

Danfoss



VLT® Textile
Reliable drives solutions for textile applications

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



**Extended and customised
service solutions available**
With the DrivePro™ service programme
production uptime can be optimised
and costs reduced. A customised service
programme is self-financing.





The VLT® brand is widely known and respected within the textile industry. 9 out of 10 enterprises globally knows Danfoss as a competent and reliable partner and drives provider.

Proven reliability in the textile business

Danfoss Drives is a proven preferred supplier within textile industries. Unsurpassed reliability characterizes both our drives and the global sales and service organisation. Danfoss Drives leaves customers confident, that production downtime will not be due to the VLT® drives.

Dedicated organisation

A dedicated staff is ready to support customers within the textile industry anywhere in the world. Local sales- and service companies in more than 100 countries provide backup all over the world.

Meets tough conditions in textile

Danfoss offer solutions tailored to the specific needs of the textile industry, combining all the necessary components in integrated package solution.

- Heat-exchange concepts to meet tough environments
- Excellent run-through and controlled ramp-down functions
- Dedicated textile functionality (wobble, winder)
- Basic and advanced motion control functionality
- Outstanding EMC performance

Application knowledge

With extensive knowledge of your business we offer process expertise in all stages of application, development and implementation. VLT® experts will work with you to design and select optimal solutions.

Comprehensive product range

With our modular product range, we are able to combine relatively few components into a multitude of variations and solutions – while passing the benefits to you.

Stable operation

High-quality VLT® frequency converters and softstarters designed for virtually every purpose in the textile industry put an end to costly downtime.

Customer driven innovation

Customer requirements for an intuitive user interface have been adopted and made 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 & Sullivans innovation award 2006.

Innovative supply chain

The modular technology concept allows for mass production of highly customised drives. The production setup is able to assemble and test a customised drive – one out of thousands of hardware configurations – in 24 hours.

Sales and Service Contacts worldwide

Helping to optimise your productivity, improve your maintenance.

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

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

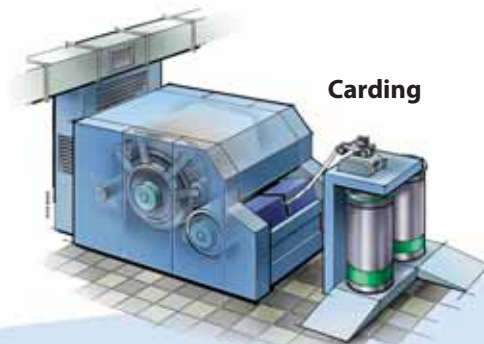
Find your local expert team on:

www.danfoss.com/drives

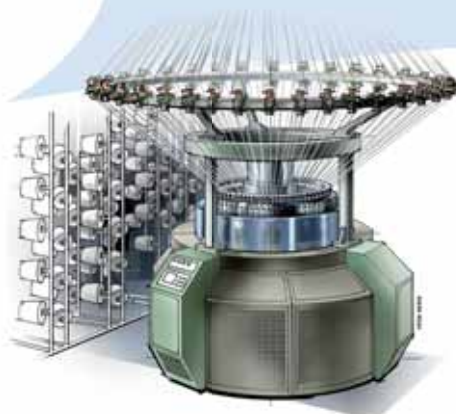
VLT® solutions optimise processes anywhere in a textile plant



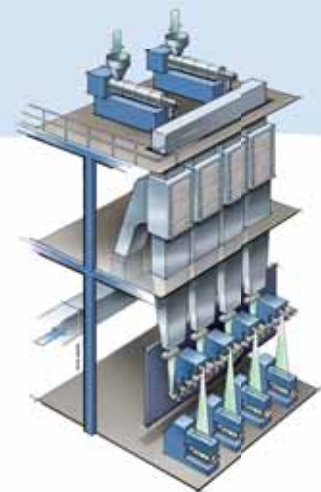
Ring spinning



Carding



Circular knitting



Extruding

Reliable and flexible VLT® drives are available for any application within the textile 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 connect, operate and 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.

Components in, for example, a 750 kW drive, can be commissioned as easily as in a 0.75 kW drive.

Compact dimensions

- The smallest frequency converters of their class, they require less control cabinet space
- No side clearance required between individual units, allowing more drives in a cabinet
- Optional extras can be integrated at the factory or retrofitted at a later date.

Optimum customisation

- IP 00, IP 20, IP 21/NEMA Type 1 and IP 55/ NEMA Type 12 and IP 66 enclosures are available
- Optional modules enable individual configuration of the drive
- Options capable of integration 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 as and when required: Motion Control Options, thermistor, fieldbus, additional I/O etc.



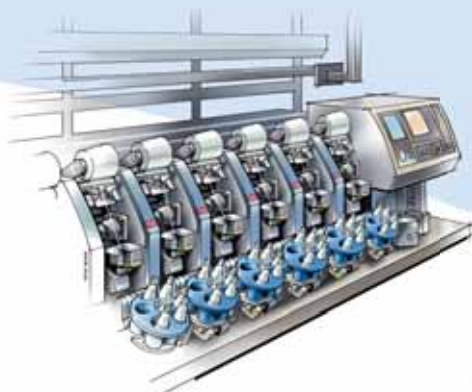
Draw texturing



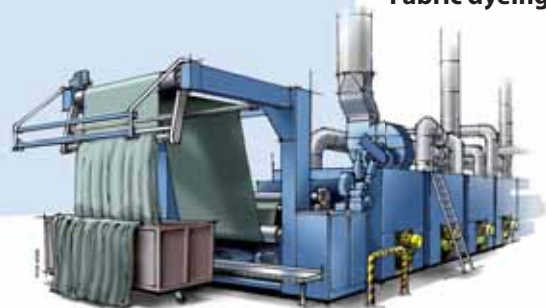
Piece dyeing



Finishing



Cone winding



Fabric dyeing

Maximum availability and reliability

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

Energy conservation

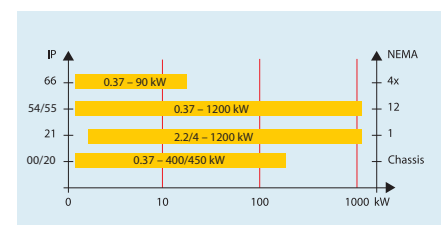
The high degree of efficiency (typically over 98%) reduces power loss, power consumption and waste heat. Less cooling investment and less operational cost on cooling leads to cost savings.

Time saving installation and commissioning

- Standard operation, software and options for the entire VLT® AutomationDrive series
- Operation in national language
- Front access for all installation and servicing work
- Backwards compatible

Handles tough environment

- Choice of heat-exchange concepts (cold-plate, fan-cooled, panel through-mount, with removable fan for cooling by external air source)
- Coated PCBs
- Intelligent heat-management system
- Various degree of enclosures (up to IP 66). See graphics below



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 specific industries are a matter of plug-and-play.

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. On board manual is also available from the display.

Hot plugable 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

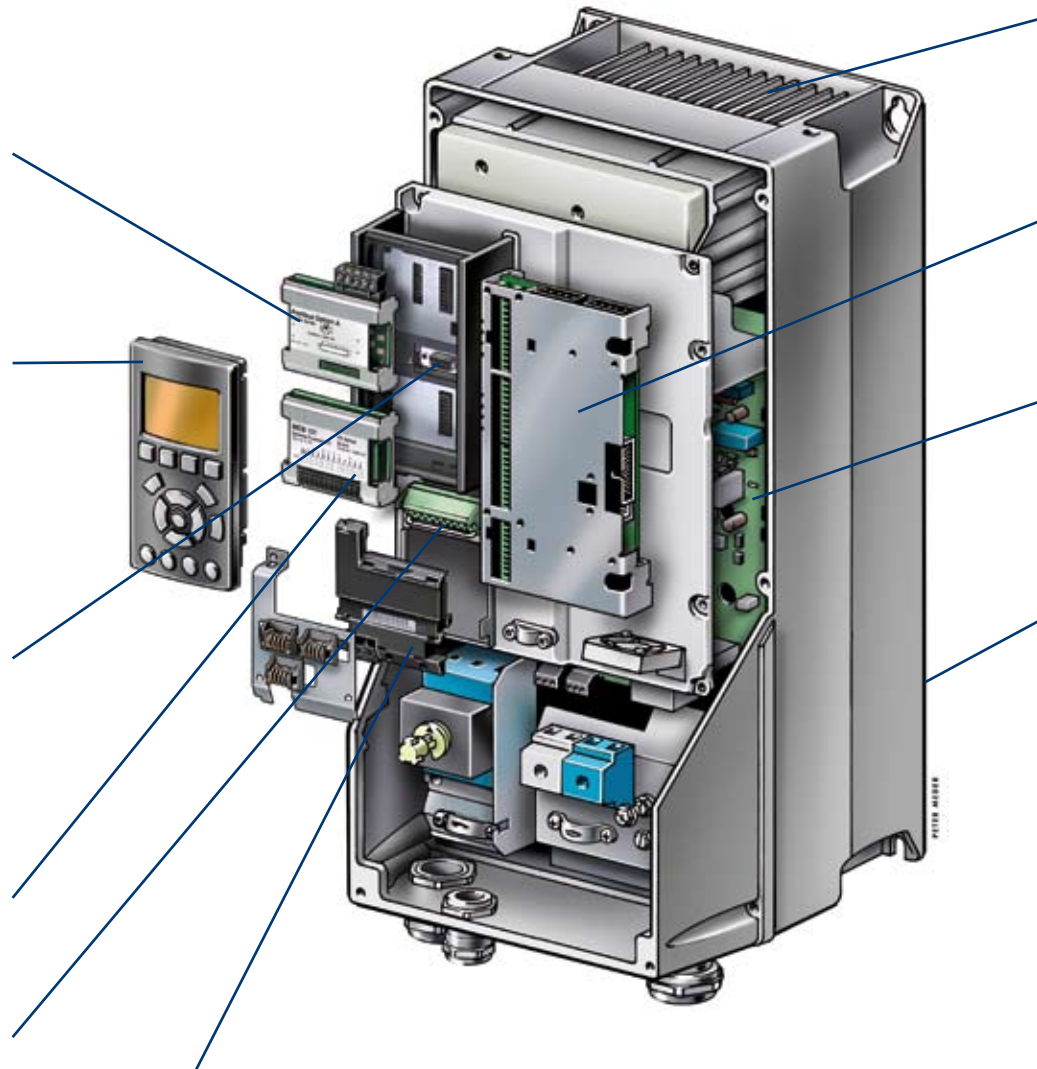
General purpose I/O, relay and thermistor expand the flexibility of the drives.

Control terminals

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

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 FC302 version.



24 V supply

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

EMC-performance

Built-in RFI filter available in versions covering emission categories C1, C2 and C3 according to the EMC product standard EN61800-3 (previously classes B, A1 and A2)

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.

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.



Danfoss Drives received the Frost & Sullivan Award for Product Innovation 2006 for the unique VLT® Automation-Drive series.



The local control panel (LCP) was given the international iF design award 2004 in the category "interface in communication".

No forced airflow over electronics

Complete separation between the heatsink area and the electronics prevents contamination of the electronics.

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 environments coating class 3C3 is an option.

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. Drives can be mounted side-by-side; no spacing is required.

Advanced operation control

Center Winder with closed-loop tension control

- Follows line speed
- Diameter calculator adjusts winder reference
- Tension PID adjusts reference

Wobble function

For winding applications ensures optimal yarn pattern.

Smart Logic Control

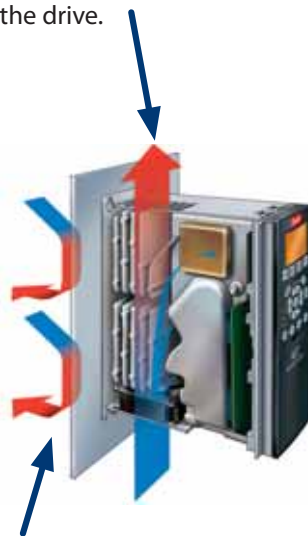
The new VLT® drives have Smart Logic Control built in. Basic, logic functions can be performed by the drive itself, hence the Smart Logic Control can often replace a PLC in the system.

Intelligent heat management

The VLT® family of drives offers various heat-exchange concepts to accommodate different demands on location, space requirements, contamination considerations etc.

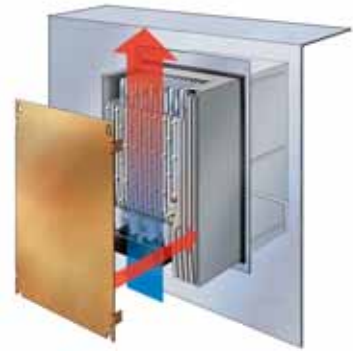
Convection cooling

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



Panel Through Mount

With the drive safely enclosed in a tight cabinet its cooling fins are out in cold air. The main fan can be removed if an external air flow is available.



Cold plate

The heat is transported out of the cabinet to a cold surface leaving only a fraction of the heat where the drive is located.

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.



A smart, dedicated back channel cooling duct kit allows IP 00 chassis style drive enclosures to be mounted in Rittal cabinets so cool air removes 85% of excess heat without contact to the electronics.

Process optimising: Spun yarn and fabric

Standard built-in features and dedicated textile futures make VLT® solutions the optimum choice for operating yarn and fabric applications.

Challenging environments:

- Can operate in temperatures up to 50° C
- Intelligent heat management
 - Reduction of switching frequency, to lower internal losses
 - Alarm
 - Controlled shut down

- Alternative heat exchange concepts, to meet various requirements
- Availability of IP 55/66, to prevent entry of dust particles
- Coating of printed circuit boards, to prevent corrosion due to humidity and presence of lint

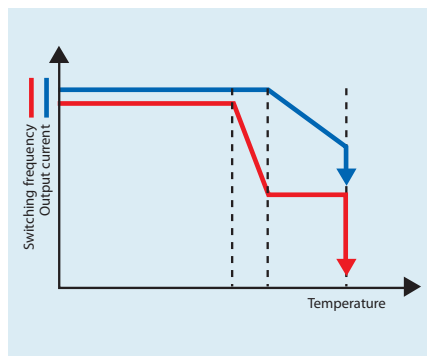
Speed profiles

- Smart Logic Control (SLC), basic PLC function as standard, for basic motion control tasks (e.g. for ringspinner profile)
- Motion Control Options, for extended functionality

Energy savings:

- High efficiency
- High energy savings possibility, compared to machines without drives

Switching frequency adjusts to temperature



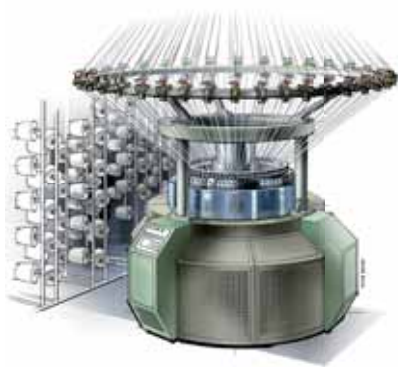
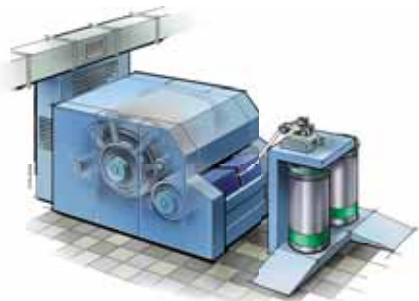
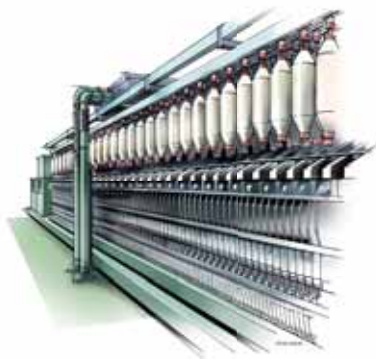
A VLT® drive will overcome short periods of over-temperature. It will run through it by changing switching frequency and diminishing output current to live through and avoid tripping.

- Fewer interruptions
- Drive protection

Humidification

The use of variable speed drives saves substantial amounts of energy – typically 20% or more – and improves reaction to changes in humidity and temperature.





Ringspinner features	Benefits
• Panel through mount	– No air-over-electronics
• 50° C ambient temperature	– Only minor heat generation in the cabinet
• 3C2-coating as standard; 3C3 as option	– No over temperature trip; less down time
• Graphical display and motion control option	– Improved immunity to humid and aggressive ambience
• In-built, basic PLC ("Smart Logic Controller")	– Direct programming of RS speed profile
• Disconnect switch	– PLC can be omitted
• High efficiency, Automatic Energy Optimizer function	– No switch required on the cabinet
• IP 55 design for direct field mount	– Less heat loss on drive
• Integrated Motion Control Option	– Less thermal load on humidification plant
• Built in RFI filter	– No extra cabinet space required for retrofit
• Built in DC harmonic filter	– Realization of speed vs. time profile. External controller and its wiring omissible
	– Saves space and external wiring
	– Less wiring and less cabinet space

Card features	Benefits
• Innovative, cold-plate design	– Drive is isolated from the environment
• Closed-loop speed control	– Reduced heat load in the cabinet
• Motion control option	– Drive fan can be turned off
• Common DC-link	– Optimal product quality
• Built in DC harmonic filter	– Synchronized operation of motors
• Small foot print	– Load sharing; energy savings
• Side-by-side mounting	– No need for an external AC chokes and saves space, cost of AC choke, wiring space
• Easy pluggable, firm grip connectors	– Saves cabinet space
	– Easy wiring. Reduces maintenance cost

Circular knitting features	Benefits
• Cold-plate	– Drive is isolated from the environment
• Minimum air over electronics	– Long service intervals
• Basic drive with excellent performance (FC51)	– Cost savings
• In-built, basic PLC ("Smart Logic Controller")	– System PLC can be omitted
• "Soft" ramp-up/ramp-down	– Prevents yarn breaks
• High resistance to mechanical vibrations	– less stress on mechanical components
	– Long life, less downtime

Coated PCB

VLT® drives are all available with coated circuit boards for maximum reliability in humid, aggressive and dusty environments.

Coating to withstand 3C2 "moderate" environments (according to IEC721-3-3) as well as 3C3 "harsh-" environments, are available. Conformal coating is available to the entire range of VLT® AutomationDrive, VLT® 2800 and VLT® Micro Drive.



Process optimising: Man-made fibre

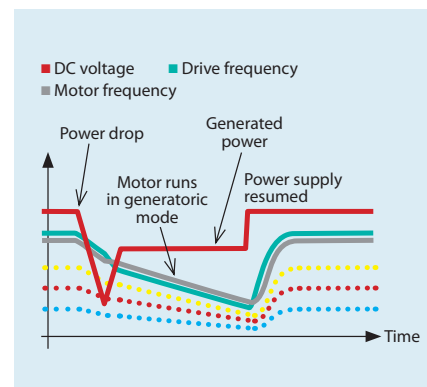
Up-time is doubly important in the textile industry. Unplanned stops mean lost production time – and leads often to broken yarns, variations in product quality and expensive time used for re-establishing the production. VLT® drives are built to prevent unforeseen stops. They handle temporary overheating, varying power quality and even stop in optimal ways.

Operational reliability:

- Kinetic backup for controlled ramp-down in case of power loss
- Common DC-connectors, for, connection to back-up power source, for synchronised ramp-down
- Intelligent heat management
- High tolerance to low-quality power supply

Dedicated functions

- Wobble-function as standard



Tolerates low-quality power supply

Drives from Danfoss incorporate a number of features to improve tolerance towards low quality power supply and ensure continued operation and/or controlled termination of operation.

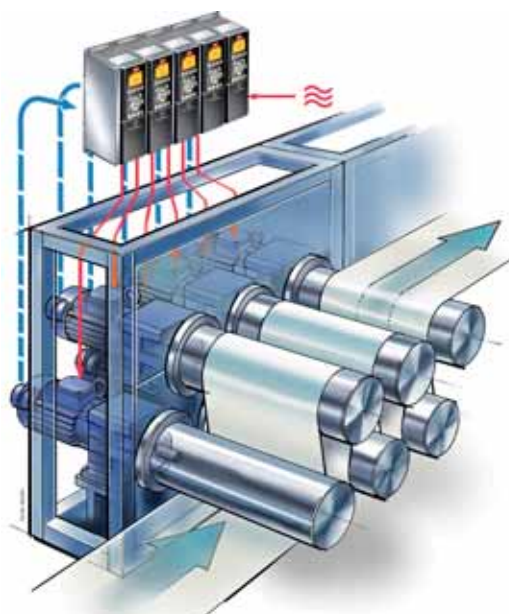
- Large tolerance for nominal voltage e.g. 380 – 480 V
- Kinetic or battery back-up via common DC-bus
- Self-protection for power failure, by utilising kinetic backup feature
- Controlled, synchronised ramp-down to stop when necessary
- Extended tolerance to voltage sags to prevent tripping
- Built in DC-chokes ensures a power factor near unity and lower peak currents

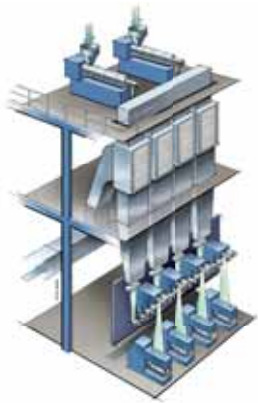


Stretching systems

- High stretching accuracy
- Optimised load sharing with common DC-bus
- Flexible production
- For asynchronous or synchronous motors

Danfoss offers built-in controller for asynchronous or synchronous motors.





Extruder/spinner features	Benefits
• Excellent torque and speed characteristics	– Stable operation
• Maintenance free (compared to DC systems)	– Cost savings
• 50° C ambient temperature	– Prevent over temp alarm and downtime
• Kinetic back-up	– Run-through capability at brown-out
• Common DC link	– Controlled ramp-down at power loss
• Coating of PCBs; 3C2 as standard, 3C3 optionally (VLT® AutomationDrive)	– Synchronised ramp-down at power loss
• Built in DC filter	– Improved immunity to aggressive ambience
	– Reduced harmonics
	– No need for external AC choke
	– Space savings



Draw texturiser features	Benefits
• Minimum air over electronics	– Long service life
• Coating of PCBs; 3C2 as standard, 3C3 optionally (VLT® AutomationDrive)	– Extends lifetime of drive
• Side-by-side mounting	– Saves cabinet space
• 50° C ambient temperature	– Improves operational reliability
	– Reduces unscheduled stops
• Wobble function as standard	– Optimal yarn pattern
	– Cost savings; improved flexibility
• Synchronised start and stop	– Improved yarn quality and less yarn breakage
• Common DC-link	– Synchronised ramp-down at power loss
	– External power back-up source possible



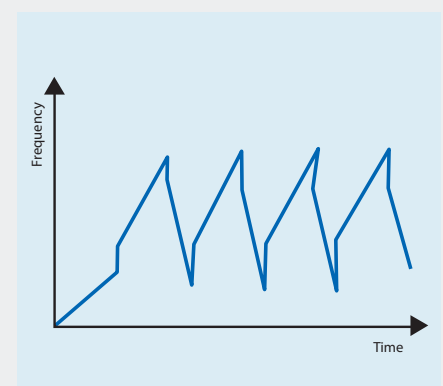
Cone-/cheese winder features	Benefits
• Side-by-side mounting	– Saves cabinet space
• Wobble function as standard	– Optimal yarn pattern
	– Cost savings; improved flexibility
• 8 preset references	– Easy change over between yarn types
• A single drive can power multiple motors	– Cost savings
• “Soft” ramp-up/ramp-down	– Prevents yarn breaks; less stress on mechanical components
• Multi language key pad	– Easy programming
• Built in user manual	– Saves time

Wobble functions for winders

Integrated “wobble” functionality ensures optimal yarn packaging and provides more flexibility compared to a fixed or mechanical traverse function.

The wobble function is standard in the VLT® 2800 series.

- Multiple motor operation possible for bobbin drive system
- Higher winding speed and better bobbin filling due to built-in wobble function for traverse system
- No mirror effect on yarn package
- Programming in relative and absolute parameters



Process optimising: Printing, dyeing and finishing

Precision combined with flexibility and robust reliability makes VLT® drives the optimal choice for treatment of yarn and fabric.

Built-in intelligence, freely programmable options leads to precise control and optimised process time.

Dedicated functions for winding and re-winding

- Smart Logic Control (SLC), PLC function as standard, for basic motion control tasks
- Embedded surface winding functionality
- Solutions for positioning and synchronising:
VLT® Motion Control MCO 305
- Dedicated function for surface- and center winding:
VLT® Motion Control MCO 352

Challenging environments:

- Can operate in temperatures up to 50° C
- Intelligent heat management
 - Reduction of switching frequency, to lower internal losses
 - Alarm
 - Controlled shut down
- Alternative heat exchange concepts, to meet various requirements
- Availability of IP 55/66, to prevent entry of dust particles
- Optional coating of printed circuit boards, to prevent corrosion due to humidity and aggressive substances

Precise control of motor speed and torque:

- VVC Plus and FLUX Vector
- Algorithms for asynchronous motors and permanent magnet motors

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





Piece dyeing features	Benefits
• High protection class	– Prevents aggressive substances from entering the drives
• Coating of PCBs; 3C2 as standard, 3C3 optional (VLT® AutomationDrive)	– Long lifetime in harsh environments
• High efficiency	– Energy savings
• 50° C ambient temperature	– Improves operational reliability – Reduces unscheduled stops
• Built in DC harmonic filter	– Reduced harmonics – Less need for AC choke – Space saved



Continuous dyeing features	Benefits
• Small footprint	– Saves cabinet space
• Side by side mounting	– Saves cabinet space
• IP 21/IP 55 design for direct field mount	– Precise tension, optimal product quality
• Center winder option	– Cost effective speed dependencies
• Scalable master/slave operation	– No external control functionality is required for basic winding functions
• Standard function for surface winding	– Cost savings
• Multi-motor operation	– Long lifetime in harsh environments
• Coating of PCBs; 3C2 as standard, 3C3 optionally (VLT® AutomationDrive)	– Complies with harmonic standards – No external AC choke needed – Less wiring and less cabinet space
• Built in DC harmonic filter	

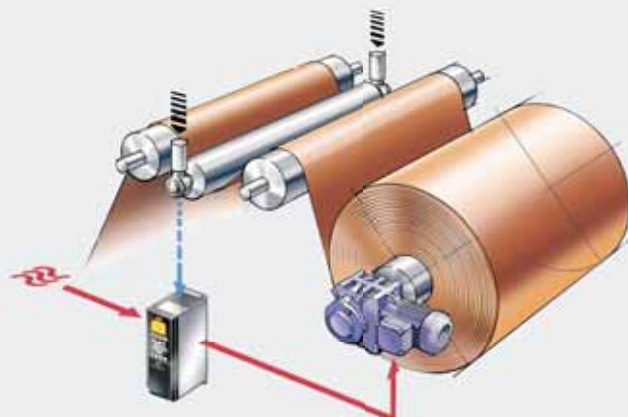


Stenter features	Benefits
• Motion Control Option	– Precise synchronization of motors
• Tension control	– Maintains precise tension, for optimal product quality
• Multi-motor operation	– Cost savings
• Coating of PCBs; 3C2 as standard, 3C3 optionally (VLT® AutomationDrive)	– Improved immunity to aggressive ambience
• 50° C ambient temperature	– Improves operational reliability – Reduces unscheduled stops

Winder Systems

Danfoss offers solutions for center winders and surface winders. A broad range of frequency converters ensures a drive for every requirement, be it simple, or high-dynamic.

- Low torque ripple ensures smooth winding
- Feedback to PID controller from a dancer roller maintains web tension
- Web protection due to built-in torque controller



Product overview



VLT® AutomationDrive

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

VLT® AutomationDrive comes in a basic version (FC301) and an advanced version (FC 302) with additional functionalities.

A choice of different heat-exchange concepts, and enclosures accommodates any requirements, whether the drive is mounted in a cabinet, or in the open, exposed to the environment.

- 0.25 – 3.7 kW, 200 – 240 V, 0.37 – 800 kW, 380 – 500 V, 37 – 1.2 MW, 525 – 690 V
- Bookstyle IP 20/IP 21/NEMA 1/IP 4X top and IP 55/NEMA 12
- Compact drive IP 55 and IP 66/NEMA 4
- Built-in PID controller, DC coils, and RFI-filter
- Integrated Smart Logic Controller, (USB and RS485) as standard
- Integrated optional communication options (Profibus DP/V1, DeviceNet, CanOpen and more)
- Integrated optional additional I/O (digital I/O's, encoders, (incremental, absolute, sin/cos, resolver))
- Integrated Motion Control Option



VLT® 2800 Series

An extremely compact series of multi purpose drives designed for side-by-side mounting and developed specifically for low power applications.

- 0.37 – 2.2 kW, 200 – 240 V and 0.55 – 18.5 kW, 380 – 480 V
- Bookstyle IP 20
- Side-by-side mounting in any direction
- Built-in PID controller, RFI-filter and DC coils
- Integrated RS 485 interface as standard
- Integrated Profibus (optional)
- Wobble function as standard



VLT® Micro Drive

A cost effective, very compact drive with basic functionality and excellent performance. Made for easy commissioning and operation. Although a basic drive, it is made to the same high quality standards of other VLT® drives and with high emphasis on user friendliness.

- 0.18 – 3.7 kW, 200 – 240 V
- 0.37 – 7.5 kW, 400 V
- 50° C ambient temperature
- Bookstyle IP 20
- Side-by-side mounting
- No forced air flow over the electronics
- Integrated Smart Logic Controller (SLC) as standard



VLT® Decentral Frequency Converter

For mounting on (any) motor or near the motor. No additional installation box due to integrated T-distributor and loop-through cage clamp terminals. Integrated Profibus or DeviceNet fieldbus interface. Built-in optional service switch. Optional electromechanical brake control.

- 0.37 – 3.3 kW (FCD); 0.37 – 7.5 kW (FCM)
- IP 66, a corrosion resistant coating
- May be mounted on the wall close to the motor, or directly onto the motor
- Twin part design makes commissioning and service easy

VLT® AutomationDrive: IP 20 enclosures, optimized for panel installation

The installation volume and/or the foot print are reduced by up to 60% compared with previous series.

The service sections nevertheless fulfil the highest requirements even for applications with high overload, long motor cables and ambient temperatures up to 50° C.

Optimised design

Optimised efficiency and intelligent cooling technology make the compact and service friendly design possible. Even equipment such as EMC filters, harmonics suppression and brake modules are integrated in the enclosure.

Save installation time

The IP 20 series is designed for easy accessibility and time-saving installation.

Mechanical fastening points are easy to access from the front even with automatic tools. All terminals are sufficiently dimensioned and clearly marked. One need only loosen a few screws to get to the terminals. Accessories for bonding of screened cables are included.

The compact enclosures are easier to install. This is important especially within existing installations with poor accessibility.

Modular and fully compatible

The IP 20 enclosed series completes the enclosure program of the modular VLT® AutomationDrive series with IP 21, IP 55 and IP 66 enclosures. They all support completely the modular platform of the VLT® AutomationDrive series.

An extensive range of options and accessories is available, optimising the drive for the respective application.

VLT® Motion Control Tool MCT 10

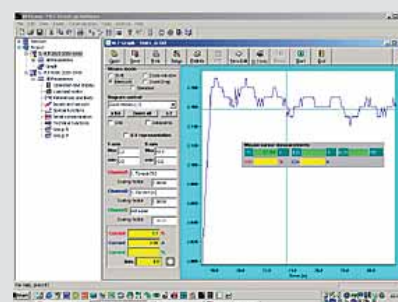
For managing Drive Parameters in systems the new Motion Control Tool MCT10 is the perfect tool for handling all drive-related data.

The MCT10 offers you:

- Project orientation, one file that contains all parameters settings plus user-defined documents
- Explorer-like view, gives the user a fast learning curve
- VLT® Motion Control Tool offers programming of synchronisation and positioning in same environment: one PC tool for all tasks
- On-line and off-line commissioning
- Support of different interfaces RS485, RS232, USB and Profibus (plus more to come)
- Importation of drive settings from Windows and DOS version of Dialog



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





Protects environment

VLT® products are manufactured with respect for environment, safety and wellbeing.

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 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 with application advice and service wherever they may be.

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

