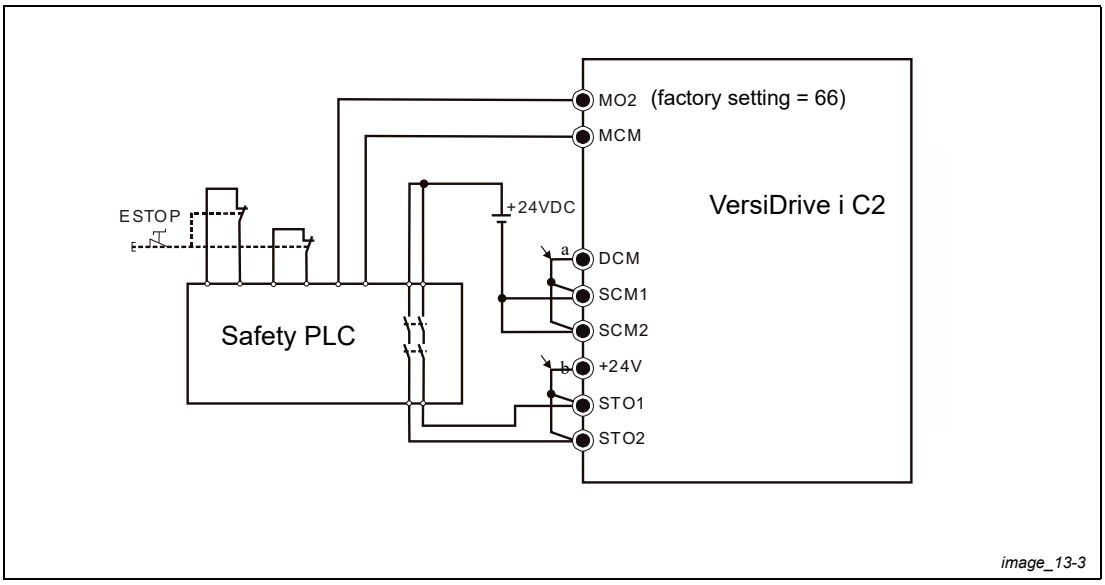


Fig. 14-3: Security circuit with safety PLC

① factory short circuit of DCM-SCM1-SCM2. To use the Safety function, please remove this short circuit.

② factory short circuit of +24 V-STO1-STO2. To use the Safety function please remove this short circuit.

14.4 Parameters

06-44 ↗ STO Alarm Latch

Factory setting: 0

Settings	0: STO Alarm Latch
	1: STO Alarm no Latch

- Pr. 06-44 = 0; STO Alarm Latch: after the reason of STO Alarm is cleared, a Reset command is needed to clear STO Alarm.
- Pr. 06-44 = 1; STO Alarm no Latch: after the reason of STO Alarm is cleared, the STO Alarm will be cleared automatically.
- All of STL1–STL3 errors are "Alarm latch" mode (in STL1–STL3 mode, the Pr. 06-44 function is not effective).

02-13 ↗ Multi-function Output 1 (Relay1)

Factory setting: 11

02-14 ↗ Multi-function Output 2 (Relay2)

Factory setting: 1

02-16 ↗ Multi-function Output 3 (MO1)

Factory setting: 0

02-17 ↗ Multi-function Output 4 (MO2)

Factory setting: 66

Settings	66: SO N.O. output
	68: SO N.C. output

Settings	Functions	Descriptions
66	SO Logic A output	Safety Output Normal Open
68	SO Logic B output	Safety Output Normal Close

Tab. 14-3: SO Safety output scheme

- VersiDrive C2 factory setting of Pr. 02-17 (MO2) = 66 (N.O.). The settings 66 and 68 were added to the multi-function output settings.

Drive status	Safety Output status	
	N.O. (MO = 66)	N.C. (MO = 68)
Normal run	Open	Close
STO	Close	Open
STL1–STL3	Close	Open

Tab. 14-4: MO2 output scheme

00-04 Content of multi-function display

Factory setting: 3

Settings	45: Hardware version

14.5 Operating sequence description

14.5.1 Normal operation status

When the STO1–SCM1 and STO2–SCM2 = ON (no STO function is needed), the drive will execute “Operating” or “Output Stop” according to RUN/STOP command (fig. 14-4).

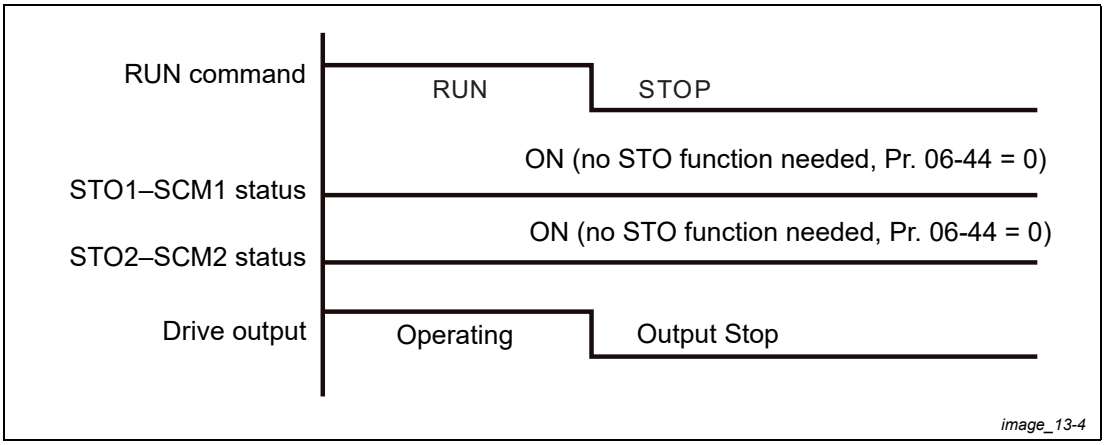


Fig. 14-4: Signal course at normal operation

14.5.2 STO · Pr. 06-44 = 0 · Pr. 02-35 = 0

When both of STO1–SCM1 and STO2–SCM2 channel are turned off during operation, the STO function will be enabled and the drive will stop output regardless of ON or OFF status of Run command (fig. 14-5).

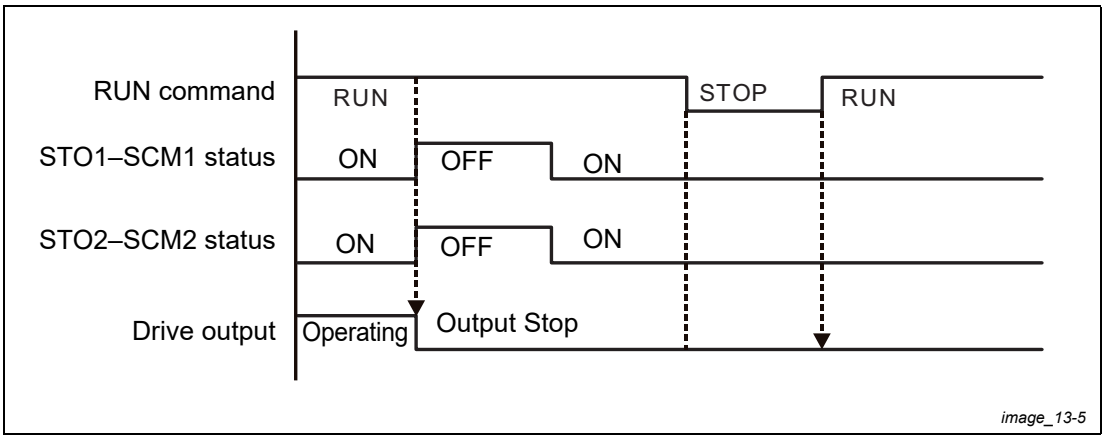


Fig. 14-5: Signal course when enabling STO1-SCM1 and STO2-SCM2

14.5.3 STO · Pr. 06-44 = 0 · Pr. 02-35 = 1

As shown in fig. 14-6: Same as the fig. 14-5. But, because the Pr. 02-35 = 1, therefore, after the Reset command, if the operating command still exists, then the drive will immediately execute the run command again.

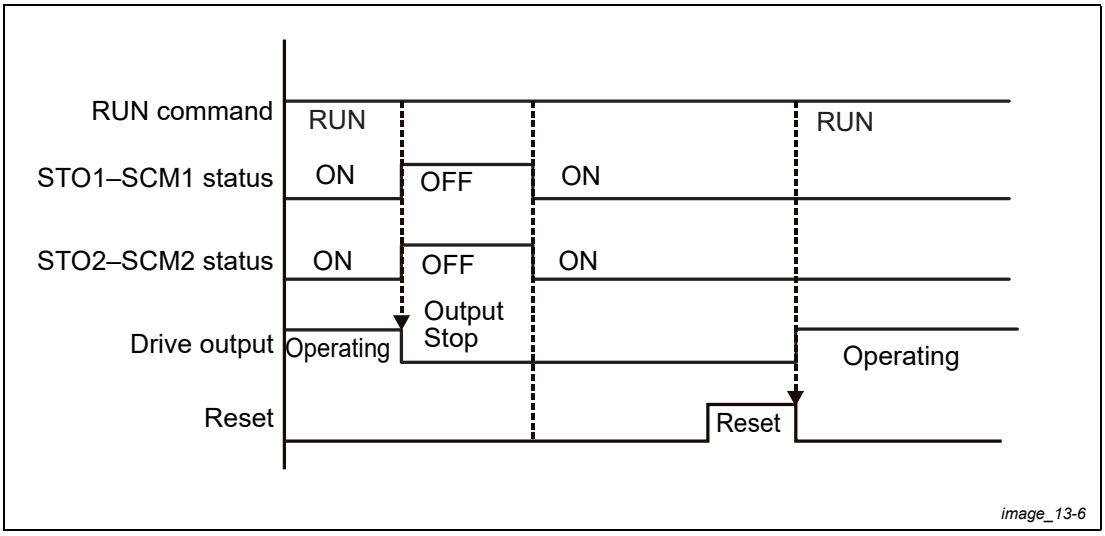


Fig. 14-6: Signal course when enabling STO1-SCM1, STO2-SCM2 with Pr. 02-35 = 1

14.5.4 STO · Pr. 06-44 = 1

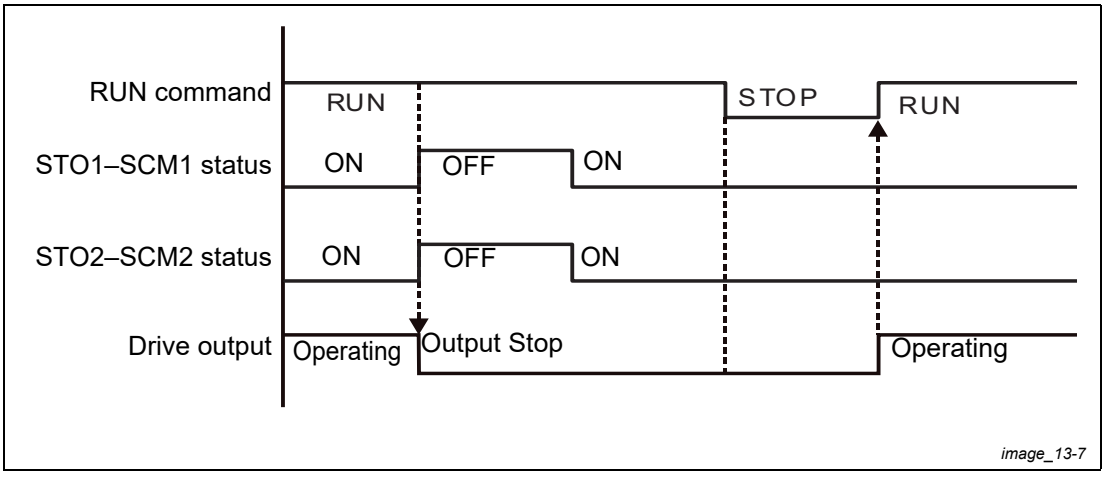


Fig. 14-7: Signal course when enabling STO1-SCM1, STO2-SCM2 with Pr. 06-44 = 1

14.5.5 STL1

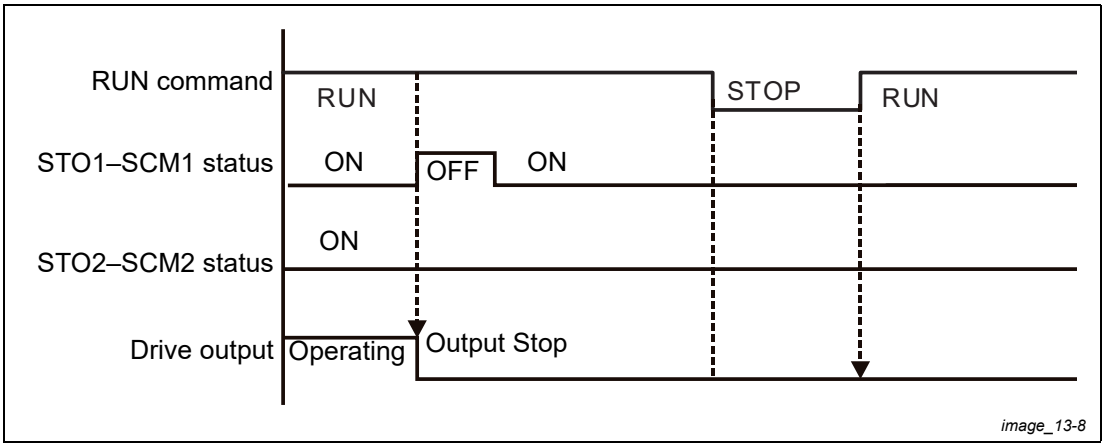


Fig. 14-8: Signal course when enabling STL1

14.5.6 STL2

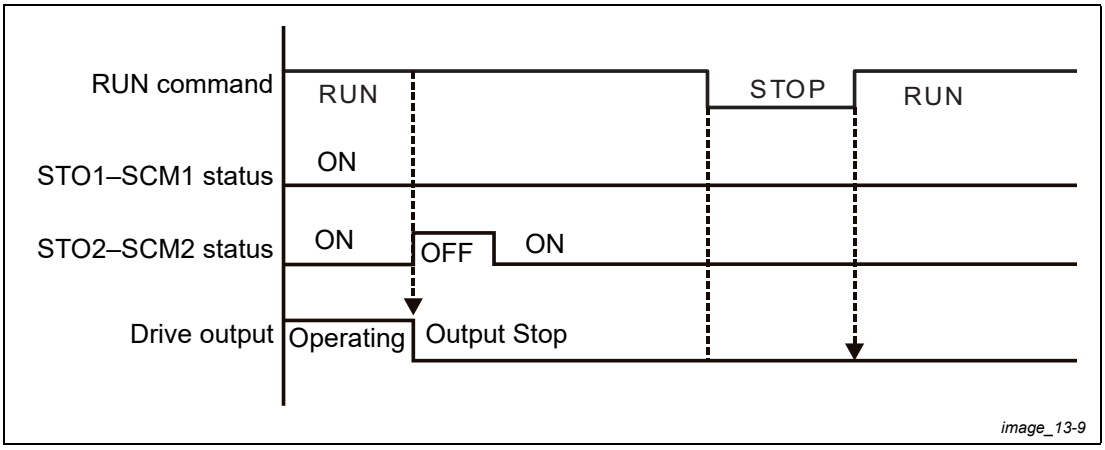


Fig. 14-9: Signal course when enabling STL2

14.6 New error code for STO function

06-17	Present Fault Record
06-18	Second Most Recent Fault Record
06-19	Third Most Recent Fault Record
06-20	Fourth Most Recent Fault Record
06-21	Fifth Most Recent Fault Record
06-22	Sixth Most Recent Fault Record

Settings	72: Channel 1 (STO1–SCM1) internal hardware error (Signal lost STO1)
	76: STO (Safety Torque Off)
	77: Channel 2 (STO2–SCM2) internal hardware error (Signal lost STO2)
	78: Channel 1 and Channel 2 internal hardware error (Signal lost STO3)

Error code	Name	Description
76	STO	Safety Torque Off function active
72	STL1 (STO1–SCM1)	STO1–SCM1 internal hardware error
77	STL2 (STO2–SCM2)	STO2–SCM2 internal hardware error
78	STL3	STO1–SCM1 and STO2–SCM2 internal hardware error

Tab. 14-5: Error codes

The Old/New control board and Old/New I/O card:

C2000	v1.12 firmware	v1.20 firmware
v1.12 control board + old I/O card (no STO function)	OK	OK
v1.12 control board + new I/O card (with STO function)	Error	Error
v1.20 control board + old I/O card (no STO function)	Error	Error
v1.20 control board + new I/O card (with STO function)	Error	OK

Tab. 14-6: Possible combination of control boards and I/O cards

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