



VLT[®] Product Catalogue

Danfoss Drives

The leading provider of Drives

Two thousand employees headed from Graasten in Denmark develop, manufacture, sell and service electronic motor controls in more than one hundred countries.

Manufacturing takes place in USA – Especially the high power products –and in Asia, but the major production takes place in the plants in Graasten, Denmark, where half of the staff are employed. Danfoss Bauer geared motors are manufactured in Esslingen, Germany.

The success of Danfoss is due to the strong combination of technology and application knowledge throughout the world combined with a highly sophisticated set-up of product development, supply chain, logistics and on-site presence anywhere on the globe.

Our customers are closely involved during every stage of design and development, specifying their needs in terms of features and user interface. Danfoss Drives dedicates itself to every step in every process until the customer has the drive in hand.

The developers at Danfoss Drives have fully adopted modular principles in development as well as design, production and configuration.

Each function is developed in parallel on dedicated technology platforms and interfaces between the elements are carefully defined. This allows development to take place for each element in parallel, reducing time to market and ensuring that customers always enjoy the benefits of recently developed features.

This unique modular concept is also the basis for a highly automated quality manufacturing process, where Danfoss Drives takes responsibility for every element – starting with the essential semi conductor power modules. Power Modules are produced in Danfoss Silicon Power in Schleswig, Germany. High quality standards and efficient manufacturing facilities makes Danfoss Silicon Power modules in great demand within industries that provide highly automated power-applications like the automotive sector.

When it comes to quality, delivery and cooperation, Danfoss makes high demands on their suppliers – both from inside and outside of the group.

Due to an unsurpassed level of automation Danfoss can produce a customer configured drive from 1.6 million possible configurations in a manufacturing time of two hours. The unique string type code that fully defines the drive can easily be obtained throughout the world by use of the internet; it determines the configuration of all elements of the drive, both electronics and hardware.

Once this unique configuration is passed to the production departments the manufacturing process can begin. Testing is carried out at all stages of the process and begins with optical checks of the PCBs to ensure that components are inserted correctly. Once the PCBs are fully assembled they all must pass an automatic in-circuit test. After assembly is complete all drives are tested under full load conditions.

During the drives manufacturing cycle the correct manual is being printed and made available for packing. By the use of this process we ensure that not only the correct language but the very latest version of the manual is always produced and shipped with the correct drive. Just in time delivery is a reality.

Once the drive is shipped, one of more than 60 local Danfoss sales companies can ensure that the drive is correctly installed and commissioned. Once the equipment is commissioned, the level of service the customer requires can be defined in an agreement with the customer according to his specific needs. At every step of the way, from development of new technologies and features, the mass production of highly customised products, to installation and service, Danfoss Drives has only the customer in mind.



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The VLT® HVAC Drive integrates and communicates seamlessly with all HVAC devices, mastered by Building Management Systems or as stand-alone unit.

VLT® Decentral FCD 300

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The VLT® Decentral FCD 300 is a complete frequency converter designed for decentral mounting.

VLT® Harmonic Filter

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Connecting the AHF 005/010 harmonic filter in front of a Danfoss frequency converter is an easy and effective way to reduce harmonic distortion.

VLT® AQUA Drive

Page 7



VLT® AQUA Drive is the perfect match for pumps and blowers in modern water, waste water, district heating and irrigation applications.

VLT® DriveMotor FCM 300

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The VLT® FCM 300 Series is an integrated drive-motor solution which combines a VLT® frequency converter and a high standard quality motor in a single product.

VLT® Sine-Wave Filter

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Sine-wave Filters provide a sinusoidal phase-to-phase motor voltage. Sine-wave Filters reduce motor insulation stress and switching acoustic noise from the motor.

VLT® AutomationDrive

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The VLT® Automation-Drive represents a single drive concept to control the entire range of operations from standard to servo on any machine or production line.

VLT® Soft Starter MCD 100

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The VLT® Soft Starter MCD 100 provides soft start features for low power applications 1.1 – 11 kW.

VLT® dU/dt Filter

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dU/dt filters reduce the dU/dt values on the motor terminal phase-to-phase voltage – an issue that is important for short motor cables. The phase-to-phase voltage is still pulse shaped.

VLT® 2800 Series

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

VLT® Soft Starter MCD 200

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The MCD 200 is a compact and cost effective soft starter range for applications where direct-on-line starting is undesirable.

VLT® Motion Control Tool

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The Motion Control Tool MCT 10 is the perfect tool to manage drive parameters in systems and handle all drive-related data.

VLT® Micro Drive

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The VLT® Micro Drive is a general purpose drive that can control AC motors up to 22 kW. It's a small drive with maximum strength and reliability.

VLT® Soft Starter MCD 500

Page 26



The MCD 500 is a total motor starter providing all the best in soft starter functionality. It offers the most advanced functionality and protection of motor and application.

VLT® Service – Your way

Page 35



DrivePro™ is an efficient productivity programme tailored to meet your specific needs. All the necessary VLT® Service facilities are at your disposal, which will minimize downtime and increase productivity at your factory.

VLT® HVAC Drive

The VLT® HVAC Drive series is available in a wide power range designed for all HVAC applications. An advanced drive built on HVAC dedication.

The new VLT® HVAC Drive is the latest series of HVAC drives from Danfoss with built in intelligence.

The VLT® HVAC Drive has a vast number of functions developed to meet the diverse needs of the HVAC business. It is the perfect match for pumps, fans and compressors in modern buildings that are fitted with increasingly sophisticated solutions.



The VLT® HVAC Drive family



Product range

| | |
|----------------------|---------------|
| 3 x 380 – 480 V..... | 1.1 – 1000 kW |
| 3 x 200 – 240 V..... | 1.1 – 45 kW |
| 3 x 525 – 600 V..... | 1.1 – 1000 kW |
| 3 x 525 – 690 V..... | 132 – 1200 kW |

With 110% over load torque

Available enclosure ratings:

| | |
|------------------------|---------------|
| IP 00: | 110 – 1000 kW |
| IP 20: | 1.1 – 90 kW |
| IP 21 (NEMA 1): | 1.1 – 1200 kW |
| IP 54 (NEMA 12): | 110 – 1200 kW |
| IP 55 (NEMA 12):..... | 1.1 – 90 kW |
| IP 66..... | 1.1 – 90 kW |

Optional coating providing extra protection for aggressive environments.

| Features | Benefit |
|--|---|
| All built in – low investment | |
| <ul style="list-style-type: none"> Modular product concept and a wide range of options | <ul style="list-style-type: none"> Low initial investment – max. flexibility, later upgrade possible |
| <ul style="list-style-type: none"> Dedicated HVAC I/O functionality for temperature sensors etc. | <ul style="list-style-type: none"> External conversion saved |
| <ul style="list-style-type: none"> Decentral I/O control via serial communication | <ul style="list-style-type: none"> Reduced wiring costs. and external controller I/O saved |
| <ul style="list-style-type: none"> Wide range of HVAC protocols for BMS controller connectivity | <ul style="list-style-type: none"> Less extra gateway solutions needed |
| <ul style="list-style-type: none"> 4 x auto tuned PID's | <ul style="list-style-type: none"> No external PID controller needed |
| <ul style="list-style-type: none"> Smart Logic Controller | <ul style="list-style-type: none"> Often makes PLC unnecessary |
| <ul style="list-style-type: none"> Real Time Clock | <ul style="list-style-type: none"> Enables daily and weekly settings |
| <ul style="list-style-type: none"> Integrated fan, pump and compressor functionality i.e. | <ul style="list-style-type: none"> Saves external control and conversion equipment |
| <ul style="list-style-type: none"> Fire Override Mode, Dry run Detection Constant Torque etc. | <ul style="list-style-type: none"> Protect equipment and save energy |
| Save energy – less operation cost | |
| <ul style="list-style-type: none"> Automatic Energy Optimizer function, advanced version | <ul style="list-style-type: none"> Saves 5-15% energy |
| <ul style="list-style-type: none"> Advanced energy monitoring | <ul style="list-style-type: none"> Overview on energy consumption |
| <ul style="list-style-type: none"> Energy saving functions i.e. flow compensation, sleepmode etc. | <ul style="list-style-type: none"> Saves energy |
| Unequaled robustness – maximum uptime | |
| <ul style="list-style-type: none"> Robust single enclosure | <ul style="list-style-type: none"> Maintenance free |
| <ul style="list-style-type: none"> Unique cooling concept with no ambient air flow over electronics | <ul style="list-style-type: none"> Problem free operation in harsh environments |
| <ul style="list-style-type: none"> Max ambient temp. 50° C without derating | <ul style="list-style-type: none"> No external cooling or over size necessary |
| User friendly – save commissioning and operating cost | |
| <ul style="list-style-type: none"> Awarded graphical display, 27 languages | <ul style="list-style-type: none"> Effective commissioning and operation |
| <ul style="list-style-type: none"> USB plug and play connection | <ul style="list-style-type: none"> Easy to use PC software tools |
| <ul style="list-style-type: none"> Global HVAC support organization | <ul style="list-style-type: none"> Local service – globally |
| Built in DC coils and RFI filters – no EMC concerns | |
| <ul style="list-style-type: none"> Integrated DC link harmonic filters | <ul style="list-style-type: none"> Small power cables. Meets EN 61000-3-12 |
| <ul style="list-style-type: none"> Integrated EMC filters | <ul style="list-style-type: none"> Meets EN 55011 Class B, A1 or A2 |

Application options

A wide range of integrated HVAC options can be fitted in the drive:

General purpose I/O option (MCB 101):

3 digital inputs, 2 digital outputs, 1 analog current output, 2 analog voltage inputs.

Relay option (MCB 105):

Adds 3 relay outputs

Analogue I/O option adds (MCB 109):

3 Pt1000/Ni1000 inputs, 3 analog voltage outputs

External 24 VDC supply option (MCB 107):

24 VDC external supply can be connected to supply, control and option cards.

Battery back-up for Real Time Clock (MCB 109).

Brake chopper option:

Connected to an external brake resistor, the built in brake chopper limits the load on the intermediate circuit in the case the motor acts as generator. Mains Disconnect Switch as a built in option

Power options

A wide range of external power options are available for VLT® HVAC Drive in critical networks or applications:

- **Advanced harmonic filters:** For critical demands on harmonic distortion
- **dU/dt filters:** For special demands on motor isolation protection
- **Sine wave filters (LC filters):** For noiseless motor

Specifications

| Mains supply (L1, L2, L3) | |
|---|--|
| Supply voltage | 200–240 V ±10% |
| Supply voltage | 380–480 V ±10% |
| Supply voltage | 525–600 V ±10% |
| 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 (U, V, W) | |
| Output voltage | 0–100% of supply voltage |
| Switching on output | Unlimited |
| Ramp times | 1–3600 sec. |
| Open/Closed loop | 0–1000 Hz |
| Digital inputs | |
| Programmable digital inputs | 6* |
| Logic | PNP or NPN |
| Voltage level | 0–24 VDC |
| * 2 can be used as digital outputs | |
| Pulse inputs | |
| Programmable pulse inputs | 2* |
| Voltage level | 0–24 VDC (PNP positive logic) |
| Pulse input accuracy | (0.1–110 kHz) |
| * Utilize some of the digital inputs | |
| Analog input | |
| Analog inputs | 2 |
| Modes | Voltage or current |
| Voltage level | 0 V to +10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Analog output | |
| Programmable analog outputs | 1 |
| Current range at analog output | 0/4–20 mA |
| Relay outputs | |
| Programmable relay outputs | 2 (240 VAC, 2 A and 400 VAC, 2 A) |
| Fieldbus communication | |
| Standard built-in: FC Protocol N2 Metasys FLN Apogee Modbus RTU | Optional: LonWorks (MCA 108) BACnet (MCA 109) DeviceNet (MCA 104) Profibus (MCA 101) |

HVAC PC software tools

- **MCT 10**
Ideal for commissioning and servicing the drive
- **VLT® Energy Box**
Comprehensive energy analysis tool, shows the drive payback time
- **MCT 31**
Harmonics calculations tool

VLT® HVAC Drive

Current and power ratings

| FC 102 | kW | T2 200 – 240 V | | | | T4 380 – 480 V | | | | | | T6 525 – 600 V | | | | T7 525 – 690 V | | | | | | | | |
|--------|------|----------------|-------|-------|-------|----------------|--------|--------|-------|-------|-------|----------------|-------|-------|-------|----------------|-------|-------|-------|-------|--------|--------|-------|-------|
| | | Amp. | IP 20 | IP 21 | IP 55 | IP 66 | Amp. | | IP 00 | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | Amp. | | IP 20 | IP 21 | IP 55 | IP 66 | Amp. | | | |
| | | | | | | | ≤440 V | >440 V | | | | | | | 400 V | ≥460 V | | | | | ≤550 V | >550 V | 550 V | 690 V |
| P1K1 | 1.1 | 6.6 | | | | | 3 | 2.7 | | | | | | | 2.6 | 2.4 | | | | | | | | |
| P1K5 | 1.5 | 7.5 | A2 | A2 | | | 4.1 | 3.4 | | | | | | | 2.9 | 2.7 | | | | | | | | |
| P2K2 | 2.2 | 10.6 | | | A5 | A5 | 5.6 | 4.8 | | | | | | | 4.1 | 3.9 | A3 | A3 | A5 | A5 | | | | |
| P3K0 | 3 | 12.5 | A3 | A3 | | | 7.2 | 6.3 | | | | | | | 5.2 | 4.9 | | | | | | | | |
| P3K7 | 3.7 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | 10 | 8.2 | | | | | | | 6.4 | 6.1 | A2 | A2 | | | | | | |
| P5K5 | 5.5 | 24.2 | | | | | 13 | 11 | | | | | | | 9.5 | 9 | A3 | A3 | A5 | A5 | | | | |
| P7K5 | 7.5 | 30.8 | B3 | B1 | B1 | B1 | 16 | 14.5 | | | | | | | 11.5 | 11 | | | | | | | | |
| P11K | 11 | 46.2 | | | | | 24 | 21 | | | | | | | 19 | 18 | | | | | | | | |
| P15K | 15 | 59.4 | B4 | B2 | B2 | B2 | 32 | 27 | | | | | | | 23 | 22 | B3 | B1 | B1 | B1 | | | | |
| P18K | 18 | 74.8 | | | | | 37.5 | 34 | | | | | | | 28 | 27 | | | | | | | | |
| P22K | 22 | 88 | C3 | C1 | C1 | C1 | 44 | 40 | | | | | | | 36 | 34 | | | | | | | | |
| P30K | 30 | 115 | | | | | 61 | 52 | | | | | | | 43 | 41 | B4 | B2 | B2 | B2 | | | | |
| P37K | 37 | 143 | C4 | C2 | C2 | C2 | 73 | 65 | | | | | | | 54 | 52 | | | | | | | | |
| P45K | 45 | 170 | | | | | 90 | 80 | | | | | | | 65 | 62 | C3 | C1 | C1 | C1 | | 56 | 54 | |
| P55K | 55 | | | | | | 106 | 105 | | | | | | | 87 | 83 | | | | | | 76 | 73 | |
| P75K | 75 | | | | | | 147 | 130 | | | | | | | 105 | 100 | C4 | C2 | C2 | C2 | | 90 | 86 | |
| P90K | 90 | | | | | | 177 | 160 | | | | | | | 137 | 131 | | | | | | 113 | 108 | D3 |
| P110 | 110 | | | | | | | 212 | 190 | | | | | | | | | | | | | 137 | 131 | D1 |
| P132 | 132 | | | | | | | 260 | 240 | D3 | | | | | | | | | | | | 162 | 155 | D1 |
| P160 | 160 | | | | | | | 315 | 302 | | | | | | | | | | | | | 201 | 192 | |
| P200 | 200 | | | | | | | 395 | 361 | D4 | | | | | | | | | | | | 253 | 242 | D2 |
| P250 | 250 | | | | | | | 480 | 443 | | | | | | | | | | | | | 303 | 290 | D2 |
| P315 | 315 | | | | | | | 600 | 540 | | | | | | | | | | | | | 360 | 344 | D2 |
| P355 | 355 | | | | | | | 658 | 590 | | | | | | | | | | | | | | | |
| P400 | 400 | | | | | | | 745 | 678 | E2 | | | | | | | | | | | | 418 | 400 | D2 |
| P450 | 450 | | | | | | | 800 | 730 | | | | | | | | | | | | | 470 | 450 | D2 |
| P500 | 500 | | | | | | | 880 | 780 | | | | | | | | | | | | | 523 | 500 | E1 |
| P560 | 560 | | | | | | | 990 | 890 | | | | | | | | | | | | | 596 | 570 | E1 |
| P630 | 630 | | | | | | | 1120 | 1050 | | | | | | | | | | | | | 630 | 630 | |
| P710 | 710 | | | | | | | 1260 | 1160 | | | | | | | | | | | | | 763 | 730 | |
| P800 | 800 | | | | | | | 1460 | 1380 | | | | | | | | | | | | | 889 | 850 | F1/F3 |
| P900 | 900 | | | | | | | | | | | | | | | | | | | | | 988 | 945 | F1/F3 |
| P1M0 | 1000 | | | | | | | 1720 | 1530 | | | | | | | | | | | | | 1108 | 1060 | F2/F4 |
| P1M2 | 1200 | | | | | | | | | | | | | | | | | | | | | 1317 | 1260 | F2/F4 |

F3 is a F1 frame with options cabinet; F4 is a F2 frame with options cabinet

| | | | | | | |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|
| IP 00/Chassis | IP 20/Chassis | IP 21/NEMA Type 1 | With upgrade kit | IP 54/NEMA Type 12 | IP 55/NEMA Type 12 | IP 66/NEMA Type 4X |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|

Dimensions [mm]

| | A2 | A3 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | E1 | E2 | F1 | F2 | F3 | F4 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|
| H | 268 | | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 1209 | 1589 | 1046 | 1327 | 2000 | 1547 | | | | 2204 |
| W | 90 | 130 | | 242 | | 165 | 230 | 308 | 370 | 308 | 370 | 420 | | 408 | | 600 | 585 | 1400 | 1800 | 2000 | 2400 |
| D | 205 | | 195 | 260 | | 249 | 242 | 310 | 335 | | 333 | 380 | | 375 | | 494 | 498 | | | | 606 |
| H+ | 375 | | | | | 475 | 670 | | | 755 | 950 | | | | | | | | | | |
| W+ | 90 | 130 | | | | 165 | 255 | | | 329 | 391 | | | | | | | | | | |

H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option A/B.

VLT® AQUA Drive

Danfoss Drives' unsurpassed experience in advanced drive technologies for water and wastewater applications makes VLT® AQUA Drive the perfect match for pumps and blowers in modern water, waste water and irrigation systems.



The VLT® AQUA Drive family



The perfect match for:

- Water supply
- Wastewater treatment
- District heating
- Irrigation

Power range:

1 x 200 – 240 V AC: 1.1 – 22 kW
 1 x 380 – 480 V AC: 7.5 – 37 kW
 3 x 200 – 240 V AC: 0.25 – 45 kW
 3 x 380 – 480 V AC: 0.37 – 1000 kW
 3 x 525 – 690 V AC: 11 – 1200 kW

| Features | Benefit |
|--|---|
| Dedicated features | |
| • Dry run detection | • Protects the pump |
| • Flow compensation function | • Saves energy |
| • 2 step ramps (initial ramp) | • Protects deep well pumps |
| • Pipe fill mode | • Eliminates water hammering |
| • Built-in motor alternation feature | • Duty-stand by operation, cost reduction |
| • Sleep Mode | • Saves energy |
| • No/low flow detection | • Protects the pump |
| • End of pump-curve detection | • Protects the pump, leakage detection |
| • Pump cascade controller | • Lower equipment cost |
| • Master/follower control | • High performance pump systems |
| Energy saving | |
| • VLT® efficiency (98%) | • Saves energy |
| • Automatic Energy Optimisation (AEO) | • Saves 5–15% energy |
| • Sleep Mode function | • Saves energy |
| Reliable | |
| • IP 20 – IP 66 enclosures | • Outdoor mounting possible |
| • All power sizes available in IP 54/55 enclosures | • Broad usability |
| • Password protection | • Reliable operation |
| • Mains disconnect switch | • No need for external switch |
| • Optional, built-in RFI suppression | • No need for external modules |
| • Built-in Smart Logic Controller | • Often makes PLC omissible |
| • One Wire safe stop | • Safe operation/less wiring |
| • Max. ambient temperature up to 50°C without derating | • Reduced need for cooling |
| User-friendly | |
| • Award winning control panel (LCP) | • Effective commissioning and operation |
| • One drive type for the full power range | • Less learning required |
| • Intuitive user interface | • Time saved |
| • Integrated Real Time Clock | • Lower equipment cost |
| • Modular design | • Enables fast installation of options |
| • Auto tuning of PI-controllers | • Time saved |
| • Payback time indication | • Less worries |

VLT® AQUA Drive

Application options

A wide range of integrated options can be fitted in the drive:

General purpose I/O option (MCB 101)

3 digital inputs, 2 digital outputs,
1 analog current output,
2 analog voltage inputs

Cascade Controller (MCO 101, 102)

Upgrade the built-in cascade controller to operate more pumps and for master/follower pump control.

Relay & Analog I/O option (MCB 105, 109)

Upgrade to advanced performance and control using the additional in/outputs.

Profibus (MCA 101), DeviceNet (MCA 104) and EtherNet IP (MCA 121)

Fieldbus options.

24 V DC supply option (MCB 107)

Back-up option to keep the control system alive during mains loss.

Coated PCB available

For harsh environments, according to levels in IEC61721-3-3, standard 3C2, optional 3C3.

Power options

We offer a wide range of external power options for use together with our drive in critical networks or applications:

- **Advanced Harmonic Filters:** For applications where reducing harmonic distortion is critical.
- **dU/dt filters:** For providing motor isolation protection.
- **Sine filters (LC filters):** For noiseless motor.

Specifications

| Mains supply (L1, L2, L3) | |
|--|--|
| Supply voltage | 200-240 V ±10%, 380-480 V ±10%, 525-600 V +/-10%, 525-690 V ±10% |
| Supply frequency | 50/60 Hz |
| Displacement Power Factor (cos φ) near unity | (> 0.98) |
| True power factor (λ) | ≥ 0.9 |
| Switching on input supply L1, L2, L3 | 1-2 times/min. |

| Output data (U, V,W) | |
|----------------------|------------------|
| Output voltage | 0-100% of supply |
| Switching on output | Unlimited |
| Ramp times | 1-3600 sec. |
| Closed loop | 0-132 Hz |

Note: VLT® AQUA Drive can provide 110% current for 1 minute. Higher overload rating is achieved by oversizing the drive.

| Digital inputs | |
|-----------------------------|------------|
| Programmable digital inputs | 6* |
| Logic | PNP or NPN |
| Voltage level | 0-24 VDC |

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

| Analog inputs | |
|-------------------------|--------------------------|
| Number of analog inputs | 2 |
| Modes | Voltage or current |
| Voltage level | -10 to +10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |

| Pulse inputs | |
|---------------------------|-------------------------------|
| Programmable pulse inputs | 2 |
| Voltage level | 0-24 VDC (PNP positive logic) |
| Pulse input accuracy | (0.1-110 kHz) |

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

| Analog output | |
|--------------------------------|-----------|
| Programmable analog outputs | 1 |
| Current range at analog output | 0/4-20 mA |

| Relay outputs | |
|----------------------------|-----------------------------------|
| Programmable relay outputs | 2 (240 VAC, 2 A and 400 VAC, 2 A) |

| Fieldbus Communication | |
|--|--|
| FC Protocol and Modbus RTU built in (DeviceNet, Profibus and Ethernet IP Optional) | |

| Ambient temperature | |
|---------------------|--|
| Up to max 55° C | |

AQUA PC software

- **MCT 10:** Ideal for commissioning and servicing the drive including guided programming of cascade controller, real time clock, smart logic controller and preventive maintenance.
- **VLT® Energy Box:** Comprehensive energy analysis tool, shows the drive payback time.
- **MCT 31:** Harmonics calculations tool.

Current and power ratings

| FC 202 | kW | T2 200 – 240 V | | | | T4 380 – 480 V | | | | | | T6 525 – 600 V | | | | T7 525 – 690 V | | | | | | | | |
|--------|------|----------------|-------|-------|-------|----------------|--------|--------|-------|--------|-------|----------------|-------|-------|-------|----------------|--------|--------|-------|-------|----------|-------|-------|----|
| | | Amp. | IP 20 | IP 21 | IP 55 | IP 66 | Amp. | | Amp. | | IP 00 | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | Amp. | | IP 00 | IP 21 | IP 54/55 | | | |
| | | | | | | | ≤440 V | >440 V | 400 V | ≥460 V | | | | | | | ≤550 V | >550 V | | | | 550 V | 690 V | |
| PK25 | 0.25 | 1.8 | | | | | | | | | | | | | | | | | | | | | | |
| PK37 | 0.37 | 2.4 | | | | | 1.3 | 1.2 | | | | | | | | | | | | | | | | |
| PK55 | 0.55 | 3.5 | | | | | 1.8 | 1.6 | | | | | | | | | | | | | | | | |
| PK75 | 0.75 | 4.6 | A2 | A2 | | | 2.4 | 2.1 | | | | | | | | 1.8 | 1.7 | | | | | | | |
| P1K1 | 1.1 | 6.6 | | | A5 | A5 | 3 | 2.7 | | | A2 | A2 | | | A5 | A5 | 2.6 | 2.4 | | | | | | |
| P1K5 | 1.5 | 7.5 | | | | | 4.1 | 3.4 | | | | | | | | 2.9 | 2.7 | A2 | A2 | A5 | A5 | | | |
| P2K2 | 2.2 | 10.6 | | | | | 5.6 | 4.8 | | | | | | | | 4.1 | 3.9 | | | | | | | |
| P3K0 | 3 | 12.5 | A3 | A3 | | | 7.2 | 6.3 | | | | | | | | 5.2 | 4.9 | | | | | | | |
| P3K7 | 3.7 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | 10 | 8.2 | | | A2 | A2 | | | A5 | A5 | 6.4 | 6.1 | A2 | A2 | | | | |
| P5K5 | 5.5 | 24.2 | | | | | 13 | 11 | | | A3 | A3 | | | A5 | A5 | 9.5 | 9 | A3 | A3 | A5 | A5 | | |
| P7K5 | 7.5 | 30.8 | B3 | B1 | B1 | B1 | 16 | 14.5 | | | | | | | | | 11.5 | 11 | | | | | | |
| P11K | 11 | 46.2 | | | | | 24 | 21 | | | | | | | | | 19 | 18 | | | | | | |
| P15K | 15 | 59.4 | B4 | B2 | B2 | B2 | 32 | 27 | | | | | | | | | 23 | 22 | B3 | B1 | B1 | B1 | | |
| P18K | 18 | 74.8 | | | | | 37.5 | 34 | | | | | | | | | 28 | 27 | | | | B2 | B2 | |
| P22K | 22 | 88 | | | | | 44 | 40 | | | | | | | | | 36 | 34 | | | | | | |
| P30K | 30 | 115 | C3 | C1 | C1 | C1 | 61 | 52 | | | | | | | | | 43 | 41 | B4 | B2 | B2 | B2 | | |
| P37K | 37 | 143 | | | | | 73 | 65 | | | | | | | | | 54 | 52 | | | | | | |
| P45K | 45 | 170 | C4 | C2 | C2 | C2 | 90 | 80 | | | | | | | | | 65 | 62 | C3 | C1 | C1 | C1 | | |
| P55K | 55 | | | | | | 106 | 105 | | | | | | | | | 87 | 83 | | | | | C2 | C2 |
| P75K | 75 | | | | | | 147 | 130 | | | | | | | | | 105 | 83 | | | | | | |
| P90K | 90 | | | | | | 212 | 160 | | | | | | | | | 137 | 131 | | | | | | |
| P110 | 110 | | | | | | | | 212 | 190 | D3 | | D1 | D1 | | | | | | | | | | |
| P132 | 132 | | | | | | | | 260 | 240 | | | | | | | | | | | | | | |
| P160 | 160 | | | | | | | | 315 | 302 | | | | | | | | | | | | | | |
| P200 | 200 | | | | | | | | 395 | 361 | D4 | | D2 | D2 | | | | | | | | | | |
| P250 | 250 | | | | | | | | 480 | 443 | | | | | | | | | | | | | | |
| P315 | 315 | | | | | | | | 600 | 540 | | | | | | | | | | | | | | |
| P355 | 355 | | | | | | | | 658 | 590 | | | | | | | | | | | | | | |
| P400 | 400 | | | | | | | | 745 | 678 | E2 | | E1 | E1 | | | | | | | | | | |
| P450 | 450 | | | | | | | | 800 | 730 | | | | | | | | | | | | | | |
| P500 | 500 | | | | | | | | 880 | 780 | | | | | | | | | | | | | | |
| P560 | 560 | | | | | | | | 990 | 890 | | | F1/F3 | F1/F3 | | | | | | | | | | |
| P630 | 630 | | | | | | | | 1120 | 1050 | | | | | | | | | | | | | | |
| P710 | 710 | | | | | | | | 1260 | 1160 | | | | | | | | | | | | | | |
| P800 | 800 | | | | | | | | 1460 | 1380 | | | | | | | | | | | | | | |
| P900 | 900 | | | | | | | | | | | | | | | | | | | | | | | |
| P1M0 | 1000 | | | | | | | | 1720 | 1530 | | | | | | | | | | | | | | |
| P1M2 | 1200 | | | | | | | | | | | | | | | | | | | | | | | |

F3 is a F1 frame with options cabinet; F4 is a F2 frame with options cabinet

| | | | | | | |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|
| IP 00/Chassis | IP 20/Chassis | IP 21/NEMA Type 1 | With upgrade kit | IP 54/NEMA Type 12 | IP 55/NEMA Type 12 | IP 66/NEMA Type 4X |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|

Dimensions [mm]

| | A2 | A3 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | E1 | E2 | F1 | F2 | F3 | F4 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|
| H | 268 | | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 1209 | 1589 | 1046 | 1327 | 2000 | 1547 | | | | 2204 |
| W | 90 | 130 | | 242 | | 165 | 230 | 308 | 370 | 308 | 370 | 420 | | 408 | | 600 | 585 | 1400 | 1800 | 2000 | 2400 |
| D | 205 | | 195 | 260 | | 249 | 242 | 310 | 335 | | 333 | 380 | | 375 | | 494 | 498 | | | | 606 |
| H+ | 375 | | | | | 475 | 670 | | | 755 | 950 | | | | | | | | | | |
| W+ | 90 | 130 | | | | 165 | 255 | | | 329 | 391 | | | | | | | | | | |

H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option A/B.

VLT® AutomationDrive

The VLT® AutomationDrive is a single drive concept that covers the entire range of application, which is a major benefit in commissioning, operating and maintaining the equipment.

The modular open-technology platform that VLT® AutomationDrive is built on makes it exceptionally adaptable and programmable. Its configurable, user-friendly interface supports local languages and letters.

Pluggable options

The drive solution can be adapted to any application due to the flexible option structure. Numerous options are available and can be mounted and tested from factory or be plugged in later for change-over or upgrade.



The perfect solution for:

- Industrial automation
- High dynamic applications
- Safety installations

Power range

0.25 – 37 kW (200 – 240 V)
 0.37 – 800 kW (380 – 500 V)
 0.75 – 75 kW (525 – 600 V)
 37 – 1200 MW (525 – 690 V)



The VLT® AutomationDrive family

Adapts to the future

The modular concept of VLT® AutomationDrive makes it highly adaptable – also to future features and options.

Modularity offers the benefit of buying on a need-to-have basis without losing future possibilities.

Hot pluggable Control Panel

The Local Control Panel (LCP) can be plugged in directly or connected through a cable for remote commissioning. The LCP can be disconnected

during operation and replaced with a blind cover. Settings are easily transferred via the LCP from one drive to another or from a PC to a drive with the VLT® Set-up Software MCT 10.

Awarded

VLT® AutomationDrive has received the Frost & Sullivan award for innovation and the iF Design Award for its user-friendliness.

| Features | Benefit |
|---|---|
| Reliable | Maximum uptime |
| <ul style="list-style-type: none"> • Ambient temperature 50° C without derating • Available in IP 20, 21, 55 and 66 enclosures • Resistant to wear and tear | <ul style="list-style-type: none"> • Less need for cooling or oversizing • Suitable for harsh and wash down areas • Low lifetime cost |
| User-friendly | Saves commissioning and operating cost |
| <ul style="list-style-type: none"> • Plug-and-Play technology • Awarded control panel • Intuitive VLT® interface • Pluggable cage clamp connectors • Exchangeable languages | <ul style="list-style-type: none"> • Easy upgrade and change over • User-friendly • Saves time • Easy connection • User-friendly |
| Intelligent | |
| <ul style="list-style-type: none"> • Intelligent warning systems • Smart Logic Control • Advanced plug-in features • Safe Stop • STO: Safe Torque Off (IEC 61800-5-2) • Intelligent heat management | <ul style="list-style-type: none"> • Warning before controlled stop • Reduces need for PLC capacity • Easy commissioning • Safety cat. 3 (EN 954-1), PL d (ISO 13849-1), Stop cat. 0 (EN 60204-1) • SIL 2 (IEC 61508) SIL CL 2 (IEC62061) • Excess heat effectively removed |

Options

The following options are available:

Fieldbus options

- MCA 101 Profibus
- MCA 104 DeviceNet
- MCA 105 CanOpen
- MCA 113 Profibus VLT® 3000 protocol converter
- MCA 114 Profibus VLT® 5000 protocol converter
- MCA 121 Ethernet IP

I/O and feedback options

- MCA 101 General Purpose I/O
- MCB 102 Encoder
- MCB 103 Resolver
- MCB 105 Relay
- MCB 113 Extended Relay Card
- MCB 107 24 V input option for control voltage

Safety options

- MCA 131 SafetyBUS p option with Safe I/O
- MCB 108 Safety PLC interface (DC/DC converter)
- MCB 112 ATEX-PTC Thermistor Card

Motion Control Options

- MCO 305 Programmable Motion Controller
- MCO 350 Synchronizing Controller
- MCO 351 Positioning Controller
- MCO 352 Center Winder Controller

Power options

- Brake resistors
- Sine-Wave Filters
- dU/dt Filters
- Harmonic Filters (AHF)

Other accessories

- IP 21/NEMA 1 Kit (convert IP 20 to IP 21)
- Sub-D9 Connector
- Decoupling plate for fieldbus cables
- USB connection cable to PC
- Panel Through option

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 (cosφ) near unity | (>0.98) |
| Switching on input supply L1, L2, L3 | Maximum 2 times/min. |
| Output data (U, V, W) | |
| Output voltage | 0 – 100% of supply |
| Output frequency | FC 301: 0.2 – 1000 Hz (0.25 – 75 kW) FC 302: 0 – 1000 Hz (0.25–75 kW) 0 – 800 Hz (90 – 1000 kW) 0 – 300 Hz (Flux mode) |
| Switching on output | Unlimited |
| Ramp times | 0.01 – 3600 sec. |
| <i>Note: 160% current can be provided for 1 minute. Higher overload rating is achieved by oversizing the drive.</i> | |
| Digital inputs | |
| Programmable digital inputs | FC 301: 4 (5) / FC 302: 4 (6) |
| Logic | PNP or NPN |
| Voltage level | 0 – 24 V DC |
| <i>Note: One/two digital inputs can be programmed as digital output for FC 301/FC 302</i> | |
| Analogue inputs | |
| Number of 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 – 20 mA (scaleable) |
| Pulse/encoder inputs | |
| Programmable pulse/encoder inputs | FC 301: 1/FC 302: 2 |
| Voltage level | 0 – 24 V DC (PNP positive logic) |
| Digital output* | |
| Programmable digital/pulse outputs | FC 301: 1/FC 302: 2 |
| Voltage level at digital/frequency output | 0 – 24 V |
| Analogue output* | |
| Programmable analogue outputs | 1 |
| Current range | 0/4 – 20 mA |
| Relay outputs* | |
| Programmable relay outputs | FC 301: 1/FC 302: 2 |
| 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) |

*More analogue and digital inputs/outputs can be added by options

VLT® AutomationDrive

Current and power ratings

| FC 300 | kW | | T2 200 – 240 V | | | | T4/T5 380 – 480/500 V | | | | | | | | | | | | | | |
|--------|------|------|----------------|------|--------|-------|-----------------------|-------|---------|--------|---------|--------|-------|-------|-------|-------|-------|-------|--|--|--|
| | | | Amp. | | IP 20 | IP 21 | IP 55 | IP 66 | Amp. HO | | Amp. NO | | IP 00 | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | | | |
| | HO | NO | HO | NO | | | | | ≤440 V | >440 V | ≤440 V | >440 V | | | | | | | | | |
| PK25 | 0.25 | | 1.8 | | A1*/A2 | A2 | A5 | A5 | | | | | | | | | | | | | |
| PK37 | 0.37 | | 2.4 | | | | | | | | | | | | | | | | | | |
| PK55 | 0.55 | | 3.5 | | | | | | | | | | | | | | | | | | |
| PK75 | 0.75 | | 4.6 | | | | | | | | | | | | | | | | | | |
| P1K1 | 1.1 | | 6.6 | | | | | | | | | | | | | | | | | | |
| P1K5 | 1.5 | | 7.5 | | | | | | | | | | | | | | | | | | |
| P2K2 | 2.2 | | 10.6 | | A2 | | | | | | | | | | | | | | | | |
| P3K0 | 3 | | 12.5 | | A3 | A3 | | | | | | | | | | | | | | | |
| P3K7 | 3.7 | | 16.7 | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | | | | | | | | | | | | | | | |
| P5K5 | 5.5 | 7.5 | 24.2 | 30.8 | B3 | B1 | B1 | B1 | | | | | | | | | | | | | |
| P7K5 | 7.5 | 11 | 30.8 | 46.2 | | | | | | | | | | | | | | | | | |
| P11K | 11 | 15 | 46.2 | 59.4 | B4 | B2 | B2 | B2 | | | | | | | | | | | | | |
| P15K | 15 | 18 | 59.4 | 74.8 | | | | | | | | | | | | | | | | | |
| P18K | 18 | 22 | 74.8 | 88 | C3 | C1 | C1 | C1 | | | | | | | | | | | | | |
| P22K | 22 | 30 | 88 | 115 | | | | | | | | | | | | | | | | | |
| P30K | 30 | 37 | 115 | 143 | C4 | C2 | C2 | C2 | | | | | | | | | | | | | |
| P37K | 37 | 45 | 143 | 170 | | | | | | | | | | | | | | | | | |
| P45K | 45 | 55 | | | | | | | | | | | | | | | | | | | |
| P55K | 55 | 75 | | | | | | | | | | | | | | | | | | | |
| P75K | 75 | 90 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 400 V | ≥460 V | 400 V | ≥460 V | | | | | | | | | |
| P90K | 90 | 110 | | | | | | | | | | | | | | | | | | | |
| P110 | 110 | 132 | | | | | | | | | | | D3 | | D1 | D1 | | | | | |
| P132 | 132 | 160 | | | | | | | | | | | | | | | | | | | |
| P160 | 160 | 200 | | | | | | | | | | | D4 | | D2 | D2 | | | | | |
| P200 | 200 | 250 | | | | | | | | | | | | | | | | | | | |
| P250 | 250 | 315 | | | | | | | | | | | | | | | | | | | |
| P315 | 315 | 355 | | | | | | | | | | | | | | | | | | | |
| P355 | 355 | 400 | | | | | | | | | | | E2 | | E1 | E1 | | | | | |
| P400 | 400 | 450 | | | | | | | | | | | | | | | | | | | |
| P450 | 450 | 500 | | | | | | | | | | | | | | | | | | | |
| P500 | 500 | 560 | | | | | | | | | | | | | | | | | | | |
| P560 | 560 | 630 | | | | | | | | | | | | | F1/F3 | F1/F3 | | | | | |
| P630 | 630 | 710 | | | | | | | | | | | | | | | | | | | |
| P710 | 710 | 800 | | | | | | | | | | | | | F2/F4 | F2/F4 | | | | | |
| P800 | 800 | 900 | | | | | | | | | | | | | | | | | | | |
| P900 | 900 | 1000 | | | | | | | | | | | | | | | | | | | |
| P1M0 | 1000 | 1200 | | | | | | | | | | | | | | | | | | | |

F3 is a F1 frame with options cabinet; F4 is a F2 frame with options cabinet

| | | | | | | |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|
| IP 00/Chassis | IP 20/Chassis | IP 21/NEMA Type 1 | With upgrade kit | IP 54/NEMA Type 12 | IP 55/NEMA Type 12 | IP 66/NEMA Type 4X |
|---------------|---------------|-------------------|------------------|--------------------|--------------------|--------------------|

| FC 300 | kW | | T6 525 – 600 V | | | | | | | | T7 525 – 690 V | | | | | | | | | | | |
|--------|------|------|----------------|--------|---------|--------|------|------|------|------|----------------|-------|---------|-------|-------|------|----------|----|--|--|-------|-------|
| | | | Amp. HO | | Amp. NO | | IP20 | IP21 | IP55 | IP66 | Amp. HO | | Amp. NO | | IP 00 | IP21 | IP 54/55 | | | | | |
| | HO | NO | ≤550 V | >550 V | ≤550 V | >550 V | | | | | 550 V | 690 V | 550 V | 690 V | | | | | | | | |
| PK25 | 0.25 | | | | | | | | | | | | | | | | | | | | | |
| PK37 | 0.37 | | | | | | | | | | | | | | | | | | | | | |
| PK55 | 0.55 | | | | | | | | | | | | | | | | | | | | | |
| PK75 | 0.75 | | | | | 1.8 | 1.7 | | | | | | | | | | | | | | | |
| P1K1 | 1.1 | | | | | 2.6 | 2.4 | | | | | | | | | | | | | | | |
| P1K5 | 1.5 | | | | | 2.9 | 2.7 | A3 | A3 | A5 | A5 | | | | | | | | | | | |
| P2K2 | 2.2 | | | | | 4.1 | 3.9 | | | | | | | | | | | | | | | |
| P3K0 | 3 | | | | | 5.2 | 4.9 | | | | | | | | | | | | | | | |
| P3K7 | 3.7 | | | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | 6.4 | 6.1 | | | | | | | | | | | | | | | |
| P5K5 | 5.5 | 7.5 | | | | 9.5 | 9 | A3 | A3 | A5 | A5 | | | | | | | | | | | |
| P7K5 | 7.5 | 11 | | | | 11.5 | 11 | | | | | | | | | | | | | | | |
| P11K | 11 | 15 | 19 | 18 | 23 | 22 | B3 | B1 | B1 | B1 | | 14 | 13 | 19 | 18 | | | | | | B2 | B2 |
| P15K | 15 | 18 | 23 | 22 | 28 | 27 | | | | | | 19 | 18 | 23 | 22 | | | | | | | |
| P18K | 18 | 22 | 28 | 27 | 36 | 34 | B4 | B2 | B2 | B2 | | 23 | 22 | 28 | 27 | | | | | | | |
| P22K | 22 | 30 | 36 | 34 | 43 | 41 | | | | | | 28 | 27 | 36 | 34 | | | | | | | |
| P30K | 30 | 37 | 43 | 41 | 54 | 52 | | | | | | 36 | 34 | 43 | 41 | | | | | | | |
| P37K | 37 | 45 | 54 | 52 | 65 | 62 | C3 | C1 | C1 | C1 | | 43 | 41 | 54 | 52 | | | | | | | |
| P45K | 45 | 55 | 65 | 62 | 87 | 83 | | | | | | 54 | 52 | 65 | 62 | | | | | | C2 | C2 |
| P55K | 55 | 75 | 87 | 83 | 105 | 100 | C4 | C2 | C2 | C2 | | 65 | 62 | 87 | 83 | | | | | | | |
| P75K | 75 | 90 | 105 | 100 | 137 | 131 | | | | | | 87 | 83 | 105 | 100 | | | | | | | |
| P90K | 90 | 110 | | | | | | | | | | 113 | 108 | 137 | 131 | | | | | | | |
| P110 | 110 | 132 | | | | | | | | | | 137 | 131 | 162 | 155 | D3 | D1 | D1 | | | | |
| P132 | 132 | 160 | | | | | | | | | | 162 | 155 | 201 | 192 | | | | | | | |
| P160 | 160 | 200 | | | | | | | | | | 201 | 192 | 253 | 242 | | | | | | | |
| P200 | 200 | 250 | | | | | | | | | | 253 | 242 | 303 | 290 | D4 | D2 | D2 | | | | |
| P250 | 250 | 315 | | | | | | | | | | 303 | 290 | 360 | 344 | | | | | | | |
| P315 | 315 | 355 | | | | | | | | | | 360 | 344 | 418 | 400 | | | | | | | |
| P355 | 355 | 400 | | | | | | | | | | 395 | 380 | 470 | 450 | E2 | E1 | E1 | | | | |
| P400 | 400 | 450 | | | | | | | | | | 429 | 410 | 523 | 500 | | | | | | | |
| P450 | 450 | 500 | | | | | | | | | | | | | | | | | | | | |
| P500 | 500 | 560 | | | | | | | | | | 523 | 500 | 596 | 570 | E2 | E1 | E1 | | | | |
| P560 | 560 | 630 | | | | | | | | | | 596 | 570 | 630 | 630 | | | | | | | |
| P630 | 630 | 710 | | | | | | | | | | 659 | 630 | 763 | 730 | | | | | | | |
| P710 | 710 | 800 | | | | | | | | | | 763 | 630 | 730 | 850 | | | | | | F1/F3 | F1/F3 |
| P800 | 800 | 900 | | | | | | | | | | 889 | 730 | 850 | 945 | | | | | | | |
| P900 | 900 | 1000 | | | | | | | | | | 988 | 850 | 945 | 1060 | | | | | | | F2/F4 |
| P1M0 | 1000 | 1200 | | | | | | | | | | 1108 | 945 | 1060 | 1260 | | | | | | | F2/F4 |

Dimensions [mm]

| | A1 | A2 | A3 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 | E1 | E2 | F1 | F2 | F3 | F4 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|----|
| H | 200 | 268 | | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 1209 | 1589 | 1046 | 1327 | 2000 | 1547 | 2204 | | | |
| W | 75 | 90 | 130 | 242 | | | 165 | 230 | 308 | 370 | 308 | 370 | 420 | 408 | | 600 | 585 | 1400 | 1800 | 2000 | 2400 | |
| D | 207 | 205 | | 195 | 260 | | 249 | 242 | 310 | 335 | 333 | | 380 | 375 | | 494 | 498 | 606 | | | | |
| H+ | 375 | | | | | | 475 | 670 | | | | 755 | 950 | | | | | | | | | |
| W+ | 90 | 130 | | | | 165 | 255 | | | | 329 | 391 | | | | | | | | | | |

H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option A/B.

VLT® 2800 Series

The VLT® 2800 series has been developed for the low power market. The drive is extremely compact and prepared for side-by-side mounting. The concept is modular with a power module and a control module.

The VLT® 2800 series is designed for stable operation in industrial environments.



The perfect solution for:

- Conveyors, centrifuges, dosing pumps, compressors
- Special applications like cutting machines with constant speed, and packaging machines with a need for high precision.

Power range

1/3 x 200 – 240 V.....0.37 – 3.7 kW
 3 x 380 – 480 V.....0.55 – 18.5 kW

With 160% overload torque (normal overload)

| Features | Benefits |
|---|--|
| <ul style="list-style-type: none"> • Automatic Motor Tuning • PID-controller • Interrupt start/stop • Dry run detection | <ul style="list-style-type: none"> • Ensure optimal match between drive and motor • Increasing performance • Optimum process control • High repeatability of positional accuracy • No need for specific detection equipment |
| <ul style="list-style-type: none"> • Fieldbus communication | <ul style="list-style-type: none"> • Allows for control and surveillance of the drives from a PC or a PLC • Profibus and DeviceNet are available |
| Reliable | Maximum up-time |
| <ul style="list-style-type: none"> • Built-in RFI filter • Enhanced sleep mode • Max. ambient temperature 45° C without derating | <ul style="list-style-type: none"> • Compliance with the EMC standard EN 55011 1A • Excellent control for shutting down the pump at low flow • No external cooling or oversizing necessary |
| User-friendly | Save commissioning and operating cost |
| <ul style="list-style-type: none"> • Quick Menu • Pipe Fill mode • Fieldbus communication | <ul style="list-style-type: none"> • Easy to use • Prevents water hammering • Allows for control and surveillance of the drives from a PC or a PLC • Profibus and DeviceNet are available |

PC software tools

- **MCT 10**
 - Ideal for commissioning and servicing the drive
- **MCT 31**
 - Harmonics calculations tool

RFI filter

The RFI filter ensures that the frequency converter will not disrupt other electrical components that are connected to the mains and might cause operating disruption.

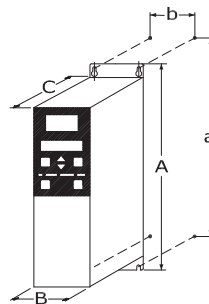
By fitting an RFI 1B filter module between the mains supply and the VLT® 2800, the solution complies with the EMC norm EN 55011-1B.

| Mains | Type | Power | | Input current | |
|---------------|-------|----------------|---------------|---------------|--|
| | | $P_{N,M}$ [kW] | I_{INV} [A] | $I_{L,N}$ [A] | |
| 1 x 220-240 V | 2803 | 0.37 | 2.2 | 5.9 | |
| | 2805 | 0.55 | 3.2 | 8.3 | |
| | 2807 | 0.75 | 4.2 | 10.6 | |
| | 2811 | 1.1 | 6.0 | 14.5 | |
| | 2815 | 1.5 | 6.8 | 15.2 | |
| | 2822* | 2.2 | 9.6 | 22.0 | |
| | 2840* | 3.7 | 16.0 | 31.0 | |
| 3 x 200-240 V | 2803 | 0.37 | 2.2 | 2.9 | |
| | 2805 | 0.55 | 3.2 | 4.0 | |
| | 2807 | 0.75 | 4.2 | 5.1 | |
| | 2811 | 1.1 | 6.0 | 7.0 | |
| | 2815 | 1.5 | 6.8 | 7.6 | |
| | 2822 | 2.2 | 9.6 | 8.8 | |
| | 2840 | 3.7 | 16.0 | 14.7 | |
| 3 x 380-480 V | 2805 | 0.55 | 1.7 | 1.6 | |
| | 2807 | 0.75 | 2.1 | 1.9 | |
| | 2811 | 1.1 | 3.0 | 2.6 | |
| | 2815 | 1.5 | 3.7 | 3.2 | |
| | 2822 | 2.2 | 5.2 | 4.7 | |
| | 2830 | 3.0 | 7.0 | 6.1 | |
| | 2840 | 4.0 | 9.1 | 8.1 | |
| | 2855 | 5.5 | 12 | 10.6 | |
| | 2875 | 7.5 | 16 | 14.9 | |
| | 2880 | 11.0 | 24 | 24.0 | |
| | 2881 | 15.0 | 32 | 32.0 | |
| 2882 | 18.5 | 37.5 | 37.5 | | |

* Not available with RFI filter

Specifications

| Mains supply (L1, L2, L3) | |
|--|--------------------------------|
| Supply voltage | 200-240 V ±10%, 380-480 V ±10% |
| 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 (U, V, W) | |
| Output voltage | 0-100% of supply |
| Switching on output | Unlimited |
| Ramp times | 1-3600 sec. |
| Closed loop | 0-132 Hz |
| Digital inputs | |
| For start/stop, reset, thermistor, etc. | 5 |
| Logic | PNP or NPN |
| Voltage level | 0-24 VDC |
| Digital outputs | |
| No. of digital outputs | 1 |
| Analog inputs | |
| No. of analog inputs | 2 |
| Voltage level | -10 to +10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Pulse inputs | |
| No. of pulse inputs | 2 |
| Voltage level | 0-24 VDC (PNP positive logic) |
| Pulse input accuracy | (0.1-110 kHz) |
| Analog outputs | |
| Programmable analog outputs | 1 |
| Current range at analog output | 0/4-20 mA |
| Relay outputs | |
| No. of relay outputs | 1 |
| Fieldbus communication | |
| RS485 | |
| Ambient temperature | |
| 50°C | |



Cabinet sizes [mm]

| Height | | | | |
|--------|-----|-------|-------|-----|
| | A | B | C | D |
| A | 200 | 267.5 | 267.5 | 505 |
| a | 191 | 257 | 257 | 490 |
| Width | | | | |
| | B | | | |
| B | 75 | 90 | 140 | 200 |
| b | 60 | 70 | 120 | 120 |
| Depth | | | | |
| | C | | | |
| C | 168 | 168 | 168 | 244 |



VLT® Micro Drive

The VLT® Micro Drive is a general purpose drive that can control AC motors up to 22 kW. It's a small drive with maximum strength and reliability.

RoHS compliant

The VLT® Micro Drive is manufactured with respect for the environment, and it complies with the RoHS Directive.



The perfect match for:

- Industrial appliances
- HVAC applications
- OEM

Power range:

- 1 phase 200–240 V AC0.18–2.2 kW
- 3 phase 200–240 V AC0.25–3.7 kW
- 3 phase 380–480 V AC0.37–22 kW

| Features | Benefits |
|--|--|
| User friendly | |
| • Minimum commissioning | • Saves time |
| • Mount – connect – go! | • Minimum effort - minimum time |
| • Copy settings via local control panel | • Easy programming of multiple drives |
| • Intuitive parameter structure | • Minimal manual reading |
| • Complies with VLT® software | • Saves commissioning time |
| • Self-protecting features | • Lean operation |
| • Process PI-controller | • No need for external controller |
| • Automatic Motor Adaptation (AMA) | • Exploits motor's full potential |
| • 150% motor torque up to 1 minute | • Plenty of brake-away and acceleration torque |
| • Flying start (catch a spinning motor) | • Doesn't trip when started on a spinning (freewheeling) motor |
| • Electronic Thermal Relay (ETR) | • Replaces external motor protection |
| • Precise stop function | • Lean production – more up-time |
| • Smart Logic Controller | • Often makes PLC unnecessary |
| • Built-in RFI filter | • Saves cost and space |
| Energy saving | |
| • Energy efficiency 98% | • Minimises heat loss |
| • Automatic Energy Optimisation (AEO) | • Saves 5-15% energy in HVAC applications |
| Reliable | |
| • Earth fault protection | • Protects the drive |
| • Over temperature protection | • Protects the motor and drive |
| • Short circuit protection | • Protects the drive |
| • Optimum heat dissipation | • Longer lifetime |
| • High quality electronics | • Low lifetime cost |
| • High quality capacitors | • Tolerates uneven mains supply |
| • All drives full load tested from factory | • High reliability |
| • Dust resistant | • Optimised productivity |
| • Tight enclosure | • Increased lifetime |
| • RoHS compliant | • Protects the environment |
| • Designed for WEEE | • Protects the environment |
| Less operation cost | |
| Maximum uptime | |

Coated PCB standard
For harsh environments.

Power options
Danfoss Drives offers a wide range of external power options for use together with our drives in critical networks or applications:

- **Advanced Harmonic Filters:**
For applications where reducing harmonic distortion is critical

PC software

- **MCT 10**
– Ideal for commissioning and servicing the drive including guided programming of cascade controller, real-time clock, smart logic controller and preventive maintenance.
- **VLT Energy Box**
– Comprehensive energy analysis tool, shows the drive payback time.
- **MCT 31**
– Harmonics calculations tool.



Cabinet sizes
(mounting flange incl.)

| [mm] | M1 | M2 | M3 | M4 | M5 |
|--------|-----|-----|-----|-----|-----|
| Height | 150 | 176 | 239 | 292 | 335 |
| Width | 70 | 75 | 90 | 125 | 165 |
| Depth | 148 | 168 | 194 | 241 | 248 |

+ 6 mm with potentiometer

Specifications

| Mains supply (L1, L2, L3) | |
|--|---|
| Supply voltage | 1 x 200–240 V ± 10%, 3 x 200–240 V ± 10% 3 x 380–480 V ± 10% |
| 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 (U, V, W) | |
| Output voltage | 0–100% of supply voltage |
| Output frequency | 0–200 Hz (VVC+ mode), 0–400 Hz (U/f mode) |
| Switching on output | Unlimited |
| Ramp times | 0.05–3600 sec |
| Digital inputs | |
| Programmable inputs | 5 |
| Logic | PNP or NPN |
| Voltage level | 0–24 V |
| Pulse inputs | |
| Programmable pulse inputs | 1* |
| Voltage level | 0–24 V DC (PNP positive logic) |
| Pulse input frequency | 20–5000 Hz |

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

| Analog input | |
|--------------------------------|--------------------------------|
| Analog inputs | 2 |
| Modes | 1 current/1 voltage or current |
| Voltage level | 0–10 V (scaleable) |
| Current level | 0/4–20 mA (scaleable) |
| Analog output | |
| Programmable analog outputs | 1 |
| Current range at analog output | 0/4–20 mA |
| Relay outputs | |
| Programmable relay outputs | 1 (240 VAC, 2 A) |
| Approvals | |
| CE, C-tick, UL | |
| Fieldbus communication | |
| FC Protocol, Modbus RTU | |

Ordering numbers

| Power [kW] | Current [I-nom.] | 200 V | | 400 V | |
|------------|------------------|-----------|-----------|------------------|-----------|
| | | 1 ph. | 3 ph. | Current [I-nom.] | 3 ph. |
| 0.18 | 1.2 | 132F 0001 | | | |
| 0.25 | 1.5 | | 132F 0008 | | |
| 0.37 | 2.2 | 132F 0002 | 132F 0009 | 1.2 | 132F 0017 |
| 0.75 | 4.2 | 132F 0003 | 132F 0010 | 2.2 | 132F 0018 |
| 1.5 | 6.8 | 132F 0005 | 132F 0012 | 3.7 | 132F 0020 |
| 2.2 | 9.6 | 132F 0007 | 132F 0014 | 5.3 | 132F 0022 |
| 3.0 | | | | 7.2 | 132F 0024 |
| 3.7 | 15.2 | | 132F 0016 | | |
| 4.0 | | | | 9.0 | 132F 0026 |
| 5.5 | | | | 12.0 | 132F 0028 |
| 7.5 | | | | 15.5 | 132F 0030 |
| 11.0 | | | | 23.0 | 132F 0058 |
| 15.0 | | | | 31.0 | 132F 0059 |
| 18.5 | | | | 37.0 | 132F 0060 |
| 22.0 | | | | 43.0 | 132F 0061 |

Micro drives from 1.5 kW and up have built in brake chopper

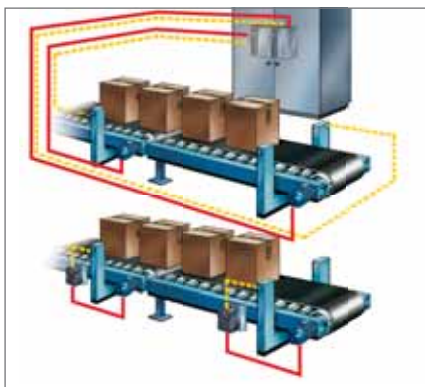
VLT® Control panel LCP 11Without potentiometer: 132B0100
VLT® Control panel LCP 12With potentiometer: 132B0101

VLT® Decentral FCD 300

The VLT® Decentral FCD 300 is a complete frequency converter designed for decentral mounting. It can be mounted on the machine or wall close to the motor, or directly on the motor.

The VLT® Decentral FCD 300 comes in very robust enclosure, with a special painting treatment to withstand harsh environments and typical cleaning agents used in wash-down areas. Its design offers a smooth cleaning-friendly surface.

The decentral design reduces the need for central control panels and eliminates the need for space-consuming motor control cabinets. The need for long screened motor cables is significantly reduced.



Central Vs. Decentral concept



Robust cleaning-friendly surface



Hot pluggable LCP

The perfect solution for:

- Material handling in Food & Beverage and Industry
- Installations in wash-down areas
- Widely distributed applications

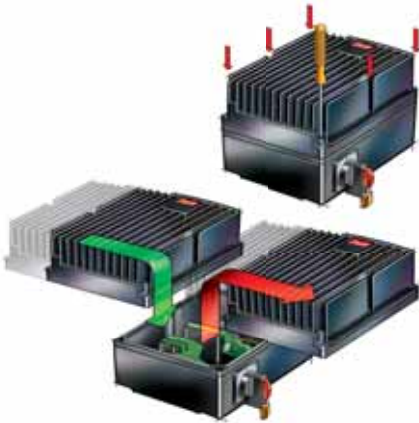
Power range

0.37 – 3.3 kW, 3 x 380 – 480 V

Enclosure

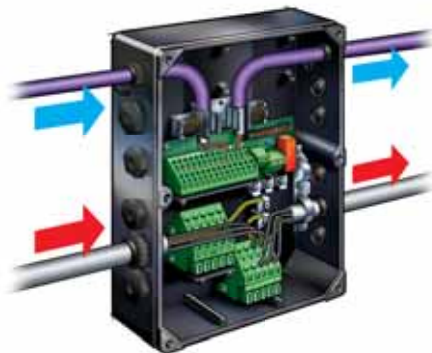
IP66/Type 4X (indoor)

| Features | Benefits |
|--|---|
| User-friendly <ul style="list-style-type: none"> • Adapts to any brand of motor and geared motor • Designed for power and fieldbus looping • Visible LEDs | Save commissioning and operating cost <ul style="list-style-type: none"> • Easy and flexible installation • Cable savings • Easy status check |
| <ul style="list-style-type: none"> • Set-up and controlled through a remote control panel or fieldbus communication and dedicated MCT 10 set-up software | <ul style="list-style-type: none"> • Easy commissioning |
| Reliable <ul style="list-style-type: none"> • Special surface treatment as protection against aggressive environments • Twin part design (installation box and electronic part) • Integrated lockable service switch available • Full protection is offered | Maximum up-time <ul style="list-style-type: none"> • Easy cleaning; no dirt trap • Easy and fast service • Local disconnecting possible • Protects the motor and drive |



Plug-and-drive

The bottom section contains maintenance-free Cage Clamp connectors and looping facilities for power and fieldbus cables. Once installed, commissioning and upgrading can be performed in no time by plugging in another control lid.



Flexible installation

The FCD 300 series facilitates internal power line and fieldbus looping. Terminals for 4 mm² power cables inside the enclosure allows connection of up to 10+ units.

Available options

- Service switch
- Connector for control panel
- M12 connectors for external sensors
- Han 10E motor connector
- Brake chopper and resistor
- 24 V external back up of control and communication
- External electromechanical brake control and supply

Specifications

| Mains supply (L1, L2, L3) | |
|---|--|
| Supply voltage | 3 x 380/400/415/440/480 V ± 10% |
| Supply frequency | 50/60 Hz |
| Max. imbalance on supply voltage | ± 2.0% of rated supply voltage |
| Switching on input supply | 2 times/min. |
| Power Factor (cos φ) | 0.9 / 1.0 at rated load |
| Output data (U, V, W) | |
| Output voltage | 0–100% of supply |
| Overload torque | 160% for 60 sec. |
| Switching on output | Unlimited |
| Ramp times | 0.02 - 3600 sec. |
| Output frequency | 0.2 - 132 Hz, 1 - 1000 Hz |
| Digital inputs | |
| Programmable digital inputs | 5 |
| Voltage level | 0–24 V DC (PNP positive logic) |
| Analog inputs | |
| Analog inputs | 2 (1 voltage, 1 current) |
| Voltage level/Current level | 0– ±10 V DC / 0/4–20 mA (scaleables) |
| Pulse inputs | |
| Programmable pulse inputs | 2 (24 V DC) |
| Max. frequency | 110 kHz (push-pull) / 5 kHz (open collector) |
| Analog output | |
| Programmable analog output | 1 |
| Current range | 0/4–20 mA |
| Digital output | |
| Programmable digital/frequency output | 1 |
| Voltage/frequency level | 24 V DC/10 kHz (max.) |
| Relay output | |
| Programmable relay output | 1 |
| Max. terminal load | 250 V AC, 2 A, 500 VA |
| Fieldbus communication | |
| FC Protocol, Modbus RTU, Metasys N2 | Built-in |
| Profibus DP, DeviceNet, AS-interface | Optional (integrated) |
| Externals | |
| Vibration test | 1.0 g (IEC 60068) |
| Max. relative humidity | 95 % (IEC 60068-2-3) |
| Ambient temperature | Max. 40°C (24 hour average max. 35°C) |
| Min. ambient temperature in full operation | 0°C |
| Min. ambient temperature at reduced performance | -10°C |
| Approvals | CE, UL, C-tick, ATEX* |

* Contact Danfoss for details

Technical data

| VLT® Decentral FCD | | 303 | 305 | 307 | 311 | 315 | 322 | 330 | 335* | |
|--------------------------------------|----------------------------|-----------------|------|------|-----|-----|-----|-----------------|------|--|
| Output current (3 x 380 – 480 V) | I _{INV (60s)} [A] | 1.4 | 1.8 | 2.2 | 3.0 | 3.7 | 5.2 | 7.0 | 7.6 | |
| | I _{MAX (60s)} [A] | 2.2 | 2.9 | 3.5 | 4.8 | 5.9 | 8.3 | 11.2 | 11.4 | |
| Output power (400 V) | S _{INV} [KVA] | 1.0 | 1.2 | 1.5 | 2.0 | 2.6 | 3.6 | 4.8 | 5.3 | |
| Typical shaft output | P _{M,N} [kW] | 0.37 | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 3.3 | |
| | P _{M,N} [HP] | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 4.0 | 5.0 | |
| Mechanical dimensions H x W x D (mm) | Motor mounting | 244 x 192 x 142 | | | | | | 300 x 258 x 151 | | |
| | Stand alone | 300 x 192 x 145 | | | | | | 367 x 258 x 154 | | |

* t_{amb} max. 35 °C

VLT® DriveMotor FCM 300

The VLT® FCM 300 Series is an integrated drive-motor solution which combines a VLT® frequency converter and a high standard quality motor in a single product.

The frequency converter is attached in place of the motor terminal box and it is no higher than the standard terminal box nor wider or longer than the motor.

Incorporated to a high standard quality motor, the VLT® DriveMotor FCM 300 is also available in a multitude of variants, individualised to meet customer requirements.

On the motor

The VLT® electronic motor control together with the motor totally eliminates motor cables and thereby minimises EMC problems. Heat from the drive is dissipated together with the motor heat.



All-in-one DriveMotor solution



Flexible motor mounting

The perfect match for:

- Air Handling Unit fan wheels
- Pumps
- Simple conveyors

Power range:

0.55 – 7.5 kW, 3 x 380 – 480 V

Enclosure:

IP55 (standard)
IP65/IP66 (optional)

Motor type:

2-pole
4-pole

Mounting versions:

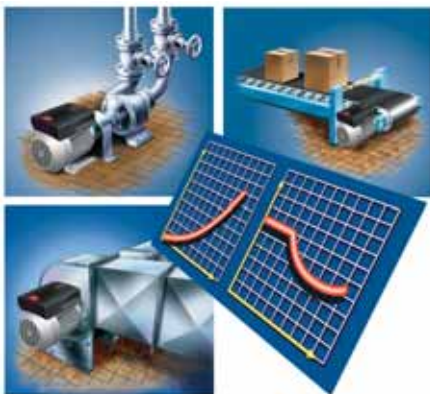
B03 foot
B05 flange
B35 foot + flange
B14 face
B34 foot + face

| Features | Benefits |
|---|---|
| User-friendly <ul style="list-style-type: none"> • Motor and drive perfectly matched to each other • No panel space required – the DriveMotor is placed on the machine • Flexible mounting – foot/flange/face/foot-flange/foot-face • Retrofit without mechanical changes • Set-up and controlled through a remote control panel or fieldbus communication and dedicated MCT 10 set-up software | Save commissioning and operating cost <ul style="list-style-type: none"> • Saves commissioning time • Saves space • Meets customer requirements • Easy service • Easy commissioning |
| Reliable <ul style="list-style-type: none"> • Robust enclosure • No power cable length limitation • Thermal protection • Straightforward EMC compliance | Maximum up-time <ul style="list-style-type: none"> • Withstands harsh environments • Increased flexibility • Total motor-inverter protection • No problem with electromagnetic interferences |



Control panel

A Local Control Panel is available for operating, setup and diagnostics. The LCP can be handheld or mounted in a panel front (IP65).



Sleep Mode

In Sleep Mode the motor will stop in a no load situation. When the load returns, the frequency converter will restart the motor.

Also available:

Forced ventilation

For constant operation at low speed without torque reduction.

Motor drain holes

For applications where formation of condensate water might occur.

Sensorless Pump Control – OEM version. Offers precise pressure (head) control without using a pressure transmitter.

Specifications

| Mains supply (L1, L2, L3) | |
|---|--|
| Supply voltage | 3 x 380/400/415/440/460/480V ± 10% |
| Supply frequency | 50/60 Hz |
| Power factor (cos φ) | Max. 0.9/1.0 at rated load |
| Max. imbalance of supply voltage | ± 2% of rated supply voltage |
| Switching on supply input | Once every 2 minutes |
| Control Characteristics (frequency converter) | |
| Frequency range | 0 – 132 Hz |
| Overload torque | 160% for 60 sec. |
| Resolution on output frequency | 0.1% |
| System response time | 30 msec. ± 10 msec. |
| Speed accuracy | ± 15 RPM (open loop, CT mode, 4-pole motor 150 – 1500 RPM) |
| Digital inputs | |
| Programmable digital inputs | 4 |
| Voltage level | 0 – 24 V DC (PNP positive logic) |
| Analog inputs | |
| Analog inputs | 2 (1 voltage, 1 current) |
| Voltage/current level | 0 – 10 V DC / 0/4 – 20 mA (scaleables) |
| Pulse input | |
| Programmable pulse input | 1 (24 V DC) |
| Max. frequency | 70 kHz (push-pull) / 8 kHz (open collector) |
| Analog/digital output | |
| Programmable analog/digital output | 1 |
| Current/voltage range | 0/4 – 20 mA / 24 V DC |
| Relay output | |
| Programmable relay output | 1 |
| Max. terminal load | 250 V AC, 2 A, 500 VA |
| Fieldbus communication | |
| FC Protocol, Modbus RTU | Built-in |
| Profibus DP | Optional (integrated) |
| Externals | |
| Vibration test | 1.0 g (IEC 60068) |
| Max. relative humidity | 95% (IEC 60068-2-3) |
| Ambient temperature | Max. 40° C (24 hour average max. 35° C) |
| Min. ambient temperature in full operation | 0° C |
| Min. ambient temperature at reduced performance | -10° C |

Technical Data

| FCM | 305 | 307 | 311 | 315 | 322 | 330 | 340 | 355 | 375 |
|--------------------------------|------|------|-----|-----|------|------|------|------|------|
| Motor output | | | | | | | | | |
| [HP] | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 4.0 | 5.0 | 7.5 | 10.0 |
| [kW] | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 4.0 | 5.5 | 7.5 |
| Motor torque | | | | | | | | | |
| 2-pole [Nm] 1) | 1.8 | 2.4 | 3.5 | 4.8 | 7.0 | 9.5 | 12.6 | 17.5 | 24.0 |
| 4-pole [Nm] 2) | 3.5 | 4.8 | 7.0 | 9.6 | 14.0 | 19.1 | 25.4 | 35.0 | 48.0 |
| Frame size | | | | | | | | | |
| [mm] | 80 | 80 | 90 | 90 | 100 | 100 | 112 | 132 | 132 |
| Input current [A] 380 V | | | | | | | | | |
| 2-pole | 1.5 | 1.8 | 2.3 | 3.4 | 4.5 | 5.0 | 8.0 | 12.0 | 15.0 |
| 4-pole | 1.4 | 1.7 | 2.5 | 3.3 | 4.7 | 6.4 | 8.0 | 11.0 | 15.5 |
| Input current [A] 480 V | | | | | | | | | |
| 2-pole | 1.2 | 1.4 | 1.8 | 2.7 | 3.6 | 4.0 | 6.3 | 9.5 | 11.9 |
| 4-pole | 1.1 | 1.3 | 2.0 | 2.6 | 3.7 | 5.1 | 6.3 | 8.7 | 12.3 |

1) at 400 V, 3000 RPM, 2) at 400 V, 1500 RPM

VLT® Soft Starter MCD 100

MCD 100 is a cost effective and extremely compact soft starter for AC motors.

A true “fit and forget” soft starter for DIN rail mount MCD 100 provides basic soft start and stop function.

- A robust semiconductor design – selection can be based on motor power which ensures easy selection.
- Can be used for an almost unlimited number of starts per hour without derating.
- A universal control voltage (24-480 V AC/ V DC) – simplifies selection and keeps stock at a minimum.
- A “fit and forget” contactor design – simplifies installation and reduces required panel space.
- Digitally controlled rotary switches – secures precise settings and simplifies installation.
- Ratings for heavy duty as standard – simplifies installation and reduces the risk of breakdown



Timed voltage ramp

- Micro Soft Start Controller for motors up to 11kW
- Extremely robust SCR design with heavy ratings as standard
- Unlimited number of starts per hour
- Contactor style design for easy selection, installation and commissioning

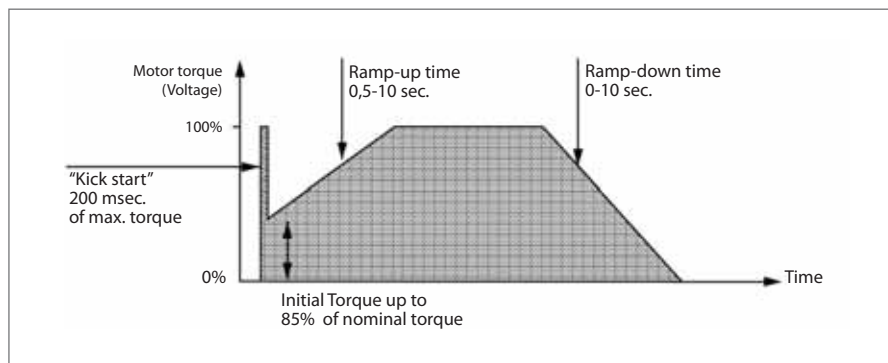
The perfect match for:

- Smaller compressors for example scroll or reciprocating compressors in air-conditioning units.
- Conveyor systems
- Pumps

Power range:

MCD 100-001 1,5 kW
 MCD 100-007 7,5 kW
 MCD 100-011 11 kW

All sizes are rated for line voltage up to 600 V AC.



| Features | Benefits |
|--|---|
| <ul style="list-style-type: none"> • Small footprint and compact size • Selection can be based on motor power | <ul style="list-style-type: none"> • Saves panel space • Easy selection |
| <ul style="list-style-type: none"> • Universal control voltage | <ul style="list-style-type: none"> • Simplifies selection • Keeps stock at a minimum |
| <ul style="list-style-type: none"> • “Fit and forget” contactor design | <ul style="list-style-type: none"> • Simplifies installation • Reduces required panel space |
| Reliable | Maximum up-time |
| <ul style="list-style-type: none"> • Robust semiconductor design • Almost unlimited number of starts per hour without derating • Max. ambient temperature 50°C without derating | <ul style="list-style-type: none"> • Reliable operation • Prevents unauthorized changes |
| User-friendly | Save commissioning and operating cost |
| <ul style="list-style-type: none"> • Easy to install and use • Digitally controlled rotary switches • Easy DIN rail mounting for sizes up to 30 kW | <ul style="list-style-type: none"> • Saves times • Secures precise settings and simplifies installation • Saves time and space |

Specifications

| Mains supply (L1, L2, L3) | |
|---|-------------------------------------|
| MCD 100 | 3 x 208 VAC ~ 600 VAC (+10% / -15%) |
| Supply frequency (at start) | 45 Hz – 66 Hz |
| Control circuit (A1, A2) | |
| MCD 100 | 24 – 480 VAC/VDC (-15% +10%) |
| Environmental | |
| Degree of protection MCD 100 | IP 20 |
| Operating temperatures | -5° C/+40° C (60° C with de-rating) |
| Pollution Degree | Pollution Degree 3 |
| EMC Emission | |
| Equipment class (EMC) | Class A |
| Conducted radio frequency emission | |
| 0.15 MHz – 0.5 MHz | < 90 dB (µV) |
| 0.5 MHz – 5 MHz | < 76 dB (µV) |
| 5 MHz – 30 MHz | 80-60 dB (µV) |
| Radiated radio frequency emission | |
| 30 MHz – 230 MHz | < 30 dB (µV/m) |
| 230 MHz – 1000 MHz | < 37 dB (µV/m) |

This product has been designed for Class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

| EMC Immunity | |
|---|--|
| Electro static discharge | 4 kV contact discharge, 8 kV air discharge |
| Radio-frequency electromagnetic field | |
| 0.15 MHz – 1000 MHz | 140 dB (µV) |
| Rated impulse withstand voltage (Fast transients 5/50 ns – Burst) | 4 kV line to earth |
| Rated insulation voltage (Surges 1.2/50 µs – 8/20 µs) | 4 kV line to earth, 2 kV line to line |
| Voltage dip and short time interruption | 100 ms (at 40% nominal voltage) |
| Short Circuit | |
| Rated short-circuit current MCD 100-001 | Normal fuses: 25 A gL/gG |
| SCR I2t rating for semiconductor fuses | 72 A2s |
| Rated short-circuit current MCD 100-007 | Normal fuses: 50 A gL/gG |
| SCR I2t rating for semiconductor fuses | 1800 A2s |
| Rated short-circuit current MCD 100-011 | Normal fuses: 80 A gL/gG |
| SCR I2t rating for semiconductor fuses | 6300 A2s |
| Heat Dissipation | |
| MCD 100-001 | Max. 4 watts |
| MCD 100-007 to MCD 100-011 | 2 watts/Ampere |
| Standards Approvals | |
| UL/C-UL | UL508 |
| CE | IEC 60947-4-2 |



| Model | Power size (kW) | Rated current (Amps) | Dimensions (mm) H x W x D | Approvals |
|--------|-----------------|------------------------------|---------------------------|-------------|
| MCD100 | 1.5 | 3 A: 5-5:10 (AC 53b) | 102x22,5x124 | UL, CSA, CE |
| | 7.5 | 15 A: 8-3: 100-3000 (AC 53a) | 110x45x128 | |
| | 11 | 25 A: 6-5:100-480 (AC 53a) | 110x90x128 | |

VLT® Compact Starter MCD 200

VLT® Compact Starter MCD 200 from Danfoss includes two families of soft starters in the power range from 7.5–110 kW.

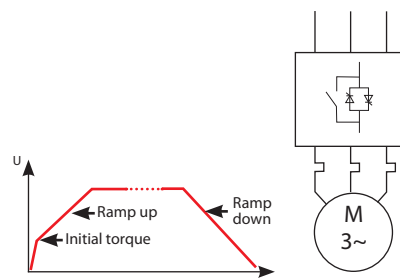
The series offer easy DIN rail mounting for sizes up to 30 kW, 2-wire or 3-wire start/stop control and excellent starting duty ($4 \times I_e$ for 6 seconds).

Heavy starting ratings at $4 \times I_e$ for 20 seconds.

Compatible with grounded delta power systems.

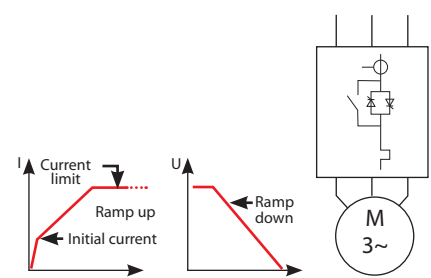


MCD 201



MCD 202

MCD 202 provides enhanced soft start functionality and various motor protection features



The perfect match for:

- Pumps
- Fans
- Compressors
- Mixers
- Conveyors

Power range:
7.5–110 kW

Features

- Small footprint and compact size
- Built-in bypass
- Advanced accessories
- Advanced SCR Control Algorithms balances output waveform

Reliable

- Essential motor protections (MCD 202)
- Max. ambient temperature 50° C without derating

User-friendly

- Easy to install and use
- Easy DIN rail mounting for sizes up to 30 kW

Benefits

- Saves panel space
- Minimises installation cost and eliminates power loss
- Reduces heat build up. Savings in components, cooling, wiring and labor
- Allows enhanced functionality
- Allowing more starts per hour, accepting higher load

Maximum up-time

- Reduces overall project investment
- No external cooling or oversizing necessary

Save commissioning and operating cost

- Saves time
- Saves time and space

Soft Starter for motors up to 110 kW

- Total motor starting solution
- Start, stop and protection features
- Local programming keypad and display

Optional:

- Modules for serial communication.
 - DeviceNet
 - Profibus
 - Modbus RTU
 - USB
- Remote operator kit
- PC software
- Pump application module



Remote operator kit

Remote Operator and display with 4–20 mA analogue output proportional to motor current (MCD 202)
 Serial communication: Modbus RTU, AS-i, Profibus and DeviceNet.
 PC-based MCD set-up software.

Specifications

| Mains supply (I1, L2, L3) | |
|-------------------------------|--|
| Supply voltage | 3 x 200 VAC – 440 VAC or 3 x 200 – 575 VAC |
| Supply frequency | 45 – 66 Hz |
| Control voltage | 100 – 240 VAC 380 – 440 VAC 24 VDC/24 VAC |
| Control inputs | |
| Control inputs | Start, Stop Reset upsh button on the unit |
| Relay outputs | |
| Relay outputs | 1 x main contactor 1 x programmable* (Trip or Run) |
| Protections, MCD 201 | |
| | Phase sequence Supply fault Shorted SCR |
| Protections, MCD 202 | |
| | Motor thermistor input Motor temperature – thermal model Phase imbalance Phase sequence Excess start time Supply fault Shorted SCR |
| LED indications | |
| Indications | Ready/Fault Run |
| Ambient operating temperature | |
| Ambient temperature | -5 to 60°C (above 40°C without derating) |
| Standards approvals | |
| Approvals | CE, UL, C-UL, CCC, C-tick |



Cabinet sizes

| Power range (400 V) | 7–30 kW | 37–55 kW | 75–110 kW |
|---------------------|---------|----------|-----------|
| Height [mm] | 203 | 215 | 240 |
| Width [mm] | 98 | 145 | 202 |
| Depth [mm] | 165 | 193 | 214 |

VLT® Soft Starter MCD 500

VLT® Soft Starter MCD 500 is a total motor starting solution. Current transformers measure motor current and provide feedback for controlled motor ramp profiles.

AAC, the Adaptive Acceleration Control automatically employs the best starting and stopping profile for the application. Adaptive Acceleration Control means, that for each start and stop, the soft starter compares and adapts the process to the chosen profile fitting to the application.

The VLT® Soft Starter MCD 500 has a four line graphical display and a logic keypad making programming easy. Advanced setup is possible displaying operational status.

Three menu systems: Quick Menu, Application Setup and Main Menu provide optimum programming approach.



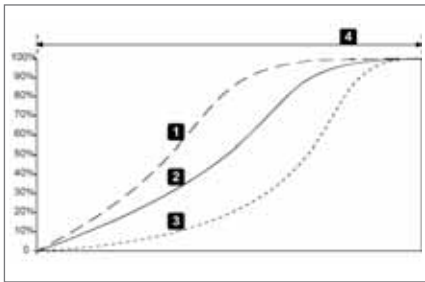
The perfect solution, also for more severe applications:

- Pumps
- Conveyors
- Fans
- Mixers
- Compressors
- Centrifuge
- Mill
- Saw
- And many more

Power range

21 – 1600 A, 7,5 – 800 kW
(1,2 MW inside Delta Connection)
Versions for 200 – 690 VAC

| Features | Benefits |
|--|---|
| User friendly | |
| • AAC Adaptive Acceleration Control | • Automatically adapts to the best starting and stopping profile for the application |
| • Adjustable bus bars allow for both top and bottom entry (360-1600 A, 160-800 kW) | • Space saving, less cable cost and easy retrofitting |
| • DC injection braking distributed evenly over three phases | • Less installation cost and less stress on the motor |
| • Inside Delta (6-wire connection) | • Smaller soft starter can be selected for the application |
| • Log Menus, 99 Events and Trip log provide information on events, trips and performance | • Eases analysis on the application |
| • Auto Reset | • Less down time |
| • Jog (slow-speed operation) | • Application flexibility |
| • Second-order thermal model | • Allows motors to be used to their full potential without damage from overloading |
| • Internal bypass contactors (21 – 215 A, 7,5 – 110 kW) | • Save space and wiring compared to external bypass • Very little heat dissipates when running. Eliminates costly external fans, wiring or bypass contactors |
| • Auto-start/stop clock | • Application flexibility |
| • Compact size – amongst the smallest in their class | • Saves space in cabinets and other application setups |
| • 4-line graphical display | • Optimum programming approach and setup for viewing operational status |
| • Multiple programming setup (Standard Menu, Extended Menu, Quick Set) | • Simplifies the programming, but still holding to maximum flexibility |
| • Multiple (8) languages | • Serving the whole world |



Fully featured Soft Starter for motors up to 800 kW

- Total motor starting solution
- Advanced start, stop and protection features
- Adaptive Acceleration Control
- Inside Delta connection
- 4 line graphical display
- Multiple programming setup menus

Optional:

- Modules for serial communication:
 - DeviceNet
 - Profibus
 - Modbus RTU
 - USB
- Remote operator kit
- PC software



Remote operation kit

- Start/stop, reset
- LED for start, run, trip
- Trip codes
- Current display
- Motor temperature display
- 4–20 mA output



Specifications

| Mains supply (L1, L2, L3) | |
|---------------------------------|--|
| MCD5-xxxx-T5 | 200 VAC ~ 525 VAC (± 10%) |
| MCD5-xxxx-T7 | 380 VAC ~ 690 VAC (± 10%) (earthed star supply system only) |
| MCD5-xxxx-T7 | 380 VAC ~ 600 VAC (± 10%) (inside delta connection) |
| Supply frequency (during start) | >45 Hz (50 Hz supply) or >55 Hz (60 Hz supply) |
| Supply frequency (during run) | >48 Hz (50 Hz supply) or >58 Hz (60 Hz supply) |
| Electronics control voltage | 230 VAC (+10%/-15%) or 400 VAC (+10%/-15%) |

| Control voltage (A4, A5, A6) | |
|-----------------------------------|--|
| CV1 (A5, A6) | 24 VAC/VDC (± 20%) |
| CV2 (A5, A6) | 110~120 VAC (+10%/-15%) |
| CV2 (A4, A6) | 220~240 VAC (+10%/-15%) |
| Mains frequency | 50/60 Hz (± 10%) |
| Rated insulation voltage to earth | 600 VAC |
| Rated impulse withstand voltage | 4 kV |
| Form designation | Bypassed or continuous, semiconductor motor starter form 1 |

| Short circuit capability | |
|---------------------------------------|----------------------------|
| Coordination with semiconductor fuses | Type 2 |
| Coordination with HRC fuses | Type 1 |
| MCD5-0021B to MCD5-0105B | Prospective current 10 kA |
| MCD5-0131B to MCD5-0245C | Prospective current 18 kA |
| MCD5-0360C to MCD5-0927C | Prospective current 85 kA |
| MCD5-1200C to MCD5-1600C | Prospective current 100 kA |

| Electromagnetic capability (compliant with EU Directive 89/336/EEC) | |
|---|---|
| EMC Emissions (Terminals 13 & 14) | IEC 60947-4-2 Class B and Lloyds Marine No. 1 Specification (up to MCD5-215B) |
| EMC Immunity | IEC 60947-4-2 |

| Outputs | |
|---------------|---|
| Relay Outputs | 10A @ 250 VAC resistive, 5A @ 250 VAC AC15 pf 0.3 |

| Programmable Outputs | |
|------------------------------------|--|
| Relay A (13, 14) | Normally open |
| Relay B (21, 22, 24) | Changeover |
| Relay C (33, 34) | Normally open |
| Analog Output (07,08) | 0 – 20 mA or 4 – 20 mA (selectable) |
| Maximum load | 600 Ω (12 VDC @ 20 mA) (accuracy ± 5%) |
| 24 VDC Output (16,08) Maximum load | 200 mA (accuracy ± 10%) |

| Environmental | |
|------------------------------------|--|
| Protection MCD5-0021B ~ MCD5-0105B | IP 20 & NEMA, UL Indoor Type 1 |
| Protection MCD5-0131B ~ MCD5-1600C | IP 00, UL Indoor Open Type |
| Operating temperature | -10° C to 60° C, above 40° C with derating |
| Storage temperature | -25° C to +60° C |
| Operating Altitude | 0 – 1000 m, above 1000 m with derating |
| Humidity | 5% to 95% Relative Humidity |
| Pollution degree | Pollution Degree 3 |

| Heat Dissipation | |
|------------------|----------------------|
| During start | 4.5 watts per ampere |

Dimensions

| Current rating [A] | Weight [kg] | Hight [mm] | Width [mm] | Depth [mm] |
|-----------------------|-------------|------------|------------|------------|
| 21, 37, 43 and 53 | 4.2 | 295 | 150 | 183 |
| 68 | 4.5 | | | |
| 84, 89 and 105 | 4.9 | 438 | 275 | 250 |
| 131, 141, 195 and 215 | 14.9 | | | |
| 245 | 23.9 | 460 | 390 | 279 |
| 360, 380 and 428 | 50.1 | 689 | 430 | 302 |
| 595, 619, 790 and 927 | 53.1 | | | |
| 1200, 1410 and 1600 | 120 | 856 | 585 | 364 |

VLT® Harmonic Filter AHF 005/010

The Danfoss AHF 005 and AHF 010 are advanced harmonic filters, not to be compared with traditional harmonic trap filters. The Danfoss harmonic filters have been specially designed to match the Danfoss frequency converters.

By connecting the Danfoss harmonic filters AHF 005 or AHF 010 in front of a Danfoss frequency converter, the harmonic current distortion generated back to the mains is reduced to a minimum.

Calculation Software

Danfoss has created a PC based program MCT31 for calculation of harmonics with different principles for suppression. It can calculate the harmonics for danfoss frequency converters depending on actual system (transformer, cables, other loads, etc.)



Product range

Line Voltage

- 380 – 415 V AC (50 Hz)
- 380 – 415 V AC (60 Hz)
- 440 – 480 V AC (60 Hz)
- 500 – 525 V (50Hz)
- 690 V (50 Hz)

Filter current

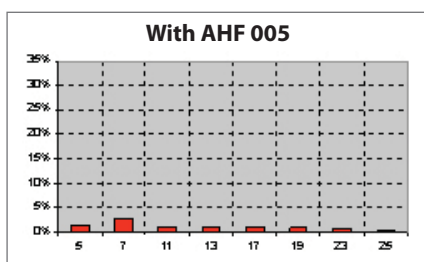
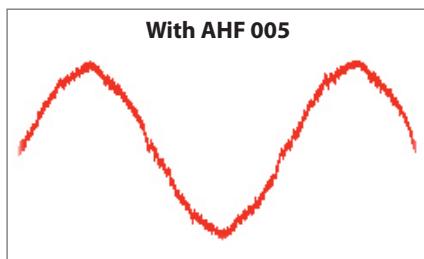
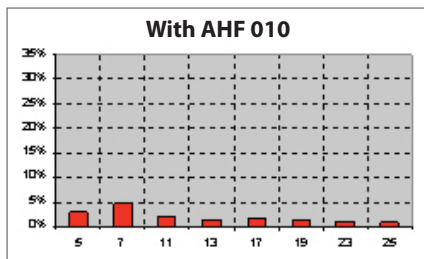
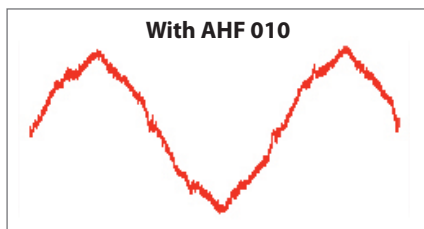
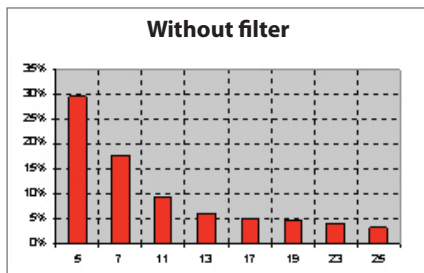
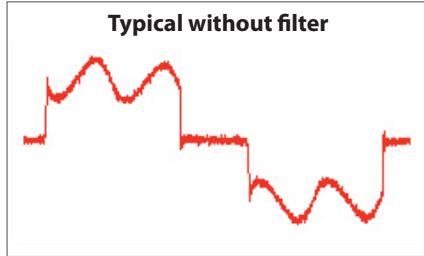
- 10 A – 370 A
- (Modules can be paralleled for higher power)

Enclosure degree

- IP 20

| Features | Benefits |
|--|--------------------------------------|
| User-friendly | |
| • Small compact housing | • Fits into a panel |
| • Easy to use in retrofit applications | • High flexibility |
| • One filter module can be used for several frequency converters | • Lowers system cost |
| • Complies with IEEE 519-1992 and stage 1 of EN 61000-3-12 | • Installation in harsh environments |
| • Easy commissioning | • No adjustment necessary |
| • No routine maintenance required | • No running expenses |
| Efficient | |
| • AHF 005 reduces the total harmonic current distortion to 5% | • Reduces transformer load |
| • AHF 010 reduces the total harmonic current distortion to 10% | • Reduces transformer load |
| • Low filter losses | • High efficiency (> 0.98) |

Current and Distortion Spectrum at Full Load



Specifications

| | |
|---------------------|--|
| Line voltage | ± 10% |
| Frequency | +/- 5% |
| Overload current | 160% for 60 s |
| Efficiency | 0.98 |
| True power factor | 0.80 @ 50% load 0.99 @ 100% load 1.0 @ 150% load |
| Ambient temperature | 5°C – 40°C without derating |

Ordering numbers

| IAHF,N | 380 V – 415 V | | | | | |
|--------|---------------|--------|---------------------|---------------------|---------------------|---------------------|
| | Typical motor | | AHF 005 | | AHF 010 | |
| | kW | HP | 50 Hz | 60 Hz | 50 Hz | 60 Hz |
| 10 A | 4, 5,5 | 6 | 175G6600 | 130B2540 | 175G6622 | 130B2541 |
| 19 A | 7,5 | 10, 15 | 175G6601 | 130B2460 | 175G6623 | 130B2472 |
| 26 A | 11 | 20 | 175G6602 | 130B2461 | 175G6624 | 130B2473 |
| 35 A | 15, 18,5 | 25, 30 | 175G6603 | 130B2462 | 175G6625 | 130B2474 |
| 43 A | 22 | 40 | 175G6604 | 130B2463 | 175G6626 | 130B2475 |
| 72 A | 30, 37 | 50, 60 | 175G6605 | 130B2464 | 175G6627 | 130B2476 |
| 101 A | 45, 55 | 75 | 175G6606 | 130B2465 | 175G6628 | 130B2477 |
| 144 A | 7,5 | 100 | 175G6607 | 130B2466 | 175G6629 | 130B2478 |
| 180 A | 90 | 125 | 175G6608 | 130B2467 | 175G6630 | 130B2479 |
| 217 A | 110 | 150 | 175G6609 | 130B2468 | 175G6631 | 130B2480 |
| 289 A | 132, 160 | 200 | 175G6610 | 130B2469 | 175G6632 | 130B2481 |
| 324 A | 160 | 250 | 175G6611 | 130B2470 | 175G6633 | 130B2482 |
| 370 A | 200 | 300 | 175G6688 | 130B2471 | 175G6691 | 130B2483 |
| 434 A | 250 | | 2 x 175G6609 | | 2 x 175G6631 | |
| 506 A | 250 | 350 | 175G6609 + 175G6610 | 130B2468 + 130B2469 | 175G6631 + 175G6632 | 130B2480 + 130B2481 |
| 578 A | 315 | 450 | 2 x 175G6610 | 2 x 130B2469 | 2 x 175G6632 | 2 x 130B2481 |
| 613 A | 350 | | 175G6610 + 175G6611 | | 175G6632 + 175G6633 | |
| 648 A | 355 | 500 | 2 x 175G6611 | 2 x 130B2470 | 2 x 175G6633 | 2 x 130B2482 |

| IAHF,N | 440 V – 480 V | | |
|--------|-------------------------|---------------------|---------------------|
| | Typical motor used (HP) | AHF 005 | AHF 010 |
| 19 A | 10, 15 | 175G6612 | 175G6634 |
| 26 A | 20 | 175G6613 | 175G6635 |
| 35 A | 25, 30 | 175G6614 | 175G6636 |
| 43 A | 40 | 175G6615 | 175G6637 |
| 72 A | 50, 60 | 175G6616 | 175G6638 |
| 101 A | 75 | 175G6617 | 175G6639 |
| 144 A | 100, 125 | 175G6618 | 175G6640 |
| 180 A | 150 | 175G6619 | 175G6641 |
| 217 A | 200 | 175G6620 | 175G6642 |
| 289 A | 250 | 175G6621 | 175G6643 |
| 324 A | 300 | 175G6689 | 175G6692 |
| 370 A | 350 | 175G6690 | 175G6693 |
| 506 A | 450 | 175G6620 + 175G6621 | 175G6642 + 175G6643 |
| 578 A | 500 | 2 x 175G6621 | 2 x 175G6643 |

| IAHF,N | 500 – 525 V | | |
|--------|-------------------------|---------------------|---------------------|
| | Typical motor used (kW) | AHF 005 | AHF 010 |
| 10 A | 4, 5,5 | 175G6644 | 175G6656 |
| 19 A | 7,5, 11 | 175G6645 | 175G6657 |
| 26 A | 15, 18,5 | 175G6646 | 175G6658 |
| 35 A | 22 | 175G6647 | 175G6659 |
| 43 A | 30 | 175G6648 | 175G6660 |
| 72 A | 37, 45 | 175G6649 | 175G6661 |
| 101 A | 55, 75 | 175G6650 | 175G6662 |
| 144 A | 90, 110 | 175G6651 | 175G6663 |
| 180 A | 132 | 175G6652 | 175G6664 |
| 217 A | 160 | 175G6653 | 175G6665 |
| 289 A | 200 | 175G6654 | 175G6666 |
| 324 A | 250 | 175G6655 | 175G6667 |
| 434 A | 315 | 2 x 175G6653 | 2 x 175G6665 |
| 469 A | 355 | 175G6652 + 175G6654 | 175G6664 + 175G6666 |
| 578 A | 400 | 2 x 175G6654 | 2 x 175G6666 |

| IAHF,N | 690 V | | |
|--------|-------------------------|---------------------|----------|
| | Typical motor used (kW) | AHF 005 | AHF 010 |
| 43 A | 37, 45 | 130B2328 | 130B2293 |
| 72 A | 55, 75 | 130B2330 | 130B2295 |
| 101 A | 90 | 130B2331 | 130B2296 |
| 144 A | 110, 132 | 130B2333 | 130B2298 |
| 180 A | 160 | 130B2334 | 130B2299 |
| 217 A | 200 | 130B2335 | 130B2300 |
| 289 A | 250 | 130B2331 + 130B2333 | 130B2301 |
| 324 A | 315 | 130B2333 + 130B2334 | 130B2302 |
| 370 A | 400 | 130B2334 + 130B2335 | 130B2304 |

VLT® Power Option Sine-Wave filter

Sine-wave output filters are low-pass filters that suppress the switching frequency component from the drive and smooth out the phase-to-phase output voltage of the drive to become sinusoidal. This reduces the motor insulation stress and bearing currents.

By supplying the motor with a sinusoidal voltage waveform, the switching acoustic noise from the motor is also eliminated.

Thermal losses and bearing currents

The sinusoidal voltage supply to the motor reduces hysteresis thermal losses in the motor. Since the motor insulation lifetime is dependent on the motor temperature, the sine-wave filter prolongs the lifetime of the motor.

The sinusoidal motor terminal voltage from the sine-wave filter furthermore has the advantage of suppressing any bearing currents in the motor. This reduces the risk of flash-over in the motor bearings and thereby also contributes to extended motor lifetime and increased service intervals.

The perfect solution for:

- Applications with older motors
- Aggressive environments
- Applications with frequent braking
- 690 V applications with general purpose motors
- Motor cable length above 150 metres

Range

3 x 200 – 500 V, 2,5 – 1,200 A
3 x 525 – 690 V, 13 – 1,320 A

Enclosures

IP00 and IP20 enclosure in the entire power range

Mounting

- Side by side mount with the drive up to 75 A
- Filters wall mounted up to 75 A and floor mount above 75 A



Quality and Design

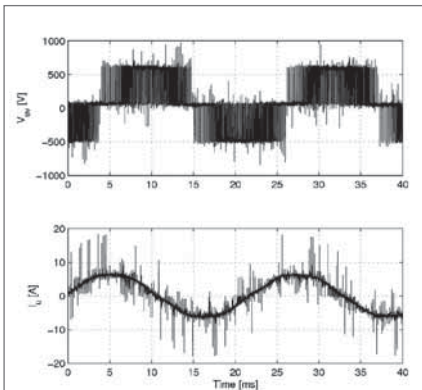
All filters are designed and tested for operation with the VLT® Automation-Drive FC 302, VLT® AQUA Drive FC 202, and the VLT® HVAC Drive FC 102. They are rated for the nominal switching frequency of the VLT® FC series and therefore no derating of the drive is needed.

The enclosure is designed to match the look and quality of the VLT® FC-series drives.

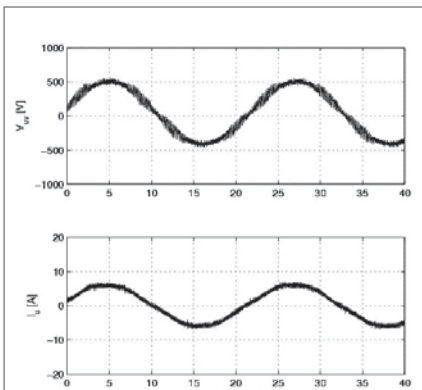
Advantages

- Compatible with all control principles including flux and VVC+
- Parallel filter installation is possible for applications in the high power range

| Features | Benefits |
|---|---|
| • Supplies the motor with a sinusoidal voltage waveform | • Prevents flashover in motor windings |
| • Eliminates over-voltages and voltage spikes caused by cable reflections | • Protects the motor insulation against premature aging |
| • Reduces electromagnetic interference by eliminating pulse reflection caused by current ringing in the motor cable. This allows the use of unshielded motor cables in some applications. | • Trouble-free operation |
| • Eliminates acoustic noise in motor | • Noiseless motor operation |
| • Reduces high frequent losses in motor | • Prolongs service interval of motor |



Voltage and current without filter

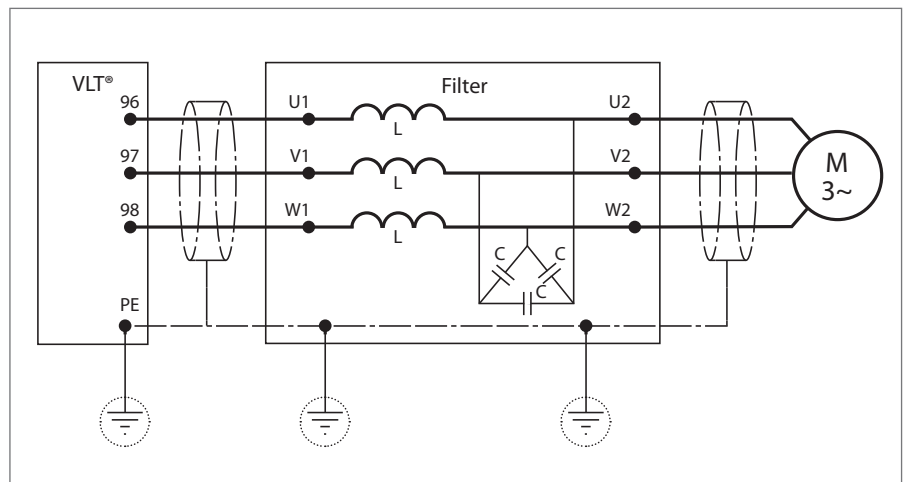


Voltage and current with filter

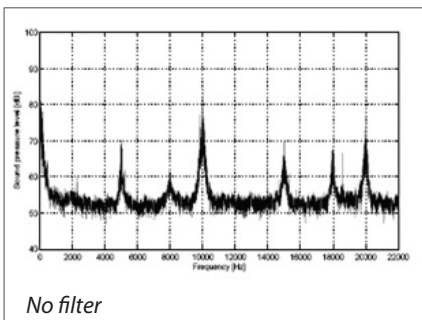
Specifications

| | |
|-------------------------------|---|
| Voltage rating | 3 x 200 – 500 V and 3 x 525 – 690 V |
| Nominal current I_N @ 50 Hz | 2.5 – 1200 A for higher power modules can be paralleled |
| Motor frequency | 0 – 60 Hz without derating 100/120 Hz (up to 10 A) with derating |
| Ambient temperature | -25° to 45°C without derating |
| Min. switching frequency | f_{min} 1,5 kHz – 5 kHz depending on filter type |
| Max. switching frequency | f_{max} 8 kHz |
| Overload capacity | 160% for 60 sec every 10 min. |
| Enclosure degree | IP00 and IP20 |
| Approvals | CE, UL |

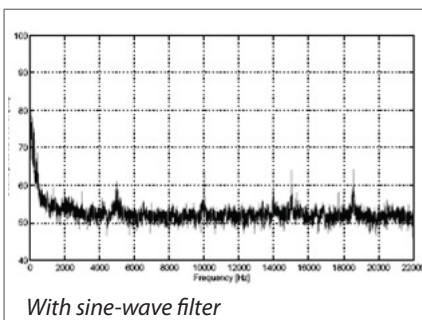
Connection diagram



Relative sound pressure measurements from the motor with and without sine-wave filter



No filter



With sine-wave filter

| | Currents | | Cabinet | Dimensions | | |
|---------------------|-----------|-----------|---------|-------------|------------|------------|
| | 500 V [A] | 690 V [A] | | Height [mm] | Width [mm] | Depth [mm] |
| Wall Mount [IP 20] | 2.5-4.5 | | A1 | 181 | 75 | 205 |
| | 8-10 | | A2 | 246 | 90 | 205 |
| | 17 | | A3 | 246 | 120 | 205 |
| | 24 | | A4 | 246 | 130 | 205 |
| | 38 | 13 | B1 | 260 | 150 | 260 |
| Floor Mount [IP 21] | 48 | | B2 | 380 | 150 | 260 |
| | 62-75 | | B3 | 285 | 170 | 260 |
| | | | B4 | 460 | 170 | 260 |
| | | | B5 | 540 | 170 | 260 |
| | | | F1 | 463 | 610 | 440 |
| | 115-180 | 28-115 | F2 | 522 | 640 | 500 |
| | | | F3 | 522 | 670 | 500 |
| | | | F4 | 602 | 740 | 550 |
| | 260-480 | 165-260 | F5 | 602 | 770 | 550 |
| 660-1200 | 303-940 | F6 | 782 | 910 | 650 | |
| | 1320 | F7 | 856 | 1150 | 860 | |
| | | F8 | 1152 | 1260 | 800 | |
| | | F9 | 1302 | 1304 | 860 | |

VLT® Power Options dU/dt filter

dU/dt filters reduce the dU/dt values on the motor terminal phase-to-phase voltage – an important issue for short motor cables.

dU/dt filters are differential-mode filters which reduce motor terminal phase-to-phase peak voltages spikes and reduce the rise time to a level that lowers the stress on the insulation of motor windings.

Compared to sine-wave filters, the dU/dt filters have a cut-off frequency above the switching frequency. They are smaller, weigh less and have a lower price compared to sine-wave filters. The voltage at the motor terminals is still PWM pulse shaped, but the rise time and U_{peak} are reduced.

Furthermore, because of the smaller inductance and capacitance, the dU/dt filters introduce a negligible reactance between inverter and motor and are therefore suitable for high dynamic applications.

Superior compared to output chokes

Output chokes cause undamped oscillations at the motor terminals which increase the risk of double pulsing and over-voltages higher than twice the DC link voltage. The dU/dt filters are low-pass L-C filters with a well defined cut-off

The perfect solution for:

- Applications with short motor cables (up to 150 m)
- Applications with older motors
- Aggressive environments
- Applications with frequent braking

Range

3 x 200 – 500 V, 24 – 2300 A
3 x 525 – 690 V, 28 – 1350 A

Enclosures

IP 00 and IP 20 enclosure in the entire power range.

Mounting

- Side by side mounting with the drive
- Filters wall mounted up to 115 A and floor mounted above that size



frequency. Therefore the ringing oscillations at the motor terminals are damped and there is a reduced risk of double pulsing and voltage peaks.

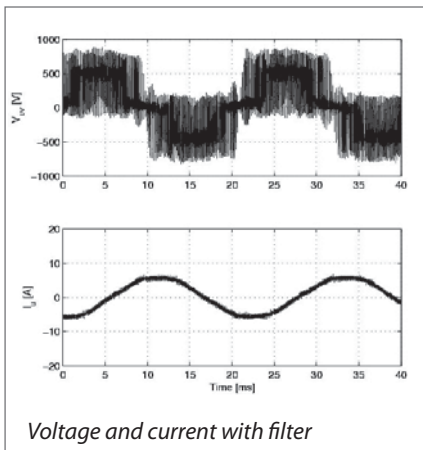
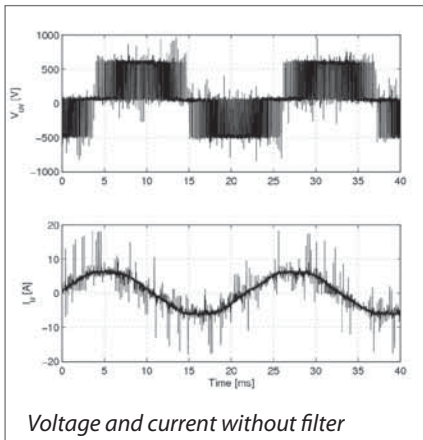
Quality and Design

All dU/dt filters are designed and tested for operation with the VLT® AutomationDrive FC 302, VLT® AQUA Drive FC 202, and the VLT® HVAC Drive FC 102. They are designed to match the look and quality of the VLT® FC series drives.

Advantages

- Compatible with all control principles, including flux and WC+
- Parallel filter installation is possible for applications in the high power range

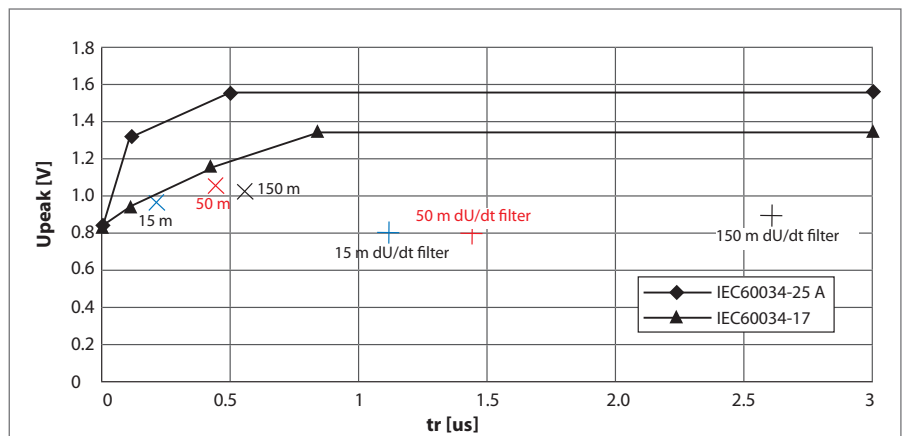
| Features | Benefits |
|---|---|
| <ul style="list-style-type: none"> • Reduces dU/dt stresses | <ul style="list-style-type: none"> • Increases motor service interval |
| <ul style="list-style-type: none"> • Lowers the magnetic interference propagation on surrounding cables and equipment | <ul style="list-style-type: none"> • Trouble-free operation |
| <ul style="list-style-type: none"> • Low voltage drop makes dU/dt filters the ideal solution for highly dynamic applications with flux vector regulation | <ul style="list-style-type: none"> • Small size and cost compared to sine-wave filters |



Specifications

| | |
|-------------------------------|---|
| Voltage rating | 3 x 200 – 500 V and 3 x 525 – 690 V |
| Nominal current I_N @ 50 Hz | 11 – 1200 Amp for higher power modules can be paralleled |
| Motor frequency | 0 – 60 Hz without derating 100/120 Hz (up to 10 A) with derating |
| Ambient temperature | -25° to 45° C without derating |
| Min. switching frequency | f_{min} 1,5 kHz – 4 kHz depending on filter type |
| Max. switching frequency | f_{max} 8 kHz |
| Mounting | Side-by-side (up to 115 A) |
| Overload capacity | 160% for 60 sec every 10 min. |
| Enclosure degree | IP 00 and IP 20 |
| Approvals | CE, UL |

dU/dt limit curves



The dU/dt value decreases with the motor cable length whereas the peak voltage increases. Therefore it is recommended to use sine-wave filters in installations with motor cable lengths above 150 m.

| | Currents | | Cabinet | Dimensions | | |
|--------------------|-----------|-----------|---------------------|-------------|------------|------------|
| | 500 V [A] | 690 V [A] | | Height [mm] | Width [mm] | Depth [mm] |
| Wall Mount [IP 20] | 24 | 28 | A1 | 181 | 75 | 205 |
| | | | A2 | 246 | 90 | 205 |
| | | | A3 | 246 | 120 | 205 |
| | | | A4 | 246 | 130 | 205 |
| | | | B1 | 260 | 150 | 260 |
| | 45-110 | 45-115 | B2 | 380 | 150 | 260 |
| | | | B3 | 285 | 170 | 260 |
| | | | B4 | 460 | 170 | 260 |
| | | | B5 | 540 | 170 | 260 |
| | | | Floor Mount [IP 21] | 182-500 | 165-630 | F1 |
| F2 | 522 | 640 | | | | 500 |
| F3 | 522 | 670 | | | | 500 |
| 750 | 530 | F4 | | 602 | 740 | 550 |
| | | F5 | | 602 | 770 | 550 |
| | | F6 | | 782 | 910 | 650 |
| 1500-2300 | 765-1350 | F7 | | 856 | 1150 | 860 |
| | | F8 | | 1152 | 1260 | 800 |
| | | F9 | | 1302 | 1304 | 860 |

VLT® Motion Control Tool MCT 10

Setup software provides easy control of details as well as a general overview of drive systems, large or small. The tool handles all drives related data.

More efficient service organization

- Scope & logging: analyse problems easily
- Read out alarms, warnings and fault log in one view.
- Compare saved project with on-line drive

More efficient commissioning

- Off-line commissioning onsite
- Save/send/mail projects anywhere
- Easy field-bus handling, multiple drives in project file. Enables service organization to be more efficient

Basic:

- Scope & Graph
- Alarm history in saved projects
- MCO305 support
- Graphical Smart Logic Controller
- Graphical Timebased Actions, Preventive Maintenance and Basic Cascade Controller (FC102/FC202 only)
- Multiple fieldbus support
- VLT5000 to FC302 Drive Conversion Wizard

Advanced:

- No limitation in number of drives
- Motor Database
- Real Time Logging from drive
- Sensorless pump control

Fieldbusses:

- ProfiBus
- RS485
- USB
- Ethernet-TSC

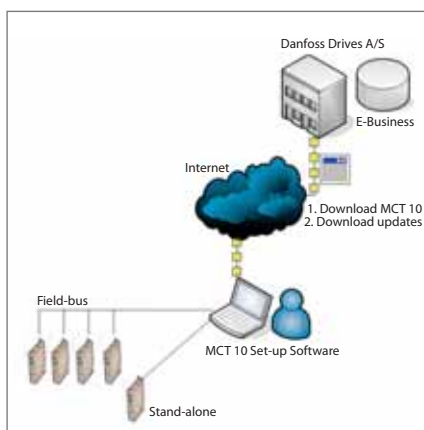


Internet download

<http://www.danfoss.com/drives>

System requirements

- MS Windows® NT 4.0, 2000, XP or Vista
- Pentium III 350 MHz or better
- 256 Mb RAM or better
- 200 Mb free hard disk space
- CD-ROM drive
- VGA or XGA graphic adapter



Features

- One PC tool for alle tasks
- "Explorer-like" view
- Option programming
- Online and offline commissioning
- Scope & logging
- Alarm history
- Multiple interfaces
- USB connection

Benefits

- Save time
- Easy to use
- Save time
- Save cost
- Easy analyzing - less downtime
- Easy fault finding
- Easy connection
- Easy connection

VLT® Service

VLT® DrivePro™ LifeCycle Service Packages

Plus, Premium and Supreme

VLT® DrivePro™ Plus

The Plus Package offers a program of support to help customers realize improve drive availability and reliability.

Features

- Preventative Maintenance
- Standard Training
- 24 hour Hotline
- 24 hour response time
- On-site service

VLT® DrivePro™ Premium

Our Premium Program provides a combination of basic and advanced service and support resources aimed at extending the life of your drives and ensure peak economic performance.

Features

- Preventative Maintenance
- Standard and scheduled training
- 24 hour Hotline
- 6 hour response time
- On-site service, inc. labour & travel
- Start-up
- Extended warranty – Depot
- Extended warranty – On-site
- Environmental disposal

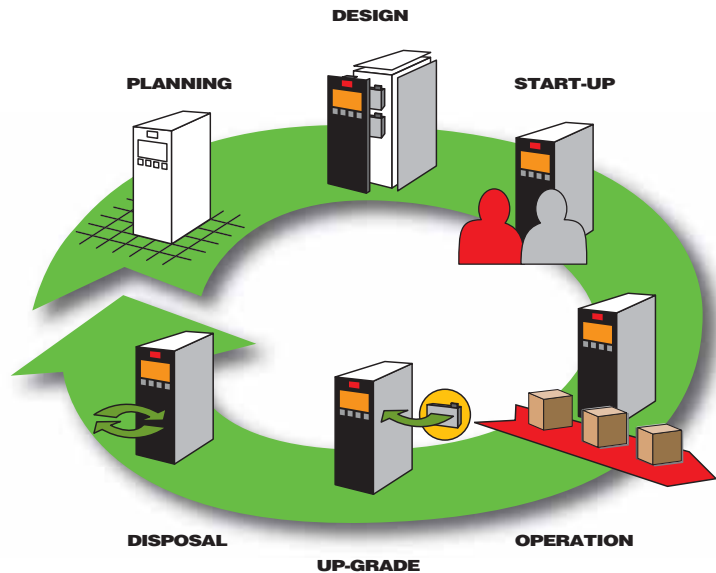
VLT® DrivePro™ Supreme

The Supreme Package provides a full scope of service to meet your operational needs, help you achieve business critical KPI metrics and last but not least give you total peace of mind.

Features

- Preventative Maintenance
- Customer-specific training
- 24 hour Hotline

- 6 hour response time
- On-site service, inc. labour & travel
- Start-up
- Extended warranty – Depot
- Extended warranty – On-site
- Environmental disposal
- Analysis and surveys
- Spare Parts/Drives
- SmartStep
- Stock Maintenance & Consignment
- Stock



VLT® DrivePro™ SmartStep

Upgrade and replace equipment proactively for total peace of mind

Upgrade sensibly

DrivePro™ SmartStep is a comprehensive replacement and upgrade program for customers to assure optimal efficiency and cost performance. It's an easy upgrade program for substantially reduced cost that's backed by professional service support.

DrivePro™ SmartStep advantages

- Customized service and upgrade program
- Flexible replacement plan
- Fixed costs

Designed for success

- Minimize down-time costs
- Extend mean-time-to-repair intervals
- Control your maintenance budget
- Avoid unexpected investments in equipment

Available for application areas such as:

- Food & Beverage
- HVAC
- CTM (chemical, textile, materials)
- Water and wastewater



Environmentally responsible

VLT® products are manufactured with respect for the safety and well-being of people and the environment.

All activities are planned and performed taking into account the individual employee, the work environment and the external environment. Production takes place with a minimum of noise, smoke or other pollution and environmentally safe disposal of the products is prepared.

UN Global Compact

Danfoss has signed the UN Global Compact on social and environmental responsibility and our companies act responsibly towards local societies.

EU Directives

All factories are certified according to ISO 14001 standard. All products fulfil the EU Directives for General Product Safety and the Machinery directive. Danfoss Drives is, in all product series, implementing the EU Directive concerning Hazardous Substances in Electrical and Electrical Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

Impact on energy savings

One year's energy savings from the annual production of VLT® drives will save the energy equivalent to the energy production from a power plant. Better process control at the same time improves product quality and reduces waste and wear on equipment.

What VLT® is all about

Danfoss Drives is the world leader among dedicated drives providers – and still gaining market share.

Dedicated to drives

Dedication has been a key word since 1968, when Danfoss introduced the world's first mass produced variable speed drive for AC motors – and named it VLT®.

Twentyfive hundred employees develop, manufacture, sell and service drives and softstarters in more than one hundred countries, focused only on drives and soft starters.

Intelligent and innovative

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

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

Rely on the experts

We take responsibility for every element of our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliable products.

Local backup – globally

VLT® motor controllers are operating in applications all over the world and Danfoss Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

Danfoss Drives experts don't stop until the customer's drive challenges are solved.

