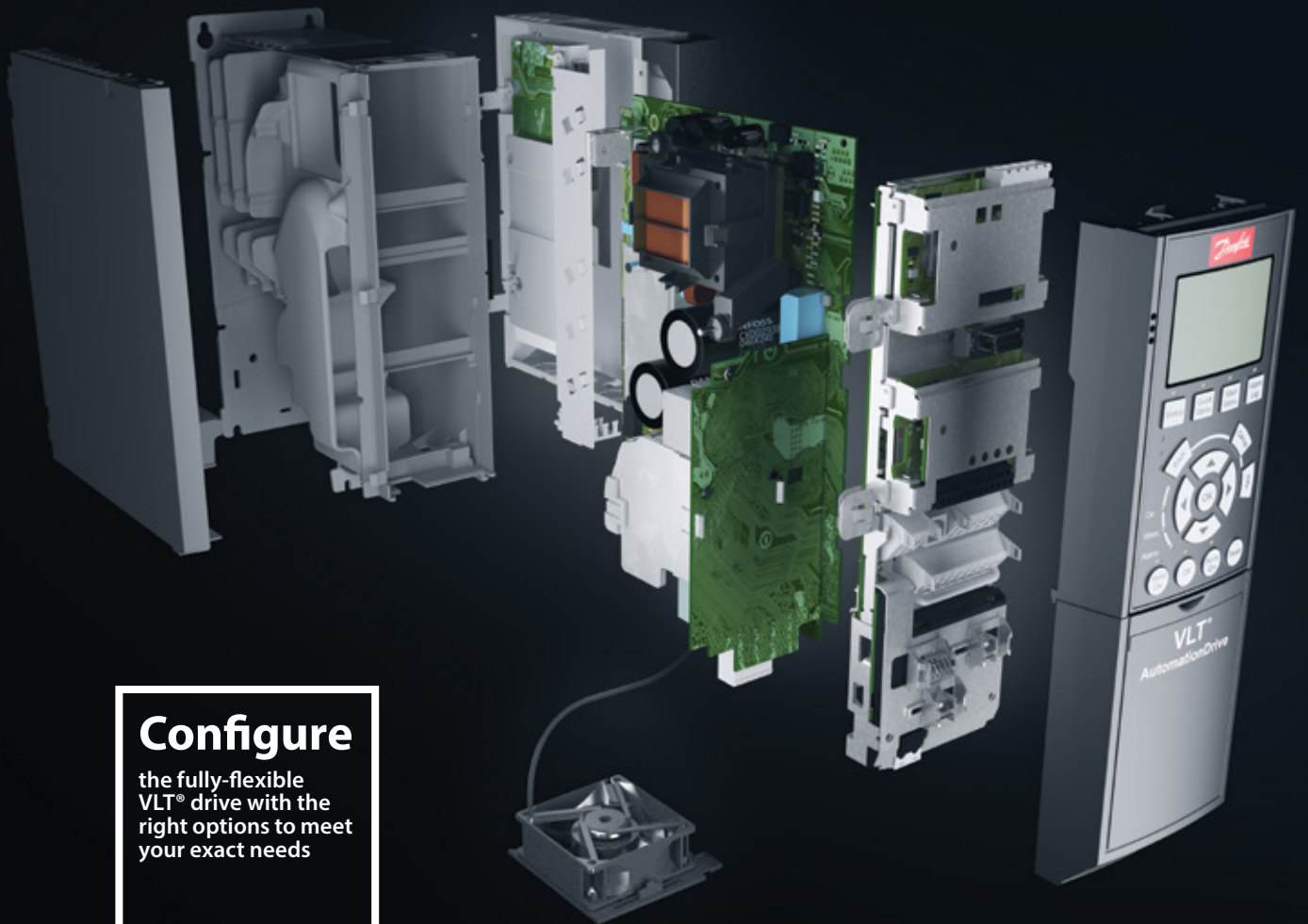


# VLT® Drives FC Series

## Option Overview

Options and accessories available for VLT® HVAC Drive, VLT® Refrigeration Drive, VLT® AQUA Drive and VLT® AutomationDrive.



### Configure

the fully-flexible  
VLT® drive with the  
right options to meet  
your exact needs

# A options: Fieldbuses



Fieldbuses	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
VLT® PROFIBUS DP MCA 101	■	■	■	■	■
VLT® DeviceNet MCA 104	■		■	■	■
VLT® PROFINET MCA 120	■	■	■	■	■
VLT® EtherNet/IP MCA 121	■		■	■	■
VLT® Modbus TCP MCA 122	■		■	■	■
VLT® POWERLINK MCA 123				■	■
VLT® EtherCAT MCA 124				■	■
VLT® AK-LonWorks MCA 107		■			
VLT® LonWorks MCA 108	■				
VLT® PROFIBUS Converter MCA 113					■
VLT® PROFIBUS Converter MCA 114					■
VLT® CANopen MCA 105				■	■
VLT® BACnet MCA 109	■				
VLT® DeviceNet Converter MCA 194					■

For more information about built-in RS485 protocols consult the individual frequency converter design guide.

## VLT® PROFIBUS DP MCA 101

Operating the frequency converter via a fieldbus enables you to reduce the cost of your system, communicate faster and more efficiently, and benefit from an easier user interface.

### VLT® PROFIBUS DP MCA 101 provides:

- Wide compatibility, a high level of availability, support for major PLC vendors, and compatibility with future versions
- Fast, efficient communication, transparent installation, advanced diagnosis and parameterisation and auto-configuration of process data via GSD-file
- Acyclic parameterisation using PROFIBUS DP-V1, PROFIdrive or Danfoss FC profile state machines, PROFIBUS DP-V1, Master Class 1 and 2

### Ordering number

130B1100 standard, 130B1200 coated

## VLT® DeviceNet MCA 104

VLT® DeviceNet MCA 104 offers robust, efficient data handling thanks to advanced Producer/Consumer technology.

- This modern communications model offers key capabilities that let you effectively determine what information is needed and when
- Benefit also from ODVA's strong conformance testing policies, which ensure that products are interoperable

### Ordering number

130B1102 standard, 130B1202 coated

## VLT® PROFINET MCA 120

VLT® PROFINET MCA 120 uniquely combines the highest performance with the highest degree of openness. The MCA 120 gives the user access to the power of Ethernet. The option is designed so that many of the features from the PROFIBUS MCA 101 can be reused, minimising user effort to migrate to PROFINET, and securing the investment in PLC program.

### Other features:

- Built-in high performance switch enabling line and ring topology, and eliminating the need for external switches
- Built-in web server for remote diagnosis and reading basic drive parameters
- Support of DP-V1 Diagnostic allows easy, fast and standardized handling of warning and fault information into the PLC, improving bandwidth in the system

PROFINET encompasses a suite of messages and services for a variety of manufacturing automation applications, including control, configuration and information.

### Ordering number

130B1135 standard, 130B1235 coated

## VLT® EtherNet/IP MCA 121

Ethernet is the future standard for communication at the factory floor. The VLT® EtherNet/IP MCA 121 is based on the newest technology available for industrial use and handles even the most demanding requirements. EtherNet/IP extends commercial off-the-shelf Ethernet to the Common Industrial Protocol (CIP™) – the same upper-layer protocol and object model found in DeviceNet.

The MCA 121 offers advanced features as:

- Built-in high performance switch enabling line and ring topology, and eliminating the need for external switches
- Advanced switch and diagnosis functions
- Built-in web server
- E-mail client for service notification
- Unicast and Multicast communication

### Ordering number

130B1119 standard, 130B1219 coated

## VLT® Modbus TCP MCA 122

Modbus TCP is the first industrial Ethernet-based protocol for automation. The VLT® Modbus TCP MCA 122 connects to Modbus TCP based networks. It is able to handle connection interval down to 5 ms in both directions, positioning it among the fastest performing Modbus TCP devices in the market. For master redundancy it features hot swapping between two masters.

### Other features:

- Built-in web-server for remote diagnosis and reading basic drive parameters
- Configure an email notification to send an email message to one or more recipients, when certain alarms or warnings occur, or are cleared.

### Ordering number

130B1196 standard, 130B1296 coated

## VLT® POWERLINK MCA 123

VLT® POWERLINK MCA 123 represents the second generation of fieldbus. The high bit rate of industrial Ethernet can now be used to make the full power of IT technologies used in the automation world available for the factory world.

POWERLINK provides not only high performance real-time and time synchronisation features. Due to its CANopen-based communication models, network management and device description, the MCA 123 offers much more than just a fast communication network.

### The perfect solution for:

- Dynamic motion control applications
- Material handling
- Synchronisation and positioning applications

### Ordering number

130B1489 standard, 130B1490 coated

## VLT® EtherCAT MCA 124

The VLT® EtherCAT MCA 124 offers connectivity to EtherCAT based networks via the EtherCAT Protocol. The option handles the EtherCAT line communication in full speed, and connection towards the drive of an interval down to 4 ms in both directions. This allows the MCA124 to participate in networks from low performance up to servo applications.

- EoE Ethernet over EtherCAT support
- CoE (CAN Over Ethernet) for access to Drive parameters.
- SMTP (Simple Mail Transfer Protocol) for e-mail notification
- TCP/IP for easy access to Drive configuration data from MCT 10

### Ordering number

NA standard, 130B5646 coated

## VLT® AK-LonWorks MCA 107

VLT® AK-LonWorks MCA 107 is a complete electronic refrigeration and control system for monitoring and controlling refrigeration plants. Connecting this drive to an ADAP-KOOL® Lon network is really simple. After entering a network address, press a service pin to start the automatic configuration procedure.

### Ordering number

130B1169 standard, 130B1269 coated

## VLT® LonWorks MCA 108

LonWorks is a fieldbus system developed for building automation. It enables communication between individual units in the same system (peer-to-peer) and thus supports decentralising of control.

- No need for big main station (master-follower)
- Units receive signals directly
- Supports Echelon free-topology interface (flexible cabling and installation)
- Supports embedded I/Os and I/O options (easy implementation of de-central I/Os)
- Sensor signals can quickly be moved to another controller via bus cables
- Certified as compliant with LonMark ver. 3.4 specifications

### Ordering number

130B1106 standard, 130B1206 coated

## VLT® PROFIBUS Converter MCA 113

The VLT® PROFIBUS Converter MCA 113 is a special version of the PROFIBUS options that emulates the VLT® 3000 commands in the VLT® AutomationDrive. The VLT® 3000 can then be replaced by the VLT® AutomationDrive, or the system can be expanded without costly change of the PLC program.

For upgrade to a different fieldbus, the installed converter is easily removed and replaced with a new option. This secures the investment without losing flexibility.

### Ordering number

130B1245 coated

## VLT® PROFIBUS Converter MCA 114

The VLT® PROFIBUS Converter MCA 114 is a special version of the Profibus options that emulates the VLT® 5000 commands in the VLT® AutomationDrive. The VLT® 5000 can then be replaced by the VLT® AutomationDrive, or the system can be expanded without costly change of the PLC program.

For upgrade to a different fieldbus, the installed converter is easily removed and replaced with a new option. This secures the investment without losing flexibility. The option supports DPV1.

### Ordering number

130B1246 coated

## VLT® CANopen MCA 105

High flexibility and low cost are two of the "cornerstones" for CANopen. The VLT® CANopen MCA 105 option for the VLT® AutomationDrive is fully equipped with both high priority access to control and status of the Drive (PDO Communication) and access to all Parameters through acyclic data (SDO Communication).

For interoperability the option has implemented the DSP402 AC drive Profile. This all guarantees standardised handling, interoperability and low cost.

### Ordering number

130B1103 standard, 130B1205 coated

## VLT® BACnet MCA 109

The open communications protocol for worldwide building automation. The BACnet protocol is an international protocol that efficiently integrates all parts of building automation equipment from the actuator level to the building management system.

Via the BACnet option it is possible to read all analogue and digital inputs and control all analogue and digital outputs of the VLT® HVAC Drive. All inputs and outputs can be operated independently of the functions of the drive, and thus work as remote I/Os:

- COV (Change of Value)
- Read/write Property Multiple
- Alarm/Warning handling

### Ordering number

130B1144 standard, 130B1244 coated

## VLT® DeviceNet Converter MCA 194

The VLT® DeviceNet Converter MCA 194 emulates VLT® 5000 commands in the VLT® AutomationDrive. This means that a VLT® 5000 can be replaced by the VLT® AutomationDrive or an existing system can be expanded, without costly change of the PLC program.

For a later upgrade to a different fieldbus, the installed converter can easily be removed and replaced with a different option. This secures the investment without losing flexibility. The option emulates I/O instances & explicit messages of a VLT® 5000.

### Ordering number

130B5601 coated

# B options: Functional extensions



Functional extensions	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® Automation Drive	
	FC 102	FC 103	FC 202	FC 301	FC 302
VLT® General Purpose I/O MCB 101	■	■	■	■	■
VLT® Encoder Input MCB 102				■	■
VLT® Resolver Input MCB 103				■	■
VLT® Relay Card MCB 105	■	■	■	■	■
VLT® Analog I/O MCB 109	■	■	■		
VLT® PTC Thermistor Card MCB 112	■		■		■
VLT® Sensor Input MCB 114	■		■	■	■
VLT® Programmable I/O MCB 115					■
VLT® Safety Option MCB 140	■		■		■
VLT® Safety Option MCB 141	■		■		■
VLT® Safety Option MCB 150					■
VLT® Safety Option MCB 151					■
VLT® Safety Option MCB 152					■
VLT® Extended Cascade Controller MCO 101			■		
VLT® Safe PLC I/O MCB 108				■	■

## VLT® General Purpose I/O MCB 101

This I/O option offers an extended number of control inputs and outputs:

- 3 digital inputs 0-24 V:  
Logic '0' < 5 V; Logic '1' > 10V
- 2 analogue inputs 0-10 V:  
Resolution 10 bit plus sign
- 2 digital outputs NPN/PNP push pull
- 1 analogue output 0/4-20 mA
- Spring-loaded connection

### Ordering number

130B1125 standard, 130B1212 coated

## VLT® Encoder Input MCB 102

This option offers the possibility to connect various types of incremental and absolute encoders. The connected encoder can be used for closed loop speed control as well as closed loop flux motor control.

### The following encoder types are supported:

- 5V TTL (RS 422)
- 1VPP SinCos
- SSI
- Hiperface
- EnDat

### Ordering number

130B1115 standard, 130B1203 coated

## VLT® Resolver Input MCB 103

This option enables connection of a resolver to provide speed feedback from the motor.

- Primary voltage ..... 2 – 8 Vrms
- Primary frequency ..... 2.0 kHz – 15 kHz
- Primary current max ..... 50 mA rms
- Secondary input voltage ..... 4 Vrms
- Spring-loaded connection

### Ordering number

130B1127 standard, 130B1227 coated

## VLT® Relay Card MCB 105

Makes it possible to extend relay functions with 3 additional relay outputs.

- Max switch rate at rated load/min. load ..... 6 min<sup>-1</sup>/20 sec<sup>-1</sup>
- Protects control cable connection
- Spring-loaded connection

### Max. terminal load:

- AC-1 Resistive load ..... 240 V AC 2 A
- AC-15 Inductive load @cos fi 0.4 ..... 240 V AC 0.2 A
- DC-1 Resistive load ..... 24 V DC 1 A
- DC-13 Inductive load @cos fi 0.4 ..... 24 V DC 0.1 A

### Min. terminal load:

- DC 5 V ..... 10 mA

### Ordering number

130B1110 standard, 130B1210 coated

## VLT® Analog I/O MCB 109

This analogue input/output option upgrades the frequency converter to advanced performance and control using the additional in/outputs. This option also provides battery back-up supply for the built-in clock to ensure reliable operation of all clock-based functionality, such as timed actions.

- 3 analogue inputs, each configurable as both voltage and temperature input
- Connection of 0-10 V analogue signals as well as PT1000 and NI1000 temperature inputs
- 3 analogue outputs each configurable as 0-10 V outputs
- Incl. back-up supply for the standard clock function in the frequency converter

The back-up battery typically lasts for 10 years, depending on environment.

### Ordering number

130B1143 standard, 130B1243 coated

## VLT® PTC Thermistor Card MCB 112

The VLT® PTC Thermistor Card MCB 112 enables improved surveillance of the motor condition compared to the built-in ETR function and thermistor terminal.

- Protects the motor from overheating
- ATEX approved for use with Ex d, Ex e, Ex n, Ex tb and Ex tc motors (Ex e and n only FC 302)
- Uses Safe Torque Off function, which is approved in accordance with SIL 2 IEC 61508
- Spring-loaded connection

### Ordering number

130B1137 coated

## VLT® Sensor Input MCB 114

The option protects the motor from being overheated by monitoring the bearings and windings temperature in the motor.

- Protects the motor from overheating
- Three self-detecting sensor inputs for 2 or 3 wire PT100/PT1000 sensors
- One additional analogue input 4-20 mA

### Ordering number

130B1172 standard, 130B1272 coated

## VLT® Programmable I/O MCB 115

The MCB 115 option has 3 outputs and 3 inputs, and extends the I/O selection available on the control card. For example, it can be used to achieve multi-zone control with 3 pressure transmitters.

- Convert the frequency converter into a decentralized I/O block supporting building automation systems with inputs and outputs
- Support the extended PI controllers with I/Os for setpoint inputs, transmitter/sensor inputs, and outputs for actuators
- Provide a digital output used for:
  - Driving a relay
  - Input to commonly used PLC I/O cards
  - Input to another frequency converter in a sequentially-controlled application

### Ordering number

130B1266

## VLT® Safety Option MCB 140 and MCB 141

VLT® Safety Option MCB 140 and MCB 141 comprise safety options providing Safe Stop 1 (SS1), Safely Limited Speed (SLS) and Safe Speed Monitor (SSM) functionality.

The options can be used up to PL e according to ISO 13849-1.

MCB 140 is a standard B-Option while MCB 141 offers the same functionality in an external 45 mm housing. MCB 141 enables the user to use the MCB 140 functionality also if another B-Option is used.

Different operating modes can be easily configured by using the on board display and buttons. The options provide only a limited set of parameters for easy and fast parameterization.

- MCB 140 standard B-Option
- MCB 141 external option
- Single channel or dual channel operation possible
- Proximity switch as speed feedback
- SS1, SLS and SMS functionality
- Easy and fast parameterization

### Ordering number

130B6443 MCB 140, 130B6447 MCB 141

## VLT® Safety Option MCB 150 and MCB 151

The VLT® Safety Options MCB 150 and MCB 151 expand the Safe Torque Off (STO) function, which is integrated in a standard VLT® AutomationDrive.

By using the Safe Stop 1 (SS1) function it is possible to perform a controlled stop before removing torque. Using the Safely Limited Speed SLS function it is able to monitor whether a specified speed is exceeded.

The functions can be used up to PL d according to ISO 13849-1 and SIL 2 according to IEC 61508.

- Additional safety functions for compliance with standards
- Replacement of external safety equipment
- Reduced space requirements
- 2 safe programmable inputs
- 1 safe output (for T37)
- Easier machine certification
- Drive can be powered continuously
- Safe LCP Copy
- Dynamic commissioning report
- TTL (MCB 150) or HTL (MCB 151) encoder as speed feedback

### Ordering number

130B3280 MCB 150, 130B3290 MCB 151

## VLT® Safety Option MCB 152

The VLT® Safety Option MCB 152 operates the safety functions of a frequency converter via the PROFIsafe fieldbus in combination with VLT® PROFINET MCA 120 fieldbus option. It improves flexibility by connecting safety devices within a plant.

Central and decentral drives located at different machinery cells can easily be interconnected with the PROFIsafe safety fieldbus. This interconnection enables activation of Safe Torque Off (STO) irrespective of where a hazard occurs. The safety functions of the MCB 152 are implemented according to EN IEC 61800-5-2.

The MCB 152 supports PROFIsafe functionality to activate integrated safety functions of the VLT AutomationDrive from any PROFIsafe host, up to Safety Integrity Level SIL 2 according to EN IEC 61508 and EN IEC 62061, Performance Level PL d, Category 3 according to EN ISO 13849-1.

### Features:

- PROFIsafe device (in combination with MCA 120)
- Replacement of external safety equipment
- Reduced space requirements
- 2 safe programmable inputs
- 1 safe output (for T37)
- Easier machine certification
- Drive can be powered continuously
- Safe LCP Copy
- Dynamic commissioning report

### Ordering number

130B9860 coated

## VLT® Extended Cascade Controller MCO 101

This option upgrades the built-in cascade controller to operate more pumps and more advanced pump control in master/follower mode.

MCO 101 supports the combination of multiple variable speed and fixed speed pumps, as well as configurations with pumps of differing capacity (mixed pump control).

- Up to 6 pumps in standard cascade setup
- Up to 6 pumps in master/follower or mixed pump setup
- Technical specifications: See VLT® Relay Option MCB 105

### Ordering number

130B1118 standard, 130B1218 coated

## VLT® Safe PLC I/O MCB 108

The VLT® AutomationDrive FC 302 provides a safety input based on a single pole 24 V DC input.

- For the majority of applications this input enables the user to implement safety in a cost-effective way. For applications that work with more advanced products such as Safety PLC or light curtains, the MCB 108 interface enables the connection of a two-wire safety link
- The MCB 108 interface allows the Safe PLC to interrupt on the plus or the minus link without signal interference

### Ordering number

130B1120 standard, 130B1220 coated

# C options: Motion control, advanced cascade controller and extended relay card



Motion controls and extended relay card	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
VLT® Motion Control Option MCO 305				■	■
VLT® Synchronizing Controller MCO 350				■	■
VLT® Positioning Controller MCO 351				■	■
VLT® Advanced Cascade Controller MCO 102			■		
VLT® Extended Relay Card MCB 113	■	■	■	■	■

## VLT® Motion Control Option MCO 305

The MCO 305 is an integrated programmable motion controller for VLT® AutomationDrive range. The option adds functionality and flexibility to the already very comprehensive standard functionality of these drives.

VLT® Motion Control Option MCO 305 offers a variety of easy to use motion functions which in combination with the programmability makes it the ideal solution for all types of positioning and synchronizing applications.

- Synchronisation (electronic shaft), positioning and electronic cam control
- 2 separate interfaces supporting both incremental and absolute encoders
- CANOpen motion bus for interconnection of several drives
- 1 encoder output (virtual master function)
- 10 digital inputs (additional inputs on control card and B-option)
- 8 digital outputs (additional inputs on control card and B-option)
- Support of CANOpen encoders and I/O modules
- Sends and receives data via fieldbus interface (requires fieldbus option)
- Definition of user/application specific parameters on Local Control Panel
- PC software: Program and Cam editor including tools for debugging and commissioning
- Structured text programming language offering both cyclic and event driven execution

**Ordering number**  
130B1134 standard, 130B1234 coated

## VLT® Synchronizing Controller MCO 350

The VLT® Synchronizing Controller MCO 350 for VLT® AutomationDrive expands the functional properties of the frequency converter in synchronizing applications, and replaces traditional mechanical solutions.

- Speed synchronizing
- Position (angle) synchronizing with or without marker correction
- On-line adjustable gear ratio
- On-line adjustable position (angle) offset
- Encoder output with virtual master function for synchronization of multiple followers
- Control via I/O's or fieldbus
- Home function
- Configuration as well as read-out of status and data via the Local Control Panel of the drive.

**Ordering number**  
130B1152 standard, 130B1252 coated

## VLT® Positioning Controller MCO 351

The VLT® Positioning Controller MCO 351 offers a host of user-friendly benefits for positioning applications in many industries. It is based on a range of carefully thought-through and innovative features.

- Relative positioning
- Absolute positioning
- Touch probe positioning
- End limit handling (software and hardware)
- Control via I/O's or fieldbus
- Mechanical brake handling (programmable hold delay)
- Error handling
- Jog speed/manual operation
- Marker related positioning
- Home function
- Configuration as well as read-out of status and data via the Local Control Panel of the drive

**Ordering number**  
130B1153 standard, 130B1253 coated

## VLT® Advanced Cascade Controller MCO 102

Easy to fit, the VLT® Advanced Cascade Controller MCO 102 upgrades the built-in cascade controller to operate up to 8 pumps and more advanced pump control in master/follower mode. MCO 102 supports the combination of multiple variable speed and fixed speed pumps, as well as configurations with pumps of differing capacity (mixed pump control).

The additional 7 digital inputs and the 24 V DC connection to the drive enable flexible adaptation to the application. The same cascade controller hardware is compatible with for the entire power range up to 2 MW.

- Up to 8 pumps in standard cascade setup
- Up to 8 pumps in master/follower or mixed pump setup

**Ordering number**  
130B1154 standard, 130B1254 coated

## VLT® Extended Relay Card MCB 113

The VLT® Extended Relay Card MCB 113 adds inputs/outputs for increased flexibility.

- 7 digital inputs
- 2 analogue outputs
- 4 SPDT relays
- Meets NAMUR recommendations
- Galvanic isolation capability

**Ordering number**  
130B1164 standard, 130B1264 coated





## D option: 24 V back-up power supply



24 V back-up power supply	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
VLT® 24 V DC Supply MCB 107	■	■	■	■	■

### VLT® 24 V DC Supply MCB 107

An external 24 V DC supply can be installed for low-voltage supply to the control card and any option card installed. This enables full operation of the LCP (including the parameter setting) and all installed options without connection to mains.

- Input voltage range  
24 V DC +/- 15% (max. 37 V for 10 sec.)
- Max. input current ..... 2.2 A
- Max. cable length ..... 75 m
- Input capacitance load ..... < 10 µF
- Power-up delay ..... < 0.6 s

**Ordering number**  
130B1108 standard, 130B1208 coated

# Power Options



## VLT® Brake Resistor MCE 101

Energy generated during braking is absorbed by the resistors, protecting electrical components from heating up. Danfoss brake resistors are optimized for the FC-series and general versions for horizontal and vertical motion are available.

- Enclosure protection as IP20 and up to IP65
- Build-in thermo switch
- Versions for vertical and horizontal mounting
- UL-recognized – a selection of the vertical-mounted units is UL-recognized

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® Automation Drive	
	FC 102	FC 103	FC 202	FC 301	FC 302
See relevant Design Guide	■		■	■	■



## VLT® Advanced Harmonic Filter AHF 005 and AHF 010

Achieve easy, effective harmonic distortion reduction by connecting the AHF 005 and AHF 010 harmonic filters at the input to a Danfoss frequency converter.

- AHF 005 reduces total harmonic current distortion to 5%

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

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® Automation Drive	
	FC 102	FC 103	FC 202	FC 301	FC 302
See relevant Design Guide	■	■	■	■	■



## VLT® Sine-wave Filter MCC 101

Position the VLT® Sine-wave Filter between the frequency converter and the motor to provide a sinusoidal phase-to-phase motor voltage. The filter reduces motor insulation stress, acoustic noise from the motor, and bearing currents (especially in large motors).

- Reduces motor insulation stress
- Reduces acoustic noise from the motor
- Reduces bearing currents (especially in large motors)
- Reduces losses in the motor
- Prolongs service lifetime
- VLT® FC series family look

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® Automation Drive	
	FC 102	FC 103	FC 202	FC 301	FC 302
See relevant Design Guide	■	■	■	■	■



## VLT® dU/dt Filter MCC 102

VLT® dU/dt filters are placed between the frequency converter and the motor to eliminate very fast voltage changes. The motor terminal phase-to-phase voltage is still pulse shaped but its dU/dt values are reduced.

- These filters reduce stress on the motor's insulation and are recommended in applications with older motors, aggressive environments or frequent braking which cause increased DC link voltage.
- VLT® FC series family look

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® Automation Drive	
	FC 102	FC 103	FC 202	FC 301	FC 302
See relevant Design Guide	■	■	■	■	■





### VLT® Common Mode Filter MCC 105

Common mode filters are placed between the frequency converter and the motor. They are nano-crystalline cores that mitigate high frequency noise in the motor cable (shielded or unshielded) and reduce bearing currents in the motor.

- Extend motor bearing lifetime
- Can be combined with dU/dt and sine-wave filters
- Reduce radiated emissions from the motor cable
- Easy to install – no adjustments necessary
- Oval shaped – allows mounting inside the frequency converter enclosure or motor terminal box

Ordering number:	Encl. size	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
		FC 102	FC 103	FC 202	FC 301	FC 302
130B3257	A and B	■	■	■	■	■
130B7679	C1	■	■	■	■	■
130B3258	C2, C3, C4	■	■	■	■	■
130B3259	D	■	■	■	■	■
130B3260	E and F	■	■	■	■	■



### VLT® Line Reactor MCC 103

The VLT® Line Reactor MCC 103 programme ensures balanced current sharing in load sharing applications, where the DC-side of the rectifier of multiple drives is connected together.

For applications using load sharing, the MCC 103 is UL-recognized and is compatible with

- VLT® AutomationDrive, VLT® AQUA Drive and VLT® HVAC Drive
- 50 Hz or 60 Hz mains supply

When planning load sharing applications, pay special attention to different enclosure type combinations and inrush concepts. For technical advice regarding load sharing applications, contact Danfoss application support.

**Ordering numbers:** Refer to MCC 103 specifications on the website: <http://vlt-drives.danfoss.com/products/power-options/vlt-line-reactor-mcc-103/>

## LCP



### VLT® Control Panel LCP 101

The numerical control panel offers a basic MMI to the drive.

- Status messages
- Quick menu for easy commissioning
- Parameter setting and adjusting
- Hand-operated start/stop function or Automatic mode select
- Reset function

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1124	■		■	■	■



### VLT® Control Panel LCP 102

The graphical control panel offers a highly user-friendly MMI to the drive.

- Multi-language display
- Status messages
- Quick menu for easy commissioning
- Parameter setting and explanation of parameter function

- Adjusting of parameters
- Full parameter backup and copy function
- Alarm logging
- Info button – explains the function of the selected item on display
- Hand-operated start/stop, or Automatic mode selection
- Reset function
- Trend graph

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1107	■	■	■	■	■

# LCP



## LCP Panel Mounting Kit

All ordering numbers are for IP55/66 and include fasteners and a gasket.

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1113: With fasteners, gasket, graphical LCP and 3 m cable	■	■	■	■	■
130B1114: With fasteners, gasket, numerical LCP and 3 m cable	■		■	■	■
130B1117: With fasteners, gasket and without LCP and with 3 m cable	■	■	■	■	■
130B1129: With fasteners, gasket, blind cover and 8 m "free end" cable	■	■	■	■	■
130B1170: With fasteners, gasket and without LCP	■	■	■	■	■

# Accessories



## For use with option A

### VLT® PROFIBUS Adapter Sub-D9 Connector

In some industries, the use of Sub-D9 connectors is used as standard. The VLT® PROFIBUS

Adapter Sub-D9 Connector allows the use of these connectors throughout all installed devices. Use of Sub-D9 cabling allows easy access for diagnosis tools and programming devices.

Ordering number:	Encl. size	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
		FC 102	FC 103	FC 202	FC 301	FC 302
130B1112	A1, A2 and A3	■	■	■	■	■
176F1742	D and E	■	■	■	■	■



## IP 21/Type 1 conversion kit

The IP21/Type 1 conversion kit is used for installation of VLT® drives in dry environments. The enclosure kits are available for enclosure sizes A1, A2, A3, B3, B4, C3 and C4

- Supports VLT® drives from 1.1 to 90 kW (NO)
- Used on standard VLT® drive with or without mounted option modules
- IP 41 on top side
- PG 16 and PG 21 holes for glands

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1121 Encl. size A1				■	■
130B1122 Encl. A2	■	■	■	■	■
130B1123 Encl. A3	■	■	■	■	■
130B1187 Encl. B3	■	■	■	■	■
130B1189 Encl. B4	■	■	■	■	■
130B1191 Encl. C3	■	■	■	■	■
130B1193 Encl. C4	■	■	■	■	■



## Leakage Current Monitor Modules

The leakage current monitoring modules RCMB20-500-01 and RCMB35-500-01 are used for fault current monitoring in applications, where frequency converters are used, and direct and/or alternating fault currents are likely to occur. Each module has to be installed and connected in the cable connection compartment in front of the mains input of the frequency converter. Both variants of the modules provide an output signal 4...20 mA proportional to the high frequency leakage current.

- AC/DC sensitive measured value acquisition
- Frequency range 0-500 Hz

- Measuring current transformer, inside diameter 20 mm/35 mm
- Measuring range 500 mA
- Measuring time ≤ 180 ms
- Supply voltage 24 V DC
- Analogue output current 4-20 mA
- CT connection monitoring using cyclical test current
- LEDs: power On LED, alarm LED

Ordering number:	Enclosure number:
130B5645	A2 and A3
130B5764	B3
130B5765	B4
130B6226	C3
130B5647	C4



## USB extension cable

The USB extension cable for IP55 and IP66 enclosures makes the USB connector available outside the drive. The USB extension is designed for mounting in a cable gland in the bottom of the drive, which makes PC communication very easy even in drives with high IP rating.

USB extension for A5-B1 enclosures,  
350 mm cable ..... 130B1155  
USB extension for B2-C enclosures,  
650 mm cable..... 130B1156

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1155 350 mm cable	■	■	■	■	■
130B1156 650 mm cable	■	■	■	■	■



## Adapter Plate for VLT® 3000 and VLT® 5000

Use the adapter plate when replacing VLT® 3000 or VLT® 5000 with an FC series frequency converter.

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B0056 *	■		■	■	■

\* To be used only for IP 20/NEMA type 1 units up to 7.5 kW



## Decoupling Plate for Fieldbus Cables

For use with option A.  
Strengthens fieldbus mounting.

Ordering number:	VLT® HVAC Drive	VLT® Refrigeration Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B0524 *	■		■	■	■

\* To be used only for IP 20/NEMA type 1 units up to 7.5 kW



## Weather shield for outdoor installations

Designed to be mounted above the VLT® drive to protect from direct sun, snow and falling debris.

### Ordering number

Frame A4, A5, B1, B2..... 130B4598  
Frame C1, C2..... 130B4597

# The vision behind VLT®

Danfoss is a market leader in the development and manufacture of frequency converters – serving new customers daily.

## Environmental responsibility

### Danfoss VLT® products – considering people and the environment

All production sites for VLT® frequency converters certified to ISO 14001 and ISO 9001.

Danfoss' activities take employees, jobs and the environment into consideration. Production processes produce minimum noise, emissions and other environmental impacts. In addition, Danfoss seeks to protect the environment when disposing of waste and end-of-life products.

### UN Global Compact

Danfoss has confirmed its commitment to social responsibility by signing the UN Global Compact. Our subsidiaries are aware of their responsibility with respect to local conditions and practices.

### Energy savings through VLT®

The energy saved in the annual production of VLT® frequency converters is as much as that generated by a large power station each year. Improved process control optimises product quality and reduces waste and wear on the production lines.



## Dedicated to drives

Danfoss VLT Drives is a global leader in the area of drive engineering and manufacture. In 1968 Danfoss introduced the world's first mass-produced frequency converters for three-phase motors, and since then has specialised in drive solutions. Today, VLT® stands for reliable technology, innovation and expertise for drive solutions within many different branches of industry.

## Innovative and intelligent frequency converters

Danfoss VLT Drives, headquartered in Graasten, Denmark, employs 2500 staff for the development, production, consulting, sales and maintenance of Danfoss drive solutions in over 100 countries.

The modular frequency converters are manufactured according to customer requirements and supplied fully assembled. This ensures that every VLT® is a state-of-the-art device when delivered.

## Trust the world experts

To ensure the consistent high standard of quality of our products, Danfoss VLT Drives controls and monitors every important product element. The group has its own research and software development department as well as modern production facilities for hardware, power modules, printed circuit boards and accessories.

VLT® frequency converters are used in diverse applications worldwide. The experts of Danfoss VLT Drives support customers with extensive specialised knowledge relating to specific applications. Comprehensive advice and a fast service ensure an optimal solution with high reliability and availability.

A project is only complete when our customers are fully satisfied with the drive solution.

