

ENGINEERING  
TOMORROW

*Danfoss*

Food Industry

**Improve** efficiency and **save** energy  
with **flexible** VLT<sup>®</sup> Drive **solutions**

**37 million**

tons of CO<sub>2</sub> are saved  
every year by the 4  
million VLT<sup>®</sup> variable  
speed drives installed  
worldwide from  
Danfoss.



**TRI-PHASE**  
AUTOMATION

[www.danfossdrives.com](http://www.danfossdrives.com)

**VLT**<sup>®</sup>

# The preferred drive provider for leading meat companies globally

Since 1968, when Danfoss launched the world's first frequency drives, VLT® has been the preferred brand within the meat industries.

## Largest installed base

Danfoss has an installed base of variable speed drives in the meat & poultry industry globally that is larger than any other supplier and we are committed to maintaining this position.

## Expert knowledge

Our expert knowledge of meat processing equipment, packaging machinery and utilities within all types of meat and poultry manufacturing plants, has helped us design and build a portfolio of products for applications such as:

- Grinders
- Mixers
- Cutters
- Brine injectors
- Tumblers
- Decanters and separators
- Conveyors
- Boilers
- Smokers
- Slicers
- Clipping
- Thermoforming
- Packing rooms
- Refrigeration
- Compressors
- Condenser fans
- Evaporators

## Excellent VLT® features

- Up to 500 ft. screened motor cable and up to 1,000 ft. unscreened, EMC compliance
- Operates up to 50° C /122° F ambient temperature
- IP66/NEMA 4X versions for wash-down areas
- Safe stop function for safety category 3 – feedback not required
- Integrated harmonics filter as standard
- Integrated RFI filters
- CTC coating available (3C2 standard, 3C3 optional)
- Real side-by-side mounting
- USB communication
- iF Awarded user interface
- Standard platform – if you know one, you know them all

## Up to 1,000 ft. between the drive and the motor

The basic design of VLT® drives allows for up to 1,000 ft. of screened motor cable – without disturbing other electronic equipment. This allows the VLT® to be installed in a central control room – far away from some of the most remote variable speed conveyors and machines in a modern meat processing plant.

## Peace of mind

You will find our dedicated sales and service staff all over the world providing 24 hour service. They are always ready to support you with commissioning assistance, technical training and troubleshooting. They can even – in many countries – offer a cost-efficient package of DrivePro™ service agreements to avoid any surprises to your maintenance budget.



### Built to last

VLT® drives are built to last – even when it gets hot. VLT® drives are manufactured to the highest quality standards and are built to operate trouble-free in ambient temperatures of up to 50° C /122° F. This guarantees maximum uptime and lowest possible cost of ownership.



Danfoss provides a broad range of IP 66/NEMA 4X enclosed drives suitable for mounting in production areas exposed to humidity, dust and frequent washdowns.

# Energy savings, less waste, better product quality

Wherever shafts turn, VLT® drives provide optimum control by optimizing the voltage and frequency to the motor according to the actual demand for power, speed, torque, pressure, flow, etc. A change of recipe merely requires a shift between pre-configured set-ups, minimizing downtime during job changes.

## Bring value to your food processing:

- Optimizing and often reducing energy consumption
- Minimizing waste
- Improving quality and product consistency

VLT® drives have dedicated features that optimize production while protecting the drive, motor and equipment.

## Pipe Fill Mode

Dedicated control algorithms to quickly fill and pressurize the system without the risk of stressing mechanical parts.

## Dedicated Operating Systems

Synchronizing and positioning capability to ensure food traceability standards are maintained throughout production.

## Compressor control functions

Optimize the efficiency of refrigeration and air systems allowing dynamic adaption to widely varying production demands.

## Two-step ramps

The pump quickly reaches minimum speed and fills the system without stressing the valves.

## Flow compensation

Flow resistance is dependent on flow speed. The drive reduces pressure at low flow to save energy.

Built in EMC filters, DC chokes and a direct Category 3 Safe Stop input makes VLT® drives a safe choice.

The advanced motion control options for positioning and synchronization makes for flexible production set-up.

VLT® drives come in the full enclosure range from IP 00 to IP 66/NEMA 4X.

A variety of performance classes from simple speed control to high performance are available.

The MCT 10 Software makes it easy to program and set parameters for even large systems

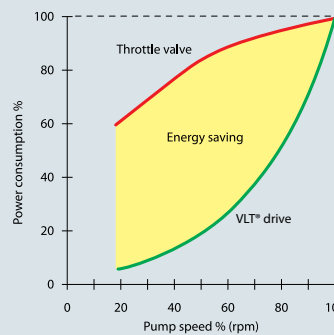
## Energy optimization

VLT® drives feature Automatic Energy Optimization, ensuring optimal magnetization of the motor delivering improved electrical efficiency.

## Fieldbus control

Automation means less waste and better process control. VLT® drives handle the most common bus protocols in the industry while integrating seamlessly into the overall control system. Remote input and output blocks add further design efficiencies.

## Comparison of energy consumption



For centrifugal pumps, power consumed is directly proportional to the cube of the speed:

$$\%P = (\%rpm)^3$$

A small reduction in pump speed results in a large reduction in energy consumption.

Even a 20% reduction in pump speed results in almost 50% reduction in energy consumption.

*Energy savings using a VLT® drive are achieved even with a modest reduction in speed.*

Brine injector features	Benefits
IP 20 to IP 66/NEMA 4X	Suitable for wash-down areas
Optional build-in MCO 305 (electronic cam)	Optimal functionality
Flux vector control	Optimal factory efficiency
Safe Stop	Optimal factory safety

Marinater features	Benefits
High motor torque (flux vector performance)	Tolerant against load chocks
IP 20 to IP 66 /NEMA 4X	Suitable for washdown areas
AC brake	Dynamic braking without brake resistors
Coated circuit boards	Resistant against chemical cleaning agents and salty environments
Built-in Smart Logic Controller	Stand alone control No need for separate PLC
Graphic display	More information in different languages
Constant torque mode	Quality in process control

Emulsifier features	Benefits
High starting torque	Soft start/stop, save cost on wear and tear
Torque control	Gearbox failure elimination
Variable speed operation	Reduced maintenance cost

# Reliable and high quality handling

## Critical hoist operations

VLT® drives ensure hoists are able to overcome high torque demand. .

## Avoid torque damage

Damage from over-torque can be avoided via online monitoring through fieldbus with a built-in fully adjustable time and torque electronic shear-pin.

## Easy change of set-up

The electronic cam disc operation permits a simple change of setup for different packaging types.

## Cost reductions with drive control

The VLT® OneGearDrive® features a permanent magnet motor, which is a synchronous motor with rotor mounted permanent magnets. The drive can achieve up to 89% efficiency and high torque, already exceeding the IE4 Super Premium Efficiency class, in a compact motor frame. With only one motor type and three available gear ratios, the motor concept covers all typical versions of conveyor drives commonly used in the food and beverage industry.

For conveyor drives in particular, this system dramatically simplifies project engineering, installation, commissioning and maintenance – regardless of whether the plant operator opts for a centralized or decentralized drive configuration.



## True low-torque

With dynamic braking and the unique true low-torque feature, VLT® drives are ideal for marinaters, mixers and tumblers in either direction.

## Reliability is critical

The internal speed controller provides stable and accurate operation of the machine.

Short downtimes are provided by an AC brake function that absorbs the energy without the use of brake resistor. VLT® drives provide higher reliability of operation.

## Packing lines

Conveyor start profiles from the packing machines are very critical.

## Feeds even frozen material

High torque at low speed benefits cutters. This prevents the drive from tripping when feeding frozen meat into the cutters and grinders.

## Longer motor life

Motor at stop function allows motor to be maintained at run temperature during standstill eliminating the need for auxiliary heaters to avoid water leakage.

## Motor Check

Check for motor faults, connection quality and field isolator status at standstill without auxiliary equipment.

Cutter features	Benefits
Dual rotation	Less switchgear No gearbox above the product
Variable speed	Flexibility of cut
High torque	Central agitation Start with frozen material

Decanter features	Benefits
Accurate torque control	Suitable for back drive applications
Load sharing through common DC-bus	Energy savings through regenerated energy
Variable speed and torque	Flexible process control and optimization
Flux motor control	Robust against load shifts
Controlled start and stop	Reduced maintenance cost
AC brake	Dynamic braking without brake resistor

Mixer/Grinder features	Benefits
High torque	Save cost – no need for over-sizing Better controllability of extrusion process
Small dimensions	Save space
Certified Safe Stop functionality	Saves external components
IP 20 to IP 66/NEMA 4X	For all operating conditions (central or decentral)
Coated circuit boards	Resistant against cleaning agents and salty environments
Built-in Smart Logic Controller	Stand alone control No need for separate PLC
Flux vector control open and closed loop	High start torque – no oversizing necessary



# Accurate dosing and filling in packaging applications

## Dosing

Control of flow with different viscosities requires optimum control and rapid response times.

VLT® drives provide accurate and precise dosing for minced meat and for the filling of thermoform containers for semisoft or solid products. This goes for a wide variety of products that can be warm, hot, cold, semi-frozen, viscous, abrasive, particulated, chunky, or free flowing.

## Synchronization and positioning

A wide range of motion control options allow positioning, synchronizing, and cam control with almost any motor and feed-back system.

Whether you need an absolute or an incremental feedback system, VLT® drives offer innovative and easy to use motion control solutions.

## VLT® Motion Control Option

VLT® Motion Control Option is an integrated freely programmable Motion Controller for VLT® AutomationDrive. It adds functionality and flexibility to the already comprehensive standard functionality of these drives. The option is also available pre-programmed for synchronizing or positioning.

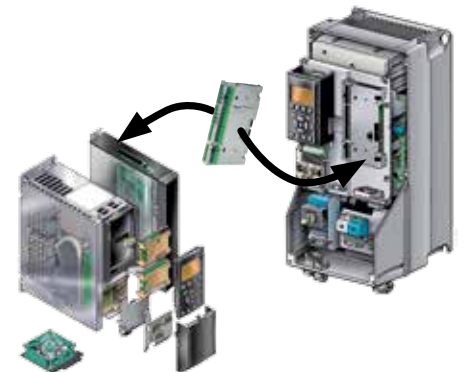
## Overall VLT® benefits:

- Rapid changeover
- Easily cleaned
- Reduced maintenance
- Ease of operation
- Connectivity
- Load sharing
- Kinetic backup
- Bus communication
- AC braking
- PM motor function

Slicer features	Benefits
Optional built-in MCO 305 (electronic cam)	High product quality
Aseptic drives	Easy cleaning, product quality
Multi setup	Reduced machine setup
Fieldbus	Permanent monitoring and documentation of capping
Design optimized for hygienic critical areas	Easy cleaning
Synchronization	Avoid cap jams More flexible machine Less mechanical wear and tear

Tray sealer features	Benefits
IP 20 to IP 66/NEMA 4X	For all operating conditions
Built-in MCO 305 (electronic cam)	Product and machine care production
Flux vector control	More flexible machine Cost reduction
Safe Stop	For all operating conditions
PM motor control	Factory efficiency Aseptic machine design

Thermoforming features	Benefits
IP 20 to IP 66/NEMA 4X	For all operating conditions
Optional built-in MCO 305 (electronic cam)	Synchronize and positioning
Flux vector control	More flexible machine Cost reduction
PM motor control	Factory efficiency Aseptic machine design



# Precise and configurable speed synchronization

VLT® drives provide optimum speed regulation between process stations and meet different torque requirements. Wide conveyors require low speeds and higher torques where narrow conveyors require high speeds and lower torques. Single item conveyors require high speeds and high torques for quick starts.

## Reduced bottlenecks

Weigh stations or detectors require vision systems, sensors and an intelligent freely programmable drive. Therefore product with faults detected are rejected. The sensor can give an input to the VLT® drive to count the number of units processed during a set time frame. If the number of units is less than is required for the next station, then the check station conveyor system is accelerated to meet the demand. The opposite occurs when the count gets too high, to reduce bottlenecks in the conveyor systems.

## Fewer encoders

New VLT® drives provide open-loop positioning with high accuracy and minimum installation cost, so that encoders and encoder cables often can be omitted.

## Less downtime

Adjustable ramps ensure that products stay in place during starts and stops. Positioning functions ensure that containers are placed correctly in an inspection situation – regardless of production speed.

## Less noise – less waste

Synchronization features adjust conveyor speeds according to the overall production to prevent congestion, damage to product, noise and energy waste.

## Overall VLT® benefits

- Line efficiency
  - Prevents scuffing
  - Reduced maintenance
  - Gentle starts and stops
  - Minimized noise
- Fieldbuses available
- Profibus
  - ProfiNet
  - DeviceNet
  - CanOpen
  - EtherNet/IP
  - Powerlink



Conveyor features	Benefits
Central/decentral solutions	Plant layout design/retrofit flexibility
IP 20 to IP 66/NEMA 4X	For all operating conditions including wash-down areas
1000 ft. motor cables	Flexibility
Ramping	Protects fragile products
Coated circuit boards (optional)	Resistant against chemical cleaning agents and salty environments
Built-in Smart Logic Controller	Stand alone control No need for separate PLC
Graphic display with several languages	Multiple languages
Safe Stop function	Optimal safety, save cost

Loader features	Benefits
Coordinated operation	Less noise Easy line modulation No congestion
Multi-setup configuration, for multipack lines	More flexible lines Reduced time for line setup

Pallet conveyor features	Benefits
Accurate ramping	Protects bottles
Variable speed	Efficiency
AC braking	Dynamic braking without brake resistor

# Fast and flexible packaging

## Efficient packing

VLT® drives provide fast accelerations even with high loads in packing machines.

With built-in synchronizing and positioning control, VLT® drives make packing/unpacking machines extremely efficient and flexible. When equipped with VLT® drives, expensive servo systems are unnecessary.

## Flexible wrapping

Wrapping requires precise positioning and synchronizing. VLT® operated motors replace mechanical systems and add flexibility.

## Optimized palletizing

Moving crates, for example from a pallet to a conveyor, requires precise stopping. Dynamic braking of the vertical operation with heavy load optimizes the process and reduces mechanical wear. Positioning, synchronizing, and load estimation make palletizer operation faster and more flexible.

## One wire safety

The VLT® AutomationDrives come as standard with the Safe Stop functionality suitable for Category 3 installations according to EN 954-1.

This prevents the drive from unintended starts by activating a safe stop. Terminal 37 can be used as "safe coast" for this purpose – the stop function satisfies Stop Category 3 EN 60204-1.

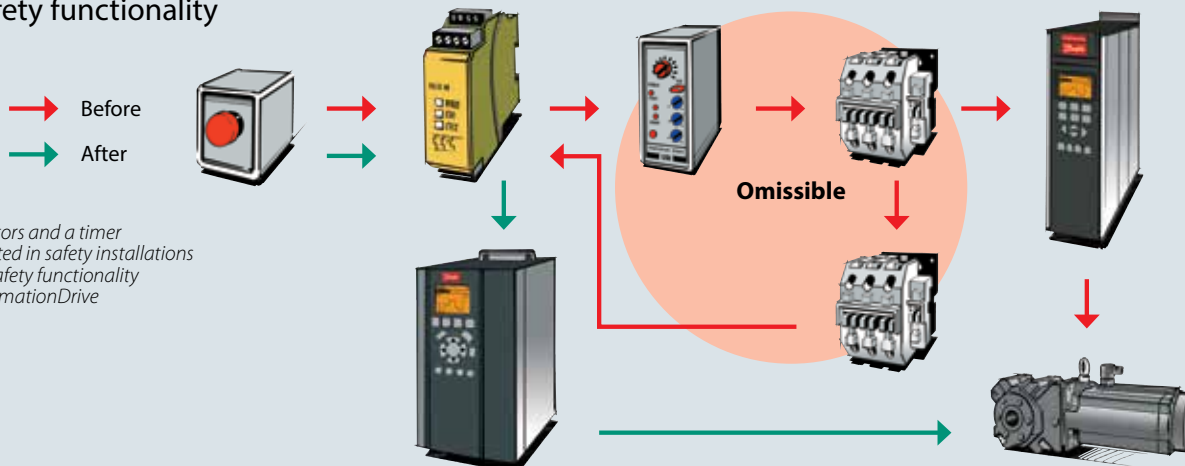
## No need for external components

Expensive and bulky external components can be omitted, wiring is considerably simplified, and production downtime is minimized with this solution. The safety related signals can be transferred via discrete signal wiring (in compact machinery) or via safe bus communication.

Packer features	Benefits
Synchronization/positioning features	VLT® drives can replace expensive servo drives
Cam control	Fast operation Flexibility
Wrapper features	Benefits
Synchronization/positioning	Use of cams Integrated positioning Nonlinear synchronous motion sequence on leading axis Precision stop
Safe Stop	No additional cabling Manual shutdown of motors VLT® drive is still functional
Palletizer features	Benefits
Synchronization/positioning features	VLT® drives can replace expensive servo drives
Cam control	Fast operation Flexibility



## Safety functionality



Two contactors and a timer can be omitted in safety installations due to the safety functionality in VLT® AutomationDrive

# Optimize supply of water, heating, and cooling

## Optimize compressor control

VLT® drives optimize control of compressors, reduce energy consumption, and provide constant pressure regulation. Fewer starts and stops reduce mechanical wear, and speed control is attractive when an air compressor is running for long periods at part-load.

VLT® soft starters, high-power drives, AHF harmonic filters with built-in cascade controller option, DC coils, and PID controllers are applied.

## Optimize boiler efficiency

VLT® drives optimize the combustion efficiency by controlling both forced draft and induced draft.

The flow rate in the feed water is also controlled via VLT® drives. Overall energy consumption – electricity and fuel – is minimized.

## Energy savings in fan operation

Fans and compressors benefit from dedicated features in VLT® drives.

With the “skip resonance” function you easily identify for the drive which frequencies to pass to avoid frequency noise and damage.

## Smart Logic Control

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

## Optimize process water treatment

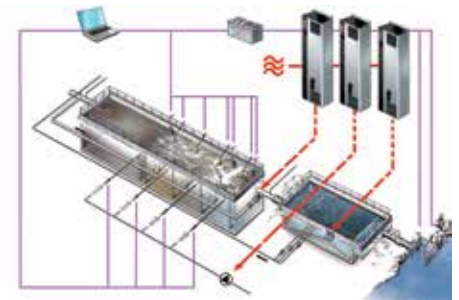
Danfoss VLT® Drives’ long-term involvement within industry resulted in dedicated drives and features for water handling. The VLT® features improve system hydraulic performance and system efficiency.

## Overall VLT® benefits

- Save energy
- Save commissioning time
- Save auxiliary equipment
- Optimize pump control
- Optimize process in aeration tank

## Pump Cascade Controller

The Pump Cascade Controller is the most sophisticated controller on the market. It distributes running hours evenly across all pumps, keeps wear and tear on individual pumps to a minimum and ensures that all pumps are in great shape.



Fan features	Benefits
Load dependent capacity control	Energy saving
Skip resonance	Noise reduction
Operate single fans as well as multiple parallel operating fans – or in cascades	Save installation cost
VLT® Pre-heat function	Eliminate anti-condensation heater

Compressor features	Benefits
Over capacity	No need for larger compressor/drive
Reduced current limit	Ensure functionality of cooling system Protect the application
Running at current limit	Extend the systems’ capacity
Minimum starts and stops	Protect compressor Reduce energy consumption
Setpoint in temperature	Easy commissioning
Monitor running hours	Schedule maintenance
Electronic control	Less maintenance
Cascade control	Stable pressure

Boiler features	Benefits
Accurate speed control of blowers	Less energy consumption Reduced pollution Stable temperature
Electronic control replaces mechanical control	Reduced maintenance time/costs



# 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 (FC 301) and an advanced version (FC 302) with additional functionalities.

3 x 200 - 240 V .....	1/3 - 50 HP
3 x 380 - 500 V .....	1/2 - 1200 HP
3 x 525 - 600 V .....	1 - 100 HP
3 x 525 - 690 V .....	37 - 1200 kW

- Built-in DC coils and RFI-filter (optional)
- Bookstyle IP 20/IP 21/NEMA 1/ IP4X top and IP 55/NEMA 12
- Compact drive IP 55 and IP 66/NEMA 4
- 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 (PLC)



## VLT® Decentral Frequency Converter

The optimum variable speed drive for bottle conveyors. 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.

- 1/2 - 4 HP (FCD); 1/2 - 10 HP (FCP)
- Mounted on the wall close to the motor or directly on the motor
- IP 66, a corrosion resistant coating
- CE, also IEC 61000-3-2, UL, and C-tick
- Twin part design makes commissioning and service easy



## VLT® OneGearDrive®

A highly efficient permanent-magnet three-phase synchronous motor coupled to an optimized bevel gear box. The VLT® OneGearDrive® helps optimize plant productivity and reduce energy costs. Available in two versions; Standard for use in dry and wet production areas, and Hygienic for use in wet areas, areas with high cleaning intensity, and aseptic and clean room production areas.

- Completely smooth enclosure leaves no crevices or dirt traps
- Aseptic coating
- Gearbox without breather vents and use of food grade lubricants compliant with FDA and NSF requirements
- High degrees of protection: IP 67 and IP 69K (OGD- H); IP 65 and IP 67 (OGD- S)
- Fan-free operation
- 3 gearbox ratios in one common design
- Compatible with all Danfoss drives FCD 302 from 1.5-3 kW



## VLT® FC 280 Midi Drive

An extremely compact series of drives prepared for side-by-side mounting and developed specifically for the low power market.

1 x 200 - 240 V .....	1/2 - 3 HP
3 x 200 - 240 V .....	1/2 - 5 HP
3 x 380 - 480 V .....	0.5- 30 HP

- Side-by-side mounting in any direction
- Built-in PID controller, RFI-filter and DC coils
- Bookstyle IP 20 or Optional NEMA 1 Kit
- Modbus communication standard
- Profibus, CANOpen, Profinet, Ethernet/IP (Dual Port), POWERLINK (Optional)
- Dual-Channel Safe Torque Off (STO) Standard



## VLT® Soft Starters

The optimum motor starter for palletizer and other applications where smooth starting and stopping is essential.

- 10 – 1000 HP, 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



## VLT® Motion Control Tool MCT10

For managing drive parameter in systems the new Motion Control Tool MCT10 is the perfect tool to handle all drive-related data.

MCT10 offers:

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

# Two concepts – two sets of benefits

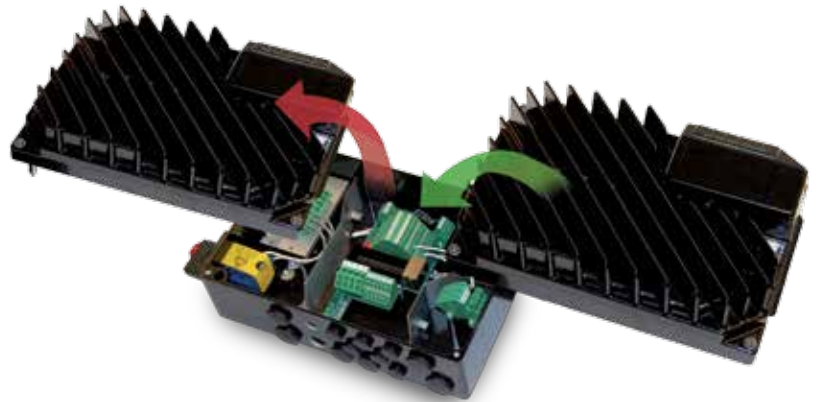
Whether to use central or decentral drives depends on the layout of the plant, the distance from the control room to the conveyor motors and the installation cost for electrical cabinets and cables.

## Decentral concept

Decentral drives are meant for delocated mounting, where the need for space-consuming control cabinets is eliminated. With the drives placed near – or directly on – the motor, there is no need for long screened motor cables.

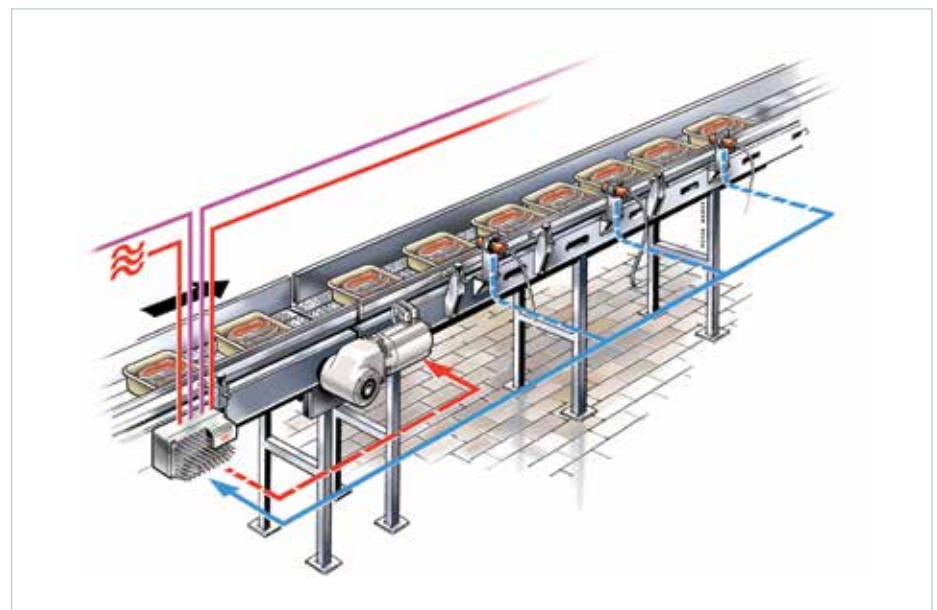
## One-box concept

All options are built as part of the unit, reducing the number of boxes to be mounted, connections and terminations in the installation. Consequently labor costs in mounting hours and risk of failures are dramatically reduced.



Danfoss provides a broad range of IP 66 / NEMA 4X enclosed drives suited for mounting in production areas, areas exposed to humidity, dust, and frequent washdowns.

Decentral features	Benefits
Special painting treatment and smooth surface	Easy cleaning; no dirt trap
Pluggable twin-part design (installation box and electronic part)	Easy and fast service
Adapts to any brand of motor and geared motor, induction as well as permanent magnet motors	Easy and flexible installation
Integrated power and fieldbus looping terminals	Cable savings
Set-up and controlled through pluggable control panel, fieldbus communication and MCT10 PC software	Easy commissioning



## Central concept

Traditionally drives are placed in control cabinets with other control equipment.

### 1,000 ft. motor cables

The long motor cables, built-in EMC filters and excellent EMC performance supports the central solution.

### 50° C/122° F ambient temperature

### Intelligent cooling solutions

Intelligent cooling solutions, coldplate solutions, coating solutions, and smart duct cooling solutions for high power drives are available.

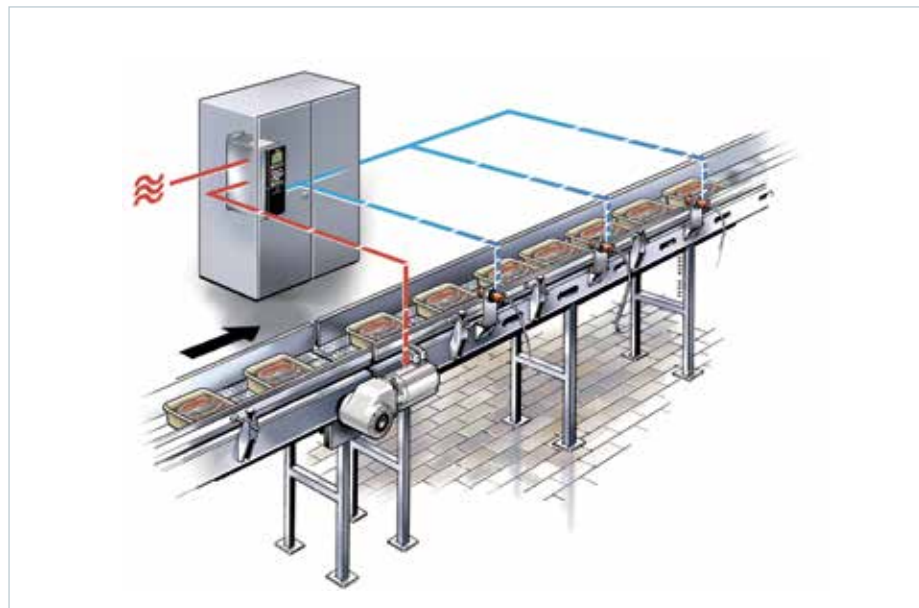
### Real side-by-side

All central VLT® drives are designed for side-by-side mounting in ambient temperatures up to 50° C/122° F without derating.



*A smart, dedicated kit allows larger drives' enclosures to be mounted in Rittal cabinets so cool air removes 85% of excess heat without contact to the electronics.*

Central features	Benefits
Multiple I/O's	Easy set-up and commissioning
Remote mounting	Low enclosure class sufficient
Cold-plate cooling available	No derating issue
Rittal kit available	Easy commissioning No derating issue
Multiple set-up	Flexible
Automatic Motor Adaptation	Easy commissioning
Book style concept True side-by-side mounting	Space-saving cabinet mounting



## Modular concept

VLT® drives are designed for maximum customization from the factory and maximum flexibility once installed. Choose from thousands of hardware configurations built and tested at the factory.

Upgrades and further options are a matter of plug-and-play.



## A better tomorrow is **driven by drives**

**Danfoss Drives is a world leader in variable speed control of electric motors.**

We offer you unparalleled competitive edge through quality, application-optimized products and a comprehensive range of product lifecycle services.

You can rely on us to share your goals. Striving for the best possible performance in your applications is our focus. We achieve this by providing the innovative products and application know-how required to optimize efficiency, enhance usability, and reduce complexity.

From supplying individual drive components to planning and delivering complete drive systems; our experts are ready to support you all the way.

You will find it easy to do business with us. Online, and locally in more than 50 countries, our experts are never far away, reacting fast when you need them.

You gain the benefit of decades of experience, since 1968. Our low voltage

and medium voltage AC drives are used with all major motor brands and technologies in power sizes from small to large.

**VACON® drives** combine innovation and high durability for the sustainable industries of tomorrow.

For long lifetime, top performance, and full-throttle process throughput, equip your demanding process industries and marine applications with VACON® single or system drives.

- Marine and Offshore
- Oil and Gas
- Metals
- Mining and Minerals
- Pulp and Paper
- Energy

- Elevators and Escalators
- Chemical
- Other heavy-duty industries

**VLT® drives** play a key role in rapid urbanization through an uninterrupted cold chain, fresh food supply, building comfort, clean water and environmental protection.

Outmaneuvering other precision drives, they excel, with remarkable fit, functionality and diverse connectivity.

- Food and Beverage
- Water and Wastewater
- HVAC
- Refrigeration
- Material Handling
- Textile

### **VLT® | VAGON®**

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