ENGINEERING
TOMORROW

Selection Guide | VLT® AutomationDrive EZ FC 321

Designed for **easy** stocking, **fast** turn-around, **simple** startup

The
Easy
choice for basic drive applications

www.danfossdrives.com | VLT®

Content

Easy to stock, fast turn around, plug-and-play simplicity. The EZ everything drive, packed with features right off the shelf.

Designed for basic drive applications with a low number of variants, quick and easy delivery, and plug and play convenience; the VLT® AutomationDrive EZ FC 321 is built for ease of use.

The new Danfoss VLT® AutomationDrive EZ FC 321 provides variable speed control of all asynchronous and permanent magnet motors, on any industrial machine or production line, and is packed with standard features right off the shelf with no special configuration or customization required.

Save energy, improve flexibility, and optimize processes with this intelligent yet simple variable frequency drive designed for easy stocking and fast turnaround — **Because every motor deserves the best AC Drive.**

As with all Danfoss drives, the VLT® AutomationDrive EZ is motor independent giving you the power to choose the motor that best suits your application.

Packed with innovation, it features both hardware and software enhancements that maximize performance, and a new Ethernet platform for improved communication.

VLT® AutomationDrive EZ takes full advantage of all that the new digital age has to offer to ensure it completely fulfills the requirements of your applications and optimizes your processes throughout the entire lifecycle.

Seamlessly into the **future**

The fourth Industrial Revolution, or Industry 4.0, builds on the progress of automation by introducing elements of interconnectivity, data acquisition, machine learning and intelligent applications of analytics. AC drives play an important and powerful part in this transition by being the first point of interaction between sensors from the process, the motor in operation and communicating this information via communications bus to a central control location.

At Danfoss Drives, we live and breathe Industry 4.0, with the VLT® AutomationDrive EZ representing the latest and best technologies in the drives industry. When you choose the VLT® AutomationDrive EZ, you can count on the intelligent drive functions, application know-how, proven quality and reliability, and the support you need to make a seamless transition into Industry 4.0 and beyond.

The VLT® AutomationDrive EZ offers:

- Web-based configuration, Electronic Data Interchange (EDI), transparent order management
- Access to drawings, engineering diagrams, and ePlan macros
- Simulation tools such as Danfoss HCS for harmonic calculation and Danfoss ecoSmart™ for motor-drive system efficiency calculations
- Compatibility with all industry-leading motor and fieldbus technologies
- Embedded intelligence for adaptability to evolving application needs
- Flexible interface to the drive data from multiple access points including: directly at the drive, via mobile applications, through an integrated web server and via cloud connectivity

Flexible, modular and adaptable **Built to last**

A VLT® AutomationDrive EZ is built on a flexible, modular design to provide an extraordinarily versatile motor control solution. The drive is equipped with a wide range of industry features, that enable optimal process control, higher quality output and reduce costs related to spare parts and service.

Free to equip

The VLT® AutomationDrive EZ can optimally control nearly all standard industrial motor technologies, including Asynchronous, IPM, SPM, Synchronous Reluctance and PM assisted Synchronous Reluctance motors. This means that system designers, OEMs and end users are free to connect the drive to their selected motor and remain confident that the system will perform to the highest possible standards.

As an independent manufacturer of AC drive solutions, you can count on Danfoss to support all commonly used motor types and foster ongoing development as new technologies emerge.

Speaks your language

When it comes to working with advanced technologies, such as AC drives, it is fairly easy to feel lost while navigating through hundreds of parameters. Using a graphical interface makes this process much easier; especially when it lists parameters in your native language.

Additionally, the ability to save up to 50 user-selectable parameters further simplifies interactions with key parameter settings for your unique application.

Automatic adaption to application

Around 90% of all motors are oversized by more than 10%. Automatic Energy Optimizing (AEO) functionality can deliver energy savings of 2-5% over the whole load range.

Advanced Automatic Motor Adaption

The VLT® AutomationDrive EZ will automatically adapt to the motor to ensure supremely efficient motor performance, no matter which brand or type of motor technology you choose for your facility. The VVC+ output switching algorithm and FLUX control automatically performs advanced motor data analysis for optimum and highest efficiency of control.

Designed for a minimum of 10 years' lifetime

With the VLT® AutomationDrive EZ high quality components, maximum 80% load on components and intelligent heat management minimizing dust on PCBs, the need for routine scheduled replacements of parts, such as electrolytic capacitors and fans, has been removed

Reduce costs with compact drives

A compact design and efficient heat management enable the drives to take up less space in control rooms and panels, thereby reducing initial costs. Compact dimensions are also an advantage in applications where drive space is restricted, making it possible for designers to develop smaller applications without being forced to compromise on protection and grid quality. For example, VLT® AutomationDrive EZ FC 321 in a D enclosure size is 25-68% smaller than equivalent drives.

Despite the compact dimensions, all units are nevertheless equipped with integrated DC link chokes and EMC filters, which help to reduce grid pollution and reduce cost and efforts for external EMC components and wiring.

The Chassis version is optimized for side-by-side mounting in cabinets to 122 °F without derating and features covered power terminals to prevent accidental contact. The AC drive can also be ordered with an optional brake chopper in the same package size. Control and power cables are fed in separately at the bottom.

The AC drives combine a flexible system architecture that allows them to be adapted to specific applications, with a uniform user interface across all power classes. This allows you to adapt the drive to the exact needs of your specific application. As a result, project work and costs are subsequently reduced. The easy-to-use interface reduces training requirements. The integrated SmartStart guides users quickly and efficiently through the set-up process, resulting in fewer faults due to configuration and parameterization errors.

Dual rated to minimize inventory

Dual rated for both constant torque (CT) / high overload (HO) and variable torque (VT) / normal overload (NO) applications.

Choose the adequate performance level

Special needs require special features and performance

	FC 321
Power range [Hp] 200-240 V	0.33-120
Power range [Hp] 380-(480) 500 V	0.50-250
Power range [Hp] 525-600 V	1-125
Power range [Hp] 525-690 V	100-200
Flux vector control	■
Cable length – screened/unscreened	500/1000 ft
Permanent magnet motor operation (w/wo feedback)	■
Safety function Safe Torque Off (STO – EN 61800-5-2)	■
Scan interval/response time ms	1
Output frequency (OL)	0-590 Hz
Max load (24 V DC) for analog output and control card [mA]	200
Programmable digital input	6 (4)
Programmable digital output changeable	2
Programmable relay output	2

Power range

200-240 V
High overload
230 V ..... 1.8-240 A I_N, 0.33-100 Hp

Normal overload
230 V ..... 1.8-302 A I_N, 0.33-120 Hp

380-500 V
High overload
460 V ..... 1.3-260 A I_N, 0.5-200 Hp

Normal overload
460 V ..... 1.3-315 A I_N, 0.5-250 Hp

525-600 V
High overload
575 V ..... 1.7-100 A I_N, 1-100 Hp

Normal overload
575 V ..... 1.7-131 A I_N, 1-125 Hp

525-690 V
High overload
575 V ..... 108-155 A I_N, 100-150 Hp

Normal overload
575 V ..... 131-192 A I_N, 125-200 Hp

Ingress protection ratings

UL: Chassis, Type 12, Type 4X

Smart customized commissioning

The VLT® Motion Control Tool MCT 10 is an interactive tool for quick and easy online/offline configuration of a VLT® drive or soft starter using a PC. You can also use the tool to configure the communication network and to back up all your relevant parameter settings. With MCT 10, you can control and configure your system simultaneously and monitor your entire system more effectively for faster monitoring, diagnosis, troubleshooting (alarms/ warnings) and better preventive maintenance. Starting with version 5.21, MCT 10 includes even more features that enhance usability.

Status plug-in

The readouts for various status and control words, relay inputs and outputs that are available over the fieldbus have been greatly improved. We have combined these signals into a single plug-in that shows you much more information. You'll be able to see right away if a certain relay or bit is on or off, and what exact command the drive has been configured with, saving you time.

VLT® Software Customizer

VLT® Software Customizer allows you to customize the commissioning experience to best fit your needs. It is a tool that enables you to simply and quickly create and test your desired setup using the simulator before uploading it to a real drive.

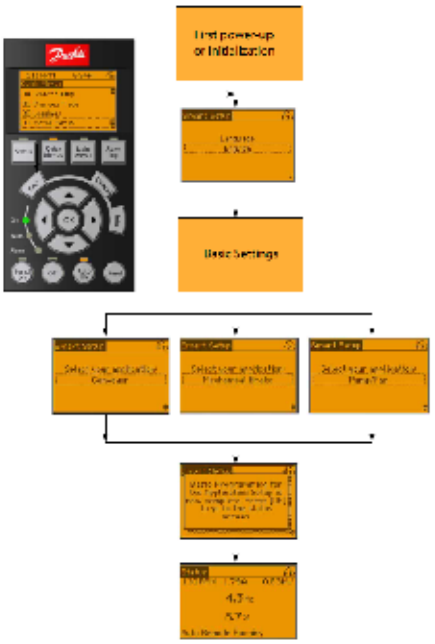
The VLT® Software Customizer consists of :

- **SplashScreen** allows you to create a custom splash screen for when the drive starts up. You can use the built-in editor to create an image from blank or import an existing image from a library or from your computer and adapt it to the FC 321.

- **InitialValues** allows you to set a new default value for virtually any parameter.

- **Smart Start** is a setup wizard that is activated at the first power up of the drive, or after a factory reset. Using easy to understand language, SmartStart guides you through a series of easy steps to ensure correct and efficient motor control. Start the wizard directly via the Quick Menu on the graphical control panel. Supported applications:
  – Conveyer
  – Mechanical Brake
  – Pump/Fan

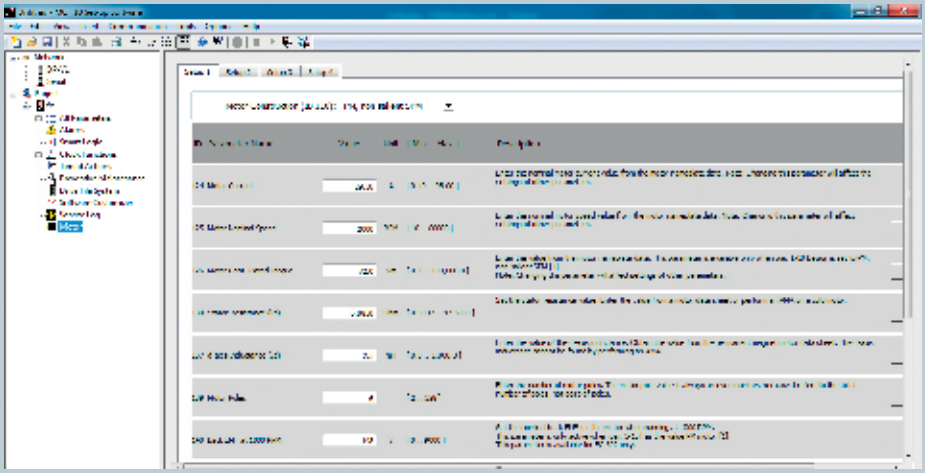
- **Smart Logic Controller for easy customization** Taking customization to the next level, the VLT® AutomationDrive EZ FC 321 lets you access functions that are not actually installed on the drive and which would normally require development of new software or complicated programming. With our Smart Logic Controller (SLC) you can create new functions via simple, intuitive drop-down selections that give you numerous options for setting the drive to specific application needs. The SLC allows you to run up to four sequences in parallel, and you can link between them to create customer and application specific behavior for easy and trouble-free operation.



Motor plug-in

The motor plug-in makes it easier to select the needed motor type and to parameterize the drive accordingly. Simply select the required motor type, and the corresponding parameters are listed together with a description guiding you on how to set the correct value. The motor types supported by the motor plug-in are:

- Asynchronous
- PM, non-salient SPM
- PM, salient IPM
- Synchronous Reluctance (SynRM)

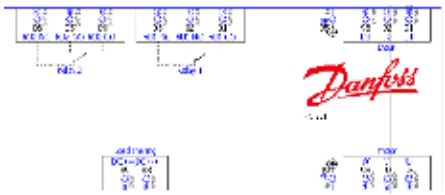


Application flexibility to boost **your business**

The VLT® AutomationDrive EZ is optimized to create value for you, enabling maximum performance in all major applications irrespective of industry.

Applications	Industries												
	HVAC	Food and Beverage, Packaging	Water and Wastewater	Refrigeration	Marine and Offshore	Mining and Minerals	Metals	Chemical	Cranes and Hoists	Elevators and Escalators	Material handling	Oil and Gas	Textile
Pumps	■	■	■	■	■	■	■	■				■	■
Fans	■	■	■	■	■	■	■	■			■	■	■
Compressors	■	■	■	■	■	■	■	■				■	
Conveyors		■			■	■	■	■			■		
Process, material treatment		■	■			■	■	■				■	■
Mills, drums, kilns						■	■						
Winding, unwinding							■						■
Drilling						■						■	
Propulsion, thrusters					■								
Winches					■								
Vertical and horizontal movement		■	■		■	■	■	■	■	■		■	■
Power conversion generation, smart grids					■				■	■			

EPLAN Data Portal



ePLAN data portal

Your online documentation advantage

Danfoss offers parts in IEC & NFPA standards on the Data Portal for FC321. NFPA macros dedicated for North America are available on the EPLAN Data Portal, this gives you online access to drawings and documentation which can be dragged and dropped into a project. You don't need to worry about configuration or formatting – the system does all the work for you, increasing the quality of your system documentation, cutting costs, and saving time.

To find out more about Danfoss on EPLAN, go to EPLAN Data Portal - Catalog DAN or contact your local Danfoss office.

Data sets include a wealth of information The downloadable FC 321 product data sets include the following information:

- Pre-designed schematics
- Metadata of part components
- Automatically generated lists on parts plus other automated reports
- PLC diagrams and 2D layout graphics
- Pre-designed mechanical 3D layouts of drives
- Production information (drilling, wiring)
- Product documentation

Tailored **safety**

Protect both equipment and operators

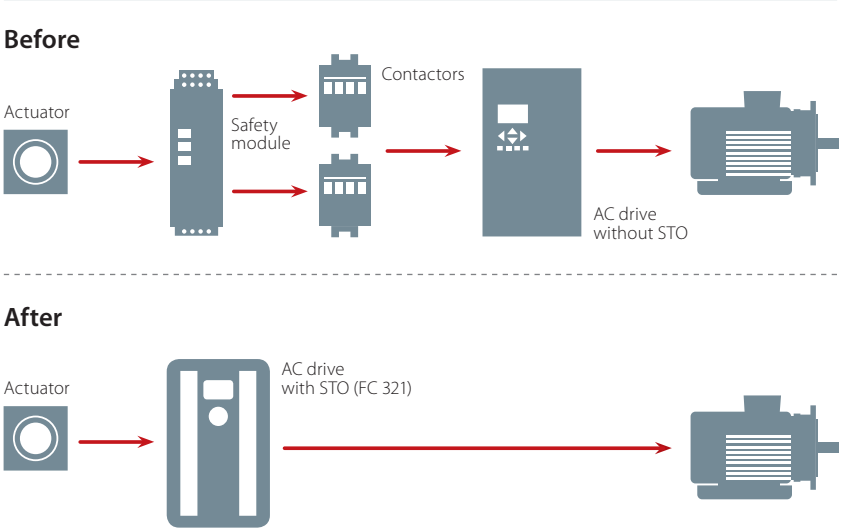
The VLT® AutomationDrive EZ FC 321 is delivered as standard with the STO (Safe Torque Off) function in compliance with ISO 13849-1 PL d and SIL 2, according to IEC 61508/IEC 62061.

Drive-based functional safety solutions in industrial systems

Drives, simply put, control movements such as motor speed and torque in industrial applications like conveyors and pumps. As levels, complexity and modularity of industrial automation increase, drive-based functional safety is fast becoming an important part of overall safety design for industrial processes.

Safe Torque Off

STO is the required basic foundation for drive-based functional safety, since it brings a drive safely to a no-torque state. STO is typically used for prevention of an unexpected startup (EN 1037) of machinery or for an emergency stop, fulfilling stop category 0 (EN 60204-1).



Troubleshooting Assistant

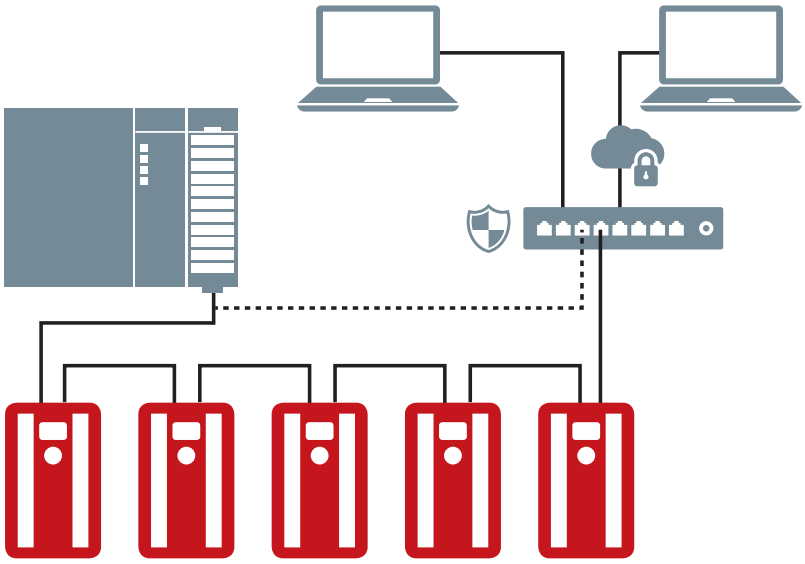
When you need information quickly, turn to our new and improved chatbot for fast, AI-guided troubleshooting. No more searching through manuals for answers to warning, fault, and alarm codes, or FAQs — simply start describing your problem and be guided to your content.

The bot learns from previous interactions, getting smarter by the hour. Instant support is available when you need it, 24/7. Try the bot.

Free to **connect**

Real-time information is becoming increasingly important in industrial automation and control systems as we progress further into Industry 4.0. Immediate access to data increases transparency in production facilities, while making it possible to optimize system performance, collect and analyze system data and provide remote support around the clock from anywhere in the world.

Regardless of your application or your preferred communication protocol, AC drives have an extremely wide variety of communication protocols to select from. In this way you can ensure that the AC drive integrates seamlessly into your chosen system providing you the freedom to communicate however you see fit.



Increase productivity

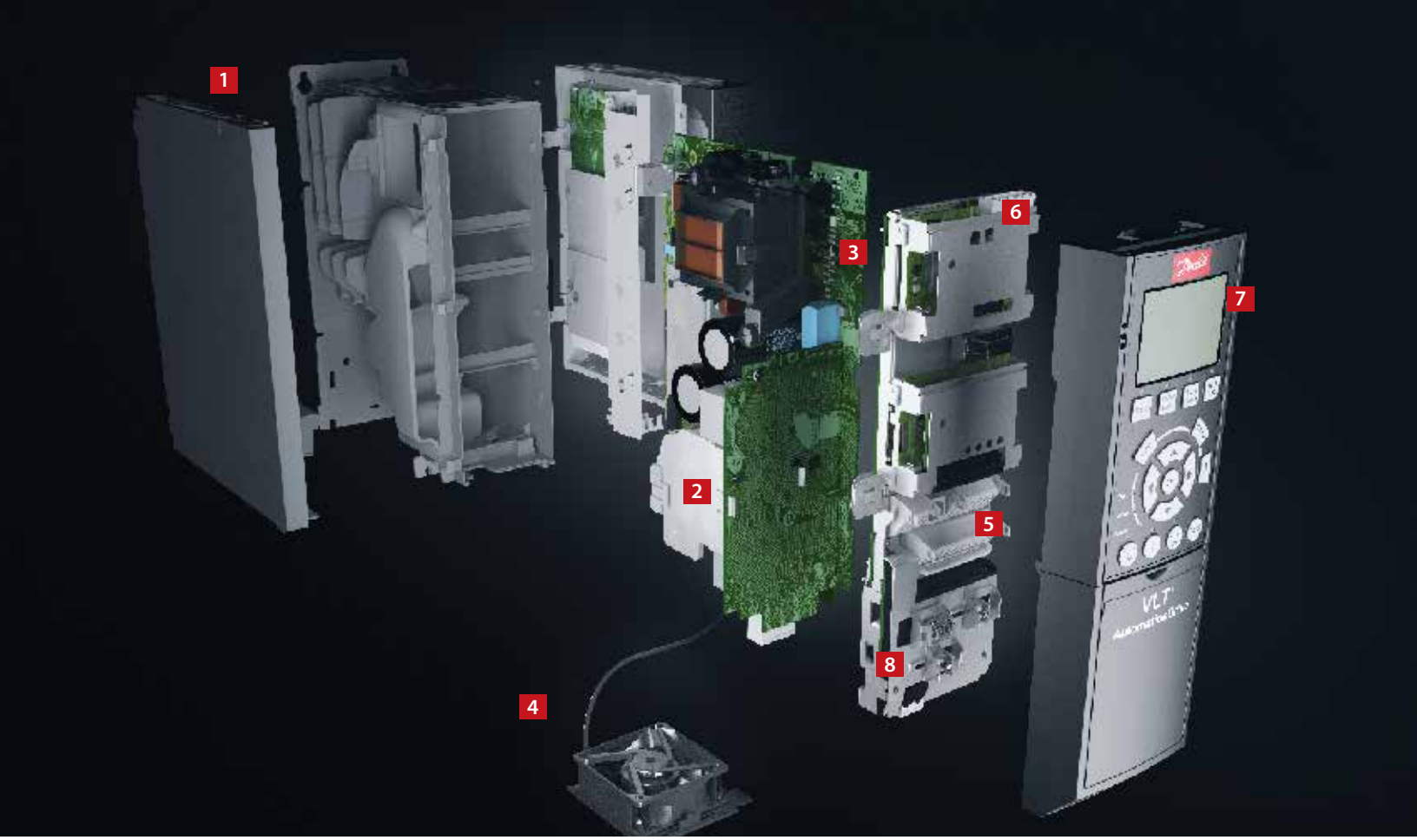
Fieldbus communication reduces capital costs in production plants. In addition to the initial savings achieved through the significant reduction in wiring and control boxes, fieldbus networks are easier to maintain, while providing improved systems performance.

User friendly and fast setup

Danfoss fieldbuses can be configured via the drive's local control panel, which features a user-friendly interface with support for many user languages. The drive and fieldbus can also be configured using the software tools that support each drive family. Danfoss Drives offers fieldbus drivers and PLC examples for free from the Danfoss Drives website to make integration to your system even easier.

Web server dashboard

PROFINET
DeviceNet
Modbus
PROFIBUS
EtherNet/IP



Modular simplicity – A, B and C enclosures

Delivered fully assembled and tested to meet your specific requirements

1. Enclosure
The drive meets requirements for enclosure class Chassis, UL Type 1, UL Type 12, or UL Type 4X.

2. EMC and Network effects
All versions of VLT® AutomationDrive EZ comply as standard with EMC limits A2 according to the EN 55011 norm and IEC61800-3 Category C3. The standard integrated DC coils ensure low harmonic load on the network according to EN 61000-3-12 and increase the lifetime of the DC link capacitors.

3. Protective coating
The electronic components are, as standard, coated as per IEC 60721-3-3, class 3C2. For harsh and aggressive environments, coating as per IEC 60721-3-3, class 3C3 is available.

4. Removable fan
Like most of the elements, the fan can be quickly removed and remounted for easy cleaning.

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

6. Fieldbus option
All major industrial fieldbuses are supported. See complete list of available fieldbus options on page 30.

7. Display option
Danfoss drives' renowned removable Local Control Panel (LCP) has an improved user interface. Choose between 28 built-in languages, including Portuguese. Languages can be changed by the user.

Alternatively the drive can be commissioned via the built-in USB/ RS485 connection or through fieldbus options with the VLT® Motion Control Tool MCT 10 PC tool.

8. 24 V supply

A 24 V supply option to keep the control section and any installed option functioning during power failure.

9. Mains switch

This switch interrupts the mains supply and has a free useable auxiliary contact.

High-power modularity
– D enclosures

The high-power VLT® AutomationDrive EZ modules are all built on a modular platform allowing for highly customized drives which are mass produced, tested, and delivered from the factory.

Upgrades and further options dedicated to your industry are a matter of plug-and-play. Once you know one, you know them all.

1. Display options
Danfoss drives' renowned removable Local Control Panel (LCP) has an improved user interface. Choose between 28 built-in languages including Portuguese, or have it customized with your own. Languages can be changed by the user.

2. Hot pluggable LCP
The LCP can be plugged in or unplugged during operation. Settings are easily transferred via the control panel from one drive to another or from a PC with MCT 10 set-up software.

3. Integrated manual
The info button makes the printed manual virtually redundant. Users have been involved throughout development to ensure optimum overall functionality of the drive. The user group has significantly influenced the design and functionality of the LCP.

The Automatic Motor Adaptation (AMA), the Quick Set-Up menu and the large graphic display make commissioning and operation a breeze.

4. Fieldbus options
See complete list of available fieldbus options on page 30.

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

6. 24 V supply
A 24 V supply keeps the VLT® drives logically "alive" in situations when the AC power supply is removed.

7. RFI filter suitable for IT grids
All high-power drives come standard with RFI filtering according to EN 61800-3 Cat. C3/EN 55011 class A2.

8. Modular construction and ease of maintenance
All components are easily accessible from the front of the drive, allowing for ease of maintenance and side-by-side mounting of drives. The drives are constructed using a modular design that allows for the easy replacement of modular sub-assemblies.

9. Conformally coated circuit boards
All high-power drive (D-enclosure) circuit boards are conformal coated to withstand the salt mist test. Meets IEC 60721-3-3 Class 3C3. The conformal coating complies with ISA (International Society of Automation) standard S71.04 1985, class G3.

10. Enclosure
The drive meets relevant requirements for all possible installation conditions. Enclosure class chassis and UL Type 12.

Efficiency is vital for high-power drives

Efficiency is essential in the design of the high-power VLT® drive series. Innovative design and exceptionally high-quality components have resulted in unsurpassed energy efficiency.

VLT® drives pass more than 98% of the supplied electrical energy on to the motor. Only 2% or less is left in the power electronics as heat to be removed.

Energy is saved and electronics last longer because they are not exposed to high temperatures within the enclosure.

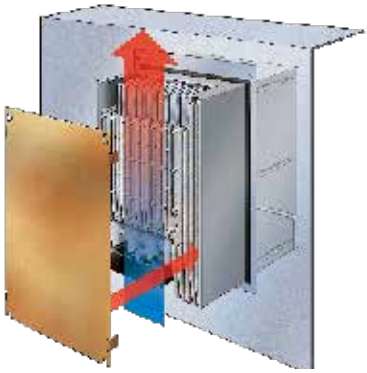
Engineered for **cost savings** via **intelligent heat management**, compactness and **protection**

All Danfoss VLT® drives follow the same design principle for fast, flexible and fault-free installation, and efficient cooling.

The AC drives are available in a broad range of enclosure sizes and protection ratings from Chassis to UL Type 4X to enable easy installation in all environments: mounted in panels, switch rooms or as stand-alone units in the production area.

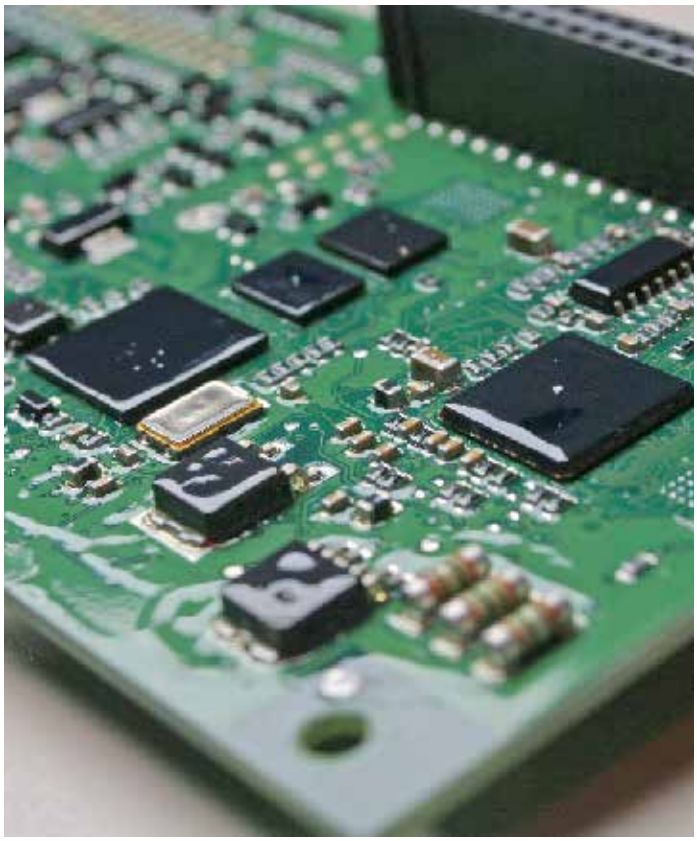
Coated circuit boards

The AC drive conforms as standard to class 3C2 (IEC 60721-3-3) to ensure long lifetime even in harsh environments.



Panel-through cooling
An accessory mounting kit for small and mid-range drives enables heat losses to be directed directly outside the panel room.

Minimal airflow over electronics
Complete separation between back-channel cooling air and the internal electronics ensures efficient cooling.



Coated for extra **protection**

The printed circuit boards in the drives can be coated in accordance with IEC 60721-3-3 class 3C3, providing additional protection against moisture and dust.

Reliable operation at engine room temperatures up to 122 °F

VLT® drives can operate at full load in engine rooms with 122 °F temperature and 122 °F at reduced power close to, for example, pumps.

There is no need for installation in air-conditioned control rooms with long motor cables.

Optimize performance and **grid protection**

Built-in protection

The AC drive contains all the modules necessary for compliance with EMC standards.

A built-in, scalable RFI filter minimizes electromagnetic interference, and the integrated DC link chokes reduce the harmonic distortion in the mains network, in accordance with IEC 61000-3-12. Furthermore, they increase the lifetime of the DC link capacitors and therefore the overall efficiency of the drive.

These built-in components save cabinet space, as they are integrated in the drive from the factory. Efficient EMC mitigation also enables the use of cables with smaller cross-sections, which reduces installation costs.

Expand grid and motor protection with filter solutions

Danfoss' wide range of solutions for harmonic mitigation ensures a clean power supply and optimal equipment protection, and includes:

- VLT® Advanced Harmonic Filter AHF
- VLT® Advanced Active Filter AAF

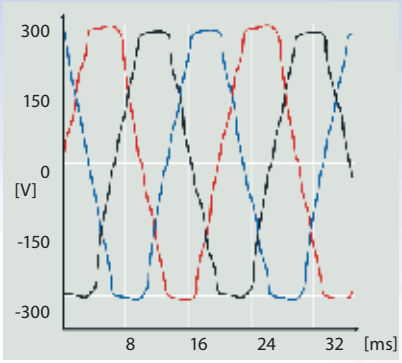
Provide extra motor protection with:

- VLT® Sine-wave Filter
- VLT® dV/dt Filter
- VLT® Common Mode Filters
- VLT® All-mode Filter

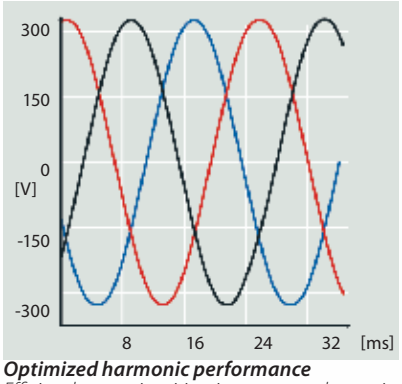
Achieve optimum performance for your application, even where the grid is weak or unstable.

Use motor cables up to 1000 ft

The design of the AC drive makes it a perfect choice in applications that require long motor cables. Without needing additional components, the drive provides trouble-free operation with cable lengths of up to 500 ft shielded or 1000 ft unshielded. This allows the drive to be installed in a central control room, away from the application without affecting motor performance.



Harmonic distortion
Electrical interference reduces efficiency and risks harming equipment.



Optimized harmonic performance
Efficient harmonic mitigation protects electronics and increases efficiency.

EMC Standards		
Standards and requirements	**EN 55011** *Facility operators must comply with EN 55011*	**Class A Group 2** Industrial environment
	EN/IEC 61800-3 *Converter manufacturers must conform to EN 61800-3*	**Category C3** Second environment
Compliance [1]		■

[1] *Compliance to mentioned EMC classes depends on the selected filter.*

DrivePro® Life Cycle services
Delivering a customized service experience!

We understand that every application is different. Having the ability to build a customized service package to suit your specific needs is essential.

DrivePro® Life Cycle Services is a collection of tailormade products designed around you. Each one engineered to support your business through the different stages of your AC drive's life cycle.

From optimized spare-part packages to condition-monitoring solutions, our products can be customized to help you achieve your business goals.

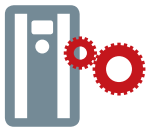
With the help of these products, we add value to your application by ensuring you get the most out of your AC drive.

When you deal with us, we also offer you access to training, as well as the application knowledge to help you in planning and preparation. Our experts are at your service.

You're covered
with DrivePro® Life Cycle service products

DrivePro® Retrofit
Minimize the impact and maximize the benefit

Manage the end of product lifecycle efficiently, with professional help to replace your legacy drives. The DrivePro® Retrofit service ensures optimal uptime and productivity during the smooth replacement process.



DrivePro® Spare Parts
Plan ahead with your spare part package

In critical situations, you want no delays. With DrivePro® Spare Parts you always have the right parts on hand, on time. Keep your drives running at top efficiency, and optimize system performance.

DrivePro® Extended Warranty
Long-term peace of mind

Get the longest coverage available in the industry, for peace of mind, a strong business case and a stable, reliable budget. You know the annual cost of maintaining your drives, up to six years in advance.

DrivePro® Exchange
The fast, most cost-efficient alternative to repair

You obtain the fastest, most cost-efficient alternative to repair, when time is critical. You increase uptime, thanks to quick and correct replacement of the drive.

DrivePro® Site Assessment
Plan for the future

Optimize your maintenance strategy with a complete onsite survey and risk analysis of all your AC drives collected in one detailed report. Together with a Danfoss expert, you can build a tailored plan for future maintenance, retrofits, and upgrades based off your exact needs..

DrivePro® Start-up
Fine-tune your drive for optimal performance today

Save on installation and commissioning time and cost. Get help from professional drives experts during start-up, to optimize drives safety, availability and performance.

DrivePro® Preventive Maintenance
Take preventive action

You receive a maintenance plan and budget, based on an audit of the installation. Then our experts perform the maintenance tasks for you, according to the defined plan.

DrivePro® Remote Expert Support
You can rely on us every step of the way

DrivePro® Remote Expert Support offers speedy resolution of on-site issues thanks to timely access to accurate information. With the secure connection, our drives experts analyze issues remotely reducing the time and cost involved in unnecessary service visits.

DrivePro® Remote Monitoring
Fast resolution of issues

DrivePro® Remote Monitoring offers you a system that provides online information available for monitoring in real time. It collects all the relevant data and analyzes it so that you can resolve issues before they affect your processes.

DrivePro® Service Agreement
Begins where the warranty leaves off

Service Contract coverage periods of 1 to 4 years are available for many Danfoss Drives products nearing the end of the standard warranty or extended warranty.

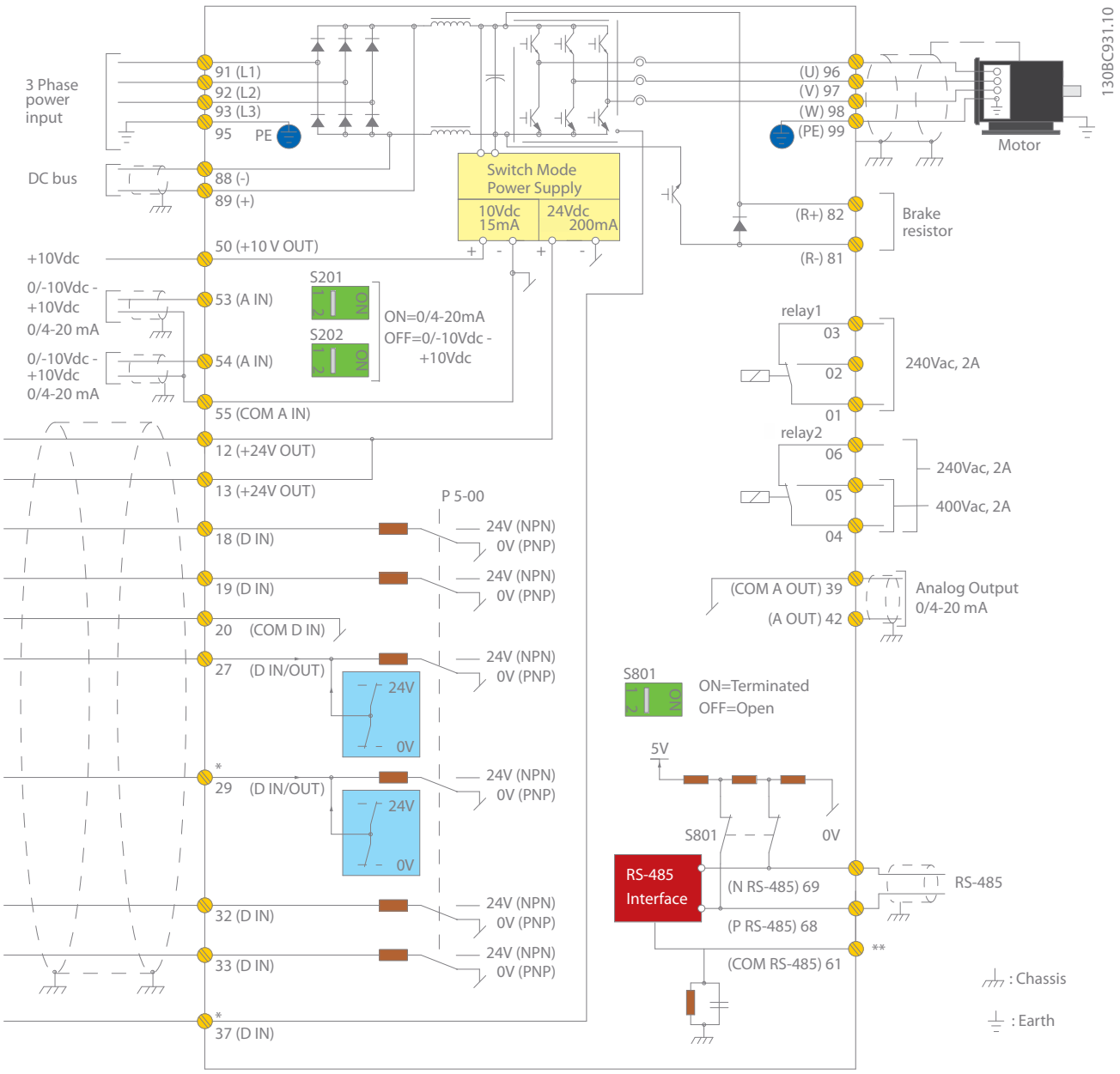
DrivePro®-tection
Coverage even from lightning strikes

A unique Danfoss offering, DrivePro®-tection Extended Warranty offers the additional comfort of coverage for many types of accidental damage.

For more information please call 1-888-DANFOSS or visit our website
https://www.danfoss.com/en-us/products/dds/drivepro-lifecycle-services/

Connection example

The numbers represent the terminals on the drive



A = Analog, D = Digital

* Terminal 37 is used for Safe Torque Off. For Safe Torque Off installation instructions, refer to the *Safe Torque Off Operating Instructions for Danfoss VLT® AutomationDrive EZ FC 321.*

** Do not connect cable screen.

This diagram shows a typical installation of the VLT® AutomationDrive EZ. Power is connected to the terminals 91 (L1), 92 (L2) and 93 (L3) and the motor is connected to 96 (U), 97 (V) and 98 (W).

Terminals 88 and 89 are used for load sharing between drives. Analog inputs can be connected to the 53 (V or mA), and for 54 (V or mA) terminals.

These inputs can be set up as either reference, feedback or thermistor inputs.

There are 6 digital inputs to be connected to terminals 18, 19, 27, 29, 32, and 33. Two digital input/output terminals (27 and 29) can be set up as digital outputs to show an actual status or warning or can be used as a pulse reference signal. The terminal 42 analog output can show process values such as 0 - Imax.

On the 68 (P+) and 69 (N-) terminals' RS 485 interface, the drive can be controlled and monitored via serial communication.

Technical data

Basic unit without extensions

Main supply (L1, L2, L3)	
Supply voltage	200-240 V AC 380-500 V AC 525-600 V AC 525-690 V AC
Supply frequency	50/60 Hz
Displacement power factor (cos ϕ) near unity	> 0.98
Switching on input supply L1, L2, L3	1-2 times/min.
Output data (T1, T2, T3)	
Output voltage	0-100% of supply voltage
Output frequency	0-590 Hz
Switching on output	Unlimited
Ramp times	0.01-3600 s
Digital inputs	
Programmable digital inputs	6*
Changeable to digital output	2 (terminal 27, 29)
Logic	PNP or NPN
Voltage level	0-24 V DC
Maximum voltage on input	28 V DC
Input resistance, Ri	Approx. 4 kΩ
Scan interval	5 ms

* *Two of the inputs can be used as digital outputs*

Analog inputs	
Analog inputs	2
Modes	Voltage or current
Voltage level	0 to +10 V (scaleable)
Current level	0/4 to 20 mA (scaleable)
Accuracy of analog inputs	Max. error: 0.5% of full scale
Pulse inputs	
Programmable pulse inputs	2*
Voltage level	0-24 V DC (PNP positive logic)
Pulse input accuracy (0.1-1 kHz)	Max. error: 0.1% of full scale

** Two of the digital inputs can be used for pulse inputs.*

Digital outputs	
Programmable digital/pulse outputs	2
Voltage level at digital/frequency output	0-24 V DC
Max. output current (sink or source)	40 mA
Maximum output frequency	0-32 kHz
Accuracy on frequency output	Max. error: 0.1% of full scale
Analog outputs	
Programmable analog outputs	1
Current range at analog output	0/4-20 mA
Max. load to common at analog output (clamp 30)	500 Ω
Accuracy on analog output	Max. error: 0.5 % of full scale

Control card	
USB interface	1.1 (Full Speed)
USB plug	Type "B"
RS485 interface	Up to 115 kBaud
Max. load (10 V)	15 mA
Max. load (24 V)	200 mA
Relay outputs	
Programmable relay outputs	Form C
Max. terminal load (AC) on 1-3 (NC), 1-2 (NO), 4-6 (NC) power card	240 V AC, 2 A
Max. terminal load (AC -1) on 4-5 (NO) power card	400 V AC, 2 A
Min. terminal load on 1-3 (NC), 1-2 (NO), 4-6 (NC), 4-5 (NO) power card	24 V DC 10 mA, 24 V AC 20 mA
Surroundings/external	
Ingress protection class	IP: 20/21/54/66 UL Type: Chassis/1/12/3R/4X
Vibration test	0.7 g
Max. relative humidity	5-95% (IEC 721-3-3); Class 3K3 (non-condensing) during operation
Ambient temperature	Max. 122 °F without derating
Galvanic isolation of all	I/O supplies according to PELV
Aggressive environment	Designed for 3C3 (IEC 60721-3-3)

Ambient temperature

– Operating temperature range is -13 °F to 122 °F without derating
Max 131 °F with derating

Fieldbus communication	
Standard built-in: FC Protocol Modbus RTU	Optional: VLT® PROFIBUS DP V1 MCA 101 VLT® DeviceNet MCA 104 VLT® PROFINET MCA 120 VLT® EtherNet/IP MCA 121 VLT® Modbus TCP MCA 122

Protection mode for longest possible up-time

– Electronic motor thermal protection against overload
– Protection against overtemperature
– The AC drive is protected against short circuits on motor terminals U, V, W
– The AC drive is protected against ground faults on motor terminals U, V, W
– Protection against mains phase loss
– Advanced data logging using real-time stamps

Agency approvals

Electrical data – A, B, and C enclosures

[T2] 3 x 200-240 V AC – high overload

High overload (160% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 200-240 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 208 V	Hp @ 230 V	[A]	[W]	Chassis	Type 4X
PK37	2.4	3.8	0.37	0.5	2.2	29	A2	A5
PK55	3.5	5.6	0.55	0.75	3.2	42	A2	A5
PK75	4.6	7.4	0.75	1	4.1	54	A2	A5
P1K1	6.6	10.6	1.1	1.5	5.9	63	A2	A5
P1K5	7.5	12	1.5	2	6.8	82	A2	A5
P2K2	10.6	17	2.2	3	9.5	116	A2	A5
P3K0	12.5	20	3	4	11.3	155	A3	A5
P3K7	16.7	26.7	3.7	5	15	185	A3	A5
P5K5	24.2	38.7	5.5	7.5	22	239	B3	B1
P7K5	30.8	49.3	7.5	10	28	371	B3	B1
P11K	46.2	73.9	11	15	42	463	B4	B2
P15K	59.4	89.1	15	20	54	624	B4	C1
P18K	74.8	112	18.5	25	68	740	C3	C1
P22K	88	132	22	30	80	874	C3	C1
P30K	115	173	30	40	104	1143	C4	C2
P37K	143	215	37	50	130	1400	C4	C2

[T2] 3 x 200-240 V AC – normal overload

Normal overload (110% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 200-240 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 208 V	Hp @ 230V	[A]	[W]	Chassis	Type 4X
PK37	2.4	3.8	0.37	0.5	2.2	29	A2	A5
PK55	3.5	5.6	0.55	0.75	3.2	42	A2	A5
PK75	4.6	7.4	0.75	1	4.1	54	A2	A5
P1K1	6.6	10.6	1.1	1.5	5.9	63	A2	A5
P1K5	7.5	12	1.5	2	6.8	82	A2	A5
P2K2	10.6	17	2.2	3	9.5	116	A2	A5
P3K0	12.5	20	3	4	11.3	155	A3	A5
P3K7	16.7	26.7	3.7	5	15	185	A3	A5
P5K5	30.8	33.9	7.5	10	28	310	B3	B1
P7K5	46.2	50.8	11	15	42	514	B3	B1
P11K	59.4	65.3	15	20	54	602	B4	B2
P15K	74.8	82.3	18.5	25	68	737	B4	C1
P18K	88	96.8	22	30	80	845	C3	C1
P22K	115	127	30	40	104	1140	C3	C1
P30K	143	157	37	50	130	1353	C4	C2
P37K	170	187	45	60	154	1636	C4	C2

[T5] 3 x 380-500 V AC – high overload

High overload (160% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continu-ous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 380-440 V)		(3 x 441-500 V)						IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 400 V	Hp @ 460 V	[A] @ 400 V	[W]	Chassis	Type 4X
PK37	1.3	2.1	1.2	1.9	0.37	0.5	1.2	35	A2	A5
PK55	1.8	2.9	1.6	2.6	0.55	0.75	1.6	42	A2	A5
PK75	2.4	3.8	2.1	3.4	0.75	1	2.2	46	A2	A5
P1K1	3	4.8	2.7	4.3	1.1	1.5	2.7	58	A2	A5
P1K5	4.1	6.6	3.4	5.4	1.5	2	3.7	62	A2	A5
P2K2	5.6	9	4.8	7.7	2.2	3	5	88	A2	A5
P3K0	7.2	11.5	6.3	10.1	3	4	6.5	116	A2	A5
P4K0	10	16	8.2	13.1	4	5	9	124	A2	A5
P5K5	13	20.8	11	17.6	5.5	7.5	11.7	187	A3	A5
P7K5	16	25.6	14.5	23.2	7.5	10	14.4	255	A3	A5
P11K	24	38.4	21	33.6	11	15	22	291	B3	B1
P15K	32	51.2	27	43.2	15	20	29	379	B3	B1
P18K	37.5	60	34	54.4	18.5	25	34	444	B4	B2
P22K	44	70.4	40	64	22	30	40	547	B4	B2
P30K	61	91.5	52	78	30	40	55	570	B4	C1
P37K	73	110	65	97.5	37	50	66	697	C3	C1
P45K	90	135	80	120	45	60	82	891	C3	C1
P55K	106	159	105	158	55	75	96	1022	C4	C2
P75K	147	221	130	195	75	100	133	1232	C4	C2

[T5] 3 x 380-500 V AC – normal overload

Normal overload (110% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continu-ous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 380-440 V)		(3 x 441-500 V)						IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 400 V	Hp @ 460 V	[A] @ 400 V	[W]	Chassis	Type 4X
PK37	1.3	2.1	1.2	1.9	0.37	0.5	1.2	35	A2	A5
PK55	1.8	2.9	1.6	2.6	0.55	0.75	1.6	42	A2	A5
PK75	2.4	3.8	2.1	3.4	0.75	1	2.2	46	A2	A5
P1K1	3	4.8	2.7	4.3	1.1	1.5	2.7	58	A2	A5
P1K5	4.1	6.6	3.4	5.4	1.5	2	3.7	62	A2	A5
P2K2	5.6	9	4.8	7.7	2.2	3	5	88	A2	A5
P3K0	7.2	11.5	6.3	10.1	3	4	6.5	116	A2	A5
P4K0	10	16	8.2	13.1	4	5	9	124	A2	A5
P5K5	13	20.8	11	17.6	5.5	7.5	11.7	187	A3	A5
P7K5	16	25.6	14.5	23.2	7.5	10	14.4	255	A3	A5
P11K	32	35.2	27	29.7	15	20	29	392	B3	B1
P15K	37.5	41.3	34	37.4	18.5	25	34	465	B3	B1
P18K	44	48.4	40	44	22	30	40	525	B4	B2
P22K	61	67.1	52	57.2	30	40	55	739	B4	B2
P30K	73	80.3	65	71.5	37	50	66	698	B4	C1
P37K	90	99	80	88	45	60	82	843	C3	C1
P45K	106	117	105	116	55	75	96	1083	C3	C1
P55K	147	162	130	143	75	100	133	1384	C4	C2
P75K	177	195	160	176	90	125	161	1474	C4	C2

[T6] 3 x 525-600 V AC – high overload

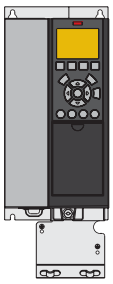
High overload (160% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 525-600 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 575 V	Hp @ 575 V	[A] @ 575 V	[W]	Chassis	Type 4X
PK75	1.7	2.7	0.75	1	1.7	35	A3	A5
P1K1	2.4	3.8	1.1	1.5	2.4	50	A3	A5
P1K5	2.7	4.3	1.5	2	2.7	65	A3	A5
P2K2	3.9	6.2	2.2	3	4.1	92	A3	A5
P3K0	4.9	7.8	3	4	5.2	122	A3	A5
P4K0	6.1	9.8	4	5	5.8	145	A3	A5
P5K5	9	14.4	5.5	7.5	8.6	195	A3	A5
P7K5	11	17.6	7.5	10	10.4	261	A3	A5
P11K	18	29	11	15	16	220	B3	B1
P15K	22	35	15	20	20	300	B3	B1
P18K	27	43	18.5	25	24	370	B4	B2
P22K	34	54	22	30	31	440	B4	B2
P30K	41	62	30	40	37	600	B4	C1
P37K	52	78	37	50	47	740	C3	C1
P45K	62	93	45	60	56	900	C3	C1
P55K	83	125	55	75	75	1100	C4	C2
P75K	100	150	75	100	91	1500	C4	C2

[T6] 3 x 525-600 V AC – normal overload

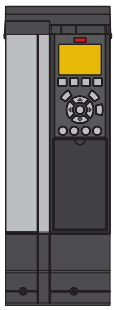
Normal overload (110% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 525-600 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP66
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 575 V	Hp @ 575 V	[A] @ 575 V	[W]	Chassis	Type 4X
PK75	1.7	2.7	0.75	1	1.7	35	A3	A5
P1K1	2.4	3.8	1.1	1.5	2.4	50	A3	A5
P1K5	2.7	4.3	1.5	2	2.7	65	A3	A5
P2K2	3.9	6.2	2.2	3	4.1	92	A3	A5
P3K0	4.9	7.8	3	4	5.2	122	A3	A5
P4K0	6.1	9.8	4	5	5.8	145	A3	A5
P5K5	9	14.4	5.5	7.5	8.6	195	A3	A5
P7K5	11	17.6	7.5	10	10.4	261	A3	A5
P11K	22	24	15	20	20	300	B3	B1
P15K	27	30	18.5	25	24	370	B3	B1
P18K	34	37	22	30	31	440	B4	B2
P22K	41	45	30	40	37	600	B4	B2
P30K	52	57	37	50	47	740	B4	C1
P37K	62	68	45	60	56	900	C3	C1
P45K	83	91	55	74	75	1100	C3	C1
P55K	100	110	75	100	91	1500	C4	C2
P75K	131	144	90	120	119	1800	C4	C2

Dimensions enclosure sizes A, B and C

Enclosure size		A2	A3	A5	B1	B2	B3	B4	C1	C2	C3	C4
Protection rating [IEC/UL]		IP20 Chassis	IP20 Chassis	IP66 / Type 4X	IP66 / Type 4X		IP20 / Chassis		IP66 / Type 4X		IP20 / Chassis	
[mm]	Height	268	268	420	480	650	399	520	680	770	550	660
	Height with decoupling plate	374	374	–	–	–	420	595	–	–	630	800
	Width	90	130	242	242	242	165	230	308	370	308	370
	Depth	205	205	200	260	260	249	242	310	335	333	333
	Depth with A option	220	220	200	260	260	262	242	310	335	333	333
	Depth with mains disconnect	–	–	224	289	290	–	–	344	378	–	–
[kg]	Weight	4.9	6	14.2	23	27	12	23.5	45	64	35	50
[in]	Height	10.6	10.6	16.6	18.9	25.6	15.8	20.5	26.8	30.4	21.7	26
	Height with decoupling plate	14.8	14.8	–	–	–	16.6	23.5	–	–	24.8	31.5
	Width	3.6	5.2	9.6	9.6	9.6	6.5	9.1	12.2	14.6	12.2	14.6
	Depth	8.1	8.1	7.9	10.3	10.3	9.8	9.6	12.3	13.2	13	13
	Depth with mains disconnect	–	–	8.9	11.4	11.5	–	–	13.6	14.9	–	–
	Depth with A option	8.7	8.7	7.9	10.3	10.3	10.4	9.6	12.3	13.2	13	13
[lb]	Weight	10.8	14.6	31.5	50.7	59.6	26.5	52	99.3	143.3	77.2	110.2

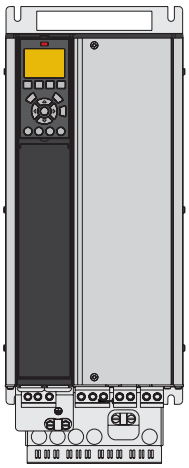


A3 IP20/Chassis
with decoupling plate

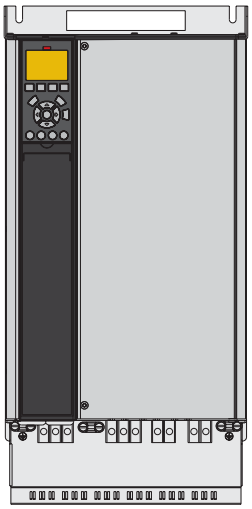


A3 with IP21/Type 1 NEMA 1 Kit

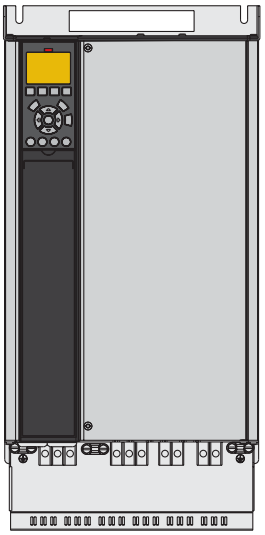
A5 NEMA 4X with mains disconnect



B4 IP20/Chassis
with decoupling plate



C3 IP20/Chassis
with decoupling plate



IP20/Chassis
with decoupling plate

Ordering typecode for A, B and C enclosures

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]
FC-																			

[1] Application *(character 4-6)*	
321	VLT® AutomationDrive EZ FC 321
[2] Power size *(character 7-10)*	
PK25	0.25 kW / 0.33 Hp
PK37	0.37 kW / 0.50 Hp
PK55	0.55 kW / 0.75 Hp
PK75	0.75 kW / 1.0 Hp
P1K1	1.1 kW / 1.5 Hp
P1K5	1.5 kW / 2.0 Hp
P2K2	2.2 kW / 3.0 Hp
P3K0	3.0 kW / 4.0 Hp
P3K7	3.7 kW / 5.0 Hp
P4K0	4.0 kW / 5.5 Hp
P5K5	5.5 kW / 7.5 Hp
P7K5	7.5 kW / 10 Hp
P11K	11 kW / 15 Hp
P15K	15 kW / 20 Hp
P18K	18.5 kW / 25 Hp
P22K	22 kW / 30 Hp
P30K	30 kW / 40 Hp
P37K	37 kW / 50 Hp
P45K	45 kW / 60 Hp
P55K	55 kW / 75 Hp
P75K	75 kW / 100 Hp
[3] AC Line Voltage *(character 11-12)*	
T2	3 x 200-240 V AC
T5	3 x 380-500 V AC
T6	3 x 525-600 V AC
[4] IP/UL protection ratings *(character 13-15)*	
IP20 / Chassis enclosures	
E20	IP20/Chassis
IP66 / UL Type 4X enclosures	
P66	NEMA 4X Backplate
[5] RFI filter, terminal and monitoring options – EN/IEC 61800-3 *(character 16-17)*	
H2	RFI-Filter, Class A2 (C3)
HX	No RFI-Filter
[6] Braking *(character 18)*	
X	No brake IGBT
B	Brake IGBT

[7] LCP Display *(character 19)*	
X	No Local Control Panel
G	VLT® Control Panel LCP 102 (Graphical)
[8] PCB Coating – IEC 721-3-3 *(character 20)*	
X	Standard coated PCB Class 3C2
C	Coated PCB Class 3C3
[9] Mains input *(character 21)*	
X	No mains option
3	Mains Disconnect + Fuse
[10] Hardware option A *(character 22)*	
X	Standard cable entries
S	Imperial cable entry
[11] Hardware option B *(character 23)*	
X	No adaptation
[12] Special version *(character 24-27)*	
SXXX	Latest released standard software
[13] LCP language *(character 28)*	
X	Language package 4 including English US, English UK, German, Greek, Brazilian , Portuguese , Spanish, Turkish and Polish
[14] A-options: Fieldbus *(character 29-30)*	
AX	No option
AN	VLT® EtherNet/IP MCA 121
[15] B-options *(character 31-32)*	
BX	No option
[16] C0-option *(character 33-34)*	
CX	No option
[17] C1-option *(character 35)*	
X	No C1-ption
[18] C-option software *(character 36-37)*	
XX	No software option
[19] D-option *(character 38-39)*	
DX	No DC input installed
D0	VLT® 24 V DC Supply Option MCB 107

Please beware that not all combinations are possible. Find help configuring your drive with the online configurator found under: ***http://vcc.danfoss.net/***

Electrical data – D enclosure

[T2] 3 x 200-240 V AC – high overload

High overload (150% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 200-240 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW	Hp	[A]	[W]	Chassis	Type 12
N45K	160	240	45	60	154	1482	D3h	D1h
N55K	190	285	55	75	183	1794	D3h	D1h
N75K	240	360	75	100	231	1990	D4h	D2h

[T2] 3 x 200-240 V AC – normal overload

Normal overload (110% 1 min/10 min)							Enclosure size	
Type code	Output current (3 x 200-240 V)		Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
							IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	kW	Hp	[A]	[W]	Chassis	Type 12
N45K	190	209	55	75	183	1505	D3h	D1h
N55K	240	264	75	100	231	2398	D3h	D1h
N75K	321	332	90	120	291	2623	D4h	D2h

[T5] 3 x 380-500 V AC – high overload

High overload (150% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 380-440 V)		(3 x 441-500 V)						IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 400 V	Hp @ 460 V	[A] @ 400 V	[W]	Chassis	Type 12
N90K	177	266	160	240	90	125	171	2031	D3h	D1h
N110	212	318	190	285	110	150	204	2289	D3h	D1h
N132	260	390	240	360	132	200	251	2923	D3h	D1h

[T5] 3 x 380-500 V AC – normal overload

Normal overload (110% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 380-440 V)		(3 x 441-500 V)						IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 400 V	Hp @ 460 V	[A] @ 400 V	[W]	Chassis	Type 12
N90K	212	233	190	209	110	150	204	2559	D3h	D1h
N110	260	286	240	264	132	200	251	2954	D3h	D1h
N132	315	347	321	332	160	250	304	3770	D3h	D1h

3 x 525-690 V AC – high overload

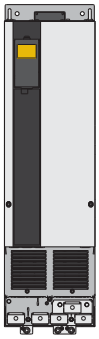
High overload (150% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 525-550 V)		(3 x 551-690 V)						IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 690 V	Hp @ 575 V	[A] @ 690 V	[W]	Chassis	Type 12
N90K	113	170	108	162	90	100	104	1479	D3h	D1h
N110	137	206	131	197	110	125	126	1798	D3h	D1h
N132	162	243	155	233	132	150	149	2157	D3h	D1h

[T7] 3 x 525-690 V AC – normal overload

Normal overload (110% 1 min/10 min)									Enclosure size	
Type code	Output current				Typical shaft output power		Continuous input current	Estimated power loss	Protection rating [IEC/UL]	
	(3 x 525-550 V)		(3 x 551-690 V)						IP20	IP54
FC-321	Con. I_N	Inter. I_{MAX} (60 s)	Con. I_N	Inter. I_{MAX} (60 s)	kW @ 690 V	Hp @ 575 V	[A] @ 690 V	[W]	Chassis	Type 12
N90K	137	151	131	144	110	125	126	1796	D3h	D1h
N110	162	178	155	171	132	150	149	2165	D3h	D1h
N132	201	221	192	211	160	200	185	2738	D3h	D1h

Dimensions enclosure size D

		VLT® AutomationDrive EZ			
Enclosure size		D1h	D2h	D3h	D4h
Protection rating [IEC/UL]		IP54 / Type 12		IP20 / Chassis	
[mm]	Height	901.0	1107.0	909.0	1122.0
	Width	325.0	420.0	250.0	350.0
	Depth	378.4	378.4	375.0	375.0
[kg]	Weight	62.0	125.0	62.0	125.0
[in]	Height	35.5	43.6	35.8	44.2
	Width	12.8	12.8	19.8	14.8
	Depth	14.9	14.9	14.8	14.8
[lb]	Weight	136.7	275.6	136.7	275.6



D3h/D4h

Ordering typecode for D enclosure

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]
FC-																			

[1] Application *(character 4-6)*	
321	VLT® AutomationDrive EZ FC 321
[2] Power size *(character 7-10)*	
N45K	45 kW / 60 Hp
N55K	55 kW / 75 Hp
N75K	75 kW / 100 Hp
N90K	90 kW / 125 Hp
N110	110 kW / 150 Hp
N132	132 kW / 200 Hp
[3] AC mains voltage *(character 11-12)*	
T2	3 x 200-240 V AC
T5	3 x 380-500 V AC
T7	3 x 525-690 V AC
[4] IP/UL protection ratings *(character 13-15)*	
IP20 Chassis enclosures	
E20	IP20 / Chassis
IP54 / UL Type 12 enclosures	
E54	IP54 / Type 12
[5] RFI filter, terminal and monitoring options – EN/IEC 61800-3 *(character 16-17)*	
H2	RFI filter, Class A2 (C3)
HX	No RFI filter
[6] Braking *(character 18)*	
X	No brake IGBT
B	Brake IGBT
[7] LCP display *(character 19)*	
X	Blank faceplate, no LCP installed
G	VLT® Control Panel LCP 102 *(Graphical)*

[8] PCB coating – IEC 721-3-3 *(character 20)*	
C	Coated PCB Class 3C3
[9] Mains input *(character 21)*	
X	No mains option
3	Mains disconnect + fuse *(enclosure size D)*
[10] Hardware option A *(character 22)*	
X	Standard cable entries
S	Smooth imperial cable entries
[11] Hardware option B *(character 23)*	
X	No adaptation
[12] Special version *(character 24-27)*	
SXXX	Latest released standard software
[13] LCP language *(character 28)*	
X	Language package 4 including English US, English UK, German, Greek, Brazilian , Portuguese , Spanish, Turkish and Polish
[14] A-options: Fieldbus *(character 29-30)*	
AX	No option
AN	VLT® EtherNet/IP MCA 121
[15] B-options *(character 31-32)*	
BX	No application option
[16] C0-option *(character 33-34)*	
CX	No option
[17] C1-option *(character 35)*	
X	No option
[18] C-option software *(character 36-37)*	
XX	No software option
[19] D-option *(character 38-39)*	
DX	No DC input installed
D0	VLT® 24 V DC Supply Option MCB 107

Please beware that not all combinations are possible. Find help configuring your drive with the online configurator found under: ***http://vcc.danfoss.net/***

A options: Fieldbuses

Available for the full product range

Fieldbus	Typecode position
A	
VLT® EtherNet/IP MCA 121	**14**

PROFIBUS DP

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

Other features:
- Wide compatibility, a high level of availability, support for all major PLC vendors, and compatibility with future versions
- Fast, efficient communication, transparent installation, advanced diagnosis and parameterization and auto-configuration of process data via GSD-file
- Acyclic parameterization using PROFIBUS DP-V1, PROFIdrive or Danfoss FC (MCA101 only) profile state machines, PROFIBUS DP-V1, Master Class 1 and 2

VLT® PROFIBUS DP MCA 101

Order code
130B1100 standard
130B1200 coated

DeviceNet

DeviceNet offers robust, efficient data handling thanks to advanced Producer/Consumer technology.

- Support of ODVA's AC drive profile supported via I/O instance 20/70 and 21/71 secures compatibility to existing systems
- Benefit from ODVA's strong conformance testing policies, which ensure that products are interoperable
- Built-in web server
- E-mail client for service notification

VLT® DeviceNet MCA 104

Order code
130B1102 standard
130B1202 coated

PROFINET

PROFINET uniquely combines the highest performance with the highest degree of openness. The option is designed so that many of the features from the PROFIBUS can be reused, minimizing user effort to migrate PROFINET and securing the investment in a PLC program.

- Same PPO types as PROFIBUS for easy migration to PROFINET
- Support of MRP
- Support of DP-V1 Diagnostic allows easy, fast and standardized handling of warning and fault information into the PLC, improving bandwidth in the system
- Implementation in accordance with Conformance Class B
- Built-in web server
- E-mail client for service notification

VLT® PROFINET MCA 120

Order code
130B1135 standard, dual-port
130B1235 coated, dual-port

EtherNet/IP

Ethernet is the future standard for communication at the factory floor. EtherNet/IP 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 option offers advanced features such as:
- Built-in high performance switch enabling line-topology, and eliminating the need for external switches
- DLR Ring
- Advanced switch and diagnosis functions
- Built-in web server
- E-mail client for service notification
- Unicast and Multicast communication

VLT® EtherNet/IP MCA 121

Order code
130B1119 standard, dual-port
130B1219 coated, dual-port

Modbus TCP

Modbus TCP is the first industrial Ethernet-based protocol for automation. Modbus TCP is able to handle connection intervals 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:
- Dual Master PLC connection for redundancy in dual port options

VLT® Modbus TCP MCA 122

Order code
130B1196 standard, dual-port
130B1296 coated, dual-port

Download the fieldbus configuration files required to more easily integrate your FC321 into your existing control system.

D option: 24 V back-up power supply

Available for the full product range

24 V back-up power supply	Typecode position
D	
VLT® 24 V DC Supply Option MCB 107	**19**

VLT® 24 V DC Supply MCB 107

Connect an external DC supply to keep the control section and any installed option functioning during power failure.

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 .....250 ft
- Input capacitance load ..... < 10 uF
- Power-up delay .....< 0.6 s

Ordering number
130B1108 standard
130B1208 coated *(Class 3C3/IEC 60721-3-3)*

Power options

Power option
VLT® Sine-Wave Filter MCC 101
VLT® dV/dt Filter MCC 102
VLT® Common Mode Filters MCC 105
VLT® Advanced Harmonic Filter AHF 005/010
VLT® Brake Resistors MCE 101
VLT® Line Reactor MCC 103
VLT® All-mode filter MCC 201

VLT® Sine-wave Filter MCC 101

- VLT® Sine-wave Filters are positioned between the AC drive and the motor to provide a sinusoidal phase-to-phase motor voltage
- 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

Power range
3 x 200-500 V, 2.5-800 A
3 x 525-690 V, 4.5-660 A

Enclosure ratings
- IP00 and IP20 wall-mounted enclosures rated up to 75 A (500 V) or 45 A (690 V)
- IP23 floor-mounted enclosures rated 115 A (500 V) or 76 A (690 V) or more
- IP54 both wall-mounted and floor-mounted enclosures rated up to 4.5 A, 10 A, 22 A (690 V)

Ordering number
See relevant Design Guide

VLT® dV/dt Filter MCC 102

- Reduces the dV/dt values on the motor terminal phase-to-phase voltage
- Positioned between the AC drive and the motor to eliminate very fast voltage changes
- The motor terminal phase-to-phase voltage is still pulse shaped but its dV/dt values are reduced
- Reduces 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

Power range
3 x 200-690 V (up to 880 A)

Enclosure ratings
- IP00 and IP20/IP23 enclosure in the entire power range
- IP54 enclosure available up to 177 A

Ordering number
See relevant Design Guide

VLT® Common Mode Filter MCC 105

- Positioned between the AC drive 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
- Extends motor bearing lifetime
- Can be combined with dV/dt and sine-wave filters
- Reduces radiated emissions from the motor cable
- Reduces electromagnetic interference
- Easy to install – no adjustments necessary
- Oval shaped – allows mounting inside the AC drive enclosure or motor terminal box

Power range
380-415 V AC (50 and 60 Hz)
440-480 V AC (60 Hz)
600 V AC (60 Hz)
500-690 V AC (50 Hz)

Ordering number
130B3257 Enclosure size A and B
130B7679 Enclosure size C1
130B3258 Enclosure size C2, C3 and C4
130B3259 Enclosure size D

VLT® All-mode Filter MCC 201

The MCC 201 technology with reduction of differential mode and common mode interference at the inverter output enables the use of extremely long motor cable lengths. This filter also supports the use of unshielded motor cables.

- Enables longer cables than limited by the drive
- Enables use of unshielded motor cables
- Reduces acoustical switching noise from motor
- Improves conducted emissions
- Eliminates motor bearing currents
- Eliminates motor insulation stress
- Extends motor service life

Power range
Voltage rating 3 x 380 - 500 V
Nominal current 6.0 - 65 A @400 V
5.5 - 62 A @500 V

VLT® Advanced Harmonic Filter AHF 005 and AHF 010

- Optimized harmonic performance for VLT® drives rated up to 200 Hp
- A patented technique reduces THD levels in the mains network to less than 5-10%
- Perfect match for industrial automation, highly dynamic applications and safety installations
- Intelligent cooling with variable-speed fan

Power range
380-415 V AC (50 and 60 Hz)
440-480 V AC (60 Hz)
600 V AC (60 Hz)
500-690 V AC (50 Hz)

Enclosure ratings
- IP20

(An IP21/NEMA 1 upgrade kit is available)

Ordering number
See relevant Design Guide

VLT® Brake Resistor MCE 101

- Energy generated during braking is absorbed by the resistors, protecting electrical components from heating up
- Optimized for the FC-series and general versions for horizontal and vertical motion are available
- Built-in thermo switch
- Versions for vertical and horizontal mounting
- A selection of the vertically mounted units are UL-recognized

Power range
Precision electrical match to each individual VLT® drive power size

Enclosure ratings:
- IP20
- IP21
- IP54
- IP65

Ordering number
See relevant Design Guide

VLT® Line Reactor MCC 103

- Ensures current balance in load-sharing applications, where the DC-side of the rectifier of multiple drives is connected together
- UL-recognized for applications using load sharing
- 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
- Compatible with VLT® AutomationDrive EZ 50 Hz or 60 Hz mains supply

Ordering number
See relevant Design Guide

Accessories

Available for the full product range

LCP

VLT® Control Panel LCP 102 *(Graphical)*
Ordering number: *130B1107*

LCP Panel Mounting Kit *(enables the LCP to be mounted in a cabinet front panel. Result is IP65)*
Ordering number for IP20 enclosure
130B1113: With fasteners, gasket, graphical LCP and 9.8 ft cable
130B1114: With fasteners, gasket, numerical LCP and 9.8 ft cable
130B1117: With fasteners, gasket and without LCP and with 9.8 ft cable
130B1170: With fasteners, gasket and without LCP

LCP Remote Mounting Kit *(enables the LCP to be mounted outdoors on any wall. Includes outdoor flip up lockable cover)*
Ordering number:
134B5223 – Kit with 9.8 ft cable:
134B5224 – Kit with 16.4 ft cable
134B5225 – Kit with 32.8 ft cable

Accessories

PROFIBUS SUB-D9 Adapter
Chassis, A2 and A3
Ordering number: *130B1112*

Option Adapter
Ordering number: *130B1130 standard, 130B1230 coated*

USB Extension
Ordering number:
130B1155: 13.8 in cable
130B1156: 25.5 in cable

IP21/Type 1 (NEMA 1) kit
Ordering number
130B1122: For enclosure size size A2
130B1123: For enclosure size size A3
130B1187: For enclosure size size B3
130B1189: For enclosure size size B4
130B1191: For enclosure size size C3
130B1193: For enclosure size size C4

NEMA 4X outdoor weather shield
Ordering number
130B4598: For enclosure size size A5, B1, B2
130B4597: For enclosure size size C1, C2

Motor connector
Ordering number:
130B1065: enclosure size A2 to A5 (10 pieces)

Mains connector
Ordering number:
130B1067: 10 pieces mains connectors IP20/21

Relays 1 terminal
Ordering number: *130B1069 (10 pieces 3 pole connectors for relay 01)*

Relays 2 terminal
Ordering number: *130B1068 (10 pieces 3 pole connectors for relay 02)*

Control card terminals
Ordering number: *130B0295*

PC software

VLT® Motion Control Tool MCT 10

VLT® Motion Control Tool MCT 31

Danfoss HCS Harmonic Calculation Software

Danfoss ecoSmart™

Click to access MyDrive® Suite to download software

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Providing consistently awesome performance for more than 50 years, Danfoss Drives are built to last. The robust VLT® AutomationDrive EZ FC 321 was designed for basic drive applications with a low number of variants, quick and easy delivery, and plug and play convenience.

Built for ease of use, the modular VLT® AutomationDrive EZ helps save energy, increase flexibility, reduce costs related to spare parts and servicing, and optimize process control across a wide range of industries.

Cement plant realizes **solid energy savings** with VFD's

Holcim Cement, Bloomsdale, MO, USA

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Peroni Brewery selects VLT® FlexConcept® to **optimize operating costs**

Peroni Brewery, Rome, Italy

Read the story

Italcementi enjoys **optimized process performance** in all conditions

Italcementi Group (GSM Aggregates limestone quarry, Roussas, France)

Read the story

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https://www.danfoss.com/en-us/products/dds

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