VLT® Motion Control Options

for VLT® AutomationDrive

VLT®
THE REAL DRIVE

VLT® Motion Control MCO 305

VLT® Motion Control MCO 305 is an integrated free programmable Motion Controller for VLT® AutomationDrive FC301 and FC302; it adds functionality and flexibility to the already very comprehensive standard functionality of these drives.

Synchronizing functions
- Speed synchronising
- Position synchronising
- Position synchronising with marker corrections (including automatic calculation of marker distance)

Positioning functions
Expands positioning functionality. Replaces mechanical solutions.

Cam Control function
The electronic cam control function can replace mechanical cam discs and cam boxes.

PLC functionality
VLT® Motion Controller built into the VLT® AutomationDrive features a programmable controller easing the load on the PLC – or making it redundant.

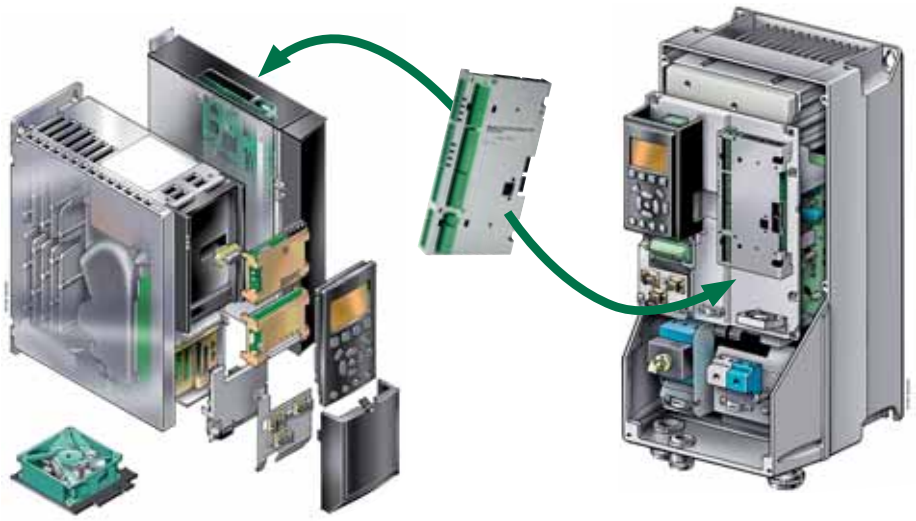
Benefits of the MCO 305
- Accurate and dynamic motion control
- Synchronisation (electronic shaft)
- Positioning and electronic cam control.
- A variety of application functions such as monitoring and intelligent error handling can be programmed.
- Limited jerk function.

PC software
The VLT® Motion Control Tool MCT10 is designed to develop application programs for the Motion Control Option and for configuration/commissioning.

The PC software tool includes programming editor with program examples, graphical cam profile editor and "test-run" and "scope" functions for controller optimising.

Event controlled programming
The VLT® Motion Control option is based on event controlled programming using a structured text programming language.

Comes as:
- "All-in-one" drive with the module pre-installed.
- Option module for field installation.
- The option can be delivered with application program preinstalled, preconfigured, and customised ready to use.



Electronic cam function

The electronic cam control function replaces mechanical cam discs and cam boxes.

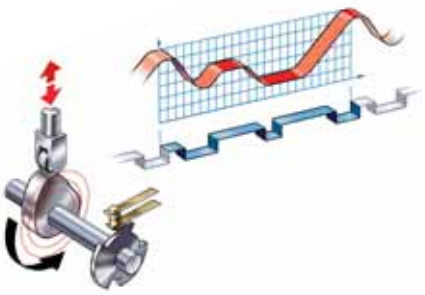
Benefits of electronic cam control:
- Increased flexibility, as cam profiles are easily modified.
- Cost reduction, fewer mechanical parts.
- Fast and easy design and modification of curves via user friendly graphical cam editor.
- Fast and easy commissioning: cam profiles can be modified during commissioning.
- Reduced maintenance costs owing to fewer mechanical parts.
- Reduced machine size.
- Limited jerk function.

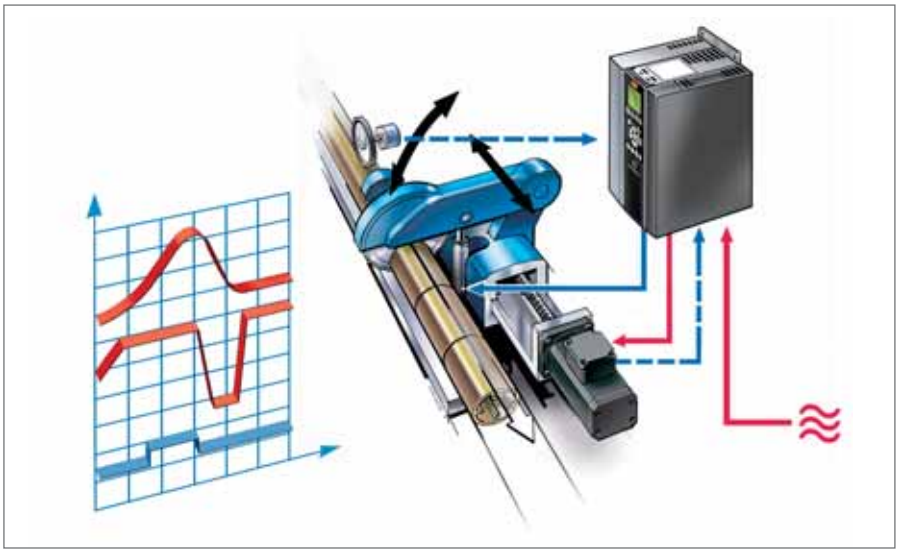
Electronic cam control is a standard feature in VLT® Motion Control Option for VLT® AutomationDrive.

With several thousand interpolation points and a high resolution cam profile, very accurate cam control is obtained.

This function is adaptable to most cam applications because of multiple cam profiles, selectable coupling/decoupling behaviour and on-line marker correction.

Transition between multiple operation modes: Speed control, synchronising, positioning and cam control is easy.



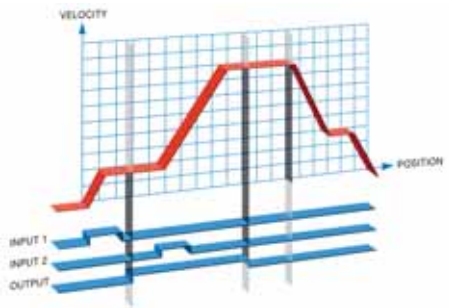


PLC functionality

With the VLT® Motion Control Option built into the VLT® AutomationDrive, it features a programmable controller that eases the load of the PLC or makes it redundant.

In such cases the drive becomes an intelligent stand alone control system.

Benefits:
- Easier installation due to less wiring
- Fewer sources of error, adding to robustness and reliability
- Greater flexibility for the design of sophisticated applications
- Savings on panel space and installation costs (using the fieldbus option, communication wiring is much simpler)



VLT® Synchronizing Controller MCO 350

The Synchronising Controller option for VLT® AutomationDrive expands the functional properties of the converter in synchronizing applications. It replaces traditional mechanical solutions.

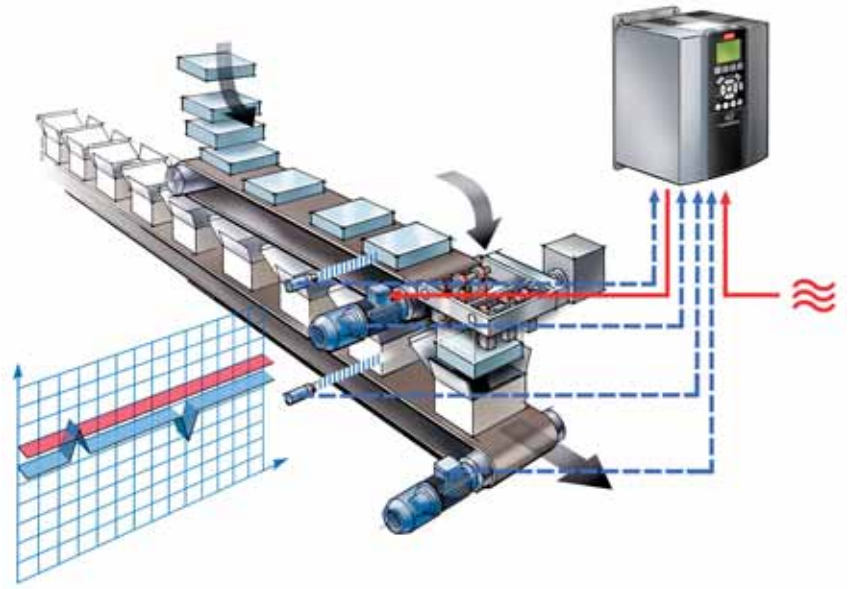
Innovative features:

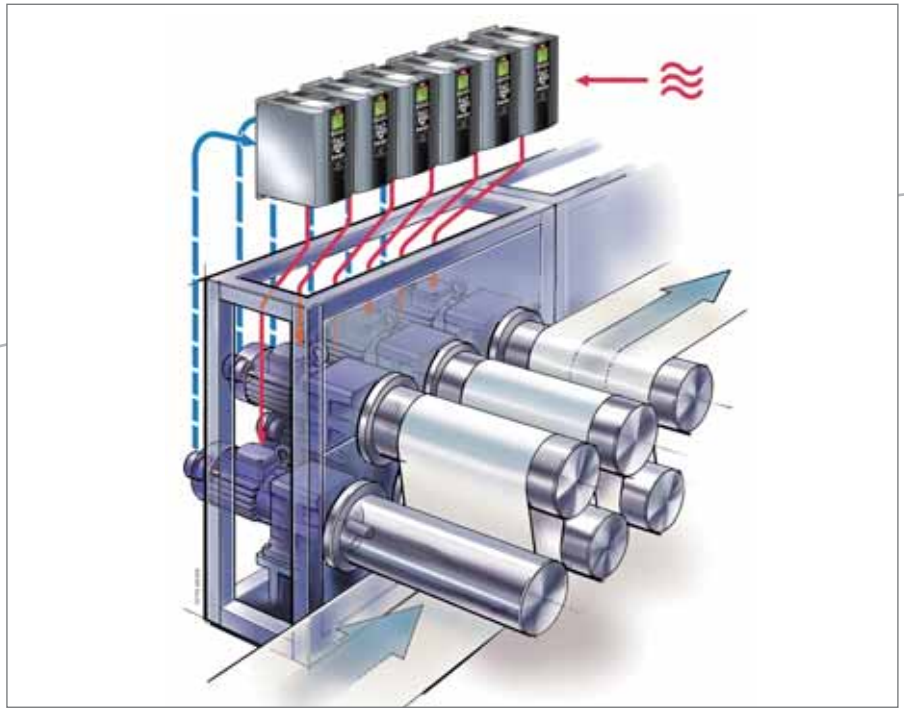
- Readout of all relevant synchronising status in the Local Control Panel.
- Speed synchronizing
- Position (angle) synchronising with or without marker correction
- On-line adjustable gear ratio
- On-line adjustable position (angle) offset
- Encoder output with virtual master function for synchronisation of multiple followers
- Homing
- Automatic mechanical brake control
- Hold function, speed up/down
- Four fixed gear ratios

Commissioning without PC software

As the VLT® Synchronizing Controller is a standard product with fixed functional properties, no additional application programming is required. To make commissioning easy, a test run function is included.

The VLT® Positioning Controller is user-friendly, enabling set-up of all parameters via the VLT® AutomationDrive Local Control Panel or via the VLT® set-up software MCT10.





VLT® Positioning Controller MCO 351

The VLT® Positioning Controller option offers a host of user-friendly benefits for positioning applications in many industries. They are based on a range of well considered and innovative features:

- Direct positioning via fieldbus
- Relative positioning
- Absolute positioning
- Touch probe positioning
- End limit handling (software and hardware)
- Mechanical brake handling (programmable hold delay)
- Error handling
- Jog speed/manual operation
- Home function

The VLT® Positioning Controller is user-friendly, enabling set-up of all parameters via the VLT® AutomationDrive Local Control Panel or via the VLT® set-up software MCT10.

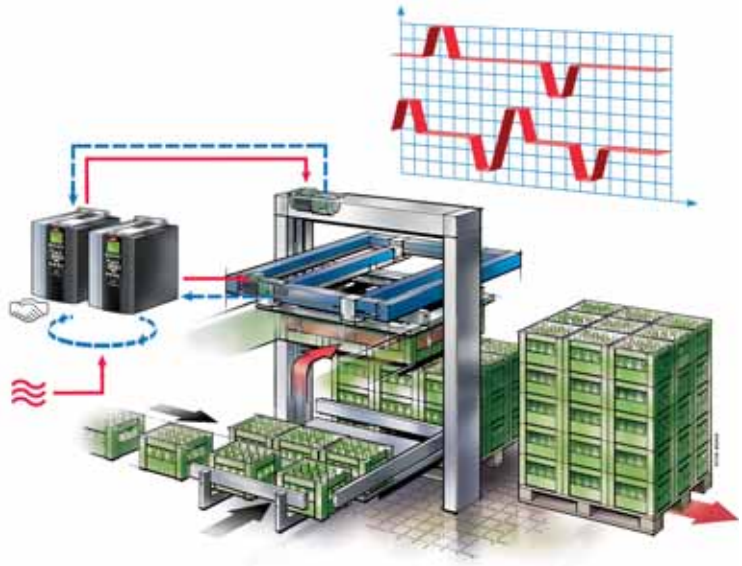
Control and monitoring is done via digital inputs/outputs or fieldbus.

As the MC 351 is a standard product with fixed functional properties, no additional application programming is required.

The VLT® Positioning Controller can handle most positioning applications with vertical as well as horizontal movements.

Likewise, most servo applications can be controlled by the VLT® AutomationDrive with a VLT® Positioning Controller.

The option is, however, mainly suited to applications with an overall control system, for example a PLC.

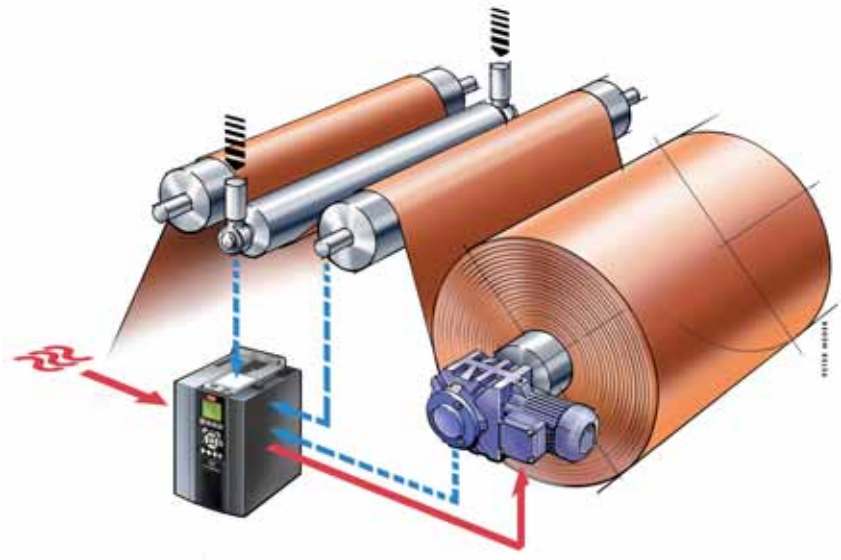


The objective of this positioning-via-indexing application is to increase the capacity and simplify the control system of a pallatiser stacking boxes with bottles.

VLT® Center Winder MCO 352

The Center Winder Controller option for VLT® AutomationDrive provides easy to set up and accurate winder control in closed loop tension controlled center winder applications.

- Follows line speed
- Diameter calculator adjusts winder reference
- Tension PID adjusts reference
- Rewind or unwind
- Diameter calculator
- Adjustable taper function
- Tension limit detector
- Diameter limit output
- Over/under winding
- Jog forward and reverse
- Diameter reset
- Core selection
- Tension on/off
- Allow initial diameter measurement



- Tension loop scan time: 30 ms
- Inertia compensation for speed loop
- Diameter compensation for tension loop

As the MC 351 is a standard product with fixed functional properties, no additional application programming is required.

Generic features

Covers the full VLT® AutomationDrive series

- For AC and PM motors
- Mounted inside for full IP/NEMA rating
- Setting and readings via drive LCP
- Utilises the drive fieldbus
- Smooth change between closed loop speed control, synchronizing, and positioning.
- Improved encoder resolution owing to quadrature signals

Adds flexibility to applications like:

- Printing lines
- Bottle washers
- Conveyor belts
- Packaging and material handling systems
- Palletisers
- Indexing tables
- Storage systems
- Pick & place systems
- Bottle washing machines
- Packaging machines
- Positioning on the fly
- Foil wrapping
- Flow packing
- Filling and sealing

Use in applications like:

- Crane and hoist applications
- Product rejection systems
- Winder applications

Protection

- All inputs, outputs and supply connections are galvanic isolated from high voltage connections such as mains supply and motor cables (PELV).
- Encoder signals are monitored during operation and standstill.
- Customer specific application programs can be copy protected.
- All MCO 305 parameters including user-defined application parameters are accessible via the VLT® AutomationDrive Local Control Panel.

Specifications

Digital inputs	
Programmable digital inputs	10
Logic	PNP or NPN
Voltage level	0-24 V DC
Voltage level, logic.0. PNP	< 5 V DC
Voltage level, logic.1. PNP	> 10 V DC
Voltage level, logic.0. NPN	> 19 V DC
Voltage level, logic.1. NPN	< 14 V DC
Maximum voltage on input	28 V DC

Digital outputs	
Programmable digital outputs *Terminals X59-1 and X59-2 can be programmed as input, parameter 33-60*	8 (6)
Logic	PNP or NPN
Voltage level	0 – 24 V DC
Max. output current (sink or source) with internal power supply (total Σ)	40 mA
Max. output current (sink or source) with external power supply (per output)	100 mA

24 V DC supply output	
Maximum load *The internal 24 V power supply can be disconnected via parameter 33-85, an external 24 V power supply must then be connected to X58-1 and X58-2*	65 mA

Encoder inputs	
Encoder inputs	2
Input impedance	120 Ω
Maximum voltage on inputs	5 V DC

Incremental encoder specifications	
Incremental encoder type	RS422/TTL
Maximum frequency	410 kHz
Phase displacement between A and B	90° ± 30°
Maximum cable length	300 m

Absolut encoder specifications	
Absolute encoder type	SSI
Data coding	Grey
Data length	12 – 37 bit
Clock frequency	78 kHz – 2 MHz
Maximum cable length	150 m

Encoder output (Virtual master)	
Number of encoder outputs	1
Signal type	RS422
Maximum frequency	410 kHz
Maximum number of slaves (more with repeater)	31
Maximum cable length	400 m

Encoder voltage supply	
24 V, max. load	250 mA
8 V, max. load	250 mA
5 V, max. load	400 mA

Encoder options (B)	
Sinus/cosinus	
Resolver	

Control characteristics	
Sample time of position PID loop	1 ms
Positioning static accuracy	± 1 increment
Synchronizing static accuracy	± 1 increment

Application program	
Program memory size	100 Kbytes
Maximum number of application programs	127

Environmentally responsible

VLT® products are manufactured with respect for the environment and health and safety.

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).

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 soft-starters.

Intelligent and innovative
Developers at Danfoss Drives have fully adopted modular principles in development as well as design, production and configuration.

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place simultaneously, reducing 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 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.