

*Danfoss*



**VLT® Chemical**  
Safe and reliable motor control

**VLT®**  
THE REAL DRIVE



# Full range proven VLT® reliability



**Full range**  
Danfoss offers the  
recognised reliability of  
VLT® drives up to 1.2 MW  
and in the full voltage  
range up to 690 V.



# Proven reliability in the chemical business

Danfoss Drives is a proven preferred supplier within chemical industries. Unsurpassed reliability characterize both our drives and the global sales and service organisation. Danfoss Drives leave customers confident, that the VLT® drives will not cause production downtime.

## Dedicated organisation

A dedicated staff supports customers within the chemical industry anywhere in the world. Local sales- and service companies in more than 100 countries meet demands of chemical customers all over the world.

## Dedicated solutions

Danfoss offers solutions tailored to the specific needs of the chemical industry, combining all the necessary components in an integrated package solution like:

- ATEX approved thermistor relay
- NAMUR module
- Long motor cables
- Outstanding EMC performance
- Optional filters
  - dU/dt
  - Sine Wave
  - Harmonics

## Rely on Danfoss

You can rely on uncompromised, well-tested solutions from Danfoss. VLT® solutions offer customers the peace in mind that comes from using products that have demonstrated ability to operate without hassle over the long term – even in harsh environments.

## Application knowledge

We have extensive knowledge of your business and can offer our process expertise in all stages of application, development and implementation. Our experts will work with you to design and select the optimal solution for your needs.

## Comprehensive product range

Our modular product range allows us to combine relatively few components into a multitude of variations and solutions and add value for the customers.

## Stable operation

Our high-quality frequency converters and softstarters are designed for virtually every purpose in the chemical industry. Our comprehensive solutions put an end to costly downtime.

## Customer driven innovation

Customers are deeply involved in Danfoss Drives product development and design.

Customer requirements for an intuitive user interface have been adapted to make the VLT® user interface the most user friendly interface on the market – winner of the iF design award.

The VLT® drives also received the Frost & Sullivan innovation award 2006.

## Innovative supply chain

The modular technology concept provides for mass production of highly customised drives. The production setup assembles and tests a customised drive chosen out of thousands of hardware configurations. The Drive is manufactured in less than 24 hours.

**LANXESS**  
Energizing Chemistry

 Bayer CropScience

**InfraServ**  
Wiesbaden TECHNIK

**LENZING**  
FIBERS

**KABRA**  
EXTRUSIONTECHNIK

 **Clariant**

**LEWA**  
pumps + systems

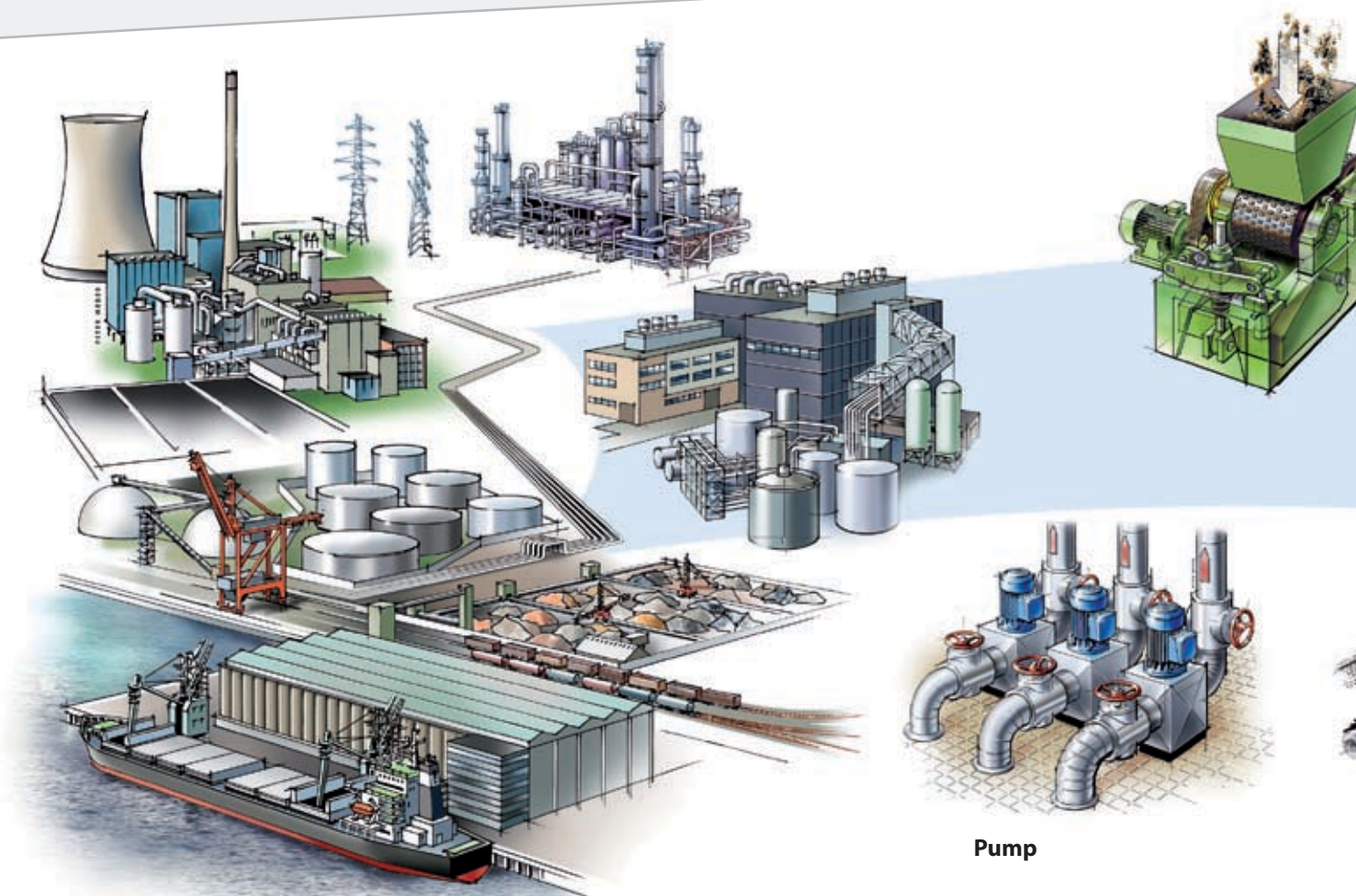
**BASF**  
The Chemical Company

 **MCE**  
CHEMSERV

**degussa.**  
creating essentials



# VLT® solutions optimise processes anywhere in a chemical plant



**Reliable and flexible VLT® drives are available for any application within the chemical industry. The VLT® family ranges from 0.18 kW to 1.2 MW and from basic motor control to servo performance. The VLT® family is designed to be extremely reliable and easy to service – ensuring maximum up-time and lowest lifetime cost.**

## Full power range

Danfoss expands the VLT® power range up to 1.2 MW. All performance levels have the same intuitive operating concept. 750 kW drives can be operated as easily as 0.75 kW drives. Years of VLT® experience can be applied to high-output drives.

## Compact dimensions

- The smallest high-power frequency converters of their class require less control cabinet space
- No side clearance required between

individual units, allowing more drives in a cabinet

- Installation-friendly and easy-maintenance design
- Optional extras can be integrated at the factory or retrofitted at a later date

## Time saving installation and commissioning

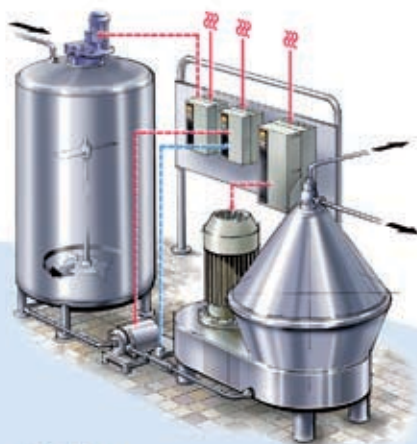
- Standard operation, software and options for the entire VLT® AutomationDrive series
- Operation in national language

- Rapid and simple installation with standard parts saves time and costs
- Front access for all installation and servicing work
- Backwards compatible

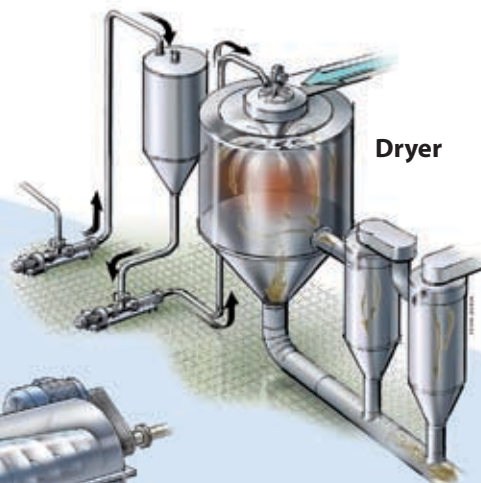
## Optimum customisation

- IP 00, IP 21/NEMA Type 1, IP 54/ NEMA Type 12 and IP 66 enclosures are available
- Optional modules enable individual configuration of the drive
- Integrable options include mains disconnect fuses and EMC filters in any combination
- To customise your drive, optional extras can be mounted at the factory and/or retrofitted when required: NAMUR, thermistor, field-bus, additional I/O etc.

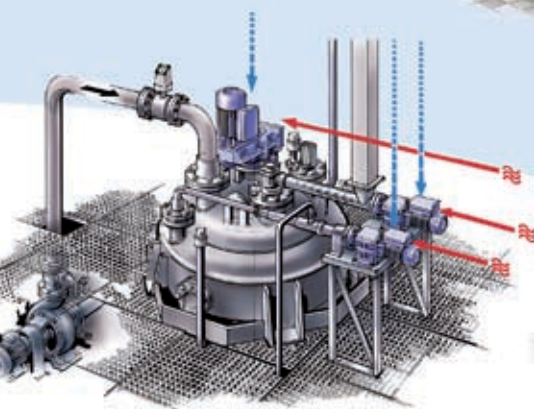
**Grinder**



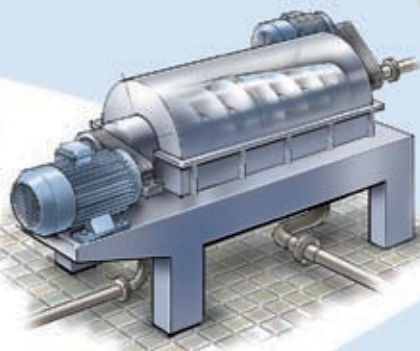
**Centrifuge**



**Dryer**



**Mixer**



**Decanter**



**Extruder**

### Maximum availability and reliability

- Drives are tested under full load before delivery
- Factory-tested and certified options increase the reliability of the drive
- Higher ambient temperatures permitted: Up to 50° C
- Fewer sub-assemblies reduce the number of spare parts needed

### Energy conservation

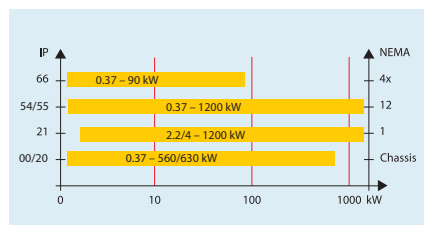
The high degree of efficiency (typically over 98 percent) reduces power loss, power consumption and waste heat.

Less cooling investment and less operational cost on cooling leads to:  
*Cost savings*

### Longer motor cables

VLT® drives apply long motor cables, enabling remote installation of drives.

- 300 m standard
- 150 m meets class C2 RFI requirements
- 50 m meets class C1 RFI requirements



### Largest IP 66 range – up to 90 kW

Enclosures classified in protection categories up to IP 66 are available for installation in particularly adverse conditions, as are coated circuit boards to protect the electronics.



# The modular VLT® technology platform

VLT® AutomationDrive is built on a modular platform allowing for highly customised drives mass produced, tested, and delivered from the factory. Upgrades and further options dedicated for the process industry are a matter of plug-and-play. It shares features and user interface with the dedicated VLT® HVAC Drive and VLT® AQUA Drive. Once you know one, you know them all.

## Fieldbus options

Options for serial bus communication, Profibus, Ethernet, Devicenet, CanOpen etc., are delivered ready to plug-and-play.

## Display options

Danfoss Drives renowned removable Local Control Panel has an improved user interface. Choose between 27 built-in languages (including Chinese) or have it customised with your own. Two of the languages can be changed by the user.

## Onboard manual

The info button makes the printed manual virtually redundant. Users have been involved throughout development to ensure optimum overall functionality of the drive. The user group has significantly influenced design and function of the Local Control Panel. The Automatic Motor Adaptation, the Quick Set-Up menu and the large graphic display make commissioning and operation a breeze. Choose numerical display, graphic display or no control panel.

## Safety

The new VLT® series can be ordered with safe stop functionality suitable for category 3 installations according to EN 954-1. This feature prevents the drive from starting unintentionally. The functionality is standard in the FC 302 version.

## ATEX approved

An ATEX approved thermistor option is available for VLT® AutomationDrive rendering the drive capable of providing sole protection for an EExd motor within the installation. The only action required is to connect the PTC thermistor to the drive, for significant reduction in costs.

## Hot pluggable LCP

The local control panel (LCP) can be plugged in or out during operation. Settings are easily transferred via the control panel from one drive to another or from a PC with MCT-10 set-up software.

## I/O options

General purpose I/O, Relay and Thermistor expands the flexibility of the drives.

## Control terminals

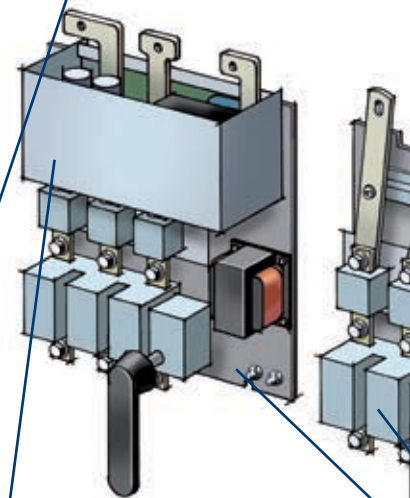
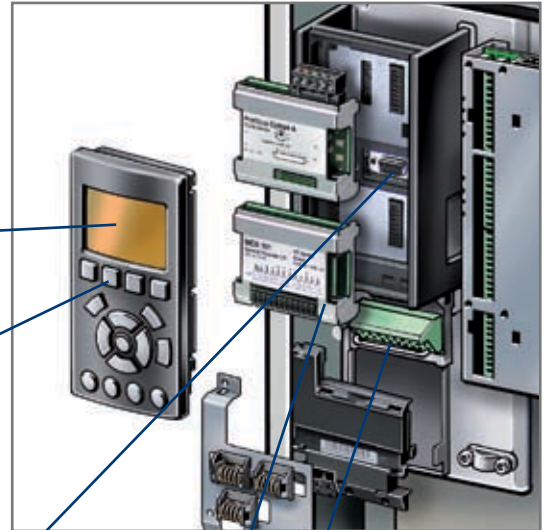
Specially developed removable spring-loaded cage clamps add to reliability and facilitate easy commissioning and service.

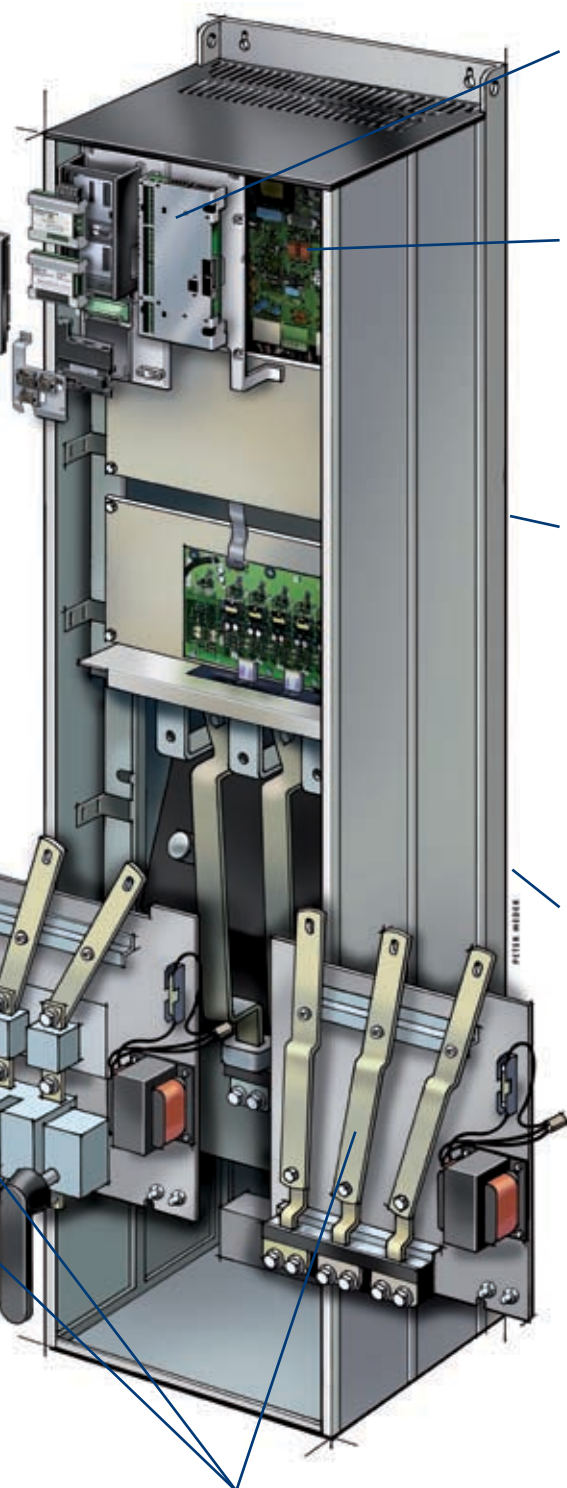
## 24 V supply

24 V supply keeps the VLT® drives logically "alive" in situations when the AC power supply is removed.

## RFI

RFI available in the versions C1, C2 and C3 (class C2 for 690 V) according to the IEC 61000 and EN 61800 standards. (hitherto B, A1 and A2 (class A1 for 690 V).





### Programmable options

Freely programmable option MCO 305 for user specific control algorithms and programs allows integration of PLC programs.

### Conformal coating

The electronic components fulfil IEC 60721-3-3, class 3C2 as standard. For harsh and aggressive environment coating class 3C3 is an option. E- and F-Frame 380-500 V AC drives and all 525-690 V AC drives have conformal coated PCB as standard.

### Back channel cooling

A unique design uses a back channel to pass cooling-air over heat sinks. This allows 85% of the heat losses to be exhausted directly outside of the enclosure with minimal air passing through the electronics area. This dramatically reduces temperature rise and contamination of the electronic components, for improved reliability and increased functional life.

### Enclosure

The drive meets relevant requirements for all possible installation conditions. Enclosure class IP 00/Chassis, IP 20/Chassis. IP 21/NEMA 1, IP 54/55/NEMA 12 or IP 66/NEMA 4x.

### Harmonic suppression

The renowned DC coil ensures very low harmonic disturbance of the power supply according to IEC-1000-3-2. Compact design: No need for external modules.

### Smart Logic Control

The new VLT® drives have Smart Logic Control built in. With this feature you can make the drive react expediently on inputs and events and often replace PLC's.

### NAMUR option

The NAMUR option extends the number of inputs and outputs. It alters the factory settings of the VLT® AutomationDrive to the standardised NAMUR control definitions (recommendation 37), allowing quick and easy installation, commissioning and operation.

### PELV

All VLT® drives comply to the PELV (Protective Extra Low Voltage) requirements and are surge-proof in accordance with VDE 0160. Inputs and outputs are electrically isolated.

### Modular construction and ease of maintenance

All components are easily accessible from the front of the drive allowing for ease of maintenance and side-by-side mounting of drives. The drive is constructed with a modular approach allowing for the easy replacement of modular sub-assemblies.



Danfoss Drives received the Frost & Sullivan Award for Product Innovation for the unique VLT® AutomationDrive series.



The local control panel (LCP) was given the international iF design award in the category "interface in communication".

# Efficient high power drives

## Efficiency is vital for high power drives

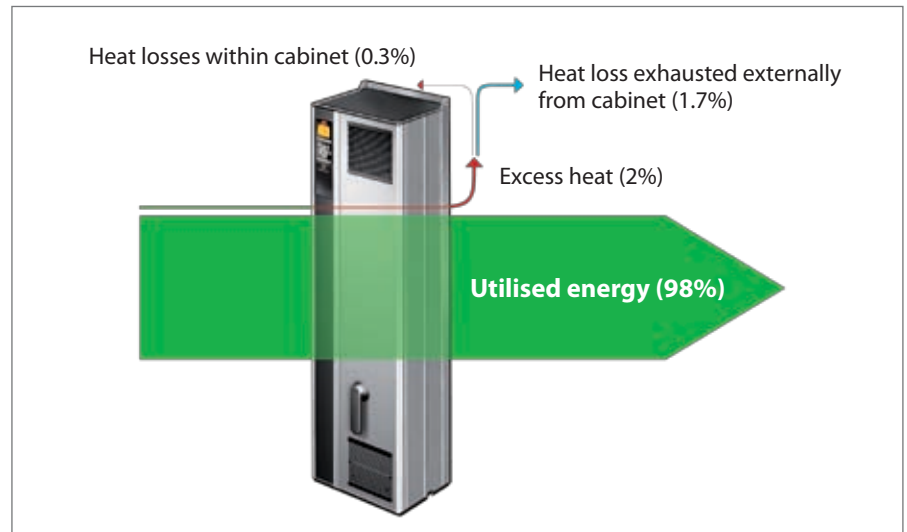
Efficiency was essential when Danfoss' developers designed the high power drives. The electronic design and the quality of the components makes for unsurpassed efficiency. VLT® drives pass 98% of the supplied electrical energy on to the motor.

## Save 25,000 kWh a year

A half percent point better efficiency of a 1 MW VLT® drive will typically lower energy consumption 25,000 kWh a year.

## Makes motors efficient too

The VLT® feature Automatic Energy Optimisation vector technology ensures maximum magnetification of the motor, minimising passive,



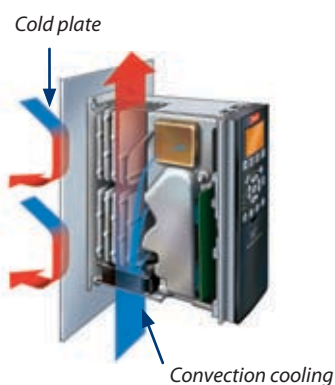
damaging currents and flux in the motor. This means that maximum electrical power provided to the drive

is exploited in the application.

# Intelligent heat management

It's vital for reliable operation that heat is effectively removed from the drive, the cabinet and at times even from the building or control room.

The intelligent heat management of VLT® drives moves 85% of the excess heat from the electronics via the heat sink.



## Cold plate

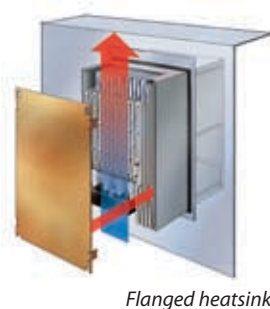
The heat is transported out of the cabinet to a cold surface.

## Convection cooling

The traditional way of cooling by means of air circulated around the drive.

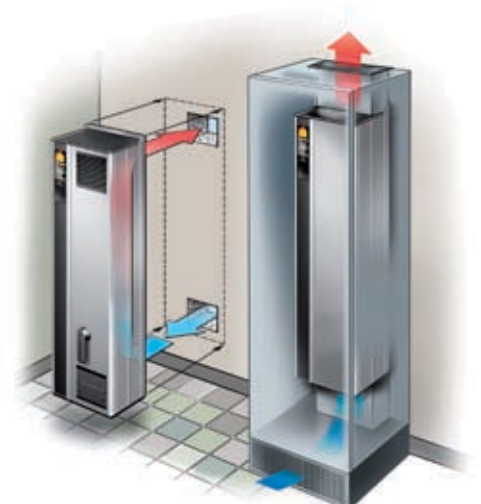
## Flanged heatsink

With the drive safely enclosed in a tight cabinet its cooling fins are exposed to cool air.



## Duct cooling

Danfoss has introduced a principle that allows simple and easy installation of high power drives in cabinets or control rooms removing the major part of dissipated heat to surroundings. Kits are available for standardised installation





# Modular Concept up to 1.2 MW

For the highest power sizes Danfoss offers a modular concept that allows the user to select exactly the options needed for the actual application. User interface, power connections and signal terminals are similar, so the VLT® drives concept is the same all over the plant.

The units are available as IP21 or IP54 enclosed drives with standard RFI filter class C3 (former A2) and comply with demands of the chemical industry. A range of generic hardware options can be selected as with the other drives range from Danfoss Drives:

- RFI filter class C2 (former A1)
- Contactor or mains switch/disconnect
- Circuit breaker
- Built-in fuses
- Brake option

In addition the modular drive offers specific features that dedicate the products even more to the chemical market:

## **Fuse protected circuit / manual motor starters**

If external fans are used on motors, the VLT® drive can control the operation hereof by means of optional control circuits. In addition auxiliary 3 phase loads can be connected through the fused circuit.

## **Door interlocks**

Electrically activated door interlocks provides additional safety when used with the optional circuit breaker.

## **Residual Current Monitor and Insulation Resistance Monitor**

For safe operation and monitoring of the system, dedicated devices can be added as options securing reliable and safe operation on any type of mains.

## **24 V power supply**

Secures easy addition of customer's own control in the cabinet in addition to the already wide range of options.

## **Thermostat and heater**

Secures that condensation does not occur inside the cabinet in case of low ambient temperature or high humidity.

## **Cabinet light and convenience power outlets**

Access to power provides easy connection of service equipment and other auxiliaries when needed and a built-in light illuminates the overview.

## **Motor temperature monitor**

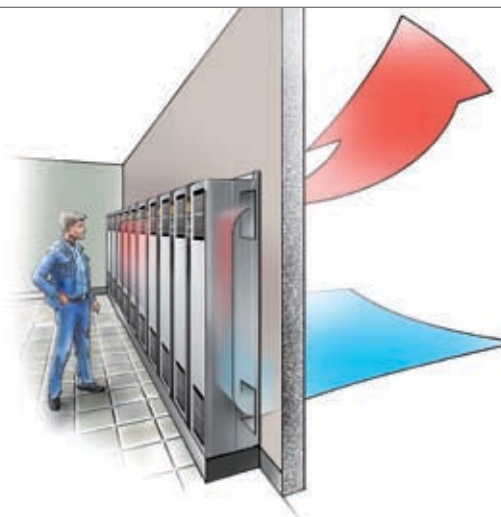
Allows specific monitoring of the connected motor in order to protect it against overheating and damage.

And of course all standard options are available for the general power range.



## **Installation savings with duct cooling**

On a 6 meter wall you can place 10 drives providing 6.3 MW (at 690 V). The process heat from these drives is 126 kW. Mounted on an outside wall, leading the heatsink cooling air directly to the outside, only 19 kW is disposed inside the room, saving significant investment in cooling capacity and operational costs.



## **VLT® PTC Thermistor**

The thermistor card protects the motor from overheating. Approval according to the ATEX equipment directive together with use of approved safe stop (EN 954-1) functionality ensures easy and cost efficient installation of drive without external relay and thermistor isolation.

# Process optimising: Grinding, mixing, dosing and kneading

**Precision combined with flexibility and robust reliability makes VLT® drives the optimal choice for grinding, mixing, and kneading applications.**

## **Tolerant to load changes**

VLT® drives are extremely tolerant to load changes and will keep grinding regardless of changing quantity or quality of the raw material.

## **Built-in intelligence**

Built-in Intelligent features, like the Smart Logic Controller, provides easy automation of, for example, mixing applications, saving external control.

## **Free programmable**

The free programmable Motion Control Option will often replace costly PLC equipment in performing even complex automation.

## **Precise control**

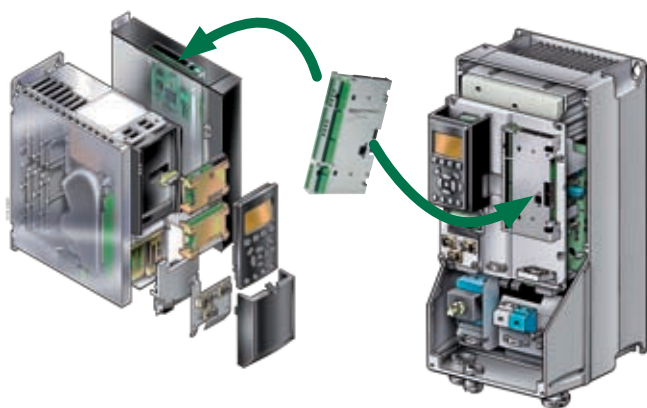
Meticulous VLT® process control improves exploitation of raw material, prevents waste and improves your product quality.

## **Optimised process time**

Change of recipe requires merely shifting between several fixed set-ups.



## VLT® Motion Control option



VLT® Motion Control Option MCO 305 is an integrated freely programmable controller for VLT® AutomationDrive. It adds functionality and flexibility to the already very comprehensive

standard functionality of these drives and allows you to integrate sophisticated control in the drive – simplifying your installation or saving a PLC in a machine.

## **Further options dedicated to chemical applications:**

- NAMUR option Card MCB113
- ATEX approved PTC Thermistor Card MCB 112
- Free programmable controller MCO 305

- Fieldbus options
- General purpose I/O option MCB 101
- Filters
  - dU/dt
  - SineWave
  - Harmonic filters



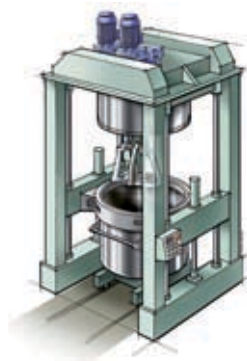
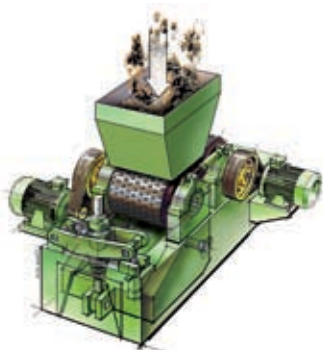
## Eliminate harmonic distortions

### **Passive filters**

The Danfoss AHF 005 and AHF 010 are advanced harmonic filters superior to traditional harmonic trap filters. The Danfoss harmonic filters have been specially designed to match the Danfoss frequency drives.

AHF 010 reduces the harmonic current to less than 10% and the AHF 005 reduces the harmonic current to less than 5%.





Grinder/roller mill features	Benefits
• High torque capability	– Robustness to overload
	– Robustness to uneven substances
• Variability of speed and torque	– Flexibility of grinder
• Easy change of setup	– Saves time
	– Flexibility

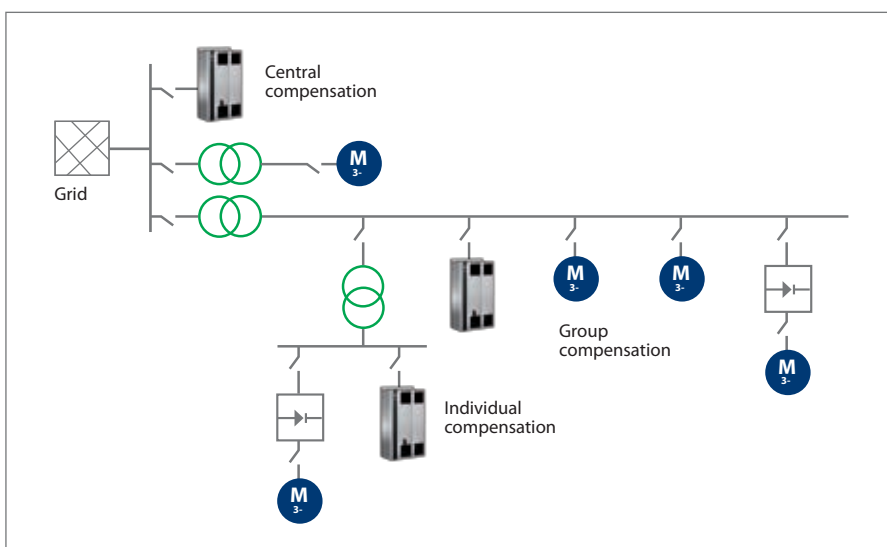
Mixer features	Benefits
• Easy change of setup	– Save time
	– Flexibility
	– Reduce product loss
• Torque control	– Controlled mixing process
	– Robustness against load changes
	– Ability to mix non-Newtonian fluids
• Frequency override	– Avoid resonance in system
	– Increase lifetime
• Smart Logic Controller	– Simple control of mixing process

Dosing feature	Benefits
• Position control of motor	– Precise dosing of ingredients
	– Simple indication of mass or volume
• Torque control	– Ability to dose varying substances
• Easy change of setup	– Quick change of dosing parameters

Kneader features	Benefits
• High torque capability	– Robustness against heavy load
• Smart Logic Controller	– Simple control and process monitoring of kneading process
• Current monitoring	– Simple indication of finished kneading process

### Active filters

VLT® Active Filter MCC 108 identifies harmonic distortion from non-linear loads and injects counter phased harmonic and reactive currents to re-establish optimal sinusoidal power. Danfoss active filters can compensate individual VLT® drives as a compact integrated solution or be installed as a compact stand-alone solution at a common point of coupling compensating several loads simultaneously.



# Process optimising: Centrifuge, extruder and decanter

**Precise torque control, resistance towards torque overload and load sharing are features that make VLT® drives reliable in applications that require torque, like centrifuges, extruders and decanters.**

The drives are able to cope with sudden changes in load without tripping.

## Load sharing

The braking motor in the decanter work in generator mode and provide electrical energy. With load sharing this energy is used by the main motor saving energy. The alternative is more expensive regenerative drives.

## Save energy

Regenerative braking (and active front end) are optional energy saving features that add value to high power drives, particularly in centrifuge applications.

## Operational savings

- Power savings
- Less tear and wear

## Applied cost benefits

- Flexibility
- Less need for software, sensors and controllers

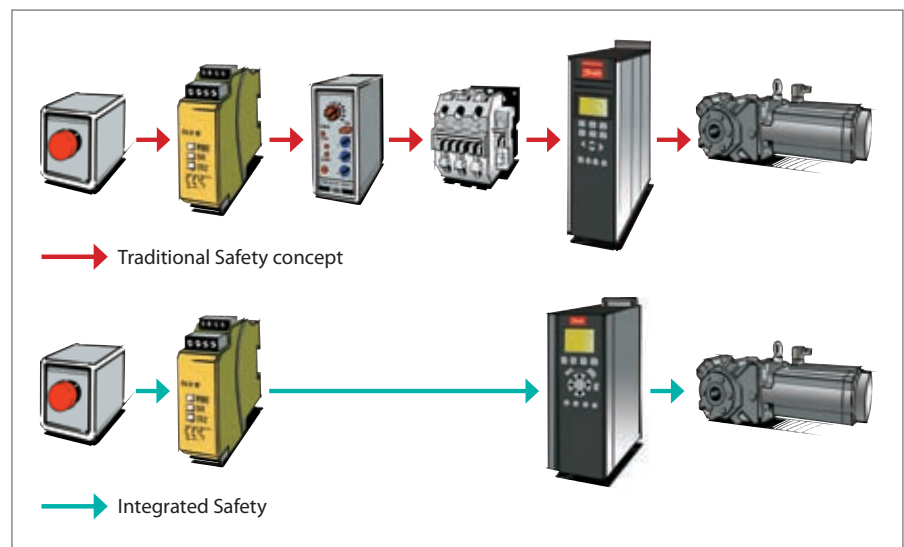
## One wire safety – Safe Stop

The certified safe-stop functionality available with VLT® AutomationDrive is suitable for category 3 installations according to EN 954-1.

This feature prevents the drive from unintended starts by activating a safe stop. The safe stop function satisfies safety category 3 EN 60204-1.

## External components saved

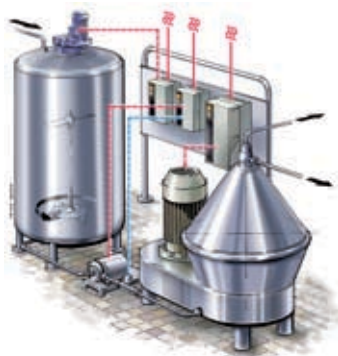
Expensive and bulky external components can be omitted, wiring is considerably simplified, and production down time is minimised with this solution.



Contactors and timer can be omitted in safety installations due to the safety functionality in VLT® AutomationDrive.







#### Centrifuge features

- Variable speed
- Load sharing through common DC-bus
- AC brake
- Flying start
- High motor torque with flux control

#### Benefits

- Flexibility of centrifuge
- Reduced energy cost in multiple centrifuge applications
- Dynamic braking without resistor
- Catches a rotating bowl, saving process time
- Tolerant against impact loads and load shifts

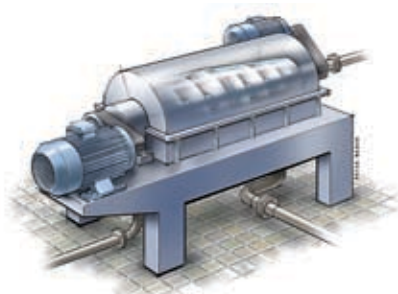


#### Extruder features

- High torque
- Constant torque mode
- Certified Safe Stop functionality

#### Benefits

- No need for larger drive
- Better controllability of extrusion process
- Optimised process control
- Saves external components



#### Decanter features

- Accurate torque control
- Load sharing through common DC-bus
- Variable speed and torque
- Flux motor control
- Controlled start and stop

#### Benefits

- Suitable for back drive applications
- Energy savings through regenerated energy
- Flexible process control and optimisation
- Robust against load shifts
- Reduced maintenance cost

### Example of customised chemical module solution

Danfoss offers customised solutions in close cooperation with partner companies. The example shown is a chemical module that boasts all the protective devices required for use on an EExd motor. This includes the PTC relay, a LC filter reducing the voltage load on the motor, thus complying with NAMUR Recommendation 38. An optimal relay and terminal stop complying with NAMUR recommendation 37 is also applied.

Sine-wave filter (MCC 101)

Extended I/O option (MCB113)

Optional safety relay

NAMUR terminal strip

Optional main contactor



# Process optimising: Pump, dryer, fan, compressor

**User-friendly control, distributed intelligence and reduced power consumption are beneficial for fan applications. The capacity is always matched to the actual load – all the way up to 1.2 MW.**

## **Lower installation cost**

VLT® drives are fitted with a built-in Smart Logic Controller. They can control cooling system functions with fans, pumps and compressors. Valuable data points are saved.

## **Resonance Monitoring**

By pressing a few buttons on the Local Control Panel, the drive can be set to avoid frequency bands at which connected fans create resonance in the system.

## **Intelligent functions**

The VLT® drives handle logical rules and input from sensors, real-time functionality, and time-related actions. This enables the drives to control a wide range of functions, including cascaded P-PI for temperature control.

## **Clean Rooms**

The unsurpassed VLT® HVAC experience developed in our organisation since 1968 ensures quality in clean room solutions.

## **Optimised compressor control**

VLT® drives can optimise control of compressors for cooling and compression of gases, reduce energy consumption and provide constant pressure regulation.

Fewer starts and stops will reduce mechanical wear, and speed control is desirable when an air compressor is running for long periods at part-load.

## **Electronic fan and pump control saves half the energy**

Traditional regulation of air streams employs dampers, having the fans running in on/off operation dimensioned for maximum required flow. Traditional regulation of liquid flow in tubes employs throttles, valves or on/off regulation.

In both pump and fan application, energy consumption rises with the cube of the speed.

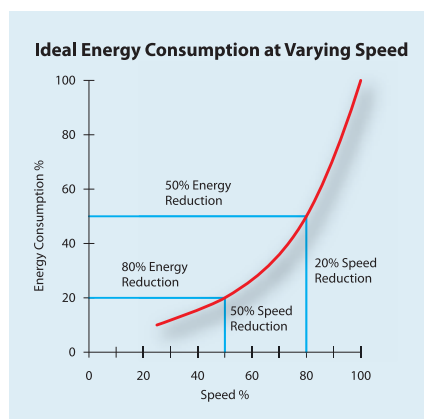
Only half of the energy is required to run the application 20 % below maximum speed ensuring significant savings.

## **Auto tuning of the PID controllers**

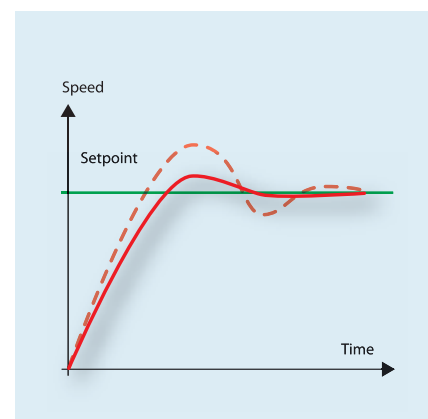
With auto tuning of the PID controllers, the drive monitors how the system reacts on corrections made by the drive – and learns from it, so that precise and stable operation is achieved quickly.

Gain factors for PID are continuously changed to compensate for changing characteristics of the loads. This applies to each PID controller in the 4-menu sets individually.

Exact P and I settings at start-up will not be necessary – which lowers the commissioning costs.



*Energy saving using a VLT® drive is achieved even with a modest reduction in speed.*

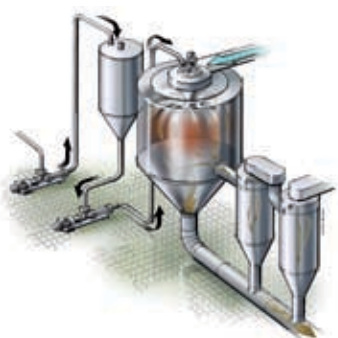


*Auto tune PID controllers can control system functions with fans, pumps and compressors. Valuable data points are saved.*





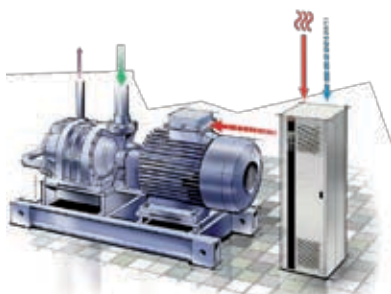
Pump features	Benefits
• AEO using cos phi algorithm	– Up to extra 10% energy savings
• PID controller built in	– Saves cost
• Dry pump protection	– Dynamic braking without resistor
• Flying start	– Protects the pump – Saves energy
• Sleep mode	– Saves energy



Dryer features	Benefits
• Variable control	– Optimised drying process time – Flexibility of process
• Controlled airflow	– Controlled heat dissipation
• Controlled pressure	– Spray optimisation



Fan features	Benefits
• Load dependent capacity control and AEO	– Energy saving
• Skip resonance monitoring	– Noise reduction – Protection of system
• Operates single as well as parallel fans	– Saves installation cost
• PID controller built in	– Saves cost
• Motor preheat	– Avoid damage on motor – Eliminates anti-condensation heater
• Current monitoring	– Controlled filter update



Compressor features	Benefits
• High Starting torque	– No need for larger drive
• Running at current limit	– Extend the systems capacity
• Optimise start/stop cycles	– Protect compressor – Reduce energy consumption
• Variable speed	– Reduced operational noise – Less wear of mechanics – Longer service intervals
• Preheat	– Avoid damage on motor – Eliminates anti-condensation heater

# Service you can rely on 24/7 – around the world

## Sales and Service Contacts worldwide

**Helping to optimise your productivity, improve your maintenance, and manage your finances.**

- 24/7 availability
- Local hotlines, local language and local stock

The Danfoss service organisation is present in more than 100 countries. It is ready to respond whenever and wherever you need, around the clock, 7 days a week.

**Find your local expert team on**  
**[www.danfoss.com/drives](http://www.danfoss.com/drives)**

*Pick your dedicated solution  
from the VLT® service menu:*

### Keep you running

- Current drives update
- Commissioning and regular adjustments
- Preventive maintenance

Service features	Benefits
• 24/7 availability	– The base for efficient use of your resources and Danfoss Drives assets
• Hotline	– Quick response time
• Onsite-repair	– Reduced impact on production
• Certified repair with warranty	– More reliable production
	– Improved maintenance
• Start-up and commissioning	– Increased performance with on-time failure free operation
• Application experts	– Optimise performance
	– Reduced lifecycle cost
• Training	– Trained resources for optimal design and maintenance
• Harmonic survey	– Prevent failure
	– Optimise performance
• Preventive inspection	– Reduce downtime
	– Lower maintenance cost
• Optimisation and retrofit	– Life-cycle optimisation
• Installed base evaluation	– Reduced capital and space bindings
	– Optimised availability
• Stock maintenance and consignment	– Optimised availability with effective finance planning
• Extended warranty	– Predictable budget for repair cost
• Agreed response time	– Minimising downtime
• Fixed repair and maintenance cost	– Effective finance planning for maintenance
• Drives Upgrade Program	– Long-term finance planning for technology upgrade of drives

### Keep you fit

- Training
- Stock maintenance & consignment
- Harmonic Survey
- Environmental Disposal

### Fix your costs

- Fixed Price
- Post warranty agreement
- Transport insurance
- Response time





# Proven experience within chemistry globally



## **BASF, Ludwigshafen, Germany**

With business partners in over 170 countries, BASF is the world's leading chemical company with more than 150 production sites worldwide and over 95,000 employees. Head quartered in Ludwigshafen, Germany, where the company operates the world's largest integrated chemical complex, the BASF Group comprises more than 160 subsidiaries and affiliates.



## **Kabra Extrusionstechnik Ltd, India**

Kabra Extrusionstechnik Ltd (KET), part of the Kolsite group, is a leading manufacturer of Plastic extrusion machinery in India. KET offers a wide range of hi-tech sophisticated extrusion lines. The company has more than four decades of experience and a installation base of over 6500 plants in more than 55 countries.



## **Lanzhou Petrochemical Works, China**

Lanzhou Petrochemical Works, located in north-east China, is one of the biggest petrochemical industry enterprises in China. It has 50 years history with the processing capability of 1050 tons of base oil per year.

In 2004, 12 units of high power VLT® 5000 were delivered to its new 5M tons coking equipment. Danfoss drives greatly help all the large fans save energy and reduce noise.



## **AstraZeneca, United Kingdom**

AstraZeneca is one of the world's leading pharmaceutical companies. It discovers, develops and manufactures high quality medicines.

The company employs more than 65,000 people worldwide: 58% in Europe, 28% in the Americas and 14% in the rest of the world.

The corporate headquarters are in London, UK.



## **Profarb, Poland**

The chemical engineering enterprise Profarb focus on dissolvers, mixers, mills and dosing stations for the coating industry. Activities comprise the complete process from decision making through production of machines to commissioning and services.



## **Albemarle Corporation, USA**

Albemarle is a leading global manufacturer and supplier of polymer additives, catalysts and fine chemicals for consumer electronics, petroleum and petrochemical processing, pharmaceuticals, agricultural products, and transportation, industrial, construction and packaging materials.

# Products overview



## VLT® AutomationDrive

An extremely flexible and cost-effective drive suitable for all industry applications – from simple speed control to dynamic servo applications.

- 0.25 – 37 kW at 200 – 240 V
- 0.37 – 1,000 kW at 380 – 500 V
- 37 – 1,200 kW at 525 – 690 V
- Built-in DC coils as standard
- RFI filters
- Enclosure ratings from IP 00 to IP 66
- Integrated Smart Logic Controller
- USB and RS485 as standard
- Integrated optional communication options (Profibus DP/V1, DeviceNet, CanOpen, EtherNet IP and more)
- Integrated optional additional I/O (digital I/O's, NAMUR, Thermistor)
- Integrated PLC option according to IEC 61131-3



## VLT® Soft Starter MCD 3000

The MCD 3000 is a total motor starting solution providing all the best in soft starter functionality. It offers high end functionality whatever it is for starting, stopping or protection of motor or application.

- 7.5 – 800 kW, versions for 200 – 690 VAC
- Current limit soft start with initial current ramp up
- Four different auto-adjustable ramp down profiles
- Numerous motor protection features
- Manual or remote control and password protection of parameters



## Sine-wave and dU/dt Filters

**Sine-wave filters** reduce motor insulation stress (dU/dt & peak voltage) and noise from the motor. Bearing currents are also reduced.

### A perfect solution for:

Applications with older motors  
Installation of motors in Ex areas  
Applications with frequent braking

**dU/dt filters** also reduce the motor insulation stress reduce by reducing dU/dt values across the motor terminal phase-to-phase voltage. The dU/dt filter is smaller

### A perfect solution for:

Applications with motors where du/dt need to be reduced.

### Range

3 x 200 – 500 V  
3 x 525 – 690 V

The filters come in IP 00 and IP 20 enclosures



## VLT® Harmonic Filter AHF 005/010

Easily & Effective Harmonic distortion reduction by connecting the AHF 005/010 harmonic filter in front of a Danfoss frequency converter.

- AHF 005 reduces total harmonic current distortion to 5%
- AHF 010 reduces total harmonic current distortion to 10%
- Small compact housing that fits into a panel
- Easy to use in retrofit applications
- User-friendly start-up – no adjustment necessary
- No routine maintenance required



## VLT® Active Filter MCC 108

Danfoss active filters are a flexible solution for both harmonics mitigation and power factor correction. Built on our drive platform and extensive knowledge in controls, the active filter offers a reliable and user friendly solution.

### Range:

190 – 500 A @ 400 V  
140 – 360 A @ 690 V  
– higher by paralleling

### The perfect solution for

- Restoring weak networks
- Increasing network capacity
- Increasing generator power
- Meeting compact retrofit demands
- Securing sensitive environments
- Utilising energy savings

# Complementary products

Danfoss offers a wide range of products to support chemical process systems



## VLT® Motion Control Tool MCT 10

**Setup software provides easy control of details as well as a general overview of drive systems, large or small. The tool handles all drives related data.**

### More efficient service organization

- Scope & logging: analyse problems easily
- Read out alarms, warnings and fault log in one view.
- Compare saved project with on-line drive

### Fieldbusses

VLT® Motion Control Tool communicates via:

- Profibus
- RS485

### Basic version (freeware):

- Limited Scope & Graph
- View alarm history
- Limited number of drives (4)
- MCO 305 support

### Advanced

- Alarm history in saved projects
- Unlimited number of drives
- Motor database
- Conversion wizard
- Improved Profibus DPV1 support

### Security

VLT® Setup Software MCT 10 stores parameter setups from any drive or drive group you want. This provides backup for the single drive but also backup for any system you want to rebuild.

### Documentation

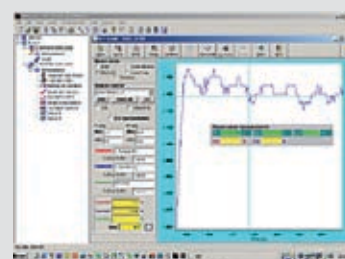
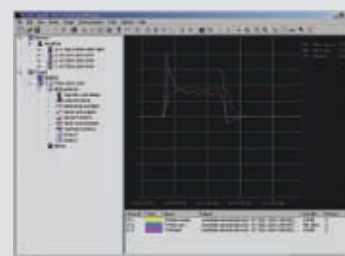
The setup of your drives system is valuable as documentation for approving authorities. This information documents the performance of your manufacturing system.

### Internet download

<http://www.danfoss.com/drives>



*Running-in applications are faster due to the graphical overview of dynamics. Data are logged and will be available as performance documentation.*



Features	Benefits
• One PC tool for all tasks	– Save time
• "Explorer-like" view	– Easy to use
• Option programming	– Save time
• Online and offline commissioning	– Save cost
• Scope & logging	– Easy analyzing – less downtime
• Alarm history	– Easy fault finding
• Multiple interfaces	– Easy connection
• USB connection	– Easy connection





## Environmentally responsible

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 Electronic Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

### Impact on energy savings

One year's production of VLT® drives will save energy equivalent to the energy production of a 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 softstarters in more than one hundred countries, focused only on drives and softstarters.

### 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 everywhere with application advice and service.

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

