

MAKING MODERN LIVING POSSIBLE

Danfoss



Dedicated to HVAC business
VLT® Drives

VLT®
THE REAL DRIVE

Effective HVAC solutions

From the world's leading supplier of HVAC drives



Tropical Islands Resort, near Berlin, Germany



Grand Hyatt, Dubai



Shanghai General Motors, China

Drives know-how

Nobody knows more about HVAC drives than Danfoss. HVAC is the heart of our company, and our global sales organisation is always ready to serve you, backed by 24-hour technical support.

HVAC know-how

The Danfoss global HVAC team also commands unsurpassed knowledge of your business. Not only do we supply dedicated products, we also provide advice and assistance in fully integrating these products into your system.

Market leading products

The Danfoss VLT® HVAC Drive is the flagship product, providing unsurpassed performance, energy savings, dedicated functionality and communication protocols for interfacing with building management systems.

Local service – worldwide

The high reliability of Danfoss drives means minimal downtime. However, knowing the importance of continuous operation, Danfoss has established a worldwide service organisation to meet your needs at only a moment's notice.

All over the world

Danfoss' knowledge of HVAC applications and expertise in drives are available throughout the world from experienced staff stationed in branch offices and authorised service companies.

Local contact – worldwide

All customers receive first-rate service directly from a local Danfoss representative. This efficient service and communication is provided by people who understand the drives, applications and equipment, as well as the local language, culture and business.

The true potential lies beneath the surface



On the surface, a drive is often viewed as a capital expenditure item. However, optimum cost efficiency is realised when the drive has been fully integrated into the system. Danfoss' HVAC expertise can help you configure and install the drive as a fully integrated system component, identifying real-time installation savings in the system that can virtually offset

the initial capital cost of the drive. Below the surface, we are able to maximise the "real" savings, delivering the best return on investment, providing optimum performance and environmental conditions through our extensive experience in integrating Danfoss technology into your new or existing applications.

How do we do this? We combine HVAC-designed product functionality, application knowledge and integration expertise, thus delivering lower system costs and optimum energy savings.

How we have dedicated our drives to HVAC

Automatic Energy Optimisation (AEO)

The drive continuously monitors the relationship between voltage and current in the motor and adjusts the output voltage to minimise current and maximise motor and drive efficiency.

Four input PID controller

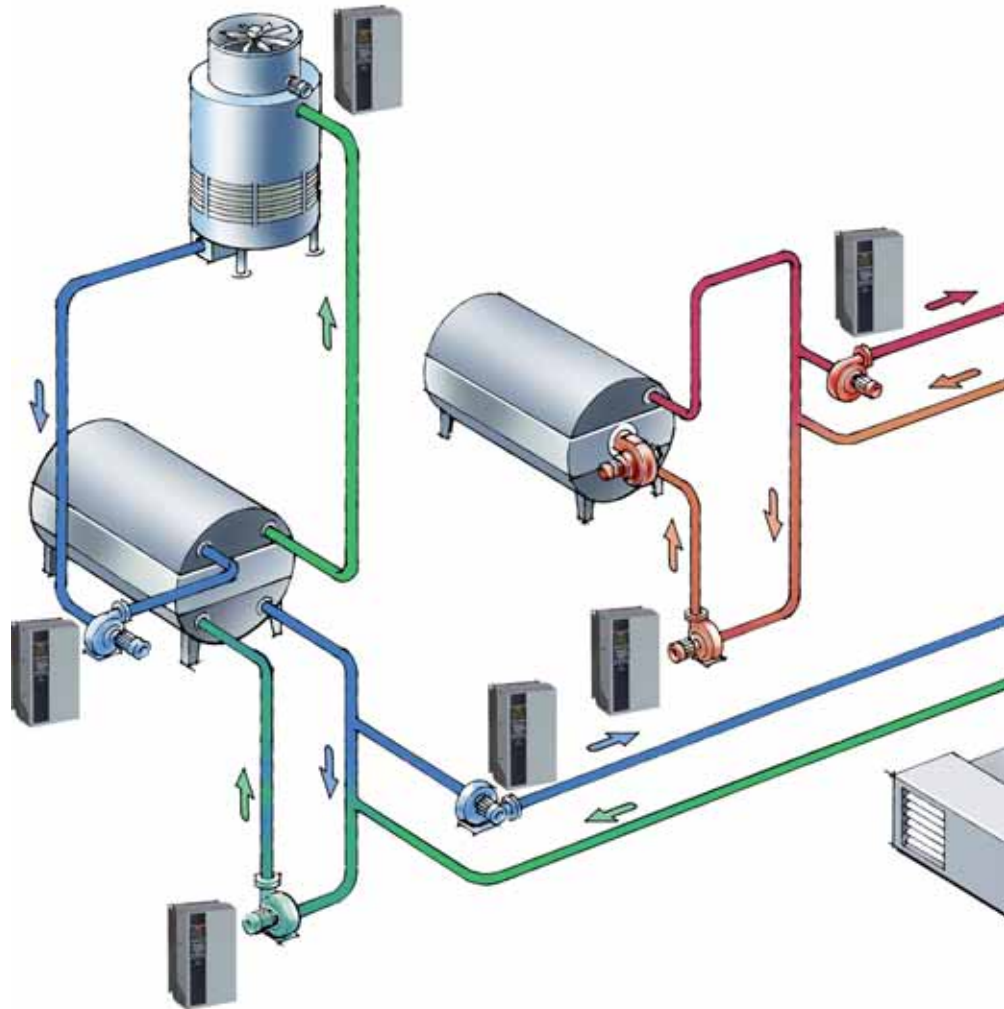
The extended PID controllers offer unequaled flexibility. One integral PID controller controls the drive's speed. Three extended PID controllers provide an output that can be used for additional HVAC control. For retrofitting, the integral PID controller and two static pressure transmitters can be used to control supply fan capacity. One transmitter controls the fan motor speed based on system static pressure. The second functions a discharge operating high limit to prevent damage to the duct work. Manual resetting of the duct sensor is eliminated. The additional extended PID controllers can be used for additional HVAC processes – heating or cooling valve control, damper control, etc.

Single input PID controller

A built-in controller operates independently and eliminates the need for a building automation system to maintain constant flow in systems. A signal from a temperature, pressure, or flow transmitter connected to the drive is all that is required.

Multi-zone feedback

The drive PID controller offers unequaled flexibility by accepting up to three feedback signals with individual set-points. Multi-zone control provides improved system performance and optimisation.



Stand-alone operation

The PID controller provides variable air volume features without dependence on a building automation system. This eliminates the need for additional direct digital control and I/O modules.

Automatic Switching Frequency Modulation (ASFM)

There is no need to derate the drive output at high load. ASFM adjusts the switching frequency based on motor current demand, rather than motor speed. This ensures that the best possible switching frequency is provided, matching both performance and noise control.

De-icing

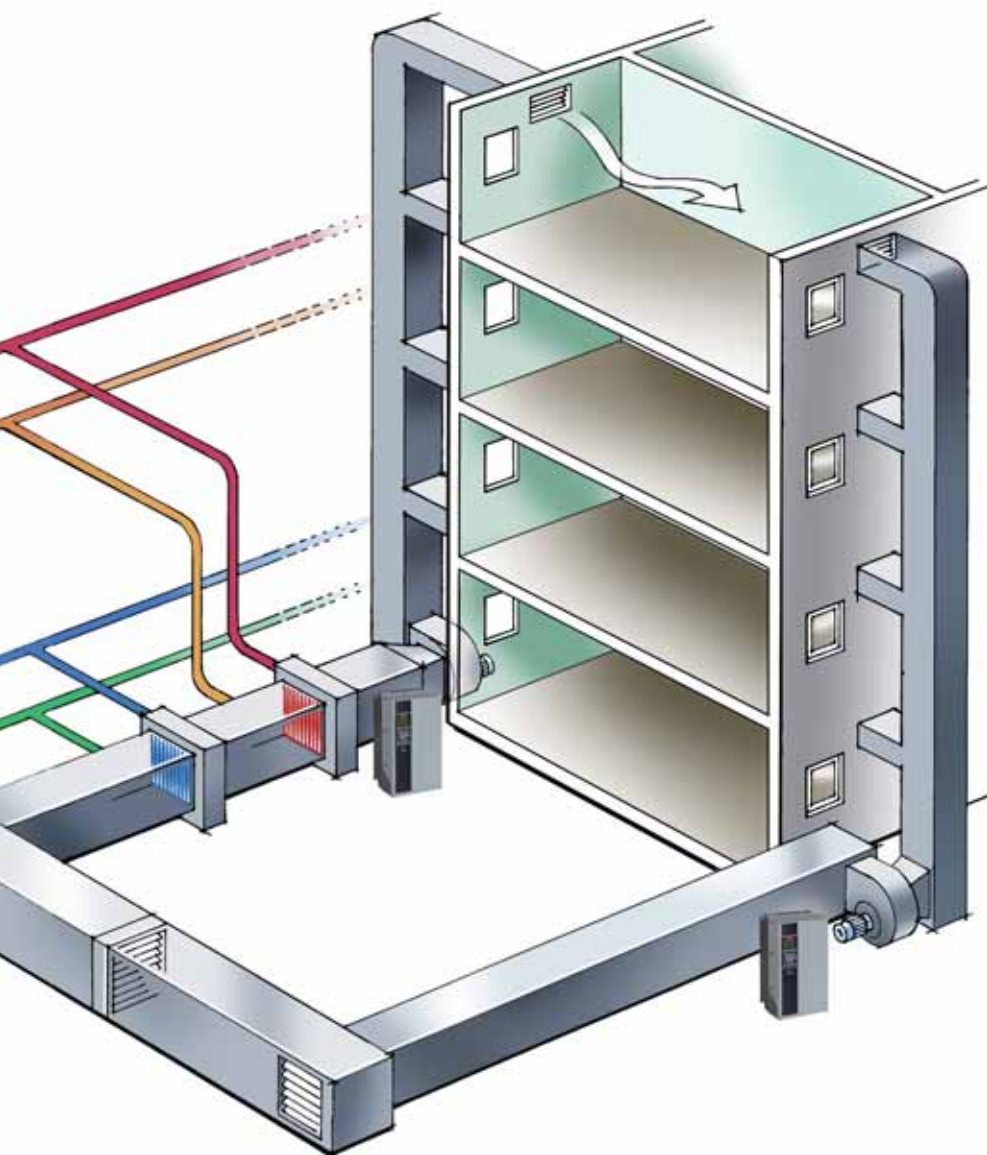
Under severe winter weather conditions, it may be necessary to reverse the cooling tower fan to remove accumulated ice from the intake louvers. The VLT® drive can reverse airflow direction for timed durations to prevent ice accumulation on both the intake louvers and the exhaust fan blades.

Minimum frequency

A minimum output frequency ensures sufficient fan speed operation for the adequate lubrication of the tower fan gearbox.

Frequency bypass

The fan motor in the cooling tower steps over speeds that cause mechanical vibration in the tower, preventing potential damage to mechanical components in the system.



Sleep mode

The VLT® drive automatically stops the cooling tower fan when the basin water temperature remains at a low level for a pre-determined amount of time.

Minimum speed control

Under minimal loads, this feature provides the required minimum air changes in a zone to ensure adequate air quality. Under increased zone loads, such as with occupancy, the fan speed increases to maintain the desired environmental conditions.

Automatic restart

Automatic power-up after a trip-out enhances automated operation for remotely controlled systems.

Run permissive

A "system ready" signal prior to operation prevents the drive from starting and ensures that dampers or other system equipment are in the proper state before starting the motor. This feature reduces the number of I/O points and installation costs.

Fire Override Mode

Primarily used for fire safety applications, the drive can override fan operation to provide a life-safety application, such as building pressurisation or a smoke-purge operation.

Broken belt detection

The drive monitors the V-belt on a fan, pump or compressor and gives a warning when a malfunction such as a broken belt occurs.

Motor soft start

Smooth acceleration of the pump reduces noise, peak current, thermal motor load, and mechanical stress to the hot water pump system caused by water hammer. In addition, smooth acceleration extends motor life.

High and low feedback warning

A selected high and low hot water differential pressure feedback signal monitored by the VLT® drive can indicate system problems prior to the boiler tripping off.

Metering

The local control panel of the drive can be used to display many drive or system operating variables including kWh, hours run, static duct pressure, condenser water return temperature etc.

High and low frequency warning

Useful in staging on or off additional equipment, such as pumps or fans when the motor speed is either too high or too low. A specific frequency can be set for warning and to stage external devices on or off.

Motor preheat

To extend the life of a motor in a damp environment, a small amount of current can be trickled into the motor to protect it from condensation and the effects of a cold start.

Dedicated drives

– all you need is built right in



VLT® HVAC Drive



IP 20 Panel mount
VLT® HVAC Drive



VLT® Micro Drive
FC51



VLT® 2800



VLT® Drive Motor
FCM 300

Features for providing precise and accurate control are standard in the VLT® HVAC Drive FC 100.

Integration

- Built in RFI filters protected to 1st environment and EN 61800-3:2004 to Category C2 with 150m of motor cable and Category C1 with 50 m of cable
- Built-in DC link coils – reduced harmonic distortion
- IP54/55/66 enclosure – fully protected field mounting unit
- Four input PID controls – two or three feedback lines for multi-zone control
- Serial communication – Metasyst® N2, Apogee® FLN, BACnet™, Lon-Works®, Modbus RTU, Profibus and DeviceNet

Energy saving

- Automatic Energy Optimisation (AEO) – reduces energy consumption for lightly loaded motors
- Automatic Motor Adaptation (AMA) – optimises motor performance
- Sleep mode – the motor is stopped and restarted by system requirements
- Temperature-dependent fan – fan operates when required, extending the life of the fan and drive

Protection

- Unlimited switching on the output of the drive – allows isolation of motor from drive
- Earth and short circuit – full fault protection
- Skip frequencies – avoids resonance in the system
- Automatic derating function – avoids trip of the drive

Reliable

- High-ambient operation – can tolerate warm environments up to 50° C
- Auto-derating – protects the drive from overheating and tripping at extreme operating temperatures above 50° C
- Auto-ramping – prevents the drive from tripping when decelerating
- Automatic restart – User friendly auto-reset after trip
- Local control panel – clear text display readout
- Quick Menu set-up – accesses most common settings
- Hand-Off-Auto function – fast and easy commissioning

Harmonic filters

VLT® drives have built-in DC link chokes to minimise harmonic distortion of the mains supply. Further harmonic reduction is possible using Danfoss advanced harmonic filters as stand-alone options. These offer a total harmonic distortion of either 10% or 5%.

Real Time Clock

The Real Time Clock performs pre-defined actions. This is a strong tool for controlling HVAC systems where the drives are not connected to a Building Management System (BMS), or if the drive is used as an intelligent component.

Preventive Maintenance

20 actions items can be scheduled within the VLT® HVAC Drive to secure planned maintenance and a more reliable HVAC system.

Full power range

1.1 kW – 1.2 MW VLT® HVAC Drives are available.

Set-up software

HVAC installations are easily set up and documented using VLT® Motion Control Tool software (MCT 10). Danfoss Drives provides a range of PC programs for facilitating set-up, commissioning and monitoring drives. The MCT 10 software is used to copy and manage documents, compare previous and present drive settings, print and display data.



Type	VLT® HVAC Drive FC100	VLT® Micro Drive FC51	VLT® 2800	FCM 300
Power range/ Voltage range	1.1 – 45 kW/3 x 200–240 V 1.1 kW – 1.2 MW/ 3 x 380 – 480 V 1.1 kW – 1.2 MW/ 3 x 525 – 600 V	1 phase 200–240 V AC/ 0.18–2.2 kW 3 phase 200–240 V AC/ 0.25–3.7 kW 3 phase 380–480 V AC/ 0.37–7.5 kW	0.37 – 1.5 kW/ 1 x 200 – 240 V 0.37 – 4 kW/ 3 x 200 – 240 V 0.75 – 18.5 kW/ 3 x 380 – 480 V	0.55 – 7.5 kW/ 3 x 380 – 480 V
Enclosure	IP 00 IP 20 / Chassis IP 21 / NEMA 1 IP 54 IP 55/ NEMA 12 IP 66	IP 20 Optional: IP 21/NEMA 1	IP 20 Optional: IP 21/NEMA 1	IP 55 Optional: IP 56, IP 66
RFI filter	Built-in Select from Category: C1 50 m/ C2 150 m C1 10 m/C2 50 m C3 25 m	Built-in Category C1 5 m/C2 15 m	Optional: Category C2 (integrated) Category C1 (with external module); integrated in 11 – 18.5 kW)	Category C2 (integrated) Optional: Category C2 (integrated)
Filter for harmonic distortion	Built-in DC coils Advanced harmonic filters 10 or 5% THID	Optional: Line filter	Built-in DC coils Optional: Advanced harmonic filters 10 or 5% THID	Built-in DC coils Optional: Advanced harmonic filters 10 or 5% THID
Display/local control	Choose between numeric, graphical or no control panel	Choose between numeric with or without potentiometer and no control panel	Numeric LED/local control (integrated) Optional: Alphanumeric LCD/local control (connectable)	Optional: Alphanumeric LCD/ local control (connectable) and local operation pad (connectable)
Control inputs	Analogue inputs: 2 Digital inputs: 6 (2 can be used as digital outputs)	Analogue inputs: 2 Digital inputs: 5 Pulse inputs: 1	Analogue inputs: 2 Digital inputs: 5	Analogue inputs: 2 (1) Digital inputs: 3 (4)
Signal outputs	Programmable analogue outputs: 1 Programmable relay outputs: 2	Programmable analogue outputs: 1 Programmable relay outputs: 1	Analogue outputs: 1 Digital outputs: 1 Relay outputs: 1	Digital outputs: 1 or (Analogue outputs: 1)
Serial communication	Standard built in: • FC Protocol • N2 Metasys • FLN Apogee • Modbus RTU Optional: • LonWorks • BACnet • DeviceNet • Profibus	Standard built in: – FC Protocol – Modbus RTU	Standard built in: – FC protocol – Metasys N2 – Modbus RTU Optional: – Profibus – DeviceNet	RS485 Port as standard Optional: Profibus (integrated)
Application adaptation	I/O Options providing flexibility including Pt1000/Ni1000 inputs, additional analogue outputs, additional relay outputs and Real Time Clock back-up power supply	Built-in brake functions Built-in Smart Logic Controller		



Protects environment

VLT® products are manufactured with respect for environment, safety and well-being.

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 assured.

UN Global Compact

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

EU Directives

All factories are certified according to ISO 14001 standard. All products fulfil the EU Directives for General Product Safety and the Machinery directive. Danfoss Drives is, in all product series, implementing the EU Directive concerning Hazardous Substances in Electrical and Electrical Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

Products' impact

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

What VLT® is all about

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

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®.

Two thousand 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 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 in our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee for reliable products.

Local backup – globally

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

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

