



VLT® AQUA Drive

Phase conversion and speed control in a single, compact package

For applications such as lift stations, farming fields or any location where three-phase power is not available, UL-listed phase-converting VLT AQUA Drives can control three-phase motors using single-phase 240V or 480V service. Since three-phase motors are more readily available and less expensive, a variable frequency drive can be a cost-effective solution in these applications while providing an attractive alternative to conventional phase conversion devices. In addition, a drive provides numerous other benefits not available with traditional phase conversion units, including speed control, motor protection and energy savings.

Danfoss' unsurpassed experience in advanced variable frequency drive technologies makes the VLT AQUA Drive the perfect choice for all water and wastewater applications. The first drive designed specifically for water and wastewater applications, the VLT AQUA Drive offers the most advanced technology and features available in the market.



Power range:

- 1-phase, 200–240 VAC: 1.5–30 HP
- 1-phase, 380–480 VAC: 10–50 HP

| Feature | Benefit |
|------------------------------------------------|-----------------------------------------------------------------------------|
| Dedicated features | |
| • Modular design | • Facilitates maintenance and field upgrades |
| • Six-line LCP display | • Simultaneously displays multiple parameters |
| • Integrated Real-Time Clock | • Time stamping of functions/process control |
| • Enhanced Sleep Mode | • Improved energy savings/process control |
| • Initial Ramp | • Performance that matches pump demands |
| • Flow compensation | • Improved setpoint control |
| • De-ragging | • Removes strings and other debris from impeller |
| • End of pump curve detection | • Protects pump, detects leakage |
| • No/low flow detection | • Pump protection |
| • Pipe fill mode | • Eliminates water hammer |
| • Pulse counter with totalizer | • VFD can be programmed to shut down at a predefined number of gallons used |
| Energy saving | |
| • VLT efficiency of >98% | • Optimized performance |
| • Automatic Motor Adaptation (AMA) | • Optimal motor tuning without spinning motor shaft |
| • Automatic Energy Optimization | • Additional 5–15% energy savings |
| • Unique cooling concept | • Effective heat management |
| Reliable | |
| • Short circuit and ground fault protection | • Prevents damage to drive |
| • Line or motor phase imbalance monitoring | • Maintains full torque under extreme conditions |
| • Over and undervoltage protection | • Protects drive and motor |
| • Overtemperature monitoring | • Provides operation capabilities in extreme temperatures |
| • Electronic Thermal Protection | • Protects motor |
| • Optimum heat dissipation | • Lengthens drive life |
| • 100% factory load testing | • Ensures high reliability |
| • Optional conformal coating on PCBs available | • Provides additional protection in harsh environments |



Enclosure ratings

- **Available in Chassis, NEMA 1, NEMA 12 and NEMA 4X enclosures:** designed either for mounting in existing panels or as standalone units

Available options

- **Modular application options:** plug-and-play cards facilitate drive upgrades, outdoor weather shield, and startup and servicing
- **dV/dt filters:** for providing motor isolation protection
- **Sine filters** (LC filters): reduce motor noise

PC software tools

- **MCT 10:** provides powerful functionality for commissioning and servicing drives
- **VLT Energy Box:** comprehensive energy analysis tool
- **MCT 31:** harmonics calculation tool



| Mains supply (L1, L2, L3) | |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Supply voltage | 1-phase 200–240 V ±10%; 1-phase 380–480 V ±10% (UL-listed) |
| Supply frequency | 50/60 Hz |
| Displacement Power Factor (cos φ) near unity | (> 0.98) |
| Switching on input supply L1, L2, L3 | 1–2 times/min. |
| Output data (U, V, W) | |
| Output voltage | 3-phase 200–240 V; 3-phase 380–480 V |
| Switching on output | Unlimited |
| Ramp times | 1–3600 sec. |
| Closed loop | 0–132 Hz |
| Digital inputs/outputs | |
| Programmable digital inputs (standard) | 6 (two can be used as digital outputs) |
| General purpose I/O card (option) | 3 additional digital inputs, 2 additional digital outputs |
| Logic | PNP or NPN |
| Voltage level | 0–24 VDC |
| Analog inputs | |
| Analog inputs (standard) | 2 |
| General purpose I/O card (option) | 2 additional analog inputs |
| Advanced analog I/O card (option)* | 3 additional analog inputs |
| Modes | Voltage or current |
| Voltage level | -10 to +10 V (scaleable) |
| Current level | 0/4 to 20 mA (scaleable) |
| Pulse inputs | |
| Programmable pulse inputs (standard) | 2 (two of the digital inputs can be used as pulse inputs) |
| Voltage level | 0–24V DC (PNP positive logic) |
| Pulse input accuracy | (0.1–110 kHz) |
| Analog outputs | |
| Programmable analog outputs (standard) | 1 |
| General purpose I/O card (option) | 1 additional analog current output |
| Advanced analog I/O card (option)* | 3 additional analog outputs |
| Current range at analog output | 0/4-20 mA |
| Relay outputs | |
| Programmable relay outputs (standard) | 2 (240 VAC, 2 A and 400 VAC, 2 A) |
| Relay card (option) | 3 additional dry contact relays (240 VAC, Form C) |
| Voltage level | 0–24V DC (PNP positive logic) |
| Pulse input accuracy | (0.1–110 kHz) |
| External DC supply | |
| External 24V DC supply card (option) | Provides backup power for control and option cards |
| Fieldbus communication | |
| FC Protocol and Modbus RTU built in (DeviceNet, Profibus and Ethernet IP modules optional) | |
| Ambient Temperature Rating | |
| 0° C min – 50° C max | |

* Advanced analog I/O option card also provides backup power for the VLT® AQUA Drive's real-time clock.

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