Honeywell

PRECISE CONTROL, HIGH COMFORT
AND MAXIMUM ENERGY SAVINGS

NX Series
Frequency Converters

For any application

Honeywell NX series frequency converters can be used to improve comfort and to optimize control in building management systems as well as in industrial processes, whilst yielding energy savings of up to 50 % or more.

The NX series comprises a complete power range from 0.25 kW to 3 MW. The modularity of the portfolio and its versatile control and integration options allow quick installation and commissioning and ensure reliable operation.

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Frequency converters from 0.25 kW to 3 MW

The key feature of all Honeywell drives is full hardware and software modularity. There are three different control units, two cooling methods for power units, space for five different I/O cards and field-installable conversion kits, just to name a few. These elements can be mixed and matched.

The NXS control unit is designed for commercial and industrial applications that do not require the precision provided by encoder feedback. The NXP control unit can use an encoder to deliver the ultimate motor control performance.
The power unit of the drive is available in either air-cooled or liquid-cooled versions (power capacity dependent).
I/O cards can be used in all three drive types: one I/O card in the NXL to expand the basic I/O, and up to five I/O cards in the NXS and NXP to create the necessary configuration for the application.

The NXL has a detachable, seven-segment LCD keypad, for parameter setting, communication and for monitoring.
The NXS and NXP have a detachable, alphanumeric keypad with built-in memory for parameter setting, communication and for monitoring.
It can be used to copy parameters between different drives and is also capable of storing the active parameter set automatically for future use.

NXx control panels can be remotely mounted. The NX control units are normally powered by the power unit. However, the control unit can also be powered from an external 24 V DC supply, making it possible to for example ‘fieldbus’ communications to read/enter data even when the main power supply to the drive is isolated.

1 NXL Compact Drive
2 NXL General-Purpose Drive
3 NXS Industrial Drive

Voltage ranges are 208 - 240 V, 380 - 500 V and 525 - 690 V.

	Power and Voltage	Enclosure	EMC	Options
1 **NXL Compact Drive**	208 – 240 V 0.25 – 0.37 kW, 1-phase 0.55 – 1.5 kW, 1/3-phase 380 – 500 V, 3-phase 0.37 – 2.2 kW	IP20	N	NXL I/O expander OPT-AA NX expanders OPT-Bx, -Cx Door installation kit, DRA-02L DIN rail mounting kit, DIN-MFx RS-232 adapter kit, NX-PAN-RS Footprint H-level filter
2 **NXL General-Purpose Drive**	380 – 500 V, 3-phase 0.75 – 30 kW	IP21 or IP54	C, H, T	NXL I/O expander, OPT-AA NX expanders OPT-Bx, Cx Door installation kit, DRA-02L RS-232 adapter kit, NX-PAN-RS Flange mounting kit
3 **NXS Industrial Drive**	208 – 240 V, 3-phase 0.75 – 30 kW 380 – 500V, 3-phase 0.75 – 200 kW 525 – 690 V, 3-phase 2.2 – 200 kW	IP21 or IP54	C, H, L, T	NX expanders OPT-Ax, -Bx, -Cx Door installation kit, DRA-02B Flange mounting kit
4 **NXP High-Performance Drive**	208 – 240 V, 3-phase 0.37 – 30 kW 380 – 500 V, 3-phase 0.75 – 200 kW (1500 kW) 525 – 690 V, 3-phase 2.2 – 200 kW (1500 kW)	IP21 or IP54 (IP00)	C, H, L, T	NX expanders OPT-Ax,-BX,-Cx,-Dx Door installation kit, DRA-02B Flange mounting kit
5 **NXP Liquid-cooled Drive**	380 – 500 V, 3-phase 7.5 – 1500 kW 525 – 690 V, 3-phase 5.5 – 1500 kW	IP00	C, H, L, T	Heat exchanger module A wide range of options available
6 **NXdrive Enclosed Drive**	380 – 500 V, 3-phase 160 – 1500 kW 525 – 690 V, 3-phase 200 – 1500 kW	IP21 or IP54	L, T, N	A wide range of options available, e.g. - cabling - terminals - input devices - output filters - protection devices

4 NXP High-Performance Drive 5 NXL Liquid-cooled Drive 6 NXdrive Enclosed Drive

The perfect choice

When designing an AC drives system it is important to choose the correct components right from the beginning. Choosing a Honeywell drive ensures Quality, Reliability and Value for Money.

Dimensioning
The 'load type' of the application and ambient temperature are the two main factors that have the most effect on the correct rating of the drive:

- starting torque
- variable or constant torque
- overloadability
- ambient temperatures
  > 40 °C, 45 °C or 50 °C
- cooling: liquid or air
- physical size.

Performance
The speed and torque accuracy as well as response time determine the control mode to be used:

- U/f frequency control
- sensorless vector control
- closed-loop vector control
- static and dynamic accuracy of speed and torque.

Functionality
The application-specific requirements determine the number of inputs and outputs, control and monitoring principles, and the appropriate application software:

- system integration
- control logic
- extendable I/O
- fieldbus
- pump and fan control
- PID control
- parameter setting
- performance monitoring.

Support
Often, Production Plant must run continuously without interruptions 24 hours a day, 7 days a week. Support is a key issue:

- technical support
- local and global presence
- 24/7 after sales support and service
- commissioning
- diagnostics
- exchange units
- spare parts.

Standards
Installations must be designed and carried out according to safety and other local regulations. Compliance with standards ensures that the drive operates properly in the given environment as specified:

- emissions and immunity (EMC)
- RFI
- harmonic currents and voltages
- low-voltage directive
- machine directive
- degree of protection (IP classes)
- CE, UL, C-UL and other approvals.

Promptness
The ordered goods must be delivered at the scheduled time, especially in projects:

- production quality
- on-time delivery
- efficient logistics.

Major Features

Quality and reliability
- Every drive is tested at maximum operating temperature and at full motor load prior to shipment
- All drives include high-quality components for long life expectancy
- Comprehensive run-time self-supervision and alarm system for enhanced reliability and safety

Customer support
- Worldwide network of Honeywell Offices, suppliers & partners provide around the clock support
- Comprehensive documentation available in many languages
- PC tools, manuals and special applications available for downloading from a Honeywell website

Full modularity
- Three control units (NXL, NXS, NXP)
- Air-cooled or liquid-cooled power units
- Space for up to five I/O cards (NXS, NXP), one I/O card for NXL
- Field-installable conversion kits
- Detachable, remote-operation keypads
- FR4-FR6 IP21-to-IP54 conversion kit

Easy installation and commissioning
- Quick and easy installation
- Start-up wizards for easy commissioning
- Compact size
- Motor parameter identification capability
- NC1131-3 Engineering tool for more demanding users
- Versatile PC tools for loading, setting and comparing parameters
- Parameter transfers between drives and applications
- Slim, space-saving bookshelf design; side-by-side installation

User-friendly
- Smart preset parameters
- Common in a range user interface for all power ratings
- The number of parameter settings can be kept to a minimum, thanks to the "All in One" application set

Environment-friendly
- On fan and pump loads potential energy savings of more than 50 %
- Decreased mechanical stresses for process equipment
- Reduced noise levels

Versatile control and integration
- Single-drive and complex process control applications possible
- Unsurpassed flexibility in communication via multiple fieldbuses
- Dedicated inter-drive bus (NXP) for coordinated drives
- Sophisticated, expandable I/O connections with ‘quick terminals (NXS/NXP)’
- A large number of I/O cards available for different applications
- Control logic can be powered from an external supply
- ‘All in One’ software package (NXS, NXP)
- Multi-control application (NXL)
- Wide selection of application software available
- RS232C (NXL NX-PAN-RS adapter) terminal for PC connection (NCLoad, NCDrive and NC1131-3 tools)

EMC
- Integrated RFI filter for 1st environment, restricted and unrestricted distribution (households, light industry) as well as 2nd environment (industry)
- Integrated AC chokes for maximum protection and minimum harmonics
- Selectable EMC levels, e.g. H to T or L to T

The NXL is a slim, space-saving drive with a power range from 0.25 to 30 kW. The bookshelf design, enclosure options and EMC classes offer an optimum solution for a wide variety of operating environments.

NXL

The compact size and flexible installation options make the NXL suitable for installations where space is at a premium. The small MF2 and MF3 frames can be mounted using a DIN rail either at the back or at the side of the drive; the larger MF4-MF6 frames are wall mounted. They use the same power section enclosures as the NXS/NXP drives with the same installation dimensions. All mechanical variations available for the NXS/NXP range of drives are also available for the MF4-MF6 frames of NXL drives.

The drives are easy to program and use. In addition to the standard I/O in the basic drive, there is space for one option card with additional I/O or other functionality. The I/O terminal numbering and functionality correspond to that of the NXS/NXP range. Parameter setting is either via the seven-segment LCD panel or via a PC and NCDrive software. An adapter for PC connection is required.

The NXL builds on the modular design concept of the NX family of drives. The drive can be delivered with or without the panel, with or without option cards and in different enclosure classes, IP20 for the small MF2 and MF3 frames, IP21 and IP54 for the larger MF4-MF6 frames.

The Honeywell NXL incorporates an integrated RS485 (Modbus) connector. Most of the option cards for the NXS/NXP range can be used with the NXL, specifically for I/O expansion and fieldbus operation/connectivity.

Features

- Steady state speed error < 1 %
- Low torque ripple
- High immunity to resonant vibrations
- Starting torque > 200 %, depending on motor and drive sizing
- Suitable for multi-motor applications

Multi-control application as standard

The NXL includes an easy-to-use and flexible multi-control application. The need for parameter adjustments is kept to a minimum, thanks to well-defined default settings. All I/Os can be programmed. The versatile features include full motor protection, flying start function, sleep function and a PID controller, with the option to control 3 +1 pumps (PFC).

NXS

The NXS is designed to be a standard, easy-to-use drive with a wide application area. It is based on an advanced sensorless vector control concept, which provides an excellent motor control under all circumstances. An automatic torque maximizer feature is available, ensuring that loads can be started reliably.
The drive also includes an automatic energy saving feature, which optimizes the motor flux as a function of motor load and speed. The basic drive operation is also suitable for multi-motor applications.

Features

- Steady state speed error < 1 %
- Low torque ripple
- High immunity to resonant vibrations
- Starting torque > 200 %, depending on motor and drive sizing
- Suitable for multi-motor applications
- High-speed applications (up to 7200 Hz) possible

NXP

The NXP should be used where high precision speed and/or torque is required. Equipped with high processing power, the NXP can use information from an encoder or a resolver in order to provide very precise motor control. Sensorless vector and simple frequency control are also supported.
Typical applications requiring high performance are: master-slave drives, positioning applications, winder tension control, and synchronization.

Features

- Speed error < 0.01 %, depending on the encoder
- Incremental or absolute encoder support
- Encoder voltages of 5 V (RS422), 15 V or 24 V, depending on the option card
- Full torque control at all speeds, including zero
- Torque accuracy < 2 %; < 5 % down to zero speed
- Starting torque > 200 %, depending on motor and drive sizing
- Integrated datalogger for system analysis
- Fast multiple drive monitoring with PC
- Full capability for master/slave configurations
- High-speed bus (12 Mbit/s) for fast inter-drive communication
- High-speed applications (up to 7200 Hz) possible

Applications

Select the software application best matching the characterictics of your actual application. The drive will then be easier to set up, because only those parameters relevant to the application will be visible. Those parameters which are not needed will be hidden. For each application there is a start-up wizard that guides the user through the start-up process and parameter settings. The drive is also capable of identifying motor parameters, further easing the start-up.

All applications support field buses, thus allowing access to all commands and all parameters.

Choose the most appropriate application from the list below:

Basic application

The basic application is the simplest of the available applications. It is intended for simple use, where there is an external setpoint signal as well as external start/stop and direction commands.
It is only necessary to set a few motor and application dependent parameters.

Standard application

The standard application is intended for more demanding requirements. The main differences to the basic application are configurable I/O and fault operation.

Local/remote application

The local/remote application is designed for cases where the drive must be controlled from two different locations – e.g. a local one beside the motor and a remote one in the control room. Control is chosen by using one digital I/O and is unambiguous at all times. All parameters relating to I/O functionality and general drive behavior are also available.

Multi-step speed control application

The multi-step speed control application is designed for cases where one to three digital inputs form a speed reference for the drive. Up to sixteen different speeds can be preprogrammed. This application

is typically used in environments where the motor must step through a repeated cycle with several preset speeds, such as coordinated conveyors, simple machine tools, or simple positioning applications.

PID control application

The PID application includes an internal PID controller. This controller can be used to maintain some variable, typically pressure or temperature, at a desired level. The variable is measured, and if there is a deviation from the setpoint, the motor speed will change in order to bring the variable to the correct value. The PID controller can also be used with an external speed sensing device to create a simple closed loop speed control.

Multi-purpose control application

The multi-purpose application is the most flexible one. It gives access to all parameters, all I/Os and enables the creation of mathematical functions using one or more inputs.

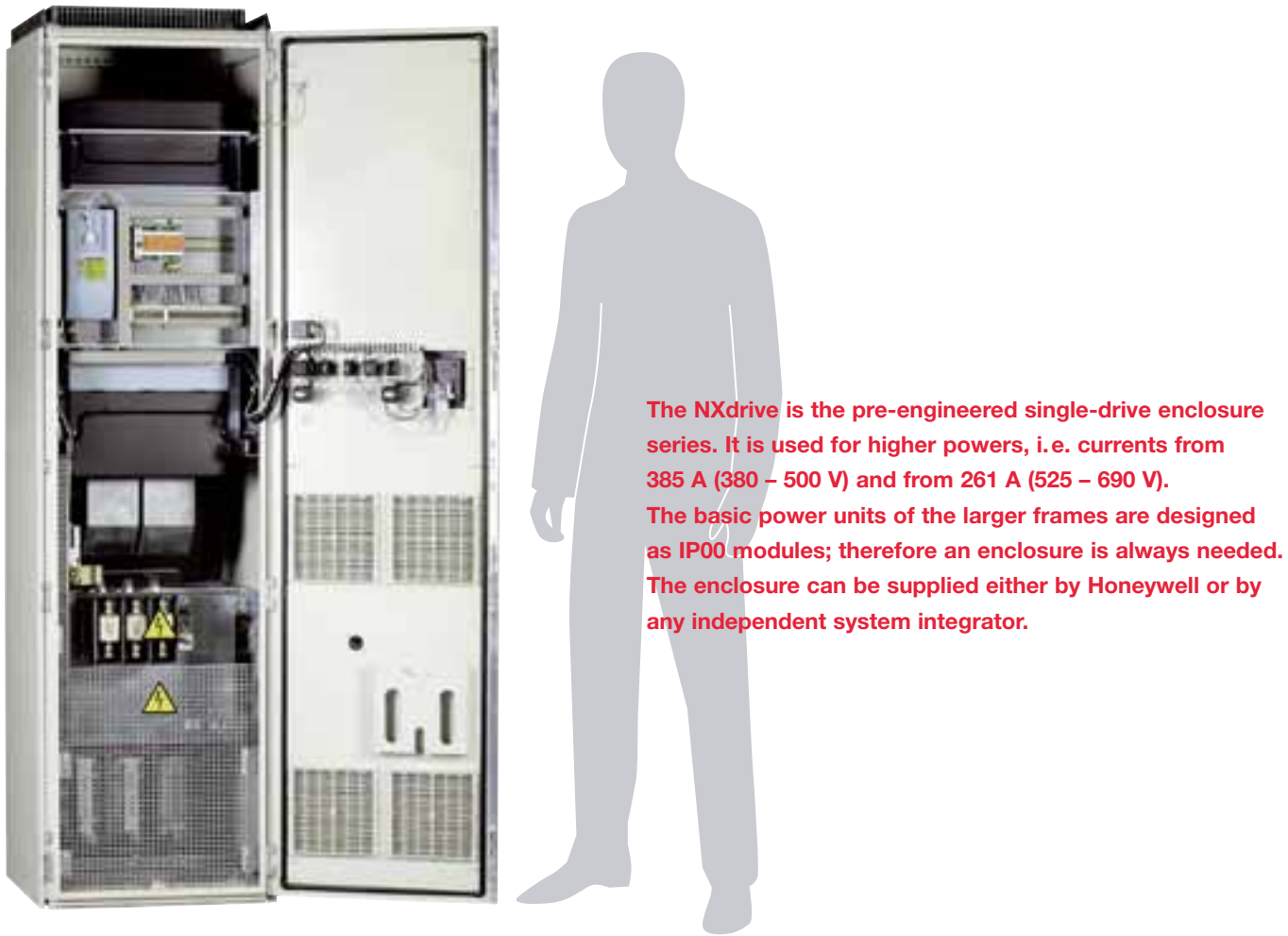
Pump and fan control with autochange

This application is designed for multiple pumps or fans that are connected in parallel. The idea is to use only the number of pumps required to meet the demand, using the drive to control the speed of one pump/fan and to switch on and off the other parallel pumps/fans. The autochange function allows the working hours of the various pumps to be balanced for equal wear.

Customized applications

There is also a wide range of special applications for special purposes, for example elevators, cranes, compressors, positioning, or winders.
Also, the NC1131-3 tool can be used to create unique applications tailored to very specific requirements.

NXDrive



The NXdrive is the pre-engineered single-drive enclosure series. It is used for higher powers, i.e. currents from 385 A (380 – 500 V) and from 261 A (525 – 690 V).
The basic power units of the larger frames are designed as IP00 modules; therefore an enclosure is always needed.
The enclosure can be supplied either by Honeywell or by any independent system integrator.

Compact and flexible

The NXdrive is a free standing enclosure for larger power frames. A large number of pre-designed options are available, typically input (fuses, switches, breakers), output (filters) devices or control options. It is compact and well tested, fully using the modular approach of the drives. The design provides great flexibility, robustness, compactness and service-friendliness.

User-friendly

The NXP control unit is physically completely separated from the power module. It is mounted on a separate control compartment at an easily accessible height. The bracket also has space for additional control circuitry, such as relays, or contactors. The power input and output terminals have ample space for cable connection. Floor plates and 360 degree earthing clamps for cable shields are included in the standard delivery.

Fully tested

All NXdrive enclosures benefit from our wide experience on enclosed high-power drives. Special care has been taken with temperature management, ensuring a long life for the enclosed drive. The EMC performance has been verified, leading to trouble-free operation in the industrial environment.

Service-friendly

The NXdrive has been designed to fully exploit the modular design of the high-power NXP drives. The power modules are mounted on extendable rails, which allow for easy servicing of the power module if required. The larger units consist of small power modules, which can be separately taken out of the enclosure.

Easy ordering

The NXdrive can incorporate a variety of options such as input fuses, breakers, contactors, switches, and a selection of output filters (sine or du/dt).
Each option is defined by adding an ordering code to the basic enclosure code, providing a very exact drive specification.

Liquid-cooled NXP

The modular construction of the Honeywell NX range has allowed the development of liquid-cooled power sections as an alternative to the standard air-cooled range. The liquid-cooled NX uses the standard NXP control modules.

Wide application area

Air-cooled and liquid-cooled drives can be used in all applications.
IP54 protection can easily be achieved with these drives and therefore they can be easily installed in most production areas. This also reduces the load on the air-conditioning system in the electrical rooms - in many retrofit applications this is an important consideration.
Liquid-cooled drives do not need large cooling fans; therefore they are by default quiet in operation.

As no air channels are required, the drives are extremely compact and suitable for all applications where space is at a premium, typically on ships and in the offshore industry, in mines or in the heavy industry.
The coolant removes almost all of the heat, resulting in a high degree of protection at all power ratings.
Space savings can be as much as 70 % over similarly rated air-cooled units.

The liquid-cooled drives are based on the hardware and software modularity concept used throughout the NX range. The liquid-cooled drives have a power section designed specifically for liquid cooling – greatly reducing the size.

All components requiring cooling are mounted on one or more common aluminum cooling elements. The entire NXP liquid-cooled series has only six different chassis sizes. The same basic mechanics are used for both AC- and DC-fed drives. The cooling liquid, which can be pure drinking water, removes about 95 % of the heat generated. There are no special dielectric requirements on the liquid (e.g. de-ionized water), as it never comes into contact with the high potentials in the drives. The power module is connected to the NXP control module either via an optical cable or, in the smaller sizes, by a copper cable. The required liquid/liquid or liquid/air heat exchangers and auxiliary devices are also available from Honeywell.

Option Boards

Four different types of boards are available for the Honeywell NX series drives. The NXS and NXP accept a total of five option boards, and the NXL one board. All the boards follow the same type designation principle, i.e. NXOPTxx in the categories shown in the table:

Suitability			Board Type	I/0 Signal											
				DI	DO	AI (mA/V)	AI (mA/V) isolated	A0 (mA/V)	A0 (mA) isolated	R0 (N0/NC)	R0 (N0)	+10ref	Therm	+24 V / EXT +24 V	PT 100
			Basic I/0 cards												
	•	•	OPT-A1	6	1	2		1				1		2	
	•	•	OPT-A2							2					
	•	•	OPT-A3							1	1		1		
		•	OPT-A4												
		•	OPT-A5												
	•	•	OPT-A8	6	1	2		1				1		2	
	•	•	OPT-A9	6	1	2		1				1		2	
•			OPT-AA	3	1						1			1	
	•	•	OPT-AE		2										
			I/0 expander cards												
	•	•	OPT-B1	6										1	
•	•	•	OPT-B2							1	1		1		
•	•	•	OPT-B4				1		2					1	
•	•	•	OPT-B5								3				
	•	•	OPT-B8											1	3
	•	•	OPT-B9								1				
		•	OPT-BB												
			Fieldbus cards												
	•	•	OPT-C2	Modbus, N2											
•	•	•	OPT-C3	Profibus DP											
•	•	•	OPT-C4	LonWorks											
•	•	•	OPT-C5	Profibus DP (D9 type connector)											
•	•	•	OPT-C6	CANopen (Slave)											
•	•	•	OPT-C7	Device Net											
	•	•	OPT-C8	Modbus, N2 (D9 type connector)											
			Adapter cards												
		•	OPT-D1	System Bus adapter (2 fiber optic pairs)											
		•	OPT-D2	System Bus adapter (1 fiber optic pair) & CAN-bus adapter (galvanically decoupled)											
	•	•	OPT-D3	RS232 adapter card (galvanically decoupled)											
		•	OPT-D6	CAN-bus adapter (galvanically decoupled)											

Other options

A wide range of other options is available for the Honeywell NXS, NXP and NXL:

- Kits for IP54 enclosure, FR4-FR6 and MF4-MF6
- Flange mount kits, FR4-FR9 and MF4-MF6
- External and internal brake resistors
- DIN rail installation for MF2 and MF3
- Door installation control panel kits
- RFI filters
- du/dt filters
- Sine filters

42-240 VAC input	DI / Encoder (10...24V)	DI / Encoder (RS 422, 5 V)	Out +5 V +15 V / +24 V	Out +15 V / +24 V
	3	3	1	1
	3			1
5	2			

PC Tools for NX Series

There are a variety of PC tools for configuring the NX Series drives. These tools are intended for commissioning, monitoring, loading various applications and application programming. The PC can be connected to the drive via the RS 232 (adapter required for NXL).

Honeywell NCDrive

The NCDrive is intended for commissioning and monitoring of the NX series drives. It allows the downloading and uploading of parameter sets between the drive and a PC and comparing parameter sets. It also allows the user to change the active application, save and print parameters and print service reports to file or paper, control the drive, set references, operate the NXP data logger, and much more.

It also allows the monitoring of up to eight user-specified variables, simultaneously on a graphical trend screen, and to save these on the PC hard disk for later analysis.
In the NXP, it can also operate the datalogger and communicate via CANbus with up to 254 drives.

NCLoad

The NCLoad is a more basic tool for downloading applications, system software and option card software into the NX Series. The user interface provides an easy point-and-click selection of an application to be downloaded and is mainly intended for use by service personnel.

NC1131-3

The NC1131-3 is a graphical programming tool for generating NX series applications and is compliant with the IEC 61131-3 PLC programming standard. All methods defined in the standard can be used, i.e. function block diagrams, structured text, ladder diagrams, instruction list and state diagrams separately or in combination.

One application can contain approximately 2000 blocks, depending on their size and complexity. When new applications are created, typically one of the existing applications is used as the basis to minimize the effort. The existing applications will usually contain the majority of the functionality required.

NC1131-3 must be ordered separately. Training is necessary to use this tool.

Find out more

For more information on Honeywell's frequency converters and other Honeywell products visit us online at http://europe.hbc.honeywell.com

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