ENGINEERING
TOMORROW

VLT® AQUA Drive

Maximize the **savings**, **efficiency**, and **earning potential** of your water/wastewater systems



100%
full load tested insuring the highest level of quality and reliability

www.danfossdrives.com | VLT®

Built from the bottom up to deliver **increased performance and efficiency**



Danfoss' unrivaled experience went into making the VLT® AQUA Drive the perfect match for pumps and blowers in water and wastewater systems. Water and Wastewater is a global business area for Danfoss Drives and you will find our dedicated sales and service staff all over the world, 24 hours a day.

Energy savings

- High efficiency (>98%)
- Sleep Mode shuts off pumps when demand is low
- Automatic Energy Optimization produces typical savings of 3–5% (up to 15% possible)
- Flow compensation of setpoint
- Unique cooling concept
- Motor independence.

Installation savings

- Intuitive user interface with an award-winning local control panel (LCP)
- SmartStart setup wizard guides you through simple steps to ensure accurate and efficient motor control
- One drive type for the full power range
- Modular VLT® design enables fast installation of options
- Automatic Motor Adaptation streamlines installation by automatically tuning the drive to the motor without spinning it or requiring the load to be decoupled
- Robust design and efficient monitoring significantly reduce maintenance requirements
- DC link reactor provides better overall performance than 5% AC Line Reactor.
- Integrated RFI filters throughout the power range
- Integrated disconnects and fusing

Water dedication

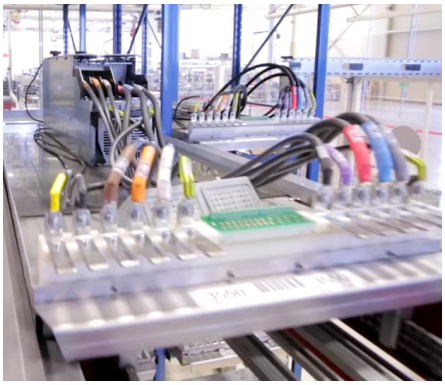
Protect your system with a series of pump-specific features:

- Cascade controller
- Deragging
- Dry pump detection
- End of curve detection
- Motor alternation
- 2-step ramps (initial ramp)
- Pipe fill mode
- Real-time clock
- Password protection
- Overload trip protection
- Smart logic controller
- User-selectable variable or constant torque operation
- NEMA/UL Type 12 (IP 54/55), NEMA 3R, and NEMA 4X/IP66 enclosures can eliminate the need for separate enclosures

Designed with **you in mind**

Factory tested for maximum performance and savings

Every VLT®AQUA Drive produced is factory tested with a full load connected for worry-free operation right from the start. Modular plug-and-play options facilitate flexibility in the field; and all VLT® AQUA Drives, regardless of horsepower size, have the same user interface and basic features. With a wide range of powerful standard and optional features designed specifically for water and wastewater applications, the VLT® AQUA Drive provides the lowest overall cost of ownership of any drive available.



100% full load factory tested

Minimize motor noise and heating with ASFM

With the ASFM (Automatic Switching Frequency Modulation) function, the switching frequency is adjusted automatically in relation to the speed of the motor. As speed is reduced, the switching frequency increases to ensure optimally low motor noise and reduce motor heating.

Input line protection from extreme running conditions

Line disturbances and transients

To protect itself from AC line voltage disturbances, the drive monitors all three phases and interrupts drive operation in the event of phase loss or imbalance. Transients on the AC line are suppressed by MOVs as well as zener diodes for extreme transients. Danfoss VLT®AQUA Drives meet VDE 0160 (European standard—2.3 x line voltage for 1.3 msec) for transient protection.

Voltage sags and surges

The VLT®AQUA Drive is designed for a wide range of operating conditions. The 480 volt drive will operate from 342–528 VAC. The 230 volt drives will operate on 180–264 VAC. 575 volt drives will operate on 495–660 VAC and 690 volt drives will operate on 472–759 VAC. Full rated motor voltage and torque can be delivered with voltage dips to 10% under nominal AC line voltage. During an AC line drop-out, the VLT®AQUA Drive continues until the intermediate circuit voltage drops below the minimum stop level, which is typically 15% below the VLT®AQUA Drive's lowest rated supply voltage.

Ground fault

The VLT®AQUA Drive provides complete protection from potentially damaging ground fault conditions on both the supply side and the motor side.

Minimal harmonic distortion/maximum power factor

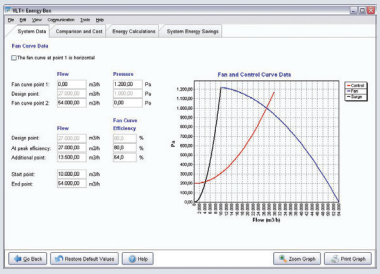
Built-in DC-link reactors reduce the harmonic distortion currents that a variable frequency drive injects back into the AC line. The properly sized reactors in a VLT®AQUA Drive can reduce line harmonic currents to less than 40% of the fundamental current. This insures that the DC line reactors are equivalent to 5% AC line reactors, which eliminates the need and cost of external AC line reactors and their resultant line voltage reduction.

Maximizes system reliability with built-in protection:

- System overloads
- Motor failures
- Motor and drive overheating
- Voltage disturbances
- Power surges
- Loss of phase
- Phase-to-phase and phase-to-ground short circuit
- Ground fault
- Switching on input/output
- Electrical disturbances
- Overvoltage
- Overcurrent
- Undervoltage
- External fault
- Overtemperature



Built-in DC-link reactors reduce harmonic noise and protect the drive. Integrated EMC filters are also available to minimize RFI interference (meets EN 55011 A2, A1 or B).



Try it yourself

Use the Danfoss VLT® Energy Box software to easily calculate a complete financial analysis for your pumps, including payback time – download it here:

www.danfossdrives.com

Save up to 25%
of initial investment in the first year

Efficiency

1. Energy efficient VFD design
2. Intelligent heat management
3. Automatically adapts to your application
4. Energy efficient harmonic mitigation
5. Optimal control of all motor technologies



Built-in **efficiency and savings**

Output protection for longer motor life

VLT® AQUA Drives incorporate both DC-link reactors and motor output protection as standard design features. This provides short circuit protection and allows unlimited switching on the output without damage to the drive, eliminating the need for additional output reactors or switch interlocks.

The DC-link reactors improve overall efficiency by increasing the power factor and lowering the ripple current on the bus voltage providing an almost threefold increase in capacitor and drive life. As a result, motor operation is smooth and quiet and longer motor life can be expected.

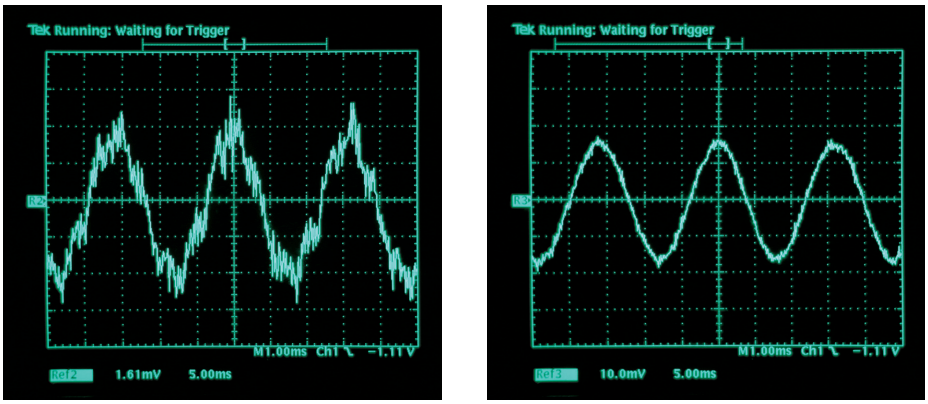
Hall-effect current transducers measure current flowing on all three motor phases. This provides highly responsive and accurate feedback to the VLT®control circuit for optimum motor protection and performance

Short circuit

The VLT®AQUA Drive incorporates 3 Hall-effect sensors, one in each of the three motor phases to protect against short circuits. A short circuit between two output phases (or to ground) will shut down the drive as soon as the current exceeds the maximum value.

Reduced installation cost

Dual DC-link reactors reduce the input RMS current to less than or equal to the output current. This greatly reduces the cable size requirement and the subsequent cost of installation.



Brand "X" PWM scope trace (left) compared to smoother VVC+ scope trace (right).

VVC+ output switching pattern

Digital VVC+ voltage vector control provides:

- A nearly perfect output sine wave that reduces overshooting and undershooting of voltage and current generated by standard PWM drives
- Fully rated motor voltage at rated frequency
- Increased efficiency for the drive and motor
- Full motor performance without derating; no additional heating of motor windings
- Motor cable lengths up to 1000' standard

VLT® Condition-Based Monitoring (CBM)

Add intelligence to your drive with CBM software to prevent problems before they occur. This break-through technology includes:

- **Stator Winding Monitoring**: detect motor winding damage before a short circuit occurs
- **Vibration Monitoring**: detect abnormal mechanical conditions by using sensor feedback correlated with motor speed
- **Load Envelope**: detect abnormal application conditions based on motor torque and speed

The optional software establishes base-line values for normal operation, then compares them to current conditions to detect abnormal conditions.

Thermal protection for drive and motor

The ETR (Electronic Thermal Relay) is an open loop method designed into the VLT®AQUA Drive software to guard against motor overheating, requiring no additional sensors or wiring. This function is UL recognized (Class 20) as an effective guard against motor thermal overload.

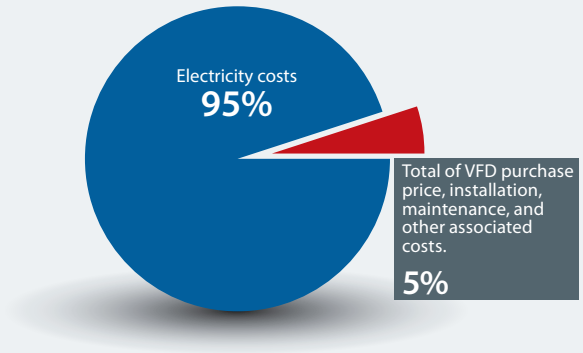
The VLT®AQUA Drive has built-in thermal protection and also accepts thermistor signal input from the motor to create closed loop thermal protection for the entire system.

Motor independence

Danfoss is the largest motor independent VFD supplier in the world. By staying at the forefront of motor control algorithms for all new motor technologies, we offer you an unrestricted choice of motor suppliers.

Small investment – big returns Look at the lifetime savings

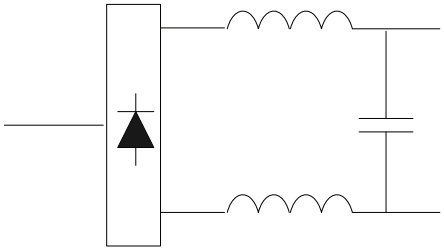
Over the last few decades, the relative cost of Variable Frequency Drives (VFDs) has dropped and energy prices have increased. This makes it more attractive to use VFDs on all rotating equipment. Over the lifetime of the VFD, energy cost is the dominating economical factor. The energy efficiency of the VFD must therefore be a key selection consideration.
The new generation VLT® AQUA Drive will provide a 0.5% to 2% energy efficiency improvement, when compared with traditional drives. This potential savings is comparable to the savings realized by replacing a Standard Duty (IE2) motor with a Premium Duty (IE3) motor.



Cost effective harmonic reduction
What is your best solution?

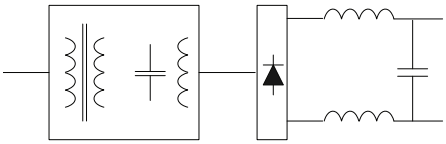
Danfoss has spent over 50 years developing cutting edge, innovative VFD technology and we have the solutions that will fit your needs . . . just ask us or download MCT31 from our website for quick engineered harmonic solutions.

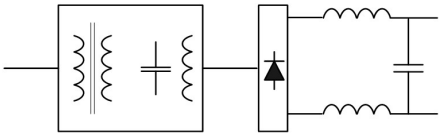
DC line reactors



- DC-Inductors are built-in as standard
- Offers moderate harmonic reduction
- Equivalent to 5% AC line reactor
- Good RMS current reduction
- 30-45% THiD

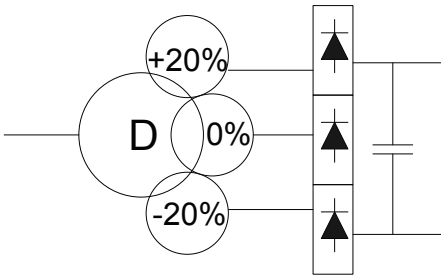
PHD-202 Adaptive passive harmonic filter



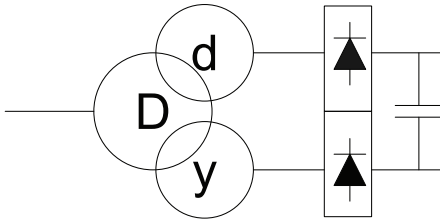


- Reduces all harmonics, not just low order frequencies
- Lowest cost of ownership
- 5 – 15% THiD <5% at the drive terminals down to 40% speed
- PHD-202 performance guarantee

Multi-Pulse Drives

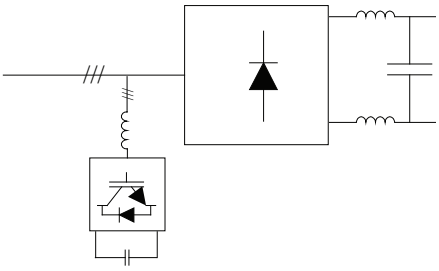


- Proven technology
- Drive power is phase shifted by input transformers to reduce harmonics
- Offers fair performance
- Dependant on high load and grid stability
- 12 pulse Front End reduces <7th harmonics
- 18 pulse Front End reduces <13th harmonics
- 5 - 14% THiD

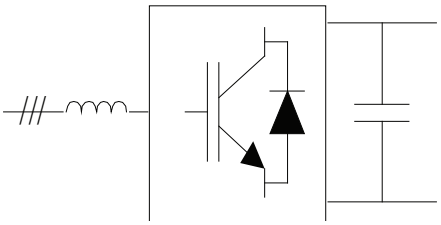


Active Filters & Low Harmonic Drives

- Offers superior harmonic reduction
- Cancels distortion by monitoring and inducing an equal and opposite signal like noise-canceling headphones
- Extensive tolerance to load and grid imbalances
- Reduces harmonics from multiple sources
- Power factor and load balance correction
- <5% THiD

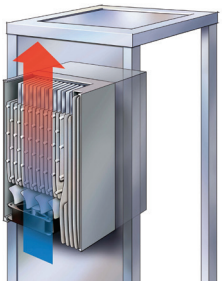


Active Front End / Regenerative

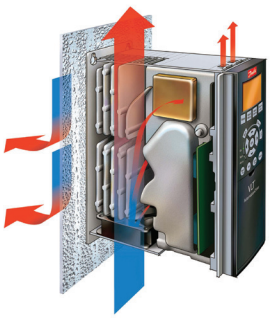


- Utilizes IGBT's in the rectifier section
- Good harmonic reduction at full load, reduced with varying loads
- Good for regeneration of power
- Small footprint, very compact
- <5% THiD at full load, higher at partial loads

VLT® AQUA Drive **advantages**



Through-panel mounting



Wall mounted with forced cooling through the heatsink.



The unique back channel cooling concept transfers up to 90% of heat away from the room. This can result in sizable energy savings by greatly reducing air conditioning requirements.

Intelligent heat management

Total separation between cooling air and electronics circulation air keeps electronics clean and cool, and provides a solution where heat needs to be removed outside the cabinets. A Through-Panel Mounting Kit is available for mounting the drive in the backplate of a cabinet.

Cold plate cooling

External cooling is achieved through the back side of the aluminum base. The solid aluminum base is integrated with the back panel to provide high mechanical stability, efficient cooling and the option of cold plate operation. Cold plate cooling is available on all A frame size drives up to 10HP at 480V.

Back-channel cooling

The intelligent heat management of VLT® high power drives removes 90% of the heat losses via finned heat sinks, which transfer the heat to the back-channel cooling air. This back-channel is separated from the electronics area by an NEMA 12/IP54 seal. This method of cooling greatly reduces contamination of the control electronics area, resulting in longer life and higher reliability. The remaining 10% of heat losses are removed from the control electronics area using lower-volume door fans.

The excess heat from the back-channel is either dispersed into the control room or it can be directly removed from the building. An optional back-channel cooling duct kit is available to aid in the installation of IP00/ Chassis drives into Rittal TS8 enclosures. Back-channel cooling is available on all D, E and F frame size drives 150HP and above at 480V

Printed circuit boards protection as standard

VLT® AQUA Drives up to 125 HP come standard with class 3C2 coating (classification according to the IEC 60721-3-3 standard). Drives 150 HP and above come standard with class 3C3 coating.

Motor preheating function

The VLT® AQUA Drive can be programmed to introduce a small amount of current to the motor whenever it is at rest. This prevents condensation inside the motor, extending its life without the need for space heaters or other external equipment.

Simplicity

1. Reduced panel space requirements
2. Direct outdoor installation
3. Long motor cable length as standard (≤1,000')
4. Reduce air conditioning investment
5. Integrated harmonic mitigation
6. Printed circuit board protection as standard
7. Simple commissioning
8. Long Design Life

Outdoor-rated

Built to withstand harsh environments, the optional NEMA 4X enclosure and **standard 1000-foot motor cable runs,** mean the VLT® AQUA Drive provides maximum mounting flexibility.

Suitable for outdoor or indoor installations that require protection against windblown dust and rain or splashing water, NEMA 4X/ IP66-rated drives (available up to 125 HP) can be installed directly at the equipment location without an additional protective enclosure. All cast aluminium parts are powder coated with a durable epoxy that can stand up to most corrosive chemicals.

NEMA 4X/IP66 rated drives are the perfect solution for demanding applications, such as lift stations, pump stations, irrigation, and other outdoor applications.



NEMA 4X enclosure available up to 125 HP

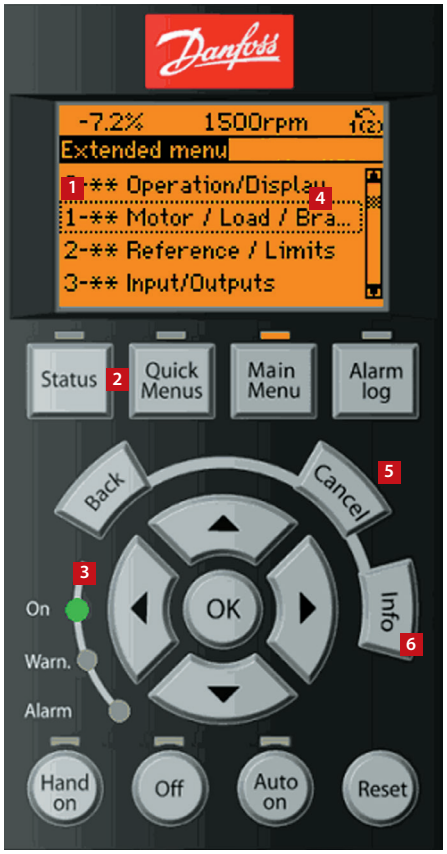
Designed specifically for all your **water and wastewater applications**

Lifetime benefits

1. User friendliness
2. Flexibility
3. Reliability
4. Energy saving
5. Pipe and plant asset protection
6. Reduced maintenance



Award-winning, **user-friendly interface**



1 Graphical display

- Informative overview
- Display with 6 lines of plain text
- Graphical or numerical display of information
- Readout in user-selectable engineering units
- Select from up to 27 languages as standard
- Backlit for increased visibility

2 Quick menus

- Danfoss-defined Quick Menu
- My Personal Menu allows users to define their own menus of commonly accessed parameters
- Changes Made Menu displays the parameters to which changes have been made
- Function Setup Menu provides quick setup for specific applications
- SmartStart setup wizard guides the user through a series of simple steps to ensure accurate and efficient motor control
- Logging Menu provides access to operation history

3 Status lights

- LED status lights to indicate operation mode

5 Other benefits

- The keypad is removable during operation
- Upload/download setups between drives using the keypad
- Remote mounting kit available for panel installation
- Hand / off / auto buttons for easy switching between manual and automatic control

6 Additional features

- Info: an "onboard manual" that provides specific information about each parameter
- Cancel: exits current parameter without saving changes
- Alarm log: easy access to a list of all previous alarm conditions
- Wireless keypad available



VLT® Wireless Communication Panel LCP 103

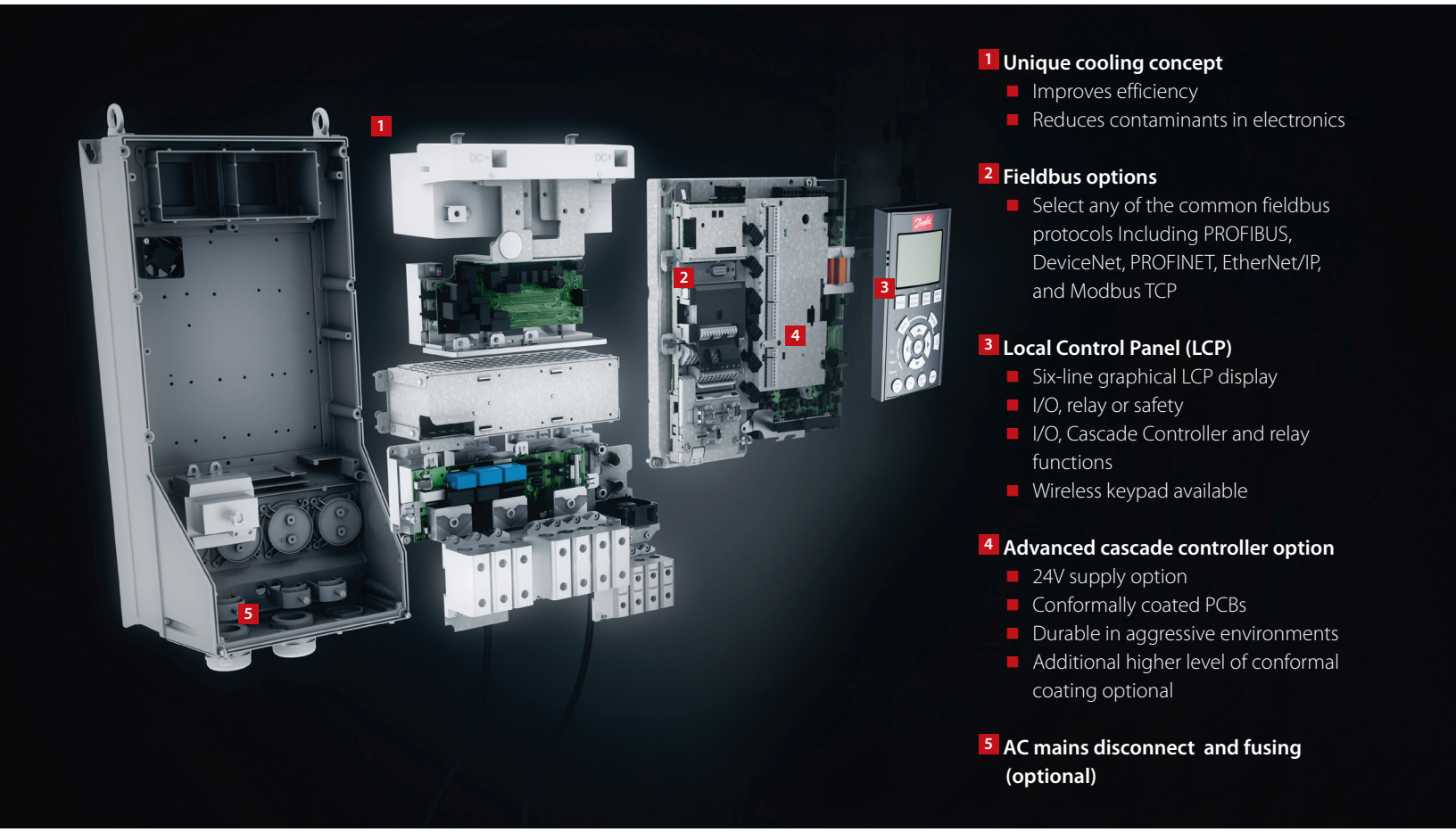
The VLT® Wireless Communication Panel LCP 103 communicates with MyDrive® Connect, an app which can be downloaded to iOS and Android-based smart devices.; as well as VLT® MCT10, a Danfoss computer commissioning and service tool.

MyDrive® Connect offers full access to the drive making it easier to perform commissioning, operation, monitoring and maintenance tasks.

Utilizing active point-to-point wireless connection, maintenance personnel can receive real-time messages via the app to ensure a quick response to potential issues and reduce downtime.



Powerful control **and flexibility**



1 Unique cooling concept
- Improves efficiency
- Reduces contaminants in electronics

2 Fieldbus options
- Select any of the common fieldbus protocols Including PROFIBUS, DeviceNet, PROFINET, EtherNet/IP, and Modbus TCP

3 Local Control Panel (LCP)
- Six-line graphical LCP display
- I/O, relay or safety
- I/O, Cascade Controller and relay functions
- Wireless keypad available

4 Advanced cascade controller option
- 24V supply option
- Conformally coated PCBs
- Durable in aggressive environments
- Additional higher level of conformal coating optional

5 AC mains disconnect and fusing (optional)

Modular application options

MCB 101 general purpose I/O
- Inputs: 3 digital; 3 analog (voltage)
- Outputs: 2 digital; 1 analog (current)

MCB 105 relay
- Provides three additional relay outputs

MCB 107 external 24 VDC supply
- 24 VDC external supply can be connected to supply backup power to control and option cards

MCB 109 advanced analog I/O
- 3 analog inputs, 3 analog outputs
- Backup power for real-time clock

MCB 113 extended relay card
- Inputs: 7 digital; 2 analog, 4 relays

MCB 114 sensor inputs
- Three 2 or 3 wire PT100/1000
- One analog input 0/4-20mA

Integrated fused disconnect
- Available in most sizes

MCO 101 extended cascade controller
- controls up to five pumps

MCO 102 advanced cascade controller
- controls up to eight pumps

Power accessories
- Advanced Harmonic Solutions: Filters and low harmonics drives for applications where reducing harmonic distortion is critical
- dV/dt filters: For providing motor isolation protection
- Sine filters (LC filters): reduce motor noise
- Common mode filters: to reduce bearing currents and EMI/RFI

PC software tools
- MCT 10: Provides powerful functionality for drive commissioning and servicing
- VLT®Energy Box: Comprehensive energy analysis tool
- MCT 31: Harmonics calculation tool

Cascade Controller Options

Hardwired

Provides additional relays for staging of additional pumps:

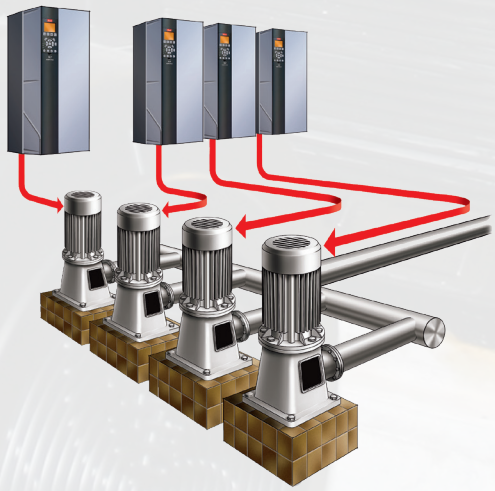
- MCO 101 extended cascade controller controls up to five pumps
- MCO 102 advanced cascade controller controls up to eight pumps

Cascade controller option cards extend the capabilities of the VLT® AQUA Drive, allowing the control of up to eight parallel pumps configured to appear to the system as a single larger pump. Individual pumps are automatically turned on (staged) and turned off (de-staged) as needed to satisfy the required system output for flow or pressure. The speed of the pumps is also controlled to provide a continuous range of system output.

Digital Modbus Cascade (new)

The new Digital Aqua Cascade controller is a software option that allows for the control of up to eight parallel pumps from one master drive through a Modus RS485 drive to drive communication connection. The drive to drive Modbus connection significantly reduces the complexity and cost associated with hardwiring I/O and allows for more complex functionality. The Digital Cascade options allows all the pumps motors to be VFD controlled or be a mixed use of VFD and fixed speed controlled motors.

Available as a factory-installed option (software option for Digital Cascade) or a field-installed accessory. The cascade controller options provide constant pressure or level control while reducing water hammer and energy consumption. They also eliminate the need for PLCs and external controllers.

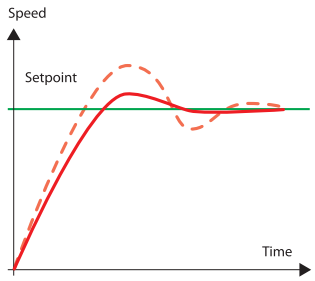


A typical VLT®AQUA Drive installation utilizing the Cascade Controller option via MODBUS in conjunctionwith three additional VLT®AQUA Drives to operate one to four pumps as demand requires.

Dedicated features for water/wastewater/irrigation applications

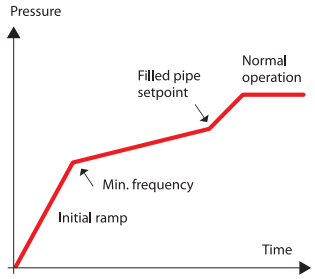
Save valuable start-up time – "Automatic tuning" of PI Controller

The VLT® AQUA Drive offers up to four separate PID loops for controlling multiple processes, each of which is automatically tuned to provide optimal performance. The drive monitors how the system reacts to corrections and learns from this data to quickly achieve precise and stable operation. Gain factors for PI are continuously adjusted to compensate for changing characteristics of the loads. Knowing the exact P and I settings at startup is not necessary, making commissioning easier.



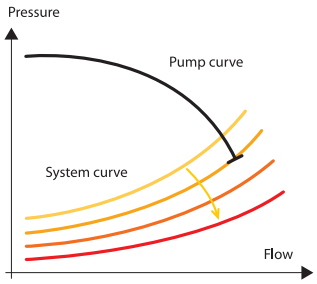
Reduce water hammer on empty pipes – Pipe Fill Mode

The VLT® AQUA Drive can provide controlled (closed loop) filling of pipes, preventing water hammer, burst water pipes and damage to sprinkler heads. This feature is particularly valuable in applications that are vulnerable to these types of damage, such as irrigation systems and water supply systems.



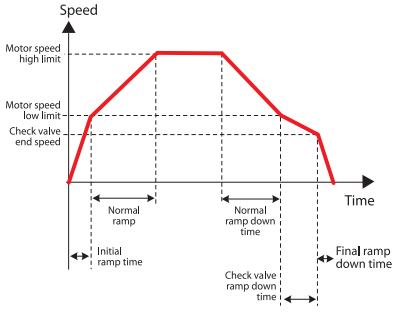
Know when there might be a problem – End of Pump Curve Detection

The VLT® AQUA Drive can detect breaks and leakage in supply lines by comparing pump speed with the system pressure. The drive can be set to trigger an alarm, shut off the pump, or perform some other programmed action whenever a pump is found running at full speed without creating the desired pressure—a situation that usually indicates a break in the system.



Open and close your check valves quietly and quickly – Check Valve Ramp

The Check Valve Ramp prevents water hammering as the pump stops and the check valve closes. The Check Valve Ramp slowly ramps down the pump speed around the value where the check valve ball is about to shut.



Additional integrated application software

Prelube or blower function

The VLT® AQUA sends a digital signal after it has received a start command for up to 15 minutes before starting the equipment and will stop once started or maintatin the signal until up to 15 minutes after the equipment has been stopped.

Know when your pump is pumping

Flow Confirmation – The VLT® AQUA monitors a digital input to verify flow or an open check valve. If after a programmable time the VLT® AQUA does not receive the input, the drive trips with "No Flow Confirmation".

Operate your pump on a schedule

Real time clock – The VLT® AQUA has an internal time clock to operate your equipment at a programmable time for a programmable duration. The clock can operate at programmable times or days and can be programmed for 8 different time events. An optional battery back-up card (MCB 109) will keep time during power loss.

Control without transmitters

Sensorless Control – The VLT® AQUA can operate equipment without additional sensors for closed loop control. once the performance curve is programmed into the FC 202 AQUA, the unit can then operate without transmitters.

Monitor energy usage

One of the main reasons for using a VLT® Series drive is the minimal payback time due to energy savings. The VLT® AQUA Drive comes with a unique feature that continuously displays the time remaining before the drive pays for itself.

Motor Alternation

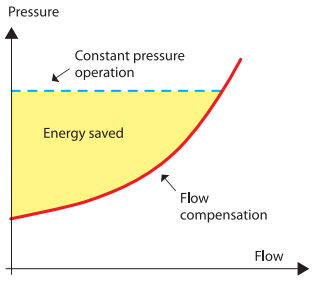
This built-in logic controls alternation between two pumps in duty/stand-by applications. Running the stand-by pump prevents sticking and lubricates the seals. An internal timer assures equal usage of the pumps.

Sleep Mode

Sleep Mode keeps pump wear and power consumption to an absolute minimum. In low flow situations, the VLT® AQUA Drive will boost the system pressure and then shut down the pump. It will continue to monitor the system pressure and restart when the pressure falls below the required level.

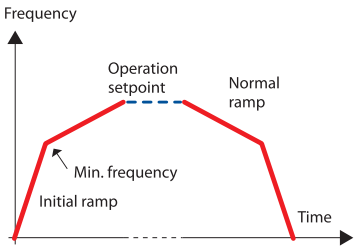
Maintain pressure on a large system – Flow compensation

The flow compensation feature of the VLT® AQUA Drive takes advantage of the fact that friction losses are reduced with less flow. Using this information, the pressure setpoint is reduced as necessary, thereby saving energy.



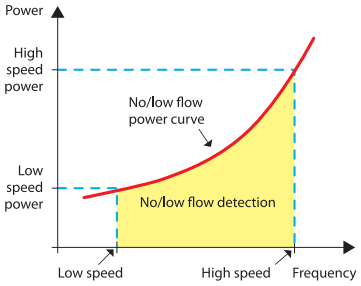
2 stage ramps for submersible or vertical turbine pumps – Initial/ Final Ramp

Initial ramp provides rapid acceleration of pumps to a desired minimum speed, at which time the normal ramp takes over. This prevents damage to thrust bearings and overheating of the pump. The final ramp decelerates pumps to avoid unintended closure of check valves and water hammer.



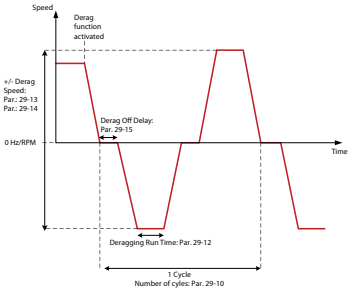
No Flow/Low Flow/Dry Pump – Dry Pump Protection

The VLT® AQUA Drive constantly evaluates the condition of the pump, based on internal frequency/power measurements. When power consumption drops too low – indicating a no or low flow situation – the VLT® AQUA Drive will shut down the pump.



Easily remove rags from impeller – Deragging feature

The 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.



Need an AC drive for **hazardous applications?** Meet Danfoss VACON® X5 HazLo®



The uniquely designed VACON® X5 HazLo® AC Drive is a compact, cost effective, patented design drive built specifically for your challenging application.

Certified for Class 1, Division 2 hazardous locations, this robust drive is suitable for water and wastewater facilities.
Source: OSHA.gov

In a class of its own, the VACON® X5 HazLo® drive has two cover options; a safety yellow colored metal cover to protect against bumps and misuse, or a full stainless steel enclosure.

Because there is no need for an additional enclosure to mount the drive, cooling concerns are not an issue, allowing for even greater mounting flexibility and reduced installation costs.

The VACON® X5 HazLo® is availabe for applications ranging from 40 to 100 HP.

Continuing to be the toughest AC Drives on the planet, VACON® X Series Drives are designed for the real world — a world that is not gentle or forgiving to electronic devices. They have been designed from the ground up to perform in harsh environments while remaining simple and cost effective to operate.

Features	Description	Benefits
Robust Enclosure	UL Type 4X environmental ratings for Indoor/Outdoor certified enclosure. No derating needed. No purging needed.	• Compact size provides cost effective installation • No cooling concerns because an additional enclosure is not necessary
Integrated Brake Resistor	Includes a Brake resistor allowing it to better handle high inertial loads and warm up in cold conditions.	• Reduced Installation Costs • Mount in Low Temperatures
Built-in Sequencer	Features a built-in multi-step sequencer that can replace a small PLC in many applications.	• Reduced investment costs • Flexible application programming
UL and cUL Standards	UL- ANSI-ISA 12.12.01-2012, cUL- Canadian National Standard C22.2, No. 14.2010 and CAN/CSA CSS.2, No. 213-M 1987	

VACON® X5 HazLo® approved hazardous locations		
Classes	Groups	Division 2
I: Gasses, vapors and liquids	A: Acetylene B: Hydrogen, etc. C: Ether, etc. D: Hydrocarbons, fuels, solvents, etc.	Not normally present in an explosive concentration (but may accidentally exist)

Safety Yellow	Voltage	HP	IL [A]	Dimensions *[WxHxD]*
VACONX5C40400X	480	20*-40	52	11.25x20.19x11.73
VACONX5C40500X	480	50	65	11.25x20.19x11.73
VACONX5C40600X	480	60	77	12.84x29.35x13.8
VACONX5C40750X	480	75	96	12.84x29.35x13.8
VACONX5C41000X	480	100	124	12.84x29.35x13.8
VACONX5C50400X	575	20*-40	41	11.25x20.19x11.73
VACONX5C50500X	575	50	52	11.25x20.19x11.73
VACONX5C50600X	575	60	62	12.84x29.35x13.8
VACONX5C50750X	575	75	77	12.84x29.35x13.8
VACONX5C51000X	575	100	99	12.84x29.35x13.8

Option Cards	Description
X5OPT01X	115 Vac and Encoder Feedback Option Card
X5EIP01X	Ethernet IP Option Card
X5DNET01X	DeviceNet Option Card
X5MBTCP01X	ModBus TCP/IP Option Card
X5PROFI01X	ProfiBus Option Card

**VACONX5C40400_ and VACONX5C50400_ can be used for applications down to 20HP.*

WARNING: VACON® X5 HazLo® should only be applied in approved hazardous locations. Check the User Manual for specific classifications.



Emergency response threatens your budget DrivePro® coverage programs are the solution

$3,500
Average savings compared to the cost of repairing or replacing a mid-size drive

Coverage programs tailored to meet the support needs of your unique application.

Given the challenges faced in modern facilities, even the best performing VFDs need protection. Combining the reliability of Danfoss products with professional and effective DrivePro® service ensures maximum up-time and eliminates unplanned expenses. DrivePro® coverage programs offer the comfort of knowing Danfoss takes responsibility for supporting Danfoss products well into the future.

- Industry's longest coverage, up to ten years
- 24/7 factory technical phone support
- One call, one single point of contact
- Certified factory and local technicians
- Original equipment replacement parts

DrivePro® Extended Warranty

DrivePro® Extended Warranty (EW) extends the standard warranty up to six years. Product failures due to defects in materials or workmanship are covered, Depot (Standard) Repair EW covers the replacement parts and repair labor costs. Onsite EW additionally covers travel costs of onsite product repair.

DrivePro® Service Contract

DrivePro® Service Contract (SC) begins where the warranty leaves off. SC coverage periods of 1 to 4 years are available for many Danfoss Drive products nearing the end of the standard warranty or extended warranty. Most products can be covered until they are 10 years old. Both Depot repair and Onsite versions of SC coverage are available. A performance inspection service is available to validate the eligibility for SC coverage of products with expired standard or extended warranties.

DrivePro®-tection Extended Warranty & Service Contract

A unique Danfoss offering, DrivePro®-tection offers the additional comfort of coverage for many types of accidental damage. Depot repair or Onsite DrivePro®-tection coverage of most products is available for the same periods as standard EW or SC. In addition to product defect and normal-wear coverage, DrivePro®-tection coverage provides coverage for the following:

- Line anomalies – including lightning strikes
- Load anomalies
- Accidental exposure to moisture or corrosives
- Accidental collision or other physical damage

Product misapplication, vandalism, natural or facility disasters, chronic problems due to the installation environment and shipping damage are not covered.

VLT® AQUA Drive **technical data**

Standard drive without options

Main supply (L1, L2, L3)	
Supply voltage	1 x 200 – 240 V AC.....1.5 – 30 HP 1 x 380 – 480 V AC.....10 – 50 HP 3 x 200 – 240 V AC.....0.33 – 200 HP 3 x 380 – 480 V AC.....0.5 – 1350 HP 3 x 525 – 600 V AC.....1 – 125 HP 3 x 525 – 690 V AC.....15 – 1900 HP*
Supply frequency	50/60 Hz
Displacement power factor (cos ϕ) near unity	> 0.98
True power factor (λ)	≥ 0.9
Switching on input supply L1, L2, L3	1–2 times/min.
Harmonic disturbance	Meets EN 61000-3-12

** Up to 2000 kW available on request*

Output data (U, V, W)	
Output voltage	0 – 100% of supply voltage
Output frequency *(dependent on power size)*	0-590 Hz
Switching on output	Unlimited
Ramp times	0.1 – 3600 sec.

Note: VLT® AQUA Drive can provide 110%, 150% or 160% current for 1 minute, dependent on power size and parameter settings. Higher overload rating is achieved by oversizing the drive.

Digital inputs	
Programmable digital inputs	6*
Changeable to digital output	2 (terminal 27, 29)
Logic	PNP or NPN
Voltage level	0 – 24 V DC
Maximum voltage on input	28 V DC
Input resistance, Ri	Approx. 4 kΩ
Scan interval	5 ms

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

Analog inputs	
Analog inputs	2
Modes	Voltage or current
Voltage level	0 to +10 V (scaleable)
Current level	0/4 to 20 mA (scaleable)
Accuracy of analog inputs	Max. error: 0.5% of full scale

Pulse inputs	
Programmable pulse inputs	2*
Voltage level	0 – 24 V DC (PNP positive logic)
Pulse input accuracy (0.1 – 1 kHz)	Max. error: 0.1% of full scale

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

Digital outputs	
Programmable digital/pulse outputs	2
Voltage level at digital/frequency output	0 – 24 V DC
Max. output current (sink or source)	40 mA
Maximum output frequency at frequency output	0 to 32 kHz
Accuracy on frequency output	Max. error: 0.1% of full scale

Analog output	
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: 1% of full scale

Global Marine

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 output	
Programmable relay outputs	2
Max. terminal load (AC) on 1-3 (break), 1-2 (make), 4-6 (break) power card	240 V AC, 2 A
Max. terminal load (AC) on 4-5 (make) power card	400 V AC, 2 A
Min. terminal load on 1-3 (break), 1-2 (make), 4-6 (break), 4-5 (make) power card	24 V DC 10 mA, 24 V AC 20 mA

Surroundings/external	
Enclosure	IP: 00/20/21/54/55/66 UL Type: Chassis/1/12/3R/4X Outdoor
Vibration test	1.0 g (D, E & F-enclosures: 0.7 g)
Max. relative humidity	5% – 95% (IEC 721-3-3; Class 3K3 (non-condensing) during operation
Ambient temperature	Up to 55° C (50°C without derating; D-frame 45°C)
Galvanic isolation of all	I/O supplies according to PELV
Aggressive environment	Designed for coated/uncoated 3C3/3C2 (IEC 60721-3-3)

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

Ambient temperature

- Electronic thermal motor protection against overload
- Up to 55° C (50°C without derating; D-frame 45°C)
- Temperature monitoring of the heatsink ensures that the drive trips in case of overtemperature
- The drive is protected against short-circuits on motor terminals U, V, W
- The drive is protected against earth faults on motor terminals U, V, W
- Protection against mains phase loss

Application options

Extend the functionality of the drive with integrated options:

- VLT® General Purpose I/O MCB 101
- VLT® Extended Cascade Controller MCO 101
- VLT® Advanced Cascade Controller MCO 102
- VLT Cascade Control via Modbus - Software option LXX1
- VLT® Sensor Input MCB 114
- VLT® PTC Thermistor Card MCB 112
- VLT® Extended Relay Card MCB 113
- VLT® 24 V External Supply MCB 107

Relay and analog I/O option

- VLT® Relay Card MCB 105
- VLT® Analog I/O MCB109

Power options

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

- VLT® Low Harmonic Drive
- VLT® Advanced Active Filter
- VLT® Advanced Harmonic Filter
- VLT® dV/dt filter
- VLT® Sine wave filter (LC filter)

High power options

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

PC software tools

- VLT® Motion Control Tool MCT 10
- VLT® Motion Control Tool MCT 31
- VLT® Energy Box

Current and **power ratings**

Single-phase						Three-phase														
1 x 200–240 VAC			1 x 380–480 VAC			3 x 200–240 VAC			3 x 380–480 VAC			3 x 525–600 VAC			3 x 525–690 VAC			Power Size Typecode designation	
Output current [A]	Shaft Output HP	Shaft Output kW	Output current [A]	Shaft Output HP	Shaft Output kW	Output current [A]	Shaft Output HP	Shaft Output kW	Output current [A]	Shaft Output HP	Shaft Output kW	Output current [A] 575V	Shaft Output HP	Shaft Output kW	Output current [A] 575 V	Shaft Output HP	Shaft Output kW		
						1.8	1/3	0.25										PK25	
						2.4	1/2	0.37	1.2	1/2								PK37	
						3.5	3/4	0.55	1.6	3/4								PK55	
						4.6	1	0.75	2.1	1	0.75	1.7	1	0.75				PK75	
6.6	1.5	1.1				6.6	1.5	1.1	2.7	1.5	1.1	2.4	1.5	1.1				P1K1	
7.5	2	1.5				7.5	2	1.5	3.4	2	1.5	2.7	2	1.5				P1K5	
10.6	3	2.2				10.6	3	2.2	4.8	3	2.2	3.9	3	2.2				P2K2	
12.5	4	3				12.5	4	3	6.3	4	3	4.9	4	3				P3K0	
16.7	5	3.7				16.7	5	3.7										P3K7	
									8.2	5	3.7	6.1	5	3.7				P4K0	
24.2	7.5	5.5				24.2	7 1/2	5.5	11	7 1/2	5.5	9	7.5	5.5				P5K5	
30.8	10	7.5	14.5	10	7.5	30.8	10	7.5	14.5	10	7.5	11	10	7.5				P7K5	
			21	15	11	46.2	15	11	21	15	11	18	15	11				P11K	
59.4	20	15				59.4	20	15	27	20	15	22	20	15				P15K	
			34	25	18.5	74.8*	25*	18.5*	34	25	18.5	27	25	18.5				P18K	
88	30	22				88	30	22	40	30	22	34	30	22				P22K	
						115	40	30	52	40	30	41	40	30				P30K	
			65	50	37	143	50	37	65*	50*	37*	52	50	37				P37K	
						170	60	45	80	60	45	62	60	45	54	50	45	P45K	
						190	75	55	105	75	55	83	75	55	73	60	55	P55K	
						240	100	75	130	100	75	100	100	75	86**	75**	75**	P75K	N75K
						302	120	90	160	125	90	131	125	90	108**	100**	90**	P90K	N90K
						361	150	110	190	150	110				131	125	110	N110	
						443	200	150	240	200	132				155	150	132	N132	
						535	215	160	302	250	160				192	200	160	N160	
									361	300	200				242	250	200	N200	
									443	350	250				290	300	250	N250	
									540	450	315				344	350	315	N315	
									590	500	355							N355	
									678	550	400				400	400	400	N400	
									730	600	450				450	450	450	N450	
									780	650	500				500	500	500	N500	
									890	750	560				570	560	600	N560	
									1050	900	630				630	630	650	N630	
									1160	1000	710				730	750	700	P710	
									1380	1200	800				850	950	800	P800	
															945	1050	900	P900	
									1530	1350	1000				1060	1150	1000	P1M0	
															1260	1350	1200	P1M2	
															1415	1550	1400	P1M4	

** 200-240VAC P18K & 380-480vac P37K Drives in Protected Chassis/IP20 are B4, NOT C3.*
*** 525 - 690 VAC N75K and N90K are Protected Chassis /IP00 are D3h frame size*

Dimensions [in]

		Protected Chassis/IP20									
Frame size		A2	A3	B3	B4	C3	C4	D3h	D4h	E3h	E4h
Height		10.6	10.6	15.7	20.4	20.7	26	35.8	44.2	62.1	62.1
Width	without C option	3.5	5.1	6.5	9.1	12.1	14.6	9.8	13.8	19.9	23.8
	with one C option	5.1	6.7	8.9							
Depth	without A or B option	8.1	8.1	9.8	9.5	13.1	13.1	14.8	14.8	19.0	19.0
	with A or B option	8.6	8.6	10.3							
		NEMA 1/IP21									
Frame size		A2†	A3†	B1	B2	C1	C2	D1h	D2h	E1h	E2h
Height		14.6	14.6	18.9	25.6	26.8	30.3	35.5	43.6	80.4	80.4
Width	without C option	3.5	5.3	9.5	9.5	12.1	14.6	12.8	16.5	23.7	27.5
	with one C option	5.1	6.7								
Depth	without A or B option with A or B option	8.1	8.1	10.2	10.2	12.2	13.2	15.0	15.0	20.2	20.2
		8.6	8.6								
		NEMA 12/IP55, NEMA 3R, NEMA 4X/IP66						NEMA 12/IP54			
Frame size		A4	A5	B1	B2	C1	C2	D1h	D2h	E1h	E2h
Height		14.2	16.5	25.6	25.6	26.8	30.3	35.5	43.6	80.4	80.4
Width		7.9	9.5	9.5	9.5	12.1	14.6	12.8	16.5	23.7	27.5
Depth		7.5	7.9	10.2	10.2	12.2	13.2	15	15	19.4	20.2

Drives available through 1350 HP. Note: some options may not be available on all drive sizes. Contact factory to ensure correct part number.
Standard drive and drive-with-bypass packages are available in a wide range of enclosure options, including Chassis, NEMA 1, NEMA 12 and NEMA 4X. In addition, Engineered Panel Solutions offer custom packages, including NEMA 3R and 4X enclosures for challenging environments.

Ordering **typecode**



[1] Application (character 4-6)	
202	VLT® AQUA Drive FC 202
[2] Power size (character 7-10)	
PK25	0.25 kW / 0.33 HP
PK37	0.37 kW / 0.50 HP
PK55	0.55 kW / 0.75 HP
PK75	0.75 kW / 1.0 HP
P1K1	1.1 kW / 1.5 HP
P1K5	1.5 kW / 2.0 HP
P2K2	2.2 kW / 3.0 HP
P3K0	3.0 kW / 4.0 HP
P3K7	3.7 kW / 5.0 HP
P4K0	4.0 kW / 5.5 HP
P5K5	5.5 kW / 7.5 HP
P7K5	7.5 kW / 10 HP
P11K	11 kW / 15 HP
P15K	15 kW / 20 HP
P18K	18.5 kW / 25 HP
P22K	22 kW / 30 HP
P30K	30 kW / 40 HP
P37K	37 kW / 50 HP
P45K	45 kW / 60 HP
P55K	55 kW / 75 HP
P75K	75 kW / 100 HP
P90K	90 kW / 125 HP
N75K	75 kW / 100 HP
N90K	90 kW / 125 HP
N110	110 kW / 150 HP
N132	132 kW / 200 HP
N160	160 kW / 250 HP
N200	200 kW / 300 HP
N250	250 kW / 350 HP
N315	315 kW / 450 HP
N315	315 kW / 450 HP
N355	355 kW / 500 HP
N400	400 kW / 550 HP
N450	450 kW / 600 HP
N500	500 kW / 650 HP
N560	560 kW / 750 HP
P630	630 kW / 900 HP
P710	710 kW / 1000 HP
P800	800 kW / 1200 HP
P900	900 kW / 1250 HP
P1M0	1.0 MW / 1350 HP
P1M2	1.2 MW / 1600 HP
P1M4	1.4 MW / 1900 HP

[3] AC Line Voltage (character 11-12)	
S2	1 x 200/240 V AC *(1.1 – 22 kW) Single Phase*
T2	3 x 200/240 V AC *(0.25 – 45 kW) Three phase*
S4	1 x 380/480 V AC *(7.5 – 37 kW) Single Phase*
T4	3 x 380/480 V AC *(0.37 – 1000 kW) Three Phase*
T6	3 x 525/600 V AC *(0.75 – 90 kW) Three Phase*
T7	3 x 525/690 V AC *(11 – 1400 kW) Three Phase*
[4] Enclosure (character 13-15)	
For cabinet mounting:	
E00	IP00/Chassis (frame E3h,E4h with load share or regen)
E20	IP20/Chassis (frame A2, A3, B3, B4, C3, C4, D3h, D4h,E3h,E4h)
Standalone:	
E21	IP21 /Type 1 (frame B1, B2, C1, C2, D1h, D2h, D5h, D6h, D7h, D8h, E1h, E2h,F1, F2, F3, F4, VLT® Low Harmonic Drive D13, E9, F18)
E5D	IP54 /Type 12 – D1h frame
E3R	NEMA 3R
E2D	IP21 /Type 1 Dh1 frame
E2S	IP20 / Chassis – D3h frame
P3R	NEMA 3R with back plate
E54	IP54/Type 12 (frame D1h, D2h, D5h, D6h, D7h, D8h, E1h, E2h, F1, F2, F3, F4 , VLT® Low Harmonic Drive D13, E9, F18)
E55	IP55 (frame A5, B1, B2, C1, C2)
E66	IP66/Type 4X outdoor (frame A5, B1, B2, C1, C2)
Z55	IP55/Type 12 (frame A4)
Z66	IP66/NEMA 4X (frame A4)
H21	IP21 / Type 1 with space heater and thermostat *(E1h,E2h,F frame)*
H54	IP54 / Type 12 with space heater and thermostat *(E1h,E2h F frame only)*
L2X	IP21 / Type 1 with cabinet light and IEC 230 V power outlet *(F frame only)*
L5X	IP54 / Type 12 with cabinet light and IEC 230 V power outlet *(F frame only)*
L2A	IP21 / Type 1 with cabinet light and NAM, 115 V power outlet *(F frame only)*
L5A	IP54 / Type 12 with cabinet light and NAM, 115 V power outlet *(F frame only)*
R2X	IP21 / Type 1 with space heater, thermostat, light and IEC 230 V power outlet *(F frame only)*
R5X	IP54 / Type 12 with space heater, thermostat, light and IEC 230 V power outlet *(F frame only)*
R2A	IP21 / Type 1 with space heater, thermostat, light and NAM, 115 V power outlet *(F frame only)*
R5A	IP54 / Type 12 with space heater, thermostat, light and NAM, 115 V power outlet *(F frame only)*
Special designs:	
E5S	NEMA 3R Ready IP54 – to be used with the NEMA 3R cover *(D1h and D2h only)*
P20	IP20 (frame B4, C3, C4 – with back plate)
E2M	IP21 / Type 1 with mains shield (frame D1h, D2h, D5h, D6h, D7h, D8h, E1h,E2h, VLT® Low Harmonic Drive D13 + E9)
P21	IP21 /Type 1 (frame as E21 – with back plate)
E5M	IP54 / Type 12 with mains shield (frame D1h, D2h, D5h, D6h, D7h, D8h, E1h,E2h, VLT® Low Harmonic Drive D13 + E9)
P55	IP55 (frame as E55 – with back plate)
Y55	IP55 (frame as Z55 – with back plate)
P66	IP66/NEMA 4X (Sames as E66 - with Stainless Steel Backplate)
Y66	IP66/NEMA 4X (frame as Z66 – with back plate)
[5] RFI filter, terminal and monitoring options – EN/ IEC 61800-3 (character 16-17)	
H1	RFI-Filter Class A1/B (C1) *(A, B and C frames only)*
H2	RFI-Filter, Class A2 (C3)
H3	RFI-Filter Class A1/B [1] *(A, B and C frames only)*
H4	RFI-Filter, Class A1 (C2) *(B, C, D,E and F frames only)*
H5	RFI-Filter, Class A2 (C3) Marine ruggedized
HG	IRM for IT mains with Class A2 RFI (frame F1, F2, F3, F4)
HE	RCD for TN/TT mains with Class A2 RFI (frame F1, F2, F3, F4)
HX	No RFI-Filter
HF	RCD for TN/TT mains and Class A1 RFI (frame F1, F2, F3, F4)
HH	IRM for IT mains and Class A1 RFI (frame F1, F2, F3, F4)
VLT® Low Harmonic Drive	
N2	VLT® Low Harmonic Drive, active filter based with Class A2 RFI
N4	VLT® Low Harmonic Drive, active filter based with Class A1 RFI
VLT® 12-Pulse F8, F9, F10, F11, F12, F13 frames	
B2	12-Pulse with Class A2 RFI
B4	12-Pulse with Class A1 RFI
BE	12-Pulse with RCD / A2 RFI
BF	12-Pulse with RCD / A1 RFI
BG	12-Pulse with IRM / A2 RFI
BH	12-Pulse with IRM / A1 RFI
VLT 6 & 12 Pulse D Frame:	
P2 P4 P6 P9	Parallel 6 Pulse + A2 Parallel 6 Pulse + A1 Parallel 12 Pulse + A2 Parallel 12 Pulse + A1

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

[6] Braking and safety (character 18)	
X	No brake IGBT
B	Brake IGBT
C	Safe Stop with Pilz Safety Relay (frame F1, F2, F3, F4)
D	Safe Stop with Pilz Safety Relay and brake IGBT (frame F1, F2, F3, F4)
E	Safe Stop with Pilz Safety Relay and regenera- tion terminals (frame F1, F2, F3, F4)
T	Safe Stop without brake
R	Regeneration terminals *(D, E and F frame only)*
S	Regeneration terminals and brake chopper (D and E frames)
U	Brake IGBT plus Safe Stop
F3, F4, F18 frames	
M	IEC Emergency Stop Pushbutton *(includes Pilz Relay)*
N	IEC Emergency Stop Pushbutton with brake IGBT and brake terminals *(includes Pilz Safety Relay)*
P	IEC Emergency Stop Pushbutton with regenera- tion terminals *(includes Pilz Safety Relay)*
[7] LCP Display (character 19)	
X	Blank faceplate, no LCP installed
N	Numerical Local Control Panel (LCP 101)
G	Graphical Local Control Panel (LCP 102)
W	Wireless Control Panel WIFI (LCP-103)
D and E Frames IP21/54 only	
J	No Local Control Panel + USB through door
K	Numerical Local Control Panel (LCP 101) + USB through door
L	Graphical Local Control Panel (LCP 102) + USB through door
[8] PCB Coating – IEC 721-3-3 (character 20)	
X	* Standard coated PCB Class 3C2
C	Coated PCB Class 3C3
R	Coated PCB Class 3C3 + ruggedized

[9] Mains input (character 21)	
X	No mains option
1	Mains disconnect *(A4, A5, B1, B2, C1 and C2 frames only)*
7	Fuses
8	Mains disconnect and load sharing *(B1, B2, C1 and C2 frames only)*
A	Fuses and load sharing terminals *(D and E frame IP20 and F3, F4, F9, F11, F14, F18 only)*
D	Load sharing terminals *(B1, B2, C1, C2, D-frame only IP20 and F3, F4, F9, F11, F14, F18 frames only)*
3	Mains disconnect + fuse
4	Mains contactor + fuse *(D frame only)*
5	Mains disconnect, fuse and load sharing *(Not available on E or F18 frame)*
E	Mains disconnect + contactor + fuse *(D and F3, F4, F9, F11, F14, F18 frame only)*
J	Circuit breaker + fuse *(D, and F3, F4, F9, F11, F14, F18 frame only)*
F	Mains circuit breaker, contactor and fuses *(F3, F4, F9, F11, F14, F18 frame only)*
G	Mains disconnect, contactor, loadsharing termi- nals and fuses *(F3, F4, F9, F11, F14, F18 frame only)*
H	Mains circuit breaker, contactor, loadsharing terminals and fuses *(F3, F4, F9, F11, F14, F18 frame only)*
K	Mains circuit breaker, loadshare and fuses *(F3, F4, F9, F11, F14, F18 frame only)*
T	Cable connection cabinet *(D frame only)*
W	Cable connection cabinet and fuse *(D frame only)*
[12] Software version (character 24-27)	
SXXX	Latest released standard software
LXX1	Cascade Controller 2.0
[13] LCP language (character 28)	
X	Standard language package including English, German, French, Spanish, Danish, Italian, Finnish and others
Contact factory for other language options	
[14] Fieldbus - A Option (character 29-30)	
AX	No option
A0	VLT® PROFIBUS DP V1 MCA 101
A4	VLT® DeviceNet MCA 104
AL	VLT® PROFINET MCA 120
AN	VLT® EtherNet/IPMCA 121
AQ	VLT® Modbus TCP MCA 122
[15] Application 1 - B Option (character 31-32)	
BX	No application option
BK	VLT® General Purpose MCB 101
BP	VLT® Relay Option MCB 105
B0	VLT® Analog I/O Option MCB 109
B2	VLT® PTC Thermistor Card MCB 112
B4	VLT® Sensor Input Card MCB 114
BY	VLT® Extended Cascade Controller MCO 101

[16] Application 2 -C Option (character 33-34)	
X	No option
5	VLT® Advanced Cascade Controller MCO 102
R	VLT® Extended Relay Card MCB 113
[19] Control Power Backup Input (character 38-39)	
DX	No DC input installed
D0	VLT® 24 V DC Supply Option MCB 107
D1	Real Time Clock MCB 117
[10] Hardware option A (character 22)	
X	Standard cable entries
O	Metric cable entries
S	US cable entries
F1, F2, F3, F4, F10, F11, F12, F13 and F18 frames:	
E	30 A fuse protected power terminals
F	30 A fuse protected power terminals and 2.5-4 A manual motor starter
G	30 A fuse protected power terminals and 4-6.3 A manual motor starter
H	30 A fuse protected power terminals and 6.3-10 A manual motor starter
J	30 A fuse protected power terminals and 10-16 A manual motor starter
K	Two 2.5-4 A manual motor starters
L	Two 4-6.3 A manual motor starters
M	Two 6.3-10 A manual motor starters
N	Two 10-16 A manual motor starters
[11] Hardware option B (character 23)	
X	No adaptation
Q	Heat-sink access panel *(D frame only)*
F1, F2, F3, F4, F10, F11, F12, F13 and F18 frames:	
G	5 A 24 V supply *(customer use)* and external temperature monitoring
H	5 A 24 V supply *(customer use)*
J	External temperature monitoring
K	Common motor terminals
L	5 A 24 V supply + common motor terminals
M	External temperature monitoring + common motor terminals
N	5 A 24 V supply + external temperature monitor- ing + common motor terminals

1) reduced motor cable length
Please beware that not all combinations are possible. Find help configuring your drive with the online configurator found under: driveconfig.danfoss.com

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