

ENGINEERING
TOMORROW

Danfoss

Selection Guide

VLT® High Power Drives to **fit your application**

98%

energy efficiency

Save energy and
money with >98%
efficient VLT® drives

www.danfossdrives.com

VLT®





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Easy-to-own AC drives with **application-specific** functionality

Welcome to a world of energy-saving opportunities delivered by high-power VLT® drives.

The Danfoss VLT® High Power Drive series is built on the success of the renowned VLT® name, created when Danfoss introduced the first mass-produced AC drives in 1968.

VLT® High Power Drives feature all the advantages you are already familiar with in the other Danfoss products, including user-friendly commissioning and operation. In addition, the high-power range offers a host of advanced yet easy-to-use features and options, that are built-in and factory tested to meet the unique demands of any application.

Enjoy savings

Reap the rewards of extremely low total cost of ownership. VLT® drives are designed for maximum efficiency with state-of-the-art power components.

In all **free-standing** or **wall-mounted** drives, **cabinet** drives, and single **drive modules**, VLT® engineering delivers:

- >98% efficiency reduces operating costs
- Unique back-channel cooling design reduces the need for additional cooling equipment, resulting in lower installation and recurring costs

- Lower power consumption for control room cooling equipment
- Reduced lifecycle costs and lower overall cost of ownership

Enjoy ease of use

- Consistent familiar user interface across the entire range means once you know one, you know them all
- Application-oriented startup wizards are tuned to your industry, presenting the most relevant parameters first
- The user interface displays your own language

Choose the best motor for your application – free choice of motor technology

Each VLT® drive is configurable, compatible and efficiency-optimized for all standard motor types. This means you can escape the restrictions of motor-drive package deals.

As an independent manufacturer of AC drive solutions, Danfoss is committed to supporting all commonly used

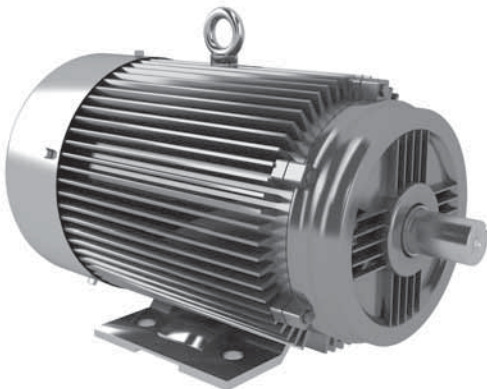
motor types and fostering ongoing development.

Danfoss VLT® drives have traditionally offered control algorithms for high efficiency with standard induction and permanent magnet (PM) motors, and now they also support high-efficiency synchronous reluctance motors.

In this way, Danfoss offers you the opportunity to combine your favorite motor technology such as induction or permanent magnet motors with a VLT® drive.

Easy commissioning – and algorithms for optimal efficiency

Furthermore, a VLT® drive makes commissioning equally easy for all motor types by combining ease of use with additional helpful functions such as SmartStart and automatic motor adaptation, which measures the motor characteristics and optimizes the motor parameters accordingly. This way the motor always operates at the highest possible efficiency, allowing you to reduce energy consumption and cut costs.





Free-standing and wall-mounted drives

No need to compromise

Can't make space for a cabinet? Now there is no need. VLT® drives are so robust that you can mount them virtually anywhere, even right beside the motor. Free-standing and wall-mounted drives are equipped for the toughest of environments. So they suit your heavy-duty application, no matter whether the requirement is resistance to the industrial environment, clean power supply, or stable grid compliance with EMC and harmonic mitigation. More features which save on compromise:

- Enclosure types rated up to IP54/NEMA 3R
- Full EMC compliance according to international standards
- Ruggedized and coated PCBs
- High temperature resistance, operating up to 50 °C without derating
- Motor cable lengths up to 150 m as standard, with uncompromised performance
- Integrated components save the need for extra externally-mounted equipment



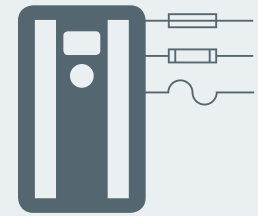
Cabinet drives

Win time

VLT® drives are designed with the installer and operator in mind to save time on installation, commissioning and maintenance.

VLT® High Power Drives are designed for full access from the front. Just open the cabinet door and all components can be reached without removing the drive, even when mounted side by side. More time-saving features:

- An intuitive user interface with an award-winning Local Control Panel (LCP) that streamlines start-up and operating procedures
- The full power range utilizes a common control platform for consistent interface and predictable operation
- Robust design and advanced controls make VLT® drives virtually maintenance free



Drive modules

Win space

The compact design of VLT® drives – and high-power VLT® drives in particular – makes them easy to fit even in small spaces.

Integrated filters, options and accessories provide additional capabilities and protection without increasing the enclosure size. More space-saving features:

- Built-in DC link reactors for harmonic suppression eliminate the need for higher loss external AC line reactors
- Optional built-in RFI filters are available throughout the power range
- Optional input fuses and loadshare terminals are available within standard enclosures
- In addition to the many valuable features that VLT® drives offer as standard, there are numerous other control, monitoring and power options available in pre-engineered factory configurations



Manufactured to the highest quality standards VLT® series drives are UL listed and made in ISO 9001-2000 certified facilities.

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

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

VLT® High Power Drives are available in a broad range of enclosure sizes and protection ratings from IP20 to IP54 to enable easy installation in all environments: mounted in panels, switch rooms or as stand-alone units in the production area.

Cost saving heat management

In VLT® High Power Drives there is total separation between the back-channel cooling air and the internal electronics. This separation greatly reduces the airflow over the sensitive electronics, minimizing the exposure to contaminants. At the same time it removes heat efficiently which helps to

prolong product life, increase the overall availability of the system and reduce faults related to high temperatures.

For example, by exhausting heat directly outside, it is possible to reduce the size of the cooling system in the panel or switch room. This can be achieved with Danfoss' extremely efficient back-channel cooling concept, allowing heat to be vented outside the control room.

In daily use the benefits are equally clear as the energy consumption related to cooling can be reduced significantly. This means that designers can reduce the size of the air conditioning system, or even eliminate it entirely.

Coated circuit boards

The VLT® High Power Drive conforms as standard to class 3C3 (IEC 60721-3-3) to ensure long lifetime even in harsh environments.

Ruggedized for extra protection

The VLT® High Power Drive in a D enclosure is available in a 'ruggedized' version that ensures the components remain firmly in place in environments characterized by high degrees of vibration, such as Marine and mobile equipment.



3C3

Coated PCBs as standard in all high-power drives

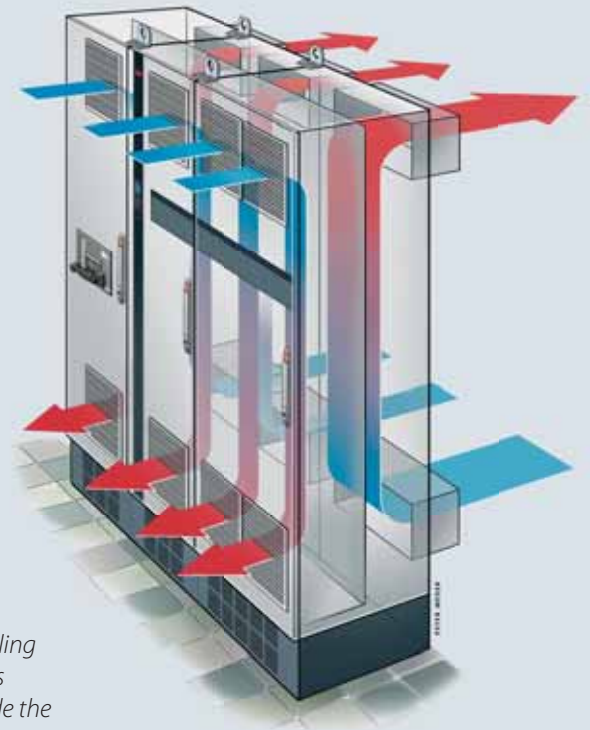
Back-channel cooling gives up to **90% reduction** in investment for air cooling systems



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



Back-channel cooling
By directing air through a rear cooling channel up to 80-90% of the drive's heat loss is removed directly outside the installation room.



Optimize performance and **grid protection**

Built-in protection

The VLT® High Power Drive contains all the modules necessary for compliance with EMC standards.

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

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

Expand grid and motor protection with filter solutions

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

- VLT® Advanced Harmonic Filter AHF
- VLT® Advanced Active Filter AAF
- VLT® Low Harmonic Drives
- VLT® 12-pulse Drives

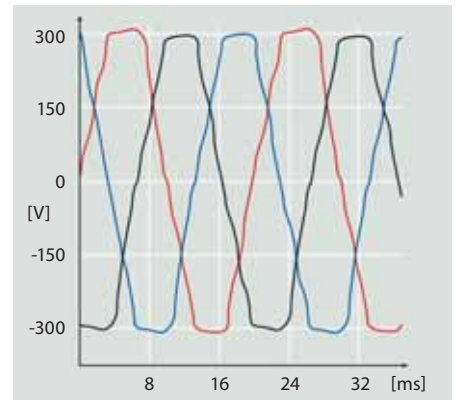
Provide extra motor protection with:

- VLT® Sine-wave Filter
- VLT® dU/dt Filter
- VLT® Common Mode Filters

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

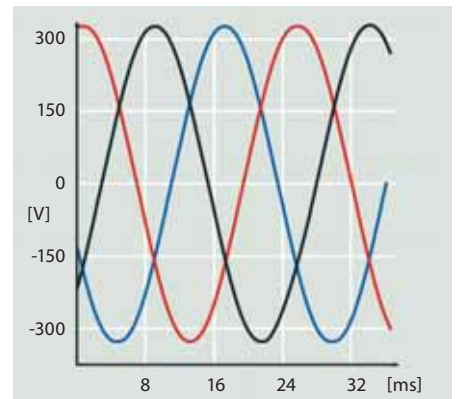
Use motor cables up to 300 m

The design of the VLT® High Power Drive makes it a perfect choice in applications that require long motor cables. Without needing additional components, the drive provides trouble-free operation with cable lengths of up to 150 m shielded or 300 m unshielded. This allows the drive to be installed in a central control room, away from the application without affecting motor performance.



Harmonic distortion

Electrical interference reduces efficiency and risks harming equipment.



Optimized harmonic performance

Efficient harmonic mitigation protects electronics and increases efficiency.

EMC Standards		Conducted emission		
Standards and requirements	EN 55011 <i>Facility operators must comply with EN 55011</i>	Class B Housing and light industries	Class A Group 1 Industrial environment	Class A Group 2 Industrial environment
	EN/IEC 61800-3 <i>Converter manufacturers must conform to EN 61800-3</i>	Category C1 First environment, home and office	Category C2 First environment, home and office	Category C3 Second environment
Compliance ¹⁾		■	■	■

¹⁾ Compliance to mentioned EMC classes depends on the selected filter. For further details see the design guides.





Harmonic filters

- Advanced active filter
- Advanced harmonic filter
- Low harmonic drives
- 12-pulse drives

Adverse effects of harmonics

- Limitations on supply and network utilization
- Increased transformer, motor and cable heating
- Reduced equipment lifetime
- Costly equipment downtime
- Control system malfunctions
- Pulsating and reduced motor torque
- Audible noise

Harmonics mitigation

The mains voltage supplied by electricity utilities to homes, businesses and industry should be a uniform sinusoidal voltage with a constant amplitude and frequency.

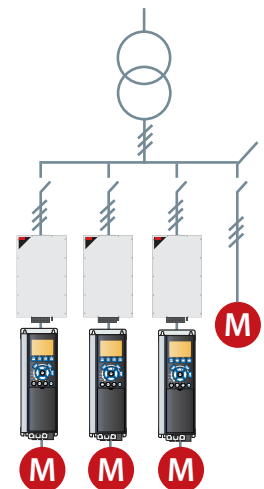
This ideal condition no longer exists in any power grid due to harmonics. Irregularities exist mainly because consumers take non-sinusoidal current from the grid, or connect items that have a nonlinear characteristic, for example strip lights, light dampers, energy-saving bulbs and AC drives.

Because of the constantly increasing use of non-linear loads, deviations become increasingly serious. Irregular power supplies influence the performance and operation of electrical equipment, so motors, AC drives and transformers must be more highly rated to maintain proper operation.

VLT® Advanced Harmonic Filter AHF 005 and AHF 010

The Danfoss harmonic filters AHF 005 and AHF 010 are specially designed to connect to the front of a VLT® drive, ensuring that the harmonic current distortion generated back to the mains is reduced to a minimum.

VLT® Advanced Harmonic Filter AHF 005 (5% THDi)
 VLT® Advanced Harmonic Filter AHF 010 (10% THDi)
 Voltage range: 380-690 V
 Filter current range: 10-1720 A



DC chokes that
 reduce mains
 interference
 to a THDi of

40%

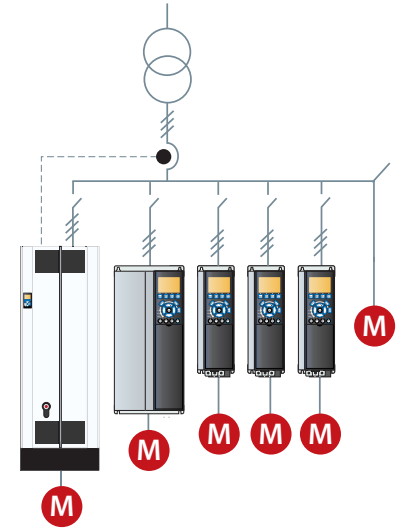
VLT® Advanced Active Filter AAF 006

VLT® Advanced Active Filters identify harmonic distortion from non-linear loads and inject counter-phase harmonic and reactive currents into the AC line to cancel out the distortion, resulting in distortion levels of no more than 5% THDv. The optimal sinusoidal waveform of the AC power is restored, and the power factor of the system is reestablished at 1.

Advanced Active Filters follow the same design principles as all our other drives. The modular platform provides high energy efficiency, user friendly operation, efficient cooling and high ingress protection ratings up to IP54.

One filter can be used for several AC drives, helping owners reduce system costs. Easy commissioning saves installation costs, and the filter's maintenance free design eliminates the running expenses.

VLT® Advanced Active Filter AAF 006
Voltage range: 380-480 V
Corrective current range: 190-400 A



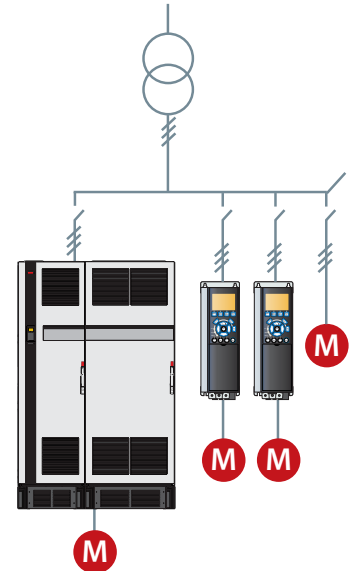
VLT® Low Harmonic Drive

The VLT® Low Harmonic Drive continuously regulates the network and load conditions without affecting the connected motor.

The drive combines the well-known performance and reliability of standard VLT® drives with a VLT® Advanced Active Filter. The result is a powerful, motor-friendly solution that provides the highest possible harmonic mitigation with THDi (total harmonic current distortion) of maximum 5%.

Completely integrated without need for additional components such as an LCL filter.

VLT® Low Harmonic Drive
Voltage range: 380-480 V
Power range: 160-710 kW



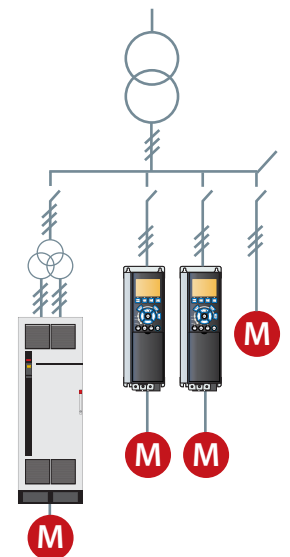
VLT® 12-Pulse Drive

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

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

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

VLT® 12-Pulse Drive
Voltage range: 250-690 V
Power range 315-1400 kW



Software tools

VLT® Motion Control Tool MCT 10

VLT® Motion Control Tool MCT 10 is a windows-based engineering tool with a clearly structured interface that provides an instant overview of all the AC drives in a system of any size. The software runs under Windows and enables data exchange over a traditional RS485 interface, fieldbus (PROFIBUS, Ethernet, or other) or via USB.

Parameter configuration is possible both online on a connected drive and offline in the tool itself. Additional documentation, such as electrical diagrams or operating manuals, can be embedded in VLT® Motion Control Tool MCT 10. This reduces the risk of incorrect configuration, while offering fast access to troubleshooting.

VLT® Energy Box

Calculate the energy consumption of HVAC applications controlled by VLT® drives and compare this with alternative – and less energy efficient – methods of air flow control.

For new installations or retrofit situations, VLT Energy Box makes it easy to evaluate and document the savings achieved by using a VLT® HVAC Drive by comparison with other types of capacity control systems.

VLT® Motion Control Tool MCT 31

The MCT 31 harmonic simulation tool is a stand-alone program for Windows and useful in the planning phase. It is easy to use, includes a database of VLT®

drives products, and provides a fast overview of the expected general system performance. It can also propose a cost-effective harmonics mitigation strategy based on the Danfoss product range.

Danfoss HCS

Danfoss HCS is a professional harmonics simulation tool that is web-based. It provides harmonic analysis of systems using VLT® and VACON® products. This tool uses a scientific simulation platform with an advanced simulation model. It uses more system parameters than the other harmonics simulation tools offered by Danfoss Drives, and therefore delivers more accurate results. Danfoss HCS presents the results of the simulation in table or graphical form.

Everything at your fingertips



Danfoss ecoSmart™

Now it's easy to determine IE and IES classes according to EN 50598-2 for VLT® and VACON® drives either alone or with a motor.

Danfoss ecoSmart™ uses nameplate data to perform the efficiency calculations, and produces a pdf report for documentation.

Danfoss ecoSmart™ app:



Danfoss ecoSmart™ online tool:

<http://ecosmart.danfoss.com>



MyDrive® Portfolio

MyDrive® Portfolio provides an overview of the entire Danfoss AC-drives portfolio. You can use it to search for information on a particular product or to find comprehensive material related to a specific industry and its applications and products. There are also links to case studies, videos, brochures and manuals. You can browse through the information online and also download the PDFs

to your mobile device. Everything you find can also be added to an e-mail for sharing.

MyDrive® Portfolio app:



Intuitive set-up with graphical interface

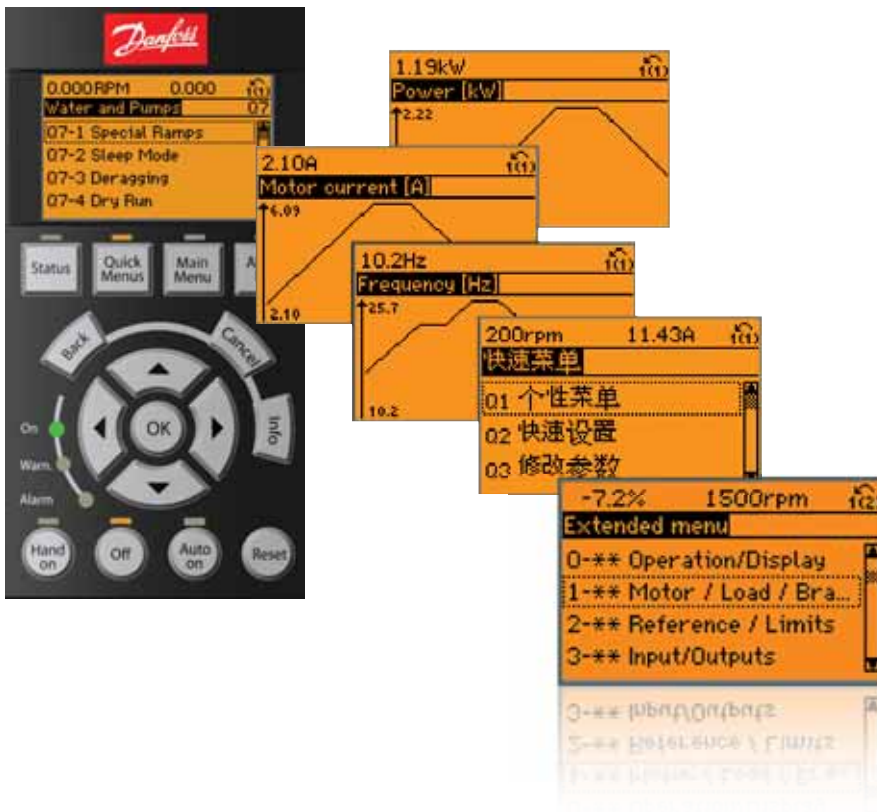
VLT® drives feature a user-friendly, hot pluggable local control panel (LCP) for easy set-up and parameter configuration.

After choosing language, navigate through set-up parameters, or you can use a pre-defined quick menu or a SmartStart guide for application specific set-up.

The LCP can be detached and used to copy settings to other drives in the system. It can also be mounted remotely

on a control panel fascia. This enables the user to take full advantage of the LCP, eliminating the need for additional switches and instrumentation.

My Personal Menu allows direct access to up to 50 user-selectable parameters.



The modular VLT® technology platform adapted to your requirements

VLT® AutomationDrive, VLT® HVAC Drive, VLT® Refrigeration Drive and VLT® AQUA Drive are all built on a modular platform allowing for highly-customized drives which are mass produced, tested, and delivered from the factory.

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

1. Display options

Danfoss drives' renowned removable Local Control Panel (LCP) has an improved user interface. Choose between 27 built-in languages (including Chinese) or have it customized with your own. Languages can be changed by the user.

2. Hot pluggable LCP

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

3. Integrated manual

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

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

4. Fieldbus options

See complete list of available fieldbus options on page 61.

5. I/O options

The general purpose I/O, relay and thermistor expands the flexibility of the drives.

6. Control terminals

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

7. 24 V supply

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

8. RFI filter suitable for IT-grids

All high-power drives come standard with RFI filtering according to EN 61800-3 Cat. C3/EN 55011 class A2. A1/C2 RFI filters according to IEC 61000 and EN 61800 standards as integrated options.

9. Modular construction and ease of maintenance

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

10. Programmable options

A freely-programmable motion control option for user-specific control algorithms and programs allows the integration of PLC programs.

11. Ruggedized printed circuit boards

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

12. Back-channel cooling

The unique design uses a back channel to pass cooling air over heat sinks. This design allows 80-90% of the heat losses to be exhausted directly outside of the enclosure with minimal air passing through the electronics area. This reduces temperature rise and contamination of the electronic components for improved reliability and increased functional life.

As an option, the back-channel cooling duct can be supplied in stainless steel to provide a degree of corrosion resistance against conditions such as those found in salt-air environments near the ocean.

13. Enclosure

The drive meets relevant requirements for all possible installation conditions. Enclosure class IP00/chassis, IP20/chassis, IP21/NEMA Type 1, and IP54/NEMA Type 12. A kit is available to increase the enclosure class on the D drive to NEMA 3R.

14. DC-link reactor

The built-in DC-link reactor ensures low harmonic disturbance of the power supply in accordance with IEC-61000-3-12. The result is a more compact design with higher efficiencies than competitive systems with external mounted AC chokes.

15. Input mains option

Various input configurations are available, including fuses, mains disconnect switch, or RFI filter.



Efficiency is vital for high-power drives

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

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

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

Safety

VLT® High Power Drive can be ordered with the Safe Torque Off (Safe Stop) function in compliance with EN ISO 13849-1 Category 3 PLd and SIL2 according to IEC 62061/IEC 61508. This feature prevents the unit from generating the voltage required to rotate the motor.

The safety functions can be extended to include SS1, SLS, SMS, SSM, safe jog mode and more with the VLT® Safety Option MCB 140 Series and VLT® Safety Option MCB 150 Series (FC 302 only).



Technical data

Basic unit without extensions

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

* Two of the inputs can be used as digital outputs

** 1 ms for FC302 and 5 ms for FC 102/103/202

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

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

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

Control card	
USB interface	1.1 (Full Speed)
USB plug	Type "B"
RS485 interface	Up to 115 kBaud
Max. load (10 V)	15 mA
Max. load (24 V)	200 mA

Relay outputs	
Programmable relay outputs	2
Max. terminal load (AC) on 1-3 (NC), 1-2 (NO), 4-6 (NC) power card	240 V AC, 2 A
Max. terminal load (AC -1) on 4-5 (NO) power card	400 V AC, 2 A
Min. terminal load on 1-3 (NC), 1-2 (NO), 4-6 (NC), 4-5 (NO) power card	24 V DC 10 mA, 24 V AC 20 mA

Surroundings/external	
Ingress protection class	IP: 00/20/21/54 UL Type: Chassis/1/12 Outdoor/3R
Vibration test	0.7 g
Max. relative humidity	5-95% (IEC 721-3-3); Class 3K3 (non-condensing) during operation
Ambient temperature	Max. 50° C without derating
Galvanic isolation of all	I/O supplies according to PELV
Aggressive environment	Designed for 3C3 (IEC 60721-3-3)

Ambient temperature	
<ul style="list-style-type: none"> - Operating temperature range is -10 °C to 50 °C without derating Max 55 °C with derating - Electronic motor thermal protection against overload - Protection against overtemperature - The AC drive is protected against short circuits on motor terminals R, S, T - The AC drive is protected against ground faults on motor terminals U, V, W - Protection against mains phase loss 	



Industry-specific solutions for high-power applications

What is your industry? Where are your opportunities to save energy? Find just the drive you need to improve efficiency and reduce operating costs in a wide range of heavy duty applications. Danfoss offers an extensive range:

- Broad power size and supply voltage range
- Drives tailored to uses such as HVAC, water, wastewater, and more
 - Customized set-up wizards suited to the industry, enabling fast commissioning

- Specialized application-related features for optimal performance
- Fieldbus options and connectivity to suit your communications environment

- Compact modules and innovative cooling concepts to save space and costs in your facilities
- Built-in harmonic mitigation, as well as filter options, for high-quality supply and protection of equipment
- Ingress protection and corrosion resistance to enable reliable performance in a wide variety of environments

- Robust products that are individually factory-tested to ensure you receive top quality

We also offer comprehensive support before, during and after installation. With local offices in more than 100 countries, we are never far away with these services:

- Application engineering in the planning phase
- Useful PC tools to support easy and fast commissioning and service
- Local service and support to react fast and minimize downtime

Use the guide below to see where VLT® drives are already saving energy in a broad range of applications and industries.



Application	Mining and cement	Chemical	Food and beverage	Material handling	Textile	Water and wastewater	HVAC	Refrigeration
Auger conveyor	■		■					
Ball mill	■							
Beater type mixer	■		■					
Belt conveyor	■		■	■				
Center-driven winder					■			
Centrifugal fan	■	■	■	■	■	■	■	■
Centrifugal pump	■	■	■	■	■	■	■	■
Centrifuge		■	■			■		
Compressor		■	■			■	■	■
Cone crusher	■							
Cooling/baking conveyor			■	■				
Crane				■				
Decanter		■						
Diverter			■	■				
Dosing		■				■		
Dryer		■				■		
Extruder		■	■					
Grinder/roller mill		■						
Hoist				■				
Impact crusher	■							
Induced draft fan	■		■					
Jaw crusher	■							
Kneader		■						
Mixer		■				■		
Palletizer			■	■	■			
Positive displacement pump	■		■	■	■	■		
Rotary kiln	■							
Screw compressor			■		■	■	■	■



Dedicated

Application-
optimized products
that target your
needs

VLT® AutomationDrive FC 302

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

Motor independent

The VLT® AutomationDrive FC 302 can control nearly all standard industrial motor technologies, including permanent magnet motors, copper rotor motors and direct line PM.

The AC drive is designed to work with all common supply voltages: 380-500 V and 525-690 V. This means that system designers, OEMs and end users are free to connect the drive to their selected motor and remain confident that the system will perform to the highest possible standards.

Safety where it matters

The VLT® AutomationDrive FC 302 features Safe Torque Off as standard. Easily configurable options are available: SS1, SLS, SMS and SSM.

Integrated Motion Controller

The Integrated Motion Controller software enables the VLT® AutomationDrive FC 302 to run induction and PM motors in positioning and synchronization applications, both with and without encoders.

Harmonic mitigation

Advanced active filter variants reduce harmonics to below 3% at best. 12-pulse drives provide robust, cost-effective harmonics reduction in supply applications.

Reduce costs with compact drives

A compact design and efficient heat management enable the drives to take up less space in control rooms and panels, thereby reducing initial costs. Compact dimensions are also an advantage in applications where drive space is restricted, making it possible for designers to develop smaller applications without being forced to compromise on protection and grid quality. For example, VLT® AutomationDrive FC 302 in a D enclosure size is 25-68% smaller than equivalent drives.

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

The IP20 version is optimized for cabinet mounting and features covered power terminals to prevent accidental contact. The unit can also be ordered with optional fuses or brake chopper in the same package size. Control and power cables are fed in separately at the bottom.

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

Power range

380-500 V

Normal overload:

400 V212-1720 A, 110-1000 kW
460 V190-1530 A, 150-1350 hp

High overload:

400 V177-1460 A, 90-800 kW
460 V160-1380 A, 125-1200 hp

525-690 V

Normal overload:

575 V86-1415 A, 75-1550 hp
690 V86-1415 A, 75-1400 kW

High overload:

575 V73-1260 A, 60-1350 hp
690 V73-1260 A, 55-1200 kW

Ingress protection ratings

IP00, IP20, IP21 and IP54.

Options

See page 61.

For more detailed information please see the FC 300 Design Guide, MG.34.xx.yy available at <http://drivesliterature.danfoss.com/>

VLT® AutomationDrive (FC 302) 380-500 V AC – High overload ¹⁾

High overload ¹⁾													Type code	Enclosure size and ingress protection rating										
Output current		Typical shaft output		Output power		Rated input current		Estimated power loss at max load ²⁾		Output frequency ²⁾		Max. external input mains fuses ²⁾		Weight, kg (lbs) ²⁾			Beginning with ³⁾		VLT® 6-Pulse		VLT® 12-Pulse		VLT® Low Harmonic Drive	
[A]		[kW]		[kVA]		[A]		[W]		Hz														
Con. I _N	Inter. I _N (MAX 4) (60 s)			Con.	Inter. (60 s)							IP00	IP20	IP21/IP54				IP00	IP20	IP21/IP54				
400 V motor nominal voltage (380-440 V)																								
177	266	90	123	185	171	2031																		
212	318	110	147	221	204	2289																		
260	390	132	180	270	251	2923																		
315	473	160	218	327	304	3093																		
395	593	200	274	411	381	4039																		
480	720	250	333	500	463	5005																		
480	720	250	333	499	472																			
600	900	315	416	624	590	6794																		
658	987	355	456	684	647	7498																		
695	1043	400	482	722	684	7976																		
800	1200	450	554	831	779	9031																		
880	1320	500	610	915	857	10146																		
990	1485	560	686	1029	964	10649																		
1120	1680	630	776	1164	1090	12490																		
1260	1890	710	873	1309	1227	14244																		
1460	2190	800	1012	1517	1422	15466																		
460 V motor nominal voltage (441-500 V)																								
160	240	125 hp	127	191	154	1828																		
190	285	150 hp	151	227	183	2051																		
240	360	200 hp	191	287	231	2689																		
302	453	250 hp	241	362	291	2872																		
361	542	300 hp	288	432	348	3575																		
443	665	350 hp	353	530	427	4458																		
443	665	350 hp	353	529	436																			
540	810	450 hp	430	645	531	6118																		
590	885	500 hp	470	705	580	6672																		
678	1017	550 hp	540	810	667	7814																		
730	1095	600 hp	582	872	711	8212																		
780	1170	650 hp	621	932	759	8860																		
890	1335	750 hp	709	1064	867	9414																		
1050	1575	900 hp	837	1255	1022	11581																		
1160	1740	1000 hp	924	1386	1129	13005																		
1380	2070	1200 hp	1100	1649	1344	14556																		
500 V motor nominal voltage (441-500 V)																								
160	240	110	139	209	154	1828																		
190	285	132	165	248	183	2051																		
240	360	160	208	312	231	2089																		
302	453	200	262	393	291	2872																		
361	542	250	313	470	348	3575																		
443	665	315	384	576	427	4458																		
443	665	315	384	575	436																			
540	810	355	468	701	531	6118																		
590	885	400	511	766	580	6672																		
678	1017	500	587	881	667	7814																		
730	1095	530	632	948	711	8212																		
780	1170	560	675	1013	759	8860																		
890	1335	630	771	1156	867	9414																		
1050	1575	710	909	1364	1022	11581																		
1160	1740	800	1005	1507	1129	13005																		
1380	2070	1000	1195	1793	1344	14556																		

¹⁾ Drive defaults to high overload. Normal overload is an optional software setting.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 150% of continuous current for high overload.

VLT® AutomationDrive (FC 302) 380-500 V AC – Normal overload ¹⁾

Normal overload											Type code	Enclosure size and ingress protection rating					
Output current		Typical shaft output		Output power		Rated input current	Estimated power loss at max load ²⁾	Output frequency ²⁾	Max. external input mains fuses	Weight, kg (lbs) ²⁾			Beginning with ³⁾	VLT® 6-Pulse		VLT® 12-Pulse	VLT® Low Harmonic Drive
[A]	[kW]	[kVA]	[A]	[W]	Hz		IP00	IP20	IP21/IP54	IP00	IP20	IP21/IP54					
Con. I _N	Inter. I _N (Max.4) (60 s)	Con.	Inter. (60 s)														
212	233	110	147	162	204	2559								D3h	D1h/D5h/D6h		
260	286	132	180	198	251	2954								D3h	D1h/D5h/D6h		
315	347	160	218	240	304	3770								D3h	D1h/D5h/D6h		D1n
395	435	200	274	301	381	4116								D4h	D2h/D7h/D8h		D2n
480	528	250	333	366	463	5137								D4h	D2h/D7h/D8h		D2n
588	647	315	407	448	567	6674								D4h	D2h/D7h/D8h		
600	660	315	416	457	590											F8/F9	E9
658	724	355	456	501	647	7532										F8/F9	E9
745	820	400	516	568	733	8677										F8/F9	E9
800	880	450	554	610	787	9473										F8/F9	E9
880	968	500	610	671	857	10162									F1/F3	F10/F11	F18
990	1089	560	686	754	964	11822									F1/F3	F10/F11	F18
1120	1232	630	776	854	1090	12512									F1/F3	F10/F11	F18
1260	1386	710	873	960	1227	14674									F1/F3	F10/F11	F18
1460	1606	800	1012	1113	1422	17293									F2/F4	F12/F13	
1720	1892	1000	1192	1311	1675	19278									F2/F4	F12/F13	
190	209	150 hp	151	166	183	2261								D3h	D1h/D5h/D6h		
240	264	200 hp	191	210	231	2724								D3h	D1h/D5h/D6h		
302	332	250 hp	241	265	291	3628								D3h	D1h/D5h/D6h		D1n
361	397	300 hp	288	317	348	3569								D4h	D2h/D7h/D8h		D2n
443	487	350 hp	353	388	427	4566								D4h	D2h/D7h/D8h		D2n
535	588	450 hp	426	469	516	5714								D4h	D2h/D7h/D8h		
540	594	450 hp	430	473	531											F8/F9	E9
590	649	500 hp	470	517	580	6724										F8/F9	E9
678	746	600 hp	540	594	667	7819										F8/F9	E9
730	803	600 hp	582	640	718	8527										F8/F9	E9
780	858	650 hp	621	684	759	8876									F1/F3	F10/F11	F18
890	979	750 hp	709	780	867	10424									F1/F3	F10/F11	F18
1050	1155	900 hp	837	920	1022	11595									F1/F3	F10/F11	F18
1160	1276	1000 hp	924	1017	1129	13213									F1/F3	F10/F11	F18
1380	1518	1200 hp	1100	1209	1344	16229									F2/F4	F12/F13	
1530	1683	1350 hp	1219	1341	1490	16624									F2/F4	F12/F13	
190	209	132	165	182	183	2261								D3h	D1h/D5h/D6h		
240	264	160	208	229	231	2724								D3h	D1h/D5h/D6h		
302	332	200	262	288	291	3628								D3h	D1h/D5h/D6h		D1n
361	397	250	313	344	348	3569								D4h	D2h/D7h/D8h		D2n
443	487	315	384	422	427	4566								D4h	D2h/D7h/D8h		D13
535	588	355	463	509	516	5714								D4h	D2h/D7h/D8h		
540	594	355	468	514	531											F8/F9	E9
590	649	400	511	562	580	6724										F8/F9	E9
678	746	500	587	646	667	7819										F8/F9	E9
730	803	530	632	695	718	8527										F8/F9	E9
780	858	560	675	743	759	8876									F1/F3	F10/F11	F18
890	979	630	771	848	867	10424									F1/F3	F10/F11	F18
1050	1155	710	909	1000	1022	11595									F1/F3	F10/F11	F18
1160	1276	800	1005	1105	1129	13213									F1/F3	F10/F11	F18
1380	1518	1000	1195	1315	1344	16229									F2/F4	F12/F13	
1530	1683	1100	1325	1458	1490	16624									F2/F4	F12/F13	

Consult factory for higher output drives

¹⁾ Drive defaults to high overload. Normal overload is an optional software setting.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload.

VLT® AutomationDrive (FC 302) 525-690 V AC – High overload ¹⁾

High overload ¹⁾											Type code	Enclosure size & ingress protection rating																				
Output current		Typical shaft output		Output power		Rated input current	Estimated power loss at max load ²⁾	Output frequency ²⁾	Max. external input mains fuses (mains)	Weight, kg (lbs) ²⁾			Beginning with ²⁾	VLT® 6-Pulse			VLT® 12-Pulse															
[A]		[kW]		[kVA]		[A]	[W]	Hz	IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54																	
Con. I _N	Inter. I _N (60 s) ⁴⁾			Con.	Inter. (60 s)																											
525V motor nominal voltage (525-550 V)																	76	122	45	72	108	77	1018	0-590	160	62 (135)	62 (135)	FC-302N55KT7	D3h	D1h/D5h/D6h		
																	90	135	55	86	129	89	1162					FC-302N75KT7	D3h	D1h/D5h/D6h		
																	113	170	75	108	161	110	1430					FC-302N90KT7	D3h	D1h/D5h/D6h		
																	137	206	90	131	196	130	1742					FC-302N110T7	D3h	D1h/D5h/D6h		
																	162	243	110	154	231	158	2080					FC-302N132T7	D3h	D1h/D5h/D6h		
																	201	302	132	191	287	198	2361					FC-302N160T7	D4h	D2h/D7h/D8h		
																	253	380	160	241	362	245	3012	0-500	550	125 (275)	125 (275)	FC-302N200T7	D4h	D2h/D7h/D8h		
																	303	455	200	289	433	299	3642					FC-302N250T7	D4h	D2h/D7h/D8h		
																	360	540	250	343	516	355	4146					FC-302N315T7	D4h	D2h/D7h/D8h		
																	395	593	300	376	564	381	4424					FC-302P355T7	E2		E1	F8/F9
																	429	644	315	409	613	413	4795					FC-302P400T7	E2		E1	F8/F9
																	523	785	400	498	747	504	6493					FC-302P500T7	E2		E1	F8/F9
																	596	894	450	568	852	574	7383	0-500	900	236 (520) 277 (611)	313 (690)	FC-302P560T7	E2		E1	F8/F9
																	659	989	500	628	942	642	8075					FC-302P630T7			F1/F3	F10/F11
																	763	1145	560	727	1090	743	9165					FC-302P710T7			F1/F3	F10/F11
																	889	1334	670	847	1270	866	10860					FC-302P800T7			F1/F3	F10/F11
																	988	1482	750	941	1412	962	12062					FC-302P900T7			F2/F4	F12/F13
																	1108	1662	850	1056	1583	1079	13269					FC-302P1M0T7			F2/F4	F12/F13
1317	1976	1000	1255	1380	1282	16089	0-500	2000	1260 (2778)/ 1561 (3441)	1045 (2300)/ 1364 (3600)	FC-302P900T7			F2/F4	F12/F13																	
											FC-302P1M0T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
575 V motor nominal voltage (551-690 V)																	73	117	60 hp	73	110	74	1018	0-590	160	62 (135)	62 (135)	FC-302N55KT7	D3h	D1h/D5h/D6h		
																	86	129	75 hp	86	129	85	1162					FC-302N75KT7	D3h	D1h/D5h/D6h		
																	108	162	100 hp	108	161	106	1430					FC-302N90KT7	D3h	D1h/D5h/D6h		
																	131	197	125 hp	130	196	124	1800					FC-302N110T7	D3h	D1h/D5h/D6h		
																	155	233	150 hp	154	232	151	2159					FC-302N132T7	D3h	D1h/D5h/D6h		
																	192	288	200 hp	191	287	189	2446					FC-302N160T7	D4h	D2h/D7h/D8h		
																	242	363	250 hp	241	362	234	3123	0-500	550	125 (275)	125 (275)	FC-302N200T7	D4h	D2h/D7h/D8h		
																	290	435	300 hp	289	433	286	3771					FC-302N250T7	D4h	D2h/D7h/D8h		
																	344	516	350 hp	343	516	339	4258					FC-302N315T7	D4h	D2h/D7h/D8h		
																	380	570	400 hp	378	568	366	4424					FC-302P355T7	E2		E1	F8/F9
																	410	615	400 hp	408	612	395	4795					FC-302P400T7	E2		E1	F8/F9
																	500	750	500 hp	498	747	482	6493					FC-302P500T7	E2		E1	F8/F9
																	570	855	600 hp	568	852	549	7383	0-500	900	236 (520) 277 (611)	313 (690)	FC-302P560T7	E2		E1	F8/F9
																	630	945	650 hp	627	941	613	8075					FC-302P630T7			F1/F3	F10/F11
																	730	1095	750 hp	727	1091	711	9165					FC-302P710T7			F1/F3	F10/F11
																	850	1275	950 hp	847	1270	828	10860					FC-302P800T7			F1/F3	F10/F11
																	945	1418	1050 hp	941	1412	920	12062					FC-302P900T7			F2/F4	F12/F13
																	1060	1590	1150 hp	1056	1584	1032	13269					FC-302P1M0T7			F2/F4	F12/F13
1260	1890	1350 hp	1255	1381	1227	18536	0-500	2000	1260 (2778)/ 1561 (3441)	1045 (2300)/ 1364 (3600)	FC-302P900T7			F2/F4	F12/F13																	
											FC-302P1M0T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
690V motor nominal voltage (551-690 V)																	73	110	55	87	131	77	1057	0-590	160	62 (135)	62 (135)	FC-302N55KT7	D3h	D1h/D5h/D6h		
																	86	129	75	103	155	87	1205					FC-302N75KT7	D3h	D1h/D5h/D6h		
																	108	162	90	129	194	109	1480					FC-302N90KT7	D3h	D1h/D5h/D6h		
																	131	197	110	157	235	128	1800					FC-302N110T7	D3h	D1h/D5h/D6h		
																	155	233	132	185	278	155	2159					FC-302N132T7	D3h	D1h/D5h/D6h		
																	192	288	160	229	344	197	2446					FC-302N160T7	D4h	D2h/D7h/D8h		
																	242	363	200	289	434	240	3123	0-500	550	125 (275)	125 (275)	FC-302N200T7	D4h	D2h/D7h/D8h		
																	290	435	250	347	520	296	3771					FC-302N250T7	D4h	D2h/D7h/D8h		
																	344	516	315	411	617	352	4258					FC-302N315T7	D4h	D2h/D7h/D8h		
																	380	570	355	454	681	366	4589					FC-302P355T7	E2		E1	F8/F9
																	410	615	400	490	735	395	4970					FC-302P400T7	E2		E1	F8/F9
																	500	750	500	598	896	482	6707					FC-302P500T7	E2		E1	F8/F9
																	570	855	560	681	1022	549	7633	0-500	900	236 (520) 277 (611)	313 (690)	FC-302P560T7	E2		E1	F8/F9
																	630	945	630	753	1129	613	8388					FC-302P630T7			F1/F3	F10/F11
																	730	1095	710	872	1309	711	9537					FC-302P710T7			F1/F3	F10/F11
																	850	1275	800	1016	1524	828	11291					FC-302P800T7			F1/F3	F12/F11
																	945	1418	900	1129	1694	920	12524					FC-302P900T7			F2/F4	F12/F13
																	1060	1590	1000	1267	1900	1032	13801					FC-302P1M0T7			F2/F4	F12/F13
1260	1890	1200	1506	2259	1227	16719	0-500	2000	1294 (2853)/ 1595 (3516)	1045 (2300)/ 1364 (3600)	FC-302P900T7			F2/F4	F12/F13																	
											FC-302P1M0T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	
											FC-302P1M2T7			F2/F4	F12/F13																	

Consult factory for higher output drives

¹⁾ Drive defaults to high overload. Normal overload is an optional software setting.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 150% of continuous current for high overload.

VLT® AutomationDrive (FC 302) 525-690 V AC – Normal overload ¹⁾

Normal overload											Type code	Enclosure size & ingress protection rating						
Output current		Typical shaft output		Output power		Rated input current	Estimated power loss at max load ²⁾	Output frequency ²⁾	Max. external input mains fuses	Weight, kg (lbs) ²⁾			Beginning with ³⁾	VLT® 6-Pulse		VLT® 12-Pulse		
Cont. I _N	Inter. I _N (Max 4)			Con.	Inter. (60 s)		[W]	Hz		IP00	IP20	IP21/IP54		IP00	IP20	IP21/IP54		
90	99	55	86	95	89	1162							FC-302N55KT7		D3h	D1h/D5h/D6h		
113	124	75	108	119	110	1428							FC-302N75KT7		D3h	D1h/D5h/D6h		
137	151	90	131	144	130	1740							FC-302N90KT7		D3h	D1h/D5h/D6h		
162	178	110	154	170	158	2101							FC-302N110T7		D3h	D1h/D5h/D6h		
201	221	132	191	211	198	2649							FC-302N132T7		D3h	D1h/D5h/D6h		
253	278	160	241	265	245	3074							FC-302N160T7		D4h	D2h/D7h/D8h		
303	333	200	289	318	299	3723							FC-302N200T7		D4h	D2h/D7h/D8h		
360	396	250	343	377	355	4465							FC-302N250T7		D4h	D2h/D7h/D8h		
418	460	315	398	438	408	5028							FC-302N315T7		D4h	D2h/D7h/D8h		
470	517	355	448	493	453	5323							FC-302P355T7	E2		E1	F8/F9	
523	575	400	498	548	504	6010							FC-302P400T7	E2		E1	F8/F9	
596	656	450	568	625	574	7395							FC-302P500T7	E2		E1	F8/F9	
630	693	500	600	660	607	8209							FC-302P560T7	E2		E1	F8/F9	
763	839	560	727	800	743	9500							FC-302P630T7			F1/F3	F10/F11	
889	978	670	847	932	866	10872							FC-302P710T7			F1/F3	F10/F11	
988	1087	750	941	1035	962	12316							FC-302P800T7			F1/F3	F10/F11	
1108	1219	850	1056	1161	1079	13731							FC-302P900T7			F2/F4	F12/F13	
1317	1449	1000	1255	1380	1282	16190							FC-302P1M0T7			F2/F4	F12/F13	
1479	1627	1100	1409	1550	1440	18536							FC-302P1M2T7			F2/F4	F12/F13	
86	95	75 hp	86	95	85	1162							FC-302N55KT7		D3h	D1h/D5h/D6h		
108	119	100 hp	108	119	106	1428							FC-302N75KT7		D3h	D1h/D5h/D6h		
131	144	125 hp	130	144	124	1740							FC-302N90KT7		D3h	D1h/D5h/D6h		
155	171	150 hp	154	170	151	2101							FC-302N110T7		D3h	D1h/D5h/D6h		
192	211	200 hp	191	210	189	2649							FC-302N132T7		D3h	D1h/D5h/D6h		
242	266	250 hp	241	265	234	3074							FC-302N160T7		D4h	D2h/D7h/D8h		
290	319	300 hp	289	318	286	3723							FC-302N200T7		D4h	D2h/D7h/D8h		
344	378	350 hp	343	377	339	4465							FC-302N250T7		D4h	D2h/D7h/D8h		
400	440	400 hp	398	438	390	5028							FC-302N315T7		D4h	D2h/D7h/D8h		
450	495	450 hp	448	493	434	5323							FC-302P355T7	E2		E1	F8/F9	
500	550	500 hp	498	548	482	6010							FC-302P400T7	E2		E1	F8/F9	
570	627	600 hp	568	624	549	7395							FC-302P500T7	E2		E1	F8/F9	
630	693	650 hp	627	690	607	8209							FC-302P560T7	E2		E1	F8/F9	
730	803	750 hp	727	800	711	9500							FC-302P630T7			F1/F3	F10/F11	
850	935	950 hp	847	931	828	10872							FC-302P710T7			F1/F3	F10/F11	
945	1040	1050 hp	941	1035	920	12316							FC-302P800T7			F1/F3	F10/F11	
1060	1166	1150 hp	1056	1161	1032	13731							FC-302P900T7			F2/F4	F12/F13	
1260	1386	1350 hp	1255	1380	1227	16190							FC-302P1M0T7			F2/F4	F12/F13	
1415	1557	1550 hp	1409	1550	1378	18536							FC-302P1M2T7			F2/F4	F12/F13	
86	95	75	103	113	87	1204							FC-302N55KT7		D3h	D1h/D5h/D6h		
108	119	90	129	142	109	1477							FC-302N75KT7		D3h	D1h/D5h/D6h		
131	144	110	157	172	128	1798							FC-302N90KT7		D3h	D1h/D5h/D6h		
155	171	132	185	204	155	2167							FC-302N110T7		D3h	D1h/D5h/D6h		
192	211	160	229	252	197	2740							FC-302N132T7		D3h	D1h/D5h/D6h		
242	266	200	289	318	240	3175							FC-302N160T7		D4h	D2h/D7h/D8h		
290	319	250	347	381	296	3851							FC-302N200T7		D4h	D2h/D7h/D8h		
344	378	315	411	452	352	4616							FC-302N250T7		D4h	D2h/D7h/D8h		
400	440	400	478	526	400	5155							FC-302N315T7		D4h	D2h/D7h/D8h		
450	495	450	538	592	434	5529							FC-302P355T7	E2		E1	F8/F9	
500	550	500	598	657	482	6239							FC-302P400T7	E2		E1	F8/F9	
570	627	560	681	749	549	7653							FC-302P500T7	E2		E1	F8/F9	
630	693	630	753	828	607	8495							FC-302P560T7	E2		E1	F8/F9	
730	803	710	872	960	711	9863							FC-302P630T7			F1/F3	F10/F11	
850	935	800	1016	1117	828	11304							FC-302P710T7			F1/F3	F10/F11	
945	1040	900	1129	1242	920	12798							FC-302P800T7			F1/F3	F10/F11	
1060	1166	1000	1267	1394	1032	14250							FC-302P900T7			F2/F4	F12/F13	
1260	1386	1200	1506	1656	1227	16821							FC-302P1M0T7			F2/F4	F12/F13	
1415	1557	1400	1691	1860	1378	19247							FC-302P1M2T7			F2/F4	F12/F13	

Consult factory for higher output drives

¹⁾ Drive defaults to high overload. Normal overload is an optional software setting.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload.

Highest harmonic performance

at lowest operating expenses in its power range



30%

cost reduction in 1st year compared with traditional drive systems

VLT® AQUA Drive FC 202

A VLT® AQUA Drive is built on a flexible, modular design to provide an extraordinarily versatile motor control solution. The drive is equipped with a wide range of features dedicated to the water/wastewater business. Optimal process control, higher quality output and reduce costs related to spare parts and service, and much more can be achieved.

Up to 1.4 MW

Available in a performance range from 0.25 kW to 1.4 MW the VLT® AQUA Drive FC 202 series can control nearly all standard industrial motor technologies, including permanent magnet motors, synchronous reluctance motors, copper rotor motors and direct line PM.

The AC drive is designed to work with all common supply voltage ranges: 380-480 V, 525-600 V and 525-690 V. This means that system designers, OEMs and end users are free to connect the drive to their selected motor and remain confident that the system will perform to the highest possible standards.

690 V

The 690 V versions of VLT® AQUA Drive units can control motors up to 1.4 MW without step-down transformer. This enables you to choose from a broad variety of compact, reliable and efficient drives for demanding applications operating from 690 V mains networks.

Focus on water and pumps

The VLT® AQUA Drive FC 202 drives and controls all types of pumps. In addition to the widely-used centrifugal pumps (quadratic load torque), the VLT® AQUA Drive FC 202 is ideal for displacement pumps or eccentric screw pumps (constant load torque).

Dedicated functions such as burst pipe monitoring, dry-running protection and flow compensation provide security and empower your pumping application independent of the motor technology.

Cascade controller as standard

The cascade controller connects or disconnects pumps as necessary and according to specified limits. It also enables master/follower operation. Extended functionality is an available option.

Direct outdoor installation

As standard, Danfoss offers AC drives with protection class IP54/NEMA 3R enclosures. In addition to the convenience of having the AC drive close to the pump, this type of installation typically reduces cable costs, removes the need for air-conditioning capacity and lowers control room costs.

Designed for minimum 10 years' lifetime

With the VLT® AQUA Drive's high quality components, maximum 80% load on components and intelligent heat management reducing dust on PCB's, the need for routine scheduled parts replacements, such as electrolytic capacitors and fans, has been removed.

Power range

380-480 V

Normal overload:

400 V212-1720 A, 110-1000 kW
460 V190-1530 A, 150-1350 hp

High overload:

400 V177-1460 A, 90-800 kW
460 V160-1380 A, 125-1200 hp

525-690 V

Normal overload:

575 V86-1415 A, 75-1550 hp
690 V86-1415 A, 75-1400 kW

High overload:

575 V73-1260 A, 60-1350 hp
690 V73-1260 A, 55-1200 kW

Ingress protection ratings

IP00, IP20, IP21 and IP54.

Options

See page 61.

For more detailed information please see the FC 200 Design Guide, MG.20.xx.yy available at <http://drivesliterature.danfoss.com/>

VLT® AQUA Drive (FC 202) 380-480 V AC– High overload ⁵⁾

High overload ⁵⁾											Type code	Enclosure size & ingress protection rating							
Output current		Typical shaft output		Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ²⁾	Max. external input mains fuses [A] ²⁾	Weight, kg (lbs) ²⁾			Beginning with ³⁾	VLT® 6-Pulse		VLT® 12-Pulse	VLT® Low Harmonic Drive		
[A]		[kW]		[kVA]		[A]	[W]	Hz	IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54				
Con. I _{NB,5}	Inter. I _{Max} (60 s) ⁴⁾	Con.	Inter. (60 s)																
400 V motor nominal voltage (380-440 V)	177	266	90	123	185	171	2031	0-590	315			FC-202N110T4		D3h	D1h/D5h/D6h				
	212	318	110	147	220	204	2289		350		62 (135)	62 (135)	FC-202N132T4		D3h	D1h/D5h/D6h			
	260	390	132	180	270	251	2923		400				FC-202N160T4		D3h	D1h/D5h/D6h		D1n	
	315	473	160	218	327	304	3093		550				FC-202N200T4		D4h	D2h/D7h/D8h		D2n	
	395	593	200	274	411	381	4039		630		125 (275)	125 (275)	FC-202N250T4		D4h	D2h/D7h/D8h		D2n	
	480	720	250	333	500	463	5005		800				FC-202P315T4		D4h	D2h/D7h/D8h	F8/F9	E9	
	600	900	315	416	624	590	6794		900	234 (516)		270 (595)	FC-202P355T4	E2		E1	F8/F9	E9	
	658	987	355	456	684	647	7498			236 (520)		272 (600)	FC-202P400T4	E2		E1	F8/F9	E9	
	695	1043	400	482	722	684	7976			277 (611)		313 (690)	FC-202P450T4	E2		E1	F8/F9	E9	
	800	1200	450	554	831	779	9031		1600				FC-202P500T4			F1/F3	F10/F11	F18	
	880	1320	500	610	915	857	10146						1045 (2300)/1364 (3000)	FC-202P560T4			F1/F3	F10/F11	F18
	990	1485	560	686	1029	964	10649		2000				FC-202P630T4			F1/F3	F10/F11	F18	
	1120	1680	630	776	1164	1090	12490							FC-202P710T4			F1/F3	F10/F11	F18
	1260	1890	710	873	1309	1227	14244		2500				FC-202P800T4			F2/F4	F12/F13		
	1460	2190	800	1012	1517	1422	15466						1293 (2850)/1633 (3600)	FC-202P1M0T4			F2/F4	F12/F13	
	460 V motor nominal voltage (441-480 V)	160	240	125 hp	127	191	158		1828	0-590	315			FC-202N110T4		D3h	D1h/D5h/D6h		
		190	285	150 hp	151	227	183		2051		350		62 (135)	62 (135)	FC-202N132T4		D3h	D1h/D5h/D6h	
240		360	200 hp	191	287	231	2689	400					FC-202N160T4		D3h	D1h/D5h/D6h		D1n	
302		453	250 hp	241	362	291	2872	550					FC-202N200T4		D4h	D2h/D7h/D8h		D2n	
361		542	300 hp	288	432	348	3575	630			125 (275)	125 (275)	FC-202N250T4		D4h	D2h/D7h/D8h		D2n	
443		665	350 hp	353	530	436	4458	800					FC-202P315T4		D4h	D2h/D7h/D8h	F8/F9	E9	
540		810	450 hp	430	645	531	6118	900	234 (516)			270 (595)	FC-202P355T4	E2		E1	F8/F9	E9	
590		885	500 hp	470	705	580	6672		236 (520)			272 (600)	FC-202P400T4	E2		E1	F8/F9	E9	
678		1017	550 hp	540	810	667	7814		277 (611)			313 (690)	FC-202P450T4	E2		E1	F8/F9	E9	
730		1095	600 hp	582	872	711	8212	1600					FC-202P500T4			F1/F3	F10/F11	F18	
780		1170	650 hp	621	932	759	8860						1045 (2300)/1364 (3000)	FC-202P560T4			F1/F3	F10/F11	F18
890		1335	750 hp	709	1064	867	9414	2000					FC-202P630T4			F1/F3	F10/F11	F18	
1050		1575	900 hp	837	1255	1022	11581							FC-202P710T4			F1/F3	F10/F11	F18
1160		1740	1000 hp	924	1386	1129	13005	2500					FC-202P800T4			F2/F4	F10/F11		
1380		2070	1200 hp	1100	1649	1344	14556						1293 (2850)/1633 (3600)	FC-202P1M0T4			F2/F4	F10/F11	

Consult factory for higher output drives

¹⁾ Does not apply to VLT® Low Harmonic Drive.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload
⁵⁾ Drive defaults to normal overload. High overload is an optional software setting.

VLT® AQUA Drive (FC 202) 380-480 V AC– Normal overload

Normal overload											Type code	Enclosure size & ingress protection rating								
Output current		Typical shaft output		Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ²⁾	Max. external input mains fuses [A] ²⁾	Weight, kg (lbs) ²⁾			Beginning with ³⁾	VLT® 6-Pulse		VLT® 12-Pulse	VLT® Low Harmonic Drive			
[A]	[kW]	[kVA]	[A]	[W]	Hz		IP00	IP20	IP21/IP54	IP00	IP20	IP21/IP54								
Con. I _{NB,5}	Inter. I _{Max} (60 s) ⁴⁾	Con.	Inter. (60 s)																	
212	233	110	147	162	204	2555	0-590	315	62 (135)	62 (135)	FC-202N110T4		D3h	D1h/D5h/D6h						
260	286	132	180	198	251	2949		350			FC-202N132T4		D3h	D1h/D5h/D6h						
315	347	160	218	240	304	3764		400			FC-202N160T4		D3h	D1h/D5h/D6h						D2n
395	435	200	274	301	381	4109		550			FC-202N200T4		D4h	D2h/D7h/D8h						D2n
480	528	250	333	366	463	5129		630			FC-202N250T4	125 (275)	125 (275)	FC-202N250T4		D4h	D2h/D7h/D8h			D2n
588	647	315	407	448	567	6663		800			FC-202N315T4			FC-202N315T4		D4h	D2h/D7h/D8h			
600	660	315	416	457	590	6705		700			FC-202P315T4	221 (487)	263 (580)	FC-202P315T4				F8/F9	E9	
658	724	355	456	501	647	7532		234 (516)			FC-202P355T4	270 (595)	270 (595)	FC-202P355T4	E2		E1	F8/F9	E9	
745	820	400	516	568	733	8677		900			FC-202P400T4	236 (520)	272 (600)	FC-202P400T4	E2		E1	F8/F9	E9	
800	880	450	554	610	787	9473		277 (611)			FC-202P450T4		313 (690)	FC-202P450T4	E2		E1	F8/F9	E9	
880	968	500	610	671	857	10162					FC-202P500T4			FC-202P500T4			F1/F3	F10/F11	F18	
990	1089	560	686	754	964	11822					FC-202P560T4			FC-202P560T4			F1/F3	F10/F11	F18	
1120	1232	630	776	854	1090	12512		2000			FC-202P630T4			FC-202P630T4			F1/F3	F10/F11	F18	
1260	1386	710	873	960	1227	14674					FC-202P710T4			FC-202P710T4			F1/F3	F10/F11	F18	
1460	1606	800	1012	1113	1422	17293					FC-202P800T4			FC-202P800T4			F2/F4	F12/F13		
1720	1892	1000	1192	1311	1675	19278		2500			FC-202P1M0T4			FC-202P1M0T4			F2/F4	F12/F13		
190	209	150 hp	151	167	185	2257		0-590			315	62 (135)	62 (135)	FC-202N110T4		D3h	D1h/D5h/D6h			
240	264	200 hp	191	210	231	2719	350		FC-202N132T4		D3h			D1h/D5h/D6h						
302	332	250 hp	241	265	291	3622	400		FC-202N160T4		D3h			D1h/D5h/D6h						D2n
361	397	300 hp	288	316	348	3561	550		FC-202N200T4		D4h			D2h/D7h/D8h						D2n
443	487	350 hp	353	388	427	4558	630		FC-202N250T4	125 (275)	125 (275)			FC-202N250T4		D4h	D2h/D7h/D8h			D2n
535	588	450 hp	426	469	516	5703	800		FC-202N315T4					FC-202N315T4		D4h	D2h/D7h/D8h			
540	594	450 hp	430	473	531	5930	700		FC-202P315T4	221 (487)	263 (580)			FC-202P315T4				F8/F9	E9	
590	649	500 hp	470	517	580	6724	234 (516)		FC-202P355T4	270 (595)	270 (595)			FC-202P355T4	E2		E1	F8/F9	E9	
678	746	550/600 hp	540	594	667	7819	900		FC-202P400T4	236 (520)	272 (600)			FC-202P400T4	E2		E1	F8/F9	E9	
730	803	600 hp	582	640	718	8527	277 (611)		FC-202P450T4		313 (690)			FC-202P450T4	E2		E1	F8/F9	E9	
780	858	650 hp	621	684	759	8876			FC-202P500T4					FC-202P500T4			F1/F3	F10/F11	F18	
890	979	750 hp	709	780	867	10424			FC-202P560T4					FC-202P560T4			F1/F3	F10/F11	F18	
1050	1155	900 hp	837	920	1022	11595	2000		FC-202P630T4					FC-202P630T4			F1/F3	F10/F11	F18	
1160	1276	1000 hp	924	1017	1129	13213			FC-202P710T4					FC-202P710T4			F1/F3	F10/F11	F18	
1380	1518	1200 hp	1100	1209	1344	16229			FC-202P800T4					FC-202P800T4			F2/F4	F12/F13		
1530	1683	1350 hp	1219	1341	1490	16624	2500		FC-202P1M0T4					FC-202P1M0T4			F2/F4	F12/F13		

Consult factory for higher output drives

- ¹⁾ Does not apply to VLT® Low Harmonic Drive.
- ²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables..
- ³⁾ See pages 70 to 71 for the complete type code.
- ⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload

VLT® AQUA Drive (FC 202) 525-690 V AC – High overload ⁵⁾

High overload ⁵⁾											Type code	Enclosure size & ingress protection rating						
Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ¹⁾ 6-Pulse only	Max. external input mains fuses [A] ¹⁾	Weight, kg (lbs) ¹⁾			Beginning with ²⁾	VLT® 6-Pulse		VLT® 12-Pulse			
[A]	[kW]	[kW]	[A]	[W]	Hz	IP00	IP20	IP21/IP54	IP00	IP20	IP21/IP54		IP00	IP20	IP21/IP54			
Cont. I _N	Inter. I _N (60 s) ⁴⁾	Con.	Inter. (60 s)															
525 V motor nominal voltage (525-550 V)																		
76	122	45	72	108	77	1018	0-590	160	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h					
90	135	55	86	129	89	1162		200			FC-202N90KT7	D3h	D1h/D5h/D6h					
113	170	75	108	161	110	1430		315			FC-202N110T7	D3h	D1h/D5h/D6h					
137	206	90	131	196	130	1742					FC-202N132T7	D3h	D1h/D5h/D6h					
162	243	110	154	231	158	2080					FC-202N160T7	D3h	D1h/D5h/D6h					
201	302	132	191	287	198	2361					FC-202N200T7	D4h	D2h/D7h/D8h					
253	380	160	241	362	245	3012					FC-202N250T7	D4h	D2h/D7h/D8h					
303	455	200	289	433	299	3642					FC-202N315T7	D4h	D2h/D7h/D8h					
360	540	250	343	514	355	4146		550			FC-202N400T7	D4h	D2h/D7h/D8h					
395	593	300	376	564	381	4424					FC-202P450T7	E2	E1	F8/F9				
429	644	315	409	613	413	4795					FC-202P500T7	E2	E1	F8/F9				
523	785	400	498	747	504	6493					900	221 (487)	272 (600)	FC-202P560T7	E2	E1	F8/F9	
596	894	450	568	852	574	7383						313 (690)	FC-202P630T7	E2	E1	F8/F9		
659	989	500	628	942	642	8075					1600	FC-202P710T7		F1/F3	F10/F11			
763	1145	560	727	1090	743	9165		1045 (2300)/1364 (3000)				FC-202P800T7		F1/F3	F10/F11			
889	1334	670	847	1270	866	10860		FC-202P900T7					F1/F3	F10/F11				
988	1482	750	941	1412	962	12062		1260 (2778)/1561 (3441)				FC-202P1M0T7		F2/F4	F12/13			
1108	1662	850	1056	1583	1079	13269		FC-202P1M2T7					F2/F4	F12/13				
1317	1976	1000	1255	1381	1282	18536	2000	1294 (2853)/1595 (3516)	FC-202P1M4T7			F2/F4	F12/13					
575 V motor nominal voltage (551-690 V)																		
73	117	75 hp	73	110	74	1018	0-590	160	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h					
86	129	100 hp	86	129	85	1162		200			FC-202N90KT7	D3h	D1h/D5h/D6h					
108	162	125 hp	108	161	106	1430		315			FC-202N110T7	D3h	D1h/D5h/D6h					
131	197	150 hp	130	196	124	1800					FC-202N132T7	D3h	D1h/D5h/D6h					
155	233	200 hp	154	232	151	2159					FC-202N160T7	D3h	D1h/D5h/D6h					
192	288	250 hp	191	287	189	2446					FC-202N200T7	D4h	D2h/D7h/D8h					
242	363	300 hp	241	362	234	3123					FC-202N250T7	D4h	D2h/D7h/D8h					
290	435	350 hp	289	433	286	3771					FC-202N315T7	D4h	D2h/D7h/D8h					
344	516	400 hp	343	516	339	4258		550			FC-202N400T7	D4h	D2h/D7h/D8h					
380	570	400 hp	398	568	366	4424					FC-202P450T7	E2	E1	F8/F9				
410	615	500 hp	448	612	395	4795					FC-202P500T7	E2	E1	F8/F9				
500	750	600 hp	498	747	482	6493					900	236 (520)	272 (600)	FC-202P560T7	E2	E1	F8/F9	
570	855	650 hp	568	852	549	7383						277 (611)	313 (690)	FC-202P630T7	E2	E1	F8/F9	
630	945	750 hp	627	941	613	8075					1600	FC-202P710T7		F1/F3	F10/F11			
730	1095	950 hp	727	1091	711	9165		1045 (2300)/1364 (3000)				FC-202P800T7		F1/F3	F10/F11			
850	1275	1050 hp	847	1270	828	10860		FC-202P900T7					F1/F3	F10/F11				
945	1418	1150 hp	941	1412	920	12062		1260 (2778)/1561 (3441)				FC-202P1M0T7		F2/F4	F12/13			
1060	1590	1350 hp	1056	1584	1032	13269		FC-202P1M2T7					F2/F4	F12/13				
1260	1890	1550 hp	1255	1381	1227	18536	2000	1294 (2853)/1595 (3516)	FC-202P1M4T7			F2/F4	F12/13					
690 V motor nominal voltage (551-690 V)																		
73	110	75	87	131	77	1057	0-590	160	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h					
86	129	90	103	155	87	1205		200			FC-202N90KT7	D3h	D1h/D5h/D6h					
108	162	110	129	194	109	1480		315			FC-202N110T7	D3h	D1h/D5h/D6h					
131	197	132	157	235	128	1800					FC-202N132T7	D3h	D1h/D5h/D6h					
155	233	160	185	278	155	2159					FC-202N160T7	D3h	D1h/D5h/D6h					
192	188	200	229	344	197	2446					FC-202N200T7	D4h	D2h/D7h/D8h					
242	363	250	289	434	240	3123					FC-202N250T7	D4h	D2h/D7h/D8h					
290	435	315	347	520	296	3771					FC-202N315T7	D4h	D2h/D7h/D8h					
344	516	400	411	617	352	4258		550			FC-202N400T7	D4h	D2h/D7h/D8h					
400	570	450	454	681	366	4589					FC-202P450T7	E2	E1	F8/F9				
450	615	500	490	735	395	4970					FC-202P500T7	E2	E1	F8/F9				
500	750	560	598	896	482	6707					900	236 (520)	272 (600)	FC-202P560T7	E2	E1	F8/F9	
570	855	630	681	1022	549	7633						277 (611)	313 (690)	FC-202P630T7	E2	E1	F8/F9	
630	945	710	753	1129	613	8388					1600	FC-202P710T7		F1/F3	F10/F11			
730	1095	800	872	1309	711	9537		1045 (2300)/1364 (3000)				FC-202P800T7		F1/F3	F10/F11			
850	1275	900	1016	1524	828	11291		FC-202P900T7					F1/F3	F10/F11				
945	1418	1000	1129	1694	920	12542		1260 (2778)/1561 (3441)				FC-202P1M0T7		F2/F4	F12/13			
1060	1590	1200	1267	1900	1032	13801		FC-202P1M2T7					F2/F4	F12/13				
1260	1890	1400	1506	2259	1227	16719	2000	1294 (2853)/1595 (3516)	FC-202P1M4T7			F2/F4	F12/13					

Consult factory for higher output drives

¹⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
²⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload
⁵⁾ Drive defaults to normal overload. High overload is an optional software setting.

VLT® AQUA Drive (FC 202) 525-690 V AC – Normal overload

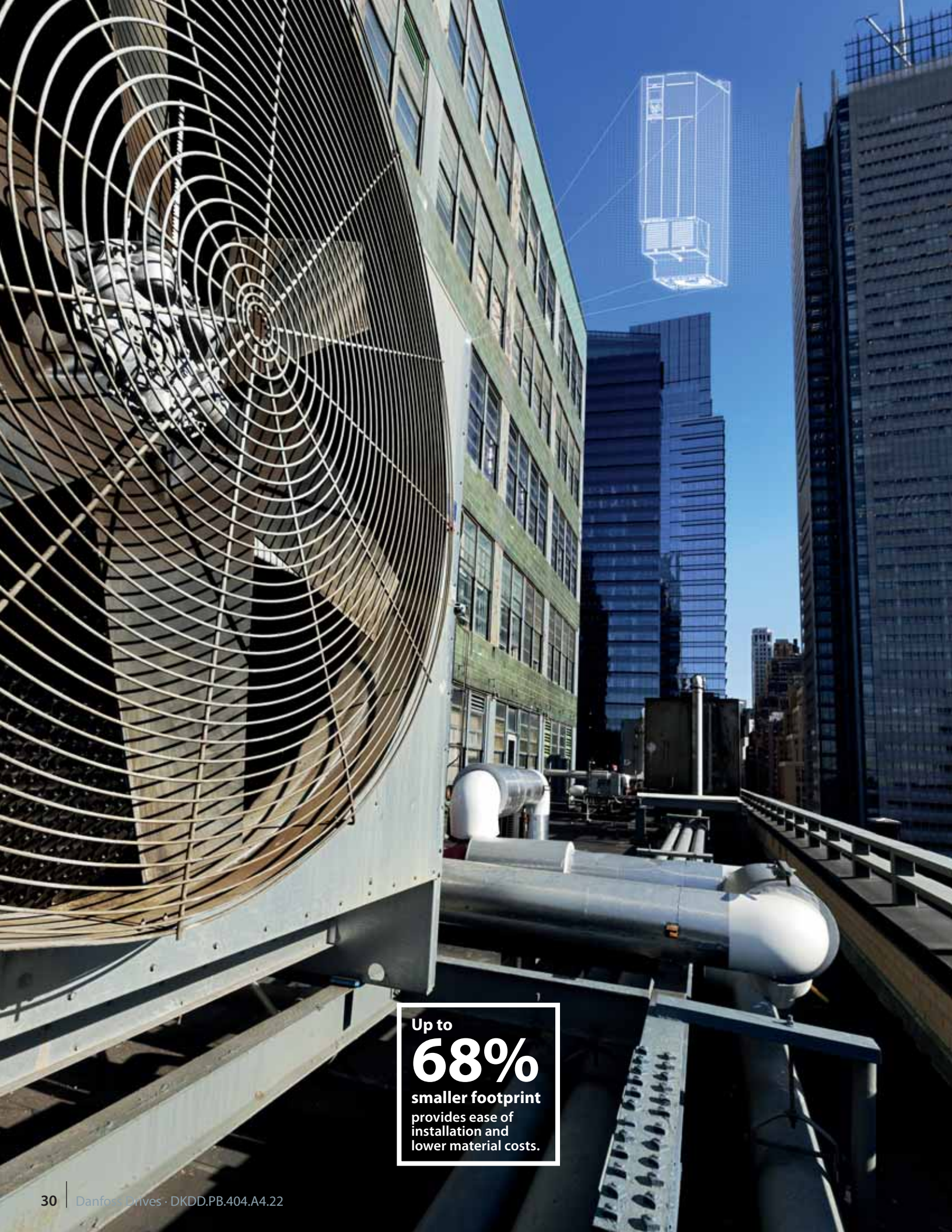
Normal overload											Type code	Enclosure size & ingress protection rating				
Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ¹⁾ 6-Pulse only	Max. external input mains fuses [A] ¹⁾	Weight, kg (lbs) ¹⁾			Beginning with ¹⁾	VLT® 6-Pulse		VLT® 12-Pulse	
[A]		[kW]	[kVA]		[A]	[W]	Hz	IP00	IP20	IP21/IP54		IP00	IP20	IP21/IP54		
Cont. I _N	Inter. I _N (60 s) ⁴⁾		Con.	Inter. (60 s)												
90	99	55	86	95	89	1162	0-590	200	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h			
113	124	75	108	119	110	1428					250	FC-202N90KT7	D3h	D1h/D5h/D6h		
137	151	90	131	144	130	1739					315	FC-202N110T7	D3h	D1h/D5h/D6h		
162	178	110	154	170	158	2099					350	FC-202N132T7	D3h	D1h/D5h/D6h		
201	221	132	191	211	198	2646					400	FC-202N160T7	D3h	D1h/D5h/D6h		
253	278	160	241	265	245	3071					500	FC-202N200T7	D4h	D2h/D7h/D8h		
303	333	200	289	318	299	3719		0-500	125 (275)	125 (275)	FC-202N250T7	D4h	D2h/D7h/D8h			
360	396	250	343	377	355	4460					550	FC-202N315T7	D4h	D2h/D7h/D8h		
418	460	315	398	438	408	5023					700	FC-202N400T7	D4h	D2h/D7h/D8h		
470	517	355	448	493	453	5323					900	FC-202P450T7	E2	E1	F8/F9	
523	575	400	498	548	504	6010					2000	FC-202P500T7	E2	E1	F8/F9	
596	656	450	568	625	574	7395					221 (487)	263 (580)	FC-202P560T7	E2	E1	F8/F9
630	693	500	600	660	607	8209		236 (520)	272 (600)	FC-202P630T7	E2	E1	F8/F9			
763	839	560	727	800	743	9500		277 (611)	313 (690)	FC-202P710T7		F1/F3	F10/F11			
889	978	670	847	932	866	10872		0-500	1045 (2300)/ 1364 (3000)	FC-202P800T7		F1/F3	F10/F11			
988	1087	750	941	1035	962	12316				1260 (2778)/ 1561 (3441)	FC-202P900T7		F1/F3	F10/F11		
1108	1219	850	1056	1161	1079	13731				1260 (2778)/ 1561 (3441)	FC-202P1M0T7		F2/F4	F12/F13		
1317	1449	1000	1255	1380	1282	16190				1294 (2853)/ 1595 (3516)	FC-202P1M2T7		F2/F4	F12/F13		
1479	1627	1100	1409	1550	1440	18536				FC-202P1M4T7		F2/F4	F12/F13			
86	95	75 hp	86	95	85	1162	0-590			200	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h	
108	119	100 hp	108	119	106	1428		250	FC-202N90KT7				D3h	D1h/D5h/D6h		
131	144	125 hp	130	144	124	1739		315	FC-202N110T7				D3h	D1h/D5h/D6h		
155	171	150 hp	154	170	151	2099		350	FC-202N132T7				D3h	D1h/D5h/D6h		
192	211	200 hp	191	210	189	2646		400	FC-202N160T7				D3h	D1h/D5h/D6h		
242	266	250 hp	241	265	234	3071		500	FC-202N200T7				D4h	D2h/D7h/D8h		
290	319	300 hp	289	318	286	3719		0-500	125 (275)	125 (275)	FC-202N250T7	D4h	D2h/D7h/D8h			
344	378	350 hp	343	377	339	4460					550	FC-202N315T7	D4h	D2h/D7h/D8h		
400	440	400 hp	398	438	390	5023					700	FC-202N400T7	D4h	D2h/D7h/D8h		
450	495	450 hp	448	493	434	5323					900	FC-202P450T7	E2	E1	F8/F9	
500	550	500 hp	498	548	482	6010					2000	FC-202P500T7	E2	E1	F8/F9	
570	627	600 hp	568	624	549	7395					221 (487)	263 (580)	FC-202P560T7	E2	E1	F8/F9
630	693	650 hp	627	690	607	8209		236 (520)	272 (600)	FC-202P630T7	E2	E1	F8/F9			
730	803	750 hp	727	800	711	9500		277 (611)	313 (690)	FC-202P710T7		F1/F3	F10/F11			
850	935	950 hp	847	931	828	10872		0-500	1045 (2300)/ 1364 (3000)	FC-202P800T7		F1/F3	F10/F11			
945	1040	1050 hp	941	1035	920	12316				1260 (2778)/ 1561 (3441)	FC-202P900T7		F1/F3	F10/F11		
1060	1166	1150 hp	1056	1161	1032	13731				1260 (2778)/ 1561 (3441)	FC-202P1M0T7		F2/F4	F12/F13		
1260	1386	1350 hp	1255	1380	1227	16190				1294 (2853)/ 1595 (3516)	FC-202P1M2T7		F2/F4	F12/F13		
1415	1557	1550 hp	1409	1550	1378	18536				FC-202P1M4T7		F2/F4	F12/F13			
86	95	75	103	113	87	1204	0-590			200	62 (135)	62 (135)	FC-202N75KT7	D3h	D1h/D5h/D6h	
108	119	90	129	142	109	1477		250	FC-202N90KT7				D3h	D1h/D5h/D6h		
131	144	110	157	172	128	1796		315	FC-202N110T7				D3h	D1h/D5h/D6h		
155	171	132	185	204	155	2165		350	FC-202N132T7				D3h	D1h/D5h/D6h		
192	211	160	229	252	197	2738		400	FC-202N160T7				D3h	D1h/D5h/D6h		
242	266	200	289	318	240	3172		500	FC-202N200T7				D4h	D2h/D7h/D8h		
290	319	250	347	381	296	3848		0-500	125 (275)	125 (275)	FC-202N250T7	D4h	D2h/D7h/D8h			
344	378	315	411	452	352	4610					550	FC-202N315T7	D4h	D2h/D7h/D8h		
400	440	400	478	526	400	5150					700	FC-202N400T7	D4h	D2h/D7h/D8h		
450	495	450	538	592	434	5529					900	FC-202P450T7	E2	E1	F8/F9	
500	550	500	598	657	482	6239					2000	FC-202P500T7	E2	E1	F8/F9	
570	627	560	681	749	549	7653					221 (487)	263 (580)	FC-202P560T7	E2	E1	F8/F9
630	693	630	753	828	607	8495		236 (520)	272 (600)	FC-202P630T7	E2	E1	F8/F9			
730	803	710	872	960	711	9863		277 (611)	313 (690)	FC-202P710T7		F1/F3	F10/F11			
850	935	800	1016	1117	828	11304		0-500	1045 (2300)/ 1364 (3000)	FC-202P800T7		F1/F3	F10/F11			
945	1040	900	1129	1242	920	12798				1260 (2778)/ 1561 (3441)	FC-202P900T7		F1/F3	F10/F11		
1060	1166	1000	1267	1394	1032	14250				1260 (2778)/ 1561 (3441)	FC-202P1M0T7		F2/F4	F12/F13		
1260	1386	1200	1506	1656	1227	16821				1294 (2853)/ 1595 (3516)	FC-202P1M2T7		F2/F4	F12/F13		
1415	1557	1400	1691	1860	1378	19247				FC-202P1M4T7		F2/F4	F12/F13			

Consult factory for higher output drives

¹⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.

²⁾ See pages 70 to 71 for the complete type code.

⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload



Up to
68%
smaller footprint
provides ease of
installation and
lower material costs.

VLT® HVAC Drive FC 102

The VLT® HVAC Drive is built on a flexible, modular design to provide an extraordinarily versatile motor control solution. Equipped with a wide range of HVAC features, owners can achieve optimal fan and pump control, higher quality output and reduce costs related to spare parts and service, and much more.

Reduce costs with compact drives

A compact design and efficient heat management enable the drive to take up less space in control rooms and panels in various environments. Especially impressive is the 400 V version, which is among the smallest in its power class on the market today, and is available in an IP54 enclosure.

Built-in EMC filters

VLT® HVAC Drive units are equipped with integrated DC link chokes and EMC filters as standard features. This enables them to reduce grid pollution and eliminate the cost and effort of fitting external EMC components and related wiring.

HVAC Inside

Engineered specifically for use with building automation, the VLT® HVAC Drive FC 102 features intelligent HVAC functions for pumps, fans, and compressors. For more information refer to pages 40-47.

Unlike many other makes, all important components and functions are integrated as standard features:

- Built-in RFI filter compliant with EN 61800-3 category C1 (Class B limits as defined by EN 55011)
- Built-in mains interference chokes (UK 4%)
- AEO function for especially high energy savings
- USB interface
- Real time clock
- VLT® HVAC Drive in low harmonic version
- Integrated cascade controller for three fans, pumps or compressors
- Optional active and passive mains filters for additional harmonic reduction
- Optional sine-wave filter and du/dt filter for all power ratings
- RS485 serial interface
- Dimensioned for long service life
- Full mains voltage at the output
- Long motor cables may be connected (150 m shielded or 300 m unshielded)
- PTC thermistor monitoring

EC+

The intelligent VVC+ control principle enables the use of permanent magnet motors or synchronous reluctance motors with VLT® HVAC Drive, providing efficiency equal to or better than EC technology.

Danfoss has integrated the necessary control algorithm into the existing VLT® drive series. This means that there are no changes for the operator. After entering the relevant motor data, the user benefits from the high motor efficiency of EC technology.

Advantages of the EC+ concept

- Free choice of motor technology: control a SynRM, PM or induction motor with the same AC drive
- Device installation and operation remain unchanged
- Manufacturer independence in the choice of all components
- Superior system efficiency thanks to a combination of individual components with optimum efficiency
- Retrofitting of existing systems is possible
- Wide range of rated powers for SynRM, PM and induction motors.

Power range

380-480 V

Normal overload:

400 V212-1720 A, 110-1000 kW
460 V190-1530 A, 150-1350 hp

525-690 V

Normal overload:

575 V86-1415 A, 75-1550 hp
690 V86-1415 A, 75-1400 kW

Ingress protection ratings

IP00, IP20, IP21 and IP54.

Options

See page 61.

For more detailed information please see the FC 100 Design Guide, MG.16.xx.yy available at <http://drivesliterature.danfoss.com/>

VLT® HVAC Drive (FC 102) 380-480 V AC – Normal overload

Normal overload											Type code	Enclosure size & ingress protection rating																																							
Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ²⁾	Max. external input mains fuses [A] ²⁾	Weight, kg (lbs) ²⁾			Beginning with ³⁾	VLT® 6-Pulse		VLT® 12-Pulse	VLT® Low Harmonic Drive																																			
[A]		[kW]	[kVA]		[A]	[W]	Hz	IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54																																					
Con. I _N	Inter. I _{Max} (60 s) ⁴⁾		Con.	Inter. (60 s)																																															
400 V motor nominal voltage (380-440 V)																	212	233	110	147	162	208	2555	0-590	315			FC-102N110T4		D3h	D1h/D5h/D6h																				
																	260	286	132	180	198	251	2949		350		62 (135)	62 (135)	FC-102N132T4		D3h	D1h/D5h/D6h																			
																	315	347	160	218	240	304	3764		400				FC-102N160T4		D3h	D1h/D5h/D6h		D2n																	
																	395	435	200	274	301	381	4109		550				FC-102N200T4		D4h	D2h/D7h/D8h		D2n																	
																	480	528	250	333	366	463	5129		630		125 (275)	125 (275)	FC-102N250T4		D4h	D2h/D7h/D8h		D2n																	
																	588	647	315	407	448	567	6663		800				FC-202N315T4		D4h	D2h/D7h/D8h																			
																	600	660	315	416	457	590	6705		700		221 (487)	263 (580)	FC-102P315T4				F8/F9	E9																	
																	658	724	355	456	501	647	7532			234 (516)	270 (595)	FC-102P355T4	E2		E1	F8/F9	E9																		
																	745	820	400	516	568	733	8677			236 (520)	272 (600)	FC-102P400T4	E2		E1	F8/F9	E9																		
																	800	880	450	554	610	787	9473			277 (611)	313 (690)	FC-102P450T4	E2		E1	F8/F9	E9																		
																	880	968	500	610	671	857	10162				FC-102P500T4			F1/F3	F10/F11	F18																			
																	990	1089	560	686	754	964	11822				1045 (2300)/1364 (3000)	FC-102P560T4			F1/F3	F10/F11	F18																		
																	1120	1232	630	776	854	1090	12512	2000				FC-102P630T4			F1/F3	F10/F11	F18																		
																	1260	1386	710	873	960	1227	14674					FC-102P710T4			F1/F3	F10/F11	F18																		
																	1460	1606	800	1012	1113	1422	17293				1293 (2850)/1633 (3600)	FC-102P800T4			F2/F4	F12/F13																			
																	1720	1892	1000	1192	1311	1675	19278		2500			FC-102P1M0T4			F2/F4	F12/F13																			
																	460 V motor nominal voltage (441-480 V)																	190	209	150 hp	151	167	185	2257	0-590	315			FC-102N110T4		D3h	D1h/D5h/D6h			
																																		240	264	200 hp	191	210	231	2719		350		62 (135)	62 (135)	FC-102N132T4		D3h	D1h/D5h/D6h		
																																		302	332	250 hp	241	265	291	3622		400				FC-102N160T4		D3h	D1h/D5h/D6h		D2n
																																		361	397	300 hp	288	316	348	3561		550				FC-102N200T4		D4h	D2h/D7h/D8h		D2n
443	487	350 hp	353	388	427	4558	630		125 (275)	125 (275)	FC-102N250T4		D4h	D2h/D7h/D8h		D2n																																			
535	588	450 hp	426	469	516	5703	800				FC-102N315T4		D4h	D2h/D7h/D8h																																					
540	594	450 hp	430	473	531	6705	700		221 (487)	263 (580)	FC-102P315T4				F8/F9	E9																																			
590	649	500 hp	470	517	580	6724		234 (516)	270 (595)	FC-102P355T4	E2		E1	F8/F9	E9																																				
678	746	550/600 hp	540	594	667	7819		236 (520)	272 (600)	FC-102P400T4	E2		E1	F8/F9	E9																																				
730	803	600 hp	582	640	718	8527		277 (611)	313 (690)	FC-102P450T4	E2		E1	F8/F9	E9																																				
780	858	650 hp	621	684	759	8876				1045 (2300)/1364 (3000)	FC-102P500T4			F1/F3	F10/F11	F18																																			
890	979	750 hp	709	780	867	10424					FC-102P560T4			F1/F3	F10/F11	F18																																			
1050	1155	900 hp	837	920	1022	11595	2000				FC-102P630T4			F1/F3	F10/F11	F18																																			
1160	1276	1000 hp	924	1017	1129	13213					FC-102P710T4			F1/F3	F10/F11	F18																																			
1380	1518	1200 hp	1100	1209	1344	16229				1293 (2850)/1633 (3600)	FC-102P800T4			F2/F4	F12/F13																																				
1530	1683	1350 hp	1219	1341	1490	16624		2500			FC-102P1M0T4			F2/F4	F12/F13																																				

Consult factory for higher output drives

¹⁾ Does not apply to VLT® Low Harmonic Drive.
²⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
³⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload

VLT® HVAC Drive (FC 102) 525-690 V AC – Normal overload

Normal overload											Type code	Enclosure size & ingress protection rating			
Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ¹⁾	Max. external input mains fuses [A] ¹⁾	Weight, kg (lbs) ¹⁾			Beginning with ²⁾	VLT® 6-Pulse		VLT® 12-Pulse
[A]	[A]	[kW]	[kW]	[A]	[W]	Hz		IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54	
Cont. I _N	Inter. I _N (60 s) ⁴⁾		Con.	Inter. (60 s)											
90	99	55	86	95	89	1162	0-590	200	62 (135)	62 (135)	FC-102N75KT7	D3h	D1h/D5h/D6h		
113	124	75	108	119	110	1428					FC-102N90KT7	D3h	D1h/D5h/D6h		
137	151	90	131	144	130	1739					FC-102N110T7	D3h	D1h/D5h/D6h		
162	178	110	154	170	158	2099					FC-102N132T7	D3h	D1h/D5h/D6h		
201	221	132	191	211	198	2646					FC-102N160T7	D3h	D1h/D5h/D6h		
253	278	160	241	265	245	3071					FC-102N200T7	D4h	D2h/D7h/D8h		
303	333	200	289	318	299	3719					FC-102N250T7	D4h	D2h/D7h/D8h		
360	396	250	343	377	355	4460					FC-102N315T7	D4h	D2h/D7h/D8h		
418	460	315	398	438	408	5023					FC-102N400T7	D4h	D2h/D7h/D8h		
470	517	355	448	493	453	5323					FC-102P450T7	E2	E1	F8/F9	
523	575	400	498	548	504	6010					FC-102P500T7	E2	E1	F8/F9	
596	656	450	568	625	574	7395					FC-102P560T7	E2	E1	F8/F9	
630	693	500	600	660	607	8209					FC-102P630T7	E2	E1	F8/F9	
763	839	560	727	800	743	9500					FC-102P710T7		F1/F3	F10/F11	
889	978	670	847	932	866	10872	FC-102P800T7		F1/F3	F10/F11					
988	1087	750	941	1035	962	12316	FC-102P900T7		F1/F3	F10/F11					
1108	1219	850	1056	1161	1079	13731	FC-102P1M0T7		F2/F4	F12/F13					
1317	1449	1000	1255	1380	1282	16190	FC-102P1M2T7		F2/F4	F12/F13					
1479	1627	1100	1409	1550	1440	18536	FC-102P1M4T7		F2/F4	F12/F13					
86	95	75 hp	86	95	85	1162	0-590	200	62 (135)	62 (135)	FC-102N75KT7	D3h	D1h/D5h/D6h		
108	119	100 hp	108	119	106	1428					FC-102N90KT7	D3h	D1h/D5h/D6h		
131	144	125 hp	130	144	124	1739					FC-102N110T7	D3h	D1h/D5h/D6h		
155	171	150 hp	154	170	151	2099					FC-102N132T7	D3h	D1h/D5h/D6h		
192	211	200 hp	191	210	189	2646					FC-102N160T7	D3h	D1h/D5h/D6h		
242	266	250 hp	241	265	234	3071					FC-102N200T7	D4h	D2h/D7h/D8h		
290	319	300 hp	289	318	286	3719					FC-102N250T7	D4h	D2h/D7h/D8h		
344	378	350 hp	343	377	339	4460					FC-102N315T7	D4h	D2h/D7h/D8h		
400	440	400 hp	398	438	390	5023					FC-102N400T7	D4h	D2h/D7h/D8h		
450	495	450 hp	448	493	434	5323					FC-102P450T7	E2	E1	F8/F9	
500	550	500 hp	498	548	482	6010					FC-102P500T7	E2	E1	F8/F9	
570	627	600 hp	568	624	549	7395					FC-102P560T7	E2	E1	F8/F9	
630	693	650 hp	627	690	607	8209					FC-102P630T7	E2	E1	F8/F9	
730	803	750 hp	727	800	711	9500					FC-102P710T7		F1/F3	F10/F11	
850	935	950 hp	847	931	828	10872	FC-102P800T7		F1/F3	F10/F11					
945	1040	1050 hp	941	1035	920	12316	FC-102P900T7		F1/F3	F10/F11					
1060	1166	1150 hp	1056	1161	1032	13731	FC-102P1M0T7		F2/F4	F12/F13					
1260	1386	1350 hp	1255	1380	1227	16190	FC-102P1M2T7		F2/F4	F12/F13					
1415	1557	1550 hp	1409	1550	1378	18536	FC-102P1M4T7		F2/F4	F12/F13					
86	95	75	103	113	87	1204	0-590	200	62 (135)	62 (135)	FC-102N75KT7	D3h	D1h/D5h/D6h		
108	119	90	129	142	109	1477					FC-102N90KT7	D3h	D1h/D5h/D6h		
131	144	110	157	172	128	1796					FC-102N110T7	D3h	D1h/D5h/D6h		
155	171	132	185	204	155	2165					FC-102N132T7	D3h	D1h/D5h/D6h		
192	211	160	229	252	197	2738					FC-102N160T7	D3h	D1h/D5h/D6h		
242	266	200	289	318	240	3172					FC-102N200T7	D4h	D2h/D7h/D8h		
290	319	250	347	381	296	3848					FC-102N250T7	D4h	D2h/D7h/D8h		
344	378	315	411	452	352	4610					FC-102N315T7	D4h	D2h/D7h/D8h		
400	440	400	478	526	400	5150					FC-102N400T7	D4h	D2h/D7h/D8h		
450	495	450	538	592	434	5529					FC-102P450T7	E2	E1	F8/F9	
500	550	500	598	657	482	6239					FC-102P500T7	E2	E1	F8/F9	
570	627	560	681	749	549	7653					FC-102P560T7	E2	E1	F8/F9	
630	693	630	753	828	607	8495					FC-102P630T7	E2	E1	F8/F9	
730	803	710	872	960	711	9863					FC-102P710T7		F1/F3	F10/F11	
850	935	800	1016	1117	828	11304	FC-102P800T7		F1/F3	F10/F11					
945	1040	900	1129	1242	920	12798	FC-102P900T7		F1/F3	F10/F11					
1060	1166	1000	1267	1394	1032	14250	FC-102P1M0T7		F2/F4	F12/F13					
1260	1386	1200	1506	1656	1227	16821	FC-102P1M2T7		F2/F4	F12/F13					
1415	1557	1400	1691	1860	1378	19247	FC-102P1M4T7		F2/F4	F12/F13					

525 V motor nominal voltage (525-550 V)

575 V motor nominal voltage (551-690 V)

690 V motor nominal voltage (551-690 V)

Consult factory for higher output drives

¹⁾ VLT® 6-Pulse only. Please see VLT® 12-Pulse and VLT® Low Harmonic Drives dimension tables.
²⁾ See pages 70 to 71 for the complete type code.
⁴⁾ Intermittent duty rated for 110% of continuous current for normal overload.



Accelerate

system payback with
best-practice speed
control.

VLT® Refrigeration Drive FC 103

Drive down lifecycle cost

Drive down lifecycle costs of your refrigeration systems by putting the VLT® Refrigeration Drive FC 103 to work. You win extended life and cost savings via its efficiency, reliability enhancing features and integrated process control functions.

Installation and commissioning are simple and fast. Integrated functions conserve energy and protect equipment. The robust construction is almost maintenance-free, and long life means change outs are rare – everything you need to achieve rock-bottom lifecycle cost.

The more often a drive system operates under partial load, the higher the potential savings in terms of energy and maintenance costs. With an electronic speed control system, the flow, pressure or differential pressure can be matched to the actual demand instead of running constantly at full capacity. Due to this high potential, the extra cost of an electronic speed control system can be recovered within a few months.

■ Pack control for optimal energy savings

Cascade configuration enables optimal interaction between compressor and drive under partial load. The base load is handled by a single compressor controlled by a VLT® Refrigeration Drive. When consumption rises, the drive starts up additional compressors one at a time. As a result, the compressors work largely at their optimum efficiency point, and the drive constantly maintains maximum energy efficiency throughout the system. The same principle also applies to drive-controlled fans and pumps.

■ Optimal operating point adjustment

Using VLT® Refrigeration Drive, you can save energy by ensuring the system always runs at the optimal operating point. This point, where the refrigeration system works most effectively, varies depending on system capacity utilization. Thanks to its continuously variable speed, the Danfoss VLT® drive can drive the system at exactly the optimal operating point.

■ Limit start-up current

Save on start-up energy consumption by avoiding start-up current peaks. Switching on equipment connected directly to the AC mains generates peak currents up to eight times greater than the rated current. The VLT® Refrigeration Drive limits the start-up current, so it does not exceed the rated motor current. In this way, the drive eliminates switch-on current peaks and avoids voltage sags due to transient heavy loading of the supply network.

Energy-saving features

Time and energy saving features are specifically tailored to meet the needs of refrigeration compressor, condenser, evaporator, fan and pump applications. The VLT® Refrigeration Drive offers:

- Top efficiency 98%
- Automatic Energy Optimization (AEO)
- Quick menu
- Refrigeration-oriented commissioning wizard
- Multi-zone cascade controller
- Neutral zone controller
- Floating condensing temperature control
- Oil return management
- Multi-feedback evaporator control
- Sleep mode

Life-extending features

These are just some of the ways VLT® Refrigeration Drive extends system component lifetimes:

For pump control

- Dry-running protection
- Overload protection
- Flow compensation
- For compressor control
- Built-in soft starter function
- Built-in oil return management to improve reliability
- Low and high pressure monitoring
- Reduced mechanical load
- Fewer starts & stops

For condenser fan control

- Reduced charge of refrigerant
- Less build-up of dirt on the condenser
- Floating setpoint for energy savings

Power range

380-480 V

Normal overload:

400 V212-800 A, 110-450 kW,
460 V190-730 A, 150-600 hp,

525-690 V

Normal overload:

575 V86-630 A, 75-650 hp
690 V86-630 A, 75-630 kW

Ingress protection ratings

IP00, IP20, IP21 and IP54.

Options

See page 61.

For more detailed information please see the FC 103 Design Guide, MG.16.Gx.yy, available at <http://drivesliterature.danfoss.com/>

VLT® Refrigeration Drive (FC 103) 380-480 V AC – Normal overload

	Normal overload											Type code	Enclosure size & ingress protection rating			
	Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load	Output frequency	Max. external input mains fuses [A]	Weight, kg (lbs) ¹⁾			Beginning with ¹⁾	VLT® 6-Pulse		
	[A]		[kW]	[kVA]	[A]	[W]	Hz		IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54	
	Con. I _N	Inter. I _{Max} (60 s) ²⁾		Con.	Inter. (60 s)											
400 V motor nominal voltage (380-440 V)	212	233	110	147	162	208	2555	0-590	315		62 (135)	62 (135)	FC-103N110T4		D3h	D1h/D5h/D6h
	260	286	132	180	198	251	2949		350				FC-103N132T4		D3h	D1h/D5h/D6h
	315	347	160	218	240	304	3764		400		FC-103N160T4		D3h	D1h/D5h/D6h		
	395	435	200	274	301	381	4109		550		FC-103N200T4		D4h	D2h/D7h/D8h		
	480	528	250	333	366	463	5129		630		FC-103N250T4		D4h	D2h/D7h/D8h		
	600	660	315	416	457	590	6663		800		FC-103P315T4		D4h	D2h/D7h/D8h		
	658	724	355	456	501	647	7532		700	234 (516)		270 (595)	FC-103P355T4	E2		E1
	745	820	400	516	568	733	8677		900	236 (520)		272 (600)	FC-103P400T4	E2		E1
800	880	450	554	610	787	9473	900	277 (611)		313 (690)	FC-103P450T4	E2		E1		
460 V motor nominal voltage (441-480 V)	190	209	150 hp	151	167	185	2257	0-590	315		62 (135)	62 (135)	FC-103N110T4		D3h	D1h/D5h/D6h
	240	264	200 hp	191	210	231	2719		350				FC-103N132T4		D3h	D1h/D5h/D6h
	302	332	250 hp	241	265	291	3622		400		FC-103N160T4		D3h	D1h/D5h/D6h		
	361	397	300 hp	288	316	348	3561		550		FC-103N200T4		D4h	D2h/D7h/D8h		
	443	487	350 hp	353	388	427	4558		630		FC-103N250T4		D4h	D2h/D7h/D8h		
	540	594	450 hp	430	473	531	5703		800		FC-103P315T4		D4h	D2h/D7h/D8h		
	590	649	500 hp	470	517	580	6724		900	234(516)		270(595)	FC-103P355T4	E2		E1
	678	746	600 hp	540	594	667	7819		900	236(520)		272(600)	FC-103P400T4	E2		E1
730	803	600 hp	582	640	718	8527	900	277(611)		313(690)	FC-103P450T4	E2		E1		

Consult factory for higher output drives

¹⁾ See pages 70 to 71 for the complete type code.

²⁾ Intermittent duty rated for 110% of continuous current for normal overload.

VLT® Refrigeration Drive (FC 103) 525-690 V AC – Normal overload

Normal overload											Type code	Enclosure size & ingress protection rating			
Output current		Typical shaft output	Output power		Rated input current	Estimated power loss at max load ¹⁾	Output frequency ¹⁾	Max. external input mains fuses [A] ¹⁾	Weight, kg (lbs) ¹⁾			Beginning with ¹⁾	VLT® 6-Pulse		
[A]	[A]	[kW]	[kVA]	[A]	[W]	Hz		IP00	IP20	IP21/IP54	IP00		IP20	IP21/IP54	
Cont. I _N	Inter. I _N (60 s) ²⁾		Con.	Inter. (60 s)											
90	99	55	86	95	89	1162		160			FC-103N75KT7		D3h	D1h/D5h/D6h	
113	124	75	108	119	110	1428		200			FC-103N90KT7		D3h	D1h/D5h/D6h	
137	151	90	131	144	130	1739			62 (135)	62 (135)	FC-103N110T7		D3h	D1h/D5h/D6h	
162	178	110	154	170	158	2099					FC-103N132T7		D3h	D1h/D5h/D6h	
201	221	132	191	211	198	2646	0-590				FC-103N160T7		D3h	D1h/D5h/D6h	
253	278	160	241	265	245	3071					FC-103N200T7		D4h	D2h/D7h/D8h	
303	333	200	289	318	299	3719			125 (275)	125 (275)	FC-103N250T7		D4h	D2h/D7h/D8h	
360	396	250	343	377	355	4460					FC-103N315T7		D4h	D2h/D7h/D8h	
418	460	315	398	438	408	5023					FC-103N400T7		D4h	D2h/D7h/D8h	
470	517	355	448	493	453	5323					FC-103P450T7	E2		E1	
523	575	400	498	548	504	6010	0-500				FC-103P500T7	E2		E1	
596	656	450	568	625	574	7395					FC-103P560T7	E2		E1	
630	693	500	600	660	607	8209					FC-103P630T7	E2		E1	
86	95	75	86	95	85	1162		160			FC-103N75KT7		D3h	D1h/D5h/D6h	
108	119	100	108	119	106	1428		200			FC-103N90KT7		D3h	D1h/D5h/D6h	
131	144	125	130	144	124	1739			62 (135)	62 (135)	FC-103N110T7		D3h	D1h/D5h/D6h	
155	171	150	154	170	151	2099					FC-103N132T7		D3h	D1h/D5h/D6h	
192	211	200	191	210	189	2646					FC-103N160T7		D3h	D1h/D5h/D6h	
242	266	250	241	265	234	3071					FC-103N200T7		D4h	D2h/D7h/D8h	
290	319	300	289	318	286	3719			125 (275)	125 (275)	FC-103N250T7		D4h	D2h/D7h/D8h	
344	378	350	343	377	339	4460					FC-103N315T7		D4h	D2h/D7h/D8h	
400	440	400	398	438	390	5023					FC-103N400T7		D4h	D2h/D7h/D8h	
450	495	450	448	493	434	5323					FC-103P450T7	E2		E1	
500	550	500	498	548	482	6010		700	221 (487)	263 (580)	FC-103P500T7	E2		E1	
570	627	600	568	624	549	7395					FC-103P560T7	E2		E1	
630	693	650	627	690	607	8209		900	236 (520) 277 (611)	272 (600) 313 (690)	FC-103P630T7	E2		E1	
86	95	75	103	113	87	1204		160			FC-103N75KT7		D3h	D1h/D5h/D6h	
108	119	90	129	142	109	1477		200			FC-103N90KT7		D3h	D1h/D5h/D6h	
131	144	110	157	172	128	1796			62 (135)	62 (135)	FC-103N110T7		D3h	D1h/D5h/D6h	
155	171	132	185	204	155	2165					FC-103N132T7		D3h	D1h/D5h/D6h	
192	211	160	229	252	197	2738					FC-103N160T7		D3h	D1h/D5h/D6h	
242	266	200	289	318	240	3172					FC-103N200T7		D4h	D2h/D7h/D8h	
290	319	250	347	381	296	3848			125 (275)	125 (275)	FC-103N250T7		D4h	D2h/D7h/D8h	
344	378	315	411	452	352	4610					FC-103N315T7		D4h	D2h/D7h/D8h	
400	440	400	478	526	400	5150					FC-103N400T7		D4h	D2h/D7h/D8h	
450	495	450	538	592	434	5529					FC-103P450T7	E2		E1	
500	550	500	598	657	482	6239		700	221 (487)	263 (580)	FC-103P500T7	E2		E1	
570	627	560	681	749	549	7653					FC-103P560T7	E2		E1	
630	693	630	753	828	607	8495		900	236 (520) 277 (611)	272 (600) 313 (690)	FC-103P630T7	E2		E1	

Consult factory for higher output drives

¹⁾ See pages 70 to 71 for the complete type code.
²⁾ Intermittent duty rated for 110% of continuous current for normal overload.

Integrated features for every purpose imaginable

When your application requires special performance features, consider the Danfoss range of purpose-designed functionalities. All have been developed to improve efficiency while meeting the needs of specific industries and applications. The integrated features of dedicated VLT® drives cater for nearly every need imaginable:

- Safety of personnel and equipment protection
- Specialized torque and loading conditions
- Tailored performance curves
- Temperature and pressure extremes
- Power supply quality variations
- Regional and industry-specific compliance
- Special needs for specific industries



Features	FC 302	FC 202	FC 102	FC 103
Pump				
End of curve detection		■	■	■
Auto tuning of the 4 PI controllers		■	■	■
Flow compensation		■	■	■
No/low flow detection and sleep mode		■	■	■
Deragging feature		■		
Pipe fill mode		■		
Initial/final ramp		■		
Flow confirmation		■		
Pre/post lubrication		■		
Freely programmable texts		■		
Advanced minimum speed monitor		■		
High/normal overload	■	■		
Check valve ramp		■		
Embedded multi-pump controller		■	■	■
High overload capability	■	■		
Vital water supply			■	
Leakage or broken pipe				■
Fan				
Velocity-to-flow conversion			■	
Fire override mode			■	
Drive bypass			■	
Extend BMS capacity			■	
Resonance monitoring			■	
Stairwell pressurization			■	
Smart logic reduces costs	■		■	
Intelligent AHU functions			■	
Condenser and evaporater				
Floating condensing temperature optimizes COP				■
Resonance monitoring				■
Intelligent functions				■
Extended I/O capacity				■
Compressor				
Day/night control				■
Neutral zone				■
Oil return management				■
Condensing temperature monitoring				■
Single compressor or pack				■
Direct entry of evaporator temperature				■
Inject ON				■
Fewer starts and stops				■
Unloaded start				■
135% starting torque	■			■
Smaller compressors with the same peak load				■
P0 optimization				■



Water and pump features

Embedded multi-pump controller

The Pump Cascade Controller distributes operation hours evenly across all pumps. Wear and tear on individual pumps is therefore reduced to a minimum, extending their lifetime expectancy and reliability considerably.

High overload capability

For high-inertia or high-friction loads, extra torque is available for undersized motors. The current can be set to a maximum of up to 160% for a limited amount of time.

Leakage or broken pipe

Continuous liquid supply can be assured in the event of leakage or a broken pipe. For example, overload is prevented by reducing drive speed – and supply is secured at lower flow.

Vital water supply

If a pipe leaks or breaks, the HVAC Drive can reduce the motor speed to prevent overload, while continuing to supply water at a lower speed.

1. End of curve detection

This feature is triggered if the pump runs without reaching a predefined setpoint, such as when a pipe leaks. The drive either sets off an alarm or performs another pre-programmed action.

2. Auto tuning of the 4 PI controllers

Auto tuning enables the drive to learn how the system reacts to corrections made by the drive. Using what it has measured, the drive calculates the P and I values to restore precise and stable operation.

3. Flow compensation

A pressure sensor mounted close to the fan or pump provides a reference point that enables pressure to be kept constant at the discharge end of the system. The drive constantly adjusts the pressure reference to follow the system curve. This method saves energy and reduces installation costs.

4. No/low flow detection and sleep mode

In situations with low or no flow, the drive enters sleep mode to conserve energy. When the pressure falls below the pre-defined setpoint, the drive starts automatically. Compared to continuous operation, this method reduces energy costs, equipment wear and helps extend the lifetime of the application.

5. Deragging feature

This VLT® AQUA Drive software feature offers proactive pump protection. The deragging can be

configured as either a preventative or reactive action. It optimizes the efficiency of the pump by constantly monitoring the motor shaft power consumption relative to flow. In the reactive mode, the drive senses the beginning of a pump clog and will reverse spin the pump to ensure a clear path for the water. As a preventative action, the drive will periodically reverse the pump to ensure a clean pump or screen.

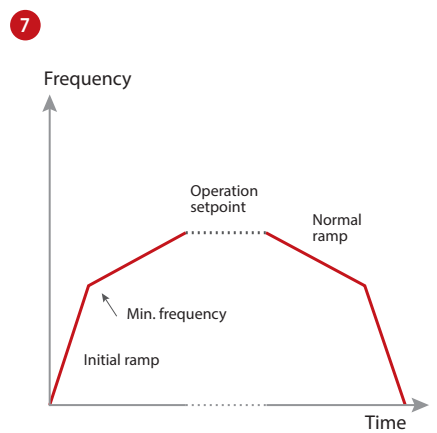
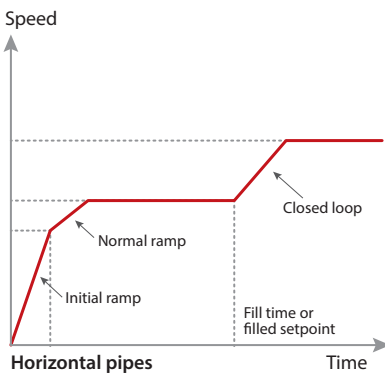
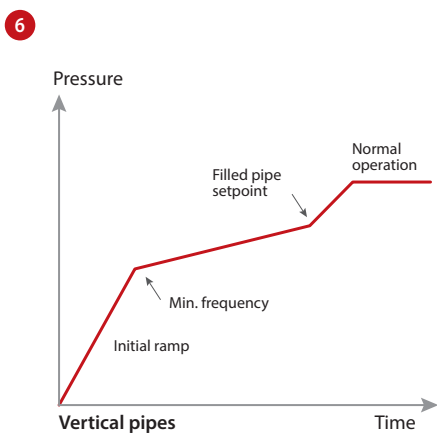
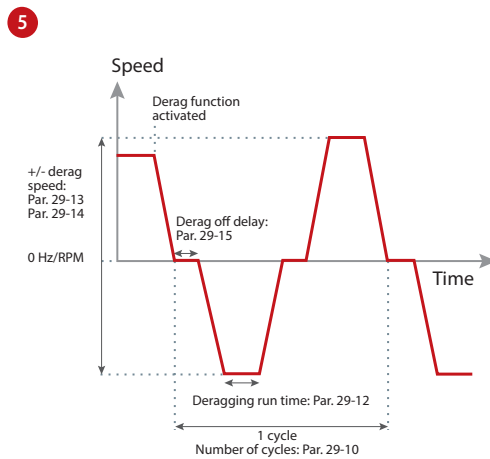
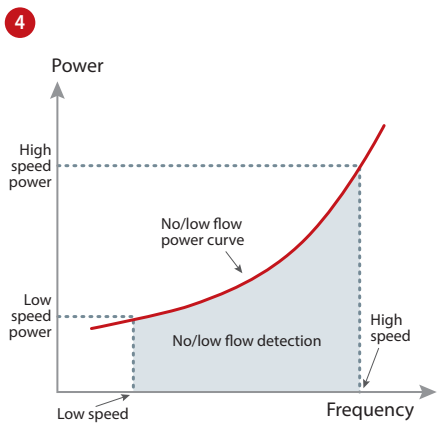
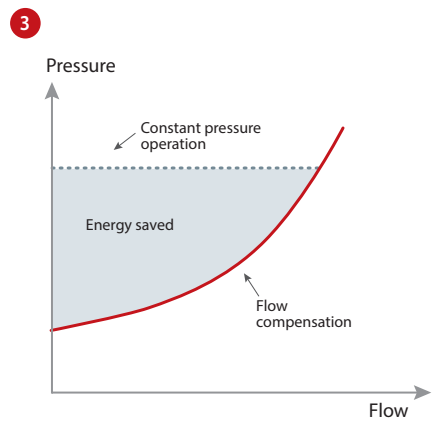
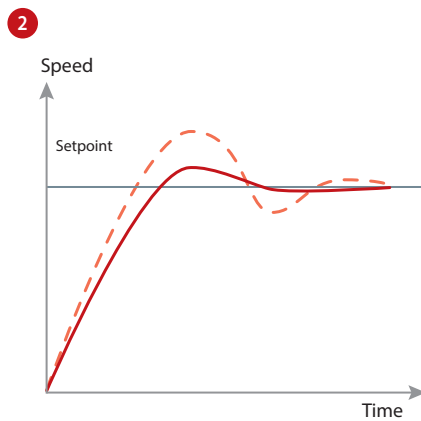
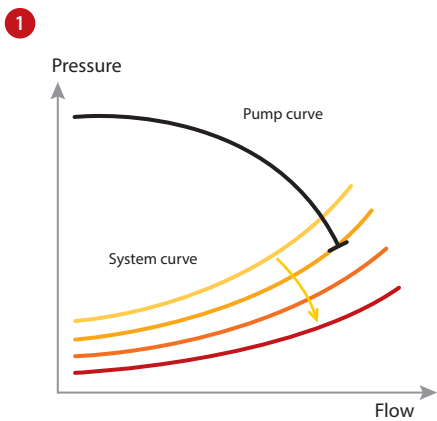
6. Pipe fill mode

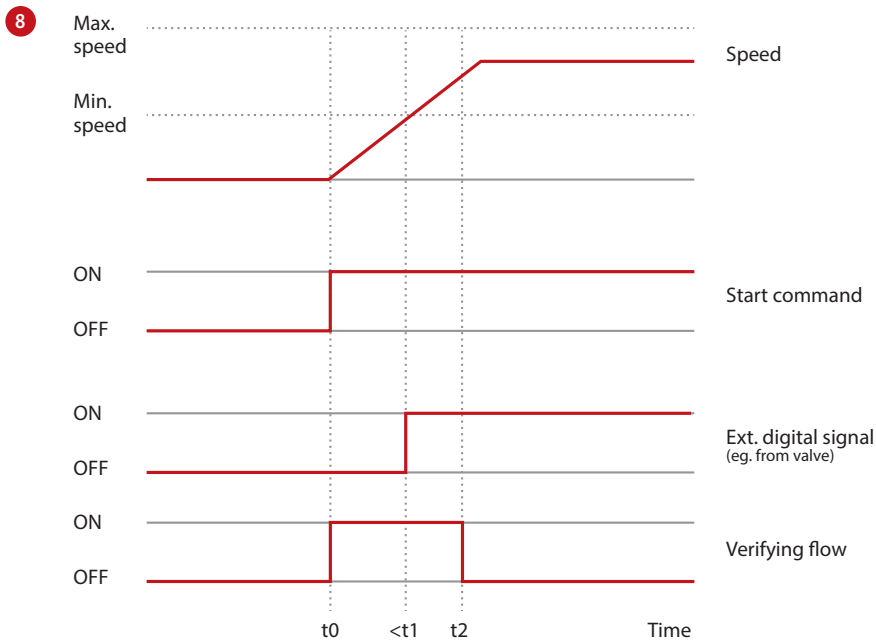
Useful in all applications where controlled pipe filling is essential, such as irrigation and water supply systems. Controlled (closed loop) filling of pipes prevents water hammering, bursting water pipes or blowing off sprinkler heads. Pipe fill mode can be used in both vertical and horizontal pipe systems.

7. Initial/final ramp

The initial ramp provides fast acceleration of pumps to minimum speed, from where the normal ramp takes over. This prevents damage to the thrust bearings on the pump. The final ramp decelerates pumps from the minimum speed to stop.

Continued on next page



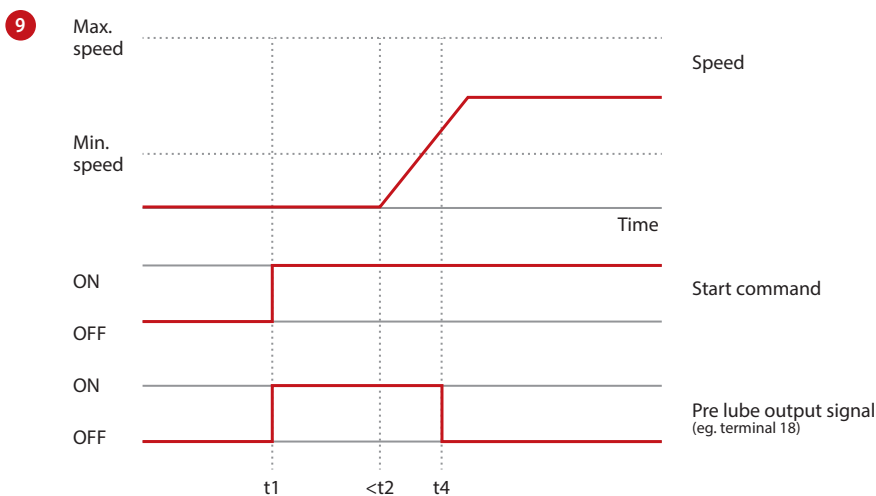


8. Flow confirmation

The flow confirmation monitor protects equipment from unexpected flow stoppage. The monitor communicates on an ongoing basis with an external device such as a valve or flow switch. If the signal from the external device times out, the monitor trips the AC drive.

9. Pre/post lubrication

Some machines require lubrication of their mechanical parts before and during operation to prevent damage and reduce wear. During lubrication, certain equipment, such as exhaust fans, must remain active. To achieve this, the Pre Lube feature supports a signal to an external device to perform a specific action for a user-defined time period. Available configurations: "Pre Lube Only", "Pre & Running" and "Pre & Running & Post".



10. Freely programmable texts

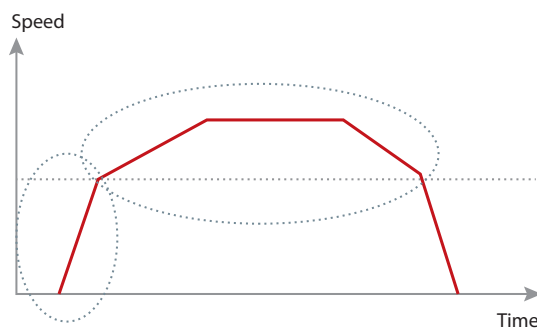
This function supports versatile adaptation to the application. Use freely programmable text messages, based on internal or external events, for information, warnings or alerts. The function also supports actions based on events, for example initiation of a ramp down triggered by a valve opening.



11. Advanced minimum speed monitor

Submersible pumps can suffer from insufficient cooling and lubrication when pump speed is too low. The advanced minimum speed monitor protects the pump by monitoring and adjusting the trip speed to reduce wear and tear. With no need for external monitoring equipment, downtime for maintenance is minimized.

11



During normal operation (after ramping up) P1-86/1-87

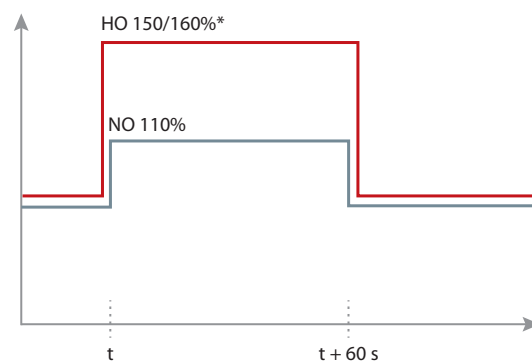
(1-86/1-87) Trip speed low [RPM, Hz]

(1-79) Start max. time to trip

12. High/normal overload

Use the overload rating functionality to adapt to different patterns of loading typical for water and wastewater applications. Normal overload is suitable for most centrifugal loads. Use high overload for loading involving periods of temporarily higher torque.

12

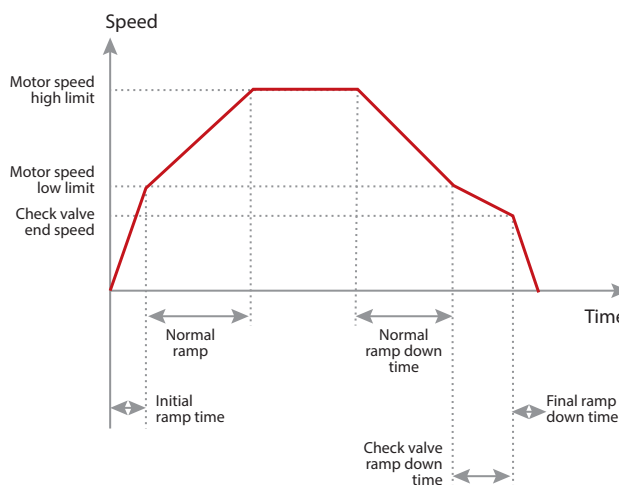


* depending on power size

13. Check valve ramp

The check valve ramp prevents water hammering when stopping the pump by ensuring slow pump speed ramp down just as the check valve ball is almost shut.

13



10

Freely programmable texts

Status	1 (1)	
49.3%	0.04 A	0.00 kW
	2.9 Hz	
	0 kWh	
Valve 5 open!		
Auto Remote Ramping		



Fan features

Velocity-to-flow conversion

The VLT® HVAC Drive is able to convert velocity pressure sensor values into flow values. This provides operators with the opportunity to set the drive up to provide a fixed flow or fixed differential flow. Regardless of method, the advantages are the same, as energy consumption is optimized while improving comfort. An added benefit is that this built-in setting eliminates the need for a flow sensor.

Fire override mode

This safety feature prevents the drive from stopping to protect itself. Instead, it will continue vital fan operation regardless of control signals, warnings or alarms.

Drive bypass

If a drive bypass is available, the VLT® HVAC Drive will not only sacrifice itself, it will also bypass itself and connect the motor directly to mains. Fan functionality will be maintained after the drive fails, as long as there is power and the motor is functioning.
(only available in the USA)

Extend BMS capacity

Easy integration into building management systems provides managers with detailed information about the current state of the infrastructure in the building. By integrating the drive into the building management network, all the I/O points in the drive are available as remote I/O to extend the capacity of the BMS.

For example: by installing room temperature sensors (PT 100/PT 1000) and monitoring them with the VLT® Sensor Input Card, the motor is protected from overheating in the bearings and windings. Monitoring of sensor temperature is visible as a readout on the display or via fieldbus.

Resonance monitoring

Avoid unwanted noise by setting the drive to avoid the frequency bands that cause fans to create resonances. Not only does this increase comfort, it also reduces wear on the equipment.

Stairwell pressurization

If there is a fire, the VLT® HVAC Drive will continue to control the motor, even beyond its standard shutoff parameters. By maintaining a higher level of air in the stairwells than in other parts of the building, stairwells remain smoke free.

Smart logic reduces costs

The drive's built-in Smart Logic Controller and four auto-tuning PID controllers can control air handling functions with fans, valves and dampers. This reduces DDC tasks in the building management system and frees valuable data points for other use.

Intelligent AHU functions

The ability to handle logical rules and inputs from sensors, real-time functionality, and time-related actions enables the HVAC Drive to control a wide range of functions:

- Weekend and working-day operations
- Cascaded P-PI for temperature control
- Multi-zone "3" control
- Flow balancing between fresh and outlet air
- Belt monitoring



Condenser and evaporator features

Floating condensing temperature optimizes COP

VLT® Refrigeration Drive FC 103 intelligently controls evaporative condensers or air-cooled condensers to optimize refrigeration system performance (COP) at lower energy consumption. The drive adapts condensing temperature set point as the outdoor temperature drops, lowering the set point to a new stable level. This functionality provides:

- Increased cooling capacity at lower power consumption
- Ability to run on fewer compressors, thereby reducing wear and tear

Intelligent functions

The FC 103 handles logical rules and inputs from sensors, real time functionality and time-related actions. This enables the FC 103 to control a wide range of functions, including:

- Weekend and working-day operations
- Cascaded P-PI for temperature control
- Belt monitoring

Resonance monitoring

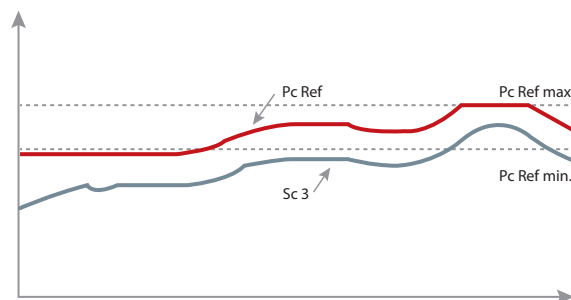
By pressing a few buttons on the Local Control Panel, the drive can be set to avoid frequency bands at which connected fans create resonances in the in condensers or evaporators. This reduces vibration noise and equipment wear.

Auto tuning of the PI controllers

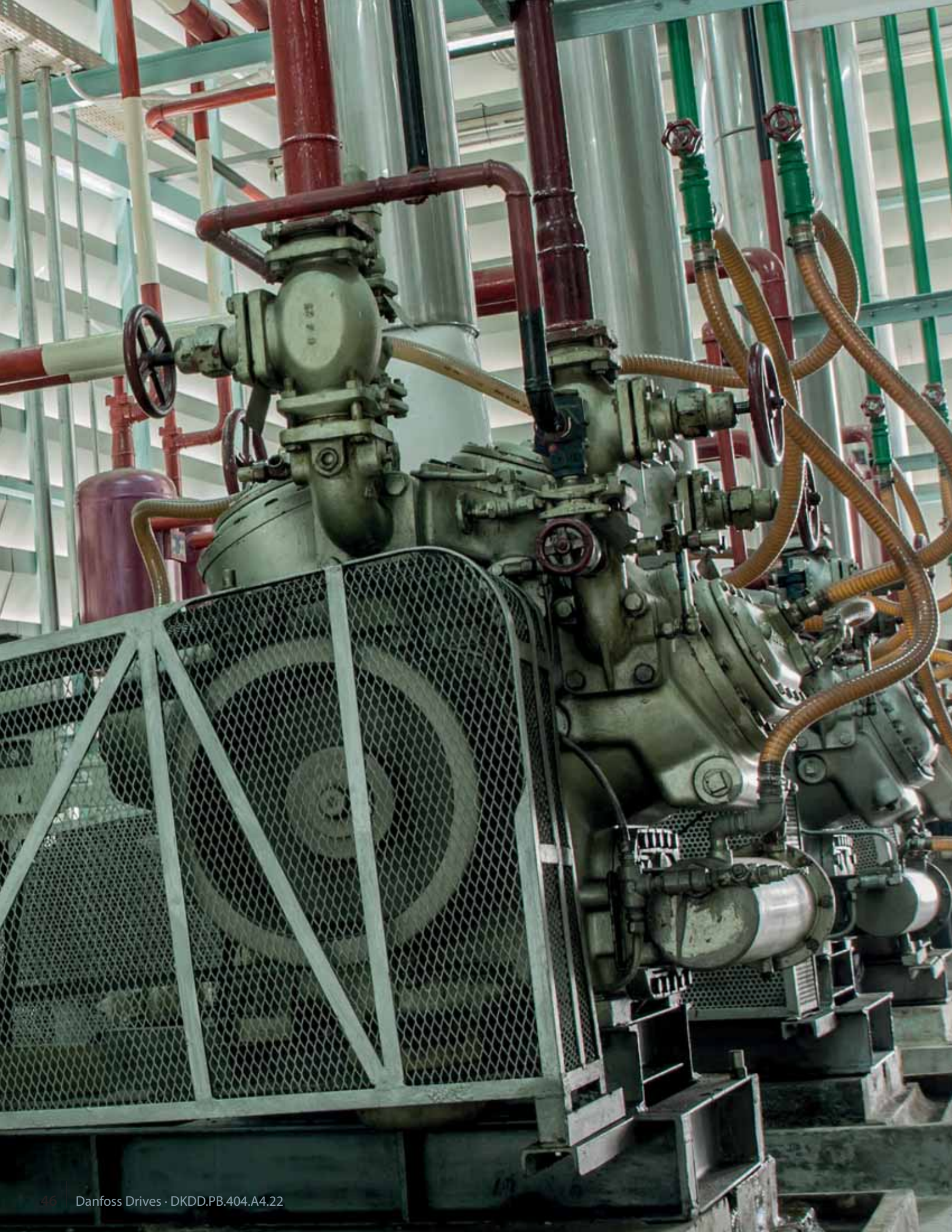
With auto tuning of the PI controllers, the drive monitors how the system reacts on corrections made by the drive – and learns from it.

Extended I/O capacity

When operated by an external controller, all the FC 103 I/O points are available as remote I/O to extend the capacity of the controller. For example, room temperature sensors (Pt1000/Ni1000) can be directly connected.



Floating condensing temperature set point control by VLT® Refrigeration Drive FC 103.



Compressor features

Day/night control

Compressors usually operate with different setpoints depending on the time of day. This in turn results in different evaporator fan speeds, resulting in reduced energy consumption. This function can be easily programmed with day/night control.

Neutral zone

The FC 103 continues to control fixed speed compressors in situations where the variable speed compressor fails. Neutral zone is in a fail situation set by a special parameter "Fixed speed neutral zone". This gives the opportunity to have fewer starts by expanding the neutral zone and longer duration of safe operation even under challenging situations.

Oil Return Management

If compressors run at low speed for longer periods of time, lubrication oil will end up in the refrigerant and pipelines. Lack of oil in crankcase causes insufficient lubrication. Built-in oil return management in the FC 103 ensures oil is returned to crankcase thus significantly improving system reliability. Oil management functionality increases the compressor speed up to its maximum value for the user-defined interval of time and brings the oil back to the compressor.

- Oil boost functionality activates at fixed time intervals
- Or when the compressor speed has been lower than nominal speed for too long time
- Improves lubrication and system reliability

Condensing temperature monitoring

The AC drive can monitor the Floating Head Pressure high pressure levels using connected temperature sensors. Speed is reduced before the head pressure

reaches a critical value. This allows safe operation of system for longer duration thus enhancing food safety and process control.

Single compressor or pack

The user has the choice of operating the system with a single large compressor or using the pack controller to operate the system with several smaller compressors that are activated as the demand for cooling capacity increases. The built-in Pack Controller can distribute running hours evenly across all compressors, keeping wear on individual compressors to a minimum and ensuring that all compressors are in great shape.

Direct entry of evaporator temperature

The user can enter the desired evaporator temperature directly in the control panel of the FC 103. The AC drive also takes the properties of the refrigerant into account. Tables for the most commonly used refrigerants are preloaded in the drive. User-defined entry of the refrigerant used in the system is also possible. This feature simplifies commissioning.

Inject ON

When all connected compressors on the FC 103 are stopped due to a missing safety circuit, this will be registered by the system unit which will close all valves connected to the case controllers. This prevents liquid flow to the compressor when FC 103 starts the compressor again. As soon as a compressor starts running again, the valves will reopen.

Fewer starts and stops

Start-up is the critical phase of compressor operation. The FC 103 minimizes the number of required starts and stops by varying the speed of the compressor to match the capacity to the cooling demand. This ensures maximum run

time and minimum number of starts and stops. In addition, the maximum number of start/stop cycles in a given period can be configured using the control panel.

Unloaded start

To further extend the lifetime of the FC 103 a pressure relief valve can be opened to allow the compressor to start up quickly with no load.

135% starting torque

The FC 103 delivers 135% of the rated starting torque for 0.5 second. In normal operation, 110% of the rated torque is available for 60 seconds.

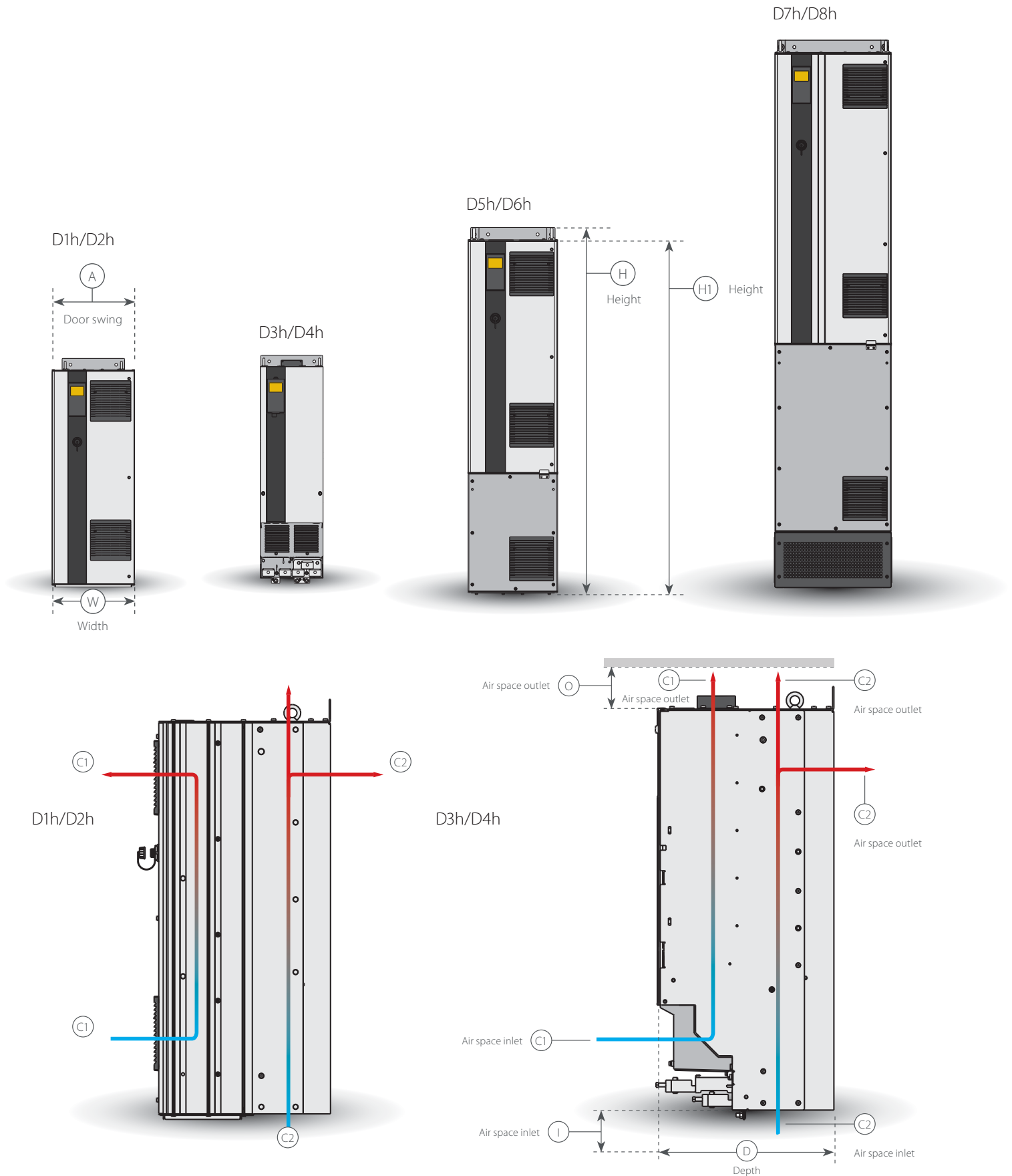
Smaller compressors with the same peak load

The operator can configure the system with a smaller compressor for a given peak load. Provided that the compressor is designed for over-speed operation, the FC 103 can run it at up to 90 Hz. This may allow brief peak loads to be handled without necessarily requiring a larger compressor.

P0 optimization

The FC 103 supports connection of an ADAP-KOOL® LonWorks control for P0 optimization.

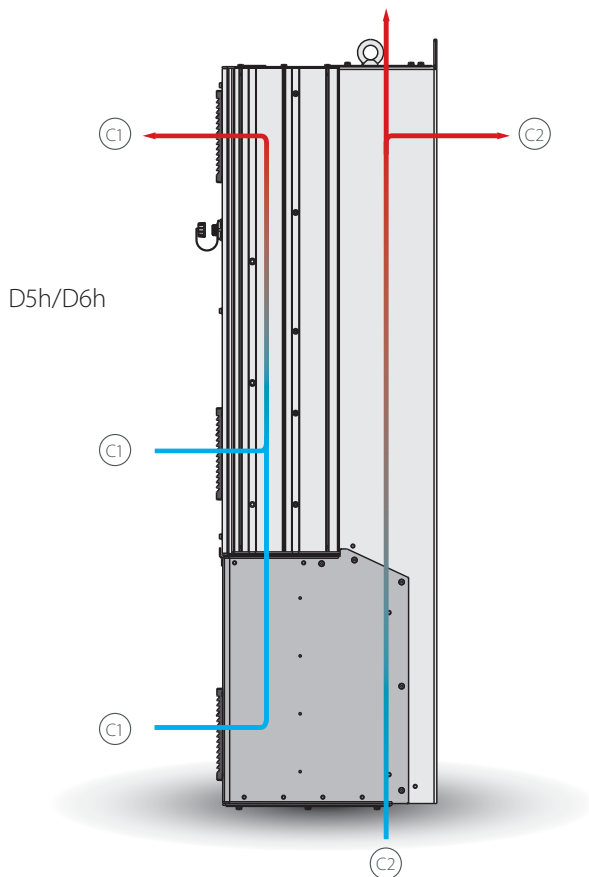
Dimensions and air flow for 6-pulse drives



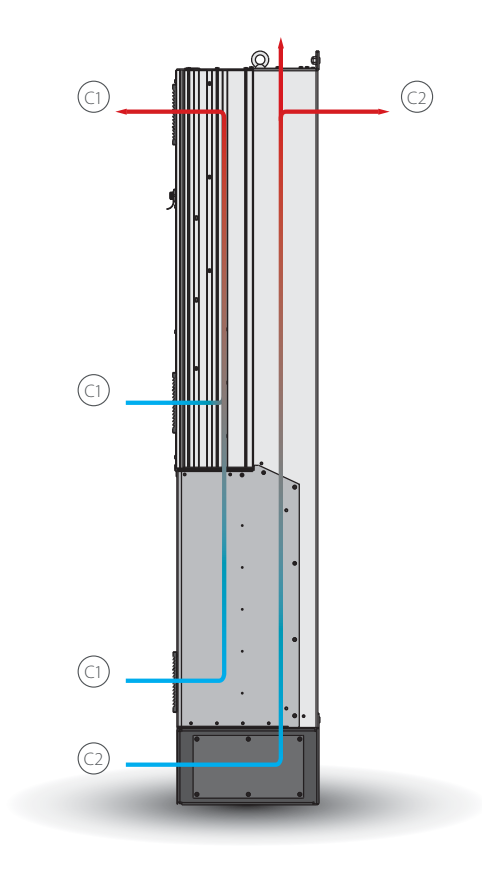
Please see the VLT® High Power Design Guide for other enclosure sizes, available at <http://vlt-drives.danfoss.com/Support/Technical-Documentation-Database/>.

Enclosure size D

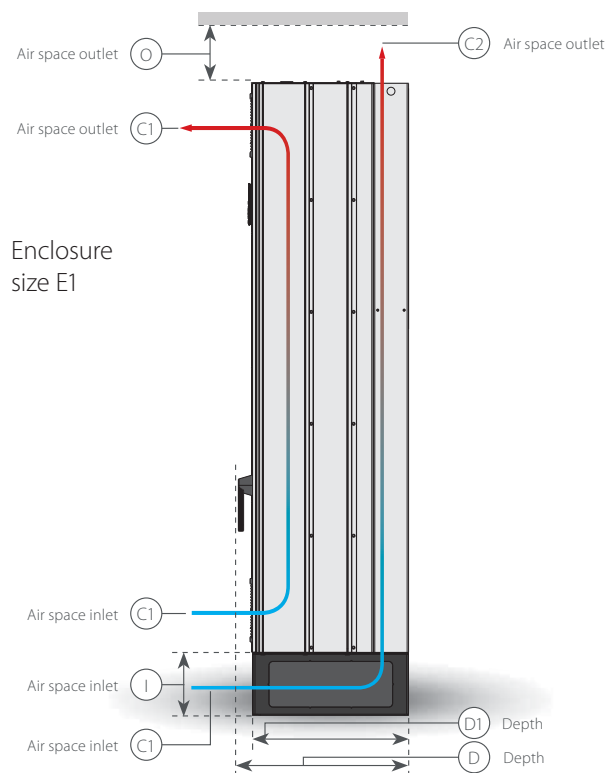
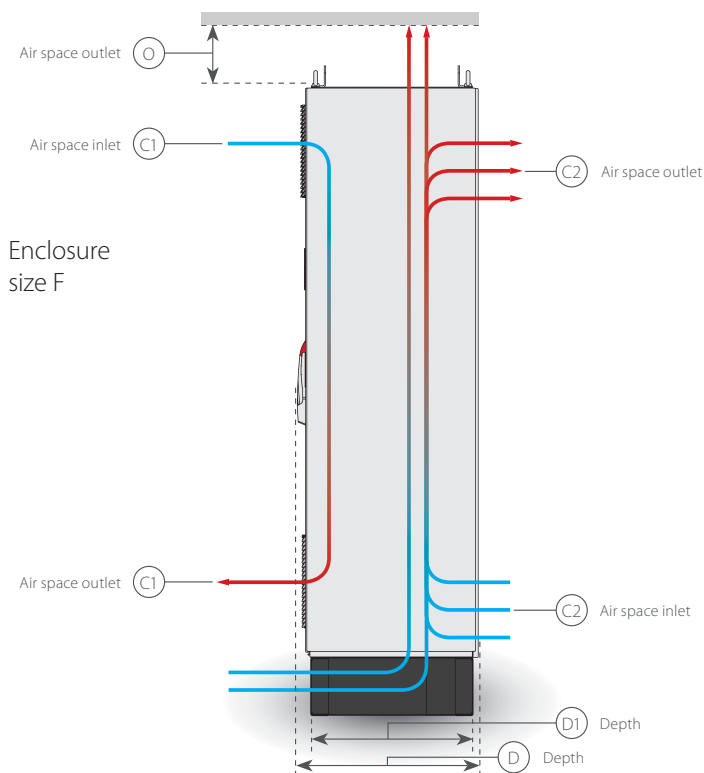
Enclosure size	VLT® drive							
	D1h	D2h	D3h	D4h	D5h	D6h	D7h	D8h
Ingress protection rating	IP21/IP54		IP20		IP21/IP54			
H mm	901	1107	909	1122	1324	1665	1978	2284
Height of backplate	(36)	(44)	(36)	(44)	(52)	(66)	(78)	(90)
H1 mm	844	1050	844	1050	1277	1617	1931	2236
Height of product	(33)	(41)	(33)	(41)	(50)	(64)	(76)	(88)
W mm	325	420	250	350	325	325	420	420
	(13)	(17)	(10)	(14)	(13)	(13)	(17)	(17)
D mm	378	378	375	375	381	381	384	402
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	
D1 mm	-	-	-	-	426	426	429	447
With mains disconnect								
Door swing A mm	298	395	n/a	n/a	298	298	395	395
	(12)	(15.6)			(12)	(12)	(16)	(16)
Air cooling	I (air space inlet) mm	225	225	225	225	225	225	225
		(9)	(9)	(9)	(9)	(9)	(9)	(9)
	O (air space outlet) mm	225	225	225	225	225	225	225
		(9)	(9)	(9)	(9)	(9)	(9)	(9)
C1	102 m³/hr (60 cfm)	204 m³/hr (120 cfm)	102 m³/hr (60 cfm)	204 m³/hr (120 cfm)	102 m³/hr (60 cfm)		204 m³/hr (120 cfm)	
C2	420 m³/hr (250 cfm)	840 m³/hr (500 cfm)	420 m³/hr (250 cfm)	840 m³/hr (500 cfm)	420 m³/hr (250 cfm)		840 m³/hr (500 cfm)	
Efficiency	0.98							
Max. cable cross-section to motor output terminals (per phase) – mm² (AWG)								
Max. cable cross-section to load sharing terminals (per -DC/+DC)								
Max. cable cross-section to regeneration terminals (per-DC/+DC)	2 x 95 (2 x 3/0)	2 x 185 (2 x 350 mcm)	2 x 95 (2 x 3/0)	2 x 185 (2 x 350 mcm)	2 x 95 (2 x 3/0)		2 x 185 (2 x 350 mcm)	
Max. cable cross-section to brake resistor terminals (per -R/+R)								
Max. cable cross-section to input mains terminals (per phase)								



D7h/D8h



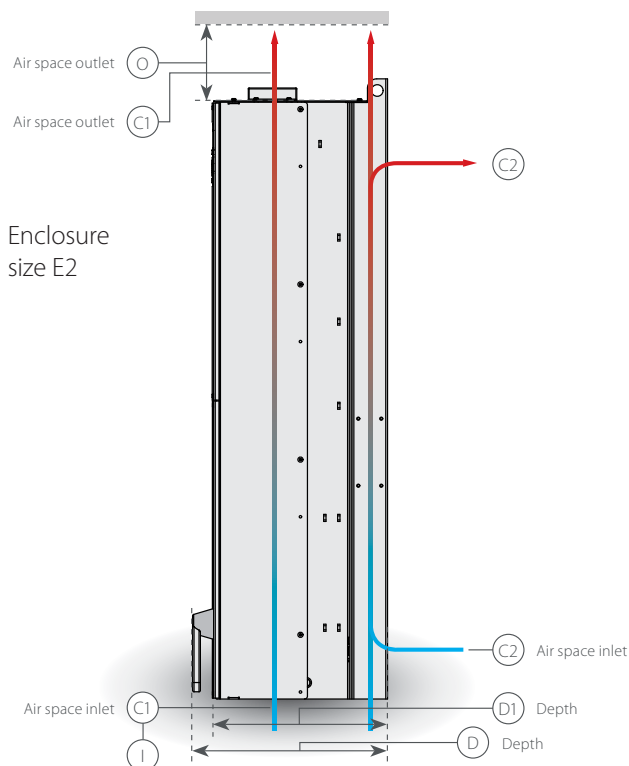
Dimensions and air flow for 6-pulse drives



Please see the VLT® High Power Design Guide for other enclosure sizes, available at <http://vlt-drives.danfoss.com/Support/Technical-Documentation-Database/>.

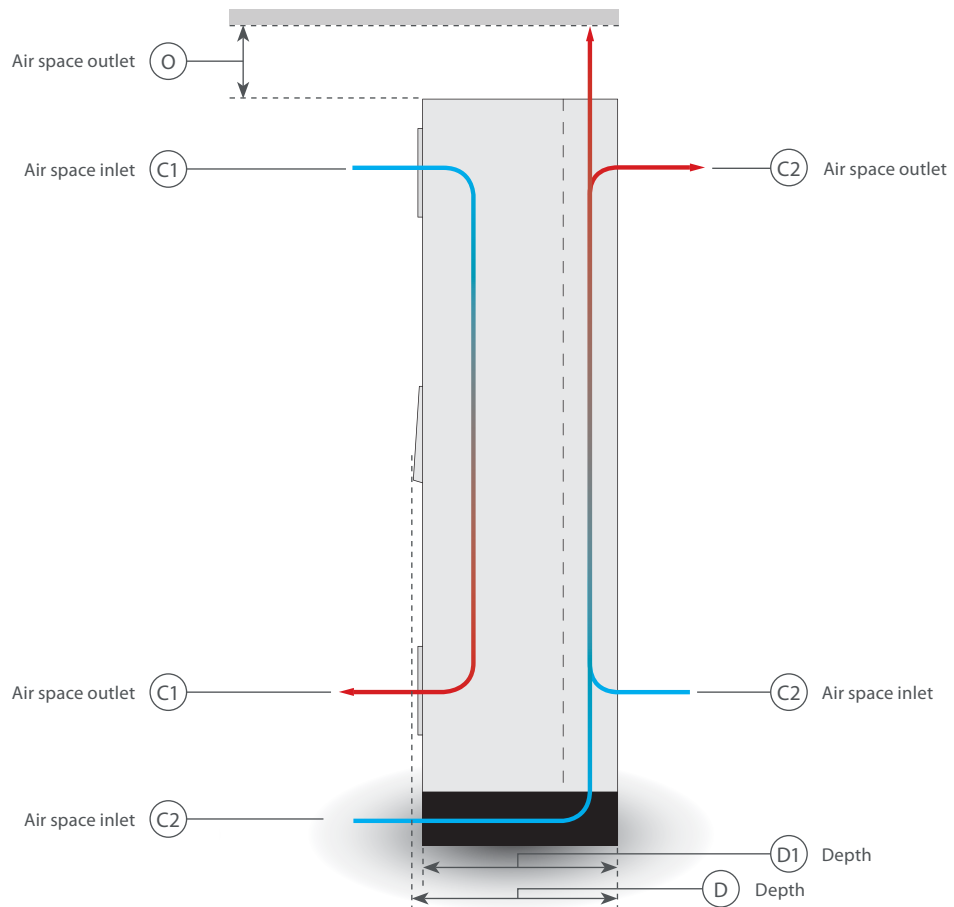
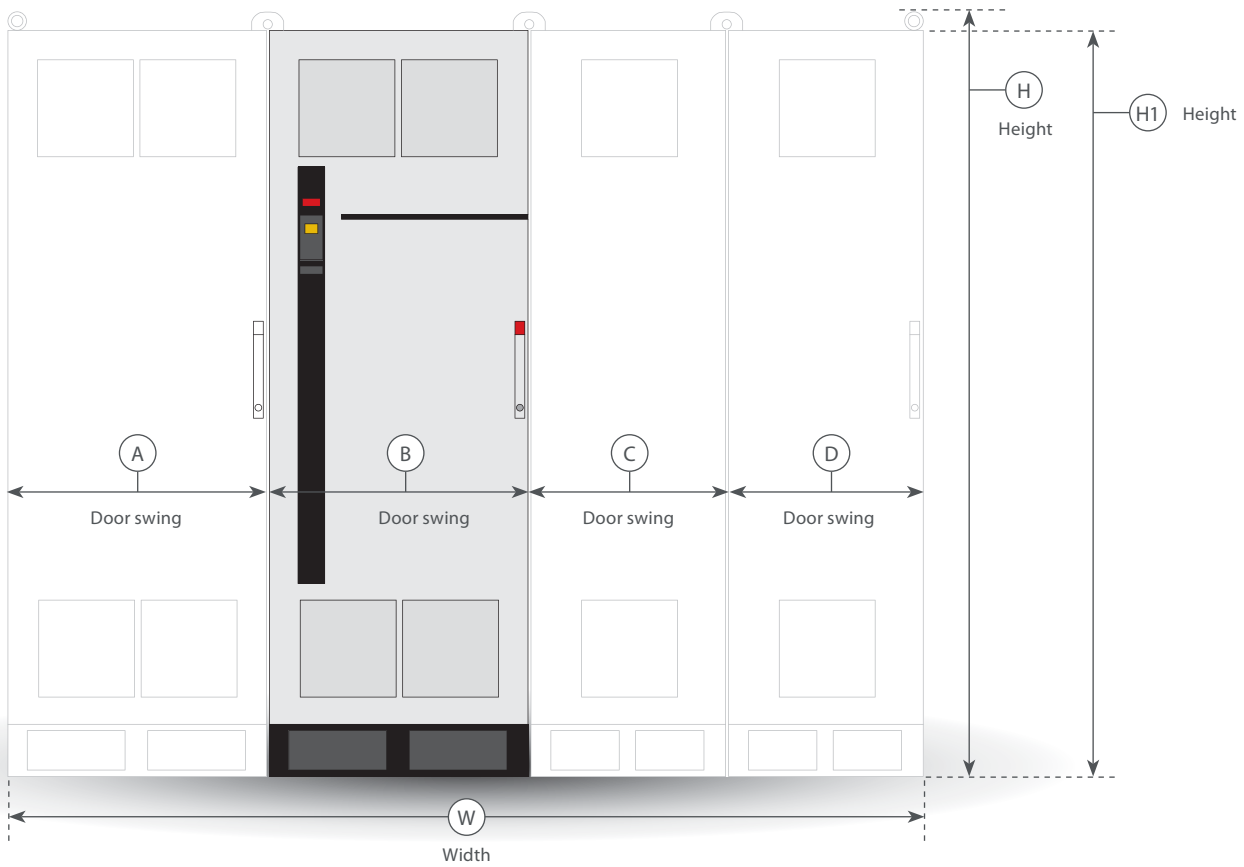
Enclosure sizes E and F

Enclosure size	VLT® 6-pulse						
	E1	E2	F1	F3	F2	F4	
Ingress protection rating	IP21/IP54	IP00		(F1 + options cabinet)		(F2 + options cabinet)	
H mm (inches)	2000 (79)	1547 (61)	2280 (90)	2280 (90)	2280 (90)	2280 (90)	
H1 mm (inches)	n/a	n/a	2205 (87)	2205 (87)	2205 (87)	2205 (87)	
W mm (inches)	600 (24)	585 (23)	1400 (55)	1997 (79)	1804 (71)	2401 (94)	
D mm (inches)	538 (21)	539 (21)	n/a	n/a	n/a	n/a	
D1 mm (inches)	494 (19)	498 (20)	607 (24)	607 (24)	607 (24)	607 (24)	
Door swing A mm (inches)	579 (23)	579 (23)	578 (23)	578 (23)	578 (23)	578 (23)	
Door swing B mm (inches)	n/a	n/a	778 (31)	578 (23)	624 (25)	578 (23)	
Door swing C mm (inches)	n/a	n/a	n/a	778 (31)	579 (23)	624 (25)	
Door swing D mm (inches)	n/a	n/a	n/a	n/a	n/a	578 (23)	
Air cooling	I (air space inlet) mm (inches)	225 (9)	225 (9)	n/a	n/a	n/a	n/a
	O (air space outlet) mm (inches)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)
	C1	340 m³/hr (200 cfm)	255 m³/hr (150 cfm)	IP21/NEMA 1 700 m³/hr (412 cfm) IP54/NEMA 12 525 m³/hr (309 cfm)			
	C2	1105 m³/hr (650 cfm) or 1444 m³/hr (850 cfm)	1105 m³/hr (650 cfm) or 1444 m³/hr (850 cfm)	985 m³/hr (580 cfm)			
Efficiency	0.98						
Max. cable cross-section to motor output terminals (per phase) – mm² (AWG)			8 x 150 (8 x 300 mcm)	8 x 150 (8 x 300 mcm)	12 x 150 (12 x 300 mcm)	12 x 150 (12 x 300 mcm)	
Max. cable cross-section to load sharing terminals (per -DC/+DC)	4 x 240 (4 x 500 mcm)		4 x 120 (4 x 250 mcm)				
Max. cable cross-section to regeneration terminals (per-DC/+DC)			2 x 150 (2 x 300 mcm)				
Max. cable cross-section to brake resistor terminals (per -R/+R)	2 x 185 (2 x 350 mcm)		4 x 185 (4 x 350 mcm)	4 x 185 (4 x 350 mcm)	6 x 185 (6 x 350 mcm)	6 x 185 (6 x 350 mcm)	
Max. cable cross-section to input mains terminals (per phase)	4 x 240 (4 x 500 mcm)		8 x 240 (8 x 500 mcm)				



Dimension and air flow for VLT® Low Harmonic Drive and VLT® 12-pulse
Please see the VLT® High Power Drive Selection Guide.

Dimensions and air flow for 12-pulse drives

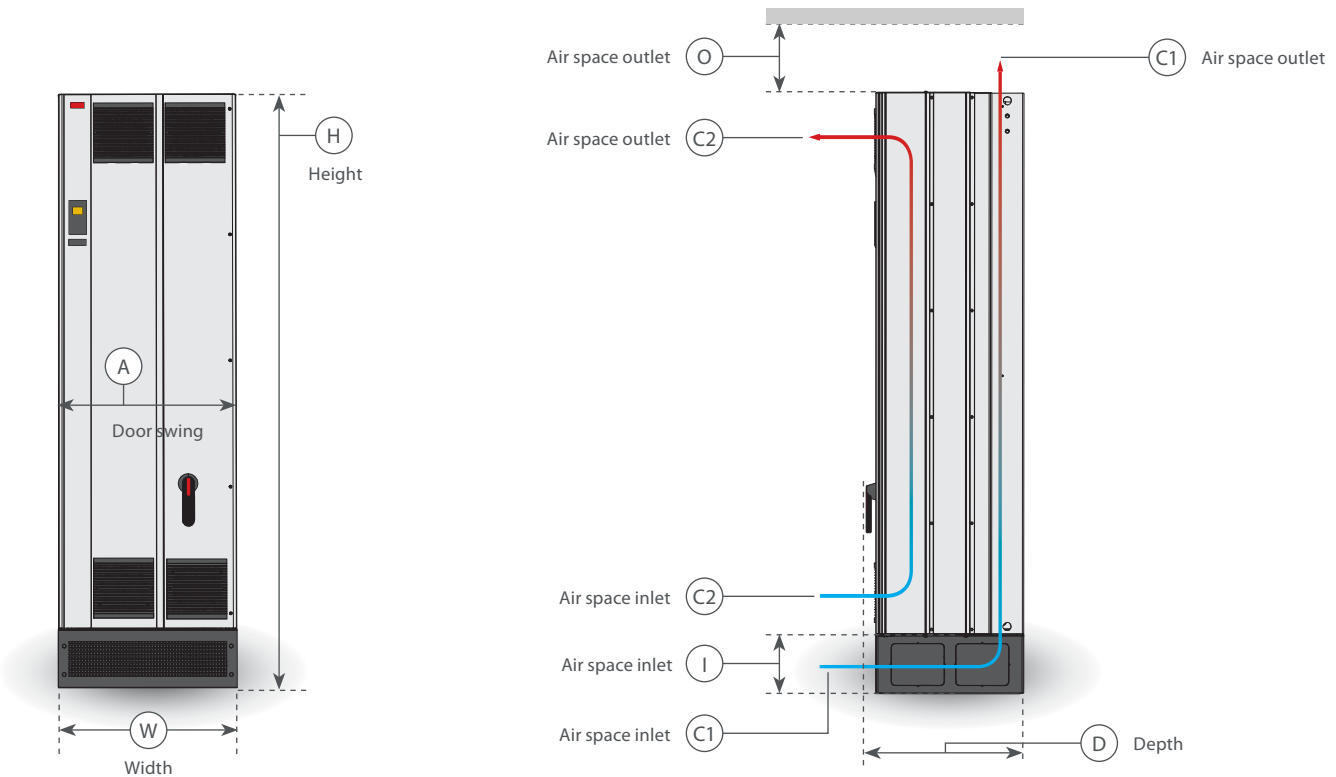


Enclosure size F

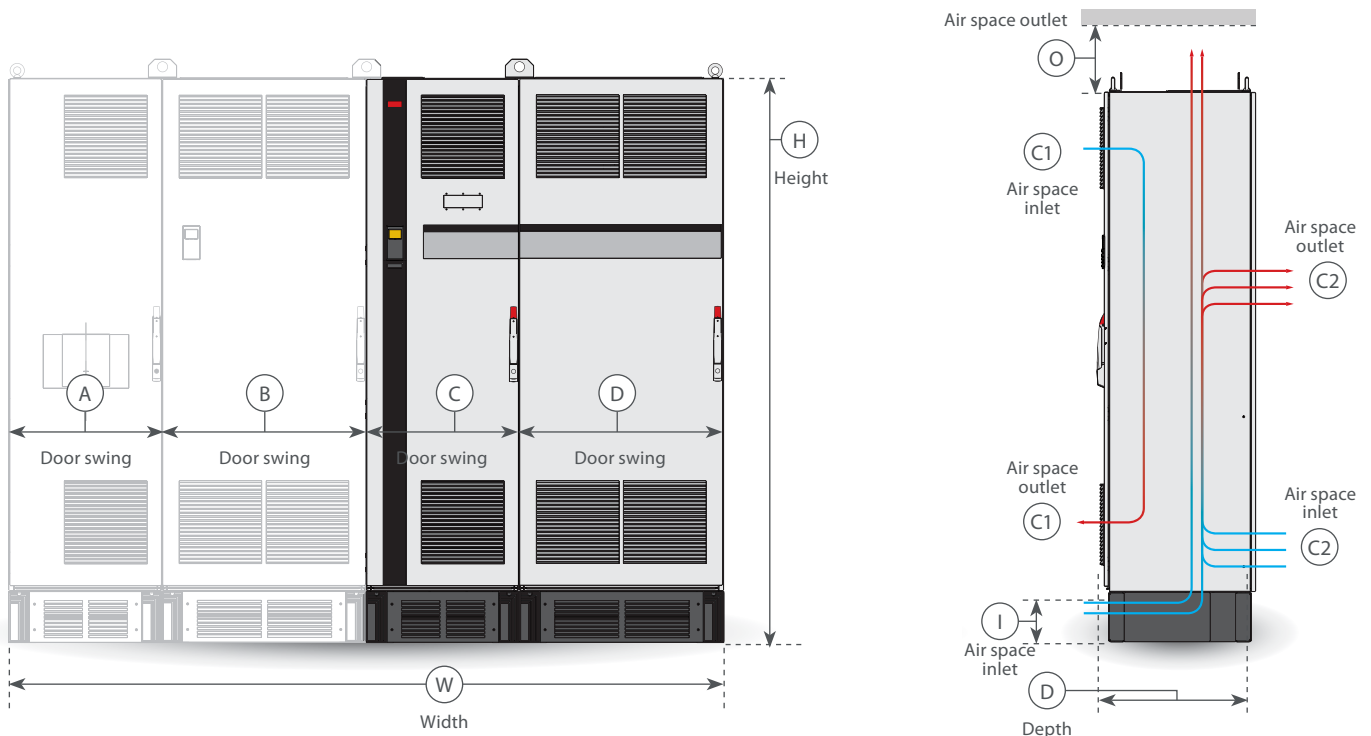
		VLT® 12-pulse					
Enclosure size		F8	F9	F10	F11	F12	F13
			(F8 + options cabinet)		(F10 + options cabinet)		(F12 + options cabinet)
H mm (inches)		2280 (90)	2280 (90)	2280 (90)	2280 (90)	2280 (90)	2280 (90)
H1 mm (inches)		2205 (87)	2205 (87)	2205 (87)	2205 (87)	2205 (87)	2205 (87)
W mm (inches)		806 (32)	1404 (55)	1606 (32)	2401 (95)	2006 (79)	2802 (110)
D mm (inches)		607 (24)	607 (24)	607 (24)	607 (24)	607 (24)	607 (24)
Door swing A mm (inches)		776 (30)	593 (23)	776 (30)	776 (30)	776 (30)	776 (30)
Door swing B mm (inches)		n/a	776 (30)	776 (30)	776 (30)	592 (23)	776 (30)
Door swing C mm (inches)		n/a	n/a	n/a	776 (30)	592 (23)	592 (23)
Door swing D mm (inches)		n/a	n/a	n/a	n/a	n/a	592 (23)
Air cooling	O (air space outlet) mm (inches)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)	225 (9)
	C1	IP21/NEMA 1 1400 m³/hr (824 CFM)	IP21/NEMA 1 2100 m³/hr (1236 CFM)	IP21/NEMA 1 2800 m³/hr (1648 CFM)	IP21/NEMA 1 4200 m³/hr (2472 CFM)	IP21/NEMA 1 2800 m³/hr (1648 CFM)	IP21/NEMA 1 4200 m³/hr (2472 CFM)
		IP54/NEMA 12 1050 m³/hr (618 CFM)	IP54/NEMA 12 1575 m³/hr (927 CFM)	IP54/NEMA 12 2100 m³/hr (1236 CFM)	IP54/NEMA 12 3150 m³/hr (1854 CFM)	IP54/NEMA 12 3150 m³/hr (1854 CFM)	IP54/NEMA 12 3150 m³/hr (1854 CFM)
C2	1970 m³/hr (1160 CFM)	1970 m³/hr (1160 CFM)	3940 m³/hr (2320 CFM)	3940 m³/hr (2320 CFM)	4925 m³/hr (2900 CFM)	4925 m³/hr (2900 CFM)	
Weight	IP21 / NEMA 1 kg (lbs)	440 (880)	656 (1443)	880 (1936)	1096 (2411)	1022 (2248)	1238 (2724)
	IP54 / NEMA 12 kg (lbs)						
Efficiency		0.98					
Max. cable cross-section to motor output terminals (per phase) – mm² (AWG)		8 x 150 (8 x 300 mcm)		8 x 150 (8 x 300mcm)		12 x 150 (12 x 300 mcm)	
Max. cable cross-section to regeneration terminals (per-DC/+DC)		4 x 120 (4 x 250 mcm)					
Max. cable cross-section to brake resistor terminals (per -R/+R)		2 x 185 (2 x 350 mcm)		4 x 185 (4 x 350 mcm)			
Max. cable cross-section to input mains terminals (per phase)		8 x 250 (8 x 500 mcm)					
Max. external input mains fuses [A]		630	630	900	900	2000	2000

Dimensions and air flow for VLT® Advanced Active Filter AAF 006 and VLT® Low Harmonic Drive

VLT® Advanced Active Filter



VLT® Low Harmonic Drive



Enclosures

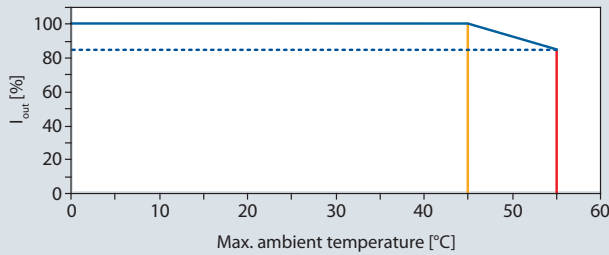
		VLT® Advanced Active Filter AAF 006		VLT® Low Harmonic Drive			
Enclosure size		D14	E1	D1n	D2n	E9	F18
H mm (inches)		1780 (70)	2000 (79)	1780 (70)	1780 (70)	2000 (79)	2277 (90)
W mm (inches)		600 (24)	600 (24)	915 (36)	1020 (40)	1200 (47)	2800 (110)
D mm (inches)		378 (15)	494 (20)	380 (15)	380 (15)	500 (19)	600 (24)
Door swing A mm (inches)		574 (23)	577 (23)	577 (23)	577 (23)	577 (23)	590 (23)
Door swing B mm (inches)		n/a	n/a	298 (12)	395 (15.6)	577 (23)	784 (31)
Door swing C mm (inches)		n/a	n/a	n/a	n/a	n/a	590 (23)
Door swing D mm (inches)		n/a	n/a	n/a	n/a	n/a	784 (31)
O (air space outlet) mm (inches)		225 (9)	225 (9)	225 (9)		225 (9)	225 (9)
Air cooling	C1	340 m³/hr (200 CFM)	765 m³/hr (450 CFM)	442 m³/hr (260 CFM)	544 m³/hr (320 CFM)	680 m³/hr (400 CFM)	3150 m³/hr (1855 CFM)
	C2	765 m³/hr (450 CFM)	1230 m³/hr (724 CFM)	1185 m³/hr (700 CFM)	1605 m³/hr (945 CFM)	2635 m³/hr (1550 CFM)	4485 m³/hr (2640 CFM)
Weight	IP21 / NEMA 1 kg (lbs)	238 (525)	AAF 250/310 429 (945)	353 (777)	413 (910)	676 (1491)	1899 (4187)
	IP54 / NEMA 12 kg (lbs)		AAF 400 453 (998)				
Efficiency		0.96					
Max. cable cross-section to motor output terminals (per phase) – mm² (AWG)		n/a				4 x 240 (4 x 500 mcm)	8 x 150 (8 x 300 mcm)
Max. cable cross-section to brake resistor terminals (per -R/+R)		n/a		Motor: 2 x 95 (2 x 3/0) Brake: 2 x 95 (2 x 3/0) Input: 2 x 185 (2 x 350)	Motor: 2 x 185 (2 x 350) Brake: 2 x 185 (2 x 350) Input: 2 x 185 (2 x 350)	2 x 185 (2 x 300 mcm)	4 x 185 (4 x 350 mcm)
Max. cable cross-section to input mains terminals (per phase)		2 x 150 (2 x 300 mcm)	4 x 240 (4 x 500 mcm)			4 x 240 (4 x 500 mcm)	8 x 240 (8 x 500 mcm)
Max. external input mains fuses [A] (Typical shaft output @ high overload)		190 A: 350	250/310 A: 700 400 A: 900	132 kW @ 400 V: 400	160 kW @ 400 V: 550 200 kW @ 400 V: 630	250 kW @ 400 V: 700 315 kW @ 400 V: 900 355 kW @ 400 V: 900 400 kW @ 400 V: 900	450 kW @ 400 V: 1600 500 kW @ 400 V: 1600 560 kW @ 400 V: 2000 630 kW @ 400 V: 2000
Estimated power loss at max load [W] (Typical shaft output @ high overload)		190 A: 7200	250 A: 8700 310 A: 11800 400 A: 13400	132 kW @ 400 V: 7428	160 kW @ 400 V: 8048 200 kW @ 400 V: 9753	250 kW @ 400 V: 13311 315 kW @ 400 V: 14577 355 kW @ 400 V: 16396 400 kW @ 400 V: 17703	450 kW @ 400 V: 22401 500 kW @ 400 V: 25110 560 kW @ 400 V: 27323 630 kW @ 400 V: 31268



Up to
50°C
ambient
temperature
without derating

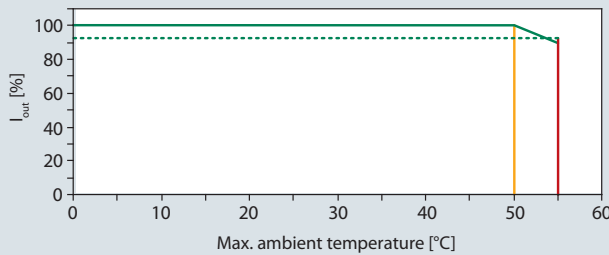
Special conditions

Normal overload drives for VLT® HVAC Drive and VLT® AQUA Drive



Derating curve based on 60 AVM switching pattern. Curve shows a derating of 1.5%/°C above 45 °C. Please see Design Guide for further information.

High overload drives for VLT® AutomationDrive



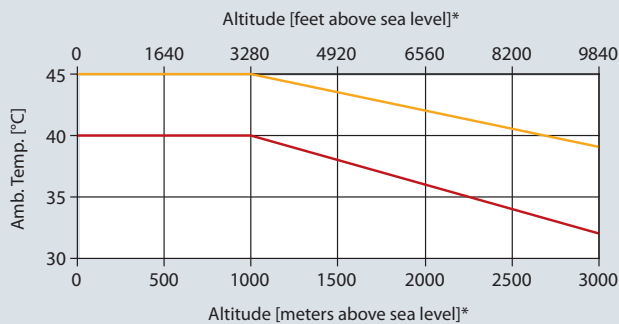
Derating curve based on 60 AVM switching pattern. Curve shows 1.5%/°C above 50 °C. For 6-pulse and 12-pulse drives. Please see the design guide for detailed information.

Derating in high ambient temperatures

VLT® series drives can provide 100% of their rated output current in environments with ambient temperatures of up to 50 °C for high overload applications and 45 °C for normal overload applications without any derating. In environments with higher ambient temperatures, VLT® series drives can still operate by reducing the output current in accordance with the derating curves in the design guides with an overview of these represented by the charts to the left.

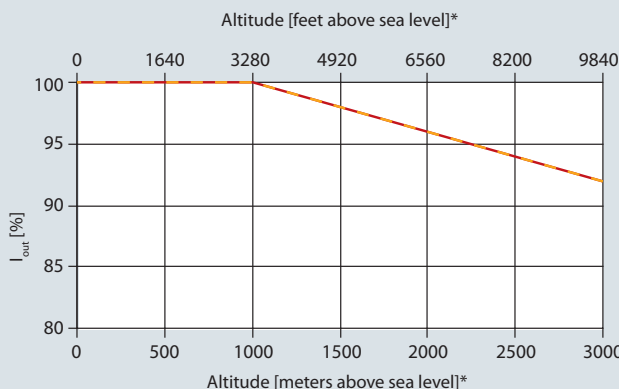
As shown to the left, when the ambient temperature is 55 °C, high overload drives can provide 92.5% of their rated output current, and normal overload drives can provide 85% of their rated output current (based on 60 AVM switching pattern). For VLT® Low Harmonic Drive derating curves, please see the LHD Operating Instructions.

■ Normal overload drives ■ High overload drives



Derating in high altitudes

The thinner air at higher altitudes reduces the effective cooling capabilities of the drive. Reliable operation in higher altitudes can still be assured as long as the ambient temperature remains within the ranges specified in the chart to the left:



Alternatively, the output current of the drive can be reduced to achieve the same objective:

* 690 V drives are limited to 6560' (2000 m) above sea level based on PELV requirements.

For derating options related to switching frequency, see the VLT® HVAC Drive, VLT® AQUA Drive or VLT® AutomationDrive Design Guide.



Accessories and typecode position overview

Enclosure size	Typecode position	D1h/ D2h	D3h/ D4h	D5h/ D7h	D6h/ D8h	D13	E1	E2	E9	F1, F2	F3 and F4 (w/ options cabinet)	F8	F9 (w/options cabinet)	F10, F12	F11, F13 (w/ options cabinet)	F18
Enclosure with corrosion-resistant back channel	4	■	■	■	■			■		■	■					
Mains shielding	4	■	■	■	■	■	■		■							■
Space heaters and thermostat	4	■	■	■	■					■	■			■	■	■
Cabinet indicator light with power outlet	4									■	■			■	■	■
Class A1 RFI Filters	5	■	■	■	■	■	■	■			■		■		■	■
NAMUR terminals	5**									■	■	■	■	■	■	■
Insulation Resistance Monitor (IRM)	5										■		■		■	
Residual Current Monitor (RCD)	5*										■		■		■	■
Brake chopper (IGBTs)	6		■	■	■	■	■	■	■	■	■	■	■	■	■	■
Safe Torque Off / 6***	6	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Regeneration terminals	6****		■				■	■	■	■	■					■
Common motor terminals	6									■	■			■	■	
Emergency Stop with Pilz Safety Relay	6*										■					■
Safe Torque Off + Pilz Safety Relay	6									■	■	■	■	■	■	■
No LCP	7	■	■	■	■											
LCP 101 numerical local control panel	7	■	■	■	■		■	■								
LCP 102 graphical local control panel	7	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fuses	9	■	■	■		■	■	■	■	■	■	■	■	■	■	■
Load sharing terminals	9		■			■	■	■	■	■	■	■	■	■	■	■
Fuses + load sharing terminals	9		■			■	■	■	■	■	■	■	■	■	■	■
Disconnect	9****			■	■	■	■	■	■		■		■		■	■
Circuit breakers	9****				■						■					■
Contactors	9****				■						■					■
Manual motor starters	10									■	■			■	■	■
30 Amp, fuse-protected terminals	10									■	■			■	■	■
24V DC supply	11	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
External temperature monitoring	11									■	■			■	■	■
Heat sink access panel	11	■	■	■	■											
NEMA 3R ready drive	11	■														

* Requires an options cabinet

** Available only for the VLT® AutomationDrive FC 302

*** Standard on VLT® AutomationDrive FC 302, optional for VLT® HVAC Drive FC 102 and VLT® AQUA Drive FC 202

**** Options supplied with fuses for enclosure size D

***** Available for IP21/54

Enclosure with corrosion-resistant back channel

For additional protection from corrosion in harsh environments, units can be ordered in an enclosure that includes a stainless steel back channel, heavier plated heat sinks and an upgraded fan. This option is recommended in salt-air environments, such as those near the ocean.

Mains shielding

Lexan® shielding can be mounted in front of incoming power terminals and input plate to protect from accidental contact when the enclosure door is open.

Space heaters and thermostat

Mounted in the cabinet interior of drives with enclosure sizes D and F and controlled via an automatic thermostat, space heaters controlled via an automatic thermostat prevent condensation inside the enclosure.

The thermostat default settings turn on the heaters at 10°C (50° F) and turn them off at 15.6°C (60° F).

Cabinet light with power outlet

A light can be mounted on the cabinet interior of drives with enclosure size F, to increase visibility during servicing and maintenance. The light housing includes a power outlet for temporarily powering laptop computers or other devices. Available in two voltages:

- 230 V, 50 Hz, 2.5 A, CE/ENEC
- 120 V, 60 Hz, 5 A, UL/cUL

RFI filters

VLT® Series drives feature integrated Class A2 RFI filters as standard. If additional levels of RFI/EMC protection are required, they can be obtained using optional Class A1 RFI filters, which provide suppression of radio frequency interference and electromagnetic radiation in accordance with EN 55011.

On drives with enclosure size F, the Class A1 RFI filter requires the addition of the options cabinet. Marine use RFI filters are also available.

NAMUR terminals

Selection of this option provides standardized terminal connection and associated functionality as defined by NAMUR NE37. NAMUR is an international association of automation technology users in the process industries, primarily chemical and pharmaceutical industries in Germany.

Requires the selection of the VLT® Extended Relay Card MCB 113 and the VLT® PTC Thermistor Card MCB 112.

Available only for VLT® AutomationDrive FC 302.

Insulation Resistance Monitor (IRM)

Monitors the insulation resistance in ungrounded systems (IT systems in IEC terminology) between the system phase conductors and ground. There is an ohmic pre-warning and a main alarm setpoint for the insulation level. Associated with each setpoint is an SPDT alarm relay for external use. Only one insulation resistance monitor can be connected to each ungrounded (IT) system.

- Integrated into the drive's safe-stop circuit
- LCD display of insulation resistance
- Fault memory
- INFO, TEST and RESET key

Residual Current Device (RCD)

Uses the core balance method to monitor ground fault currents in grounded and high-resistance grounded systems (TN and TT systems in IEC terminology). There is a pre-warning (50% of main alarm setpoint) and a main alarm setpoint. Associated with each setpoint is an SPDT alarm relay for external use. Requires an external "window-type" current transformer (supplied and installed by customer).

- Integrated into the drive's safe-stop circuit
- IEC 60755 Type B device monitors, pulsed DC, and pure DC ground fault currents
- LED bar graph indicator of the ground fault current level from 10-100% of the setpoint
- Fault memory
- TEST / RESET key

Safe Torque Off with Pilz Safety Relay

Available for drives with enclosure size F. Enables the Pilz Relay to fit in the enclosure without requiring an options cabinet. The relay is used in the external temperature monitoring option. If PTC monitoring is required, VLT® PTC Thermistor Card MCB 112 must be ordered.

Emergency Stop with Pilz Safety Relay

Includes a redundant 4-wire emergency stop pushbutton mounted on the front of the enclosure, and a Pilz relay that monitors it in conjunction with the drive's safe-stop circuit and contactor position. Requires a contactor and the options cabinet for drives with enclosure size F.

Brake Chopper (IGBTs)

Brake terminals with an IGBT brake chopper circuit allow for the connection of external brake resistors. For detailed data on brake resistors please see the VLT® Brake Resistor MCE 101 Design Guide, MG.90.Ox.yy, available at <http://drivesliterature.danfoss.com/>

Regeneration terminals

Allow connection of regeneration units to the DC bus on the capacitor bank side of the DC-link reactors for regenerative braking. The enclosure size F regeneration terminals are sized for approximately 50% the power rating of the drive. Consult the factory for regeneration power limits based on the specific drive size and voltage.

Load sharing terminals

These terminals connect to the DC-bus on the rectifier side of the DC-link reactor and allow for the sharing of DC bus power between multiple drives. For drives with enclosure size F, the load sharing terminals are sized for approximately 33% of the power rating of the drive. Consult the factory for load sharing limits based on the specific drive size and voltage.

Disconnect

A door-mounted handle allows for the manual operation of a power disconnect switch to enable and disable power to the drive, increasing safety during servicing. The disconnect is interlocked with the cabinet doors to prevent them from being opened while power is still applied.

Circuit breakers

A circuit breaker can be remotely tripped, but must be manually reset. Circuit breakers are interlocked with the cabinet doors to prevent them from being opened while power is still applied. When a circuit breaker is ordered as an option, fuses are also included for fast-acting current overload protection of the AC drive.

Contactors

An electrically – controlled contactor switch allows for the remote enabling and disabling of power to the drive. An auxiliary contact on the contactor is monitored by the Pilz Safety if the IEC Emergency Stop option is ordered.

Manual motor starters

Provide 3-phase power for electric cooling blowers that are remote required for larger motors. Power for the starters is provided from the load side of any supplied contactor, circuit breaker or disconnect switch. If a Class 1 RFI filter option is ordered, the input side of the RFI provides the power to the starter. Power is fused before each motor starter and is off when the incoming power to the drive is off. Up to two starters are allowed. If a 30 A, fuse-protected circuit is ordered, then only one starter is allowed. Starters are integrated into the drive's safe-stop circuit.

Unit features include:

- Operation switch (on/off)
- Short circuit and overload protection with test function
- Manual reset function

30 A, fuse-protected terminals

- 3-phase power matching incoming mains voltage for powering auxiliary customer equipment
- Not available if two manual motor starters are selected
- Terminals are off when the incoming power to the drive is off
- Power for the fused-protected terminals will be provided from the load side of any supplied contactor, circuit breaker, or disconnect switch if a Class 1 RFI filter option is ordered, the input side of the RFI provides the power to the starter.

Common Motor Terminals

The common motor terminal option provides the bus bars and hardware required to connect the motor terminals from the paralleled inverters to a single terminal (per phase) to accommodate the installation of the motor-side top entry kit.

This option is also recommended to connect the output of a drive to an output filter or output contactor. The common motor terminals eliminate the need for equal cable lengths from each inverter to the common point of the output filter (or motor).

24 V DC supply

- 5 A, 120 W, 24 V DC
- Protected against output overcurrent, overload, short circuits, and overtemperature
- For powering customer-supplied accessory devices such as sensors, PLC I/O, contactors, temperature probes, indicator lights and/or other electronic hardware
- Diagnostics include a dry DC-ok contact, a green DC-ok LED and a red overload LED

External temperature monitoring

Designed for monitoring temperatures of external system components, such as the motor windings and/or bearings. Includes eight universal input modules plus two dedicated thermistor input modules. All ten modules are integrated into the drive's safe-stop circuit and can be monitored via a fieldbus network, which requires the purchase of a separate module/bus coupler. A Safe Torque Off brake option must be ordered when selecting external temperature monitoring.

Universal inputs (5)

Signal types:

- RTD inputs (including Pt100), 3-wire or 4-wire
- Thermocouple
- Analog current or analog voltage

Additional features:

- One universal output, configurable for analog voltage or analog current
- Two output relays (N.O.)
- Dual-line LC display and LED diagnostics
- Sensor lead wire break, short circuit and incorrect polarity detection
- Interface set-up software
- If 3 PTC are required, MCB 112 control card option must be added.

Additional external temperature monitors:

- This option is available in case you need more than the MCB 114 and MCB 112 provides.

VLT® Control Panel LCP 101 (Numeric)

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

Ordering number

130B1124

VLT® Control Panel LCP 102 (Graphical)

- Multi-language display
- Quick menu for easy commissioning
- Full parameter back-up and copy function
- Alarm logging
- Info key explains the function of the selected item on display
- Hand-operated start/stop or selection of Automatic mode
- Reset function
- Trend graphing

Ordering number

130B1107



A options: Fieldbuses

Available for the full product range



Fieldbus	Typecode position	FC 302	FC 202	FC 102	FC 103
A					
VLT® PROFIBUS DP MCA 101	14	■	■	■	■
VLT® DeviceNet MCA 104		■	■	■	
VLT® CANopen MCA 105		■			
VLT® AK-LonWorks MCA 107					■
VLT® LonWorks MCA 108				■	
VLT® BACnet MCA 109				■	
VLT® 3000 PROFIBUS Converter MCA 113		■			
VLT® 5000 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® BACnet/IP MCA 125				■	
VLT® 5000 DeviceNet Converter MCA 194		■			

VLT® PROFIBUS DP MCA 101

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

VLT® PROFIBUS DP MCA 101 provides:

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

Ordering number

130B1100 standard
130B1200 coated (Class 3C3/IEC 60721-3-3)

VLT® DeviceNet MCA 104

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

- Support of ODVA's AC drive profile supported via I/O instance 20/70 and 21/71 secures compatibility to existing systems

- Benefit from ODVA's strong conformance testing policies, which ensure that products are interoperable

Ordering number

130B1102 standard
130B1202 coated (Class 3C3/IEC 60721-3-3)

VLT® CANopen MCA 105

High flexibility and low cost are two of the "cornerstones" for CANopen.

The VLT® CANopen MCA 105 option for the VLT® AutomationDrive is fully equipped with both high-priority access to control and status of the drive (PDO Communication) and access all parameters through acyclic data (SDO Communication).

For interoperability, the option has implemented the DSP402 AC drive Profile. These features all guarantees standardized handling, interoperability and low cost.

Ordering number

130B1103 standard
130B1205 coated (Class 3C3/IEC 60721-3-3)

VLT® AK-LonWorks MCA 107

VLT® AK-LonWorks MCA 107 is a complete electronic refrigeration and control system for monitoring and controlling refrigeration plants.

Connecting this drive to a Danfoss ADAP-KOOL® Lon network is a simple process that needs only a network address.

Ordering number

130B1169 standard
130B1269 coated (Class 3C3/IEC 60721-3-3)

VLT® LonWorks MCA 108

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

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

Ordering number

130B1106 standard
130B1206 coated (Class 3C3/IEC 60721-3-3)

VLT® BACnet MCA 109

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

Via the BACnet option, it is possible to read all analog and digital inputs and control all analog and digital outputs of the VLT® HVAC Drive.

All inputs and outputs can be operated independently of the functions of the drive, and thus work as remote I/O:

- COV (Change of Value)
- Synchronization of RTC from BACnet
- Read/write property multiple
- Alarm/warning handling

Ordering number

130B1144 standard
130B1244 coated (Class 3C3/IEC 60721-3-3)

VLT® PROFIBUS Converter MCA 113

The VLT® PROFIBUS Converter MCA 113 is a special version of the PROFIBUS options that emulates the VLT® 3000 commands in the VLT® AutomationDrive.

The VLT® 3000 can be replaced by the VLT® AutomationDrive, or an existing system can be expanded without costly change of the PLC program.

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

Ordering number

NA standard
130B1245 coated (Class 3C3/IEC 60721-3-3)

VLT® PROFIBUS Converter MCA 114

The VLT® PROFIBUS Converter MCA 114 is a special version of the PROFIBUS options that emulates the VLT® 5000 commands in the VLT® AutomationDrive.

The VLT® 5000 can be replaced by the VLT® AutomationDrive, or an existing system can be expanded without costly change of the PLC program.

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

Ordering number

NA standard
130B1246 coated (Class 3C3/IEC 60721-3-3)

VLT® PROFINET MCA 120

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

- Same PPO types as the MCA 101 PROFIBUS for easy migration to PROFINET
- Built-in web server for remote diagnosis and reading out of basic drive parameters
- Support of MRP
- Support of DP-V1 Diagnostic allows easy, fast and standardized handling of warning and

fault information into the PLC, improving bandwidth in the system

- Support of PROFISAFE when combined with MCB 152
- Implementation in accordance with Conformance Class B

Ordering number

130B1135 standard
130B1235 coated (Class 3C3/IEC 60721-3-3)

VLT® EtherNet/IP MCA 121

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

The VLT® MCA 121 offers advanced features such as:

- Built-in high performance switch enabling line-topology, and eliminating the need for external switches
- DLR Ring (from October 2015)
- Advanced switch and diagnosis functions
- Built-in web server
- E-mail client for service notification
- Unicast and Multicast communication

Ordering number

130B1119 standard
130B1219 coated (Class 3C3/IEC 60721-3-3)

VLT® Modbus TCP MCA 122

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

Other features:

- Built-in web-server for remote diagnosis and reading out basic drive parameters
- Email notification can be configured to send an email message to one or more recipients when certain alarms or warnings occur, or are cleared
- Dual Master PLC connection for redundancy

Ordering number

130B1196 standard
130B1296 coated (Class 3C3/IEC 60721-3-3)

VLT® POWERLINK MCA 123

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

POWERLINK provides high performance real-time and time synchronization features. Due to its CANopen-based communication models, network management and device description model, it offers much more than just a fast communication network.

The perfect solution for:

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

Ordering number

130B1489 standard
130B1490 coated (Class 3C3/IEC 60721-3-3)

VLT® EtherCAT MCA 124

The VLT® EtherCAT MCA 124 offers connectivity to EtherCAT® based networks via the EtherCAT Protocol.

The option handles the EtherCAT line communication in full speed, and connection towards the drive with an interval down to 4 ms in both directions. This allows the MCA 124 to participate in networks ranging from low performance up to servo applications.

- EoE Ethernet over EtherCAT support
- HTTP (Hypertext Transfer Protocol) for diagnosis via built-in web server
- CoE (CAN Over Ethernet) for access to drive parameters
- SMTP (Simple Mail Transfer Protocol) for e-mail notification
- TCP/IP for easy access to drive configuration data from MCT 10

Ordering number

130B5546 standard
130B5646 coated (Class 3C3/IEC 60721-3-3)

VLT® BACnet/IP MCA 125

The VLT® BACnet/IP MCA 125 option optimizes the use of VLT® HVAC Drive together with building management systems (BMS) using the BACnet/IP protocol or running BACnet on Ethernet. The option has two Ethernet connectors, enabling daisy-chain configuration with no need for external switches. The VLT® BACnet/IP MCA 125 makes it easy to control or to monitor points required in typical HVAC applications, reducing overall cost of ownership.

Besides standard functionality, the option provides:

- COV, Change Of Value
- Read/WritePropertyMultiple
- Alarm/Warning notifications
- PID Loop object
- Segmented data transfer
- Trending

Ordering number

134B1586 coated (Class 3C3/IEC 60721-3-3)

VLT® DeviceNet Converter MCA 194

The VLT® DeviceNet Converter MCA 194 emulates VLT® 5000 commands in the VLT® AutomationDrive.

This means that a VLT® 5000 drive can be replaced by the VLT® AutomationDrive, or a system can be expanded without costly change of the PLC program.

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

Ordering number

NA standard
130B5601 coated (Class 3C3/IEC 60721-3-3)



B options: Functional extensions

Available for the full product range



Functional extensions	Typecode position	FC 302	FC 202	FC 102	FC 103
B					
VLT® General Purpose MCB 101	15	■	■	■	■
VLT® Encoder Input MCB 102		■			
VLT® Resolver Input MCB 103		■			
VLT® Relay Option 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 Card MCB 114		■	■	■	
VLT® Safety Option MCB 140		■		■	
VLT® Safety Option MCB 150 TTL		■			
VLT® Safety Option MCB 151 HTL		■			
VLT® Safety Option MCB 152 PROFIsafe STO		■			
VLT® Extended Cascade Controller MCO 101				■	

VLT® General Purpose I/O MCB 101

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

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

Ordering number

130B1125 standard
130B1212 coated (Class 3C3/IEC 60721-3-3)

VLT® Encoder Input MCB 102

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

The following encoder types are supported:

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

Ordering number

130B1115 standard
130B1203 coated (Class 3C3/IEC 60721-3-3)

VLT® Resolver Input MCB 103

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

- Primary voltage2-8 Vrms
- Primary frequency 2.0-15 kHz
- Primary current max.....50 mA rms
- Secondary input voltage4 Vrms
- Spring loaded connection

Ordering number

130B1127 standard
130B1227 coated (Class 3C3/IEC 60721-3-3)

VLT® Relay Card MCB 105

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

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

Max. terminal load:

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

Min. terminal load:

- DC 5 V 10 mA

Ordering number

130B1110 standard
130B1210 coated (Class 3C3/IEC 60721-3-3)

VLT® Safe PLC I/O MCB 108

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

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

Ordering number

130B1120 standard
130B1220 coated (Class 3C3/IEC 60721-3-3)

VLT® Analog I/O Option MCB 109

This analog input/output option is easily fitted in the AC drive for upgrading to advanced performance and control using the additional I/O. This option also upgrades the AC drive with a battery back-up supply for the AC drive built-in clock. This provides stable use of all AC drive clock functions as timed actions.

- 3 analog inputs, each configurable as both voltage and temperature input
- Connection of 0-10 V analog signals as well as Pt1000 and Ni1000 temperature inputs
- 3 analog outputs each configurable as 0-10 V outputs
- Back-up supply for the standard clock function in the AC drive

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

Ordering number

130B1143 standard
130B1243 coated (Class 3C3/IEC 60721-3-3)

VLT® PTC Thermistor Card MCB 112

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

- Protects the motor from overheating
- ATEX-approved for use with Ex d and Ex e motors (EX e only FC 302)
- Uses Safe Stop function, which is approved in accordance with SIL 2 IEC 61508

Ordering number

NA standard
130B1137 coated (Class 3C3/IEC 60721-3-3)

VLT® Sensor Input Card MCB 114

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

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

Ordering number

130B1172 standard
130B1272 coated (Class 3C3/IEC 60721-3-3)

VLT® Safety Option MCB 140 and MCB 141

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

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

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

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

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

Ordering number

130B6443 MCB 140, 130B6447 MCB 141

VLT® Safety Option MCB 150 and MCB 151

The VLT® Safety Options MCB 150 and MCB 151 expand the Safe Torque Off (STO) function, which is integrated in a standard VLT® AutomationDrive. Use the Safe Stop 1 (SS1) function to perform a controlled stop before removing torque. Use the Safely-Limited Speed SLS function to monitor whether a specified speed is exceeded.

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

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

Ordering number

130B3280 MCB 150, 130B3290 MCB 151

VLT® Safety Option MCB 152

The VLT® Safety Option MCB 152 enables activation of Safe Torque Off (STO) via the PROFIsafe fieldbus in combination with VLT® PROFINET MCA 120 fieldbus option. It improves flexibility by connecting safety devices within a plant.

The safety functions of the MCB 152 are implemented according to EN IEC 61800-5-2. The MCB 152 supports PROFIsafe functionality to activate integrated safety functions of the VLT AutomationDrive from any PROFIsafe host, up to Safety Integrity Level SIL 2 according to EN IEC 61508 and EN IEC 62061, Performance Level PL d, Category 3 according to EN ISO 13849-1.

- PROFIsafe device (in combination with MCA 120)
- Replacement of external safety equipment
- 2 safe programmable inputs
- Safe LCP copy
- Dynamic commissioning report

Ordering number

130B9860 coated (Class 3C3/IEC 60721-3-3)

VLT® Extended Cascade Controller MCO 101

The MCO 101 upgrades the built-in cascade controller to operate more pumps and provide more advanced pump control in master/follower mode.

- Up to 6 pumps in standard cascade set-up
- Up to 5 pumps in master/follower set-up
- Technical specifications: See VLT® Relay Option MCB 105

Ordering number

130B1118 standard
130B1218 coated (Class 3C3/IEC 60721-3-3)



C options: Motion control and relay card

Available for the full product range

Option slot	Typecode position	FC 302	FC 202	FC 102	FC 103
C					
VLT® Advanced Cascade Controller MCO 102	17	■	■		
VLT® Motion Control MCO 305	16	■			
VLT® Synchronizing Control MCO 350	16 and 18	■			
VLT® Positioning Controller MCO 351		■			
VLT® Extended Relay Card MCB 113	17	■	■		■

VLT® Advanced Cascade Controller MCO 102

Easy to fit, the VLT® Advanced Cascade Controller MCO 102 upgrades the built-in cascade controller to operate up to 8 pumps and more advanced pump control in master/follower mode.

MCO 102 supports the combination of multiple variable speed and fixed speed pumps, as well as configurations with pumps of differing capacity (mixed pump control).

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

- Up to 8 pumps in standard cascade set-up
- Up to 8 pumps in master/follower set-up

Ordering number

130B1154 standard
130B1254 coated (Class 3C3/IEC 60721-3-3)

VLT® Extended Relay Card MCB 113

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

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

Ordering number

130B1164 standard
130B1264 coated (Class 3C3/IEC 60721-3-3)

VLT® Motion Control MCO 305

An integrated programmable motion controller adding extra functionality for VLT® AutomationDrive FC 301 and FC 302.

VLT® Motion Control Option MCO 305 offers easy-to-use motion functions combined with programmability – an ideal solution for positioning and synchronizing applications.

- Synchronization (electronic shaft), positioning and electronic cam control
- 2 separate interfaces supporting both incremental and absolute encoders
- 1 encoder output (virtual master function)
- 10 digital inputs
- 8 digital outputs
- Support of CANopen motion bus, encoders and I/O modules
- Sends and receives data via fieldbus interface (requires fieldbus option)
- PC software tools for debugging and commissioning: Program and Cam editor
- Structured programming language with both cyclic and event-driven execution

Ordering number

130B1134 standard
130B1234 coated (Class 3C3/IEC 60721-3-3)

VLT® Synchronizing Controller MCO 350

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

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

Ordering number

130B1152 standard
130B1252 coated (Class 3C3/IEC 60721-3-3)

VLT® Positioning Controller MCO 351

The VLT® Positioning Controller MCO 351 offers a host of user-friendly benefits for positioning applications in many industries.

Features:

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

Ordering number

130B1153 standard
130B1253 coated (Class 3C3/IEC 60721-3-3)



D option: 24 V back-up power supply

Available for the full product range



Option slot	Typecode position	FC 302	FC 202	FC 102	FC 103
D					
VLT® 24 V DC Supply Option MCB 107	19	■	■	■	■

VLT® 24 V DC Supply MCB 107

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

This enables full operation of the LCP (including the parameter setting) and all installed options without connection to mains.

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

Ordering number

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

Kits to fit your application

Kit	Available for following enclosure sizes
NEMA 3R outdoor weather shield	D1h, D2h
USB in the door kit	D1h, D2h, D3h, D4h, D5h, D6h, D7h, D8h, E1, F
Enclosure size F top entry kit motor cables	F
Enclosure size F top entry kit mains cables	F
Common motor terminal kits	F1/F3, F2/F4
Adapter plate	D1h, D2h, D3h, D4h
Back-channel duct kit	D1h, D2h, D3h, D4h, E2
NEMA 3R Rittal and welded enclosures	D3h, D4h, E2
Back-channel cooling kits for non-Rittal enclosures	D3h, D4h
Back-channel cooling kit (in-bottom/out-top)	D1h, D2h, D3h, D4h, E2
Back-channel cooling kit (in-back/out-back)	D1h, D2h, D3h, D4h, E, F
Pedestal kit with in-back/out-back cooling	D1h, D2h
Pedestal kit	D1h, D2h, D5h, D6h, D7h, D8h, E1, E2
Input-plate option kit	D, E
IP20 conversion kit	E2
Top entry of fieldbus cables	D3, D4, D1h-D8h, E2

NEMA 3R outdoor weather shield

Designed to be mounted over the VLT® drive to protect from direct sun, snow and falling debris. Drives used with this shield must be ordered from the factory as "NEMA 3R Ready". This is an enclosure option in the type code – E55.

Ordering number

D1h.....	176F6302
D2h.....	176F6303

USB in the door kit

Available for all enclosure sizes, this USB extension cord kit allows access to the drive controls via laptop computer without opening the drive. The kits can only be applied to drives manufactured after a certain date. Drives built prior to these dates do not have the provisions to accommodate the kits. Reference the following table to determine which drives the kits can be applied to.

IP20

D1h, D2h, D3h, D4h, D5h, D6h, D7h and D8h.

IP21/IP54

D1h, D2h, D3h, D4h, D5h, D6h, D7h, D8h, E1 and F.

Enclosure size F top entry kit motor cables

To use this kit, the drive must be ordered with the common motor terminal option. The kit includes everything to install a top entry cabinet on the motor side (right side) of an F size enclosure.

Ordering number

F1/F3, 400 mm	176F1838
F1/F3, 600 mm	176F1839
F2/F4 400 mm	176F1840
F2/F4, 600 mm	176F1841
F8, F9, F10, F11, F12, F13	Contact factory

Enclosure size F top entry kit mains cables

The kits include everything required to install a top entry section onto the mains side (left side) of an F size enclosure.

Ordering number

F1/F2, 400 mm	176F1832
F1/F2, 600 mm	176F1833
F3/F4 with disconnect, 400 mm	176F1834
F3/F4 with disconnect, 600 mm	176F1835
F3/F4 without disconnect, 400 mm	176F1836
F3/F4 without disconnect, 600 mm	176F1837
F8, F9, F10, F11, F12, F13	Contact factory

Common motor terminal kits

The common motor terminal kits provide the bus bars and hardware required to connect the motor terminals from the paralleled inverters to a single terminal (per phase) to accommodate the installation of the motor-side top entry kit. This kit is equivalent to the common motor terminal

option of a drive. This kit is not required to install the motor-side top entry kit if the common motor terminal option was specified when the drive was ordered.

This kit is also recommended to connect the output of a drive to an output filter or output contactor. The common motor terminals eliminate the need for equal cable lengths from each inverter to the common point of the output filter (or motor).

Ordering number

F1/F2, 400 mm	176F1832
F1/F2, 600 mm	176F1833

Adapter plate

The adapter plate is used to replace an old enclosure size D drive with the new enclosure size D drive, using the same mounting.

Ordering number

D1h/D3h adapter plate to replace	
D1/D3 drive	176F3409
D2h/D4h adapter plate to replace	
D2/D4 drive	176F3410

Back-channel duct kit

Back-channel duct kits are offered for conversion of enclosure sizes D and E. They are offered in two configurations – in-bottom/out-top venting and top only venting. Available for enclosure sizes D3h, D4h and E2.

Ordering number top and bottom

D3h kit 1800 mm	176F3627
D4h kit 1800 mm	176F3628
D3h Kit 2000 mm	176F3629
D4h Kit 2000 mm	176F3630
E2 2000 mm	176F1850
E2 2200 mm	176F0299

Ordering number top only

E2	176F1776
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NEMA 3R Rittal and welded enclosures

The kits are designed to be used with the IP00/IP20/Chassis drives to achieve an ingress protection rating of NEMA 3R or NEMA 4. These enclosures are intended for outdoor use to provide a degree of protection against inclement weather.

Ordering number for

NEMA 3R (welded enclosures)

D3h back-channel cooling kit	
(in back out back)	176F3521
D4h back-channel cooling kit	
(in back out back)	176F3526
E2 kit	176F0298

Ordering number for

NEMA 3R (Rittal enclosures)

D3h back-channel cooling kit	
(in back out back)	176F3633
D4h Back-channel cooling kit	
(in back out back)	176F3634
E2 kit	176F1852

Back-channel cooling kits for non-Rittal enclosures

The kits are designed to be used with the IP20/Chassis drives in non-Rittal enclosures for in-back/out-back cooling. Kits do not include plates for mounting in the enclosures.

Ordering number

D3h	176F3519
D4h	176F3524

Ordering number for corrosion resistant

D3h	176F3520
D4h	176F3525

Back-channel cooling kit (in-bottom/out-back)

Kit for directing the back-channel air flow in the bottom of the drive and out the back.

Ordering number

D1h/D3h	176F3522
D2h/D4h	176F3527

Ordering number corrosion resistant

D1h/D3h	176F3523
D2h/D4h	176F3528

Back-channel cooling kit (in-back/out-back)

These kits are designed to be used for redirecting the back-channel air flow. Factory back-channel cooling directs air in the bottom of the drive and out the top. The kit allows the air to be directed in and out the back of the drive.

Ordering number for in-back/out-back cooling kit

D1h	176F3648
D2h	176F3649
D3h	176F3625
D4h	176F3626
D5h/D6h	176F3530
D7h/D8h	176F3531

Ordering number for corrosion resistant

D1h	176F3656
D2h	176F3657
D3h	176F3654
D4h	176F3655

Ordering number for top and base covers

E2 – IP00 (welded enclosures)	176F1861
E1 – IP21/54	176F1946
E1 – IP00 (Rittal enclosures)	176F1783

Ordering number for VLT® Low Harmonic Drives

D1n	176F6482
D2n	176F6481
E9	176F3538
F18	176F3534

Ordering number for VLT® Advanced Active Filter AAF 006

D14	176F3535
E1	176F3537

Pedestal kit with in-back/out-back cooling

See additional documents 177R0508 and 177R0509.

Ordering number

D1h 400 mm kit..... 176F3532
D2h 400 mm kit..... 176F3533

Pedestal kit

The pedestal kit is a 400 mm high pedestal for enclosure sizes D1h and D2h, and 200 mm high for enclosure sizes D5h and D6h, that allows the drives to be floor mounted. The front of the pedestal has openings for input air to cool the power components.

Ordering number

D1h 400 mm kit..... 176F3631
D2h 400 mm kit..... 176F3632
D5h/D6h 200 mm kit..... 176F3452
D7h/D8h 200 mm kit..... 176F3539
E pedestal kit..... 176F6739

Input-plate option kit

Input-plate option kits are available for enclosure sizes D and E. The kits can be ordered to add fuses, disconnect/fuses, RFI, RFI/fuses and RFI/disconnect/fuses. Please consult the factory for kit ordering numbers.

IP20 conversion kit

This kit is for use with enclosure size E2 (IP00). After installation, the drive will have an ingress protection rating of IP20.

Ordering number

E2 – terminal cover height
254 mm (10 inch.) 176F1884

Top entry of fieldbus cables

The top entry kit provides the ability to install fieldbus cables through the top of the drive. The kit is IP20 when installed. If an increased rating is desired, a different mating connector can be used.

Ordering number

D3/D4/E2..... 176F1742
D1h-D8h..... 176F3594

LCP mounting kit

Ordering number for IP20 enclosure

130B1113:

With fasteners, gasket, graphical LCP and 3 m cable

130B1114:

With fasteners, gasket, numerical LCP and 3 m cable

130B1117:

With fasteners, gasket and without LCP and with 3 m cable

130B1170:

With fasteners, gasket and without LCP

Ordering number for IP55 enclosure

130B1129:

With fasteners, gasket, blind cover and 8 m “free end” cable



True system independence

System independence

When it comes to optimizing system efficiency to meet your needs exactly, the right components are vital. Whether it's a particular vendor, certain motor technology or a standardized way to communicate, Danfoss Drives can provide the right AC drive to meet your specific needs. You'll always get the most flexible VLT® or VACON® drive adapted to:

- Meet the unique requirements of your applications
- Operate at peak performance
- Optimize efficiency

When you have the freedom to select the optimal components for your system, a potential energy saving of up to 60% is possible.

Motor independence

With increasingly stringent demands on motor efficiency, traditional induction motors cannot always comply. New motor technologies therefore continue to emerge, extending both full-load and part-load efficiency. The unique requirements of these newer motor technologies – such as permanent magnet (PM) motors and synchronous reluctance (SynRM) motors – also demand special motor control algorithms within the AC drive. Both VLT® and VACON® drives have the built-in capabilities to control whatever motor technology your application requires, at optimum efficiency. The required performance of your system is always available exactly when you need it.

Fieldbus independence

An important aspect of any system is the ability to communicate efficiently over various interfaces, such as PROFINET or EtherNet/IP in industrial applications, or BACnet/IP in building automation applications. Regardless of your application or your preferred communication protocol, both VLT® and VACON® drives have an extremely wide variety of communication protocols to select from. In this way, you can ensure that the AC drive integrates seamlessly into your chosen system. The control system attains optimal efficiency while also reducing costs related to training, commissioning and maintenance.



Danfoss Drives

Danfoss Drives is a world leader in variable speed control of electric motors. We aim to prove to you that a better tomorrow is driven by drives. It is as simple and as ambitious as that.

We offer you unparalleled competitive edge through quality, application-optimized products targeting your needs – and a comprehensive range of product lifecycle services.

You can rely on us to share your goals. Striving for the best possible performance in your applications is our focus. We achieve this by providing the innovative products and application know-how required to optimize efficiency, enhance usability, and reduce complexity.

From supplying individual drive components to planning and delivering complete drive systems; our experts are ready to support you all the way.

We draw on decades of experience within industries that include:

- Chemical
- Cranes and Hoists
- Food and Beverage
- HVAC
- Lifts and Escalators
- Marine and Offshore
- Material Handling
- Mining and Minerals
- Oil and Gas
- Packaging
- Pulp and Paper
- Refrigeration
- Water and Wastewater
- Wind

You will find it easy to do business with us. Online, and locally in more than 50 countries, our experts are never far away, reacting fast when you need them.

Since 1968, we have been pioneers in the drives business. In 2014, Vacon and Danfoss merged, forming one of the largest companies in the industry. Our AC drives can adapt to any motor technology and we supply products in a power range from 0.18 kW to 5.3 MW.

VLT® | VAGON®

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