



# HVACR Capabilities

HVAC/R Packaged AC Drive Solutions  
for Building Automation

**CONTROL TECHNIQUES™**

***Nidec***  
All for dreams

# Advanced Motor Control Solutions for HVACR Applications

## Introduction

Nidec Control Techniques is a world leader in the design, manufacture and support of technologically advanced Variable Frequency Drives (VFDs) and packaged drive systems dedicated to HVACR customers. Our extensive industry experience, innovative modular drive design, powerful technology and advanced tool kits provide complete solutions to applications ranging from simple fan control to integration into comprehensive building automation systems.

Nidec Corporation's mission is to contribute to the development of society and welfare of the general public around the world. Nidec aims to do so by supplying the highest quality products. Our company is sincerely and enthusiastically dedicated to the trinity of technology, expertise, and modern science. Thereby, Nidec strives to promote the prosperity of our society, our company, and all our employees.

## Ratings

Built to meet rigorous international standards for quality, safety and interoperability, Nidec Control Techniques' drives carry one or more of the following approval ratings:



## Software Included!

**Connect** Software enables complete control and display of all parameters within the drive. This complimentary Windows® PC software tool can be used off-line in the office or on-line connected to the drive for commissioning, optimizing, monitoring drive/system performances, and includes digital oscilloscope functionality. Our drive software is complimentary with no associated licensing fees.

Other complimentary software includes an **Energy Savings Estimator** and a **Harmonics Calculator** which help you meet the required standards for your installation.

## Warranty

Nidec Control Techniques' drives carry a standard two year warranty with available extended warranty options for longer-term support for your equipment investment.

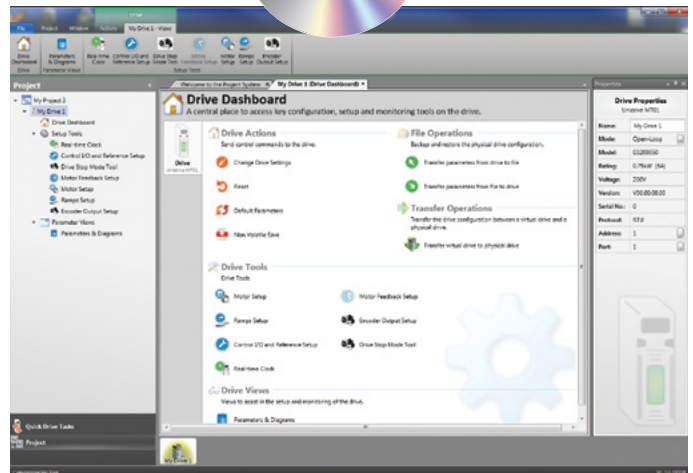


## Innovative, Intelligent Drive Technology

Combining extensive drive and controls experience with direct input from building operators, consultants and contractors, Nidec Control Techniques manufactures the industry's most advanced energy saving and easy-to-operate AC drives. The Nidec Control Techniques HVACR product line features a wide range of VFDs used to control motor speed to vary the pressure or flow of air, refrigerant, glycol, water and other liquids for HVACR pump, fan and compressor applications.



**SOFTWARE INCLUDED**





# Driving Technology with Innovation and Quality

## The Drive for Constant Comfort

The HVAC Drive H300 Building Automation drive is built for HVACR applications with the flexibility and performance to work flawlessly with all major building management systems. The combination of forty years of drive and controls experience with the direct input of building operators, consultants and contractors is the cornerstone of this advanced, easy-to-operate HVACR AC drive.

## Easy to Specify

The HVAC Drive H300 is manufactured under ISO 9001 and ISO 14001 certifications and is approved for use by UL, cUL, CE, and C✓. Models are available in 208 V to 230 V, 460 V and 575 V with power ranges to 4,200 HP. Nidec Control Techniques' drive systems are built for high performance and continuous duty as well as working efficiently, effectively and, to specification.

## Easy to Integrate

The HVAC Drive H300 has built-in support for communications with building automation control systems including BACnet, Modbus RTU, and Johnson Controls Metasys N2. Additional I/O and communications are also supported using zero-space option modules that fit beneath the cover. Siemens FLN and other communication protocols are also available.

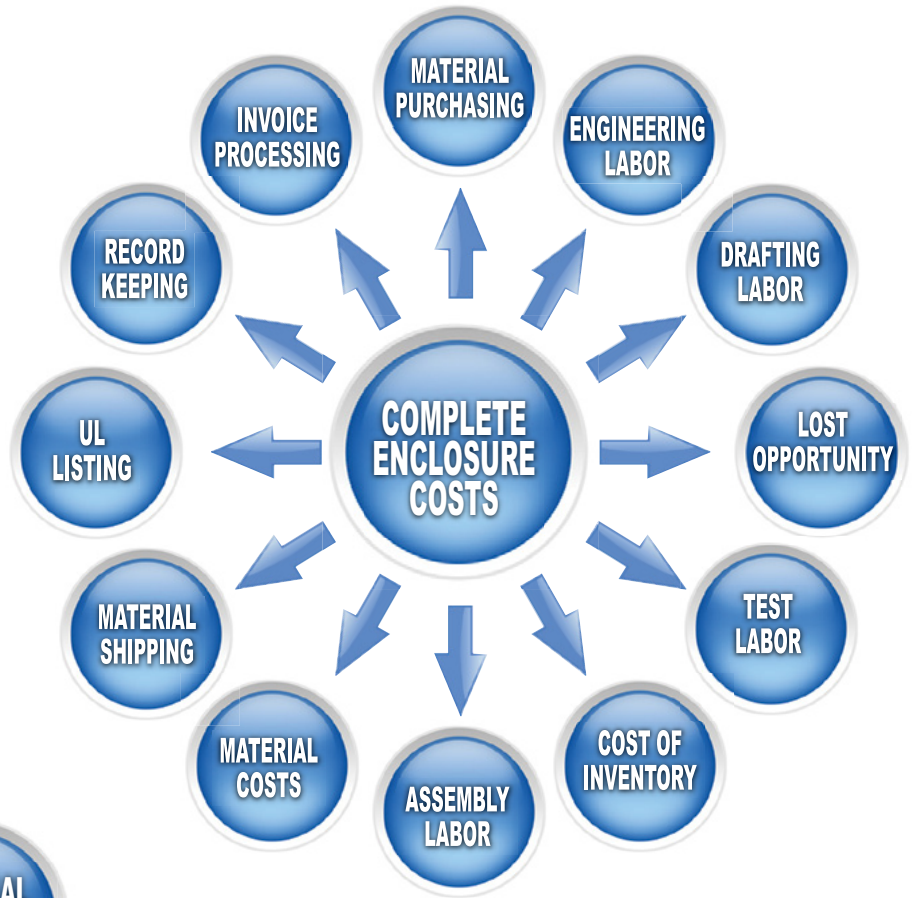
## Easy to Operate, Monitor and Maintain

Setup is simple using the keypad, a computer or a parameter copying device. Drives can be monitored from the keypad, a full-color LCD touchscreen interface, or the building control system. Troubleshooting is simplified as the drives have their own logic power supply and can be monitored even if the rest of the system is down. In addition, our suite of complimentary software is easy to use.



**Consider the Total Cost of Manufacturing**

When accounting for the cost of a motor control enclosure, much of the cost is unseen (see diagram, right). In addition to the cost of materials and design time, administrative overhead, testing, certifications, shipping and labor consume limited resources that could be hard at work improving your bottom-line performance. Nidec Control Techniques has the staff, expertise and buying power to help you get control of your costs and reduce lead times. Our cost effective, pre-engineered turnkey solutions provide the efficiency you need to stay competitive in today's rapidly-changing global economy.



**Fast, Easy "Quote-Order-Ship" Turnaround**

With standard lead times of 2-4 weeks (among the shortest in the industry), you can have a complete, pre-tested packaged drive solution faster than traditional enclosure suppliers. When you need it even faster, 24 to 48-hour shipping may be available depending on availability.

# Packaged Systems – Standardized Solution for Quick Delivery

## Pre-engineered Packaged Solutions

When your motor control application demands more than panel-mount or free-standing drives, Nidec Control Techniques' pre-engineered motor control packages can help meet your needs. Known worldwide for reliable motor control products and application expertise, Nidec Control Technique's also offers these packaged motor control solutions in a variety of NEMA-rated enclosures with a wide range of power and control options to choose from.

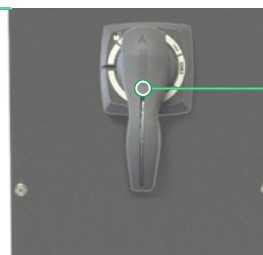


- Setup wizard
- I/O setup
- Autotune
- System status
- Visual diagnostics

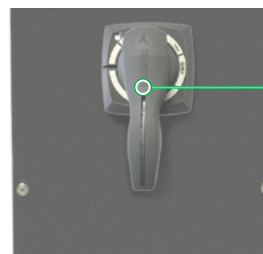
Power accessory options can add to standard height



- VFD/AC Drive
- Standard System Integration modules:
  - SI-Ethernet - EtherNet/IP, Modbus TCP, and RTMoE
  - SI-I/O - additional analog and digital I/O
- Onboard RS-485: Modbus RTU, BACnet, Metasys N2
- Full-color LCD Touchscreen HMI / 2 contactor bypass control
- Customer connection terminals
- Optional VFD service switch
- Circuit breaker / fused disconnect handle (moves with options below)
- Motor overload relay protection



Optional input filtering



Optional output filtering and manual motor protection for up to six (6) motors (consult factory for protection for more motors)

NEMA 1 HVAC Drive H300 HMI Bypass shown



# Order Code Configurator

## Packaged HVACR drives from 1 to 600 HP

[Order Code digit number] →	BASE ORDER CODE						POWER & DOOR OPERATOR OPTIONS						CONTROL OPTIONS				COOLING TOWER										
	X	X	XXXX	N	X	X	-	X	0	X	X	X	X	X	0	-	X	X	X	X	X	X	X	X	X		
	1	2	3 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	26	27	28	29	30

**[1] Package Type**

G = Pre-engineered - 2 contactor with LCD Touchscreen HMI
P = Pre-Engineered
S = Seismic (consult factory)
C = Custom (consult factory)

**[2] Voltage Rating**

8 = 208 Vac
2 = 230 Vac
4 = 460 Vac
5 = 575 Vac

**[3] - [6] Horsepower Rating**

0001 = 1 HP	0060 = 60 HP
01P5 = 1.5 HP	0075 = 75 HP
0002 = 2 HP	0100 = 100 HP
0003 = 3 HP	0125 = 125 HP
0005 = 5 HP	0150 = 150 HP
0007 = 7 HP	0200 = 200 HP
0010 = 10 HP	0250 = 250 HP
0015 = 15 HP	0300 = 300 HP
0020 = 20 HP	0350 = 350 HP
0025 = 25 HP	0400 = 400 HP
0030 = 30 HP	0450 = 450 HP
0040 = 40 HP	0500 = 500 HP
0050 = 50 HP	0600 = 600 HP

**[7] Duty Rating**

N = Normal Duty
-----------------

**[8] Enclosure Style**

1 = NEMA 1
2 = NEMA 12
3 = NEMA 3R
4 = NEMA 4X (consult factory)
F = NEMA 1 (Disconnect with Fusing)

**[9] Input Power Connection**

1 = Circuit Breaker
2 = Disconnect Switch with Fusing
3 = Circuit Breaker (65 kAIC)
4 = Circuit Breaker (100 kAIC)
5 = Fused Disconnect (100 kAIC)

*Input fuses for drives are included as standard for all input power options*

**[10] VFD/AC Drive Solutions**

2 = Unidrive M200 - "P" package
3 = HVAC Drive H300
X = HVAC Drive H300 AFE (Active Front End)

**[12] Bypass Option**

0 = No Bypass
2 = Manual Bypass
3 = LCD Touchscreen HMI 2-Contactor Bypass with VFD Service Switch
4 = LCD Touchscreen HMI 2-Contactor Bypass
6 = Soft Starter LCD Touchscreen HMI 2-Contactor Bypass (no service switch)

**[14] Door-Mounted Keypad/HMI**

0 = None
C = LCD Keypad, IP55 rated, plain-text with Real-Time-Clock
E = LED Keypad, IP65 rated
H = Door-mounted Full-color LCD Touchscreen HMI, NEMA 4X rated

*Unidrive M200 includes drive mounted LED keypad as standard. Choose these options if keypad is required to be door mounted..*

*\*Requires selection of X or Y RS-485 option module.*

*\*\*Standard with Bypass Options 3, 4, and 6.*

**[15] Input Filtering**

0 = None
1 = Input Reactor 3%
2 = Input Reactor 5%
3 = RFI Filter
4 = Input Reactor 3% + RFI Filter
5 = Input Reactor 5% + RFI Filter
6 = Matrix AP Filter

*Enclosure size considerations. Addition of one or multiple filtering options may change the size and or style of the enclosure. Matrix filter - consult factory.*

**[16] Output Filtering**

0 = None
1 = Output Reactor 3%
2 = DV/dt Filter
3 = Sine Filter
4 = Output Reactor 1.5%

**[17] Multiple Motors**

2 = Two Manual Motor Protectors (MMP)
3 = Three Manual Motor Protectors
4 = Four Manual Motor Protectors
5 = Five Manual Motor Protectors
6 = Six Manual Motor Protectors

*Cumulative amp ratings of motors must not exceed the drive rating. Each motor must have its own overload protection. Multiple Manual Motor Protectors are of equal size.*

**[18] Space Heaters\*\***

0 = None
2 = 200 W
4 = 400 W

*Larger heaters can be chosen for extremely cold ambient temperatures.*

*\*\*Available with NEMA 3R enclosure only*

**[21] - [23] Option Module**

0 = None
W = SI-I/O*
Y = AI-485-ADAPTOR**
Z = KI-485-ADAPTOR**
1 = SI-PROFIBUS
2 = SI-ETHERNET*
3 = SI-DEVICENET
4 = SI-CANOPEN
5 = SI-PROFINET-V2
6 = SI-ETHERCAT+

*Unidrive M200 has 1 option module slot only. HVAC Drive H300 has 3 option slots.*

*\*HMI bypass configurations come with SI-Ethernet and SI-I/O as standard. Only 1 option module slot is available.*

*+ HVAC Drive H300 is not compatible with SI-EtherCAT.*

*\*\*KI-485-ADAPTOR is only compatible with HVAC Drive H300 and AI-485-ADAPTOR is only compatible with Unidrive M200.*

**[24] Phase Loss Monitor**

0 = None
1 = Yes

**[26] Temperature Controller\*\*\***

0 = None
1 = Thermocouple
2 = RTD

**[27] Basin Heater\*\***

0 = None
1 = 1 kW
2 = 2 kW
3 = 3 kW
4 = 4 kW
5 = 5 kW
6 = 6 kW
7 = 7 kW
8 = 8 kW
9 = 9 kW
A = 10 kW
B = 11 kW
C = 12 kW
D = 13 kW
E = 14 kW
F = 15 kW
G = 16 kW
H = 17 kW
I = 18 kW
J = 19 kW
K = 20 kW

**[28] Spray Pump\*\*\***

0 = None
1 = 1 HP
2 = 2 HP
3 = 3 HP
5 = 5 HP
7 = 7 HP
A = 10 HP
B = 15 HP

**[29] De-icer / Sun Shield\*\*\***

0 = None
1 = De-icer
2 = Sun Shield
3 = De-icer & Sun Shield

**[30] Siemens FLN**

0 = None
1 = Yes

*\*\*\*Selection of options 26-29 require a cooling tower NEMA 3R enclosure.*

## 8 Enclosure Styles

- NEMA 1
- NEMA 12
- NEMA 3R
- NEMA 4X (consult factory)

These UL508A engineered solutions are fully tested and backed by complete engineering documentation and drawings as well as robust after-sale support programs.

The result is a single-source solution with single-source accountability.

Choosing the correct enclosure style can spell the difference between a successful installation and one in which improper product operation can lead to premature failure, often voiding the warranty. Enclosures are measured to standards established by several industry organizations including the National Electrical Manufacturers Association (NEMA) and Underwriters Laboratory (UL).

UL listed Type 1 enclosures for indoor applications help protect against personal contact with enclosed equipment and provide limited protection against falling dirt. For indoor and outdoor applications, Type 12 enclosures help protect against dust, dripping water and non-corrosive condensation.

NEMA is the trade association of choice for electrical manufacturing in the generation, transmission and distribution, control and end-use of electricity.



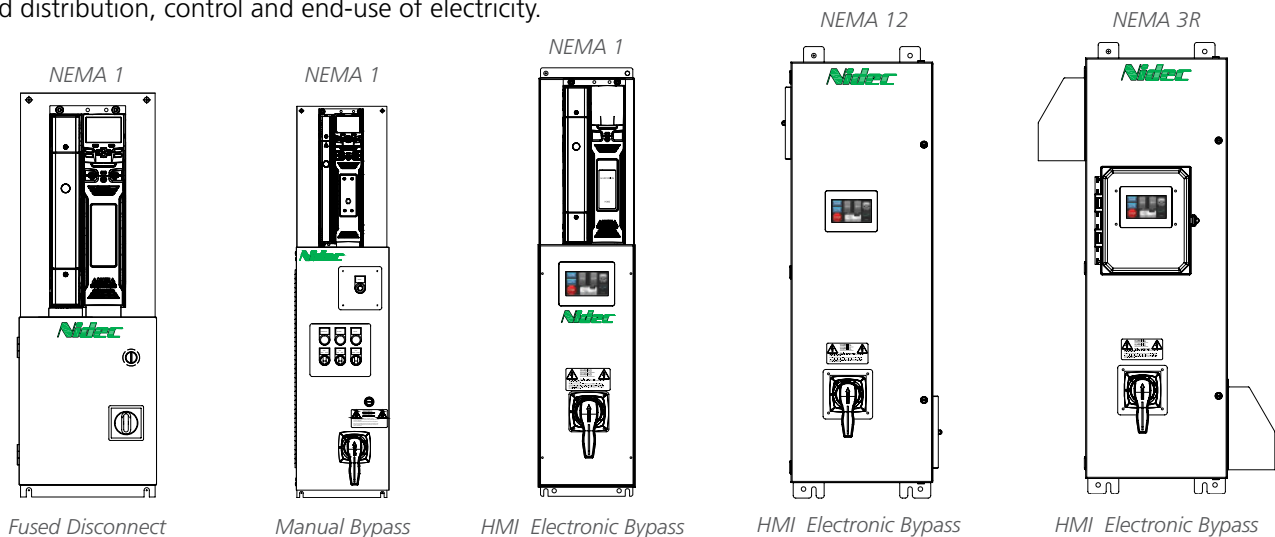
Although adherence to NEMA standards is voluntary, manufacturers use NEMA compliance to indicate their product performs well and is reliable and robust.

To provide you with the most cost effective and space efficient system design, Nidec Control Techniques offers pre-engineered NEMA 3R and NEMA 12 (PPBF) enclosures best suited for the lower end of the motor control power range and/or applications that require fewer options that take up panel space.

## 9 Input Power Connection

- Circuit Breaker
- Disconnect/Fuses
- 65 kAIC, 100 kAIC optional SCCR ratings

Disconnecting means for all power options includes disconnect switches and circuit breakers, with short circuit protection provided by fusing the output of the disconnect switch or with the circuit breaker. These are the defining components in determining the short circuit (SCCR) rating of each package. Circuit breakers rated for either 65 kAIC or 100 kAIC are available. The default rating for packages using a disconnect switch is 5 kAIC. The HVAC Drive H300 and Unidrive M200 are rated for 100 kAIC with the proper input fusing, the latter is always included in each package design (The drive SCCR rating does not imply the package SCCR rating).



# HVACR AC Motor Drives & Memory Devices

## 10 VFD/AC Drive Solutions

### HVAC Drive H300 VFD/AC Drives

1 to 4,200 HP

208–230 V, 460 V, 575 V and 690 V

This technologically advanced, energy-saving variable frequency drive (VFD) is the result of extensive research and builds on Nidec Control Techniques vast experience in the HVAC/R market. Easy to specify, commission, monitor, and control, the comprehensive HVAC Drive H300 product line offers installation flexibility, special drive functionality and a broad selection of accessories to meet the needs of:

#### Consultants and design engineers

All the necessary features to meet your building HVAC project specification requirements

#### Contractors

Fast, easy and secure installation, commissioning, and maintenance

#### Owners of commercial buildings

Achieves maximum building occupant comfort  
Optimum energy saving and value with rapid ROI

### Unidrive M200 VFD/AC Drives

1/3 to 200 HP

115 V, 208–230 V, 460 V, 575 V and 690 V

Unidrive M200 delivers excellent motor control in an easy-to-use platform. In addition to excellent open loop motor control performance the Unidrive M200 is loaded with features including onboard intelligence, I/O, Ethernet and fieldbus communication options. Unidrive M200 delivers more than what is expected from a general purpose variable speed AC drive.

#### Optional Memory Devices

The HVAC Drive H300 and Unidrive M200 drives have the option to store various parameter sets to help significantly reduce commissioning time. The Smartcard and SD Smartcard Adaptor (the latter uses a standard SD card, purchased separately) allow you to store and copy HVAC Drive H300 parameters.

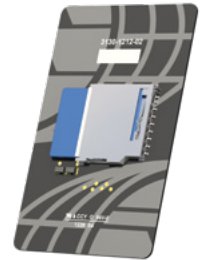
The Unidrive M200 requires an AI-Backup-Adaptor to use a standard SD card.



#### HVAC Drive H300



SMARTCARD



SD-CARD-ADAPTOR

#### Unidrive M200



AI-BACKUP-ADAPTOR



Standard SD card  
(purchased separately)



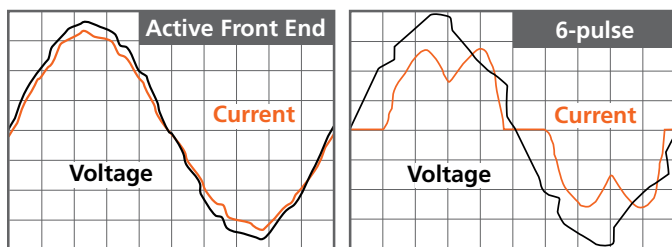
## HVAC Drive H300 AFE Active Front End advanced harmonic reduction technology

Designed to meet the HVACR industry's demand for clean power, Control Techniques offers the latest in both microprocessor and power semiconductor technology providing the industry with economical, compact and highly flexible Active Front End (AFE) drive packages.

The packages incorporate a dedicated HVAC Drive H300 with a Nidec Control Techniques AFE controller and EMC filtering to provide extremely low harmonic distortion.



75 HP HVAC Drive H300 AFE system



Typical current distortion 3%

Typical current distortion 35%

## Key Features

- Static and rotational auto tune
- 8 preset speeds; 8 sets of accel/decel rates
- Catch spinning motor and broken belt detector functions
- Built-in dual PID for advanced functionality
- Energy savings mode to enhance efficiency
- Power metering to track energy usage
- Flexible network connectivity
- Easy-to-use, plain text LCD keypad
- Fire Mode for occupant safety
- Option slots for other communication options and/or for I/O expansion
- Smartcard for parameter cloning
- Speed/frequency skipping to avoid mechanical resonance
- Filter change timer for easy maintenance reminders
- Complimentary energy savings, harmonics estimator, diagnostic and drive setup PC tools, and mobile Diagnostic Tool app

## Active Front End Benefits

- Low Harmonic Distortion
  - IEEE519-2014 harmonic compliance at the drive input terminals
  - Won't interfere with sensitive equipment
  - Not sensitive to line imbalances
  - Superior to 12- and 18-pulse solutions
  - Maintains Unity Power Factor
- Easy Installation
  - Available up to 4,200 HP at 460 V (Consult factory above 300 HP)
  - Single package – no need for external filters or transformers
  - UL508A approved
  - 100 kA SCCR rating options
- Flexible Solutions
  - Integrated network connectivity – BACnet, Metasys N2 and Modbus RTU
  - Wide range of I/O, machine control, and communications option modules
  - Two contactor HMI bypass and soft start options

## Alternative Harmonic Reduction Solutions

- Passive filters

Please consult factory should these alternative solutions better fit your harmonic reduction needs.

# HVACR Package Options

## 12 Bypass Option

The bypass options come with contactors that upon drive fault switch motor control from the VFD to line-to-line source power. Additionally, a solid state reduced voltage starter which limits the in-rush current during motor starts can be provided in place of line-to-line switching. An optional input disconnect switch is provided to isolate the drive from the power line. Motor protection is provided even if the VFD is taken out of service via overload relay. Utilizing a full-color LCD touchscreen HMI bypasses include such features as Setup Wizard, trip logs and diagnostics, dual PID feedback, Auto Bypass, Fireman's Override and Damper Control.

Optional soft starters are a simple and economical method of starting AC motors for fixed-speed applications. Traditional methods of starting motors such as across-the-line (ATL) or wye/delta, result in increased machine wear through rapid acceleration and very high peak currents. Soft starters solve this problem by controlling the acceleration and deceleration periods of operation.

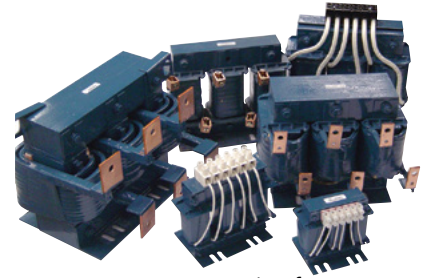
These ultra-compact HMI bypass packages have a smaller footprint than the previous generation Electronic bypass packages allowing you to pack in the most popular features and options while saving valuable space. Nidec Control Techniques' bypass packages are equipped with features most commonly listed in engineering/consultant specifications.



All controls on the HMI touchscreen are selectable for ease of changing operational states on-site. Automatic reset after loss of power ensures the panel will resume operation when power is restored.

## 15 Input Filtering

- 3% Line Reactor
- 5% Line Reactor
- Passive Filter



Input line reactors (sometimes called "line chokes") are common power accessories for electronic variable speed drives.

Line reactors add an extra margin of safety by reducing the risk of drive damage due to supply imbalances and severe disturbances and are strongly recommended for installation with AC drives that do not have built-in inductors.

Line reactors in AC drive applications:

- Help reduce harmonic distortion of the input line current
- Improve input line current balance
- Reduce nuisance drive over-voltage trips caused by transient voltage spikes and power line notches
- Protect input rectifiers from in-rush current caused by sudden power line surges and sags
- Extend the life of the DC bus capacitor bank by reducing the internal heating caused by ripple current

## 16 Output Filtering

- Reactor
- dV/dt
- Sine



Output filters change the drive's output to the motor thus creating less stress on the motor windings. This filter can be a simple reactor, a dV/dt filter or a sine filter.

## 17 Multiple Motors

- Overloads
- Motor Circuit Protector

Multiple motors can be driven from one VFD, but individual motor overload and in some cases short circuit protection is required to protect the motors and the wiring to these motors. This can include motor overloads or manual motor protectors.



## 21-23 Option Module

Click-in SI (System Integration) modules add design flexibility. System integration modules can be used to tailor Control Techniques drives to special communication and I/O requirements.

The SI-Ethernet module is the easiest way to provide secure access to the drives from anywhere in the building or around the world. This is particularly useful when the drives are in a difficult-to-reach part of the building or if building maintenance is outsourced.



## 26-29 Cooling Tower Controller

Designed specifically for cooling tower applications, particularly where building management systems do not exist, Nidec Control Techniques cooling tower control packages are also well suited for other outdoor HVACR applications such as rooftop air handling units, air cooled chillers, condenser fans, pumps, and compressors.

These packages offer the latest in microprocessor and IGBT VFD technology to reduce EMI/RFI emissions and provide a 50% reduction in dV/dt allowing for longer motor leads. IGBT also eliminates the need for costly output filters and reactors while providing reliable operation in wet or humid ambient conditions. Packages are available in a NEMA 3R enclosure with thermostatically controlled space heaters, ventilation fans and an optional sun shield. Complete control is available with optional water temperature controller, basin (sump) heater contactor, fluid cooler spray pump starter, de-icing control and damper control. Models include 208-230 V, 460 V, 575 V in power sizes to 200 HP in VFD with disconnect configurations.

With world-class quality design and manufacture, competitive pricing and uncompromising performance, these controllers are among the most versatile and reliable cooling tower control packages available on the market today.



Tested and proven in the harshest operating conditions by Nidec Control Techniques' electrical, mechanical, and software engineering groups, these powerful drives get machines up and running quickly and consistently in any environment. With dynamic performance, advanced features and plug-in options, Nidec Control Techniques cooling tower control packages deliver more than the average general purpose drive, providing lower cost solutions and better productivity in motor control applications.



**CONTROL TECHNIQUES**<sup>™</sup>

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