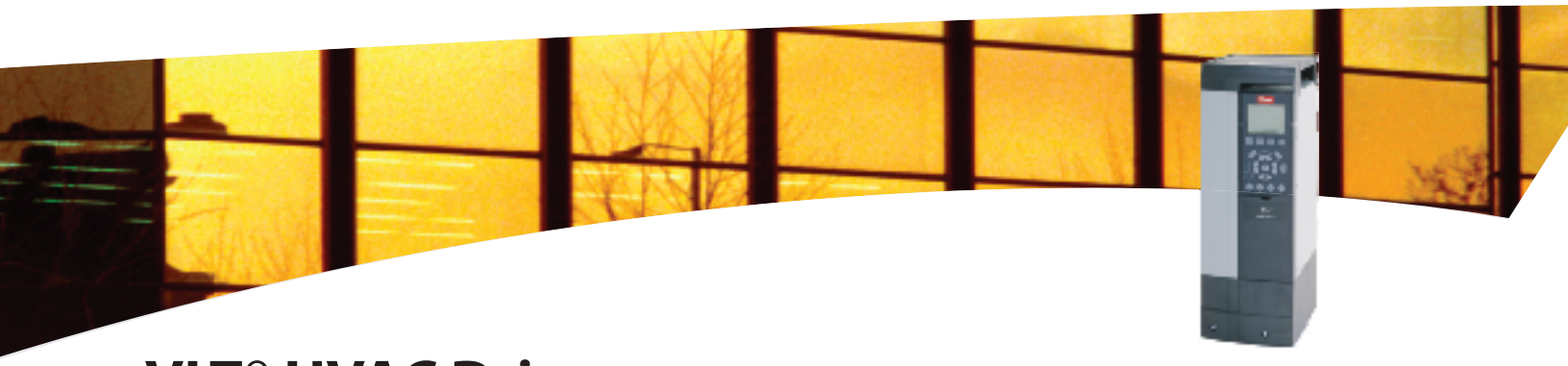
NES NAGLE ENERGY SOLUTIONS

Danfoss



VLT® HVAC Drive

VLT HVAC Drives are specifically designed for the unique requirements of HVAC applications and are rich in standard features, including intelligent control through advanced PID functions, energy optimizing functions, and system protection and performance capabilities.

Performance ranges

208 V: ½ to 60 HP
460 V or 600 V: ½ to 600 HP

Enclosures

NEMA/UL Type 1, 3R and 12

Depth of features

- **Automatic Energy Optimization (AEO)** constantly adjusts the motor voltage to optimize energy savings.
- **Automatic Motor Adaptation (AMA)** optimizes performance and efficiency by measuring the motor's stator resistance and reactance without running the motor.
- **Automatic Switching Frequency Modulation (ASFM)** provides quiet motor operation at critical low flow conditions and full output without derating at high load.
- **VVC^{PLUS} output switching pattern** provides nearly perfect output current sine wave and full rated motor voltage at rated frequency.
- **Firefighter's Override Mode** can be invoked automatically by the building's automation system, allowing fire and smoke to be controlled, contained and extracted.
- **Automatic high ambient derate** allows the drive to be set to warn of overtemperature while continuing to run at a reduced output carrier frequency and then, if necessary, reducing the output current.
- **Energy monitoring** provides real energy savings without additional hardware.
- **Real-time clock** adds sophisticated performance to basic control schemes.

Flexible, easy menu structure

- Intuitive navigation
- Four independent setups
- HVAC Application Menu
- Personal Menu
- Quick Setup Menu
- Changes Made Menu

Advanced display options

User-friendly, hot-pluggable interfaces streamline installation and troubleshooting:

- Standard graphic display can show up to five meters simultaneously as well as process variables (in. wg., °C and many others) with two-level password protection
- Available numeric keypad provides basic data display
- Available blind cover (no display) locks out local control and parameter access
- USB port enables programming and monitoring via PC with MCT 10 software

HVAC intelligent control

The combination of standard control features and flexible I/O enables advanced application control at the lowest possible cost. Operation can utilize four independent, self-tuning PID controllers or up to four separate setpoints and three feedbacks. The drive's built-in sleep and cascade control functions also maximize energy savings.

Options

Panel options

Bypass, disconnect, fuses, circuit breakers, output filters and other packages available from the factory's UL 508A panel shop.

Drive-based power options

Input disconnect, fuses or fused disconnect

Option cards

Provide application-specific capabilities

Communications

Fully equipped for serial communication, up to 31 drives can be connected to one serial bus up to 5,000 feet long.

Built-in serial communications

Johnson Controls Metasys® N2, Modbus RTU and Siemens Apogee® FLN are standard, built-in protocols. LonWorks and BACnet optional.

Protection

- 5% DC-link reactors integrated in all units
- EMI/RFI filters integrated in all units

System protection

- Belt monitoring
- No flow pumping, dead head protection
- Pump end-of-curve protection
- Automated vibration avoidance
- Plenum rated

Drive protection

- Metal oxide varistors and capacitor snubber on the input
- Optional conformal coating of electronics
- Input short circuit, ground fault and phase loss

Motor protection

- UL I^2T overload
- Output short circuit, ground fault and phase loss

VLT® THE REAL DRIVE

VFD Specifications

Danfoss Model FC-102, NEMA 12 enclosure and internal disconnect; bypass optional

Input Voltages (select model based on input voltage)	200-240, 380-480, 525-600*
Motor Voltages	200, 208, 220, 230, 240, 380, 400, 415, 440, 460 or 575 VAC
Input Voltage Range for Full Output	Nominal ±10%
Input Voltage without Tripping	164-299, 313-538 or 394-690 VAC
Input Frequency	50 or 60 Hz, ±2 Hz
Output Frequency	Selectable 0 to 1000 Hz
Drive Efficiency	97% or greater at full load and nominal motor speed
Input Section	Full wave three phase bridge rectifier
Output Section	Insulated gate bipolar transistors (IGBT)
Input Displacement Power Factor (cos φ)	>98% at all speeds and loads
Total Power Factor	>.90 at full load
Switching on Input	1-2 times/min.
Follower Signal	0 to 5 V DC, 0 to 10 V DC, 0 to 20 mA, 4 to 20 mA fully selectable, direct and inverse acting
Lost Analog Reference Action	Selectable to go to a preset speed, go to maximum speed,stay at last speed, stop, turn off, or stop and trip
Time Delay for Lost Analog Reference Action	1 to 99 sec.
Output Current Limit Setting	Adjustable to 110% of drive rating
Switching on Output	Unlimited
Current Limit Timer	0 to 60 sec. or infinite
Adjustable accel/decel ramp times	1–3600 sec.
Adjustable Maximum Speed	From minimum speed setting to 120 Hz
Adjustable Minimum Speed	From maximum speed setting to 0 Hz
Adjustable Acceleration/Deceleration Times	To 3,600 sec. to base speed
Adjustable Auto Restart Time Delay	0 to 600 sec.
Starting Torque	Constant torque until commanded speed reached
Breakaway Torque Time (1.6 times drive rated current)	0.0 to 0.5 sec.
Preset Speeds	16
Frequency Stepovers	4
Accel/Decel Rates	4
Programmable Digital Inputs	6 (2 can be used as digital outs)
Programmable Analog Inputs	2; selectable voltage or current
Programmable Analog Outputs	1; 0/4 to 20 mA
Programmable Relay Outputs	2; standard Form C, 240-400 VAC, 2A (3 additional optional)
Start Voltage	0 to 10%
Delayed Start	0 to 120 sec.
DC Braking	0 to 60 sec., 0-50% rated current
Automatic Restart Attempts	0 to 20 or infinite
Automatic Restart Time Delay	0 to 600 sec. between each attempt
Relay ON Delay and Relay OFF Delay	0 to 600 sec.
Ambient Operating Temperature Range	14°F to 113°F (-10°C to 45° C)
Humidity	<95%, non-condensing
Maximum Elevation without Derate	3,300 ft. (1000 m)
Short Circuit Current Rating	100,000 amps