

ENGINEERING
TOMORROW



Safety Guide

iC7 Series Frequency Converters

Installation Safety



drives.danfoss.com | **iC7**

1 Installation Safety

1.1 Safety Overview

To install the product safely:

- Check that the content of the delivery is correct and complete.
- Never install or start up damaged units. If there are signs of damage, immediately contact the shipping company to file a complaint.
- Follow the instructions in this guide and the specific product guides.
- Make sure that all personnel working on or with the product have read and understood this guide and any additional product guides. Contact if the given information is unclear, or information is missing.
- There can be sharp edges in the product that can cause cuts. Be careful to avoid injuries and wear the appropriate safety equipment during mounting, cabling, or maintenance operations.

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 products. Only qualified personnel are allowed to perform all related activities for these tasks. Qualified 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 qualified personnel must be familiar with the instructions and safety measures described in this guide and other relevant guides. Non-qualified electricians are not allowed to perform any electrical installation or troubleshooting activities.

Only authorized, qualified personnel are allowed to repair this equipment. Specialized training is required to perform the activities related to repair.

1.3 Safety Symbols

The following symbols are used in this guide:

	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 Considerations

	WARNING
	LACK OF SAFETY AWARENESS This guide provides 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.

 WARNING

ELECTRIC SHOCK

Drives contain hazardous voltage when a power source is connected to AC or DC terminals. Failure to disconnect all power sources can result in death or serious injury.

- Before performing any electrical work on the drive, disconnect, lock out, and tag out all power sources to the drive.
- Review the wiring diagram in the installation guide.

 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 can result in death or serious injury.

- Stop the motor.
- Disconnect all input and output power sources of the drive (for example permanent magnet type motors, batteries, or DC-link connections to other drives).
- Wait for the capacitors to discharge fully. The discharge time is shown on the exterior of the drive.
- Measure the voltage level to verify full discharge.

 WARNING
UNINTENDED START

When the drive is connected to a power source, the system 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 an external switch, a fieldbus command, an input reference signal from the control panel, or after a cleared fault condition.
- Disconnect the drive from the power source whenever safety considerations make it necessary to avoid an unintended 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.

1.5 Lifting the Drive

WARNING

LIFTING HEAVY LOADS

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

- Follow local safety regulations on lifting.
- Use a lifting device that is in proper working condition and appropriate for the weight of the load.
- Secure the lifting area.
- Test lift the load to verify the proper center of gravity. Reposition the lifting point if not level.
- Do not walk under, or place any part of your body under a suspended load.

1.6 Electrical Installation Precautions

WARNING



ELECTRICAL SHOCK AND FIRE HAZARD

The drive can cause a DC current in the PE conductor. Failure to use a Type B residual current-operated device (RCD) can lead to death or serious injury.

- Use a Type B residual current-operated device (RCD) on the supply side.

WARNING

INDUCED VOLTAGE

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

- Install output motor cables in separate conduits or use shielded cables.

WARNING



ELECTRICAL SHOCK HAZARD - HIGH LEAKAGE CURRENT

Leakage currents exceed 3.5 mA. Failure to connect drive properly to protective earth may result in death or serious injury.

- Ensure reinforced protective earthing (PE) conductor according to IEC 60364-5-54 cl. 543.7 or local safety regulations for equipment with leakage current >3.5 mA.
- PE conductor with a cross-section of at least 10 mm² Cu or 16 mm² Al, or an additional PE conductor of the same cross-sectional area as the original PE conductor as specified by IEC 60364-5-54, with a minimum cross-sectional area of 2.5 mm² (mechanical protected) or 4 mm² (not mechanical protected).
- PE conductor completely enclosed within an enclosure or otherwise protected throughout its length against mechanical damage.
- PE conductor that is part of a multi-conductor power cable with a minimum PE conductor cross-section of 2.5 mm² (permanently connected or plugged in by an industrial connector). The multi-conductor power cable must be installed with an appropriate strain relief.

WARNING

OVERHEATED CABLES HAZARD

Incorrect cable installation or environmental conditions can cause cables to overheat. Overheated cables are a fire hazard.

- Use overload protection. The drive system is equipped with an internal overcurrent protection that can be used for upstream overload protection.
- Perform overcurrent protection according to local regulations.
- Use fuses or circuit breakers to provide overcurrent protection.
- Use symmetrical power cabling with power units connected in parallel. Each power unit must have the same number of cables with an equal cross-section and equal length.
- Install cables according to local regulations and IEC/EN standards.

CAUTION

THERMISTOR INSULATION

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

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.

- Other 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 installation guide for fuse specifications.

NOTICE

MOTOR 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.

1.7 Safe Operation

The drive is not suitable as the only safety device in the system. Make sure that all needed extra monitoring and protection devices on drives, motors, and accessories are installed according to the regional safety guidelines and accident prevention regulations.

- Before activating any automatic fault reset functions or changing limit values, make sure that no dangerous situations can occur after restart. If the autoreset function is activated, the device connected to the drive output starts automatically after an automatic fault reset.
- Close and securely fasten all doors, covers, terminal boxes during drive operation or when the drive is connected to power.
- Drive components and accessories can still be live and connected to AC or DC supply, even after the operation indicators are no longer illuminated.

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Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalog descriptions, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogs, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the product. All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.

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