NX Series Variable Frequency Drives

Honeywell

The Drive For All Applications
For HVAC Applications Large And Small, Honeywell NX Series Drives Are The Answer.
From simple HVAC applications to closed-loop process control applications, the Honeywell NX Series is the right Variable Frequency Drive (VFD) for all scenarios.

You can depend on an NX Series drive to control anything from simple fans, pumps, and compressors to elevators, cranes, or winders. NXS models offer the greatest application versatility for multiple control applications. NXL models meet simple application needs in the low-horsepower range.

Together, these versatile performers feature modular, easily adaptable hardware, precise semiconductor technology and a flexible, pre-installed application package that supports a fieldbus system. That makes NX Series drives the single best solution for a wide range of HVAC and industrial applications.

For Distributors/Contractors

For the distributor or contractor, the NX Series offers a range of new application capabilities that help keep stock to a minimum and speed installation.

Since the NX is a functional replacement for its predecessor, the CX Series, existing drawings, installation and training material can be easily adapted. In addition, a wide selection of option cards offers new possibilities for reconfiguring the drive to future requirements. The wide voltage range, high overload capacity, and a user-friendly alphanumeric display on the control panel make choosing and opening the correct drive very easy.

For OEM Customers

For the OEM customer, the modular construction and wide selection of option cards make the NX Series a drive that can be easily incorporated into almost any application. The versatile programming tool enables easy and seamless integration into your existing control strategy, and the onboard intelligence means the drive can replace the local controller.

For System Designers

The flexible I/O configuration and the dynamic performance of the NX Series make it ideal for a wide range of system applications, including drives used in HVAC and industrial markets. The NX Series can be configured to operate with several different fieldbuses, making it easy to communicate with a variety of control systems. The powerful control unit can be used for local control tasks, freeing the control system for general control tasks and minimizing the total number of controllers necessary for a complete automation solution.
Control Unit

The control unit features a control panel for setting parameters and controlling the function of the drive, along with an enhanced microprocessor and Application Specific Integrated Circuitry (ASIC). The display provides information including actual current, power and voltage, and can also be used for starting and stopping the drive. If necessary, the display can be mounted directly on the enclosure door.

The control unit provides five slots for various I/O cards. A wide selection of cards is available, ranging from cards with simple analog and digital inputs to smart fieldbus cards. (See your Honeywell NX Series Quick Selection Guide for a complete list of
The Modular Design

option cards and features.) Flexibility rules with cards that are interchangeable between both the NXS and the NXL. While the control unit is usually powered from the power unit, it also can be powered from an external 24VDC supply, maintaining critical access to the stored data programming even if the main supply is disconnected.

Power Unit
The power unit is available in 200-240 and 380-500 three-phase AC input voltage ranges. It includes all power circuit components necessary to operate the drive, and is connected to the control unit with a multipole connector.

All drives up to 40 hp are equipped with a built-in brake chopper. An external brake resistor can be installed as an option. The resistor is designed for a two-second full torque rapid stop once every minute.

Enclosure Class
The standard enclosure class for NXS drives is NEMA1 (IP21). Models are also available in NEMA12 (IP54). NXL drives are shipped as an open chassis panel-mount-only device.
Most drive installations require additional equipment such as controllers and sensors. This equipment is often installed in close proximity to the drive, creating the potential for interference.

There are two main types of interference:
- Low frequency — harmonic
- High frequency — electro-mechanical Interference

NXS drives are specifically designed against susceptibility to Radio Frequency Interference (RFI).

**Harmonic Currents**

Non-linear loads — like rectifier bridges in power electronics, switch-mode power supplies in office equipment, and fluorescent lamps — draw currents that are not sinusoidal and can generate harmonics. The additional harmonic current does not carry power, though it is an added current flowing in the cables. If the harmonics are not taken out of the system, problems such as overloaded conductors, decreased power factor and disturbance of measuring systems can plague the electrical system in a building. The voltages created by the harmonics may also damage other equipment or interfere with power line communication equipment.

**Eliminating the Problem**

The magnitude of the harmonic currents decreases as their frequency increases. Focusing on the lower frequencies can control or limit these effects.

Additional line impedance in the form of an AC choke is an extremely effective way to reduce or, in some cases, eliminate the problem. Drives without input line chokes generate significantly higher levels of harmonics. The choke has the added effect of protecting the drive against spikes in their power supply. All NXS drives have built-in AC chokes.

**High-Frequency Interference**

High-frequency interference consists of either radiated or conducted disturbances at frequencies above 9 kHz. These disturbances can be created by switching elements in any device (e.g., the crystal clocks in a computer, switch-mode power supplies, and the output devices in drives). The high frequency noise emitted from any device may create problems in measuring and communication systems, and may interfere with radio receivers.

NXS Drives come standard with industrial-quality RFI filters, immunizing them from the effects of interference.
The NX Series have a built-in AC choke. The choke reduces the harmonic currents and protects the rectifier against voltage spikes in the supply (compared to a DC choke which provides no spike protection). The RFI filter is standard on the NXS and optional on the NXL model.
Features Of The Drive: Broad Application, Simple Startup, Long Life

NX Series features include:

- Integrated AC choke for maximum protection and minimum harmonics
- Integral RFI filter for residential and light commercial as well industrial
- Factory tested at maximum temperature and load
- Flexibility in communication with multiple fieldbus options: LonWorks®, N2/Modbus®, DeviceNet, BACnet® and ProfiBus
- Highly flexible I/O configuration
- Multi-application software package pre-installed
- Versatile PC tools for loading, adjusting and comparing parameters
- Slim, space-saving “bookshelf” design for side-by-side installation
- Continuous self-supervising runtime and alarm system enhances reliability and safety
- Control logic can be powered from an external auxiliary supply, maintaining power to the control panel, internal drive functions and fieldbuses while the power module is down
- Configurations and applications can be transferred between drives
- Multilingual control display

Years of experience are behind the design and manufacture of these reliable, robust drives.

The NX Series extends the CX Series’ reputation for reliability, with the same high level of resistance to electromagnetic interference. The NXS and NXL control units incorporate the same application packages, control panels, I/O cards and can connect to the same PC tools package. Easy programming and commissioning simplify start-up. The NX default control I/O includes the most common control inputs and outputs. For maximum compatibility, the wiring terminals of the NX Series match the previous CX Series settings. Setting parameters is easy too, using either the control panel or the PC tools for the NX.

An optimal solution is available for most application needs. The modular design allows the choice of only the needed functions and features for specific applications. A wide selection of option cards offers new possibilities for future reconfigurations.
A number of Windows®-based PC programs are available for working with the NX Series.

**NCDrive**
NCDrive is a full-featured commissioning and control application for the NX Series. It provides the following functions:
- Parameter adjust, compare and save
- Trending for up to six signals
- Fault finding/trouble shooting

NCDrive requires a PC equipped with a Pentium II processor, 32 MB free RAM, 10 MB free disk space and Windows 95/98, 2000 or XP

**NCLoad**
NCLoad is a tool for loading software into the drive, including:
- System software (the operating system)
- Application software

Graphical Tools

Monitor window
Up to eight user-selectable variables can be monitored simultaneously
The NX Series can be easily adapted to a variety of needs using the factory-installed application package.

Applications

The basic application is set as factory default. The I/O signals are fixed, not programmable. A single group of 18 parameters is available. The frequency reference can be provided either as a current signal, a voltage signal, or directly from the control panel. This is the most popular application.

The standard application features the same control signal logic as the basic application plus the ability to freely program all digital inputs and outputs. Eight parameter groups are available, including basic, input signal, output and supervision, drive control, frequency, motor control, protection, and auto-restart parameters.

The local/remote application is an ideal choice for operation with two active control sources. The source of the frequency reference can be freely programmed, allowing maximum control flexibility. The active control source is selected with a digital input. All outputs are programmable, and, like the standard application, eight parameter groups are standard.

The multi-step speed control application allows selecting the reference between several fixed speeds. Nine programmable speeds include basic, seven multi-step, and jogging. The speed is selected by a digital input signal. The basic speed reference can be provided either as a current or as a voltage signal.

All inputs and outputs are programmable, and the eight parameter groups are standard.
All applications can support a fieldbus system without any additional software. Typical HVAC applications include pumps, fans and compressors. Industrial applications include conveyors, winders, cranes, hoists and elevators. Choose the right application for your needs from the guide below.

The pump and fan control with autochange application can be used for controlling one variable-speed drive and a total of four auxiliary drives.

The PI regulator controls the rate of the variable speed drive and provides start and stop signals to the auxiliary drives. All outputs are freely programmable.

A parameter group for multi-pump and fan control functions is available in addition to the eight standard parameter groups.
NXS Applications

The standard NXS drive is typically supplied with the following pre-engineered applications:

- Basic
- Standard
- Local/Remote Control
- Multi-step Speed Control
- PID Control
- Multi-purpose Control
- Pump and Fan Control with Automatic Changeover

Several customized, special-purpose applications are also available for pumps, elevators, cranes, winders and more. All NXS applications are similar to the CX configurations.
NXL

The NXL is a slim, compact and easy-to-use VFD for the 1/2–3 hp power range. The installation is flexible and easy using the mounting components shipped with the unit. Choose traditional back installation or DINrail, suitable for very limited space.

The latest control technology, coupled with real-time electrical measurement, is at the core of the NXL fieldbus control using RS485 (Modbus®), and PID control and enhanced special features such as a sleep function, are standard. All common fieldbus cards and I/O expander cards available for the NX range of products can be used in the NXL.

User-Friendly Features:

NXS and NXL Models

- Simple to operate
- Smart preset parameters: In most cases, enter the motor ratings and the NX does the rest
- Simple quick-connect control terminals cut installation and commissioning time
- Wide variety of I/O cards for different applications ensure compatibility
- RS232C port for connection to PC
- Comprehensive manuals available in English, Spanish and French
- Multilingual control panel, similar operation for all power ratings
Sensorless vector control technology is at the core of the NXS, along with an adaptive motor model and a sophisticated ASIC. The motor flux model is based on the measurement of all three output phase currents and the voltage level obtained by the ASIC. The model automatically identifies motor parameters for both the sensorless vector mode and the U/f mode, keeping track of changes in the parameters over time.

The vector control is carried out in a system of stator flux coordinates, which is resistant to small variations in measurements and motor parameters. No demanding or complicated calculations are required. The ASIC also supervises the internal buses and some external functions, freeing the processor for other tasks.
Vector Control Without Feedback

The vector calculations are carried out every millisecond, based on the instantaneous values of the phase currents and their phase angles. The motor voltage is measured by the ASIC, preventing errors in measurements. The motor model uses those values to calculate the torque and flux. Integrators that can cause drift problems due to inaccuracies in parameters, measurements or changes in motor values are excluded. Combine that with the incorporation of the converter and motor cable, and you have the most accurate and most precise motor control device in the industry.