



# VLT® FlexConcept Energy-efficient, flexible & reliable drives solutions for the future



Up to 70%  
reduction

in the overall number of variants in the plant by applying the components of the new VLT® FlexConcept

# VLT® FlexConcept – efficient drives solutions for the future – now!

Modern manufacturing regimes need higher efficiency, more flexibility and greater reliability in their drive systems than ever before – all necessary to reduce manufacturing costs.

To meet that need, Danfoss has developed the VLT® FlexConcept – a modern, contemporary drive system using modern motor technology, combined with the most advanced inverter drives and developed as a unified system.

## Highest efficiency

The most efficient variable frequency converters in the world, coupled with high reliability geared motor units driven by compact, efficient, permanent magnet (PM) motors is the ideal drives solution for every high volume manufacturing facility.

## Centralised/decentralised drives – your choice

Danfoss VLT® drives offer the flexible choice of drives for centralized location in control rooms or decentral units for mounting close to or even onto the drive motors, giving you greater flexibility in plant design and maintenance.

## Meets the toughest hygiene regulations

To meet the specialised wash-down needs of hygiene-specific conditions such as in food and beverage plants, the geared motor units VLT® OneGearDrive have been created with a smooth crevice-free design that leaves no hiding place for germs or food contamination. At the same time, the durable coating applied to both the prime movers and the VLT® Decentral Drive FCD302 has been

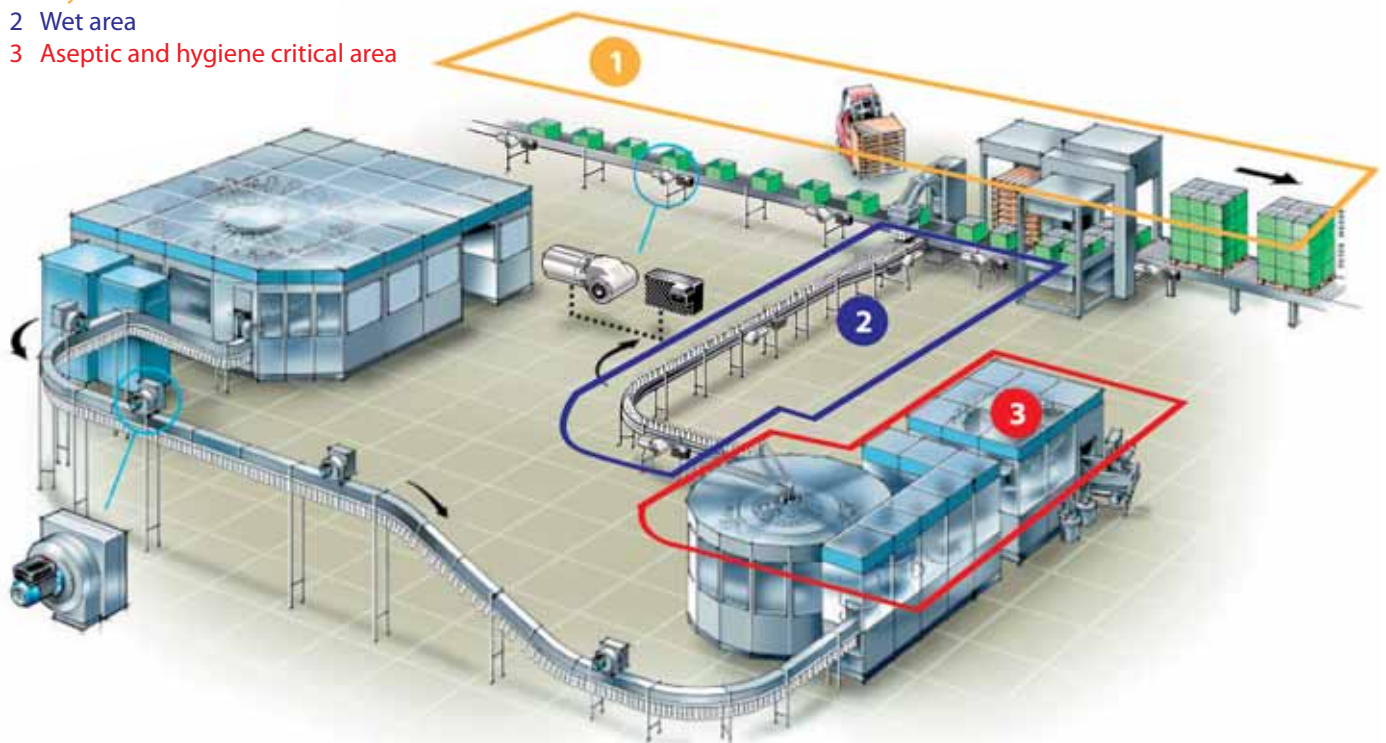
designed to withstand the harshest cleaning chemicals and processes, ensuring effective wash-down with no detriment to reliability.

## Reduced spares holding

The variety of drive solutions available to manufacturing industry is greater than ever before, which can result in substantial spares holdings and increasing costs in storing and maintaining those spares. VLT® FlexConcept cuts through this problem at a stroke and can reduce the number of drive variants by up to 70%.

## Drive solutions

- 1 Dry area
- 2 Wet area
- 3 Aseptic and hygiene critical area



# Fewer variants – increased freedom of choice at reduced cost

With fewer variants, VLT® FlexConcept simplifies project planning, installation, commissioning and maintenance, especially in conveyor applications, irrespective of whether a centralized or decentralized plant design is required.

The system components provide the user with maximum flexibility with a minimum number of units – i.e. motors, gear units and frequency converters, which offer a unified operating design and standard functions.

## Variant reduction up to 70%

VLT® FlexConcept offers the highest level of flexibility in selecting drive components and system structures, regardless of whether the system is to be centralized or decentralized or whether the drives are destined for use in a dry, wet or aseptic area. The overall number of system variants could be reduced by up to 70%.

## Maximum energy efficiency – lowest running costs

Maximizing energy efficiency has been a prime focus in the development of VLT® FlexConcept.

All the components guarantee a high level of efficiency and either meet or beat the new EU regulations relating to motors and their use in systems, as well as in the retrofitting or modernization of existing systems.

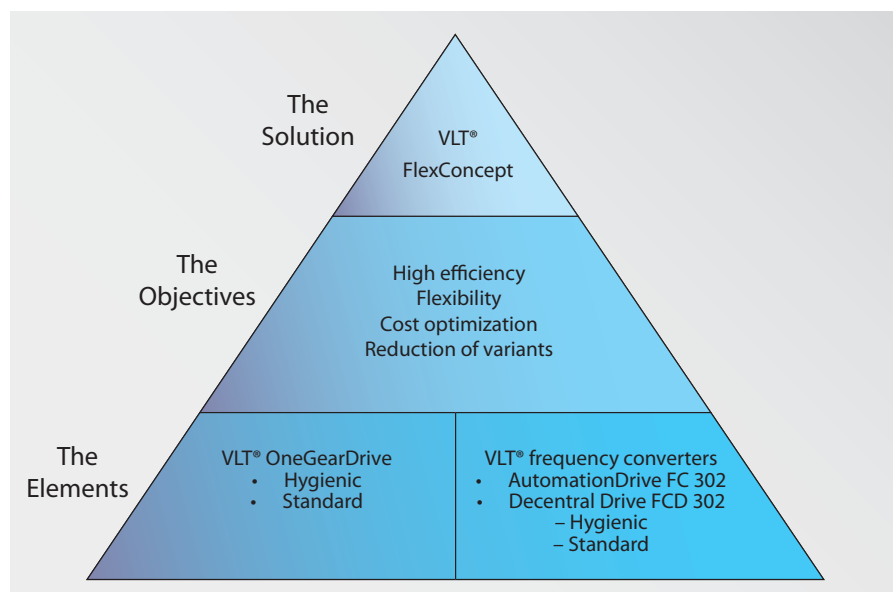
## Open system architecture

The open system architecture of the VLT® FlexConcept allows users to meet the demands of a new system development or a retrofit by combining with available solutions from other controls vendors to implement the best configuration possible. This eliminates any dependence on a single supplier while maximising system efficiency and control flexibility.

Features	Customer benefits
Operation of AC and PM motors	Manufacturer independence; suitable for simple or dynamic applications
Centralized or decentralized	Flexible system planning; simple integration of existing system parts
Open-loop operation	Simple cabling; cost reduction
Closed-loop operation	Synchronization of dynamic band sections and machines
Equal parameter structure and operation	Reduced training expenditure; same display and PC software for parameterization; text in national language for rapid diagnosis
Safety function	No costly protective combinations required; high level of operating safety and system availability
Enclosure type IP 66	Use in all system areas. Flexibility also in retrofits
High level of efficiency of up to 90% (VLT® OneGearDrive together with VLT® AutomationDrive FC 302)	Reduction of TCO costs (cost savings of up to 25% compared with conventional systems)
Worldwide support	Worldwide Danfoss service

# VLT® FlexConcept

## – quicker and more cost effective



**Effective, on-going cost reduction requires drive solutions that significantly reduce running costs and the adoption of the latest, high-efficiency technology by both the operator and the system manufacturer.**

**They should also aim to optimise installation, commissioning, maintenance and service costs by optimising staff resources and maximising system availability.**

The VLT® FlexConcept provides the user with perfectly adapted components for energy-efficient drives in all system areas. It consists of the VLT® OneGearDrive, the VLT® Decentral Drive FCD 302 and the VLT® AutomationDrive FC 302.

### 4 points of cost optimization

#### High efficiency

All the drives used in the VLT® Flex-Concept stand out for their high level of efficiency and energy savings. The high efficiency PM motors meet or beat the current and projected efficiency categories, in smaller frame sizes, than current induction motors. Efficiency is maximised in the system as a whole by the matched design of the motors and the inverters.

#### Fewer variants

Conveyor solutions can be offered with a vastly reduced number of variants by careful motor selection and optimal frequency converter adoption, even in large systems. This in turn affords a smaller spare parts inventory, particularly for larger systems, along with reduced storage costs and faster component availability compared to current standard drive solutions.

#### Lower training and maintenance costs

Training expenditure and maintenance staff requirements are greatly reduced by the unified operating design and standard operating scope of VLT® frequency converters, in addition to the simple connection of the VLT® OneGearDrive Hygienic drive motors via stainless steel pin connectors.

#### Flexibility

Easily and reliably combine components with existing solutions from other manufacturers on both centralized and decentralized systems. The open system architecture of the VLT® FlexConcept means that standard, geared and PM motors can all be controlled and operated at high efficiency by Danfoss VLT® drives.



# Centralized or decentralized – always the right solution

**The choice of a centralized or decentralized drives solution is not always that clear cut. Both solutions offer advantages depending of the system structure.**

The choice of solution relies upon a variety of factors such as spatial and environmental conditions, the extent of the system and the acceptability to the end user. Economic aspects also figure, such as cabinet or control room costs compared to cabling expenditure.

## Application-dependent design

Ultimately, the application dictates the system design. It is essential to engage with the drives supplier to conduct an accurate, detailed system cost-analysis. Since service staff and technicians will have to gain familiarity with the technology adopted, acceptability by the end user is critical.

Both solutions include the option of shifting the system intelligence to the individual drives. Such a shift increases efficiency depending on the drives functionality required.

## The solution for both designs

VLT® FlexConcept perfectly meets the needs of both centralized and decentralized systems, ensuring the use of components perfectly adapted to the system structure.

VLT® drives are compact and available with enclosure ratings from IP 00 to IP 66. All VLT® FlexConcept drives benefit from unified operation and are matched to common filters and coils and provide the same interfaces and use the same parameterization software.

The geared motor units are available with finishes from standard to anti-bacterial varnish. For direct use in hygiene-critical production areas, all the components are resistant to aggressive detergents in the range pH2..12 so as to guarantee optimal hygiene with long-term reliability.

For retrofit applications, all VLT® FlexConcept components are compatible with existing industry standard system components, including PM motors.

## A cost-effective integrated solution

VLT® FlexConcept provides system manufacturers and end users with a fully integrated drive solution. Costs are reduced at the planning stage since documentation, training, and spare parts and storage requirements are all reduced, thanks to the new motor body design and the unified drive operating structure.

Compliance with applicable current and projected motor efficiency standards, right up to MEPS in 2017, guarantees a high degree of investment security.



# EHEDG/IPA certification – the only choice for hygiene critical areas

Hygiene requirements are extremely strict in areas where machines come into direct contact with products in food and beverage production equipment and in areas in which an increased risk of contamination exists for exposed food and beverages. In addition to the applicable EU standards and guidelines, the regulations of the European Hygienic Engineering & Design Group (EHEDG) also apply. This organization develops specifications and guidelines for the comprehensive, preventative protection of food against impurities and unwanted contamination by bacteria, fungus and yeast during processing.

## Meets current hygiene legislation

Legislation demands that all component construction design must be adapted as effectively as possible to the manufacturing process and the product flow in the food sector. The materials used must not influence the food in any way (e.g., by the migration of material components) and must all be easy to clean (hygienic design).

## EHEDG certified

VLT® FlexConcept is currently the only solution available offering EHEDG certified components specifically designed for installation directly in hygiene-critical areas.

The VLT® OneGearDrive is IPA certified by the Fraunhofer Institute for use directly in clean-rooms. All VLT® FlexConcept components are matched to each other to ensure rapid commissioning and the optimum efficiency of the overall solution.

## Smooth surfaces resistant to cleaning materials

Absolute cleanliness demands components with extremely smooth surfaces and no hiding place for germs or contamination. This permits the free flow of liquids and the easy removal of residual products and the prevention of contaminant build-up. All VLT® FlexConcept components for installation directly on the production floor are finished with perfectly smooth surfaces and the motors and gears mate with a seamless, crevice-free fit. These components are resis-

tant to all standard detergents and disinfectants of pH 2..12. The VLT® OneGearDrive is designed without fans and the gears are filled with special oil suitable for the food sector. They can be supplied with stainless steel shafts up to V4A and AISI 316 as an option and the shaft end is fitted with a cover.

# EHEDG

certified

VLT® OneGearDrive and VLT® Decentral Drive FCD 302 are EHEDG certified



*A cover is also provided for shaft ends used in gears for hygiene critical areas.*

*Special screw connections and stainless steel screws provide extremely reliability in hygiene critical areas.*

*CleanConnect™ stainless steel connectors provide simple, safe connections even during replacement work.*

*Six LEDs indicate the current device status of the VLT® Decentral Drive FCD 302.*



# Access all areas – robust, reliable and clean

## Wet and hygiene critical areas

VLT® FlexConcept offers distinct advantages in wet production areas. The Decentral Drive FCD 302 enclosure, along with the matched, geared motor enclosure, fulfils the requirements of DIN 1672-2 Hygienic Design and all enclosures are designed to IP 66/67 and IP 69k. The system components offer no hiding place for contaminants or harmful micro-organisms such as bacteria, yeast or fungus.

The smooth, fan-free design of both motors and drives avoids the circulation or distribution of dirt particles and germs and eliminates the possibility of aerosol formation and the subsequent contamination of products under manufacture, making them ideally suited for use in wet production areas.

A positive benefit of mounting the VLT® Decentral FCD 302 close to or on the motor is the cable reduction. This not only saves space but eliminates electromagnetic interference with other system components.

A typical combination might be a VLT® OneGearDrive with a VLT® Decentral Drive FCD 302.

In a centralized system, a VLT® AutomationDrive FC 302 with the same unified control strategy would be used with the VLT® OneGearDrive as it could support up to 300 m of unshielded cables or 150 m of shielded cables.

## Dry areas

For conveyors in dry areas, a standard VLT® FlexConcept solution would be the efficient, compact VLT® OneGear-

Drive Standard with either a VLT® Decentral FCD 302 or a VLT® AutomationDrive FC 302 mounted centrally. This drive solution could be equipped with a motor mounted brake and a transmitter, for greater precision, particularly on conveyor belts with inclines or declines.

VLT® Decentral Drive FCD 302 is completely flexible in adoption and can of course be mounted in centralised system structures, on the wall close to the motor, on the conveyor or even on the motor itself. The matrix below gives an overview of the recommended combinations of motors and drives for differing production areas.

	VLT® OGD Standard	VLT® OGD Hygienic	VLT® Decentral Drive FCD 302 Standard	VLT® Decentral Drive FCD 302 Hygienic	VLT® AutomationDrive FC 302 IP 00/IP 20	VLT® AutomationDrive FC 302 IP 55/IP 66
Dry area	x	o	x	o	x	x
Wet area	x	x	x	o	x	x
Hygiene-critical area	o	x	o	x	x <sup>1</sup>	o

<sup>1</sup>) Mounted on panel outside hygiene-critical area

The FCD 302 connection box with integrated T-distributors allows for rapid installation and commissioning.

The VLT® OneGearDrive Standard with a terminal box, optional resolver and a brake is available for dry and wet areas.

The VLT® AutomationDrive FC 302 is available for centralized installation and can be installed in enclosures of up to IP 66 or directly in the system.

For simple parameterization the graphical control unit of the FC series, the LCP 102 can be connected





# 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 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.

### 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 VLT 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 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.

