



Danfoss A1-A5 VLT Frequency Converters Installation Guide

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Danfoss A1-A5 VLT Frequency Converters



Product Information

The product is a Danfoss drive, designed for installation, commissioning, and maintenance by qualified personnel. It is important to follow the safety measures and instructions provided in the installation guide to prevent injury and damage to the equipment or system.

The user manual includes safety symbols to indicate hazardous situations and important information. These symbols include:

- **DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

The user manual also provides safety precautions to be followed, including:

- Understanding the dangers and safety measures present in the application.
- Locking out and tagging out all power sources before performing any electrical work on the drive.
- Following local safety regulations on lifting heavy objects.
- Checking the weight of the drive and ensuring lifting equipment is in proper working condition.
- Testing the lift of the drive to verify the proper center of gravity lift point.
- Performing installation, start-up, and maintenance only by qualified personnel.
- Waiting for capacitors to fully discharge before performing service or repair work.

- Verifying full discharge by measuring the voltage level.

Product Usage Instructions

To use the Danfoss drive safely and effectively, please follow these instructions:

1. Ensure that only qualified personnel install, commission, and maintain the drive.
2. Familiarize yourself with and follow all pertinent laws, regulations, instructions, and safety measures provided in the installation guide.
3. Pay attention to the safety symbols used in the guide to identify hazardous situations.
4. Take note of the precautions mentioned in the user manual to prevent injury and damage to the equipment or system.
5. Before performing any electrical work on the drive, lock out and tag out all power sources to ensure safety.
6. Follow local safety regulations and guidelines when lifting heavy objects, especially when handling the drive.
7. Check the weight of the drive, which is provided on the outside of the shipping box.
8. If using lifting equipment, ensure it is in proper working condition and capable of safely lifting the weight of the drive.
9. Test lift the drive to verify the proper center of gravity lift point. Reposition if not level.
10. Only allow qualified personnel to perform installation, start-up, and maintenance tasks.
11. Stop the motor and disconnect all power sources, including permanent magnet type motors, before performing any service or repair work on the drive.
12. Wait for capacitors to fully discharge as indicated on the nameplate before proceeding with service or repair work.
13. Measure the voltage level to verify full discharge of capacitors.
14. Be aware that the motor may start at any time when the drive is connected to the AC mains or DC terminals, which can pose risks of injury and equipment or property damage.

Instructions

Safety and Installation Awareness

Before starting installation, read all safety guidelines and precautions in this installation guide. Additional documentation such as the product-specific operating guide, design guide, and programming guide, as well as the functional safety guides can be accessed by scanning the QR code on the front cover. PC tools and MyDrive® ecoSmart™ can be downloaded at www.danfoss.com.

Qualified Personnel

Only qualified personnel are allowed to install, commission, and maintain Danfoss drives. Qualified personnel are trained individuals who are familiar with and authorized to mount and wire the drive in accordance with pertinent laws and regulations. Also, qualified personnel must be familiar with the instructions and safety measures described in this installation guide.

Safety Symbols

The following symbols are used in this guide:

D A N G E R

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

W A R N I N G

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

C A U T I O N

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

Safety Precautions

WARNING

LACK OF SAFETY AWARENESS

This guide gives important information on preventing injury and damage to the equipment or the system. Ignoring this information can lead to death, serious injury, or severe damage to the equipment.

- Make sure to fully understand the dangers and safety measures present in the application.
- Before performing any electrical work on the drive, lock out and tag out all power sources to the drive.

LIFTING HEAVY LOAD

The drive is heavy. Lifting heavy objects incorrectly can result in death, injury, or property damage. Follow local safety regulations on lifting.

- Check the weight of the drive. The weight is provided on the outside of the shipping box.
- If lifting equipment is used, ensure that it is in proper working condition and can safely lift the weight of the drive.
- Test lift the drive to verify the proper center of gravity lift point. Reposition if not level.

HAZARDOUS VOLTAGE

AC drives contain hazardous voltage when connected to the AC mains or connected on the DC terminals. Failure to perform installation, start-up, and maintenance by qualified personnel can result in death or serious injury.

- Only qualified personnel must perform installation, start-up, and maintenance.

DISCHARGE TIME

The drive contains DC-link capacitors, which can remain charged even when the drive is not powered. High voltage can be present even when the warning indicator lights are off. Failure to wait the specified time after power has been removed before performing service or repair work can result in death or serious injury.

- Stop the motor.
- Disconnect all power sources, including permanent magnet type motors.
- Wait for capacitors to discharge fully. The discharge time is shown on the nameplate. See Illustration 1.
- Verify full discharge by measuring the voltage level.

UNINTENDED START

When the drive is connected to the AC mains or connected on the DC terminals, the motor may start at any time, causing risk of death, serious injury, and equipment or property damage.

- Stop the drive and motor before configuring parameters.
- Make sure that the drive cannot be started by external switch, a fieldbus command, an input reference signal from the control panel, or after a cleared fault condition.
- Disconnect the drive from the mains whenever safety considerations make it necessary to avoid unintended motor start.
- Check that the drive, motor, and any driven equipment are in operational readiness.

CAUTION

INTERNAL FAILURE HAZARD

An internal failure in the drive can result in serious injury when the drive is not properly closed.

- Ensure that all safety covers are in place and securely fastened before applying power.

W A R N I N G

ELECTRICAL SHOCK AND FIRE HAZARD

The drive can cause a DC current in the ground conductor. Failure to use a Type B residual current-operated protective device (RCD) can lead to the RCD not providing the intended protection which can result in death, fire, or other serious hazard.

- Use an RCD device.
- When an RCD is used for protection against electrical shock or fire, use only a Type B device on the supply side.

INDUCED VOLTAGE

Induced voltage from output motor cables that run together can charge equipment capacitors, even with the equipment turned off and locked out/tagged out. Failure to run output motor cables separately, or to use shielded cables, could result in death or serious injury.

- Run output motor cables separately or use shielded cables.
- Simultaneously lock out/tag out all the drives.

ELECTRICAL SHOCK HAZARD

Due to the stray capacitance of the shielded motor cable, the leakage currents exceed 3.5 mA. Failure to properly ground the drive can result in death or serious injury.

- Ensure that minimum size of the ground conductor complies with the local safety regulations for high touch current equipment.
- Use a reinforced ground conductor according to IEC 60364-5-54 cl. 543.7 or local safety regulations for equipment with leakage current >3.5 mA.
- For reinforced grounding:
 - Use a ground conductor with a cross-section of at least 10 mm² (8 AWG) Cu or 16 mm² (6 AWG) Al, or an extra ground conductor of the same cross-sectional area as the original ground conductor as specified by IEC 60364-5-54, with a minimum cross-sectional area of 2.5 mm² (14 AWG) mechanically protected or 4 mm² (12 AWG) not mechanically protected.
 - Use a ground conductor inside an enclosure or otherwise protected throughout its length against mechanical damage.
 - Use a ground conductor that is part of a multi-conductor power cable with a minimum PE conductor cross-section of 2.5 mm² (14 AWG) that is permanently connected or plugged in by an industrial connector. The multi-conductor power cable must be installed with an appropriate strain relief.

C A U T I O N

THERMISTOR INSULATION

Risk of personal injury or equipment damage.

- To meet PELV insulation requirements, use only thermistors with reinforced or double insulation.

N O T I C E

EXCESSIVE HEAT AND PROPERTY DAMAGE

Overcurrent can generate excessive heat within the drive. Failure to provide overcurrent protection can result in risk of fire and property damage.

- Use additional protective devices such as short-circuit protection or motor thermal protection between the drive and the motor for applications with multiple motors.
- Input fusing is required to provide short circuit and overcurrent protection. If fuses are not factory-supplied, the installer must provide them.

NOTICE

PROPERTY DAMAGE

Protection against motor overload is not active by default. The ETR function provides class 20 motor overload protection. Failure to set the ETR function means that motor overload protection is not provided and property damage can occur if the motor overheats.

- Enable the ETR function. See the application guide for more information.

Required Tools

- Lifting aid
- Tape measure
- Drill with assorted bits
- Screwdrivers (Torx, Phillips, slotted)
- Wrench with 7–17 mm sockets
- Socket extensions
- Sheet metal punch and/or pliers
- Wire crimper

Verifying the Shipment and the Contents

Make sure that the items supplied and the information on the nameplate located on the exterior of the enclosure match the order.

NOTICE

The type code is used in the fuse table. Write down the type code and serial number for future reference.



Illustration 1: Example of the Nameplate

1. Type code
2. Part number and serial number
3. Power rating
4. Input/output voltage, frequency, and current
5. Protection rating
6. Frame

EMC-compliant Installation

- For more information, refer to the product-specific operating guide and design guide.
- Use shielded cables for motor (unshielded cables in metal conduit are acceptable), brake, DC, and control wiring.

- Ensure that motor, brake, and DC cables are as short as possible to reduce the interference level from the entire system. Provide a minimum space of 200 mm (7.9 in) between mains input, motor cables, and control cables.
- Convey the currents back to the drive using a metal mounting plate. Ensure good electrical contact from the mounting plate through the mounting screws to the metal frame of the enclosure.
- If the shield connection points have a voltage potential difference, connect a low impedance equalizing wire parallel to the shielded cable.
- When using relays, control cables, a signal interface, fieldbus, or brake, connect the shield to the enclosure at both ends. If the ground path has high impedance, is noisy, or is carrying current, break the shield connection on one end to avoid ground current loops.

Installing the Drive

The installation location is important.

Full output current is available when the following installation conditions are met. For temperatures and altitudes outside this range, consult the Derating sections in the product-specific design guide.

- Maximum surrounding air temperature: 45 °C (113 °F) average over 24 hours and 50 °C (122 °F) for 1 hour.
- Minimum allowed surrounding air temperature: 0 °C (32 °F).
- Altitude < 1000 m (3280 ft) above sea level.

Procedure

1. Identify the enclosure size. See Illustration 1.

2. Identify any options that need extra wiring and setup by using the type code. See step 1 in the Illustrations section.

Scanning the QR code on the cover opens the documentation search page. Use the option number to search for related documentation. For example, use MCA 120 to search for VLT® PROFINET MCA 120 documentation.

3. Make sure that the operating environment and electrical installation meet the following requirements.

- Indoor unconditioned/pollution degree 2.
- Overvoltage category 3.

4. Review the wiring diagram. See step 2 in the Illustrations section.

All wiring must comply with local and national regulations regarding cross-section and ambient temperature requirements.

Loose connections can cause equipment faults or reduced performance. Tighten the terminals according to the proper torque value shown in step 9 in the Illustrations section.

5. Review the fuse specifications. See step 3 in the Illustrations section.

The drive may be suitable for use on a circuit capable of delivering up to 100 kA short-circuit current rating (SCCR) at 480/600 V. For circuit breaker and switch SCCR ratings, see the product-specific design guide.

6. Review the power cable specifications. See step 4 in the Illustrations section.

Use copper wire with a minimum 70 °C (158 °F) rating. For aluminum wire, see the product-specific design guide.

7. Install the drive following the numbered steps in the Illustrations section. Certain illustrations/steps pertain to specific enclosure sizes and are marked as such.

- Attach accessory bag components to the drive (step 5).
- Mount the drive on or against a solid, non-combustible mounting surface such as concrete or metal (step 6). Ensure proper cooling by providing minimum clearance above and below the drive.
- Create openings in the cable entry plate (step 7).

- Install the control wiring (step 8).
- Install the ground wiring, then the motor wiring, and then the mains wiring (step 9).
- Route the control cables (step 10)

8. Securely fasten the cover to the drive.

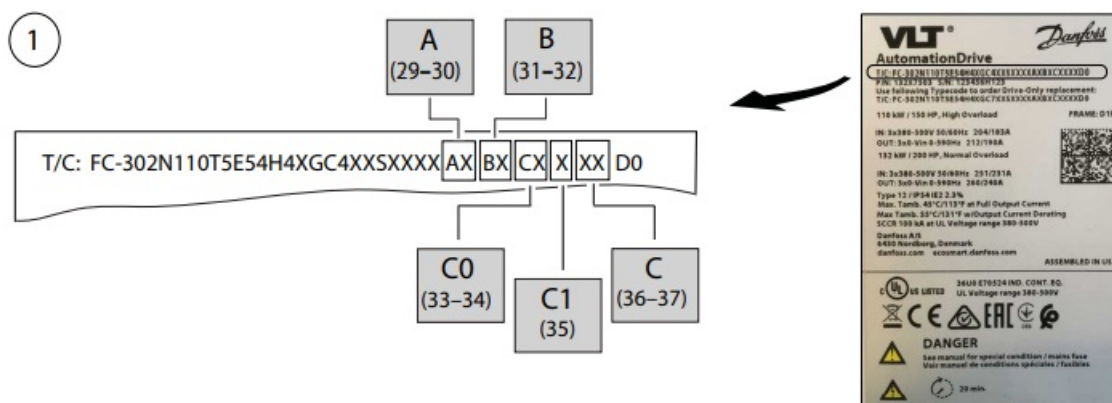
9. Perform initial drive and motor setup. Consult the product-specific programming guide.

Functional safety options require extra wiring and parameter configuration. See the specific functional safety operating guide, such as the Safe Torque Off Operating Guide, for more information on installing the safety option.

Power Losses and Efficiency

For power loss data including part load losses, see <https://ecosmart.mydrive.danfoss.com>.

Illustrations

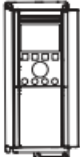






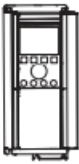


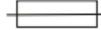
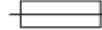
A (29–30)	
AX	–
A0	VLT® PROFIBUS DP V1 MCA 101
A4	VLT® DeviceNet MCA 104
A6	VLT® CANopen MCA 105
A8	VLT® EtherCAT/IP MCA 124
AG	VLT® LonWorks MCA 108
AJ	VLT® BACnet MCA 109
AK	VLT® BACnet/IP MCA 125
AL	VLT® PROFINET MCA 120
AN	VLT® EtherNet/IP MCA 121
AQ	VLT® POWERLINK MCA 122
AT	VLT® PROFIBUS Converter MCA 113
AU	VLT® PROFIBUS Converter MCA 114
AY	VLT® Powerlink MCA 123

B (31–32)	
BX	–
B0	VLT® Analog I/O Option MCB 109
B2	VLT® PTC Thermistor Card MCB 112
B4	VLT® Sensor Input MCB 114
B6	VLT® Safety Option MCB 150
B7	VLT® Safety Option MCB 151
B8	VLT® Safety Option MCB 152
BK	VLT® General Purpose I/O MCB 101
BP	VLT® Relay Card MCB 105
BR	VLT® Encoder Input MCB 102
BU	VLT® Resolver Input MCB 103
BY	VLT® Extended Cascade Controller MCO 101
BZ	VLT® Safe PLC I/O MCB 108

C1 (35)	
X	–
R	VLT® Extended Relay Card MCB 113
7	VLT® Sensorless Safety MCB 159

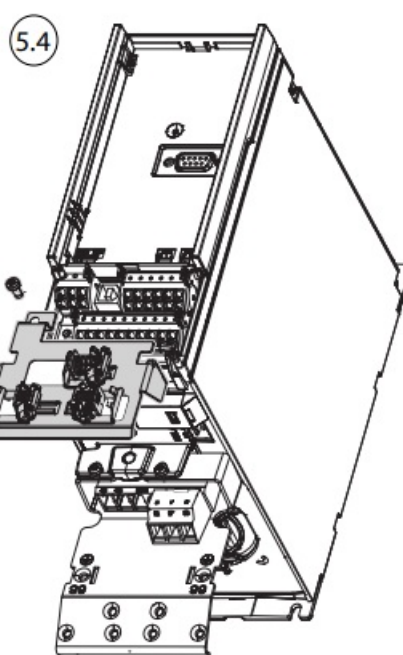
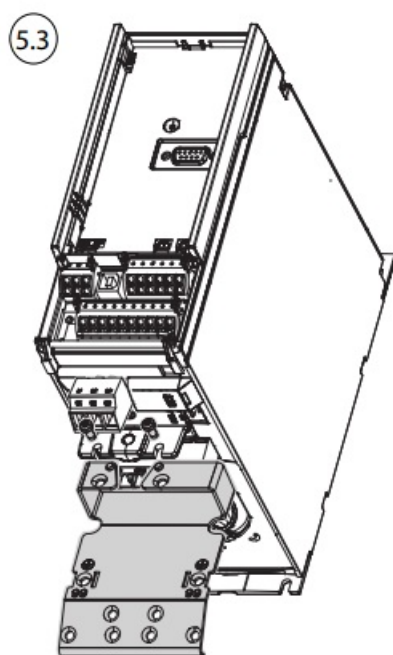
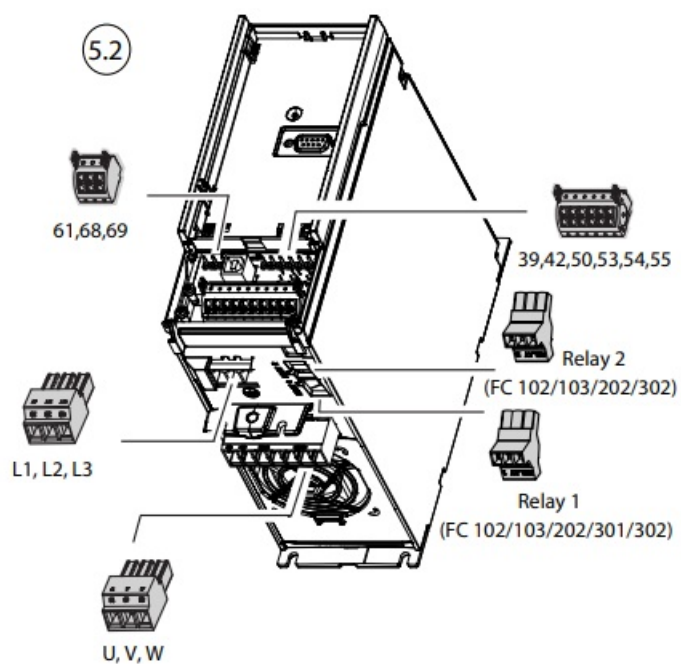
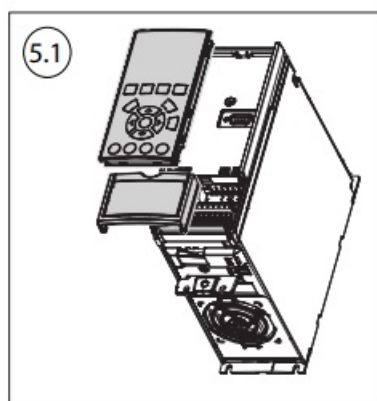
C0 (33–34) + C (36–37)	
CX_XX	–
C4_XX	VLT® Motion Control Option MCO 305
C4_10	VLT® Synchronizing Controller MCO 350
C4_11	VLT® Position Controller MCO 351

A		B	C			
		FC-302	FC-102/FC-103/FC-202	FC-302	FC-102/FC-103/FC-202	
		 IEC	 IEC	 UL	 UL	
T2	PK25	10 A, gG	–	5 A, T/J 5 A, CC	–	–
T2	PK37	10 A, gG	–	5 A, T/J 5 A, CC	–	–
T2	PK55	10 A, gG	–	10 A, T/J 10 A, CC	–	–
T2	PK75	10 A, gG	–	10 A, T/J 10 A, CC	–	–
T2	P1K1	10 A, gG	10 A, gG	10 A, T/J 10 A, CC	10 A, T/J	10 A, CC
T2	P1K5	10 A, gG	10 A, gG	15 A, T/J 15 A, CC	15 A, T/J	15 A, CC
T2	P2K2	16 A, gG	16 A, gG	20 A, T/J 20 A, CC	20 A, T/J	20 A, CC
T2	P3K0	16 A, gG	16 A, gG	25 A, T/J 25 A, CC	25 A, T/J	25 A, CC
T2	P3K7	20 A, gG	20 A, gG	30 A, T/J 30 A, CC	30 A, T/J	30 A, CC
T2	P5K5	25 A, gG	25 A, gG	50 A, T/J –	50 A, T/J	–
T2	P7K5	32 A, gG	32 A, gG	60 A, T/J –	50 A, T/J	–
T2	P11K	50 A, gG	32 A, gG	80 A, T/J –	60 A, T/J	–
T2	P15K	63 A, gG	50 A, gG	125 A, T/J –	80 A, T/J	–
T2	P18K	80 A, gG	63 A, gG	125 A, T/J –	125 A, T/J	–
T2	P22K	100 A, gG	80 A, gG	150 A, T/J –	125 A, T/J	–
T2	P30K	160 A, aR	125 A, aR	200 A, T/J –	150 A, T/J	–
T2	P37K	200 A, aR	160 A, aR	250 A, T/J –	200 A, T/J	–
T2	P45K	–	200 A, aR	–	250 A, T/J	–
T4/T5	PK25	10 A, gG	–	6 A, T/J 6 A, CC	–	–
T4/T5	PK37	10 A, gG	–	6 A, T/J 6 A, CC	–	–
T4/T5	PK55	10 A, gG	–	6 A, T/J 6 A, CC	–	–
T4/T5	PK75	10 A, gG	–	6 A, T/J 6 A, CC	–	–
T4/T5	P1K1	10 A, gG	10 A, gG	6 A, T/J 6 A, CC	6 A, T/J	6 A, CC
T4/T5	P1K5	10 A, gG	10 A, gG	10 A, T/J 10 A, CC	10 A, T/J	10 A, CC
T4/T5	P2K2	10 A, gG	16 A, gG	10 A, T/J 10 A, CC	10 A, T/J	10 A, CC
T4/T5	P3K0	10 A, gG	20 A, gG	15 A, T/J 15 A, CC	15 A, T/J	15 A, CC
T4/T5	P3K7	–	–	–	–	–
T4/T5	P4K0	16 A, gG	40 A, gG	20 A, T/J 20 A, CC	20 A, T/J	20 A, CC
T4/T5	P5K5	16 A, gG	50 A, gG	25 A, T/J 25 A, CC	25 A, T/J	25 A, CC
T4/T5	P7K5	16 A, gG	50 A, gG	30 A, T/J 30 A, CC	30 A, T/J	30 A, CC
T4/T5	P11K	40 A, gG	63 A, gG	40 A, T/J –	40 A, T/J	–
T4/T5	P15K	40 A, gG	100 A, gG	50 A, T/J –	40 A, T/J	–
T4/T5	P18K	50 A, gG	100 A, gG	60 A, T/J –	50 A, T/J	–
T4/T5	P22K	63 A, gG	100 A, gG	80 A, T/J –	60 A, T/J	–
T4/T5	P30K	80 A, gG	100 A, gG	100 A, T/J –	80 A, T/J	–
T4/T5	P37K	100 A, gG	100 A, gG	125 A, T/J –	100 A, T/J	–
T4/T5	P45K	160 A, gG	100 A, gG	150 A, T/J –	125 A, T/J	–
T4/T5	P55K	200 A, aR	100 A, gG	200 A, T/J –	150 A, T/J	–
T4/T5	P75K	250 A, aR	100 A, gG	250 A, T/J –	200 A, T/J	–
T4/T5	P90K	–	100 A, gG	–	250 A, T/J	–

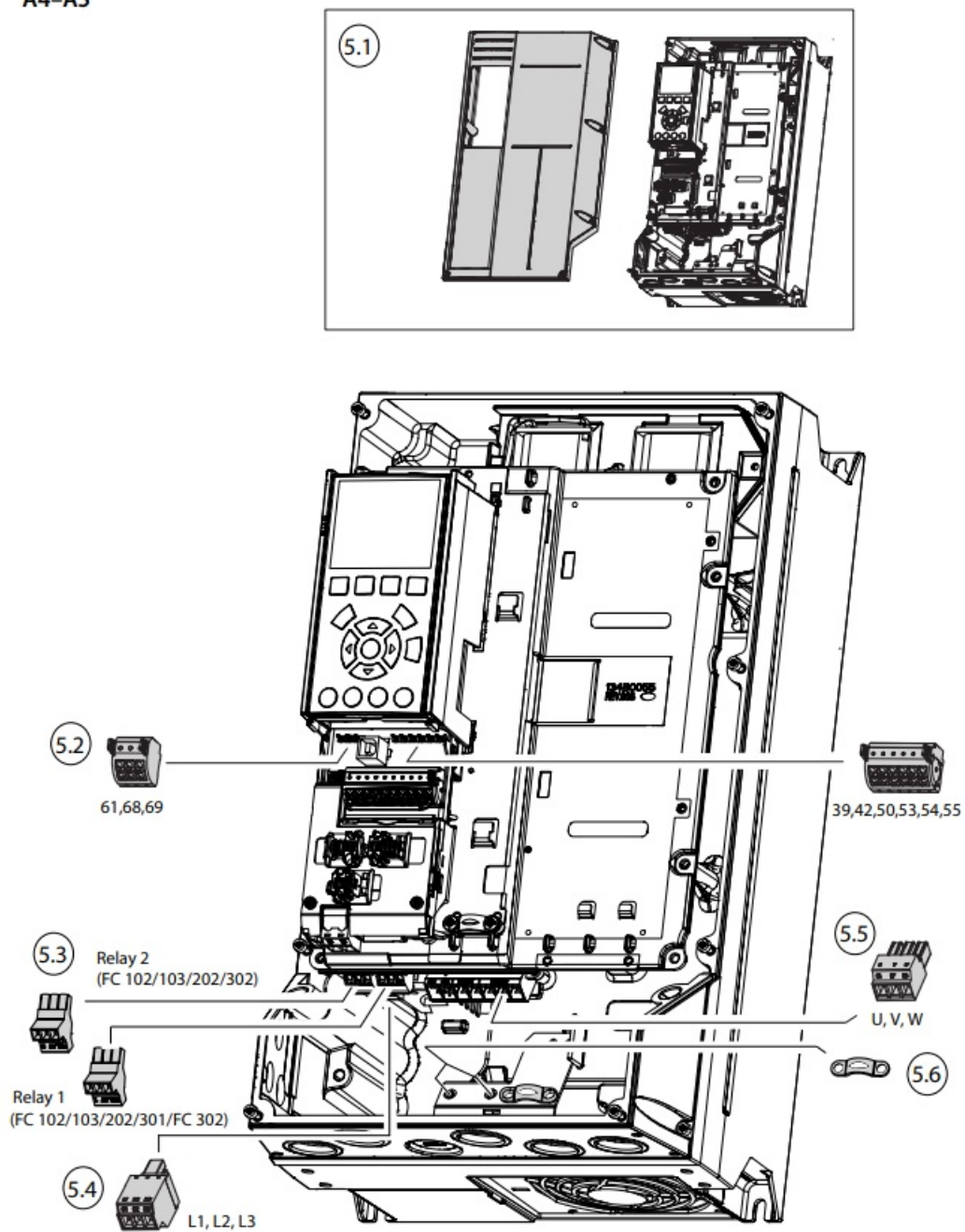
A		B	C			
		FC 302	FC 102/FC 103/FC 202	FC 302	FC 102/FC 103/FC 202	
		 IEC	 IEC	 UL	 UL	
T6	PK75	10 A, gG	–	–	5 A, T/J	5 A, CC
T6	P1K1	10 A, gG	10 A, gG	–	5 A, T/J	5 A, CC
T6	P1K5	10 A, gG	10 A, gG	–	10 A, T/J	10 A, CC
T6	P2K2	10 A, gG	10 A, gG	–	10 A, T/J	10 A, CC
T6	P3K0	10 A, gG	10 A, gG	–	15 A, T/J	15 A, CC
T6	P3K7	–	–	–	–	–
T6	P4K0	10 A, gG	10 A, gG	–	20 A, T/J	20 A, CC
T6	P5K5	10 A, gG	10 A, gG	–	25 A, T/J	25 A, CC
T6	P7K5	16 A, gG	16 A, gG	–	30 A, T/J	30 A, CC
T6	P11K	25 A, gG	25 A, gG	–	35 A, T/J	–
T6	P15K	32 A, gG	32 A, gG	–	35 A, T/J	–
T6	P18K	40 A, gG	32 A, gG	–	45 A, T/J	–
T6	P22K	50 A, gG	40 A, gG	–	50 A, T/J	–
T6	P30K	63 A, gG	50 A, gG	–	60 A, T/J	–
T6	P37K	63 A, gG	63 A, gG	–	80 A, T/J	–
T6	P45K	100 A, gG	100 A, gG	–	100 A, T/J	–
T6	P55K	160 A, aR	100 A, aR	–	125 A, T/J	–
T6	P75K	200 A, aR	200 A, aR	–	150 A, T/J	–
T6	P90K	–	200 A, aR	–	175 A, T/J	–
T7	PK25	–	–	–	–	–
T7	PK37	–	–	–	–	–
T7	PK55	–	–	–	–	–
T7	PK75	–	–	–	–	–
T7	P1K1	6 A, gG	6 A, gG	6 A, T/J	6 A, CC	6 A, T/J
T7	P1K5	6 A, gG	6 A, gG	10 A, T/J	10 A, CC	10 A, T/J
T7	P2K2	6 A, gG	6 A, gG	10 A, T/J	10 A, CC	10 A, T/J
T7	P3K0	10 A, gG	10 A, gG	15 A, T/J	15 A, CC	15 A, T/J
T7	P3K7	–	–	–	–	–
T7	P4K0	10 A, gG	10 A, gG	20 A, T/J	20 A, CC	20 A, T/J
T7	P5K5	16 A, gG	16 A, gG	25 A, T/J	25 A, CC	25 A, T/J
T7	P7K5	16 A, gG	16 A, gG	30 A, T/J	30 A, CC	30 A, T/J
T7	P11K	25 A, gG	25 A, gG	35 A, T/J	–	35 A, T/J
T7	P15K	32 A, gG	32 A, gG	45 A, T/J	–	35 A, T/J
T7	P18K	32 A, gG	32 A, gG	50 A, T/J	–	45 A, T/J
T7	P22K	40 A, gG	40 A, gG	60 A, T/J	–	50 A, T/J
T7	P30K	63 A, gG	63 A, gG	80 A, T/J	–	60 A, T/J
T7	P37K	63 A, gG	63 A, gG	100 A, T/J	–	80 A, T/J
T7	P45K	80 A, gG	80 A, gG	125 A, T/J	–	100 A, T/J
T7	P55K	100 A, gG	100 A, gG	150 A, T/J	–	125 A, T/J
T7	P75K	125 A, gG	125 A, gG	175 A, T/J	–	150 A, T/J
T7	P90K	–	–	–	–	175 A, T/J



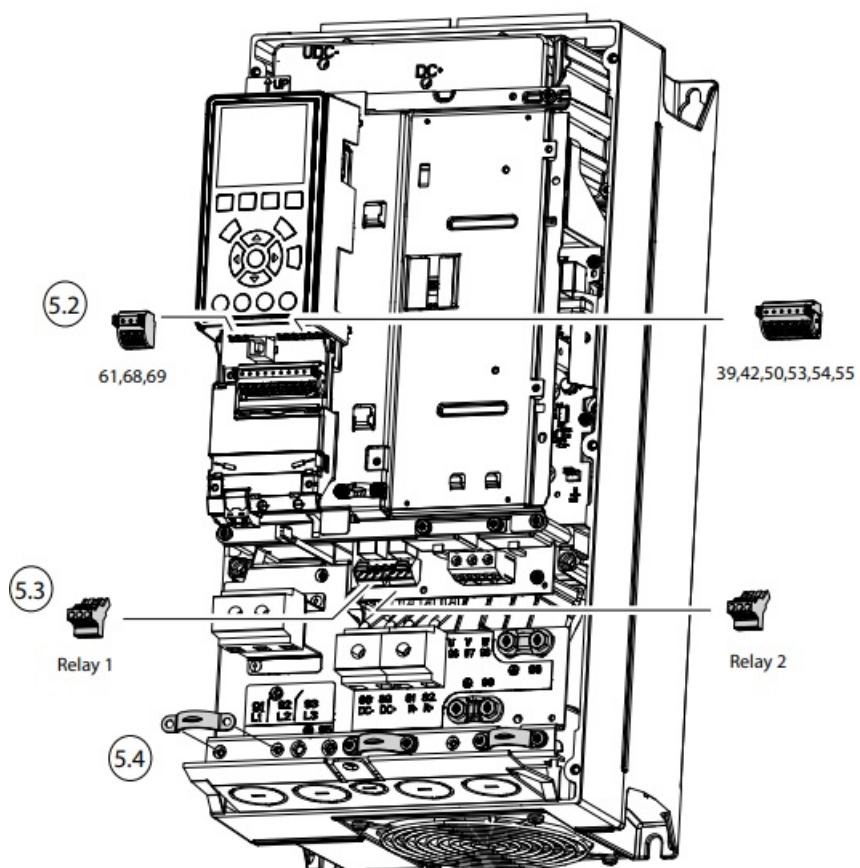
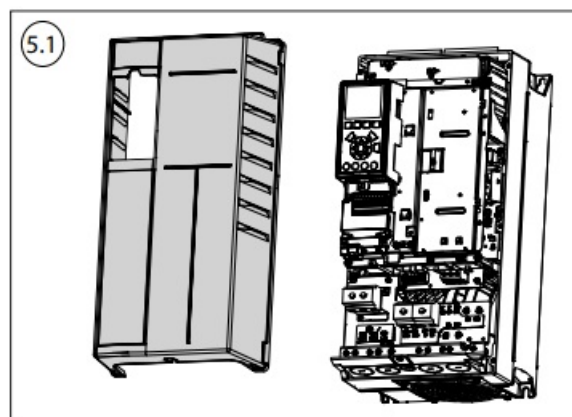
A1–A3



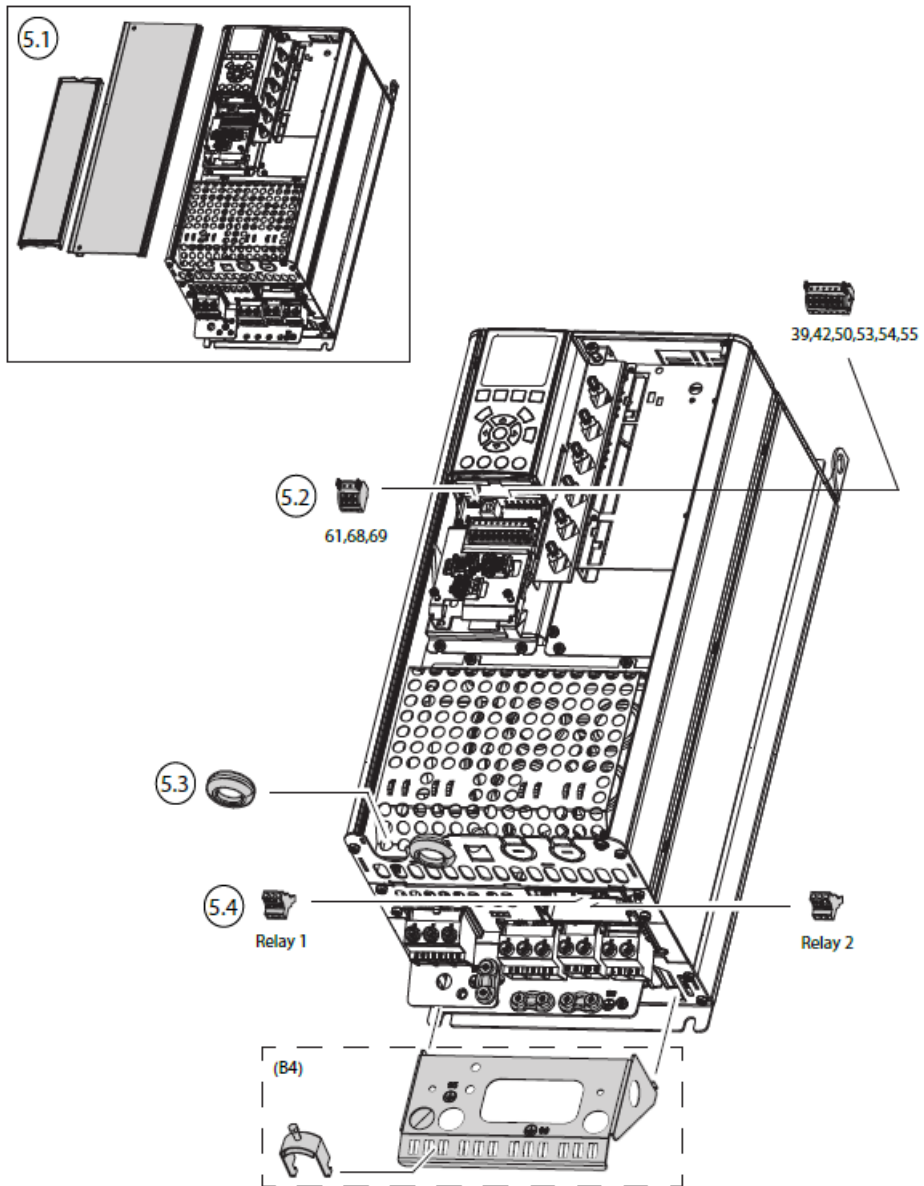
A4-A5



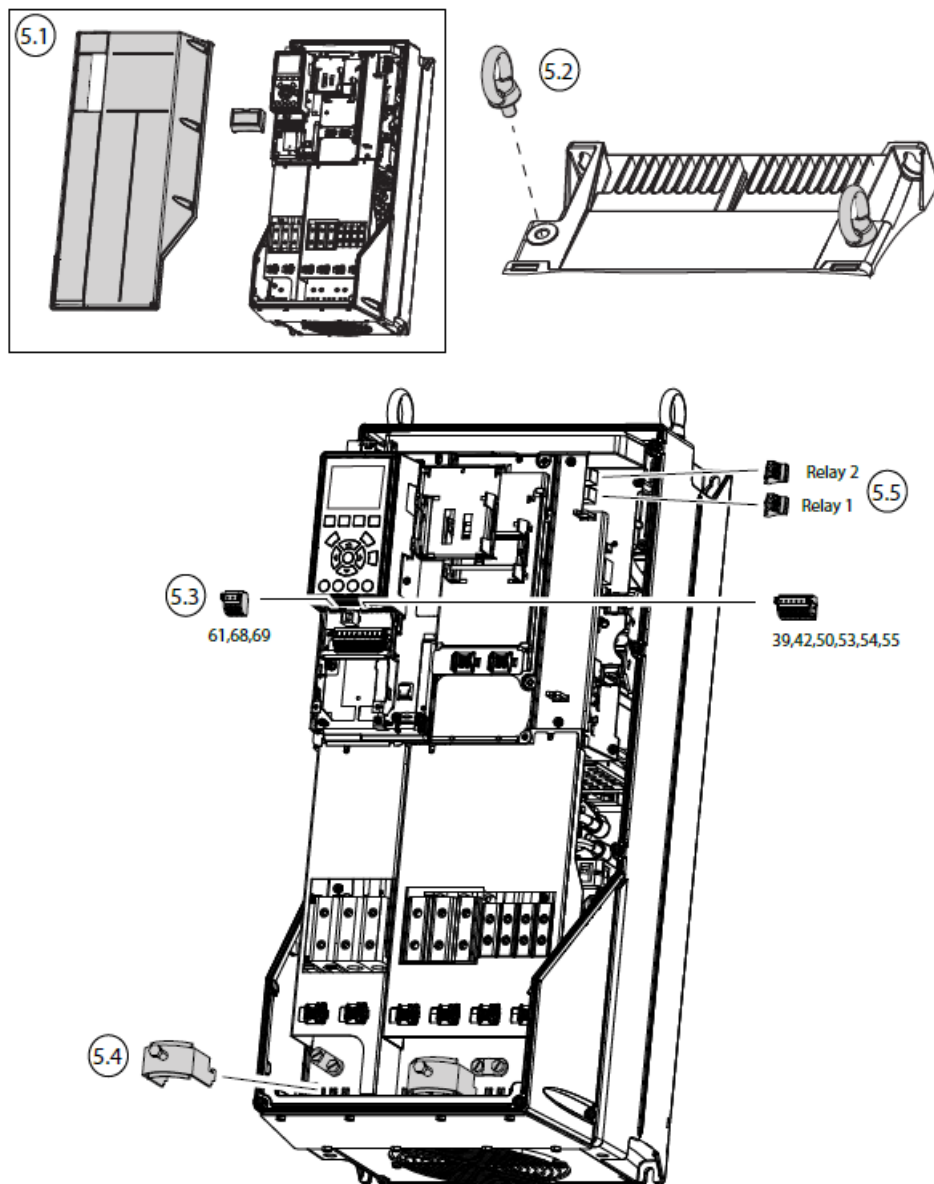
B1-B2



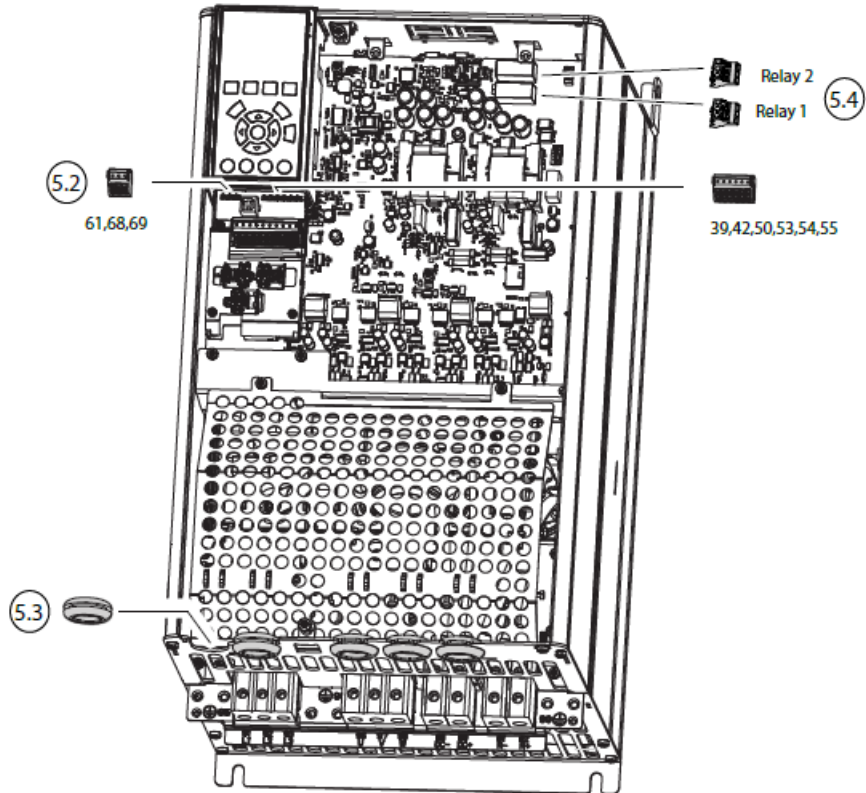
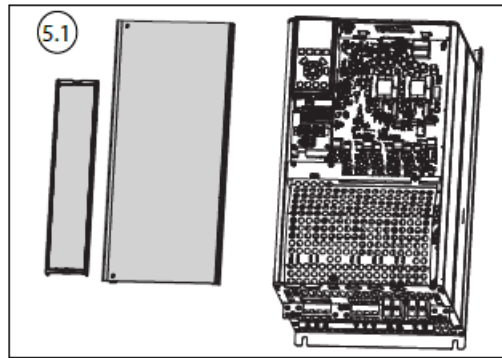
B3-B4




C1-C2




C3-C4

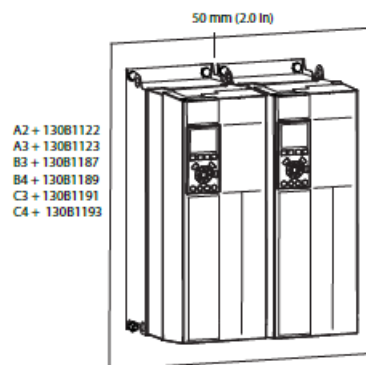
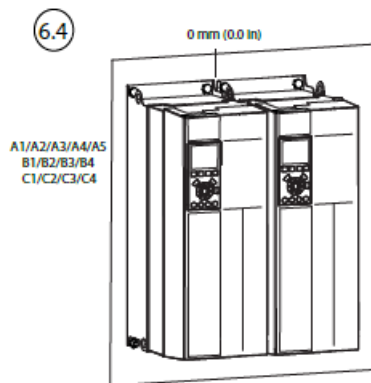
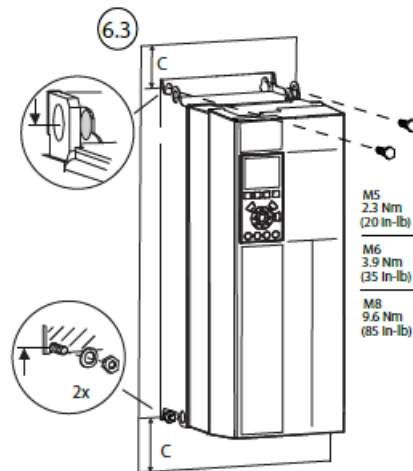
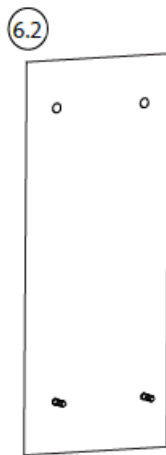
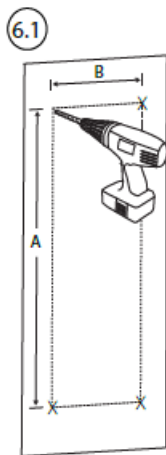


A1/A2/A3/A4/A5/B1/B2/B3/B4/C1/C2/C3/C4

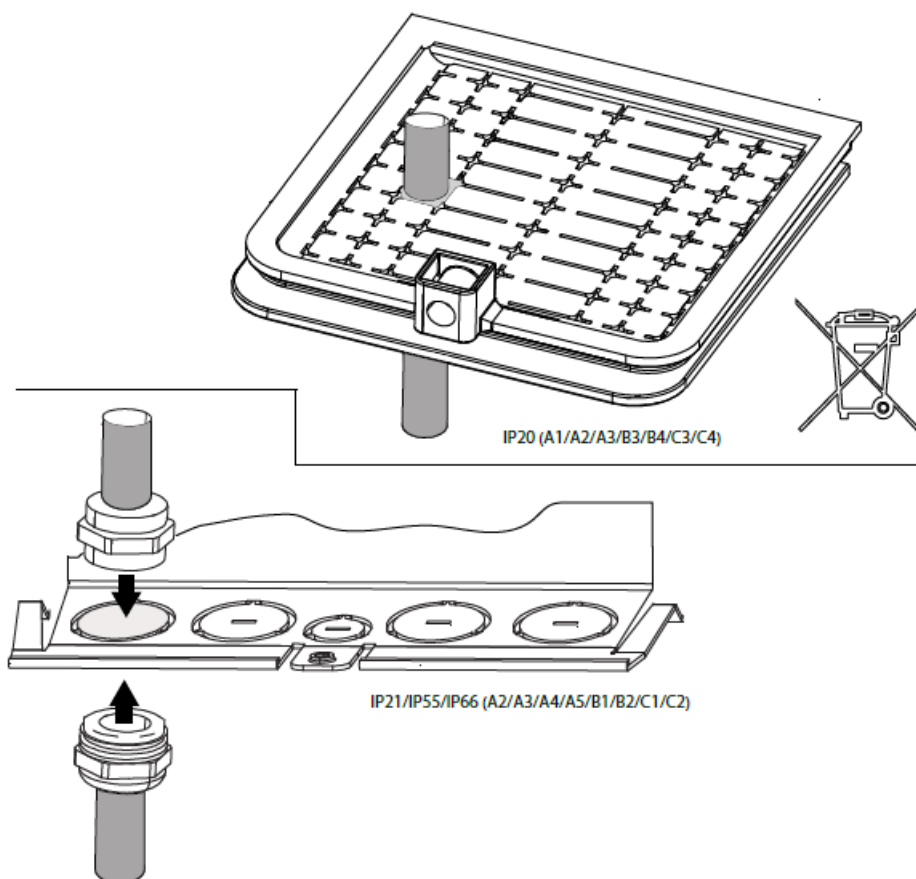
	A	B	C	
A1	190 (7.5)	60 (2.4)	100 (3.9)	4 x M5
A2	257 (10.1)	70 (2.8)	100 (3.9)	4 x M5
A3	257 (10.1)	110 (4.3)	10 (3.9)	4 x M5
A4	398 (15.7)	171 (6.7)	10 (3.9)	4 x M5
A5	402 (15.8)	215 (8.4)	100 (3.9)	4 x M5
B1	454 (17.8)	210 (8.3)	100 (3.9)	4 x M6
B2	624 (24.6)	210 (8.3)	200 (7.9)	4 x M6

	A	B	C	
B3	380 (14.9)	140 (5.5)	200 (7.9)	4 x M5
B4	495 (19.5)	200 (7.9)	200 (7.9)	4 x M5
C1	648 (25.5)	272 (10.7)	200 (7.9)	4 x M5
C2	727 (28.6)	339 (13.3)	225 (8.9)	4 x M5
C3	521 (20.5)	270 (10.6)	200 (7.9)	4 x M5
C4	631 (24.8)	330 (13.0)	225 (8.9)	4 x M6

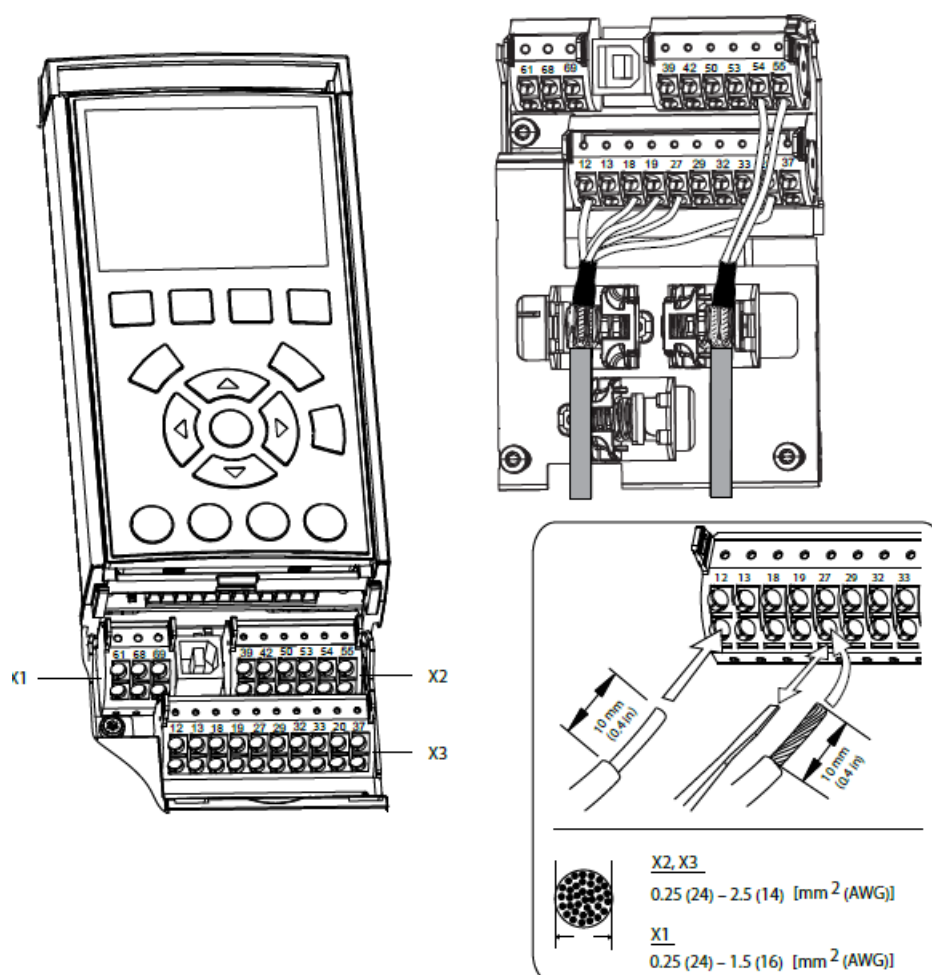
[mm (in)]



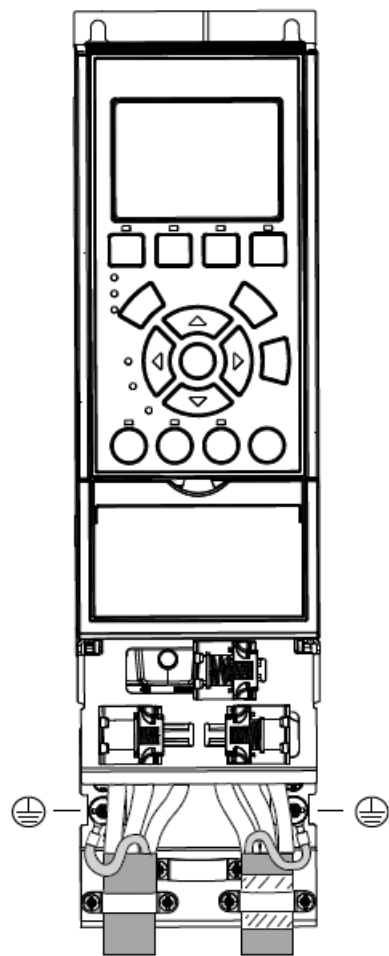
A1/A2/A3/A4/A5/B1/B2/B3/B4/C1/C2/C3/C4











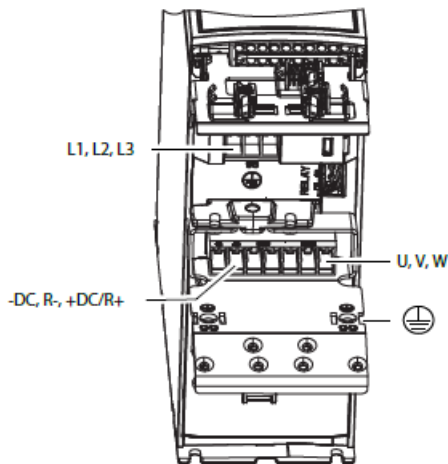
A1/A2/A3/A4/A5/B1/B2/B3/B4/C1/C2/C3/C4



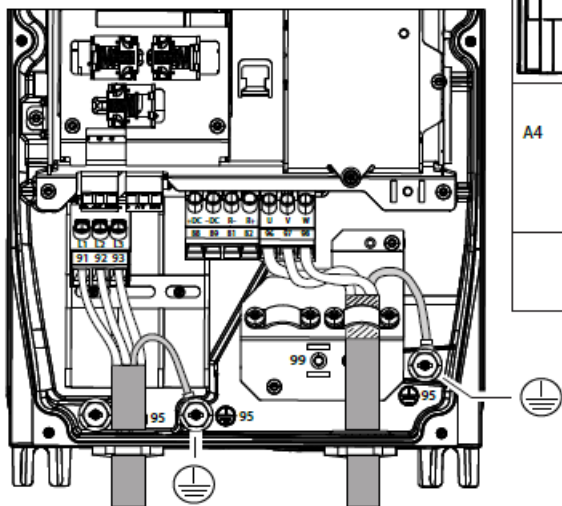
A1–A3









		
A1	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC/R+	2 Nm (124 in-lb)
	 	3 Nm (26 in-lb)
A2/A3	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC/R+	2 Nm (17 in-lb)
	 	3 Nm (26 in-lb)
 SL2/T20		

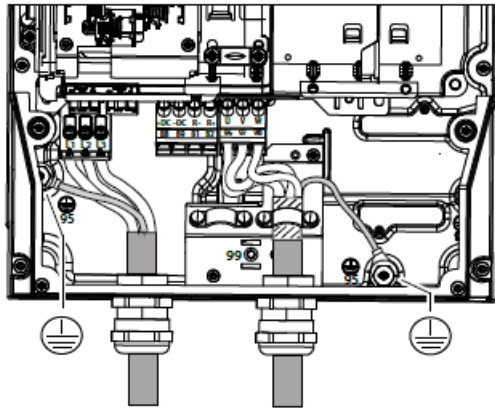






A4



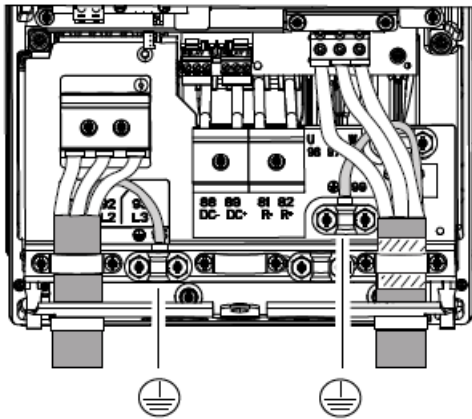
		
A4	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC, R+	2 Nm (17 in-lb)
	 	3 Nm (26 in-lb)
 SL2/T20		




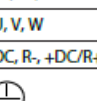
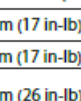


A5



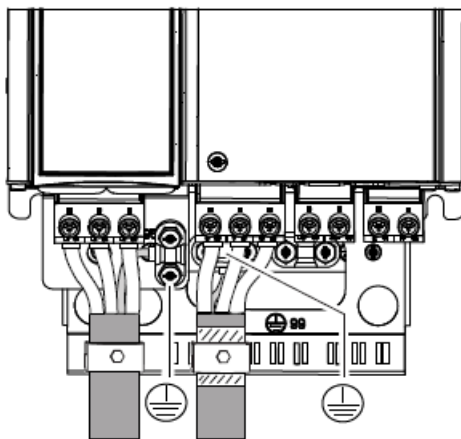
A5		
	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC/R+	2 Nm (124 in-lb)
		3 Nm (26 in-lb)
 SL2/T20		

B1–B2

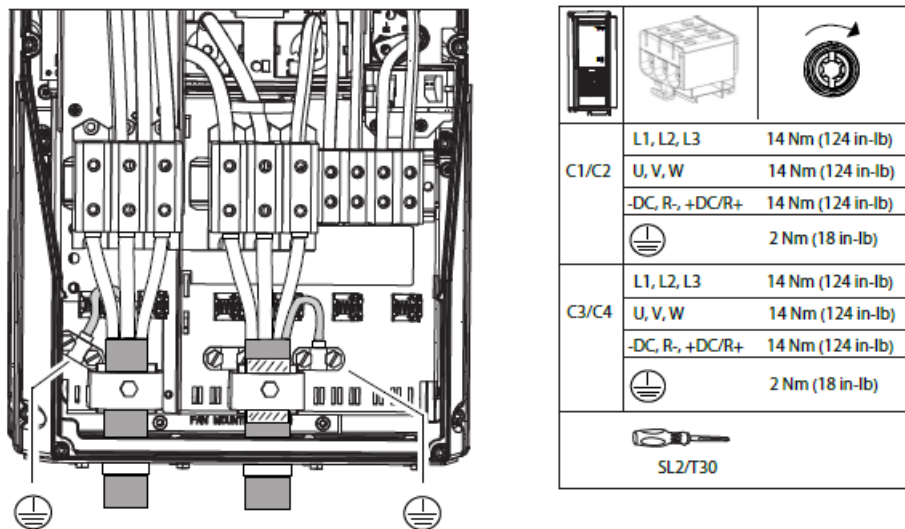


B1/B2		
	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC/R+	2 Nm (124 in-lb)
		3 Nm (26 in-lb)
B3/B4		
	L1, L2, L3	1.2–1.5 Nm (11–13 in-lb)
	U, V, W	2 Nm (17 in-lb)
	-DC, R-, +DC/R+	2 Nm (17 in-lb)
		3 Nm (26 in-lb)
 SL2/T20		

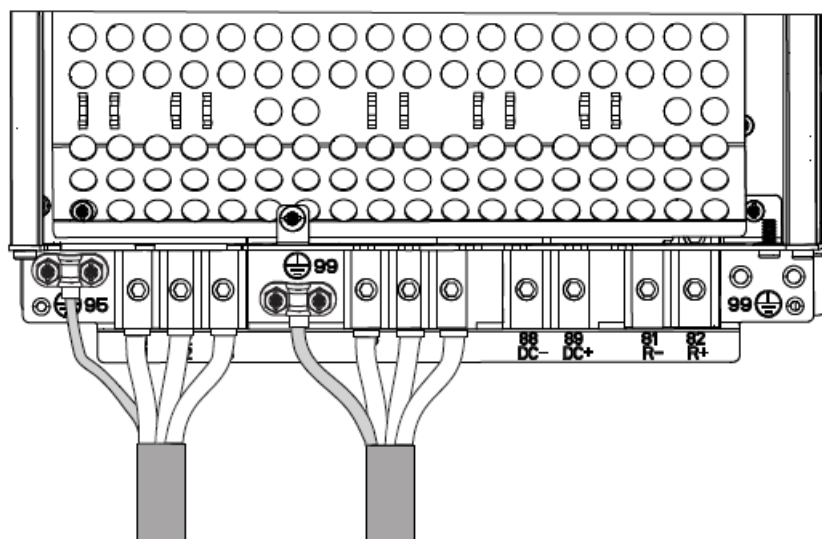
B3–B4



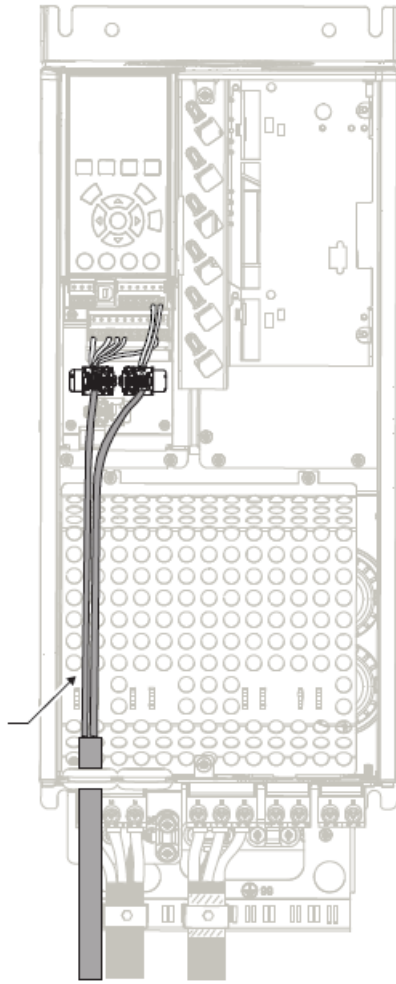
C1–C2



C3-C4



A1/A2/A3/A4/A5/B1/B2/B3/B4/C1/C2/C3/C4



Declaration of Conformity

VLT® HVAC Drive FC 102

EU DECLARATION OF CONFORMITY

Danfoss A/S
Danfoss Drives

declares under our sole responsibility that the

Product category: Frequency Converter

Type designation(s): FC-102XXXX*****

Character X: N or P

Character YYY: K37, K75, 1K1, 1K5, 2K2, 3K0, 3K7, 4K0, 5K5, 7K5, 11K, 15K, 18K, 22K, 30K, 37K, 45K, 55K, 75K, 90K, 110, 132, 150, 160, 200, 250, 315, 355, 400, 450, 500, 560, 630, 710, 800, 900, 1M0, 1M2, 1M4

Character ZZ: T2, T4, T6, T7

* may be any number or letter indicating drive options which do not impact this DoC.

The meaning of the 39 characters in the type code string can be found in appendix 00729776.

Covered by this declaration is in conformity with the following directive(s), regulation(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

Low Voltage Directive 2014/35/EU

EN61800-5-1:2007 + A1:2017 Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy.

EMC Directive 2014/30/EU

EN61800-3:2004 + A1:2012 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods.

RoHS Directive 2011/65/EU including amendment 2015/863.

EN IEC63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Date: 2017-05-25 Place of issue:	Issued by Signature:  Name: Martin Skov Holm Title: Head of PM - EU	Date: 2017-05-25 Place of issue:	Approved by Signature:  Name: Michael Qultzau Title: Head of PM&D, Denmark
Graasten, DK		Graasten, DK	

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ID No: 00730213

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Revision No: 1, 6

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Commission Regulation (EU) 2019/1781 under the Ecodesign Directive 2009/125/EC including amendment in Commission Regulation (EU) 2021/341

EN61800-9-2:2017

Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters.

For products including available Safe Torque Off (STO) function according to unit typecode on the nameplate: **X, B or R at character 18 of the typecode**. The following directives apply:

Machine Directive 2006/42/EC

EN/IEC 61800-5-2:2007
(Safe Stop function conforms with STO - Safe Torque Off, SIL 2 Capability)

Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional

Other standards considered:

EN ISO 13849-1:2015
(Safe Stop function, PL d
(MTTFd=14000 years, DC=90%, Category 3)
EN/IEC 61508-1:2011, EN/IEC 61508-2:2011
(Safe Stop function, SIL 2 (PFH = 1E-10/h, 1E-8/h for specific variants, PFD = 1E-10, 1E-4 for specific variants, SFF=99%, HFT=C))

Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design

Functional safety of electrical/electronic/programmable electronic safety-related systems
Part 1: General requirements

Part 2: Requirements for electrical/ electronic / programmable electronic safety-related systems
Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems

EN/IEC 62061:2005 + A1:2013 + A2:2015
(Safe Stop function, SILCL 2)

Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN/IEC 60204-1:2006 + A1:2009
(Stop Category 0)

For products including ATEX option, it requires STO function in the products. The products can have the VLT PTC Thermistor Card MCB112 installed from factory (**2 at character 32 in the typecode**), or it can be separately installed as an additional part.

2014/34/EU - Equipment for explosive atmospheres (ATEX)

EN50455: 2010

Safety devices required for safe functioning of equipment with respect to explosion risks.

Notified Body:

PTB Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig, has assessed the conformity of the "ATEX-certified motor thermal protection systems" of Danfoss FC VLT Drives with Safe Torque Off function and has issued the certificate PTB 14 ATEX 3009. The assembly covered by the certificate PTB 14 ATEX 3009 have been evaluated internally at Danfoss to be in compliance with 2014/34 EU.



ID No: 00730213

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VLT® Refrigeration Drive FC 103

EU DECLARATION OF CONFORMITY

Danfoss A/S
Danfoss Drives

declares under our sole responsibility that the

Product category: Frequency Converter

Type designation(s): FC-103XXXX*****

Character X: N or P

Character YYY: 1K1, 1K5, 2K2, 3K0, 3K7, 4K0, 5K5, 7K5, 11K, 15K, 18K, 22K, 30K, 37K, 45K, 55K, 75K, 90K, 110, 132, 160, 200, 250, 315, 400, 450, 500, 560, 630, 710, 800.

Character ZZ: T2, T4, T6, T7

* may be any number or letter indicating drive options which do not impact this DoC.

The meaning of the 39 characters in the type code string can be found in appendix 00729776.

Covered by this declaration is in conformity with the following directive(s), regulation(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

Low Voltage Directive 2014/35/EU

EN61800-5-1:2007 + A1:2017 Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy.

EMC Directive 2014/30/EU

EN61800-3:2004 + A1:2012 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods.

RoHS Directive 2011/65/EU including amendment 2015/863.

EN IEC63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Date: 2017-11-12 Place of issue:	Issued by Signature:  Name: Martin Skov Holm Title: Head of PM - EU	Date: 2017-11-12 Place of issue:	Approved by Signature:  Name: Michael Qultzau Title: Head of PM&D, Denmark
Graasten, DK		Graasten, DK	

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ID No: 00730214

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Revision No: A/7

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Classified as Business

Commission Regulation (EU) 2019/1781 under the Ecodesign Directive 2009/125/EC including amendment in Commission Regulation (EU) 2021/341

EN61800-9-2:2017

Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters.

For products including available Safe Torque Off (STO) function according to unit typecode on the nameplate: **X, B or R at character 18 of the typecode**. The following directives apply:

Machine Directive 2006/42/EC

EN/IEC 61800-5-2:2007
(Safe Stop function conforms with STO - Safe Torque Off, SIL 2 Capability)

Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional

Other standards considered:

EN ISO 13849-1:2015
(Safe Stop function, PL d
(MTTFd=14000 years, DC=90%, Category 3)
EN/IEC 61508-1:2011, EN/IEC 61508-2:2011
(Safe Stop function, SIL 2 (PFH = 1E-10/h, 1E-8/h for specific variants, PFD = 1E-10, 1E-4 for specific variants, SFF=99%, HFT=C))

Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design

Functional safety of electrical/electronic/programmable electronic safety-related systems
Part 1: General requirements

Part 2: Requirements for electrical/ electronic / programmable electronic safety-related systems
Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems

EN/IEC 62061:2005 + A1:2013 + A2:2015
(Safe Stop function, SILCL 2)

Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN/IEC 60204-1:2006 + A1:2009
(Stop Category 0)

For products including ATEX option, it requires STO function in the products. The products can have the VLT PTC Thermistor Card MCB112 installed from factory (**2 at character 32 in the typecode**), or it can be separately installed as an additional part.

2014/34/EU - Equipment for explosive atmospheres (ATEX)

EN50455: 2010

Safety devices required for safe functioning of equipment with respect to explosion risks.

Notified Body:

PTB Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig, has assessed the conformity of the "ATEX-certified motor thermal protection systems" of Danfoss FC VLT Drives with Safe Torque Off function and has issued the certificate PTB 14 ATEX 3009. The assembly covered by the certificate PTB 14 ATEX 3009 have been evaluated internally at Danfoss to be in compliance with 2014/34 EU.



ID No: 00730214

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Revision No: A/7

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VLT® Aqua Drive FC 202

<p style="text-align: center;">EU DECLARATION OF CONFORMITY Danfoss A/S Danfoss Drives</p> <p>declares under our sole responsibility that the</p> <p>Product category: Frequency Converter Type designation(s): FC-202XXXXXX*****</p> <p>Character X: N or P Character YYY: K25, K37, K55, K75, 1K1, 1K5, 2K2, 3K0, 3K7, 4K0, 5K5, 7K5, 11K, 15K, 18K, 22K, 30K, 37K, 45K, 55K, 75K, 90K, 110, 132, 150, 160, 200, 250, 315, 355, 40C, 450, 500, 560, 630, 710, 800, 900, 1M0, 1M2, 1M4 Character ZZ: S2, S4, T2, T4, T6, T7 * may be any number or letter indicating drive options which do not impact this DoC. The meaning of the 39 characters in the type code string can be found in appendix 00729776.</p> <p>Covered by this declaration is in conformity with the following directive(s), regulation(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.</p> <p>Low Voltage Directive 2014/35/EU EN61800-5-1:2007 + A1:2017 Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy.</p> <p>EMC Directive 2014/30/EU EN61800-3:2004 + A1:2012 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods.</p> <p>RoHS Directive 2011/65/EU including amendment 2015/863. EN IEC63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances</p>	<p style="text-align: center;">ENGINEERING TOMORROW</p> <p style="text-align: center;">Danfoss</p> <p>Danfoss A/S 6430 Nordborg Denmark CVR nr.: 20 14 57 15 Telephone: +45 7488 2222 Fax: +45 7449 8949</p>
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Date: 2021.03.25 Place of issue: Grasten, DK	Issued by: Name: Martin Skov Holm Title: Head of PM - EU	Date: 2021.03.25 Place of issue: Grasten, DK	Approved by: Name: Michael Quitau Title: Head of PM&D, Denmark
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<p>Commission Regulation (EU) 2019/1781 under the Ecodesign Directive 2009/125/EC including amendment in Commission Regulation (EU) 2021/341 EN61800-9-2:2017 Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters.</p> <p>For products including available Safe Torque Off (STO) function according to unit typecode on the nameplate: X, B or R at character 18 of the typecode. The following directives apply:</p> <p>Machine Directive 2006/42/EC EN/IEC 61800-5-2:2007 (Safe Stop function conforms with STO - Safe Torque Off, SIL 2 Capability) Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional</p> <p>Other standards considered: EN ISO 13849-1:2015 (Safe Stop function, PL d (MTTFd=14000 years, DC=90%, Category 3) EN/IEC 61508-1:2011, EN/IEC 61508-2:2011 (Safe Stop function, SIL 2 (PFH = 1E-10/h, 1E-8/h for specific variants, PFD = 1E-10, 1E-4 for specific variants, SFF>99%, HFT=0)) EN/IEC 62061:2005 + A1:2013 + A2:2015 (Safe Stop function, SILCL 2) EN/IEC 60204-1:2006 + A1:2009 (Stop Category 0) Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems Safety of machinery - Electrical equipment of machines - Part 1: General requirements</p> <p>For products including ATEX option, it requires STO function in the products. The products can have the VLT PTC Thermistor Card MCB112 installed from factory (2 at character 32 in the typecode), or it can be separately installed as an additional part.</p> <p>2014/34/EU - Equipment for explosive atmospheres (ATEX) EN50495: 2010 Safety devices required for safe functioning of equipment with respect to explosion risks.</p> <p>Notified Body: PTB Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig, has assessed the conformity of the ATEX certified motor thermal protection systems of Danfoss FC VLT Drives with Safe Torque Off function and has issued the certificate PTB 14 ATEX 3009. The assembly covered by the certificate PTB 14 ATEX 3009 have been evaluated internally at Danfoss to be in compliance with 2014/34 EU.</p>	<p style="text-align: center;">ENGINEERING TOMORROW</p> <p style="text-align: center;">Danfoss</p> <p>Danfoss A/S 6430 Nordborg Denmark CVR nr.: 20 14 57 15 Telephone: +45 7488 2222 Fax: +45 7449 8949</p>
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Date: 2021.03.25 Place of issue: Grasten, DK	Issued by: Name: Martin Skov Holm Title: Head of PM - EU	Date: 2021.03.25 Place of issue: Grasten, DK	Approved by: Name: Michael Quitau Title: Head of PM&D, Denmark
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FC 100000000 with MCB 112 PTC Motor protection mode PTB 14 ATEX 3009

CAUTION: See manual for operational instructions

B 20 050 + d (Ex d) Ex d

P 20 050 + d (Ex d) Ex d

Label above must be placed visible on this drive

Classified as Business

VLT® AutomationDrive FC 301

<p style="text-align: center;">EU DECLARATION OF CONFORMITY Danfoss A/S Danfoss Drives</p> <p>declares under our sole responsibility that the</p> <p>Product category: Frequency Converter Type designation(s): FC-301XXXXXX*****</p> <p>Character XXX: K25, K37, K55, K75, 1K1, 1K5, 2K2, 3K0, 3K7, 4K0, 5K5, 7K5, 11K, 15K, 18K, 22K, 30K, 37K, 45K, 55K, 75K Character YY: T2, T4 * may be any number or letter indicating drive options which do not impact this DoC. The meaning of the 39 characters in the type code string can be found in appendix 00729776.</p> <p>Covered by this declaration is in conformity with the following directive(s), regulation(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.</p> <p>Low Voltage Directive 2014/35/EU EN61800-5-1:2007 + A1:2017 Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy.</p> <p>EMC Directive 2014/30/EU EN61800-3:2004 + A1:2012 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods.</p> <p>RoHS Directive 2011/65/EU including amendment 2015/863. EN IEC63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances</p>	<p style="text-align: center;">ENGINEERING TOMORROW</p> <p style="text-align: center;">Danfoss</p> <p>Danfoss A/S 6430 Nordborg Denmark CVR nr.: 20 14 57 15 Telephone: +45 7488 2222 Fax: +45 7449 8949</p>
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Date: 2021.03.25 Place of issue: Grasten, DK	Issued by: Name: Martin Skov Holm Title: Head of PM - EU	Date: 2021.03.25 Place of issue: Grasten, DK	Approved by: Name: Michael Quitau Title: Head of PM&D, Denmark
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ID No: 00730216 Revision No: A, 6 Page 1 of 4
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Classified as Business

<p>Commission Regulation (EU) 2019/1781 under the Ecodesign Directive 2009/125/EC including amendment in Commission Regulation (EU) 2021/341 EN61800-9-2:2017 Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters.</p> <p>For products including available Safe Torque Off (STO) function according to unit typecode on the nameplate: T at character 18 of the typecode. The following directives apply:</p> <p>Machine Directive 2006/42/EC EN/IEC 61800-5-2:2007 (Safe Stop function conforms with STO - Safe Torque Off, SIL 2 Capability) Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional</p> <p>Other standards considered: EN ISO 13849-1:2015 (Safe Stop function, PL d (MTTFd=14000 years, DC=90%, Category 3) EN/IEC 61508-1:2011, EN/IEC 61508-2:2011 (Safe Stop function, SIL 2 (PFH = 1E-10/h, 1E-8/h for specific variants, PFD = 1E-10, 1E-4 for specific variants, SFF>99%, HFT=0)) EN/IEC 62061:2005 + A1:2013 + A2:2015 (Safe Stop function, SILCL 2) EN/IEC 60204-1:2006 + A1:2009 (Stop Category 0) Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems Safety of machinery - Electrical equipment of machines - Part 1: General requirements</p> <p>Further information can be found in manufacturers declarations: EU Declaration of conformity 00730213 A.1, 00730215 A.1 and 00730217 A.1 or newer / Manufacturers declaration 00596226 A.9 or newer.</p>	<p style="text-align: center;">ENGINEERING TOMORROW</p> <p style="text-align: center;">Danfoss</p> <p>Danfoss A/S 6430 Nordborg Denmark CVR nr.: 20 14 57 15 Telephone: +45 7488 2222 Fax: +45 7449 8949</p>
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Danfoss only vouches for the correctness of the English version of this declaration. In the event of the declaration being translated into any other language, the translator concerned shall be liable for the correctness of the translation.

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Documents / Resources

	<p>Danfoss A1-A5 VLT Frequency Converters [pdf] Installation Guide A1 A5, B1 B4, C1 C4, A1 A5 VLT Frequency Converters, A1 A5, VLT Frequency Converters, Frequency Converters, Converters</p>
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References

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