



Need exceptional control for food, beverage, and industrial applications?



Meet the premium, globally supported drive concept for exceptional control of motor-driven applications in a wide range of sectors.

Designed for variable speed control of all motor technologies, on any industrial machine or production line, the VLT® AutomationDrive helps its owner save energy, increase system flexibility, and optimize processes.

Efficient

This 98% energy efficient drive enables you to optimize processes while reducing carbon footprint and operating costs. The result is a market-leading control solution that provides a fast return on investment and a highly competitive cost of ownership. Versatile, flexible, configurable, and built to last.

Flexible and expandable

Built on a flexible, modular design concept, the VLT® AutomationDrive is packed with standard industry features out of the box. These can be expanded with plug-and-play options with additional features, positioning control, fieldbuses, safety functions such as STO, SS1, SLS, SMS and SSM, motor protection, and more.

- No cloud connection required: high security level and no subscription fee
- Reduced installation costs, since no external controller or PLC is required to generate the CBM observation and notification
- Documentation of system stability

Explore opportunities with CBM

CBM for high reliability

Condition-based monitoring (CBM) functionality embedded in the drive means you can perform monitoring and analytics locally in the drive with no need for a PLC. The integrated CBM functionality gives you early warning of issues so you can act in time to prevent unplanned stoppages. The result is optimal uptime, longer equipment life, and increased productivity:

Power range

3 x 200-240 V	0.25-150 kW
	0.34-204 hp
3 x 380-480/500 V	0.37-500 kW
	0.5-680 hp
3 x 525-600 V	0.75-75 kW
	1-100 hp
3 x 525-690 V	1.1-710 kW
	1.5-965 hp
Normal overload	1.5-800 kW
	2-1088 hp

Feature	Benefit
Integrated condition-based monitoring (CBM) gives early warning of issues before they cause unplanned stoppage	Maximum uptime and maximum productivity
Ambient temperature 50° C without derating	Less need for cooling or oversizing
Available in IP00, 20, 21, 54, 55 and 66 enclosures	Enclosures for all environments
Resistant to wear and tear	Low lifetime cost
Back-channel cooling for frame D and E	Prolonged lifetime of electronics
Plug-and-Play technology	Easy upgrade and changeover
Same user interface for all VLT® drives. Know one, know them all.	Easy to use. Saves time in training
Exchangeable languages	User-friendly
Intelligent warning systems	Warning before controlled stop
Smart Logic Control	Reduces need for PLC capacity
Advanced plug-in features	Easy commissioning
Integrated functional safety: Safe Stop SS1 and Safe Torque Off as standard	Reduces cost: Eliminate need for external functional safety equipment
Intelligent heat management	Reduce capital and operating costs
Cybersecurity compliance: IEC 62443 ML 3 IEC 62443-4-1 SL 1 IEC 62443-4-2	Future proof: Prepared for upcoming cybersecurity requirements
Compliance with Low Voltage Directive IEC 61800-5-1:2022 (ED 3.0)	Future proof: Already complies with upcoming electrical safety compliance requirements



Learn more about
VLT® AutomationDrive

Protect your assets from unauthorized access

Product development processes at Danfoss are certified for cybersecurity according to the standard IEC 62443-4-1. Balancing risk exposure with usability, premium VLT® drives are also Security Level 1 (SL1)-compliant according to IEC 62443-4-2 and manufactured on Danfoss' own premises, which ensures that the design remains protected and cannot be manipulated within the firmware.

Our cybersecure access strategy puts you in control:

- Set up advanced roles and access levels to limit which personnel are permitted to manage and modify the variable speed drive operations
- Specify which parameters are accessible for viewing or change, for individual roles at each access level
- Get comprehensive verification of user access: Every login via cybersecure access is meticulously logged in the memory of the drive, for easy reporting

 **Discover SL1-compliant drives**

Robust and safe

VLT® AutomationDrive is a proven performer in all industrial environments and grid voltages, including 690 V. Enclosures are available up to protection rating IP 66 (depending on model), and integrated DC chokes and RFI filters in all models protect installations by minimizing harmonic distortion and electromagnetic interference. Every single drive is fully tested at the factory before shipping.

Easy to set up and operate via the user-friendly graphical control panel, the VLT® AutomationDrive requires only minimal maintenance once in operation.

Choose your favorite motor

Compatible with your preferred motor technology:

- Induction motor (IM)
- Permanent magnet motor (PM)
- Non salient (SPM)
- Salient (IPM)
- Synchronous reluctance motor (SynRM)
- Permanent magnet-assisted synchronous reluctance motor (PMA SynRM)

Integrated Motion Controller (IMC)

With IMC, motion functionality, high-precision scaled positioning and synchronizing tasks are simple to perform with or without encoder feedback, and commissioning is fast and safe. IMC is configurable by parameters and no special programming language is required. No additional modules or hardware are necessary.

For the complete range of options, see Selection Guide for Motion Control Options.

Future-proof ED3.0 compliance

The FC 302 complies with the Low Voltage Directive IEC 61800-5-1:2022 (ED 3.0). This is the key electrical safety standard for variable frequency drives, ensuring their electrical, thermal, and energy aspects are designed and tested to protect people and equipment during installation, operation, and maintenance.





Harmonic mitigation

A range of filters offers supreme protection against harmonic distortion, ensuring high power quality and stable operation. The range includes:

Danfoss Advanced Active Filter AAF 007

Enjoy harmonic mitigation, power factor correction and imbalance compensation, all in one product. You can adjust the settings to your needs and put focus on the area that is important in your application.

- AAF 007 ensures 60% less power loss than similar filters
- Selective harmonic mitigation and automatic resonance detection ensure reliable operation tailored to your application requirements
- The newest-generation SiC switches give unmatched high efficiency and effective elimination of high-order harmonics
- Compatible with all drives in the entire Danfoss product portfolio

VLT® Advanced Harmonic Filter AHF 005 and AHF 010

This advance passive harmonic filter optimizes harmonic performance for VLT® drives rated up to 250 kW

- 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
- Line voltage and filter current:
3 x 380/400/500/600/690 V 10-480 A*

** Achieve higher ratings by connecting in parallel. See AHF 005 or AHF 010 Design Guide for details.*

- Enclosure ratings:
IP20 (An IP21/NEMA 1 upgrade kit is available)

Options

Fieldbus options

- VLT® PROFIBUS DP MCA 101
- VLT® DeviceNet MCA 104
- VLT® CANopen MCA 105
- VLT® PROFIBUS Converter MCA 114 ¹⁾
- VLT® PROFINET MCA 120
- VLT® Ethernet/IP MCA 121
- VLT® Modbus TCP MCA 122
- VLT® POWERLINK MCA 123
- VLT® EtherCAT MCA 124
- VLT® DeviceNet Converter MCA 194

I/O and feedback options

- VLT® General Purpose I/O MCB 101
- VLT® Encoder Input MCB 102
- VLT® Resolver Input MCB 103
- VLT® Relay Card MCB 105
- VLT® 24 V External Supply MCB 107
- VLT® Extended Relay Card MCB 113
- VLT® Sensor Input MCB 114

Safety options

- VLT® Safe PLC Interface Option MCB 108
- VLT® PTC Thermistor Card MCB 112
- VLT® Safety Options MCB 150, 151 and 152

Power options

- VLT® Brake Resistor MCE 101
- VLT® Sine-Wave Filter MCC 101
- VLT® dU/dt Filter MCC 102
- VLT® Common Mode Filter MCC 105
- VLT® Advanced Harmonic Filters AHF 005/010
- Danfoss Advanced Active Filter AAF 007

Other accessories/ Cooling kit

- IP 21/NEMA 1 Kit (convert IP 20 to IP 21)
- PROFIBUS adapter
- Sub-D9 Connector
- Decoupling plate for fieldbus cables
- USB connection cable to PC
- Panel Through option
- LCP panel mounting kit
- Mains disconnect option
- USB Extension
- Option Adapter

Brake chopper (IGBT) option

Limits the load on the intermediate circuit in the case the motor acts as a generator.

High power options

- RFI Filters
- Mains shielding
- Multi-wire regen terminals

Please see the Design Guide for the complete range of options.

¹⁾ Use FC 302 with the VLT® PROFIBUS Converter option to replace older drives such as VLT® 3000 and VLT® 5000. Using this option, FC 302 delivers more than 30 years of reverse compatibility

Specifications

Mains supply (L1, L2, L3)

Supply voltage	200 – 240 V ±10% FC 301: 380 – 480 V ±10% FC 302: 380 – 500 V ±10%, 525 – 600 V ±10% 525 – 690 V ±10%
Supply frequency	50/60 Hz
True power factor (λ)	0.92 nominal at rated load
Displacement power factor ($\cos \phi$) near unity	(> 0.98)
Switching on input supply L1, L2, L3	1–2 times/min.
Output data (U, V, W)	
Output voltage	0–100% of supply voltage
Output frequency	0–590 Hz
Switching on output	Unlimited
Ramp times	1–3600 sec.

Digital inputs

Programmable digital inputs	FC 301: 4 (5) / FC 302: 4 (6)
Logic	PNP or NPN
Voltage level	0–24 VDC

Note: One/two digital inputs can be programmed as digital output for FC 301/FC 302.

Analogue input

Analogue inputs	2
Modes	Voltage or current
Voltage level	FC 301: 0 to +10 V FC 302: -10 to +10 V (scaleable)
Current level	0/4 to 20 mA (scaleable)

Pulse/encoder inputs

Programmable pulse/encoder inputs	FC 301: 1 / FC 302: 2
Voltage level	0–24 VDC (PNP positive logic)

Digital outputs ²⁾

Programmable digital/pulse outputs	FC 301: 1 / FC 302: 2
Voltage level at digital/frequency output	0–24 V

Analogue output ²⁾

Programmable analogue outputs	1
Current range	0/4–20 mA

Relay outputs ²⁾

Programmable relay outputs	FC 301: 1 / FC 302: 2
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Cable lengths

Max. motor cable lengths	FC 301: 50 m / FC 302: 150 m (screened/armoured) FC 301: 75 m / FC 302: 300 m (unscreened/unarmoured)
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Compliance

Low Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU
Machinery Directive 2006/42/EC (January 2027: 2023/1230/EU)
EcoDesign Directive 2009/125/EC
Commissioning Regulation 2009/1781 EU
RoHS Directive 2011/65/EU
ATEX Directive 2014/34/EU
REACH Regulation
UL Listing
CSA/cUL
China RoHS

²⁾ Use options to extend the number of inputs and outputs, when required