



Danfoss VLT Drives VLT® Product Catalogue



50%

Energy saving

Speed control of fans and pumps can in many cases lead to significant energy savings.

Contents

| | | |
|---------|--|---|
| PAGE 4 |  <p>VLT® AutomationDrive</p> <p>A single drive concept that covers the entire spectrum of drives applications – a major benefit in commissioning, operating and maintaining the equipment. VLT® AutomationDrive comes in a standard version (FC 301) and an advanced high dynamic version (FC 302) with additional functionalities.</p> |  <p>VLT® Decentral Drive FCD 300</p> <p>A complete frequency converter designed for decentral mounting. It can be mounted on the machine/wall – close to the motor. The decentral design eliminates the need for space-consuming control cabinets and the need for long screened motor cables is significantly reduced.</p> |
| PAGE 8 |  <p>VLT® HVAC Drive</p> <p>Dedicated HVAC drive that features advanced energy monitoring, system maintenance and motor control. The drive is built on a modular platform that makes it easy to operate, while feeding back all the operation information you need.</p> |  <p>VLT® DriveMotor FCM 300</p> <p>Integrated drive-motor solution which combines a VLT® frequency converter and a high standard quality induction 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.</p> |
| PAGE 11 |  <p>VLT® Refrigeration Drive</p> <p>Specially designed for the needs of pump, fan and compressor applications. The drive 'speaks' refrigeration language, making setup easy and efficient.</p> |  <p>VLT® OneGearDrive®</p> <p>A highly efficient permanent-magnet three-phase synchronous motor coupled to an optimised bevel gear box. As part of the Danfoss VLT® FlexConcept® the VLT® OneGearDrive® is an energy-efficient drive system that helps to optimise plant productivity and reduce energy costs.</p> |
| PAGE 14 |  <p>VLT® AQUA Drive</p> <p>The perfect match for pumps and blowers in modern water and wastewater systems, offering advanced application protective features. Available with cascade control of up to 8 pumps in fixed speed mode or master/follower mode.</p> |  <p>VLT® Integrated Servo Drive System ISD 410</p> <p>A high performance Integrated Servo Drive system based on PM motor technology. The motion control is integrated in the drive. The communication bus is CAN. It is a system for applications with a variable number of axis and it allows flexible machine structure within food & beverage and packaging.</p> |
| PAGE 18 |  <p>VLT® 2800 Series</p> <p>An extremely compact series of drives designed for side-by-side mounting and developed specifically for the low power market.</p> |  <p>VLT® Soft Starter MCD 500</p> <p>A total motor-starting solution with advanced start, stop and protection features, Adaptive Acceleration Control, inside delta connection, 4 line graphical display and multiple programming setup menus.</p> |
| PAGE 20 |  <p>VLT® Micro Drive</p> <p>A compact general purpose drive for AC motors up to 22 kW. It performs perfectly even in complex application set-ups and optimises energy efficiency and operation.</p> |  <p>VLT® Compact Starter MCD 200</p> <p>A compact and cost effective soft starter range for applications where direct-on-line starting is undesirable. MCD 200 is, because of its size and functionality, a good alternative to other reduced voltage starting methods such as star/delta starters.</p> |
| PAGE 22 |  <p>VLT® Decentral Drive FCD 302</p> <p>The new generation of decentral drives based on the VLT® AutomationDrive FC 302 platform. It combines the key features of both products in a completely re-designed enclosure, made for best fit on direct machine mounting.</p> |  <p>VLT® Soft Starter MCD 100</p> <p>A cost effective and extremely compact soft starter for AC motors from 1.1 – 11 kW. Due to a unique semiconductor design it is a true "fit and forget" product.</p> |



VLT® Low Harmonic Drive

Meets the toughest harmonic requirements under all load/grid conditions. The Danfoss VLT® Low harmonic drive is the first solution combining an active filter and a drive in one package. The VLT® Low harmonic drive continuously regulates harmonic suppression according to the load and grid conditions without affecting the connected motor.



12-pulse VLT® drive

A robust and cost effective harmonic solution for the higher power range. The Danfoss 12-pulse VLT® drive offers reduced harmonics for demanding industry applications above 250 kW. The 12-pulse VLT® drive is a high efficiency variable frequency converter which is built to the same modular design as the popular 6-pulse VLT® drives.



VLT® Advanced Active Filter AAF 006

A flexible and adaptable solution for central or de-central harmonic mitigation. Danfoss Advanced Active Filters can compensate for individual VLT® drives as a compact integrated solution or can be installed as a compact stand-alone solution at a point of common coupling, compensating for multiple loads simultaneously. Danfoss Active Filters can operate at medium voltage level by means of a step-down transformer.



VLT® Advanced Harmonic Filter AHF 005/010

The Danfoss Advanced Harmonic Filters have been specially designed to match the Danfoss frequency converters. The solution is available in two variants, AHF 005 and AHF 010, connected in front of a Danfoss frequency converter, the harmonic current distortion generated back to the mains is reduced to 5% and 10% Total Harmonic Current Distortion at full load.



VLT® Common Mode Filters

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



VLT® Sine-Wave Filters

Sine-Wave filters are placed between the frequency converter and the motor. They are differential-mode low-pass filters that suppress the switching frequency component from the frequency converter and smooth out the phase-to-phase output voltage of the frequency converter to make it sinusoidal. This reduces the motor insulation stress, bearing currents and eliminates the switching acoustic noise from the motor.



VLT® dU/dt Filters

dU/dt filters are placed between the frequency converter and the motor. They are differential-mode low-pass filters that reduce motor terminal phase-to-phase peak voltage spikes and reduce the rise time to a level that lowers the stress on the insulation of motor windings. dU/dt filters are smaller, weigh less and have a lower price compared to Sine-Wave filters.



VLT® Motion Control Tool MCT 10

For managing drive parameters in systems, the Motion Control Tool MCT 10 is the perfect tool to handle all drive-related data.



VLT® Motion Control Tool MCT 31

With VLT® Motion Control Tool MCT 31, you can determine whether harmonics will be an issue in your installation when drives are added. MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion.



VLT® Energy Box

With VLT® Energy Box software you can both theoretically in project face estimate and afterwards physically validate your real energy savings and reductions in your carbon footprint – from your desk.



VLT® Service – Your way

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® AutomationDrive



The VLT® AutomationDrive is a single drive concept that covers an entire range of applications, 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.

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® Motion Control Tool MCT 10.

| Feature | Benefit |
|--|--|
| Reliable | Maximum uptime |
| Ambient temperature 50° C without derating (D-frame 45° C) | Less need for cooling or oversizing |
| Available in IP 00, 20, 21, 54, 55 and 66 enclosures | Suitable for harsh and wash down areas |
| Resistant to wear and tear | Low lifetime cost |
| Back-channel cooling for frame D, E and F frames | Prolonged lifetime of electronics |
| User-friendly | Saves commissioning and operating cost |
| Plug-and-Play technology | Easy upgrade and change over |
| Awarded control panel | User-friendly |
| Intuitive VLT® interface | Saves time |
| Pluggable cage clamp connectors | Easy connection |
| Exchangeable languages | User-friendly |
| Intelligent | |
| Intelligent warning systems | Warning before controlled stop |
| Smart Logic Control | Reduces need for PLC capacity |
| Advanced plug-in features | Easy commissioning |
| Safe stop | Safety cat. 3 (ISO13849-1), PL d (ISO 13849-1), Stop cat. 0 (EN 60204-1) |
| STO: Safe Torque Off (IEC 61800-5-2) | SIL 2 (IEC 61508) SIL CL 2 (IEC 62061) |
| Intelligent heat management | Intelligent heat management |

Awarded

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

Power range

| | |
|-----------------|----------------|
| 3 x 200 – 240 V | 0.25 – 37 kW |
| 3 x 380 – 500 V | 0.37 – 1000 kW |
| 3 x 525 – 600 V | 0.75 – 75 kW |
| 3 x 525 – 690 V | 1.1 – 1400 kW |

Options

The following options are available:

Fieldbus options

- VLT® PROFIBUS DP MCA 101
- VLT® DeviceNet MCA 104
- VLT® CanOpen MCA 105
- VLT® PROFIBUS Converter MCA 113
- VLT® PROFIBUS Converter MCA 114
- VLT® PROFINET MCA 120
- VLT® Ethernet/IP MCA 121
- VLT® Modbus TCP MCA 122
- VLT® POWERLINK MCA 123
- VLT® EtherCAT MCA 124
- VLT® DeviceNet Converter MCA 194

I/O and feedback options

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

Safety options

- VLT® Safe PLC I/O MCB 108
- VLT® PTC Thermistor Card MCB 112
- VLT® Safe Option MCB 140 Series
- VLT® Safe Option MCB 150 Series

Brake chopper (IGBT) 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 a generator.

Motion Control Options

- VLT® Motion Control Option MCO 305
- VLT® Synchronizing Controller MCO 350
- VLT® Position Controller MCO 351
- VLT® Center Winder MCO 352

Power options

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

Specifications

| Mains supply (L1, L2, L3) | |
|--|--|
| Supply voltage | 200 – 240 V ±10% FC 301: 380 – 480 V ±10% FC 302: 380 – 500 V ±10%, 525 – 600 V ±10% 525 – 690 V ±10% |
| Supply frequency | 50/60 Hz |
| True Power Factor (λ) | 0.92 nominal at rated load |
| Displacement Power Factor ($\cos \phi$) near unity | (> 0.98) |
| Switching on input supply L1, L2, L3 | Maximum 2 times/min. |

| Output data (U, V, W) | |
|-----------------------|---|
| Output voltage | 0 – 100% of supply voltage |
| Output frequency | FC 301: 0.2 – 590 Hz (0.25 – 75 kW) FC 302: 0 – 590 Hz (0.25 – 75 kW) 0 – 590 Hz (90 – 1200 kW) 0 – 300 Hz (Flux mode) |
| Switching on output | Unlimited |
| Ramp times | 1–3600 sec. |

Note: 160% current can be provided for 1 minute.
Higher overload rating is achieved by oversizing the drive.

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

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

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

| Pulse/encoder inputs | |
|-----------------------------------|----------------------------------|
| Programmable pulse/encoder inputs | FC 301: 1 / FC 302: 2 |
| Voltage level | 0 – 24 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.

Other accessories

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

High power options

- IEC Emergency stop with Safety Relay
- Safety Stop with Safety Relay
- RFI Filters
- NAMUR terminals
- RCD
- IRM
- Mains shielding
- Regen terminals

Please see the VLT® High Power Drive Selection Guide for the complete range of options.

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 | A4/A5 | A4/A5 | | | | | | | | | | | | | | |
| PK37 | 0.37 | | 2.4 | | | | | | 1.3 | 1.2 | 1.3 | 1.2 | | | | | | | | | | |
| PK55 | 0.55 | | 3.5 | | | | | | 1.8 | 1.6 | 1.8 | 1.6 | | | | | | | | | | |
| PK75 | 0.75 | | 4.6 | | | | | | 2.4 | 2.1 | 2.4 | 2.1 | | | | | | | | | | |
| P1K1 | 1.1 | | 6.6 | | | | | | 3 | 2.7 | 3 | 2.7 | | | | | | | | | | |
| P1K5 | 1.5 | | 7.5 | | | | | | 4.1 | 3.4 | 4.1 | 3.4 | | | | | | | | | | |
| P2K2 | 2.2 | | 10.6 | | | | | | 5.6 | 4.8 | 5.6 | 4.8 | | | | | | | | | | |
| P3K0 | 3 | | 12.5 | | | | | | 7.2 | 6.3 | 7.2 | 6.3 | | | | | | | | | | |
| P3K7 | 3.7 | | 16.7 | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | | | | | | | 10 | 8.2 | 10 | 8.2 | | | | | | |
| P5K5 | 5.5 | 7.5 | 24.2 | 30.8 | B3 | B1 | B1 | B1 | 13 | 11 | 13 | 11 | | | | | | | | | | |
| P7K5 | 7.5 | 11 | 30.8 | 46.2 | | | | | 16 | 14.5 | 16 | 14.5 | | | | | | | | | | |
| P11K | 11 | 15 | 46.2 | 59.4 | | | | | 24 | 21 | 32 | 27 | | | | | | | | | | |
| P15K | 15 | 18 | 59.4 | 74.8 | | | | | 32 | 27 | 37.5 | 34 | | | | | | | | | | |
| P18K | 18.5 | 22 | 74.8 | 88 | | | | | 37.5 | 34 | 44 | 40 | | | | | | | | | | |
| P22K | 22 | 30 | 88 | 115 | | | | | 44 | 40 | 61 | 52 | | | | | | | | | | |
| P30K | 30 | 37 | 115 | 143 | | | | | 61 | 52 | 73 | 65 | | | | | | | | | | |
| P37K | 37 | 45 | 143 | 170 | | | | | 73 | 65 | 90 | 80 | | | | | | | | | | |
| P45K | 45 | 55 | | | | | | | 90 | 80 | 106 | 105 | | | | | | | | | | |
| P55K | 55 | 75 | | | | | | | 106 | 105 | 147 | 130 | | | | | | | | | | |
| P75K | 75 | 90 | | | 147 | 130 | 177 | 160 | | | | | | | | | | | | | | |
| N55K | | | | | | | | | | | | | | | | | | | | | | |
| N75K | | | | | | | | | | | | | | | | | | | | | | |
| N90K | 90 | 110 | | | | | | | 177 | 160 | 212 | 190 | | | | | | | | | | |
| N110 | 110 | 132 | | | | | | | 212 | 190 | 260 | 240 | | | | | | | | | | |
| N132 | 132 | 160 | | | | | | | 260 | 240 | 315 | 302 | | | | | | | | | | |
| N160 | 160 | 200 | | | | | | | 315 | 302 | 395 | 361 | | | | | | | | | | |
| N200 | 200 | 250 | | | | | | | 395 | 361 | 480 | 443 | | | | | | | | | | |
| N250 | 250 | 315 | | | | | | | 480 | 443 | 588 | 535 | | | | | | | | | | |
| N315 | 315 | | | | | | | | | | | | | | | | | | | | | |
| P250 | 250 | 315 | | | | | | | 480 | 443 | 600 | 540 | | | | | | | | | | |
| P315 | 315 | 400 | | | | | | | 600 | 540 | 658 | 590 | | | | | | | | | | |
| P355 | 355 | 450 | | | | | | | 658 | 590 | 745 | 678 | | | | | | | | | | |
| P400 | 400 | 500 | | | | | | | 695 | 678 | 800 | 730 | | | | | | | | | | |
| P450 | 450 | 500 | | | | | | | 800 | 730 | 880 | 780 | | | | | | | | | | |
| P500 | 500 | 560 | | | | | | | 880 | 780 | 990 | 890 | | | | | | | | | | |
| P560 | 560 | 630 | | | | | | | 990 | 890 | 1120 | 1050 | | | | | | | | | | |
| P630 | 630 | 710 | | | | | | | 1120 | 1050 | 1260 | 1160 | | | | | | | | | | |
| P710 | 710 | 800 | | | | | | | 1260 | 1160 | 1460 | 1380 | | | | | | | | | | |
| P800 | 800 | 1000 | | | | | | | 1460 | 1380 | 1720 | 1530 | | | | | | | | | | |
| P900 | 900 | 1000 | | | | | | | | | | | | | | | | | | | | |
| P1M0 | 1000 | 1200 | | | | | | | | | | | | | | | | | | | | |
| P1M2 | 1200 | 1400 | | | | | | | | | | | | | | | | | | | | |
| P1M4 | Consult factory | | | | | | | | | | | | | | | | | | | | | |
| P1M6 | Consult factory | | | | | | | | | | | | | | | | | | | | | |

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

| FC 300 | kW | | T6 525 – 600 V | | | | | | | | T7 525 – 690 V | | | | | | | | | |
|--------|------|------|----------------|--------|---------|--------|-------|-------|-------|-------|----------------|-------|---------|-------|-------|-------|-------------|-------------|-------|-------|
| | | | Amp. HO | | Amp. NO | | 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 | ≤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 | | | | 2.1 | 1.6 | | | | | | | | A5 | A5 |
| P1K5 | 1.5 | | | | 2.9 | 2.7 | A3 | A3 | A5 | A5 | 2.7 | 2.2 | | | A3 | A3 | | | | |
| P2K2 | 2.2 | | | | 4.1 | 3.9 | | | | | | | | | | | | | | |
| P3K0 | 3 | | | | 5.2 | 4.9 | | | | 3.9 | 3.2 | | | | | | | | | |
| P3K7 | 3.7 | | | | | | | | | 4.9 | 4.5 | | | | | | | | | |
| P4K0 | 4.0 | | | | 6.4 | 6.1 | | | | | | | | | | | | | | |
| P5K5 | 5.5 | 7.5 | | | 9.5 | 9 | A3 | A3 | A5 | A5 | 9 | 7.5 | | | A3 | A3 | | | A5 | A5 |
| P7K5 | 7.5 | 11 | | | 11.5 | 11 | | | | | 11 | 10 | 14 | 13 | | | | | | |
| P11K | 11 | 15 | 19 | 18 | 23 | 22 | B3 | B1 | B1 | B1 | 14 | 13 | 19 | 18 | | | | | | |
| P15K | 15 | 18 | 23 | 22 | 28 | 27 | | | | | 19 | 18 | 23 | 22 | | | B2 | | B2 | |
| P18K | 18.5 | 22 | 28 | 27 | 36 | 34 | | | | | 23 | 22 | 28 | 27 | | | | | | |
| P22K | 22 | 30 | 36 | 34 | 43 | 41 | B4 | B2 | B2 | B2 | 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 | | C3 | | | | |
| 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 | | | | | | |
| N55K | 55 | 75 | | | | | | | | | 76 | 73 | 90 | 86 | | | | | | |
| N75K | 75 | 90 | | | | | | | | | 90 | 86 | 113 | 108 | | | | | | |
| N90K | 90 | 110 | | | | | | | | | 113 | 108 | 137 | 131 | | D3h | D1h/D5h/D6h | D1h/D5h/D6h | | |
| N110 | 110 | 132 | | | | | | | | | 137 | 131 | 162 | 155 | | | | | | |
| N132 | 132 | 160 | | | | | | | | | 162 | 155 | 201 | 192 | | | | | | |
| N160 | 160 | 200 | | | | | | | | | 201 | 192 | 253 | 242 | | | | | | |
| N200 | 200 | 250 | | | | | | | | | 253 | 242 | 303 | 290 | | | | | | |
| N250 | 250 | 315 | | | | | | | | | 303 | 290 | 360 | 344 | | D4h | D2h/D7h/D8h | D2h/D7h/D8h | | |
| N315 | 315 | 400 | | | | | | | | | 360 | 344 | 418 | 400 | | | | | | |
| P250 | 250 | 315 | | | | | | | | | | | | | | | | | | |
| P315 | 315 | 400 | | | | | | | | | | | | | | | | | | |
| P355 | 355 | 450 | | | | | | | | | 395 | 380 | 470 | 450 | E2 | | E1 | E1 | | |
| P400 | 400 | 500 | | | | | | | | | 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 | 730 | 899 | 850 | | | F1/F3 | F1/F3 | | |
| P800 | 800 | 900 | | | | | | | | | 889 | 850 | 988 | 945 | | | | | | |
| P900 | 900 | 1000 | | | | | | | | | 988 | 945 | 1108 | 1060 | | | | | | |
| P1M0 | 1000 | 1200 | | | | | | | | | 1108 | 1060 | 1317 | 1260 | | | F2/F4 | F2/F4 | | |
| P1M2 | 1200 | 1400 | | | | | | | | | 1317 | 1260 | 1479 | 1415 | | | | | | |

Dimensions [mm]

| | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1h | D2h | D3h | D4h | D5h | D6h | D7h | D8h | E1 | E2 | F1 | F2 | F3 | F4 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| H | 200 | 268 | 390 | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 901 | 1107 | 909 | 1122 | 1324 | 1665 | 1978 | 2284 | 2000 | 1547 | 2280 | 2280 | 2280 | 2280 | 2280 |
| W | 75 | 90 | 130 | 200 | 242 | 165 | 230 | 308 | 370 | 308 | 370 | 308 | 370 | 325 | 420 | 250 | 350 | 325 | 420 | 600 | 585 | 1400 | 1804 | 1997 | 2401 | 2401 | |
| D | 207 | 205 | 175 | 200 | 260 | 249 | 242 | 310 | 335 | 333 | 378 | 375 | 381 | 384 | 402 | 494 | 498 | 607 | 607 | 607 | 607 | 607 | 607 | 607 | 607 | 607 | |
| H+ | | 375 | | | | 475 | 670 | | | 755 | 950 | | | | | | | | | | | | | | | | |
| W+ | 90 | 130 | | | | 165 | 255 | | | 329 | 391 | | | | | | | | | | | | | | | | |

Note: H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option. A or B for A2 and A3.

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 VLT® HVAC Drive is a full-featured, HVAC dedicated drive 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.

Product range

| | |
|-----------------------|---------------|
| 3 x 200 – 240 V | 1.1 – 45 kW |
| 3 x 380 – 480 V | 1.1 – 1000 kW |
| 3 x 525 – 600 V | 1.1 – 90 kW |
| 3 x 525 – 690 V | 55 – 1400 kW |

With 110% over load torque

Available enclosure ratings

| | |
|------------------------------|---------------|
| IP 00 | 45 – 630 kW |
| IP 20 | 1.1 – 400 kW |
| IP 21 (NEMA 1) | 1.1 – 1400 kW |
| IP 54 (NEMA 12) | 55 – 1400 kW |
| IP 55 (NEMA 12) | 1.1 – 90 kW |
| IP 66 (NEMA 4X indoor) | 1.1 – 90 kW |

Optional coating providing extra protection for aggressive environments.

| Feature | Benefit |
|--|---|
| All built-in – low investment | |
| Modular product concept and a wide range of options | Low initial investment – max. flexibility, later upgrade possible |
| Dedicated HVAC I/O functionality for temperature sensors etc. | External conversion saved |
| Decentral I/O control via serial communication | Reduced wiring costs, and external controller I/O saved |
| Wide range of HVAC protocols for BMS controller connectivity | Less extra gateway solutions needed |
| 4 x auto tuned PID's | No external PID controller needed |
| Smart Logic Controller | Often makes PLC unnecessary |
| Real Time Clock | Enables daily and weekly settings |
| Integrated fan, pump and compressor functionality i.e. | Saves external control and conversion equipment |
| Fire Override Mode, Dry run Detection Constant Torque etc. | Protects equipment and saves energy |
| Back-channel cooling for frame D, E and F frame | Prolonged lifetime of electronics |
| Save energy – less operation cost | |
| Automatic Energy Optimizer function, advanced version | Saves 5 – 15% energy |
| Advanced energy monitoring | Overview on energy consumption |
| Energy saving functions i.e. flow compensation, sleep mode etc. | Saves energy |
| Unequaled robustness – maximum uptime | |
| Robust single enclosure | Maintenance-free |
| Unique cooling concept with no ambient air flow over electronics | Problem-free operation in harsh environments |
| Max ambient temp. 50° C without derating (D-frame 45° C) | No external cooling or oversize necessary |
| User-friendly – save commissioning and operating cost | |
| Smart start | Quick and precise start-up |
| Awarded graphical display, 27 languages | Effective commissioning and operation |
| USB plug and play connection | Easy to use PC software tools |
| Global HVAC support organisation | Local service – globally |
| Built-in DC coils and RFI filters – no EMC concerns | |
| Integrated DC link harmonic filters | Small power cables. Meets EN 61000-3-12 |
| Integrated EMC filters | Meets EN 55011 Class B, A1 or A2 |

Application options

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

VLT® General Purpose I/O MCB 101

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

VLT® Relay Card MCB 105

Adds 3 relay outputs

VLT® Analog I/O MCB 109

3 PT1000/Ni1000 inputs, 3 analogue voltage outputs and back-up power for Real-Time Clock.

VLT® 24 V External Supply MCB 107

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

Sensor input card

Sensor input card for motor protection with 2 or 3 PT100 or PT1000 inputs (VLT® Sensor Input MCB 114).

Brake chopper (IGBT) 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 a generator.

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**

HVAC PC software tools

- **VLT® Motion Control Tool MCT 10:** Ideal for commissioning and servicing the drive
- **VLT® Energy Box:** Comprehensive energy analysis tool. Energy consumption with and w/o drive can be calculated (drive payback time). Online function for accessing drives energy log.
- **VLT® Motion Control Tool MCT 31:** Harmonics calculations tool

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) |
| 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. |
| Output frequency | 0–590 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 | |
| Analogue input | |
| Analogue inputs | 2 |
| Modes | Voltage or current |
| Voltage level | 0 V to +10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Analogue output | |
| Programmable analogue outputs | 1 |
| Current range at analogue 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 BACnet embedded | Optional: VLT® LonWorks MCA 108 VLT® BACnet MCA 109 VLT® DeviceNet MCA 104 VLT® PROFIBUS DP MCA 101 |

High power options

- IEC Emergency stop with Safety Relay
- Safety Stop with Safety Relay
- RFI Filters
- NAMUR terminals
- RCD
- IRM
- Mains shielding
- Regen terminals

Please see the VLT® High Power Drive Selection Guide for the complete range of options.

The Danfoss EC+ concept...

... enables the use of PM motors in IEC-standard sizes with Danfoss VLT® frequency converters. After entering the relevant motor data, you benefit from the high engine efficiency at EC tech-

nology level in all applications. Necessary control method has been embedded in dedicated VLT® series drives.

Benefits of the EC+ concept:

- Free choice of motor technology: PM or asynchronous with same frequency converter
- Operation and installation of the VLT® drive remain the same
- Vendor-independent selection of all components
- Best system efficiency by combining efficiency-optimized components
- Retrofit of existing plants
- Support a broad range of standard and PM motors



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 54 | IP 55 | IP 66 | | | |
| | | | | | | | ≤440 V | >440 V | | | | | | | ≤550 V | >550 V | | | | | | 550 V | 690 V | |
| P1K1 | 1.1 | 6.6 | | | | | 3 | 2.7 | | | | | | 2.6 | 2.4 | | | | | | | 2.1 | 1.6 | |
| P1K5 | 1.5 | 7.5 | A2 | A2 | A4/A5 | A4/A5 | 4.1 | 3.4 | | A2 | A2 | | A4/A5 | A4/A5 | 2.9 | 2.7 | | | | | | 2.7 | 2.2 | |
| P2K2 | 2.2 | 10.6 | | | | | 5.6 | 4.8 | | A2 | A2 | | | 4.1 | 3.9 | A3 | A3 | A5 | A5 | | | 3.9 | 3.2 | |
| P3K0 | 3 | 12.5 | A3 | A3 | A5 | A5 | 7.2 | 6.3 | | | | | | 5.2 | 4.9 | | | | | | | 4.9 | 4.5 | |
| P3K7 | 3.7 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | 10 | 8.2 | | A2 | A2 | | A4/A5 | | 6.4 | 6.1 | | | | | | 6.1 | 5.5 | |
| P5K5 | 5.5 | 24.2 | | | | | 13 | 11 | | A3 | A3 | | A5 | A5 | 9.5 | 9 | A3 | A3 | A5 | A5 | | 9 | 7.5 | |
| P7K5 | 7.5 | 30.8 | B3 | B1 | B1 | B1 | 16 | 14.5 | | | | | | | 11.5 | 11 | | | | | | | 11 | 10 |
| P11K | 11 | 46.2 | | | | | 24 | 21 | | | | | | | 19 | 18 | | | | | | | 14 | 13 |
| P15K | 15 | 59.4 | | | | | 32 | 27 | | B3 | B1 | | B1 | B1 | 23 | 22 | B3 | B1 | B1 | B1 | | 19 | 18 | |
| P18K | 18 | 74.8 | B4 | B2 | B2 | B2 | 37.5 | 34 | | | | | | | 28 | 27 | | | | | | 23 | 22 | |
| P22K | 22 | 88 | | | | | 44 | 40 | | | | | | | 36 | 34 | | | | | | | 28 | 27 |
| P30K | 30 | 115 | C3 | C1 | C1 | C1 | 61 | 52 | | B4 | B2 | | B2 | B2 | 43 | 41 | B4 | B2 | B2 | B2 | | 36 | 34 | |
| P37K | 37 | 143 | | | | | 73 | 65 | | | | | | | 54 | 52 | | | | | | 43 | 41 | |
| P45K | 45 | 170 | C4 | C2 | C2 | C2 | 90 | 80 | | | | | | | 65 | 62 | | | | | | 54 | 52 | |
| P55K | 55 | | | | | | 106 | 105 | | C3 | C1 | | C1 | C1 | 87 | 83 | C3 | C1 | C1 | C1 | | 65 | 62 | |
| P75K | 75 | | | | | | 147 | 130 | | | | | | | 105 | 100 | | | | | | 87 | 83 | |
| P90K | 90 | | | | | | 177 | 160 | | C4 | C2 | | C2 | C2 | 137 | 131 | C4 | C2 | C2 | C2 | | 105 | 100 | |
| N75K* | 75 | | | | | | | | | | | | | | | | | | | | | 90 | 86 | |
| N90K* | 90 | | | | | | | | | | | | | | | | | | | | | 113 | 108 | |
| N110** | 110 | | | | | | 212 | 190 | | | | | | | | | | | | | | 137 | 131 | |
| N132 | 132 | | | | | | 260 | 240 | | D3h | D1h/D5h/D6h | D1h/D5h/D6h | | | | | | | | | | 162 | 155 | |
| N160 | 160 | | | | | | 315 | 302 | | | | | | | | | | | | | | 201 | 192 | |
| N200 | 200 | | | | | | 395 | 361 | | | | | | | | | | | | | | 253 | 242 | |
| N250 | 250 | | | | | | 480 | 443 | | D4h | D2h/D7h/D8h | D2h/D7h/D8h | | | | | | | | | | 303 | 290 | |
| N315 | 315 | | | | | | 588 | 535 | | | | | | | | | | | | | | 360 | 344 | |
| N400 | 400 | | | | | | | | | | | | | | | | | | | | | 418 | 400 | |
| P315 | 315 | | | | | | 600 | 540 | | | | | | | | | | | | | | | | |
| P355 | 355 | | | | | | 658 | 590 | | E2 | | E1 | E1 | | | | | | | | | | | |
| P400 | 400 | | | | | | 745 | 678 | | | | | | | | | | | | | | | | |
| P450 | 450 | | | | | | 800 | 730 | | | | | | | | | | | | | | 470 | 450 | |
| P500 | 500 | | | | | | 880 | 780 | | | | | | | | | | | | | | 523 | 500 | |
| P560 | 560 | | | | | | 990 | 890 | | | | | | | | | | | | | | 596 | 570 | |
| P630 | 630 | | | | | | 1120 | 1050 | | | | | | | | | | | | | | 630 | 630 | |
| P710 | 710 | | | | | | 1260 | 1160 | | | | | | | | | | | | | | 763 | 730 | |
| P800 | 800 | | | | | | 1460 | 1380 | | | | | | | | | | | | | | 889 | 850 | |
| P900 | 900 | | | | | | | | | | | | | | | | | | | | | 988 | 945 | |
| P1M0 | 1000 | | | | | | 1720 | 1530 | | | | | | | | | | | | | | 1108 | 1060 | |
| P1M2 | 1200 | | | | | | | | | | | | | | | | | | | | | 1317 | 1260 | |
| P1M4 | 1400 | | | | | | | | | | | | | | | | | | | | | 1479 | 1415 | |

* @ 690 V
 ** @ 400 V
 † Expected release Q1 2013

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

Dimensions [mm]

| | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1h | D2h | D3h | D4h | D5h | D6h | D7h | D8h | E1 | E2 | F1 | F2 | F3 | F4 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|
| H | 268 | | 390 | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 901 | 1107 | 909 | 1122 | 1324 | 1665 | 1978 | 2284 | 2000 | 1547 | 2280 | 2280 | 2280 | 2280 |
| W | 90 | 130 | 200 | | 242 | | 165 | 230 | 308 | 370 | 308 | 370 | 325 | 420 | 250 | 350 | | 325 | | 420 | 600 | 585 | 1400 | 1804 | 1997 | 2401 |
| D | | | 205 | 175 | 200 | 260 | 249 | 242 | 310 | 335 | | 333 | | | | | | | | | | | 607 | 607 | 607 | 607 |
| H+ | | | 375 | | | | 475 | 670 | | | | 755 | 950 | | | | | | | | | | | | | |
| W+ | 90 | 130 | | | | | 165 | 255 | | | | 329 | 391 | | | | | | | | | | | | | |

Note: H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option. A or B for A2 and A3.

VLT® Refrigeration Drive



Dedicated

to refrigeration application

The VLT® Refrigeration Drive FC 103 is designed to suit fans, pumps and compressors in any kind of refrigeration application.

Regardless if you want to operate compressors, pumps or fans, the VLT® Refrigeration Drive FC 103 provides you the possibility to save energy and extend the lifetime of the components.

Speed control provides many benefits in all motor driven parts of refrigeration applications. The VLT® Refrigeration Drive moves the user in the position to profit from this in a very simple way.

One drive for all

The VLT® Refrigeration Drive FC 103 covers a power range between 1.1-315 kW. Available in a variety of protection classes the drive suits the needs of pump, fan and compressor applications. Every application and power size can be operated and programmed with the same common user interface.

Easy commissioning

The VLT Refrigeration Drive FC 103 offers a setup Wizard, using common refrigeration terms rather than computer language, making installation quick and easy for service technicians and installers. The wizard menu also supports the commissioning engineers if they encounter any problems. The menu will help the engineer troubleshoot and offer solutions to get the drive up and running again if there is a problem.

| Feature | Benefit |
|---|---|
| Robust single enclosure | Maintenance free |
| Protection classes IP 20/21/55/66 | Fits every application |
| Coated electronics (class 3C2 or 3C3) | Withstands challenging environments |
| Max. ambient temp. 50° C without derating (D-frame 45° C) | No external cooling or oversize necessary |
| Software features | Benefits |
| Sleep mode | Optimum system efficiency |
| Thermostat/Pressostat function | System protection |
| Fieldbus (AKD LON, Modbus RTU...) | Open for all kind of controllers |
| Velocity-to-flow conversion | Saves costs |
| Day/Night Control | Reduces wear and energy consumption |
| Advanced energy monitoring | Overview of energy consumption |
| Pressure to temperature conversion | Saves costs |
| Compressor features | Benefits |
| High starting torque | Operates all types of compressor |
| PO optimization | Optimum system efficiency |
| Injection on/off | Improves refrigeration processes |
| Discharge temperature monitor | Protects the compressor |
| Pack controller | Saves energy and reduce maintenance |
| Neutral zone controller | Handling of unsymmetrical zones |
| Pump features | Benefits |
| Pump cascade controller | Saves energy and reduce maintenance |
| Dry pump protection and end of curve | Protects the pump |
| Flow compensation | Saves energy |
| Fan features | Benefits |
| Broken belt detection | Protects the system |
| Operate induction motors in parallel | Reduces investment cost |
| Automatic Energy Optimizer AEO function | Saves energy |
| No EMC concerns | Benefits |
| Integrated DC link harmonic filters | Low harmonic load on mains |
| Integrated EMC filters | No external filters required |

VLT® Refrigeration Drive – continued

Product range

3 x 200 – 240 V 1.1 – 45 kW
 3 x 380 – 480 V 1.1 – 315 kW
 3 x 525 – 600 V 1.1 – 90 kW
 With 110% overload torque

Available enclosure ratings

IP 20 (NEMA 1) 1.1 – 315 kW
 IP 21 (NEMA 1) 1.1 – 315 kW
 IP 54 (NEMA 12) 110 – 315 kW
 IP 55 (NEMA 12) 1.1 – 90 kW
 IP 66 (NEMA 4X) 1.1 – 90 kW

Standard coating providing extra protection for aggressive environments.

Options

A wide range of VLT® Refrigeration Drive FC 103 options are available mounted and tested from the factory or as plug-and-play options for later upgrades.

VLT® General purpose I/O MCB 101

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

VLT® Relay Card MCB 105

3 relay outputs

VLT® Analogue I/O MCB 109

3 Pt1000/Ni1000 inputs,
 3 analogue voltage outputs
 Buffer for Real Time Clock

VLT® 24 V External Supply MCB 107

24 V DC external supply can be connected to supply control- and option cards.

Filters

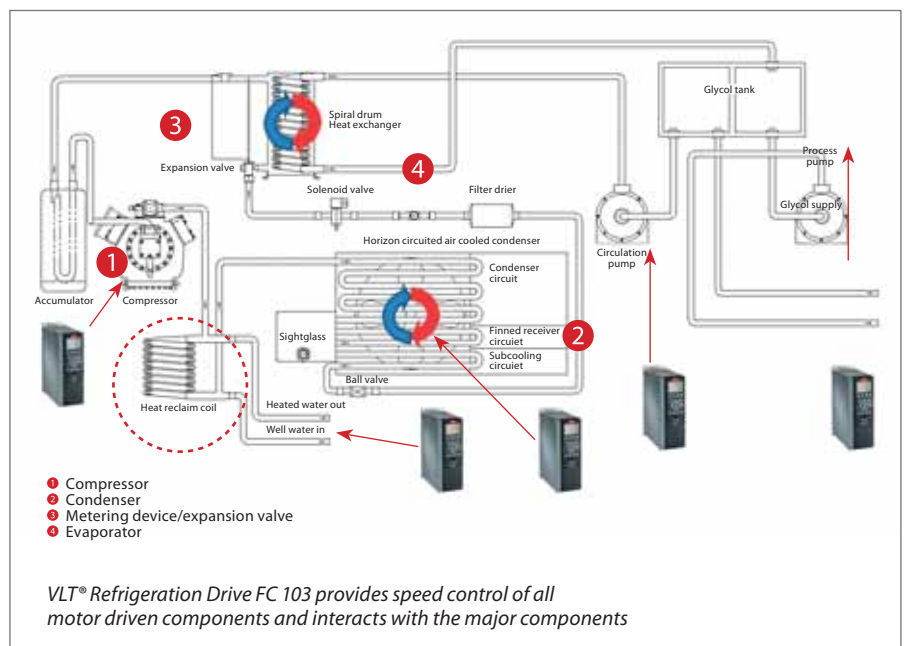
- **Advanced Harmonic Filters:**
For critical demands on harmonic distortion
- **dU/dt filters:**
For special demands on motor isolation protection
- **Sine-Wave filters:**
For noiseless motor operation or special demands on motor isolation protection

PC software tools

- **VLT® Motion Control Tool MCT 10:**
Ideal for commissioning and servicing the drive

Specifications

| Mains supply (L1, L2, L3) | |
|---|--|
| Supply voltage | 200 – 240 V ±10% 380 – 480 V ±10% 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. |
| Output frequency | 0 – 590 Hz |
| Digital inputs | |
| Programmable digital inputs | 6* |
| Logic | PNP or NPN |
| Voltage level | 0 – 24 V |
| * 2 can be used as digital outputs | |
| Analogue input | |
| Analogue inputs | 2 |
| Modes | Voltage or current |
| Voltage level | 0 – 10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Relay outputs | |
| Programmable relay outputs | 2 (240 VAC, 2 A and 400 VAC, 2 A) |
| Fieldbus communication | |
| Standard built-in: FC Protocol Modbus RTU N2 Metasys | Optional: VLT® AK-LonWorks MCA 107 |



Current and power ratings

| FC 103 | kW | T2 200 – 240 V | | | | T4 380 – 480 V | | | | | T6 525 – 600 V* | | | | | | | | |
|--------|-----|----------------|-------|-------|-------|----------------|--------|--------|-------|-------|-----------------|-------|-------|--------|--------|-------|-------|-------|-------|
| | | Amp. | IP 20 | IP 21 | IP 55 | IP 66 | Amp. | | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | Amp. | | IP 20 | IP 21 | IP 55 | IP 66 |
| | | | | | | | ≤440 V | >440 V | | | | | | ≤550 V | >550 V | | | | |
| P1K1 | 1.1 | 6.6 | | | | | 3 | 2.7 | | | | | | 2.6 | 2.4 | | | | |
| P1K5 | 1.5 | 7.5 | A2 | A2 | A4/A5 | A4/A5 | 4.1 | 3.4 | | | | A4/A5 | A4/A5 | 2.9 | 2.7 | | | | |
| P2K2 | 2.2 | 10.6 | | | | | 5.6 | 4.8 | A2 | A2 | | | | 4.1 | 3.9 | A3 | A3 | A5 | A5 |
| P3K0 | 3 | 12.5 | | | | | 7.2 | 6.3 | | | | | | 5.2 | 4.9 | | | | |
| P3K7 | 3.7 | 16.7 | A3 | A3 | A5 | A5 | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | 10 | 8.2 | A2 | A2 | | | A4/A5 | 6.4 | 6.1 | | | | |
| P5K5 | 5.5 | 24.2 | | | | | 13 | 11 | A3 | A3 | | | A5 | 9.5 | 9 | A3 | A3 | A5 | A5 |
| P7K5 | 7.5 | 30.8 | B3 | B1 | B1 | B1 | 16 | 14.5 | | | | | A5 | 11.5 | 11 | | | | |
| P11K | 11 | 46.2 | | | | | 24 | 21 | | | | | | 19 | 18 | | | | |
| P15K | 15 | 59.4 | | | | | 32 | 27 | B3 | B1 | | | B1 | 23 | 22 | B3 | B1 | B1 | B1 |
| P18K | 18 | 74.8 | B4 | B2 | B2 | B2 | 37.5 | 34 | | | | | | 28 | 27 | | | | |
| P22K | 22 | 88 | | | | | 44 | 40 | | | | | | 36 | 34 | | | | |
| P30K | 30 | 115 | C3 | C1 | C1 | C1 | 61 | 52 | B4 | B2 | | | B2 | 43 | 41 | B4 | B2 | B2 | B2 |
| P37K | 37 | 143 | | | | | 73 | 65 | | | | | | 54 | 52 | | | | |
| P45K | 45 | 170 | C4 | C2 | C2 | C2 | 90 | 80 | | | | | C1 | 65 | 62 | | | C1 | C1 |
| P55K | 55 | | | | | | 106 | 105 | C3 | C1 | | | C1 | 87 | 83 | C3 | C1 | C1 | C1 |
| P75K | 75 | | | | | | 147 | 130 | | | | | C2 | 105 | 100 | | | | |
| P90K | 90 | | | | | | 177 | 160 | C4 | C2 | | | C2 | 137 | 131 | C4 | C2 | C2 | C2 |
| N110 | 110 | | | | | | 212 | 190 | | | | | | | | | | | |
| N132 | 132 | | | | | | 260 | 240 | D3h | D1h | D1h | | | | | | | | |
| N160 | 160 | | | | | | 315 | 302 | | | | | | | | | | | |
| N200 | 200 | | | | | | 395 | 361 | | | | | | | | | | | |
| N250 | 250 | | | | | | 480 | 443 | D4h | D2h | D2h | | | | | | | | |
| N315 | 315 | | | | | | 588 | 535 | | | | | | | | | | | |

* available in US only

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

Dimensions [mm]

| | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1h | D2h | D3h | D4h |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|
| H | 268 | | 390 | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 901 | 1107 | 909 | 1122 |
| W | 90 | 130 | 200 | | 242 | | 165 | 231 | 308 | 370 | 308 | 370 | 325 | 420 | 250 | 350 |
| D | 205 | | 175 | 200 | 260 | | 248 | 242 | 310 | 335 | 333 | | 378 | | 375 | |
| H+ | 375 | | | | | | 475 | 670 | | | 755 | 950 | | | | |
| W+ | 90 | 130 | | | | | 165 | 255 | | | 329 | 391 | | | | |

Note: H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option. A or B for A2 and A3.

VLT® AQUA Drive



Dedicated

features for water applications

User friendly setup of water and pump settings reduces installation time ensuring maximum energy efficiency and motor control.

Optimized drive for AC motor driven water and wastewater applications. User friendly setup makes installation easy and enables owners to reach the highest level of performance and lowest cost of ownership.

Featuring a wide range of powerful, standard features, which can be expanded with performance improving options, the VLT® AQUA Drive is equally suited to both new and retrofit projects.

Set up the drive quickly and easily with the user friendly quick menu. By collecting the most important water and pump parameters in one place, the risk of incorrect configuration is reduced significantly.

Instantly benefit from high efficiency, fast payback and the lowest overall cost of ownership for water and wastewater applications.

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 – 600 V AC: | 0.75 – 90 kW |
| 3 x 525 – 690 V AC: | 11 – 1400 kW |

| Feature | Benefit |
|---|--|
| Dedicated features | |
| Dry run detection | Protects the pump |
| Flow compensation function | Saves energy |
| 2 step ramps (initial/final ramp) | Protects deep well pumps |
| Check valve ramp | Protects against water hammering and saves installation cost for soft close valves |
| 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 | Pump protection, leakage detection |
| Pump cascade controller | Lower equipment cost |
| Built-in Smart Logic Controller | Often makes PLC omissible |
| Deragging | Preventive/reactive pump cleaning |
| Back-channel cooling for frame D, E and F | Prolonged lifetime of electronics |
| Energy saving | |
| VLT® efficiency (98%) | Saves energy |
| Automatic Energy Optimisation (AEO) | Saves 3 – 8% energy |
| Auto Tuning of Staging Speeds | Smoothens the staging and saves energy |
| Reliable | |
| IP 00 – IP 66 enclosures (depending on power size) | Choose the protection class you need |
| All power sizes available in IP 54/55 enclosures | Broad usability in standard enclosure |
| Password protection | Reliable operation |
| Mains disconnect switch | No need for external switch |
| Optional, built-in RFI suppression | No need for external modules |
| One Wire safe stop | Safe operation/less wiring |
| Max. ambient temperature up to 50°C without derating (D-frame 45°C) | Reduced need for cooling |
| User-friendly | |
| 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 | Monitor performance |

Application options

Extend the functionality of the drive with integrated options:

VLT® General Purpose I/O MCB 101

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

VLT® Extended Cascade Controller MCO 101, VLT® Advanced Cascade Controller MCO 102

Upgrade the built-in cascade controller to operate more pumps with higher energy efficiency using master/follower pump control. Run the pumps in use at the same speed and optimise staging speeds automatically during operation. Runtime of all pumps is balanced to distribute wear and tear evenly.

VLT® Sensor Input MCB 114

Monitors the PT100/PT1000 and protects motors from overheating.

VLT® PTC Thermistor Card MCB 112

The MCB 112 is connected to safe stop and protects the motor from overheating. It is approved for controlling a certified Ex proof motor in a potentially explosive atmosphere (ATEX) in zones 1 + 2 (gas) zones 21 + 22 (dust).

VLT® 24 V External Supply 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.

Relay & Analogue I/O option

(VLT® Relay Card MCB 105, VLT® Analog I/O MCB109)

Flexible I/O options adding 3 relays or 3 analogue inputs and 3 analogue outputs respectively.

High power options

See the VLT® High Power Drive Selection Guide for a complete list.

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 | 0.1 – 3600 sec. |
| Output frequency (dependent on power size) | 590 Hz |
| <i>Note: VLT® AQUA Drive can provide 110% current for 1 minute. Higher overload rating is achieved by oversizing the drive.</i> | |
| Digital inputs | |
| Programmable digital inputs | 6* |
| Logic | PNP or NPN |
| Voltage level | 0 – 24 V DC |
| <i>* Two of the inputs can be used as digital outputs.</i> | |
| Analogue inputs | |
| Number of analogue 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 V DC (PNP positive logic) |
| Pulse input accuracy | (0.1 – 110 kHz) |
| <i>* Two of the digital inputs can be used for pulse inputs.</i> | |
| Analogue output | |
| Programmable analogue outputs | 1 |
| Current range at analogue 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 (Optional: Modbus TCP, Profibus, Profinet, DeviceNet, Ethernet IP) | |
| Ambient temperature | |
| Up to 55° C (50° C without derating; D-frame 45° C) | |

Power options

Choose from a wide range of external power options for use with our drive in critical networks or applications:

- **VLT® Low Harmonic Drive:** Optimum reduction of harmonic distortion with built-in active filter.
- **VLT® Advanced Harmonic Filter:** For applications where reducing harmonic distortion is critical.
- **VLT® dU/dt filter:** Provides motor isolation protection.
- **VLT® Sine-Wave filter**

PC software tools

- **VLT® Motion Control Tool 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. Energy consumption with and w/o drive can be calculated (drive payback time). Online function for accessing drives energy log.
- **VLT® Motion Control Tool MCT 31**
Harmonics calculations tool.

Current and power ratings

| FC 202 | kW | S2/T2 200 – 240 V | | | | | | | | S4/T4 380 – 480 V | | | | | | | | T6 525 – 600 V | | | | T7 525 – 690 V | | | | | | | | | | | | | |
|--------|------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------------------|-------|-------------|-------|-------|-------|-------|---------------------------------|----------------|-------|-------|-------|----------------|-------|-------|-------|-------|------|------|-------|-------|-------|---------------------------------|-------|-------|-------|
| | | 1 ph | | | | 3 ph | | | | 1 ph | | 3 ph | | | | | | Amp. | | Amp. | | Amp. | | Amp. | | | | | | | | | | | |
| | | IP 20 | IP 21 | IP 55 | IP 66 | IP 20 | IP 21 | IP 55 | IP 66 | ≤440V | >440V | IP 21/55/66 | ≤440V | >440V | IP 00 | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | ≤550V | >550V | IP 20 | IP 21 | IP 55 | IP 66 | 550V | 690V | IP 00 | IP 20 | IP 21 | IP 54 | IP 55 | IP 66 | |
| | | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | Amp. | | | |
| 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 | | | | | | | | | | 2.4 | 2.1 | | | | | | | | | 1.8 | 1.7 | | | | | | | | | | | | |
| P1K1 | 1.1 | 6.6 | A3 | A3 | A5 | A5 | A2 | A2 | | | | | | A2 | A2 | | | | A4/A5 | A4/A5 | | 2.6 | 2.4 | | | | | 2.1 | 1.6 | | | A5 | A5 | | |
| P1K5 | 1.5 | 7.5 | | | | | | | | | | 4.1 | 3.4 | | | | | | | | | 2.9 | 2.7 | A3 | A3 | A5 | A5 | 2.7 | 2.2 | | | A3* | | | |
| P2K2 | 2.2 | 10.6 | | | | | | | | | | 5.6 | 4.8 | | | | | | | | | 4.1 | 3.9 | | | | | 3.9 | 3.2 | | | | | | |
| P3K0 | 3 | 12.5 | | | | | | | | | | 7.2 | 6.3 | | | | | | | | | 5.2 | 4.9 | | | | | 4.9 | 4.5 | | | | | | |
| P3K7 | 3.7 | 16.7 | | | | | A3 | A3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P4K0 | 4.0 | | | | | | | | | | | 10 | 8.2 | A2 | A2 | | | | A4/A5 | A4/A5 | | 6.4 | 6.1 | | | | | 6.1 | 5.5 | | | | | | |
| P5K5 | 5.5 | 24.2 | B1 | B1 | B1 | | | | | | | 13 | 11 | | | | | | A5 | A5 | | 9.5 | 9 | A3 | A3 | A5 | A5 | 9.0 | 7.5 | | | A3* | A5 | A5 | |
| P7K5 | 7.5 | 30.8 | B2 | B2 | B2 | B3 | B1 | B1 | B1 | 33 | 30 | B1 | 16 | 14.5 | A3 | A3 | | | | | | 11.5 | 11 | | | | | 11 | 10 | | | | | | |
| P11K | 11 | 46.2 | | | | | | | | 48 | 41 | B2 | 24 | 21 | | | | | | | | 19 | 18 | | | | | 14 | 13 | | | | | | |
| P15K | 15 | 59.4 | C1 | C1 | C1 | | B2 | B2 | B2 | | | 32 | 27 | B3 | B1 | | | B1 | B1 | | | 23 | 22 | B3 | B1 | B1 | B1 | 19 | 18 | | | | | | |
| P18K | 18 | 74.8 | | | | | B4 | | | 37.5 | 34 | C1 | 37.5 | 34 | | | | | | | | 28 | 27 | | | | | 23 | 22 | | | B2 | | B2 | |
| P22K | 22 | 88 | C2 | C2 | C2 | | | | | | | 44 | 40 | | | | | B2 | B2 | | | 36 | 34 | B2 | B2 | B2 | B2 | 28 | 27 | | | | | | |
| P30K | 30 | 115 | | | | | C3 | C1 | C1 | | | 61 | 52 | B4 | B2 | | | B2 | B2 | | | 43 | 41 | B4 | B2 | B2 | B2 | 36 | 34 | | | | | | |
| P37K | 37 | 143 | | | | | | | | 151 | 135 | C2 | 73 | 65 | | | | | | | | 54 | 52 | | | | | 43 | 41 | | | | | | |
| P45K | 45 | 170 | | | | | C4 | C2 | C2 | | | 90 | 80 | | | C3 | C1 | | C1 | C1 | | 65 | 62 | C3 | C1 | C1 | C1 | 54 | 52 | | | C3 | C2 | C2 | |
| P55K | 55 | | | | | | | | | | | 106 | 105 | | | | | | | | | 87 | 83 | | | | | 65 | 62 | | | | | C2 | |
| P75K | 75 | | | | | | | | | | | 147 | 130 | | | C4 | C2 | | C2 | C2 | | 105 | 100 | | | C4 | C2 | 87 | 83 | | | | | | |
| P90K | 90 | | | | | | | | | | | 177 | 160 | | | | | | | | | 137 | 131 | | | | | 105 | 100 | | | | | | |
| N75K | 75 | | | | | | | | | | | | | | | | | | | | | | | | | | | 90 | 86 | | | | | | |
| N90K | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | 113 | 108 | | | | | | |
| N110 | 110 | | | | | | | | | | | 212 | 190 | | | D3h | D1h/D1h/ D5h/D5h/ D6h/D6h | | | | | | | | | | 137 | 131 | | | D3h | D1h/D1h/ D5h/D5h/ D6h/D6h | | | |
| N132 | 132 | | | | | | | | | | | 260 | 240 | | | | | | | | | | | | | | | 162 | 155 | | | | | | |
| N160 | 160 | | | | | | | | | | | 315 | 302 | | | | | | | | | | | | | | | 201 | 192 | | | | | | |
| N200 | 200 | | | | | | | | | | | 395 | 361 | | | D4h | D2h/D2h/ D7h/D7h/ D8h/D8h | | | | | | | | | | 253 | 242 | | | | | | | |
| N250 | 250 | | | | | | | | | | | 480 | 443 | | | | | | | | | | | | | | | 303 | 290 | | | | | | |
| N315 | 315 | | | | | | | | | | | 600 | 540 | | | | | | | | | | | | | | | 360 | 344 | | | | | | |
| N400 | 400 | | | | | | | | | | | | | | | | | | | | | | | | | | | 418 | 400 | | | | | | |
| P315 | 315 | | | | | | | | | | | 600 | 540 | | | E2 | | E1 | E1 | | | | | | | | | | | | | | | | |
| P355 | 355 | | | | | | | | | | | 658 | 590 | | | | | | | | | | | | | | | | | | | | | | |
| P400 | 400 | | | | | | | | | | | 745 | 678 | | | | | | | | | | | | | | | | | | | | | | |
| P450 | 450 | | | | | | | | | | | 800 | 730 | | | | | | | | | | | | | | | 470 | 450 | | | | | | |
| P500 | 500 | | | | | | | | | | | 880 | 780 | | | | | | | | | | | | | | | 523 | 500 | | | | | | |
| P560 | 560 | | | | | | | | | | | 990 | 890 | | | | | | | | | | | | | | | 596 | 570 | | E2 | | | E1 | E1 |
| P630 | 630 | | | | | | | | | | | 1120 | 1050 | | | | | | | | | | | | | | | 630 | 630 | | | | | | |
| P710 | 710 | | | | | | | | | | | 1260 | 1160 | | | | | | | | | | | | | | | 763 | 730 | | | | | | |
| P800 | 800 | | | | | | | | | | | 1460 | 1380 | | | | | | | | | | | | | | | 889 | 850 | | | F1/F3 | | F1/F3 | |
| P900 | 900 | | | | | | | | | | | | | | | | | | | | | | | | | | | 988 | 945 | | | | | | |
| P1M0 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1108 | 1060 | | | | | | |
| P1M2 | 1200 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1317 | 1260 | | | | F2/F4 | | F2/F4 |
| P1M4 | 1400 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1479 | 1415 | | | | | | |

* Expected release: Q1, 2013

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

Dimensions [mm]

| | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1h | D2h | D3h | D4h | D5h | D6h | D7h | D8h | E1 | E2 | F1 | F2 | F3 | F4 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|----|
| H | 268 | 390 | 420 | 480 | 650 | 399 | 520 | 680 | 770 | 550 | 660 | 901 | 1107 | 909 | 1122 | 1324 | 1665 | 1978 | 2284 | 2000 | 1547 | 2280 | 2280 | 2280 | 2280 | |
| W | 90 | 130 | 200 | 242 | | 165 | 230 | 308 | 370 | 308 | 370 | 325 | 420 | 250 | 350 | 325 | | 420 | 600 | 585 | 1400 | 1804 | 1997 | 2401 | | |
| D | 205 | 175 | 200 | 260 | | 249 | 242 | 310 | 335 | 333 | | | 378 | 375 | | 381 | 384 | 402 | 494 | 498 | 607 | 607 | 607 | 607 | | |
| H+ | 375 | | | | | 475 | 670 | | | 755 | 950 | | | | | | | | | | | | | | | |
| W+ | 90 | 130 | | | | 165 | 255 | | | 329 | 391 | | | | | | | | | | | | | | | |

Note: H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D dimensions are without option. A or B for A2 and A3.

Option overview

An overview of available options for VLT® HVAC Drive, VLT® Refrigeration Drive, VLT® AQUA Drive og VLT® AutomationDrive.

| Options | VLT® HVAC Drive | VLT® Refrigeration Drive | VLT® AQUA Drive | VLT® Automation Drive | | |
|---------|--|--------------------------|-----------------|-----------------------|--------|---|
| | FC 102 | FC 103 | FC 202 | FC 301 | FC 302 | |
| Slot A | VLT® PROFIBUS DP MCA 101 | ■ | | ■ | ■ | ■ |
| | VLT® PROFINET MCA 120 | ■ | | ■ | ■ | ■ |
| | VLT® DeviceNet MCA 104 | ■ | | ■ | ■ | ■ |
| | VLT® DeviceNet Converter MCA 194* | ■ | | ■ | ■ | ■ |
| | VLT® EtherNet/IP MCA 121 | ■ | | ■ | ■ | ■ |
| | VLT® CANopen MCA 105 | | | | ■ | ■ |
| | VLT® EtherCAT MCA 124 | | | | ■ | ■ |
| | VLT® POWERLINK MCA 123 | | | | ■ | ■ |
| | VLT® LonWorks MCA 108 | ■ | | | | |
| | VLT® BACnet MCA 109 | ■ | | | | |
| | VLT® Modbus TCP MCA 122 | ■ | | ■ | ■ | ■ |
| | VLT® PROFIBUS Converter MCA 113 | | | | | ■ |
| | VLT® PROFIBUS Converter MCA 114 | | | | | ■ |
| | VLT® AK-LonWorks MCA 107 | | ■ | | | |
| Slot B | VLT® General Purpose I/O MCB 101 | ■ | ■ | ■ | ■ | ■ |
| | VLT® Encoder Input MCB 102 | | | | ■ | ■ |
| | VLT® Resolver Input MCB 103 | | | | ■ | ■ |
| | VLT® Relay Card MCB 105 | ■ | ■ | ■ | ■ | ■ |
| | VLT® Safe PLC I/O MCB 108 | ■ | ■ | ■ | ■ | ■ |
| | VLT® Analog I/O Option MCB 109 | ■ | ■ | ■ | | |
| | VLT® PTC Thermistor Card MCB 112 | ■ | | ■ | | ■ |
| | VLT® Sensor Input MCB 114 | ■ | | ■ | ■ | ■ |
| | VLT® Safe Option MCB 140 Series | ■ | ■ | ■ | ■ | ■ |
| | VLT® Safe Option MCB 150 Series | | | | | ■ |
| | VLT® Extended Cascade Controller MCO 101 | | | ■ | | |
| Slot C | VLT® Advanced Cascade Controller MCO 102 | | | ■ | | |
| | VLT® Motion Control MCO 305 | | | | ■ | ■ |
| | VLT® Extended Relay Card MCB 113 | | | | ■ | ■ |
| | VLT® Synchronizing Controller MCO 350 | | | | ■ | ■ |
| Slot D | VLT® Position Controller MCO 351 | | | | ■ | ■ |
| | VLT® 24 V Supply MCB 107 | ■ | ■ | ■ | ■ | ■ |

* Release in Q1, 2013

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.

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)

| Feature | Benefit |
|---|--|
| Automatic Motor Tuning | <ul style="list-style-type: none"> – Ensure optimal match between drive and motor – Increasing performance |
| PID-controller | Optimum process control |
| Interrupt start/stop | High repeatability of positional accuracy |
| Dry run detection | No need for specific detection equipment |
| 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 uptime |
| Built-in RFI filter | Compliance with the EMC standard EN 55011 1A |
| Enhanced sleep mode | Excellent control for shutting down the pump at low flow |
| Max. ambient temperature 45° C without derating | No external cooling or oversizing necessary |
| User-friendly | Saves commissioning and operating cost |
| Quick Menu | Easy to use |
| Pipe Fill mode | Prevents water hammering |
| 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 |

PC software tools

- **VLT® Motion Control Tool MCT 10:**
Ideal for commissioning and servicing the drive.
- **VLT® Motion Control Tool 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.

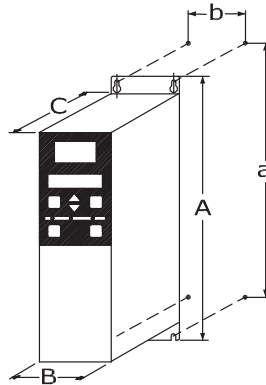
By fitting an RFI 1B filter module between the mains supply and the VLT® 2800, the solution complies with the EMC norm EN 55011-1B.

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 voltage |
| 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 V DC |
| Analogue input | |
| No. of analogue 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 V DC (PNP positive logic) |
| Pulse input accuracy | (0.1–110 kHz) |
| Digital output | |
| No. of digital outputs | 1 |
| Analogue output | |
| Programmable analogue outputs | 1 |
| Current range | 0/4–20 mA |
| Relay outputs | |
| No. of relay outputs | 1 |
| Fieldbus communication | |
| RS485 | |
| Ambient temperature | |
| 50°C | |

| 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



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.

VLT® Micro Drive is a full member of the VLT® family sharing the overall quality of design, reliability and user-friendliness.

Due to high quality components and genuine VLT® solutions, VLT® Micro Drive is extremely reliable.

RoHS compliant

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

Power range

1 phase 200–240 V AC 0.18–2.2 kW
 3 phase 200–240 V AC 0.25–3.7 kW
 3 phase 380–480 V AC 0.37–22 kW

| Feature | Benefit |
|---|--|
| 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 Tuning | Ensure optimal match between drive and motor |
| 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 |
| 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 |
| Unique cooling concept with no forced air flow over electronics | Problem-free operation in harsh environments |
| High quality electronics | Low lifetime cost |
| High quality capacitors | Tolerates uneven mains supply |
| All drives full load tested from factory | High reliability |
| Dust resistant | Increased lifetime |
| RoHS compliant | Protects the environment |
| Designed for WEEE | Protects the environment |

Coated PCB standard

For harsh environments.

Power options

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

- **VLT® Advanced Harmonic Filter:**
For applications where reducing harmonic distortion is critical.

PC software tools

- **VLT® Motion Control Tool 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.
- **VLT® Motion Control Tool MCT 31:**
Harmonics calculations tool.

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 digital inputs | 5 |
| Logic | PNP or NPN |
| Voltage level | 0–24 VDC |
| 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. | |
| Analogue input | |
| Analogue inputs | 2 |
| Modes | 1 current/1 voltage or current |
| Voltage level | 0–10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Analogue 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 | |



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

Ordering numbers

| Power [kW] | 200 V | | | 400 V | |
|------------|------------------|-----------|-----------|------------------|-----------|
| | Current [I-nom.] | 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 11 Without potentiometer: 132B0100
 VLT® Control Panel LCP 12 With potentiometer: 132B0101

VLT® Decentral Drive FCD 302



IP 66

enclosure

for conveyor applications, installations in wash-down areas or widely distributed applications with a large number of drives

The VLT® Decentral Drive FCD 302 is the new generation of the VLT® Decentral Drive FCD 300, based on the VLT® AutomationDrive FC 302 platform. Combining the key features of both products in a completely re-designed enclosure, the drive is made for the best fit for direct machine mounting.

Designed for simplicity and robustness the new VLT® Decentral Drive FCD 302 is a user-friendly product with high performance and strong protection degree.

Decentral drives are meant for decentral mounting, eliminating the need for space-consuming control cabinets. With the drives placed near the motor, there is no need for long screened motor cables.

One-box concept

All options are built into the unit, reducing the number of boxes to be mounted, connections and terminations in the installation. Consequently labor costs for mounting and risk of failures are dramatically reduced.

Power range

0.37 – 3 kW, 3 x 380 – 480 V

| Feature | Benefit |
|--|---|
| Reliable | Maximum uptime |
| Pluggable twin-part design (installation box and electronic part) | Easy and fast service |
| Integrated lockable service switch available | Local disconnection possible |
| User-friendly | Saves commissioning and operation cost |
| Smooth surface | Easy cleaning; no dirt trap |
| Adapts to any brand of motor and geared motor, induction as well as permanent magnet motors | Easy and flexible installation |
| Integrated power and fieldbus looping terminals | Cable savings |
| Visible LEDs | Quick status check |
| Set-up and control through pluggable control panel, fieldbus communication and set-up software VLT® Motion Control Tool MCT 10 | Easy commissioning |
| Awarded control panel with on-board manual (accessory) | Easy operation |
| Screwless spring-loaded terminals | Easy and fast connection |
| Integrated USB port | Direct connection to PC |
| Intelligent | Built-in feature |
| Smart Logic Control | Reduces need for PLC capacity |
| Safe Torque Off (Safe Stop) as standard | Reduces the need for extra components |
| Intelligent warning systems | Warning before controlled stop |

Enclosure

- IP 66 standard black
 - IP 66 standard white
 - IP 66 hygienic white
- (all enclosures are rated as NEMA 4X)

Integrated 24 V supply

24 V DC control supply is provided by the drive. Separate supply terminals have been made for remote I/Os distribution.

Power looping

The new FCD 302 facilitates internal power looping. Terminals for 6 mm² (big box) or 4 mm² (small box) power cable inside the enclosure allows connection of multiple units in the same branch.

Ethernet switch

Integrated Ethernet switch/ hub with the two RJ-45 ports are available in the drive for easy daisy-chaining of Ethernet communication. Fieldbuses are routed easily, without adding commissioning time, by connecting Ethernet or Profibus based fieldbuses to a M12 pluggable interface.

Safety

The VLT® Decentral Drive FCD 302 is delivered as standard with the Safe Torque Off (Safe Stop) function in compliance with EN ISO 13849-1 Category 3 PL d and SIL 2 according to IEC 61508 low demand and high demand mode.

Fieldbus options

(integrated into the control card)

- PROFIBUS DP
- PROFINET
- EtherNet/IP

Application options

- VLT® Encoder Input MCB 102
- VLT® Resolver Input MCB 103
- VLT® Safe PLC I/O MCB 108

Hardware options

- Mounting brackets
- Service switch
- Internal circuit breaker
- M12 sensor plugs
- 24 V DC input for control supply
- Brake chopper
- Electromechanical brake control and supply
- Fieldbus plugs

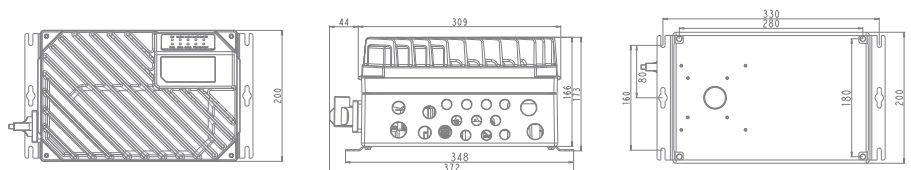
Specifications

| Mains supply (L1, L2, L3) | |
|---|--------------------------------------|
| Supply voltage | 380 – 480 V ±10% |
| Supply frequency | 50/60 Hz |
| True Power Factor (λ) | 0.92 nominal at rated load |
| Displacement Power Factor (cos φ) | (>0.98) |
| Switching on input supply | 2 times/min. |
| Output data (U, V, W) | |
| Output voltage | 0 – 100% of supply |
| Output frequency | 0 – 590 Hz 0 – 300 Hz (Flux mode) |
| Switching on output | Unlimited |
| Ramp times | 0.01 – 3600 sec. |
| Digital inputs | |
| Programmable digital inputs | 4 (6) |
| Logic | PNP or NPN |
| Voltage level | 0 – 24 V DC |
| <i>Note: One/two digital inputs can be programmed as digital output</i> | |
| Analogue inputs | |
| Number of analogue inputs | 2 |
| Modes | Voltage or current |
| Voltage level | -10 to +10 V (scaleable) |
| Current level | 0/4 – 20 mA (scaleable) |
| Pulse/encoder inputs | |
| Programmable pulse/encoder inputs | 2 |
| Voltage level | 0 – 24 V DC (PNP positive logic) |
| Digital output | |
| Programmable digital/pulse outputs | 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 | 2 |
| Integrated 24 V supply | |
| Max. load | 600 mA |

Dimensions

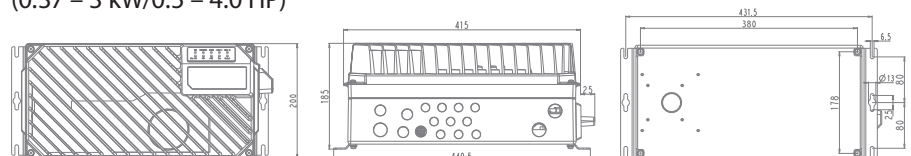
Small frame

(0.37 – 2.2 kW/0.5 – 3.0 HP)



Large frame

(0.37 – 3 kW/0.5 – 4.0 HP)



All measurements are in mm

VLT® Decentral Drive FCD 300



The VLT® Decentral Drive 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 Drive 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.

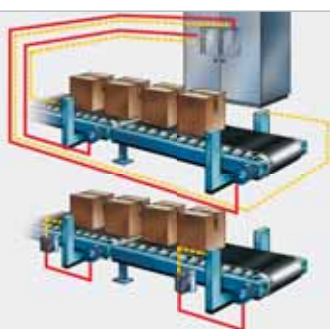
| Feature | Benefit |
|---|---|
| Reliable | Maximum uptime |
| Special surface treatment as protection against aggressive environments | Easy cleaning; no dirt trap |
| Twin part design (installation box and electronic part) | Easy and fast service |
| Integrated lockable service switch available | Local disconnection possible |
| Full protection is offered | Protects the motor and drive |
| User-friendly | Saves commissioning and operating cost |
| Adapts to any brand of motor and geared motor | Easy and flexible installation |
| Designed for power and fieldbus looping | Cable savings |
| Visible LEDs | Quick status check |
| Set-up and controlled through a remote control panel or fieldbus communication and dedicated MCT 10 set-up software | Easy commissioning |

Power range

0.37 – 3.3 kW, 3 x 380 – 480 V

Enclosure

IP 66/Type 4X (indoor)



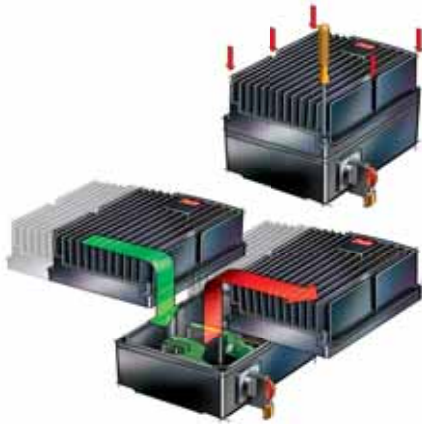
Central Vs. Decentral concept



Robust cleaning-friendly surface

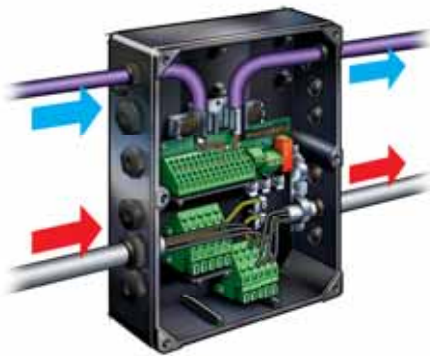


Hot pluggable LCP



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 |
| | P _{M,N} [kW] | 0.37 | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 3.3 |
| Typical shaft output | 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



IE2

motors for high efficiency

combined with a high-performance, energy saving VLT®.



The VLT® DriveMotor 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.

Power range

0.55 – 7.5 kW, 3 x 380 – 480 V

| Feature | Benefit |
|---|---|
| Reliable | Maximum uptime |
| Robust enclosure | Withstands harsh environments |
| No power cable length limitation | Increased flexibility |
| Thermal protection | Total motor-inverter protection |
| Straightforward EMC compliance | No problem with electromagnetic interferences |
| User-friendly | Saves commissioning and operating cost |
| Motor and drive perfectly matched to each other | Saves commissioning time |
| No panel space required – the DriveMotor is placed on the machine | Saves space |
| Flexible mounting – foot/flange/face/foot-flange/foot-face | Meets customer requirements |
| Retrofit without mechanical changes | Easy service |
| Set-up and controlled through a remote control panel or fieldbus communication and dedicated MCT 10 set-up software | Easy commissioning |

Enclosure

IP 55 (standard)
IP 65/IP 66 (optional)

Motor type

2-pole
4-pole

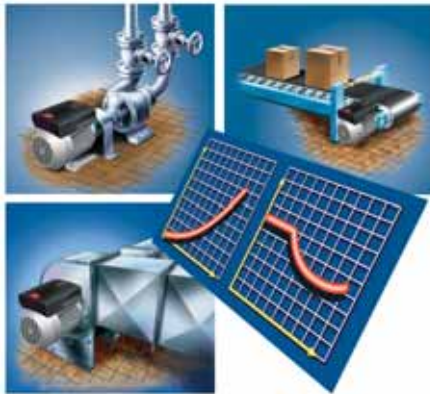
Mounting versions

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



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.

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® OneGearDrive®



VLT® OneGearDrive® Standard with brake

VLT® OneGearDrive® Hygienic

Up to 89%

system efficiency

can be achieved with VLT® OneGearDrive® together with VLT® AutomationDrive FC 302 or VLT® Decentral Drive FCD 302. Exceed the IE4 Super Premium Efficiency class today.

VLT® OneGearDrive® is a highly efficient permanent-magnet three-phase synchronous motor coupled to an optimised bevel gear box. As part of the Danfoss VLT® FlexConcept® the VLT® OneGearDrive® is an energy-efficient drive system that helps to optimise plant productivity and reduce energy costs.

With only one motor type and three available gear ratios, the motor concept covers all typical versions of conveyor drives commonly used in the food and beverage industry. Furthermore, the restricted range of physical configurations of the VLT® OneGearDrive® simplifies spares holding and makes it more cost efficient, easing engineering and installation thanks to uniform mechanical dimensions.

Flexible plant design

In combination with the VLT® AutomationDrive FC 302 or the VLT® Decentral Drive FCD 302 the VLT® OneGearDrive® is equally suited to central and decentral installations, giving the plant designer complete flexibility from the outset. As a whole, the system can reach energy savings of up to 40% compared with conventional systems.

Two versions

The VLT® OneGearDrive® comes in two versions, the VLT® OneGearDrive® Standard for use in dry and wet production areas and the VLT® OneGearDrive® Hygienic for use in wet areas, areas with high cleaning intensity and aseptic and clean room production areas.

| Feature | Benefit |
|---|--|
| High system efficiency incl. frequency converter | Save money and energy – up to 40% energy savings compared to conventional systems |
| High-efficiency Permanent-magnet three-phase synchronous 10-pole motor with bevel gear drive | Better than Super Premium Efficiency class IE4 |
| Available hollow shaft diameters: 30, 35, 40 mm and 3 imperial shaft sizes | Flexible adaption to customer standards |
| Completely smooth enclosure leaves no crevices or dirt traps | – Easy to clean – Safe production |
| Motor connection with Danfoss CleanConnect® stainless steel circular connector | – Safe connection in wet areas – Fast installation and replacement – High cleanability |
| Motor and brake connections via terminal box with CageClamp® technology | – Fast, reliable connection – Lower installation cost |
| Aseptic coating | – Resistant to detergents and disinfectants (pH 2..12) |
| Gearbox without breather vents and use of food grade lubricants compliant with FDA and NSF requirements | Up to 35,000 operating hours in partial loa between oil change |
| High degrees of protection: – IP 67 and IP 69K (OGD- H) – IP 65 and IP 67 (OGD- S) | – Unrestricted use in wash down areas – High protection in wash down areas |
| Fan-free operation | – Less noise emission – No air-born germs and dirt particles to be drawn into the motor and then expelled back into the surrounding air |
| Only 3 gearbox ratios in one common design | Up to 70% reduction in variants reduces spare part stock |
| Compatible with all Danfoss frequency converters FC/D 302 from 1.5-3 kW | Free choice of central and decentral instalations |

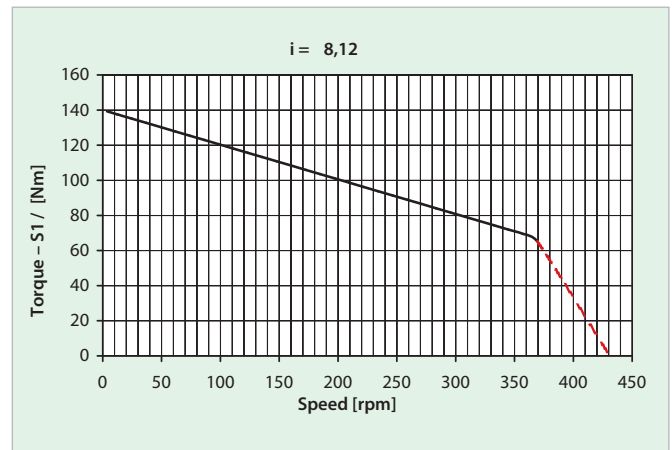
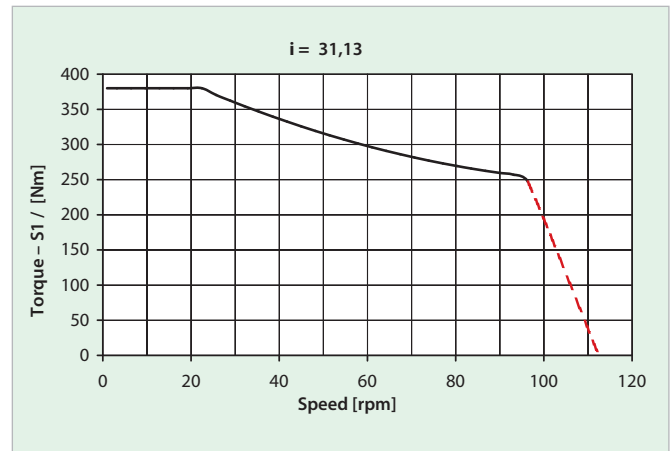
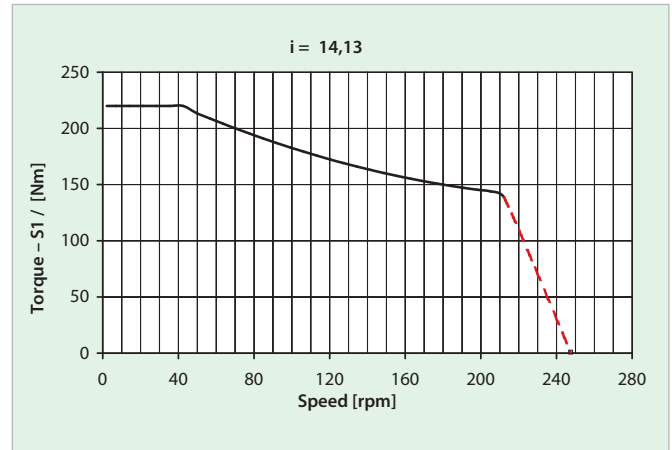
In both versions, completely smooth, easy to clean surface without cooling fins, prevents pockets of dirt from forming and allows detergents to drain off freely. The fan-free motor avoids the risk of air-borne germs and dirt particles being drawn in and then expelled back into the surrounding air.

Hygienic design

The VLT® OneGearDrive® Hygienic complies with the requirements for best cleaning and hygienic design – with certification according to EHEDG (European Hygienic Engineering & Design Group). It is certified as usable for clean rooms and aseptic filling by IPA (Fraunhofer institute) according to the dedicated “Air Cleanliness Classification” DIN EN ISO 14644-1.

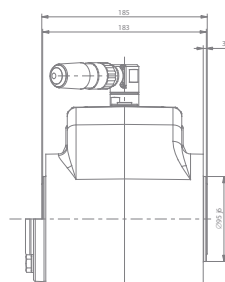
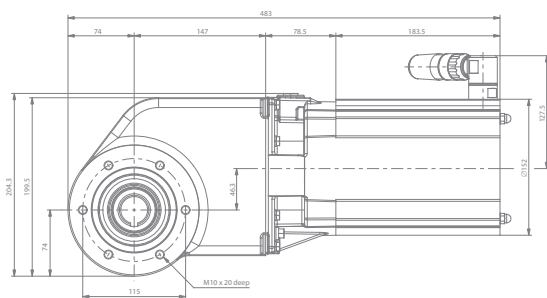


Speed/ torque characteristics for gear ratios $i = 31.13$; $i = 14.13$ and $i = 8.12$ (max 3.0 kW)



Specifications

- Power rating 1.5 – 3.0 kW
- Speed max 3000 rpm
- Frequency max..... 250 Hz
- Current max..... 7.2 A
- Torque..... 1.7 Nm/A
- Voltage 120 V/1000 rpm
- Weight Approx. 28 kg
- CSA/UL On request



Dimensions of Danfoss VLT® OneGearDrive® Hygienic in mm

VLT® Integrated Servo Drive System ISD 410



The integration of servomotor and electronic drive unit in the same housing makes this drive system predestined for applications requiring high flexibility and dynamics, such as those in the food & beverage and packaging industries. The decentralisation of the drive unit offers benefits in mounting, installation and operation. Depending on the application, up to 60 drives can be integrated into the servo drive system.

Servo Drive

The motion control is integrated into the drive so that the motion sequences can take place independently. This releases the higher-ranking controller and offers a highly flexible drive concept. The master can be programmed via IEC 61131-3 and hybrid cables are used to connect the drives, making installation fast and simple.

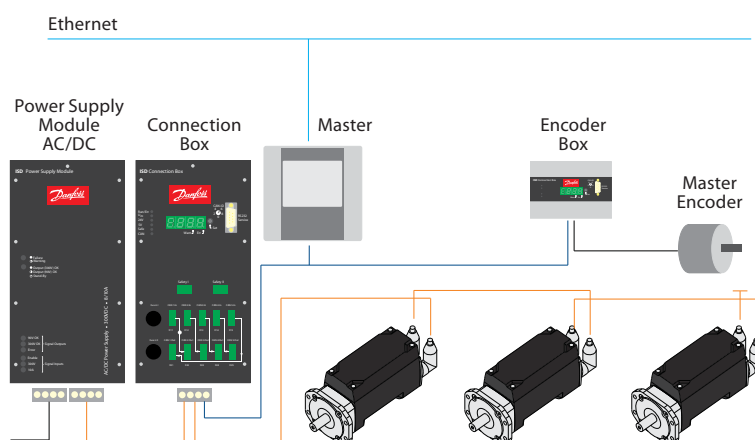
Power Supply Module

The system is powered with DC 300 V via the power supply module. LEDs on the front of the unit enable easy monitoring of operating status. The maximum current output is 10 A and nominal power is 3 kW.

Connection Box

The connection box creates the link between the servomotors and the power supply. Two independent groups of up to 30 motors can be connected. The hybrid cable contains the DC supply, CAN and safety.

| Feature | Benefit |
|--|--|
| Compact and decentral servo drive | Reduced costs and high flexibility |
| Dynamic servo performance | Fast, accurate and energy-efficient |
| System setup performance | Simple and fast configuration of several drives |
| DC supply to drives from a central power supply module | Fast installation, reduced number of cables |
| Control via IEC 61131-3 | Open system |
| Hybrid cable | Easy and fast installation, reduced number of cables |
| All components support CAN | Enhanced diagnostics, reduced downtime |



Encoder Box

The encoder box enables a master encoder to be connected, this to be read with high precision, and time information to be sent to the drives via CAN. If no encoders are connected, the encoder box functions as a virtual axis for the ISD 410 servo drive system.

Available Options

- Safe Torque Off (STO)
- Brake
- Feedback:
 - Resolver
 - Singleturn
 - Multiturn
- Flexible hybrid loop cable
- IEC flange
- Customised flange on request

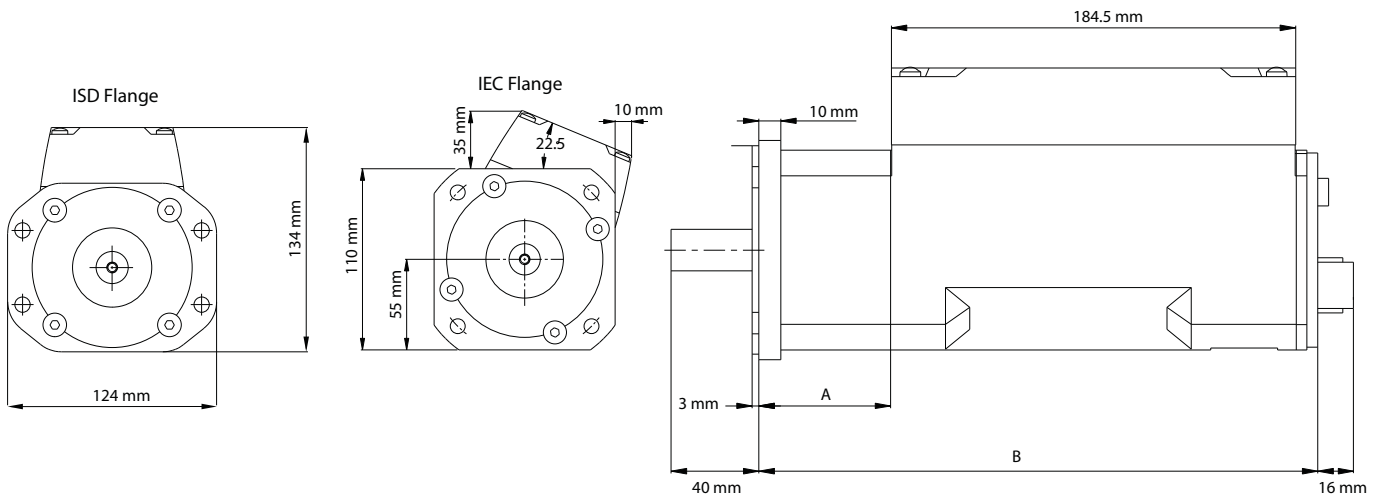
Available Accessories

- Shaft seal
- Shaft seal change kit
- Connector kits for:
 - Power Supply Module
 - Connection Box
 - Encoder Box
- Terminating resistor

Specifications

| Servomotor | |
|----------------------------|---|
| Rated voltage | DC 300 V |
| Rated torque | 1.7-2.1 Nm |
| Max. torque | 8-11 Nm |
| Rated current | 0.6-1.15 A |
| Max. current | 3.95-7.05 A |
| Rated speed | 600-1000 rpm |
| Max. speed | 1000-1500 rpm |
| Rated power | 180-345 W |
| Inertia | $3.5 \cdot 10^{-4}$ to $6.5 \cdot 10^{-4}$ kgm ² |
| Shaft diameter | 19 mm |
| Enclosure | IP 54/IP 65 |
| Power Supply Module | |
| Input voltage | AC 380-480 V $\pm 10\%$, 3-phase: L1, L2, L3, PE |
| Input current | 6 A _{rms} each phase |
| Output voltage | DC 300 V |
| Rated power | 3000 W |
| Rated current | 10 A |
| Dimensions (H x W x D) | 268 x 130 x 205 mm |
| Connection Box | |
| Input voltage | DC 300 V |
| Output voltage lines 1 & 2 | DC 300 V |
| Rated power | 3000 W |
| Rated current | 10 A |
| Dimensions (H x W x D) | 268 x 130 x 205 mm |
| Encoder Box | |
| Input voltage | DC 24 V |
| Supported encoder inputs | SSI, SSI-CRC, QEP, BiSS |
| Dimensions (H x W x D) | 105.2 x 142.0 x 70.8 mm |

Dimensions



| Motor ISD 410 | Dimensions [mm] | |
|--------------------------------|-----------------|-----|
| | A | B |
| ISD / IEC flange with brake | 60 | 255 |
| ISD / IEC flange without brake | 35 | 230 |

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, 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.

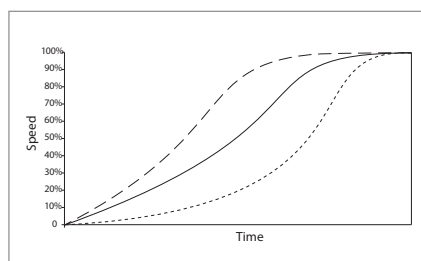
VLT® Soft Starter MCD 500 has a four line graphical display and a logic keypad making programming easy. Advanced setup is possible displaying operational status.

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

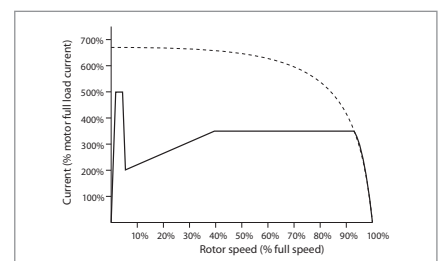
Power range

21 – 1600 A, 7.5 – 850 kW
(1.2 MW inside Delta Connection)
Versions for 200 – 690 VAC

| Feature | Benefit |
|--|--|
| AAC Adaptive Acceleration Control | Automatically adapts to the chosen starting and stopping profile |
| Adjustable bus bars allow for both top and bottom entry (360–1600 A, 160–850 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 of 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, 7.5–110kW) | <ul style="list-style-type: none"> – Saves 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 languages | Serving the whole world |



Three Adaptive Acceleration Control (AAC) start profiles; early, constant and late acceleration



Constant current/ current ramp – here shown with kickstart

Fully featured Soft Starter for motors up to 850 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:
 - WinMaster
 - VLT® Motion Control Tool MCT10



VLT® Control Panel LCP 501

- A full function HMI interface
 - everything you can do on the VLT® Soft Starter MCD 500 is possible via the LCP 501
- Danfoss “FC” menu structure and button interface concept
- Multiple language selection
 - incl. Russian and Chinese
- Full graphics
- Real language in 4 lines
- Full parameter list, Quick Menu and application setup
- Adjustable multiple monitoring views
- A “copy-paste” function allows the user to copy parameter settings in the LCP and load to other unit.
- IP 65, NEMA3R
- 3 m cable and mounting kit included

Specifications

| Mains voltage (L1, L2, L3) | |
|---|---|
| MCD5-xxxx-T5 | 200 VAC ~ 525 VAC (± 10%) |
| MCD5-xxxx-T7 | 380 VAC ~ 690 VAC (± 10%) |
| MCD5-xxxx-T7 | 380 VAC ~ 600 VAC (± 10%) (inside delta connection) |
| Control voltage (terminals 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 |
| MCD500-0021B to 0215B | Prospective current of 65 kA |
| MCD500-0245C | Prospective current of 85 kA |
| MCD500-1200C to 1600C | Prospective current of 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 |
| 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 |
| Analogue 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] | Height [mm] | Width [mm] | Depth [mm] | Frame size |
|-----------------------|-------------|-------------|------------|------------|------------|
| 21, 37, 43 and 53 | 4.2 | 295 | 150 | 183 | G1 |
| 68 | 4.5 | | | 213 | |
| 84, 89 and 105 | 4.9 | 438 | 275 | 250 | G2 |
| 131, 141, 195 and 215 | 14.9 | | | 279 | |
| 245 | 23.9 | 460 | 390 | 279 | G3 |
| 360, 380 and 428 | 35 | 689 | 430 | 302 | G4 |
| 595, 619, 790 and 927 | 45 | | | | |
| 1200, 1410 and 1600 | 120 | 856 | 585 | 364 | G5 |

VLT® Compact Starter MCD 200



The VLT® Compact Starter MCD 200 from Danfoss includes two families of soft starters in the power range from 7.5 to 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).

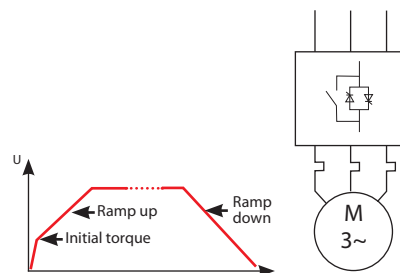
Heavy starting ratings at $4 \times I_e$ for 20 seconds.

Compatible with grounded delta power systems.

Power range
7.5 – 110 kW

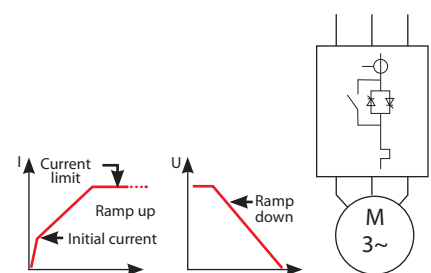
| Feature | Benefit |
|--|--|
| Small footprint and compact size | Saves panel space |
| Built-in bypass | <ul style="list-style-type: none"> Minimises installation cost and eliminates power loss Reduces heat build up. Savings in components, cooling, wiring and labor |
| Advanced accessories | Allows enhanced functionality |
| Advanced SCR Control Algorithms balances output waveform | Allowing more starts per hour, accepting higher load |
| User friendly | Save commissioning and operating cost |
| Easy to install and use | Saves time |
| Easy DIN rail mounting for sizes up to 30 kW | Saves time and space |
| Reliable | Maximum uptime |
| Essential motor protections (MCD 202) | Reduces overall project investment |
| Max. ambient temperature 50° C without derating | No external cooling or oversizing necessary |

MCD 201



MCD 202

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



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 operation 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, Lloyds |

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 Start Controller MCD 100

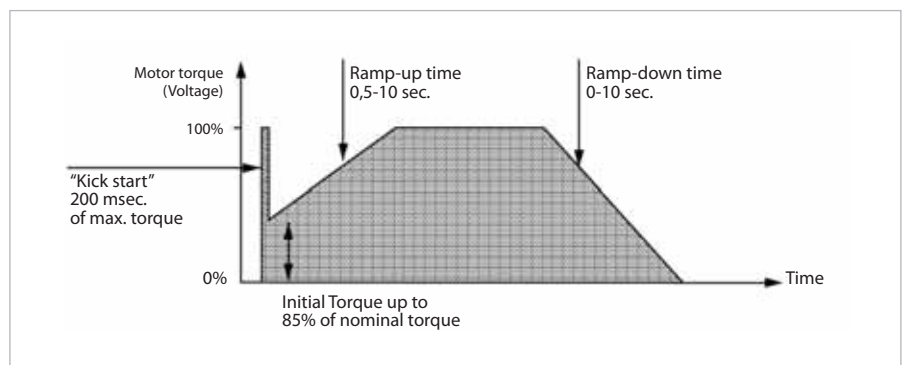


VLT® Soft Start Controller MCD 100 is a cost effective and extremely compact soft starter for AC motors.

A true “fit and forget” soft starter for DIN rail mount, VLT® Soft Start Controller 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

| Feature | Benefit |
|---|---|
| Small footprint and compact size | Saves panel space |
| Selection can be based on motor power | Easy selection |
| Universal control voltage | <ul style="list-style-type: none"> – Simplifies selection – Keeps stock at a minimum |
| “Fit and forget” contactor design | <ul style="list-style-type: none"> – Simplifies installation – Reduces required panel space |
| User friendly | Save commissioning and operating cost |
| Easy to install and use | Saves time |
| Digitally controlled rotary switches | Secures precise settings and simplifies installation |
| Easy DIN rail mounting for sizes up to 30 kW | Saves time and space |
| Reliable | Maximum uptime |
| Robust semiconductor design | Reliable operation |
| Almost unlimited number of starts per hour without derating | Prevents unauthorized changes |
| Max. ambient temperature 50° C without derating | No external cooling or oversizing necessary |



Timed voltage ramp

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

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.

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 |

Dimensions

| Model | Power size (kW) | Rated current (Amps) | Dimensions (mm) H x W x D | Approvals |
|---------|-----------------|------------------------------|---------------------------|-------------|
| MCD 100 | 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® Low Harmonic Drive



Optimised

for:

- VLT® HVAC Drive FC 102
- VLT® AQUA Drive FC 202
- VLT® AutomationDrive FC 302

The Danfoss VLT® Low Harmonic Drive is the first solution combining an active filter and a drive in one package.

The VLT® Low harmonic drive continuously regulates harmonic suppression according to the load and grid conditions without affecting the connected motor.

The total harmonic current distortion is reduced to less than 3% on grids with balanced mains, a minimum pre-distortion to less than 5% on grids with high harmonic distortion and 2% phase unbalance. As individual harmonics also fulfil toughest harmonic requirements, the VLT® Low harmonic drive meets all present harmonic standards and recommendations.

Unique features such as sleep mode and back channel cooling offers unmatched energy efficiency for Low Harmonic Drives.

The VLT® Low harmonic drive requires the same set-up and installation as a standard VLT® drive and out of the box it ensures optimum harmonic performance.

The VLT® Low harmonic drive has the same modular build-up as our standard high power drives and shares similar features: Built-in RFI filters, coated PCB and user-friendly programming.

| Feature | Benefit |
|---|--|
| Reliable | Maximum uptime |
| No increased winding stress on motor | - Longer motor lifetime - Less initial cost (no output filter needed) |
| - 100% factory tested - Coated PCBs | Low failure rate |
| Innovative cooling concept | Prolonged lifetime of electronics |
| User-friendly | Saves commissioning and operating cost |
| No extra wiring and set-up needed | Easy commissioning and low initial costs |
| Modular design | Easy serviceability |
| Full readout of grid conditions | Reduces needed harmonic testing |
| Energy saving | Lower operation costs |
| - High efficiency - Sleep mode and progressive switching freq. | Low running expenses |
| Independent of grid and load changes | - Increased transformer efficiency - Reduced cable losses |

Voltage range

- 380 – 480 V AC 50 – 60 Hz

Power Range

132 – 630 kW High Overload/
160 – 710 kW Normal Overload
(Matching drive frames D, E and F)

Enclosure degree

- IP 21/NEMA 1
- IP 54/NEMA 12

Options

The following options are available:

- RFI filters
- Disconnect
- Fuses
- Mains shielding
- Feedback and I/O options
- Fieldbus options
- dU/dt filters
- Sine wave filters

PC software

VLT® Motion Control Tool MCT 10 offers advanced programming functionality for all Danfoss drive products, greatly reducing programming and set-up time.

MCT 10 Basic (available free of charge from www.danfoss.com) allows access to a finite number of drives with limited functionality.

The advanced edition, offering a higher level of functionality, is available from your Danfoss sales partner.

Calculation Software

With VLT® Motion Control Tool MCT 31, you can determine whether harmonics will be an issue in your installation when drives are added.

MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion. Furthermore the software provides quick indication of whether the installation complies with the most recognised harmonic norms and recommendations.

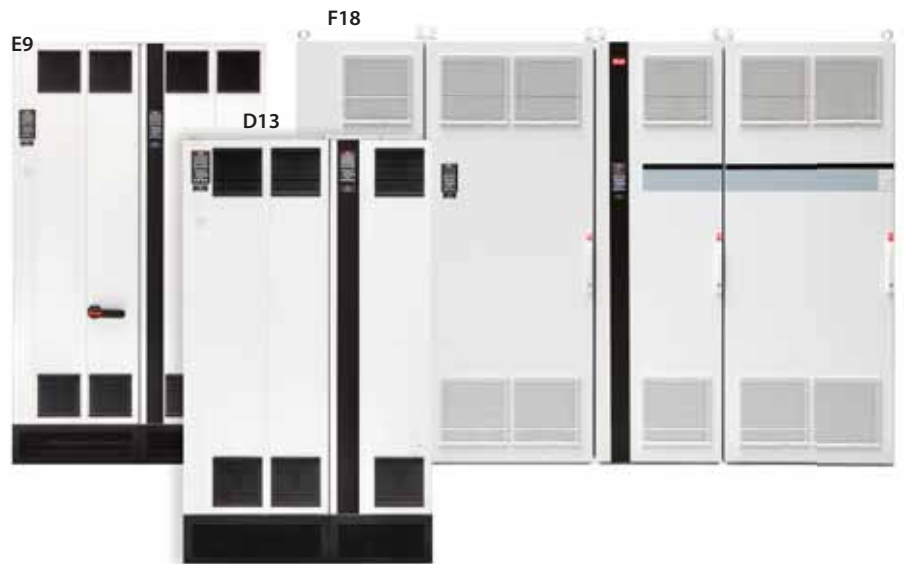
From www.danfoss.com you can download the free tool MCT 31 – the most up-to-date version of the calculation software.

Specifications

| | |
|------------------------|--|
| THiD* at: | |
| – 40% load | < 5,5% |
| – 70% load | < 3,5% |
| – 100% load | < 3% |
| Efficiency* at: | |
| – 40% load | > 93% |
| – 70% load | > 95% |
| – 100% load | > 96% |
| True power factor* at: | |
| – 40% load | > 98% |
| – 70% load | > 98% |
| – 100% load | > 98% |
| Ambient temperature | 50° C without derating (D-frame 45° C) |
| Cooling | Back-channel air cooling |

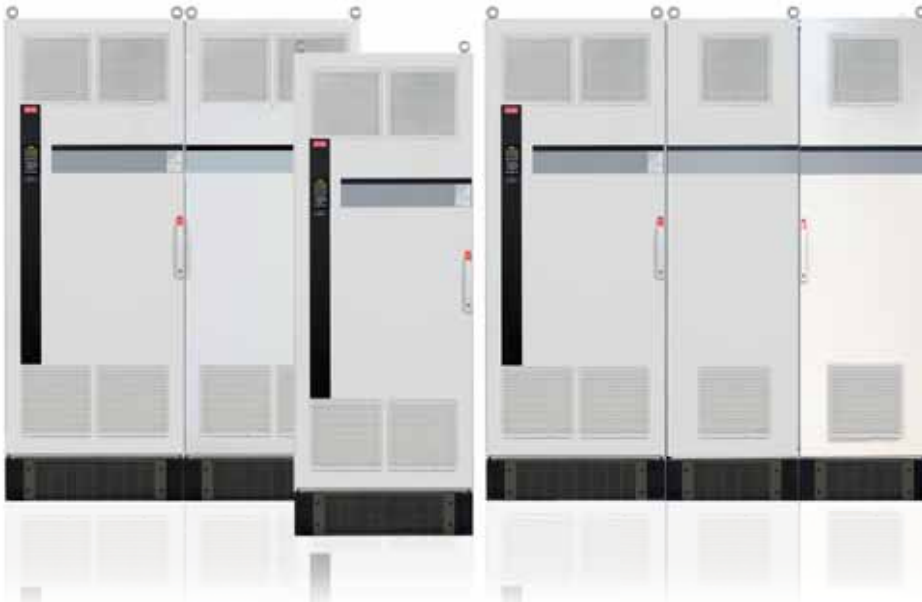
* Measured at balanced grid without pre-distortion

| Norms and recommendations | Compliance |
|-------------------------------------|--------------|
| IEEE519 | Always |
| IEC61000-3-2 (up to 16 A) | Out of scope |
| IEC61000-3-12 (between 16 and 75 A) | Out of scope |
| IEC61000-3-4 (above 75 A) | Always |



| 400 VAC (380 – 460 VAC) | | | | | | | | | | |
|-------------------------|---------|------|---------------|---------|------|-------|--|------|--------|--|
| Normal Overload | | | High Overload | | | Frame | Dimensions | | Weight | |
| Power | Current | | Power | Current | | | H x W x D | | | |
| kW | HP | [A] | kW | HP | [A] | | IP 21/54 | kg | lbs | |
| 160 | 250 | 315 | 132 | 200 | 260 | D13 | 1780 x 1020 x 380 mm 70 x 40 x 15 inches | 390 | 860 | |
| 200 | 300 | 395 | 160 | 250 | 315 | | | 390 | 860 | |
| 250 | 350 | 480 | 200 | 300 | 395 | | | 390 | 860 | |
| 315 | 450 | 600 | 250 | 350 | 480 | E9 | 2000 x 1200 x 500 mm 79 x 47 x 19 inches | 676 | 1491 | |
| 355 | 500 | 658 | 315 | 450 | 600 | | | 676 | 1491 | |
| 400 | 625 | 745 | 355 | 500 | 658 | | | 676 | 1491 | |
| 450 | 700 | 800 | 400 | 625 | 695 | | | 676 | 1491 | |
| 500 | 780 | 880 | 450 | 700 | 800 | | | 1899 | 4187 | |
| 560 | 875 | 990 | 500 | 780 | 880 | F18 | 2277 x 2800 x 600 mm 90 x 110 x 24 inches | 1899 | 4187 | |
| 630 | 985 | 1120 | 560 | 875 | 990 | | | 1899 | 4187 | |
| 710 | 1100 | 1260 | 630 | 985 | 1120 | | | 1899 | 4187 | |

12-pulse VLT® drive



Robust and cost effective harmonic solution for the higher power range. The Danfoss 12-pulse VLT® drive offers reduced harmonics for demanding industry applications above 250 kW.

The 12-pulse VLT® drive is a high efficiency variable frequency converter which is built with the same modular design as the popular 6-pulse VLT® drives. It is offered with similar drive options and accessories and can be configured according to customer need.

Together with the needed 30°-phase shifting transformer the solution provides durability and reliability at a low cost.

Under ideal grid conditions the solution eliminates the 5th, 7th, 17th and 19th harmonics and results in a THiD of around 12% at full load.

The needed transformer makes this solution ideal for applications where stepping down from medium voltage is required or where isolation from the grid is needed.

The Danfoss 12-pulse VLT® drive provides harmonic reduction without adding capacitive or inductive components which often require network analysis to avoid potential system resonance problems.

| Feature | Benefit |
|--|--|
| Reliable | Maximum uptime |
| Maintenance free | No running expenses |
| Durability | Long lifetime |
| Coated PCBs | Environmental robustness |
| 100% factory tested | Low failure rate |
| Back-channel cooling | Prolonged lifetime of electronics |
| Design | Easy operation and user-friendly set-up |
| Modular design | Easy serviceability |
| Same easy programming as a 6-pulse drive | User-friendly operation |
| – Standard award-winning control panel (LCP) | Effective commissioning and operation |
| – Available in 27 languages | |

Power Range

- 250 kW – 1.4 MW

Voltage Range

- 380 – 690 V

Enclosure

- IP 21/NEMA Type 1
- IP 54/NEMA Type 12

Options

The following options are available:

- RFI filters
- Disconnect
- Fuses
- Mains shielding
- Feedback and I/O options
- Fieldbus options
- dU/dt filters
- Sine wave filters

PC software

VLT® Motion Control Tool MCT 10 offers advanced programming functionality for all Danfoss drive products, greatly reducing programming and set-up time.

MCT 10 Basic (available free of charge on www.danfoss.com) allows access to a finite number of drives with limited functionality. The advanced edition, offering a higher level of functionality, is available from your Danfoss sales partner.

Calculation Software

With VLT® Motion Control Tool MCT 31 you can determine whether harmonics will be an issue in your installation when drives are added.

MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion.

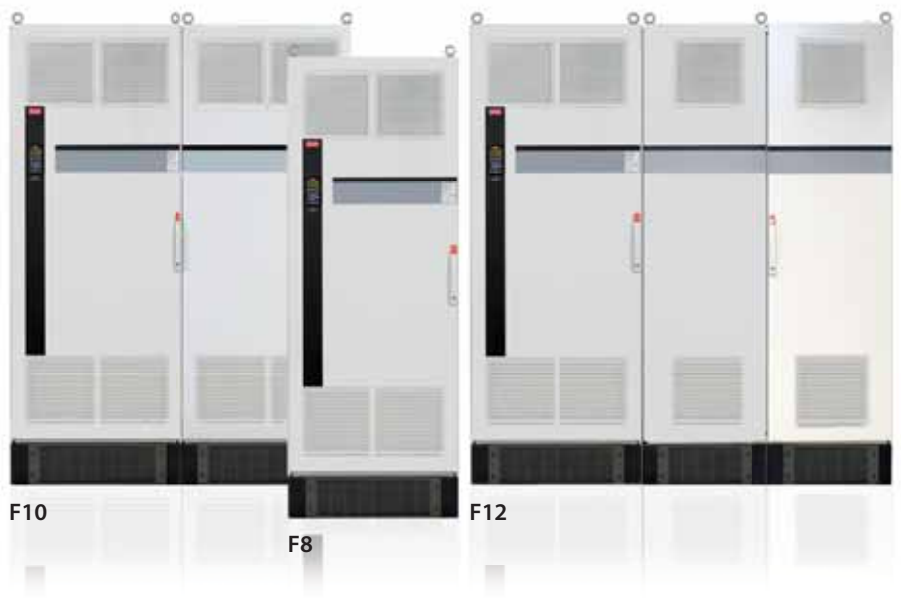
From www.danfoss.com you can download the free tool MCT 31.

Specifications

| | |
|------------------------|--------------------------|
| THiD* at: | |
| - 40% load | 20% |
| - 70% load | 14% |
| - 100% load | 12% |
| Efficiency* at: | |
| - 40% load | 95% |
| - 70% load | 97% |
| - 100% load | 98% |
| True power factor* at: | |
| - 40% load | 91% |
| - 70% load | 95% |
| - 100% load | 97% |
| Ambient temperature | 45° C without derating |
| Cooling | Back-channel air cooling |

* Measured at balanced grid without pre-distortion

| Norms and recommendations | Compliance |
|-------------------------------------|-------------------------------------|
| IEEE519 | Depends on grid and load conditions |
| IEC61000-3-2 (up to 16 A) | Out of scope |
| IEC61000-3-12 (between 16 and 75 A) | Out of scope |
| IEC61000-3-4 (above 75 A) | Always |



| 400 V AC | | | | 460 V AC | | | | 690 V AC | | | | Frame dimensions | |
|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|--|---|
| Normal | | High | | Normal | | High | | Normal | | High | | Without options cabinet H x W x D IP 21 [mm] | With options cabinet H x W x D IP 21 [mm] |
| Power [kW] | Current [A] | Power [kW] | Current [A] | Power [HP] | Current [A] | Power [HP] | Current [A] | Power [kW] | Current [A] | Power [kW] | Current [A] | | |
| 315 | 600 | 250 | 480 | 450 | 540 | 350 | 443 | 450 | 450 | 355 | 380 | F8 2280 x 800 x 607 | F9 2280 x 1400 x 607 |
| 355 | 658 | 315 | 600 | 500 | 590 | 450 | 540 | 500 | 500 | 400 | 410 | | |
| 400 | 745 | 355 | 658 | 600 | 678 | 500 | 590 | 560 | 570 | 500 | 500 | | |
| 450 | 800 | 400 | 695 | 600 | 730 | 550 | 678 | 630 | 630 | 560 | 570 | | |
| 500 | 880 | 450 | 800 | 650 | 780 | 600 | 730 | 710 | 730 | 630 | 630 | F10 2280 x 1600 x 607 | F11 2280 x 2400 x 607 |
| 560 | 990 | 500 | 880 | 750 | 890 | 650 | 780 | 800 | 850 | 710 | 730 | | |
| 630 | 1120 | 560 | 990 | 900 | 1050 | 750 | 890 | 900 | 945 | 800 | 850 | | |
| 710 | 1260 | 630 | 1120 | 1000 | 1160 | 900 | 1050 | | | | | | |
| 800 | 1460 | 710 | 1260 | 1200 | 1380 | 1000 | 1160 | 1000 | 1060 | 900 | 945 | F12 2280 x 2000 x 607 | F13 2280 x 2800 x 607 |
| 1000 | 1720 | 800 | 1460 | 1350 | 1530 | 1200 | 1380 | 1200 | 1260 | 1000 | 1160 | | |
| | | | | | | | | 1400 | 1415 | 1200 | 1260 | | |

VLT® Advanced Active Filter AAF 006



A flexible and adaptable solution for central or decentral harmonic mitigation.

VLT® Advanced Active Filter AAF 006 can compensate for individual VLT® drives or can be installed as a compact stand-alone solution at a common point of coupling, compensating for several loads simultaneously.

Consequently the filter ensures optimal harmonic suppression independent of the number of loads and their individual load profile. In addition the active filter corrects the power factor and balances the phase load providing an optimal energy utilization.

This improves the system efficiency and increases the grid robustness to avoid downtime.

The extensive re-use of proven VLT® components and the modular construction ensures a high reliability and at the same time offers high energy efficiency, back channel cooling and high enclosure grades without size increase.

The VLT® Advanced Active Filter is easily controlled via the user-friendly LCP, sharing design and programming structure with the VLT® drives series.

| Feature | Benefit |
|---|--|
| Reliable | Maximum uptime |
| <ul style="list-style-type: none"> – 100% factory tested – Coated PCBs – >90% components re-used from proven VLT® FC series | Low failure rate |
| Innovative cooling concept | Prolonged lifetime of electronics |
| User-friendly and flexible | Saves commissioning and operating cost |
| Innovative programming possibilities | Low running expenses |
| Modular design | Easy serviceability |
| Wide range of options | <ul style="list-style-type: none"> – Low initial investment – High degree of customisation |
| Energy saving | Lower operation costs |
| <ul style="list-style-type: none"> – High efficiency – Sleep mode and progressive switching freq. – Power factor correction | Low running expenses |

Without dismantling existing installation, the VLT® Advanced Active Filters are easily retrofitted to the existing installation, where harmonics are increased because of enlarged employment of non-linear loads such as variable speed drives.

Voltage range

380 – 480 V AC 50 – 60 Hz

Current range

190 A, 250 A, 310 A, 400 A.
Up to 4 units can be paralleled for higher power.

Enclosure degree

- IP 21/NEMA Type 1
- IP 54/NEMA Type 12

Options

The following options are available:

- RFI filters
- Disconnect
- Fuses
- Mains shielding

PC software

VLT® Motion Control Tool MCT 10 offers advanced programming functionality for all Danfoss drive products, greatly reducing programming and set-up time.

MCT 10 Basic (available free of charge from www.danfoss.com) allows access to a finite number of drives with limited functionality.

The advanced edition, offering a higher level of functionality, is available from your Danfoss sales partner.

Calculation Software

With VLT® Motion Control Tool MCT 31, you can determine whether harmonics will be an issue in your installation when drives are added.

MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion. Furthermore the software provides quick indication of whether the installation complies with the most recognised harmonic norms and recommendations.

From www.danfoss.com you can down-load the free tool MCT 31 – the most up-to-date version of the calculation software.

Specifications

| | |
|------------------------|--------------------------|
| THiD* at: | |
| - 40% load | < 7% |
| - 70% load | < 5.5% |
| - 100% load | < 5% |
| Efficiency* at: | |
| - 40% load | > 95% |
| - 70% load | > 98% |
| - 100% load | > 98% |
| True power factor* at: | |
| - 40% load | > 0.98 |
| - 70% load | > 0.98 |
| - 100% load | > 0.98 |
| Ambient temperature | 40° C without derating |
| Cooling | Back-channel air cooling |

* Measured at balanced grid without pre-distortion and with VLT® drive matching full load demand

| Norms and recommendations | Compliance |
|-------------------------------------|--------------------------------|
| IEEE519 | Application and load dependent |
| IEC61000-3-2 (up to 16 A) | Out of scope |
| IEC61000-3-12 (between 16 and 75 A) | Out of scope |
| IEC61000-3-4 (above 75 A) | Out of scope |



| 400 V AC (380 – 480 V AC) | | | | | |
|---------------------------|-------------------|-------------------|-------|-----------------------------------|-----------------|
| Total Current [A] | Max. Reactive [A] | Max. Harmonic [A] | Frame | Dimensions H x W x D mm [Inches] | Weight Kg [Lbs] |
| 190 | 190 | 170 | D14 | 1780 x 600 x 380 [70 x 24 x 15,0] | 238 [525] |
| 250 | 250 | 225 | E1 | 2000 x 600 x 500 [79 x 24 x 20] | 429 [945] |
| 310 | 310 | 280 | | | 453 [998] |
| 400 | 400 | 360 | | | |

| Total Current [A] | Max. individual harmonic compensation [A] | | | | | | | |
|-------------------|---|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | I ₅ | I ₇ | I ₁₁ | I ₁₃ | I ₁₇ | I ₁₉ | I ₂₃ | I ₂₅ |
| 190 | 133 | 95 | 61 | 53 | 34 | 34 | 30 | 27 |
| 250 | 175 | 125 | 80 | 70 | 50 | 45 | 40 | 35 |
| 310 | 217 | 155 | 99 | 87 | 62 | 56 | 50 | 43 |
| 400 | 280 | 200 | 128 | 112 | 80 | 72 | 64 | 56 |

VLT® Advanced Harmonic Filter AHF 005/ 010



Optimised harmonic performance with the FC series up to 250 kW.

The VLT® Advanced Harmonic Filter AHF 005/ 010 have been specially designed to match the Danfoss frequency converters for unmatched performance and design.

Compared to traditional harmonic trap filters they offer a smaller foot print and higher harmonic reduction.

The solution is available in two variants, AHF 005 and AHF 010. When connected in front of a Danfoss VLT® frequency converter, the harmonic current distortion generated back to the mains is reduced to 5% and 10% Total Harmonic Current Distortion at full load.

With a >98% efficiency the passive Advanced Harmonic Filters offer cost effective and very robust harmonic solutions specifically for power up to 250 kW.

As stand-alone options the advanced harmonic filters feature a compact housing that is easily integrated into existing panel space. This makes them well-suited for retrofit applications with limited adjustments of the frequency converter.

| Feature | Benefit |
|---|---|
| Reliable | Maximum uptime |
| <ul style="list-style-type: none"> – 100% factory tested – Based on proven and tested filter concept | Low failure rate |
| Energy saving | Lower operation costs |
| <ul style="list-style-type: none"> – High efficiency – Electrically matched to the individual VLT® FC drives | Low running expenses |
| Design | Compact and aesthetic enclosure |
| <ul style="list-style-type: none"> – Innovative coil design – Side-by-side mounting – Optimized for mounting in panels | <ul style="list-style-type: none"> – Smaller footprint – Less wall space needed |
| Easy commissioning | Low commissioning costs |
| Enclosure size and colour matches | Danfoss look and feel |

Line Voltage

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

Filter current

- 10A-480A (380-415V AC, 50 and 60 Hz)
- 10A-436A (440-480V AC, 60 Hz)
- 15A-395A, 600V AC, 60 Hz)
- 15A-395A (500-690V AC, 50 Hz)
- (Modules can be paralleled for higher power)

Enclosure degree

- IP 20/IP 00*

* No fan in IP00 units. Mitigations for air-flow required in installation.

Options

The following options are available:

- IP 21/NEMA 1 kit
- IP21/NEMA 1 kit with capacitor disconnect feature

Calculation Software

With VLT® Motion Control Tool MCT 31, you can determine whether harmonics will be an issue in your installation when drives are added.

MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion. Furthermore the software provides quick indication of whether the installation complies with the most recognised harmonic norms and recommendations.

From www.danfoss.com you can down-load the free tool MCT 31 – the most up-to-date version of the calculation software.

Specifications

| | AHF 010 | AHF 005 |
|---|--------------------------|-------------------------|
| THiD* at: – 40% load – 70% load – 100% load | ~ 12% ~ 11% < 10% | ~ 7% ~ 6% < 5% |
| Efficiency* at 100% load | >98.5% | |
| True power factor* at: – 40% load – 70% load – 100% load | ~ 81% ~ 96% > 99% | ~ 80% ~ 95% > 98% |
| Ambient temperature | 45° C without derating | |
| Cooling | Back-channel air cooling | |

* Measured at balanced grid without pre-distortion

| Norms and recommendations | Compliance |
|-------------------------------------|---|
| IEEES19 | AHF 005 always AHF 010 depends on grid and load conditions |
| IEC61000-3-2 (up to 16 A) | Always |
| IEC61000-3-12 (between 16 and 75 A) | Always |
| IEC61000-3-4 (above 75 A) | Always |

Enclosures

| 380–415 V 50/60 Hz | 440–480 V 60 Hz | Enclosure Type | |
|-----------------------|--------------------|----------------|--------|
| | | AHF010 | AHF005 |
| 10 | 10 | X1 | X1 |
| 14 | 14 | X1 | X1 |
| 22 | 19 | X2 | X2 |
| 29 | 25 | X2 | X2 |
| 34 | 31 | X3 | X3 |
| 40 | 36 | X3 | X3 |
| 55 | 48 | X3 | X3 |
| 66 | 60 | X4 | X4 |
| 82 | 73 | X4 | X4 |
| 96 | 95 | X5 | X5 |
| 133 | 118 | X5 | X5 |
| 171 | 154 | X6 | X6 |
| 204 | 183 | X6 | X6 |
| 251 | 231 | X7 | X7 |
| 304 | 291 | X7 | X7 |
| 325 | 355 | X7 | X8 |
| 381 | 380 | X7 | X8 |
| 480 | 436 | X7 | X8 |

Dimensions

| Enclosure Type | Dimensions in mm | | |
|----------------|------------------|-----------|-----------|
| | A (height) | B (width) | C (depth) |
| X1 | 347 | 190 | 206 |
| X2 | 451 | 230 | 248 |
| X3 | 605 | 378 | 242 |
| X4 | 634 | 378 | 333 |
| X5 | 747 | 418 | 333 |
| X6 | 778 | 418 | 400 |
| X7 | 911 | 468 | 450 |
| X8 | 911 | 468 | 515 |

VLT® Common Mode Filters MCC 105



VLT® Common Mode Filters MCC 105 core kit reduce electromagnetic interference and eliminate bearing damage by electrical discharge.

VLT® Common Mode Filters MCC 105 (HF-CM) cores are special nanocrystalline magnetic cores which have superior filtering performance compared to regular ferrite cores. They act like a common-mode inductor (between phases and ground).

Installed around the three motor phases (U, V, W), they reduce high-frequency common-mode currents. As a result, high-frequency electromagnetic interference from the motor cable is reduced. However, the core kit should not be used as the sole mitigation measure, and even when the cores are used, the EMC installation rules shall be followed.

Prevent motor bearing currents

The most important function is to reduce high-frequency currents associated with electrical discharges in the motor currents. These discharges contribute to the premature wear-out and failure of motor bearings. By reducing or even eliminating discharges, the wear-out of the bearings is reduced and the lifetime extended. Thus, maintenance and down-time costs are lowered.

| Feature | Benefit |
|---|---|
| High-performance nanocrystalline magnetic material | <ul style="list-style-type: none"> – Effective reduction of electrical discharges in the motor bearings – Reduces bearing wear-out, maintenance costs and down-time – Reduces high-frequency electromagnetic interference from the motor cable |
| <ul style="list-style-type: none"> – Oval shape – Scalable solution: longer cables handled by stacking more cores | Easy to install in restricted places such as the VLT® enclosure or the motor terminal box |
| Only 4 core sizes cover the entire VLT® power range | <ul style="list-style-type: none"> – Easy logistics, fast delivery and comprehensible product program – Allows the addition to a service tool-kit |
| Low investment | Cost-effective alternative to, for example, sine-wave filters if the only phenomena to be mitigated is bearing wear-out through electrical discharge |

Ideal for retrofitting

Bearing current problems are most often discovered after commissioning. Therefore, the cores have an oval shape which makes them ideal for retrofitting and for installation in restricted places.

Only 4 variants cover the entire VLT® product range making it possible to carry these valuable aids in a service tool kit.

A flexible solution

The cores can be combined with other output filters, and especially in combination with dU/dt filters they offer a low cost solution for protection of both motor bearings and insulation.

Product range

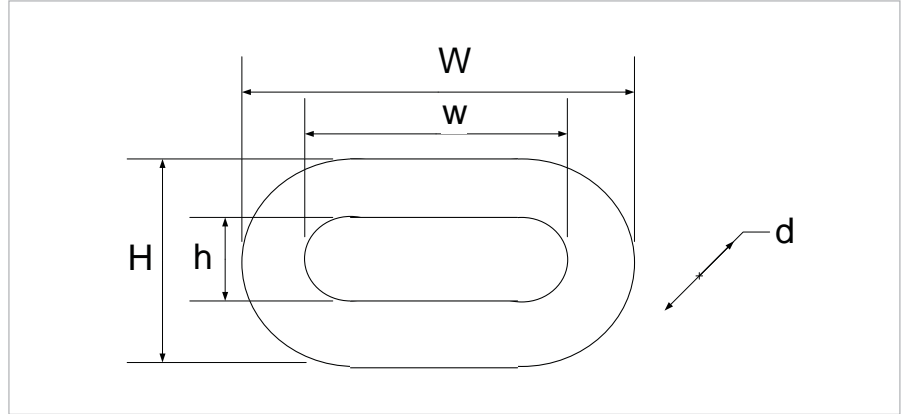
- Available for all power sizes from 0.18 kW to 1.4 MW
- 4 core sizes cover the entire VLT® power range

HF-CM selector

The cores can be installed at the frequency converter's output terminals (U, V, W) or in the motor terminal box. When installed at the frequency converter's terminals, the HF-CM kit reduces bearing stress and high-frequency electromagnetic interference from the motor cable. The number of cores depends on motor cable length and frequency converter voltage. A selection table is shown to the right.

| Cable length [m] | A and B frame | | C frame | | D frame | | E and F frame | |
|------------------|---------------|----|---------|----|---------|----|---------------|----|
| | T5 | T7 | T5 | T7 | T5 | T7 | T5 | T7 |
| 50 | 2 | 4 | 2 | 2 | 2 | 4 | 2 | 2 |
| 100 | 4 | 4 | 2 | 4 | 4 | 4 | 2 | 4 |
| 150 | 4 | 6 | 4 | 4 | 4 | 4 | 4 | 4 |
| 300* | 4 | 6 | 4 | 4 | 4 | 6 | 4 | 4 |

* Longer cable lengths are easily handled by stacking more HF-CM cores.

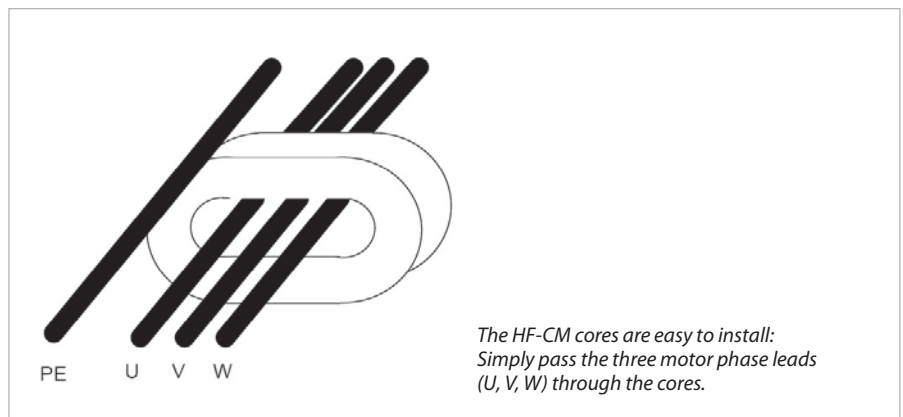


Ordering numbers and dimensions

Ordering numbers for the core kits (2 cores per package) are given in the table below.

| VLT® Frame Size | Danfoss ordering number | Core dimension [mm] | | | | | Weight [kg] | Packaging dimension [mm] |
|-----------------|-------------------------|---------------------|-----|-----|----|------|-------------|--------------------------|
| | | W | w | H | h | d | | |
| A and B | 130B3257 | 60 | 43 | 40 | 25 | 22.3 | 0.25 | 190 x 100 x 70 |
| C | 130B3258 | 102 | 69 | 61 | 28 | 37 | 1.6 | 190 x 100 x 70 |
| D | 130B3259 | 189 | 143 | 126 | 80 | 37 | 2.45 | 235 x 190 x 140 |
| E and F | 130B3260 | 305 | 249 | 147 | 95 | 37 | 4.55 | 290 x 260 x 110 |

Installation



The HF-CM cores are easy to install: Simply pass the three motor phase leads (U, V, W) through the cores.

VLT® Sine-Wave Filter MCC 101



VLT® Sine-wave Filter MCC 101 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.

VLT® Sine-wave Filter MCC 101 output filters are differential-mode 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 flashover in the motor bearings and thereby also contributes to extended motor lifetime and increased service intervals.

| Feature | Benefit |
|---|---|
| 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 |

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

Range

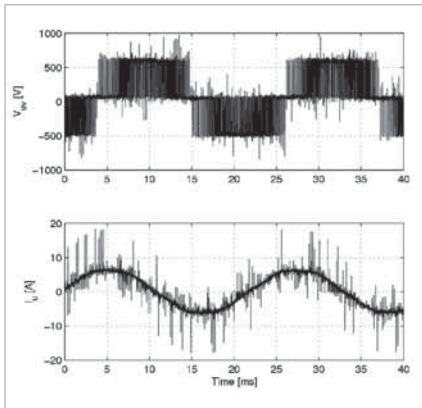
- 3 x 200 – 500 V, 2.5 – 800 A
- 3 x 525 – 690 V, 13 – 660 A

Enclosures

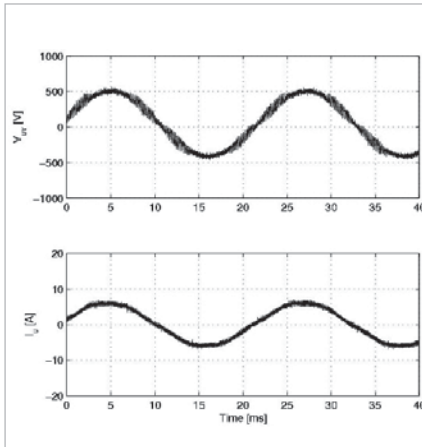
- IP 00 and IP 20 wall-mounted enclosure up to 75 A (500 V)/13 A (690 V)
- IP 23 floor-standing enclosure from 115 A (500 V)/28 A (690 V)

Mounting

- Side by side mount with the drive up to 75 A (500 V)



Voltage and current without filter

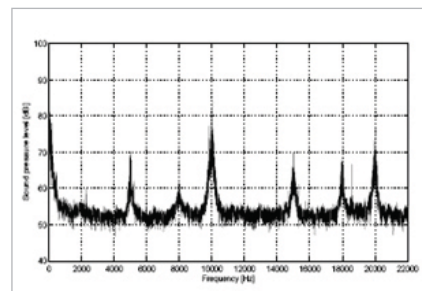


Voltage and current with filter

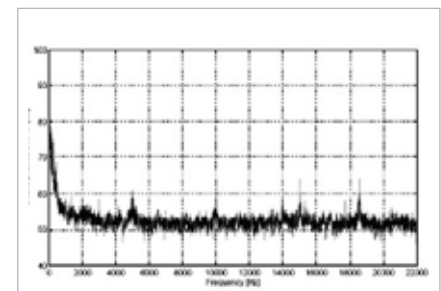
Specifications

| | |
|--|---|
| Voltage rating | 3 x 200 – 500 V and 3 x 525 – 690 V |
| Nominal current I _N @ 50 Hz | 2.5 – 800A 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 | IP 00/IP 20/IP 23 (ref. page 1) |
| Approvals | CE, UL508 |

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



No filter



With sine-wave filter

| Performance Criteria | du/dt filters | Sine-wave filters |
|---------------------------------------|--|--|
| Motor insulation stress | Up to 100 m cable (shielded/unshielded) complies with the requirements of IEC60034-17* (general purpose motors). Above this cable length the risk of "double pulsing" increases. | Provides a sinusoidal phase-to-phase motor terminal voltage. Complies with IEC-60034-17* and NEMA-MG1 requirements for general purpose motors with cables up to 500 m (1 km for frame size D and above). |
| Motor bearing stress | Slightly reduced, mainly in high power motors. | Reduces bearing currents caused by circulating currents. Does not reduce common-mode currents (shaft currents). |
| EMC performance | Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the frequency converter's built-in RFI filter. | Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the frequency converter's built-in RFI filter. |
| Max. motor cable length | 100 m ... 150 m With guaranteed EMC performance: 150 m screened Without guaranteed EMC performance: 150 m unshielded | With guaranteed EMC performance: 150 m shielded and 300 m unshielded (only conducted emissions). Without guaranteed EMC performance: up to 500 m (1 km for frame size D and above). |
| Acoustic motor switching noise | Does not eliminate acoustic switching noise from the motor. | Eliminates acoustic switching noise from the motor caused by magnetostriction. |
| Relative size | 15 – 50% (depending on power size). | 100% |
| Relative price | 50% | 100% |

*Not 690 V

VLT® dU/dt Filter MCC 102



VLT® dU/dt Filter MCC 102 reduce the dU/dt values on the motor terminal phase-to-phase voltage – an issue that is important for short motor cables.

VLT® dU/dt Filter MCC 102 are differential-mode low-pass 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. The voltage at the motor terminals is still PWM pulse shaped, but the rise time and U_{peak} are reduced. They are smaller, weigh less and have a lower price compared to sine-wave filters. 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

| Feature | Benefit |
|---|---|
| Reduces dU/dt stresses | Increases motor service interval |
| Lowers the magnetic interference propagation on surrounding cables and equipment | Trouble-free operation |
| Low voltage drop makes dU/dt filters the ideal solution for highly dynamic applications with flux vector regulation | Small size and cost compared to sine-wave filters |

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 FC series.

Advantages

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

Range

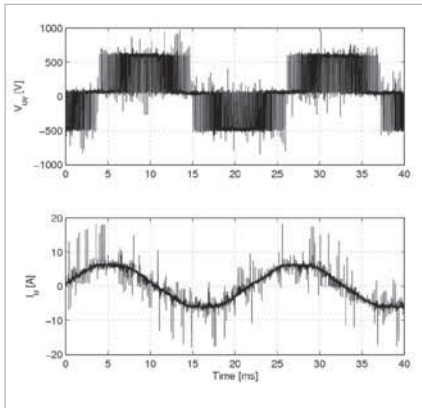
3 x 200 – 690 V (up to 880 A)

Enclosures

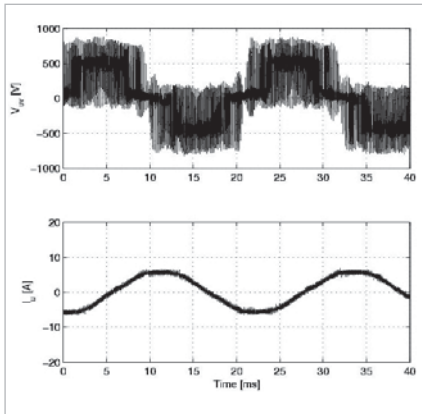
- IP 00 and IP 20/23 enclosure in the entire power range.
- IP 54 enclosure available up to 180 A.

Mounting

- Side by side mounting with the drive
- Filters wall mounted up to 480 A (380 V) and floor mounted above that size



Voltage and current without filter

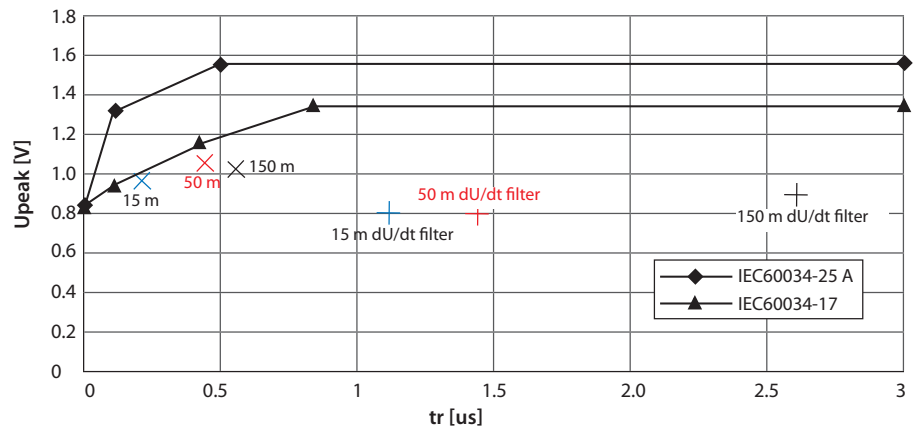


Voltage and current with filter

Specifications

| | |
|-------------------------------|---|
| Voltage rating | 3 x 200 – 690 V |
| Nominal current I_N @ 50 Hz | 44 – 880 A @ 200 – 380 V, 40 – 780 A @ 460 V 32 – 630 A @ 600 V and 27 – 630 A @ 690 V for higher power modules can be paralleled |
| Motor frequency | 0 – 60 Hz without derating Max. 100 Hz (with derating) |
| Ambient temperature | -25° to 45° C without derating |
| Max. switching frequency | f_{sw} 1,5 kHz – 4 kHz depending on filter type |
| Mounting | Side-by-side |
| Overload capacity | 160% for 60 sec every 10 min. |
| Enclosure degree | IP 00, IP 20/23 and IP 54 |
| Approvals | CE, UL508 |

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.

| Performance Criteria | du/dt filters | Sine-wave filters |
|---------------------------------------|--|--|
| Motor insulation stress | Up to 100 m cable (shielded/unshielded) complies with the requirements of IEC60034-17* (general purpose motors). Above this cable length the risk of "double pulsing" increases. | Provides a sinusoidal phase-to-phase motor terminal voltage. Complies with IEC-60034-17* and NEMA-MG1 requirements for general purpose motors with cables up to 500 m (1 km for frame size D and above). |
| Motor bearing stress | Slightly reduced, mainly in high power motors. | Reduces bearing currents caused by circulating currents. Does not reduce common-mode currents (shaft currents). |
| EMC performance | Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the frequency converter's built-in RFI filter. | Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the frequency converter's built-in RFI filter. |
| Max. motor cable length | 100 m ... 150 m With guaranteed EMC performance: 150 m screened Without guaranteed EMC performance: 150 m unshielded | With guaranteed EMC performance: 150 m shielded and 300 m unshielded (only conducted emissions). Without guaranteed EMC performance: up to 500 m (1 km for frame size D and above). |
| Acoustic motor switching noise | Does not eliminate acoustic switching noise from the motor. | Eliminates acoustic switching noise from the motor caused by magnetostriction. |
| Relative size | 15 – 50% (depending on power size). | 100% |
| Relative price | 50% | 100% |

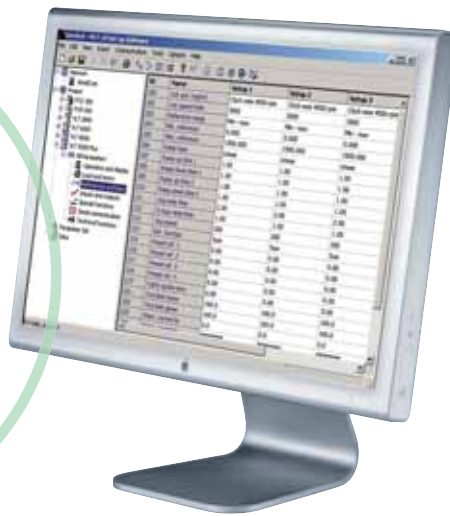
*Not 690 V

VLT® Motion Control Tool MCT 10

Optimised

for:

- Commissioning
- Servicing
- Programming



The VLT® Motion Control Tool MCT 10, is ideal for commissioning and servicing the drive including guided programming of cascade controller, real-time clock, smart logic controller and preventive maintenance.

The setup software provides easy control of details as well as a general overview of systems, large or small. The tool handles all drive series, VLT® Advanced Active Filters and VLT® Soft Starter 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
- Update drive or option firmware. One tool handling all *(to be supported in January)*

More efficient commissioning

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

| Feature | Benefit |
|----------------------------------|---|
| One PC tool for all tasks | Save time |
| "Explorer-like" view | Easy to use |
| Option programming | Save time |
| Online and offline commissioning | Flexible and save cost |
| Scope & logging | Easy and fast analyzing – less downtime |
| Alarm history | Easy fault finding |
| Multiple interfaces | Easy connection |
| USB connection | Easy connection |
| Flexible Ethernet connection | Easy connection – save time (utilizing all Danfoss Ethernet based fieldbus options) |

Basic version

- Off –line commissioning (max. 4 drives)
- Scope & Graph (max. 2 channels)
- Multiple fieldbus support
- Alarm history in saved projects
- MCO 305 support
- Graphical Smart Logic Controller
- Graphical Clock functions, Time-based Actions, Preventive Maintenance and Basic Cascade Controller (FC 102/FC 202 only)
- Update drive support to support new firmware (future compatible)
- FC drive conversion (FC 102/FC 202 & FC 300 series)

Advanced version

- Basic version functionality +
- No limitation in number of drives
- Scope & Graph (max. 8 channels)
- Real Time Logging from drive
- Motor Database
- Graphical Sensorless pump control
- Graphical Extended Cascade Controller (FC-202 only)
- Full Customer Specific Initialization File support *(to be supported in January)*
- Full drive password protection support *(To be supported in January)*

Fieldbusses

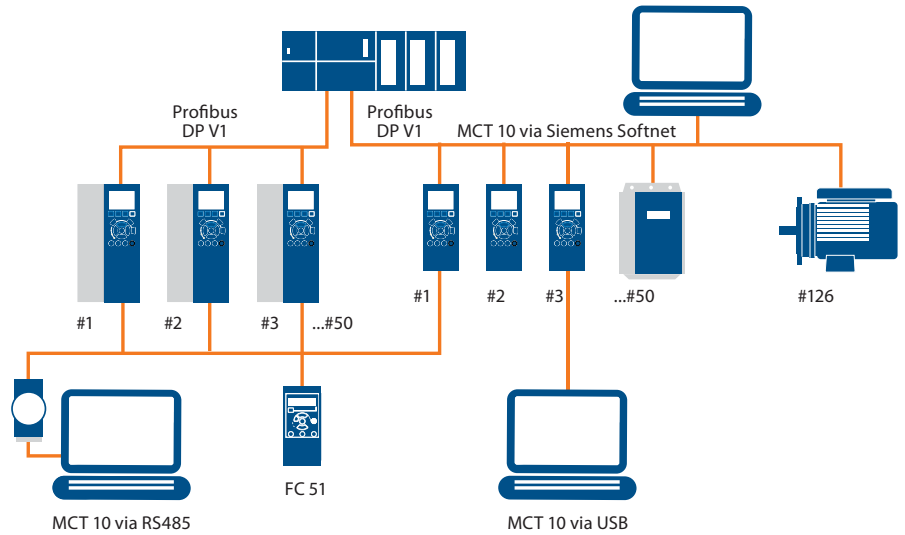
- PROFIBUS DP-V1
- RS485
- USB
- EtherNet-TSC

Internet download

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

System requirements

- MS Windows® NT 4.0, 2000, XP, Vista or 7
- Pentium III 350 MHz or better
- 512 MB RAM or better
- 200 MB free hard disk space
- CD-ROM drive
- VGA or XGA graphic adapter



VLT® Motion Control Tool MCT 31

Optimised

for:

- Application specific simulations
- Various Power Supply sources
- Norm compliance indication
- Project Documentation



With VLT® Motion Control Tool MCT 31, you can determine whether harmonics will be an issue in your installation when drives are added. MCT 31 estimates the benefits of adding various harmonic mitigation solutions from the Danfoss product portfolio and calculates system harmonic distortion.

Save money and reduce running costs

On the basis that it is better to avoid a problem rather than cure one after it happens, it is preferable to calculate the effect of installing non-linear loads before doing so, to estimate the degree of harmonic distortion that may result.

Trying to achieve this on a spreadsheet basis can be time consuming and inaccurate.

To help, Danfoss offers free to download, the VLT® Motion Control Tool MCT 31, a simple to use and fast software tool for calculating the harmonic disruption from your existing or intended drives installation.

A fast estimate is vital as, in this case, more is not better, simply more costly, so the MCT 31 can help save money when selecting harmonic mitigation solutions.

Simply over-specifying a harmonic mitigation solution will lead to unnecessary initial cost escalation and increased running expenses.

Feature

Explore-like view

Simple simulation model with less parameters

Configurable for various Power supply sources

One tool supporting all Danfoss harmonic mitigation solutions

Configurable Norm compliance indication

User configurable Report gation solutions

Simulate the setup before installation

Benefit

Easy to use

Easy to use and fast simulation – save time

Matching all customer needs

Matching all customer needs

Save time

Project documentation

Save time and money. Prevent problems appear later

Calculate the harmonic disturbance

The MCT 31 tool can easily be used to evaluate the expected grid quality and includes a range of passive and active counter-measures which can be selected to ease system stress.

The power quality impact of electronic devices can be estimated in the frequency range up to 2.5 kHz, depending on the system configuration and standard limits.

The analysis includes indication of compliance with various standards and recommendations.

The Windows-like interface of the MCT 31 tool makes possible intuitive

operation of the software. It is built with a focus on user-friendliness and the complexity is limited to system parameters that are normally accessible.

The Danfoss VLT® frequency converter and mitigation equipment data is already pre-loaded, allowing fast data entry.

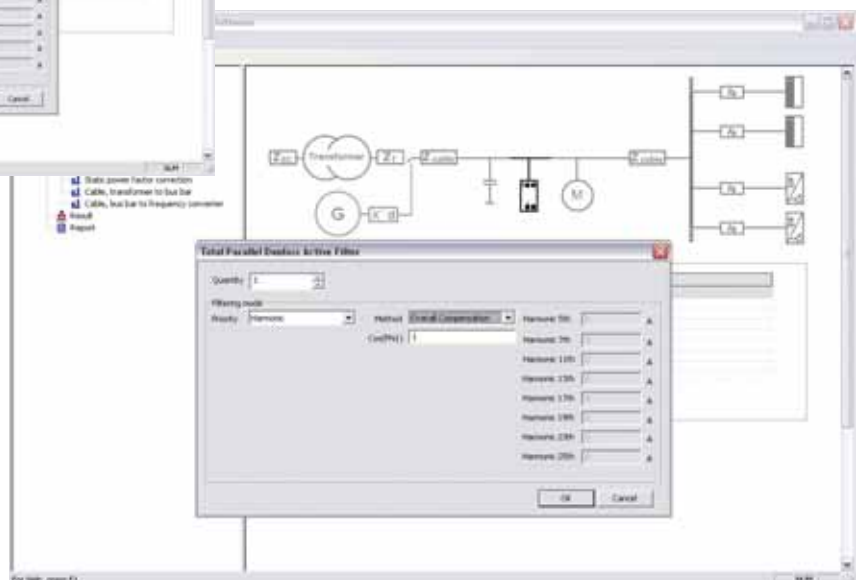
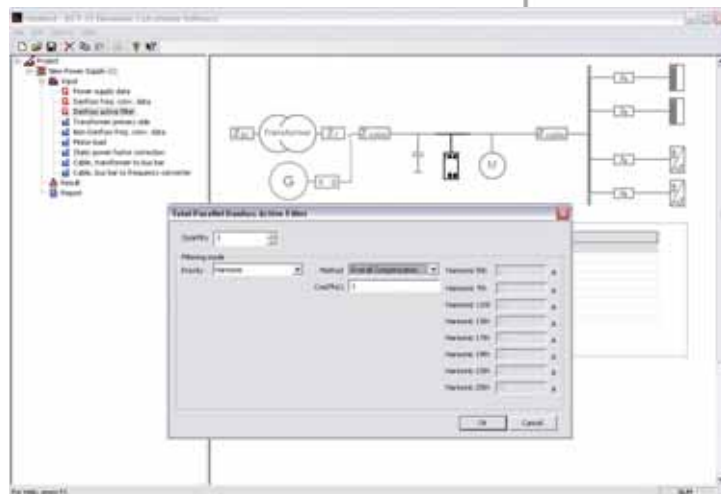
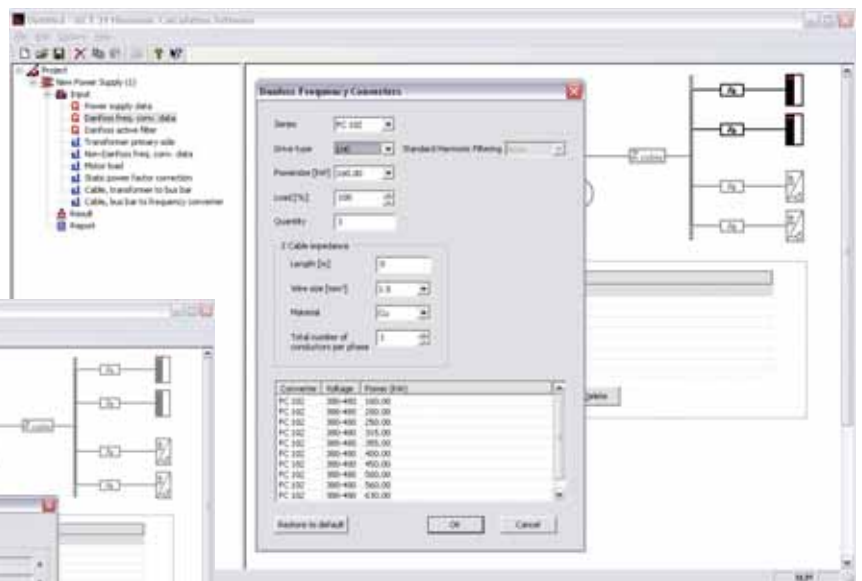
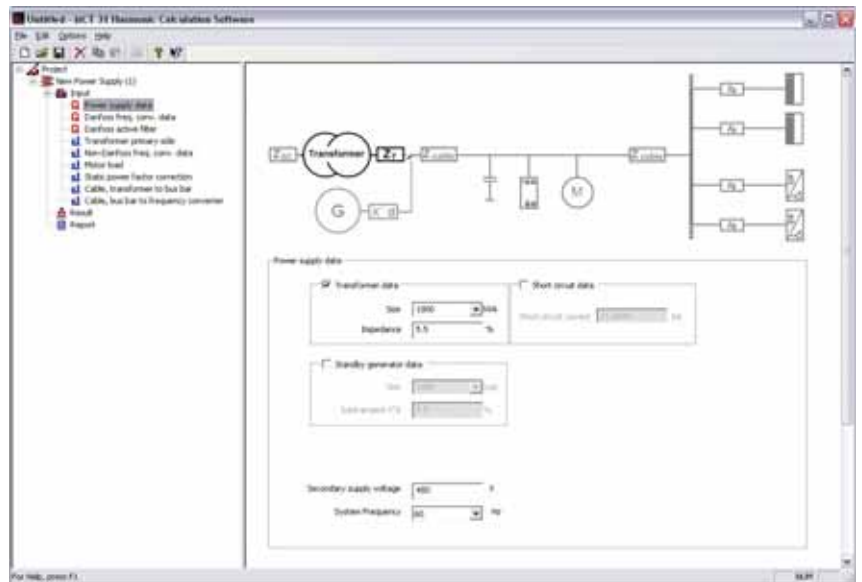
Your local Danfoss consultant will be very happy to provide all the assistance you need to evaluate your power quality and advice in the selection of the correct mitigation for your circumstances.

Internet download

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

System requirements

- MS WindowsR NT 4.0, 2000, XP, Vista or 7
- Pentium III 350 MHz or better
- 512 MB RAM or better
- 200 MB free hard disk space
- CD-ROM drive
- VGA or XGA graphic adapter



VLT® Energy Box

Optimised

for:

- Designing HVAC installations
- Obtaining energy savings
- Calculating pay-back time



With VLT® Energy Box software you can both theoretically in project face estimate and afterwards physically validate your real energy savings and reductions in your carbon footprint – from your desk.

VLT® Energy Box makes energy consumption calculations of fan, pump and cooling tower applications driven by VLT® HVAC Drives from Danfoss and compares it with alternative methods of flow control.

The program compares the total operation costs of various traditional systems compared to operation of the same system with a VLT® HVAC Drive.

With VLT® Energy Box software you can both theoretically in project face estimate and afterwards physically validate your real energy savings and reductions in your carbon footprint – also from your desk.

The VLT® Energy Box communicates with the drives through the USB/RS485 protocol and can read all data about duty cycles and energy consumptions.

Data about duty cycles and energy consumptions can be requested remotely from the VLT® HVAC Drive, making it easy to monitor your energy savings and return on investment. Monitoring via fieldbus often makes energy meters omissible.

Feature

- Estimate savings
- Calculates pay back based on investments and annual costs
- Generates a report
- Special cooling tower mode based on climate data
- Possible to adjust climate region to local conditions
- Download of energy data from the drive via serial communication and USB
- Covers several projects and systems in same file

Benefit

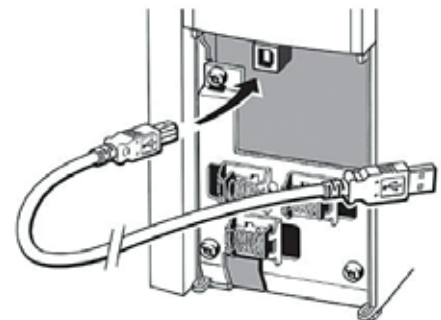
- Make purchase decision easy
- Economical overview
- Easy communication
- Easy calculation
- More accurate calculations
- Facilitates the drives payback function
- Visualize actual load profile
- Generation of common project report

The software allows you to upload real trend and energy data, to present multiple systems in one report and to calculate energy consumption for cooling towers.

Complete financial analysis

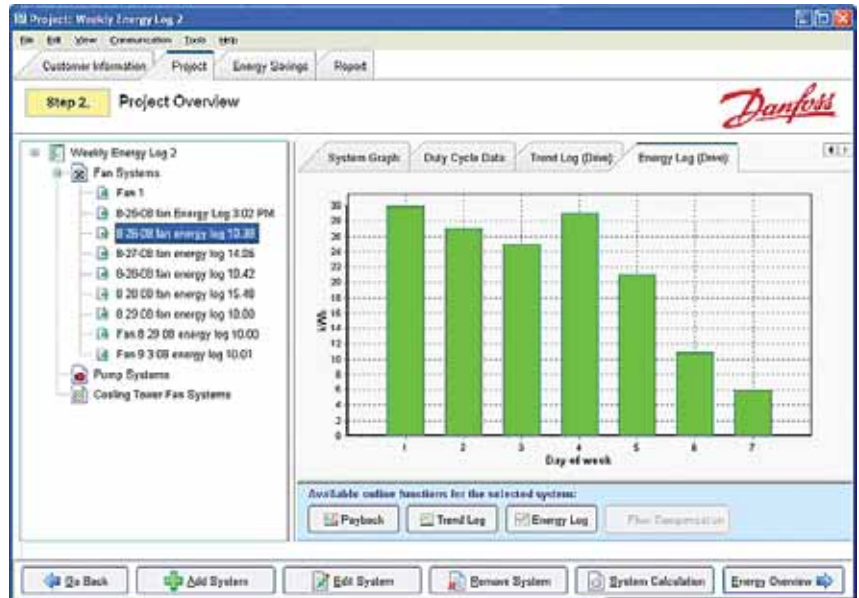
VLT® Energy Box provides a complete financial analysis including:

- Initial cost for the drive system and the alternative system
- Installation and hardware costs
- Annual maintenance costs and any utility company incentives for installation of energy conservation products
- Payback time and accumulated savings are calculated



No nonsense

Since VLT® Energy Box both estimates and afterwards measures the real energy savings, it is a very trustworthy means for calculating projects involving many fans, pumps and cooling towers. You can simply install a single VLT® HVAC Drive and check the actual savings to exactly calculate the benefits from installing VLT® HVAC Drives on the other applications.



Considers local conditions

VLT® Energy Box use local weather data in its calculations for cooling towers.

Data from weather zones around the Globe are pre-installed, but the user is free to adjust these data according to local conditions.



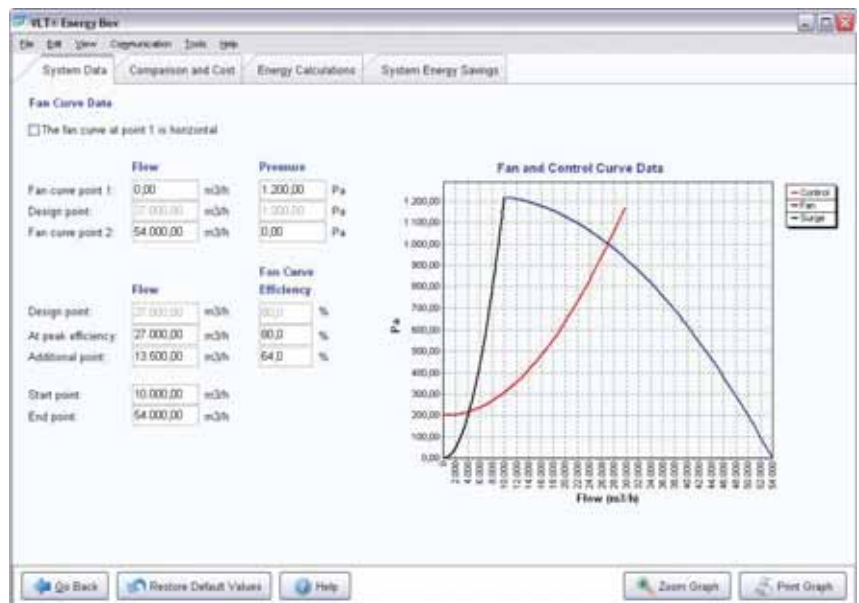
Specify the curve

Energy Box offers an advanced mode to specify the fan or pump curve in more detail.

The fan or pump (equipment) curve can be adjusted to match almost any shape.

Choose flow and pressure points to generate an equipment curve similar to the published fan or pump curve over the relevant section of the curve using the mechanical flow control method.

The program will not allow calculations in regions that are in a surge region or beyond the end of the curve.



VLT® Service

VLT® DrivePro™

LifeCycle Service Packages

VLT® DrivePro™ Plus

The Plus Package offers a program of support to help customers realize improved 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

Service you can rely on 24/7 – around the world

Sales and Service

Contacts worldwide. Helping to optimise your productivity, improve your maintenance, and control your finances.

- 24/7 availability
- Local hotlines, local language and local stock

The Danfoss service organisation is present in more than 100 countries – ready to respond whenever and wherever you need, around the clock, 7 days a week.

Find your local expert team on www.danfoss.com/drives

Configure your VLT® drive to fit your needs on <http://driveconfig.danfoss.com>

The Drive Configurator gives you the possibility to configure (select) the right drive for your purpose. You don't have to consider if the combinations are valid, while the configurator only gives you valid selections.

Drive Configurator

The Danfoss Drive Configurator is an advanced but easy-to-use tool to configure the Danfoss VLT® frequency converter that exactly matches your requirements.

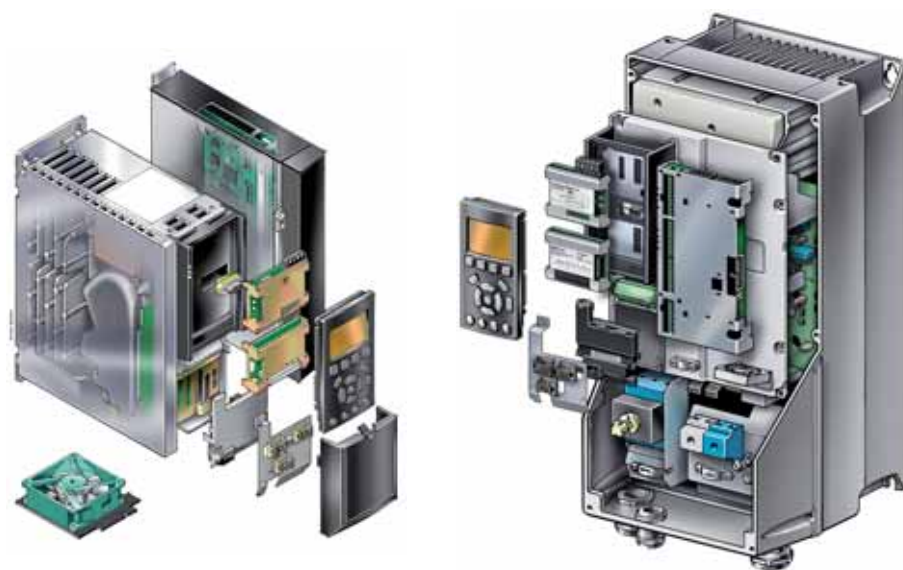
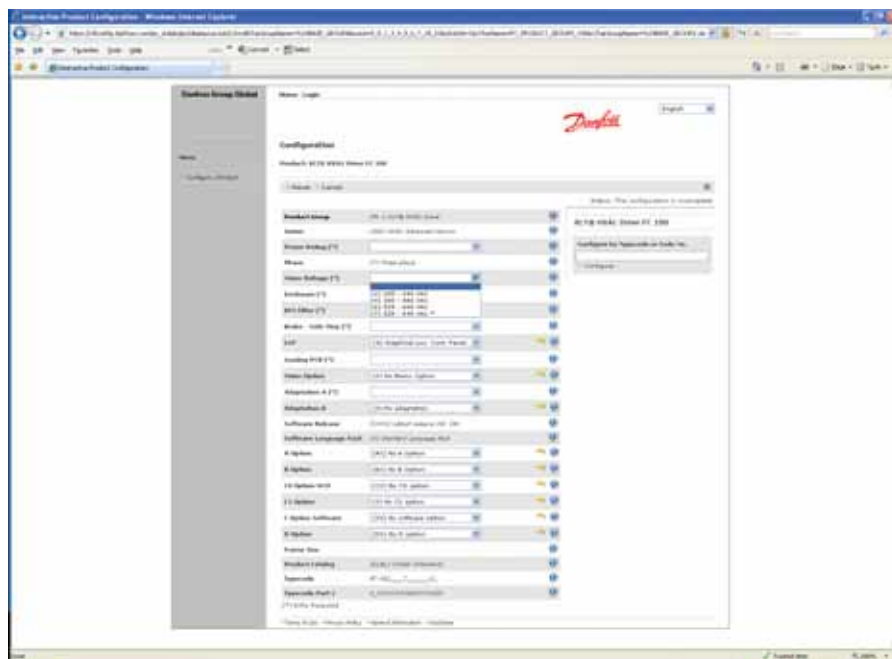
The Drive Configurator generates the unique article number for the drive you need, preventing errors during order entry.

"Decoding" is also available: Enter a Typecode and the Drive Configurator will decode the configuration and show configuration for your drive.

"Reverse engineering" is also supported: Enter an article number and the Drive Configurator will display the exact configuration for the drive in question, including all options and special features. A further advantage of using the Drive Configurator is that it tells you exactly which options and features are available and so prevents you selecting conflicting or nonsensical combinations.

If you need to replace an obsolete product, just enter the article number of the older VLT® and the Drive Configurator will provide details of the appropriate newer generation replacement.

Last but by no means least, the Drive Configurator provides quick access to the available spare parts and accessories for both current and obsolete products.





What VLT® is all about

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

Environmentally responsible

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

All frequency converter factories are certified according to ISO 14001 and ISO 9001 standards.

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 pre-prepared.

UN Global Compact

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

Impact on energy savings

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

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®.

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

Intelligent and innovative

Developers at Danfoss VLT 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 VLT Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

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

