



VLT® AQUA Drive Type FC 202

Key features, product benefits and value summary



Danfoss Drives' unsurpassed experience in advanced drive technologies for water and wastewater applications makes VLT® AQUA Drive the perfect match for pumps and blowers in modern water, wastewater and irrigation systems.










The perfect match for:



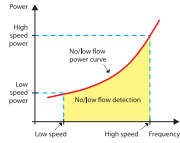
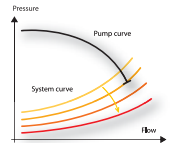

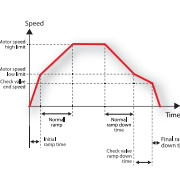
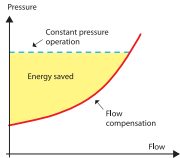
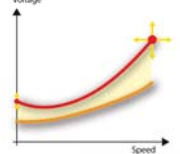

- Water supply
- Wastewater treatment
- District heating
- Irrigation








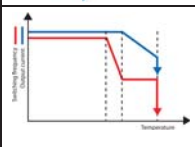
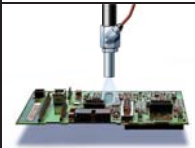
Power range:

- 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 – 690 V AC: 11 – 1400 kW

Features	Benefits
Dedicated features	
• Dry run detection	• Protects the pump
• Flow compensation function	• Saves energy
• 2 step ramps (initial ramp)	• Protects deep well pumps
• 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
• Master/follower control	• High performance pump systems
Energy saving	
• VLT® efficiency (98%)	– Less operation cost
• Automatic Energy Optimisation (AEO)	• Saves energy
• Sleep Mode function	• Saves 5–15% energy
• Sleep Mode function	• Saves energy
Reliable	
• IP 20 – IP 66 enclosures	– Maximum uptime
• All power sizes available in IP 54/55 enclosures	• Outdoor mounting
• Password protection	• Broad usability
• Mains disconnect switch	• Reliable operation
• Optional, built-in RFI suppression	• No need for external switch
• Built-in Smart Logic Controller	• No need for external modules
• One Wire safe stop	• Often makes PLC omissible
• Max. ambient temperature up to 50° C without derating	• Safe operation/less wiring
	• Reduced need for cooling
User-friendly	
• Award winning control panel (LCP)	– Save initial and operation cost
• One drive type for the full power range	• Effective commissioning and operation
• Intuitive user interface	• Less learning required
• Integrated Real Time Clock	• Time saved
• Modular design	• Lower equipment cost
• Auto tuning of PI-controllers	• Enables fast installation of options
• Payback time indication	• Time saved
	• Less worries

	Feature	Function / benefit	Value
	Extension of high power range up to 1.4 MW	<ul style="list-style-type: none"> Now possible to provide solution for high power applications (including MV using step up/step down transformers) 	<ul style="list-style-type: none"> One drive / supplier for all applications = less confusion & lower spares / inventory cost
	Full range of IP55/IP66 and NEMA Type 4X enclosure up to 90 kW	<ul style="list-style-type: none"> Directly wall mounted in any environment 	<ul style="list-style-type: none"> No requirement for panels
	More compact IP55/IP66 and NEMA Type 4X enclosure (A4) for 0.37 – 4.0 kW	<ul style="list-style-type: none"> 32% smaller than existing A5 enclosure Tested outdoor installation Easier installation Continuous operation at 50° C 	<ul style="list-style-type: none"> No need for additional panel of outdoor installation No need for additional cooling in hot environments
	0.37 – 7.5 kW units are now available in IP20 book style enclosures	<ul style="list-style-type: none"> Less panel space required 	<ul style="list-style-type: none"> Smaller panels & lower panel cost
	1.1 – 22 kW single phase 200 – 240 V units available for remote locations	<ul style="list-style-type: none"> Simple conversion from single phase to three phase without transformer 	<ul style="list-style-type: none"> Reduced installation cost
	Mains disconnect switch and fuses are available as factory option	<ul style="list-style-type: none"> Local mains isolation now possible where required, without the need for separate isolator switch, fuses, enclosure & wiring 	<ul style="list-style-type: none"> Reduces total installation / wiring cost & simplifies isolation process
	Local control panel now with graphical display plus “Info” & fault log buttons	<ul style="list-style-type: none"> Simplifies set-up and status / fault diagnostics through graphical means, on board manual and fault data logger 	<ul style="list-style-type: none"> Lower set-up & fault diagnostic time / cost, plus increases drive availability
	New plug-in options now include I/O, Modbus TCP, Ethernet IP & connection of external 24 V dc supply etc.	<ul style="list-style-type: none"> Increased interface flexibility + universal communication compatibility with enhanced security via back-up supply 	<ul style="list-style-type: none"> No external interface options / gateways required = lower system / integration cost
	Smart Logic Controller is built-in as standard	<ul style="list-style-type: none"> Now possible to incorporate control using basic sequential user-defined actions determined by user-defined events Example: Automatic deragging of wastewater pumping stations 	<ul style="list-style-type: none"> Save on external PLC / relays, comparators, timers, panel space and wiring cost, etc.

	Feature	Function / benefit	Value
	3/2 pump cascade controller is standard (6 or 8 pump controller are plug-in options, including master/follower operation)	<ul style="list-style-type: none"> Basic 3 pump standard cascade control or 2 pump cascade control with lead pump alternation is now possible as standard 	<ul style="list-style-type: none"> Save on external pump controller and wiring cost on basic 3/2 pump applications Increased energy savings using master/follower functionality
	PI Controllers now include auto-tuning function	<ul style="list-style-type: none"> Functions by introducing step-wise changes whilst operating at steady state & then monitoring the feedback to tune PI 	<ul style="list-style-type: none"> Save on set-up time / cost + potentially improve system performance and efficiency
	Low flow / dry run detection now includes automatic set-up option to generate no flow power curve	<ul style="list-style-type: none"> When enabled automatically runs pump to ~50% & 85% speed, storing measured power with shut off valve closed 	<ul style="list-style-type: none"> Save set-up time / cost + potentially improve pump protection
	End of curve monitoring / broken pipe detection now available in closed loop mode	<ul style="list-style-type: none"> Shuts system down if feedback signal is below setpoint for user-defined period, with output frequency at maximum 	<ul style="list-style-type: none"> Protects pump impeller from damage & potentially reduces piping damage & water loss
	Horizontal pipe fill mode is now available in addition to vertical pipe fill mode (closed loop)	<ul style="list-style-type: none"> Now functions with fill speed for user-defined time on horizontal pipes, in addition to fill rate on vertical pipes 	<ul style="list-style-type: none"> Protects piping from mechanical shock /water hammer damage & water loss
	Check valve ramp & initial/final ramp down functions are now available	<ul style="list-style-type: none"> Initial and final ramp secures cooling flow in pump and prevents over heating Independent ramp for slow closing of check valve allows the use of standard check valves 	<ul style="list-style-type: none"> Protects check valve & thrust bearings from damage / reduces water hammer damage Using a standard check valve in stead of special soft-close valve will save 60% on the valve cost or up to 16% of the drive cost
	Flow Compensation	<ul style="list-style-type: none"> Programs the system curve Closed loop PID decreases the speed depending on pressure Flow compensation decreases the setpoint 	<ul style="list-style-type: none"> Energy saving can be up to 40%
	Automatic Energy Optimiser is available in constant torque mode as well as variable torque	<ul style="list-style-type: none"> Ensures the motor is optimally magnetised at all speeds / loads, for maximum efficiency 	<ul style="list-style-type: none"> Improves system efficiency and reduces operating cost, in particular on lightly loaded motors
	Sleep mode	<ul style="list-style-type: none"> Saves energy when pump is in standby 	<ul style="list-style-type: none"> Reduced energy cost

	Feature	Function / benefit	Value
	Real time clock is now incorporated as standard with user definable text	<ul style="list-style-type: none"> It is possible to program 10 x time-based functions and 20 x preventative maintenance actions (Battery backup optional) 	<ul style="list-style-type: none"> Saves cost for external timers & controls & improves system reliability
	MCT10 now includes Wizard function for Cascade Controller	<ul style="list-style-type: none"> Provides simple step by step graphic procedure to set-up cascade controller to match number of pumps, feedback etc. 	<ul style="list-style-type: none"> Save on set-up time / cost + improve system security with back-up of all settings
	Programming and monitoring via USB port	<ul style="list-style-type: none"> Standard USB port for PC connectivity 	<ul style="list-style-type: none"> No cost for adaptors Reduced time for setup
	Standard DC link coils or optional Low Harmonics Drive (LHD) and Advanced Harmonics Filters (AHF) for optimum harmonics mitigation	<ul style="list-style-type: none"> Selectable active or passive harmonics mitigation Optimised installation cost and performance 	<ul style="list-style-type: none"> Reduce transformer and cable cost
	Built-in RFI filters as standard and operation with long motor cables up to 300 m unshielded motor cable or 150 m shielded cable	<ul style="list-style-type: none"> Operation of deepwell pumps without output transformer Central mounting in large plants No problems with high frequency noise in the installation 	<ul style="list-style-type: none"> Reduced installation cost Improved reliability of communications
	Back channel cooling on full product range <ul style="list-style-type: none"> Panel through mount from 0.25 to 90 kW Factory designed back channel cooling from 110 kW to 1.4 MW 	<ul style="list-style-type: none"> Reduced requirement for panel cooling Control room air conditioning can be reduced 	<ul style="list-style-type: none"> 80% reduction of heating in panels
	High drive efficiency	<ul style="list-style-type: none"> Reduced heat loss from drives in panels and motor control centres 	<ul style="list-style-type: none"> 20% lower heat loss than previous generation of VLT® drives
	High ambient temperature	<ul style="list-style-type: none"> 50° C ambient temperature without derating the drive Reduced risk of nuisance tripping 	<ul style="list-style-type: none"> Reduced cost for air conditioning in high temperature areas
	Corrosion resistant as standard in compliance with level 3C2 according to IEC 60721-3-3. Protection level 3C3 is factory option.	<ul style="list-style-type: none"> Reduced risk of corrosion of boards and terminals 	<ul style="list-style-type: none"> Longer life time of drives