VLT® AQUA Drive

Danfoss VLT Drives' unequalled experience was used to make VLT® AQUA Drive the perfect match for AC motor driven applications in modern water and wastewater systems – also for retrofitting.

Danfoss VLT® AQUA Drive is dedicated to water and wastewater applications. With a wide range of powerful standard and optional features, VLT® AQUA Drive provides the lowest overall cost of ownership for water and wastewater applications.

Power range:

1 x 200 – 240 V AC: ..... 1.1 – 22 kW
1 x 380 – 480 V AC: ..... 7.5 – 37 kW
3 x 200 – 240 V AC: ..... 0.25 – 45 kW
3 x 380 – 480 V AC: ..... 0.37 – 1000 kW
3 x 525 – 600 V AC: ..... 0.75 – 90 kW
3 x 525 – 690 V AC: ..... 11 – 1400 kW

Perfect match for:

– Water supply
– Wastewater treatment
– District heating
– Irrigation

Feature	Benefit
Dedicated features	
Dry run detection	Protects the pump
Flow compensation function	Saves energy
2 step ramps (initial ramp)	Protects deep well pumps
Check valve ramp	Protects against water hammer and saves installed cost on soft close valves
Pipe fill mode	Eliminates water hammering
Built-in motor alternation feature	Duty-stand by operation, cost reduction
Sleep Mode	Saves energy
No/low flow detection	Protects the pump
End of pump-curve detection	Protects the pump, leakage detection
Pump cascade controller	Lower equipment cost
Back-channel cooling for frame D, E and F	Prolonged lifetime of electronics
Energy saving	**Less operation cost**
VLT® efficiency (98%)	Saves energy
Automatic Energy Optimisation (AEO)	Saves 3 – 8% energy
Sleep Mode function	Saves energy
Master/follower control	Saves up to 15% energy
Auto Tuning of Staging Speeds	Smoothens the staging and saves energy
Flow Compensation	Saves Energy by self-adjusting the set-point
Reliable	**Maximum uptime**
IP 20 – IP 66 enclosures	Outdoor mounting
All power sizes available in IP 54/55 enclosures	Broad usability in standard factory supplied enclosure
Password protection	Reliable operation
Mains disconnect switch	No need for external switch
Optional, built-in RFI suppression	No need for external modules
Built-in Smart Logic Controller	Often makes PLC omissible
One Wire safe stop	Safe operation/less wiring
Max. ambient temperature up to 50° C without derating	Reduced need for cooling
User-friendly	**Save initial and operation cost**
Award winning control panel (LCP)	Effective commissioning and operation
One drive type for the full power range	Less learning required
Intuitive user interface	Time saved
Integrated Real Time Clock	Lower equipment cost
Modular design	Enables fast installation of options
Auto tuning of PI-controllers	Time saved
Payback time indication	Less worries

Application Options

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

General purpose I/O option (MCB 101)
3 digital inputs, 2 digital outputs,
1 analogue current output,
2 analogue voltage inputs.

Continued on the following page!

Application options, *continued.*

Cascade Controller (MCO 101, 102)
Upgrade the built-in cascade controller to operate more pumps with a higher energy efficiency, using master/follower pump control. Running the pumps in use at the same speed and optimising staging speeds automatically during operation. At the same time runtime of all pumps is balanced to distribute wear and tear evenly.

Relay & Analogue I/O option (MCB 105, 109)
Upgrade to advanced performance and control using the additional in/outputs.

Sensor Input Option (MCB 114)
Monitors the PT100/PT1000 installed in the motor winding and bearing temperatures and protects them from overheating according to customised limits.

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

Profibus (MCA 101),
DeviceNet (MCA 104)
PTC Thermistor Card (MCB 112)
Profinet SRT (MCA 120)
EtherNet IP (MCA 121) and
Modbus TCP (MCA 122)
Fieldbus options.

24 V DC supply option (MCB 107)
Back-up option to keep the control system alive during mains loss.

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

High power options

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

Specifications

Mains supply (L1, L2, L3)	
Supply voltage	200 – 240 V ±10%, 380 – 480 V ±10%, 525 – 600 V ±10%, 525 – 690 V ±10%
Supply frequency	50/60 Hz
Displacement Power Factor (cos φ) near unity	(> 0.98)
True power factor (λ)	≥ 0.9
Switching on input supply L1, L2, L3	1 – 2 times/min.
Output data (U, V,W)	
Output voltage	0 – 100% of supply
Switching on output	Unlimited
Ramp times	0.1 – 3600 sec.
Output frequency *(dependent on power size)*	1000 Hz

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

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

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

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

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

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

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

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

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

Ambient temperature
Up to 55° C (50° C without derating)

Power options

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

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

PC software tools

- **MCT 10:** Ideal for commissioning and servicing the drive including guided programming of cascade controller, real time clock, smart logic controller and preventive maintenance.
- **VLT® Energy Box:** Comprehensive energy analysis tool. Energy consumption with and w/o drive can be calculated (drive payback time). Online function for accessing drives energy log.
- **MCT 31:** Harmonics calculations tool.

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