

# Danfoss VLT<sup>®</sup> Drives Product Overview

Our products for your applications



# Product overview

## VLT® HVAC Drive FC 102

The ideal choice for fan and pump applications in modern buildings. The drive offers maximum flexibility in installation, bus connections and control intelligence.

### HVAC Inside

Perfectly engineered for building automation with intelligent HVAC functions.

### Optimal EMC protection

Standard integrated chokes and high-quality RFI filters ensure interference-free operation at all times.

### EC+

The intelligent VVC+ PM control principle enables the use of permanent magnet motors with an efficiency equal to or better than EC technology.

### Power range

3 x 200 – 240 V ..... 1.1 – 45 kW  
 3 x 380 – 480 V ..... 1.1 – 1000 kW  
 3 x 525 – 600 V ..... 1.1 – 90 kW  
 3 x 525 – 690 V ..... 45 – 1400 kW

### Fieldbus

RS 485	USB	BAC	PB	PN
DN	LON	BAC	MOD	TCP
EIP				

### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	■
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■	■	■

## VLT® Refrigeration Drive FC 103

Optimized to control compressors, pumps and fans for significant energy savings in refrigerating plants, whilst prolonging the service life of components.

### Improving COP (Coefficient of performance)

Intelligent power adjustment increases system stability and optimises the volumetric efficiency of the evaporator.

### Refrigeration terminology

The use of refrigeration terminology allows quick and easy configuration.

### Variable speed drive as standard

The combination of speed-controlled and mains-operated compressors enables the design of low-wear and energy-efficient systems.

### Power range

3 x 200 – 240 V ..... 1.1 – 45 kW  
 3 x 380 – 480 V ..... 1.1 – 315 kW  
 3 x 525 – 600 V ..... 1.1 – 90 kW

### Fieldbus

RS 485	USB	MOD	AKD
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### Enclosure

IP 00	IP 20	IP 21/Type 1
	■	■
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■	■	■

## VLT® AQUA Drive FC 202

The VLT® AQUA Drive FC 202 is suitable for driving and controlling all types of pumps. In addition to the widely used centrifugal pumps (quadratic load torque), the FC 202 is ideal for displacement pumps or eccentric screw pumps (constant load torque).

### Focusing on water and pumps

Functions such as burst pipe monitoring, dry-running protection and flow compensation are the main features of this drive.

### Aggressive environment

High degrees of protection IP55 or IP66 and coated printed circuit boards can withstand aggressive environments, e.g. chlorinated air.

### Cascade controller as standard

The cascade controller connects or disconnects pumps as necessary and according to specified limits. Features include an additional option for master/follower operation.

### Power range

3 x 200 – 240 V ..... 0.25 – 45 kW  
 3 x 380 – 480 V ..... 0.37 – 1000 kW  
 3 x 525 – 600 V ..... 0.75 – 90 kW  
 3 x 525 – 690 V ..... 45 – 1400 kW

### Fieldbus

RS 485	USB	PB	PN	DN
MOD	TCP	EIP		

### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	■
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■	■	■

## VLT® AutomationDrive FC 300

The VLT® AutomationDrive FC 300 series is a modular drive platform designed to comply with all modern industrial application requirements with easy configuration and a wide power range.

### One Drive concept

With identical installation and operating features, the FC 301 is ideal for more simple applications, while the FC 302 is designed for all applications.

### Safety where it matters

The FC 302 features Safe Torque Off as standard. Easily configurable options are available: SS1, SLS, SMS, SSM.

### High functionality

All functions necessary for industrial applications can be realised and configured quickly and easily.

### Power range

#### FC 301

3 x 200 – 240 V ..... 0.25 – 37 kW  
 3 x 380 – 480 V ..... 0.37 – 75 kW

#### FC 302

3 x 200 – 240 V ..... 0.25 – 37 kW  
 3 x 380 – 500 V ..... 0.37 – 1100 kW  
 3 x 525 – 600 V ..... 0.75 – 75 kW  
 3 x 525 – 690 V ..... 1.1 – 1400 kW

### Fieldbus

RS 485	USB	PB	PN	PL
DN	CAN	MOD	TCP	EIP
ECAT				

### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	■
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■	■	■

## Integral elements

RS 485	RS 485 connection
USB	USB connection
BAC	BACnet (integrated)
ASi	AS interface

## Optional

PB	Profibus DP V1
PN	Profinet
PL	Powerlink
DN	DeviceNet
CAN	CANopen
AKD	LONworks for AKD
LON	LONworks
BAC	BACnet (MSTP)
MOD	RTU mode (optional)
TCP	Modbus TCP
EIP	EtherNet/IP
ECAT	EtherCAT





VLT® Micro Drive

### VLT® Micro Drive

The smallest converters in the VLT® Micro Drive series are particularly suitable for side-by-side mounting with a high integration density. The typical features of Danfoss drives are still retained.

#### Compact

Up to 40 per cent smaller than drives with comparable power.

#### Protection for electronics

To ensure a long service life, the cooling air does not flow directly over the power electronics.

#### Power range

1 x 200 – 240 V ..... 0.18 – 2.2 kW  
 3 x 200 – 240 V ..... 0.25 – 3.7 kW  
 3 x 380 – 480 V ..... 0.37 – 22 kW

#### Fieldbus

RS 485

#### Enclosure

IP 00	IP 20	IP 21/Type 1
	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x

### VLT® 2800

The reliable and compact VLT® 2800 series drives are suitable for a wide range of applications and feature easily adaptable functions for a variety of applications.

#### Low system load

The DC link circuit and integrated chokes reduce harmonic loads on the system.

#### Operation with residual current operated devices

The drive is available with filters that are suitable for operation with residual current operated devices.

#### Power range

1 x 200 – 240 V ..... 0.37 – 1.5 kW  
 3 x 200 – 240 V ..... 0.37 – 3.7 kW  
 3 x 380 – 480 V ..... 0.55 – 18.5 kW

#### Fieldbus

RS 485 PB PN

#### Enclosure

IP 00	IP 20	IP 21/Type 1
	■	■
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x



VLT® 2800

### VLT® DriveMotor FCM 300

Consisting of motor and VLT® frequency converter, this unit is the ideal solution for simple control applications. It is no higher than the standard motor enclosure and no wider or longer than the motor.

#### No control cabinet necessary

Mounting the converter directly on the motor can eliminate the need for a control cabinet.

#### IE3 alternative

EU Regulation 640/2009 defines IE2 motors with converters as an alternative to IE3 motors.

#### Power range

3 x 380 – 480 V ..... 0.55 – 7.5 kW

#### Fieldbus

PB

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x

### VLT® Decentral Drive FCD 300

A compact frequency converter designed for decentral mounting. It can be mounted close to or directly on the motor. This reduces the need for central devices and saves space in switchgear and control cabinets.

#### Plug-and-drive

Installation and replacement is a simple matter of plugging in or changing the electronics section.

#### Flexible installation

The FCD 300 series facilitates power supply installation via integrated T-distributors.

#### Service switch

The optional, lockable service switch ensures disconnection of the frequency converter and motor during servicing.

#### Power range

3 x 380 – 480 V ..... 0.37 – 3.3 kW

#### Fieldbus

RS 485 PB ASi

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x

### VLT® Decentral Drive FCD 302

This decentral drive in a rugged design offers a high degree of flexibility and functionality. It can be mounted close to the motor and is ideal for demanding applications.

#### One-Box concept

All required modules and available options are accommodated in the frequency converter housing.

#### Minimising installation costs

Fewer components and connectors save installation, assembly and maintenance time.

#### Hygienic Design

Complies with all requirements for ease of cleaning and hygienic design according to EHEDG (European Hygienic Engineering & Design Group).

#### Power range

3 x 380 – 480 V ..... 0.37 – 3 kW

#### Fieldbus

RS 485 USB PB PN EIP

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x



VLT® DriveMotor FCM 300



VLT® Decentral Drive FCD 300



VLT® Decentral Drive FCD 302



VLT® OneGearDrive®

### VLT® OneGearDrive®

The highly efficient combination of a permanent magnet motor and optimised bevel gearing, powered by a central or decentral VLT® frequency converter, contributes significantly to operating and maintenance cost savings.

#### Long service intervals

A OneGearDrive operating under partial load does not require an oil change until after 35,000 operating hours.

#### Fewer variants

With only one motor type and three gear ratios available, the motor concept covers all typical conveyor drives.

#### Hygienic version

For use in wet areas including aseptic areas and clean room production areas.

#### Power range

3 x 380 – 480 V..... 1.5 – 3.0 kW



VLT® Integrated Servo Drive  
ISD 410 System

### VLT® Integrated Servo Drive ISD 410 System

A decentral compact drive based on a synchronous servomotor that is energy-efficient, precise and easy to install. The drive is especially suited to applications that require high flexibility and dynamics.

#### Trajectory generator/Curve planner

Cam discs can be operated directly via the integrated motion controller in the ISD 410 local control.

#### Hybrid cable

Power supply and CAN bus communication take place via a single cable assembly.

#### Open master system

Programming is based on the standard IEC 61131-3.

#### Power range

300 V DC ..... nom. 1.7 – 2.1 Nm  
/max. 8 – 11 Nm

#### Fieldbus

RS 485 CAN

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 67/IP 69K	IP 65/IP 67

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x



VLT® Soft Start Controller MCD 500

VLT® Compact Starter MCD 200

VLT® Soft Starter MCD 100

### VLT® Soft Starter MCD 100

The compact soft starter series is a cost-effective alternative to traditional contactors and can also replace star/delta combinations. The ramp time is adjusted via controls on the front of the unit.

#### Almost unlimited number of motor starts

For a power rating of up to 25 A, up to 480 starts per hour are possible. For ratings up to 15 A, this is 3000 starts per hour.

#### Technical data

Input..... 3x 208 – 600 V  
 Control voltage .....24 – 480 V AC or DC  
 Power..... 0.1 kW – 11 kW (25 A)

#### Enclosure

IP 00	IP 20	IP 21/Type 1
	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x

### VLT® Compact Starter MCD 200

While the basic MCD 201 version is only used for motor starting, the extended MCD 202 version offers additional motor protection functions. These include, for example, current limitation during motor starting.

#### Integral bypass

After the motor is started, the device connects the motor to the mains supply via the bypass. This minimises losses during operation under full load.

#### Technical data

Input.....3x 200 – 575 V  
 Control voltage .....24V AC or DC/110-440V AC  
 Power ..... 7.5 kW – 110 kW (200 A)

#### Fieldbus

RS 485 PB DN MOD

#### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x

### VLT® Soft Start Controller MCD 500

The MCD 500 is the comprehensive solution for soft starting and stopping of three-phase asynchronous motors. Integrated current transducers measure the motor current and provide important data for optimal start and stop ramps. An integrated bypass is available for motors up to 110 kW.

#### Fast commissioning

The four-line graphic display (choice of eight languages) ensures easy and reliable configuration.

#### Load-oriented start

Adaptive Acceleration Control (AAC), adjusted to the respective load, ensures the best possible start and stop ramps.

#### Comprehensive protection

Phase error detection, thyristor monitoring and bypass are just a few integrated monitoring functions.

#### Technical data

Input..... 3x 200 – 690 V  
 Control voltage ..... 24V/110-220V /380-440V  
 Power..... 7.5 – 850 /1200\* (1600A) kW  
 \*"Inside delta connection"

#### Fieldbus

RS 485 USB PB DN MOD

#### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x





VLT® Low Harmonic Drive

12-Pulse VLT® drive

### VLT® Low Harmonic Drive

The combination of the latest VLT® frequency converters with active AAF filters offers high motor performance in confined spaces. Active compensation of harmonics minimises system load.

#### System neutral

The drive reduces harmonics to below 3% at best, and below 5% for pre-loaded systems with up to 2% phase shift.

#### Cost-efficient

Features include an innovative cooling concept, tried and tested energy-saving functions and low maintenance design.

#### Power range

3 x 380 – 480 V ..... 132 – 710 kW

#### Fieldbus

Fieldbus options depend on the frequency converter type (VLT® AutomationDrive, VLT® HVAC Drive or VLT® AQUA Drive), see page 2.

#### Enclosure

IP 00	IP 20	IP 21/Type 1
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IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■		

### 12-Pulse VLT® drive

This converter, which is suitable for supply applications, e.g. via three-winding transformers, is a robust and cost-effective solution for reducing harmonics in demanding industrial applications.

#### Proven technology

The input module consists of the combination of proven rectifier circuits from the current FC series.

#### Step-up - step-down solution

Suitable for applications where a transformer steps down a medium voltage which changes the VLT® voltage/frequency and a further transformer subsequently steps up the voltage again.

#### Power range

3 x 380 – 690 V ..... 250 – 1200 kW

(FC 302)

3 x 380 – 690 V ..... 315 – 1400 kW

(FC 102, FC 202)

#### Fieldbus

Fieldbus options depend on the frequency converter type (VLT® AutomationDrive, VLT® HVAC Drive or VLT® AQUA Drive), see page 2.

#### Enclosure

IP 00	IP 20	IP 21/Type 1
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■		■

### VLT® Advanced Active Filter AAF

The active filter analyses load-applied harmonics and compensates these by active counter-control. It is suitable for the compensation of frequency converters and improvement of the system quality.

#### Easy to use

The VLT® Advanced Active Filter is configured for most applications upon leaving the factory.

#### Optimal filtering

Individually adjustable compensation modes for adaptation to suit specific requirements.

#### Versatile

Can be used for central, individual or group compensation.

#### Power range

3 x 380 – 690 V ..... 10 – 480 A

3 x 380 – 480 V ..... 190 – 400 A

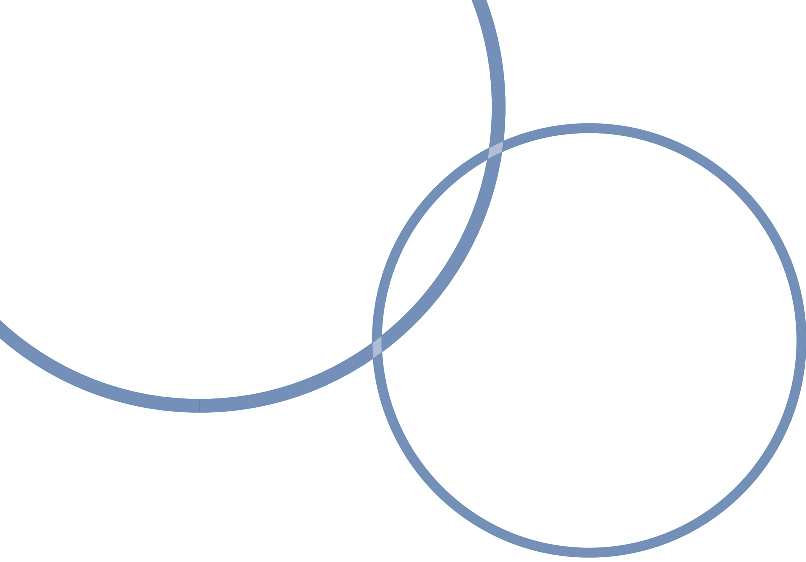
#### Fieldbus

RS 485 USB

#### Enclosure

IP 00	IP 20	IP 21/Type 1
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IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
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## VLT® Advanced Harmonic Filter AHF 005/010

Harmonic filters with additional functions specially adapted for use with VLT® frequency converters. When connected upstream of a frequency converter, the filter reduces the total current distortion fed back to the system to 5% or 10%.

### Compact units

Small, compact enclosure that fits perfectly in a control cabinet.

### Retrofit

Simple to use for retrofitting in a system

### Flexible

One filter module can be used for several frequency converters.

### Power range

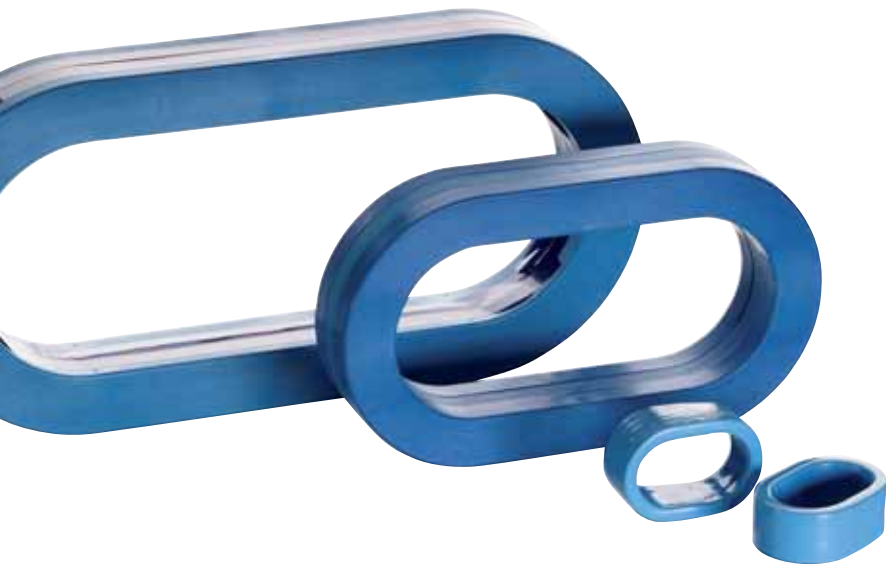
3 x 400 –500V ..... 190 – 400 A  
 3 x 380 –690 V ..... 10 – 400 A\*

\* Higher rating when connected in parallel

### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x





### VLT® Common Mode Filter

High-frequency common mode cores for reducing electromagnetic interference and protecting against bearing currents.

#### Wide coverage

Just four sizes cover the range up to 480 A.

#### Combinable

The filters can be combined with other output filters.

#### Power range

3 x 380 – 690 V ..... 10 – 480 A

### VLT® Sine-Wave Filters

VLT® Sine-Wave Filters smooth the output voltage of the VLT® and reduce motor insulation stress and bearing currents as well as noise development in the motor.

#### For critical motors

Converter operation of older motors, low permitted voltages in terminal boxes or without phase insulation.

#### Long motor cables

Enables the use of motor cables with a length of 500 m and more.

#### Power range

3 x 200 – 690 V ..... 2.5 – 800 A\*  
*\*(for higher power ratings a combination of several modules is possible)*

### VLT® dU/dt Filters

VLT® dU/dt Filters reduce the rate of voltage rise on the motor terminals and protect old or weak motor insulation against breakdown. This is particularly important for short motor cables.

#### Retrofit

Easy retrofitting in older systems or motors.

#### Compact

Smaller, lighter and more affordable compared to sine-wave filters.

#### Power range

3 x 200 – 690 V ..... 2.5 – 800 A\*  
*\*(for higher power ratings a combination of several modules is possible)*



VLT® Sine-Wave Filters

#### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■		

#### Enclosure

IP 00	IP 20	IP 21/Type 1
■	■	
IP 54/Type 12	IP 55/Type 12	IP 66/Type 4x
■		

## **VLT® Motion Control Tool MCT 10**

This Windows-based Engineering Tool for Danfoss VLT® drives and soft starters is available in two versions: the basic version is available free of charge at [www.Danfoss.com](http://www.Danfoss.com). This covers all the essential functions for the daily operation of VLT® converters. The Advanced Version, subject to a charge, offers advantages for very large and extensive projects with numerous drives, as well as own motor databases and application packages.

### **Compatible**

Existing configuration files created with previous Danfoss PC programs can be easily imported.

### **For all VLT® drives**

The VLT® Motion Control Tool MCT 10 configures all current VLT® drives and soft starters and subsequently archives all parameters and projects.

### **Integrated database**

An integrated converter database is provided for off-line entry.

### **Database update in the converter**

The FC converter series (FC 100/FC 200/FC 300) allow database updates to be read-out directly from the converters.

### **Integrated oscilloscope**

An oscilloscope is provided for commissioning, troubleshooting and visualisation.

### **USB, RS485, PROFIBUS and Ethernet**

MCT 10 supports communication with VLT® drives. Existing networks can be used.

### **Graphic assistance**

Commissioning of complex functions is simplified by means of graphics.

## **VLT® Motion Control Tool MCT 31**

Not only systems with emergency generating sets benefit from low harmonic loads. This software is designed to quickly assess the loads placed on the system by converters in the planning phase. This allows suitable measures to be taken to relieve the systems in advance.

### **Danfoss devices**

The Danfoss FC 100, FC 200 and FC 300 converter series and active filters are stored in the system.

### **External products**

The software can also take the influence of converters of other manufacturers into account.

### **Performance within limits**

A summary report also shows if and which limits are exceeded by the drives and the system.





# What VLT® is all about

Danfoss VLT Drives is the world leader among dedicated drives providers – and still gaining market share.

## Environmentally responsible

VLT® products are manufactured with respect for the safety and well-being of people and the environment.

All frequency converter factories are certified according to ISO 14001 and ISO 9001 standards.

All activities are planned and performed taking into account the individual employee, the work environment and the external environment. Production takes place with a minimum of noise, smoke or other pollution and environmentally safe disposal of the products is pre-prepared.

## UN Global Compact

Danfoss has signed the UN Global Compact on social and environmental responsibility and our companies act responsibly towards local societies.

## Impact on energy savings

One year's energy savings from our annual production of VLT® drives will save the energy equivalent to the energy production from a major power plant. Better process control at the same time improves product quality and reduces waste and wear on equipment.

## Dedicated to drives

Dedication has been a key word since 1968, when Danfoss introduced the world's first mass produced variable speed drive for AC motors – and named it VLT®.

Twenty five hundred employees develop, manufacture, sell and service drives and soft starters in more than one hundred countries, focused only on drives and soft starters.

## Intelligent and innovative

Developers at Danfoss VLT Drives have fully adopted modular principles in development as well as design, production and configuration.

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

## Rely on the experts

We take responsibility for every element of our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliable products.

## Local backup – globally

VLT® motor controllers are operating in applications all over the world and Danfoss VLT Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

Danfoss VLT Drives experts don't stop until the customer's drive challenges are solved.

