Safety Guide

VLT® Flow Drive FC 111

1 Safety Instructions

1.1 Overview

This Safety Guide only provides general safety precautions for the drive. When operating or programming the drive, refer to the Operating Guide or Programming Guide for applicable safety instructions.

Make sure that all personnel working on or with the drive have read and understood this guide and any additional product manuals. Contact Danfoss if you are unclear of the given information, or if you are missing information.

1.2 Target Group and Necessary Qualifications

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the AC drive. Only **skilled personnel** are allowed to perform all related activities for these tasks. Skilled personnel are defined as properly trained staff, who are familiar with and authorized to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Also, the skilled personnel must be familiar with the instructions and safety measures described in this manual and the other product-specific manuals. If you are not a skilled electrician, do not perform any electrical installation, and troubleshooting activities.

Only **Danfoss authorized**, skilled personnel are allowed to repair this equipment. Further training is required to perform the activities related to repair.

1.3 Safety Symbols

⚠ 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).

1.4 General Safety Precautions

⚠ WARNING

LACK OF SAFETY AWARENESS

This document gives important information on how to prevent injury and damage to the equipment or the system. Ignoring them can lead to death, serious injury, or severe damage to the equipment.

- Make sure to fully understand the dangers and safety measures incurred in the application.

⚠ WARNING

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 skilled personnel can result in death or serious injury.

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

⚠ WARNING ⚠

UNINTENDED START

When the drive is connected to AC mains, DC supply, or load sharing, the motor may start at any time. Unintended start during programming, service, or repair work can result in death, serious injury, or property damage. Start the motor with an external switch, a fieldbus command, an input reference signal from the local control panel (LCP), via remote operation using MCT 10 software, or after a cleared fault condition.

- Disconnect the drive from the mains.
- Press [Off/Reset] on the LCP before programming parameters.
- Ensure that the drive is fully wired and assembled when it is connected to AC mains, DC supply, or load sharing.

⚠ WARNING ⚠

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 could result in death or serious injury.

- Stop the motor.
- Disconnect AC mains, permanent magnet type motors, and remote DC-link supplies, including battery back-ups, UPS, and DC-link connections to other drives.
- Wait for the capacitors to discharge fully. The minimum waiting time is specified in the table *Discharge time* and is also visible on the nameplate on top of the drive.
- Before performing any service or repair work, use an appropriate voltage measuring device to make sure that the capacitors are fully discharged.

Table 1: Discharge Time

Voltage [V]	Power range [kW (hp)]	Minimum waiting time (minutes)
3x400	0.37–7.5 (0.5–10)	4
3x400	11–90 (15–125)	15
3x400	110–315 (150–450)	20

⚠ WARNING ⚠

EQUIPMENT HAZARD

Contact with rotating shafts and electrical equipment can result in death or serious injury.

- Ensure that only trained and qualified personnel perform installation, start-up, and maintenance.
- Ensure that electrical work conforms to national and local electrical codes.

⚠ 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.

1.5 Lifting the Drive

NOTICE

LIFTING HEAVY LOAD

The weight of **high power drive** is heavy and failure to follow local safety regulations for lifting heavy weights may cause death, personal injury, or property damage.

- Ensure that the lifting equipment is in proper working condition.
- Check the weight from the **Operating Guide** of the drive and verify that the lifting equipment can safely lift the weight.
- The angle from the top of the drive module to the lifting cables affects the maximum load force on the cable. This angle must be 65° or greater.
- Attach and dimension the lifting cables properly.
- Test lift the unit approximately 610 mm (24 in) to verify the proper center of gravity lift point. Reposition if not level.
- Never walk under suspended loads.
- To guard against injury, wear personal protective equipment such as gloves, safety glasses, and safety shoes.

1.6 Electrical Installation Precautions

Before you do electrical work on the drive, lock out and tag out the power source to the drive.

⚠ WARNING ⚠

SHOCK HAZARD

The unit can cause a DC current in the PE conductor. Failure to use a Type B residual current-operated protective device (RCD) may lead to the RCD not providing the intended protection and therefore may result in death or serious injury.

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

⚠ WARNING ⚠

INDUCED VOLTAGE

Induced voltage from output motor cables that run together can charge equipment capacitors, even with the equipment turned off and locked 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 all the drives.

⚠ WARNING

LEAKAGE CURRENT HAZARD

Leakage currents exceed 3.5 mA. Failure to ground the drive properly can result in death or serious injury.

- Ensure that the minimum size of the ground conductor complies with the local safety regulations for high touch current equipment.

NOTICE

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.

- Additional protective devices such as short circuit protection or motor thermal protection between drive and motor is required 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. See the Operating Guide for fuse specifications.

NOTICE

WIRE TYPE AND RATINGS

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

– Power connection wire recommendation: Minimum 75 °C (167 °F) rated copper wire. See the Operating Guide for recommended wire sizes and types.

1.7 Safe Operation

When operating the unit, refer to the Operating Guide and Programming Guide for guidance and all applicable safety instructions.

- The drive is not suitable as the only safety device in the system. Make sure that additional monitoring and protection devices on drives, motors, and accessories are installed according to the regional safety guidelines and accident prevention regulations.
- Keep all doors, covers, and terminal boxes closed and securely fastened during operation.

1.8 Technical Documentation

Other online resources are available to understand operating and programming of the AC drive, scan the QR code to download.

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