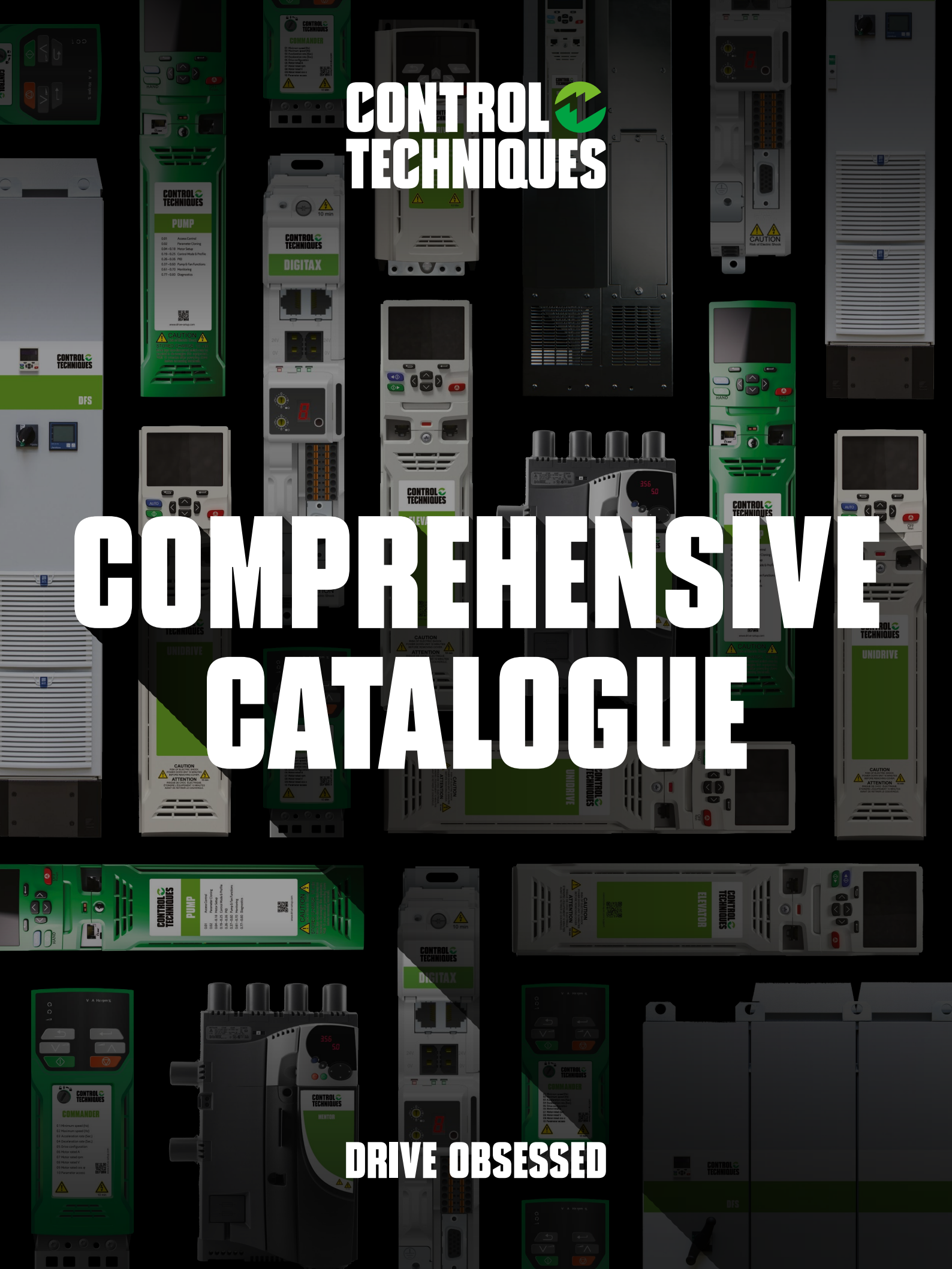
CONTROL TECHNIQUES

# COMPREHENSIVE CATALOGUE



DRIVE OBSESSED

# WELCOME

**Control Techniques, a Nidec company, is the global drives specialist with a long entrepreneurial history.**

We are a challenger and with the backing of our international parent company, Nidec, we have ensured we are a big name in the drives industry, We provide ourselves on the service we provide, not only from Newtown in Wales, but also from our network of drive centres around the world. We are drive obsessed and our ambition pushes us to the be the go-to for drives.

This catalogue will showcase the tools we create to help innovators to move the world. From our general purpose Commander range, up to our high performance Unidrive family; whatever your application we have the answer.

We've been doing this for decades and have a long history of firsts.

**So, whenever you think drives, think Control Techniques.**

**Anthony Pickering**
President, Control Techniques



WWW.CONTROLTECHNIQUES.COM


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## DRIVING THE WORLD WITH

# CLASS-LEADING MOTOR CONTROL PRODUCTS

**Control Techniques is 100% focused on delivering world-class variable speed drives and power conversion technologies that are used in industry, commerce and renewable energy schemes.**

Our motor control solutions help businesses to significantly reduce energy costs and improve their operating efficiency.






### General Purpose Drives

**Commander**

C300
C200
S100



### High Performance Drives

**Unidrive**

M700
M600
M400
Extreme Power



### Freestanding Drives

**DFS Series**

DFS Series



### Specialist Drives

Elevator Drive E300
Pump Drive F600
HVAC Drive H300



### Servo Drives & Motors

**Digitax**

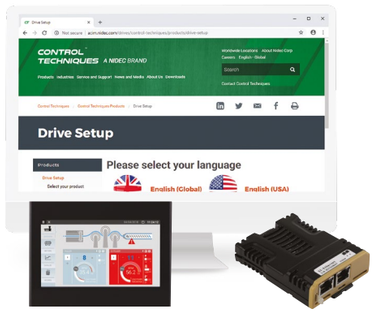
Digitax HD Series
Digitax SF
Unimotor hd



### DC Drives

**Mentor**

Mentor MP




### Industrial Control

PLC Controlled Motion
MCH040, MCH070, MCHMobile
Remote I/O and EtherCAT I/O
MCe Motion Controller, MCz Industrial PC
Integration Modules

# DRIVE OBSESSED

CONTROL TECHNIQUES

## Control Techniques has been designing and manufacturing the best variable speed drives in the world since 1973.

**Our customers reward our commitment to building drives that outperform the market. They trust us to deliver on time every time with our trademark outstanding service.**

More than 45 years later, we're still in pursuit of the best motor control, reliability and energy efficiency you can build into a drive. That's what we promise to deliver, today and always.

**1.6K+**
Employees

**5**
Global Manufacturing Sites

**23**
Drive Centres

**70**
Countries





## #1 FOR ADVANCED

# MOTOR AND DRIVE TECHNOLOGY

Nidec

## Nidec Corporation is a global manufacturer of electric motors and drives.

**Nidec was set up in 1973. The company made small precision AC motors and had four employees. Today, it's a global corporation that develops, builds and installs cutting-edge drives, motors and control systems in over 40 countries with a workforce of more than 114,000.**

You'll find its innovations in thousands of industrial plants, IoT products, home appliances, cars, robotics, mobile phones, haptic devices, medical apparatus and IT equipment all over the world.

**114K**
Employees

**$17.4B**
Group Turnover

**40+**
Countries

**300+**
Companies



# GREW. INNOVATED. ADVANCED.





## HOW WE DEVELOPED

# A LOT HAS CHANGED IN 50 YEARS...









# OUR PURPOSE

**Our purpose gives us a reason to exist beyond making a profit. It gets us up in the morning and draws others to work with us.**

**We are innovators. Our customers are innovators. We want to give them the tools to move the world.**

We are proud for our products and people to be the unsung heroes behind our customers who make machines that turn the world.

**EMPOWERING INNOVATORS TO MOVE THE WORLD, ONE REVOLUTION AT A TIME**





# OUR VISION

**Our vision turns our purpose into a measurable and visual goal we can work towards.**

**We are drive obsessed and our ambition pushes us to be the go-to for drives in our industry.**

It won't be easy, and all of us have a role to play in moving the world!

**WHEN ANYONE THINKS DRIVES, THEY THINK CONTROL TECHNIQUES**

# OUR PRIORITIES

**ENGAGE AND DEVELOP THE BEST PEOPLE.**

**BE COMMERCIALLY AND OPERATIONALLY EXCELLENT.**

**CONTINUALLY IMPROVE OUR PROCESSES. EVERYWHERE. ALL THE TIME.**

## We have our priorities right.

**While day-to-day tasks may change, the overall principles that guide us remain the same.**

The best people, continuously seeking excellence commercially and operationally, relentlessly improving the ways in which we achieve success.

**It's the Control Techniques way.**



WWW.CONTROLTECHNIQUES.COM

# OUR PROMISE

**This is our promise to our customers, it is the benefit we bring to them.**

**DRIVES FOR EVERY PURPOSE. DRIVEN BY YOU, SUPPORTED BY EXPERTS**

WWW.CONTROLTECHNIQUES.COM

# A HISTORY OF DRIVE INNOVATION

**1973** — **Founded**

**1985** — Became **Control Techniques**

**1986** — **Mentor I** (1st Digital DC Drive)

**1989** — **Vector** (1st Flux Vector Drive)

**1992** — **Mentor II**

**1995** — Joined **EMERSON**

**1996** — **Unidrive** (1st Universal AC/Servo Drive)

**2000** — **Commander SE**

**2003** — **Unidrive SP**

**2005** — **Commander SK**

**2007** — **Digitax ST**

**2008** — **Mentor MP**

**2012** — **Unidrive M**

**2017** — Joined **NIDEC**

**2018** — **Digitax HD**

**2019** — **Commander C**

**2020** — **Pump Drive F600**

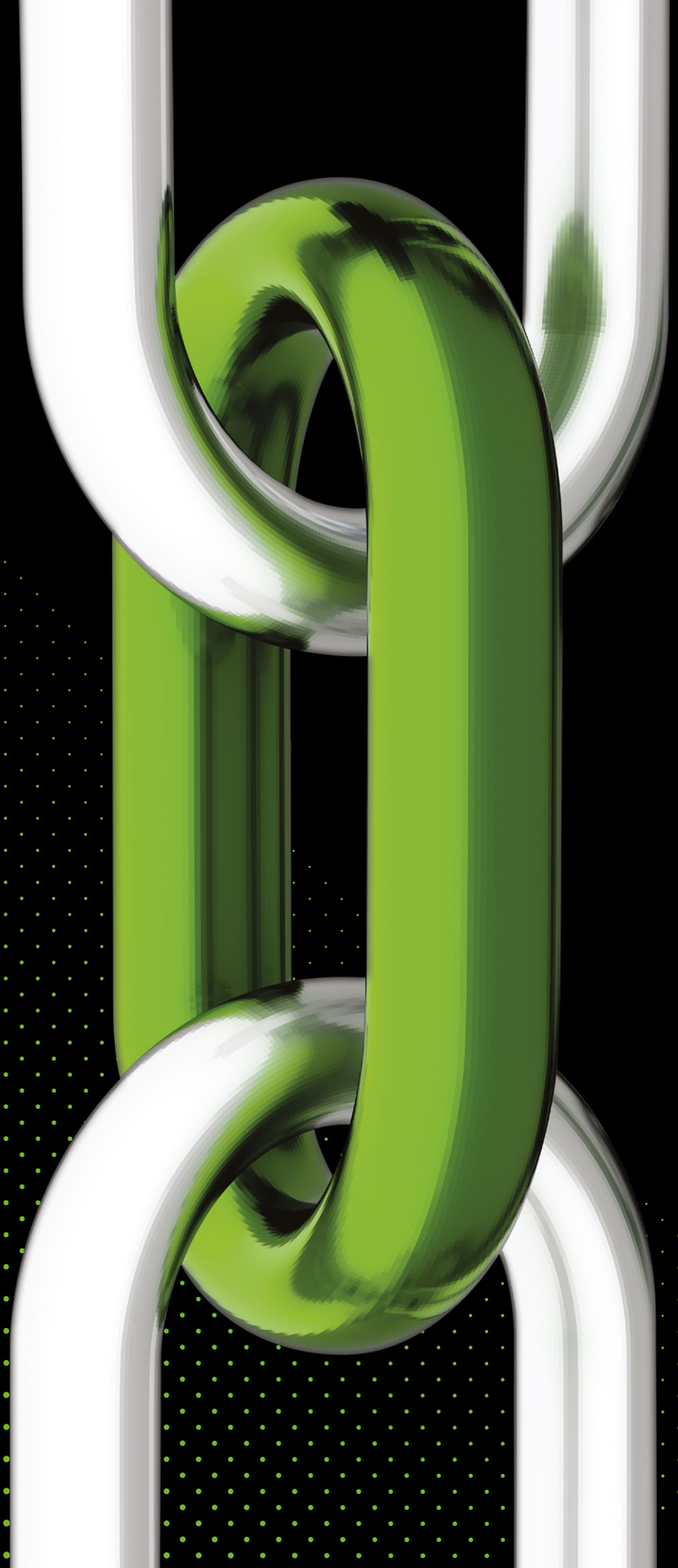
**2021** — **HVAC Drive H300**

**2022** — **Commander S & Marshal**

# INSPIRED MACHINES. TRUSTED PARTNERS.

**Control Techniques has been at the front of customer-focused drive technology for over 45 years. We're dedicated to the advancement of automation and providing an A-one reputation for customer service and support.**

Developing partnerships with our customer base is what we are all about. From OEM's to end-users we have drive obsessives just waiting to connect, to see your projects through from conception to completion, providing solutions that you won't find anywhere else. With our wealth of knowledge and expertise we are best placed to create a journey that is hassle free, quick and above all a partnership where we put you first.



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## AND THAT'S NOT ALL

# PLUS ALL OF THIS

**In addition to the Control Techniques product range you will also have access to our Nidec Synergy portfolio**

CTD

Over several decades, CTD has developed generations of high performance motor ranges to meet the design, the performance, the functionality and the cost specifications of a wide range of applications and industries.

**www.controltechniquesdynamics.com**

Bevel gears create powerful systems using housings, shafts, flanges and bearings. Your complex design is in good hands with Nidec Graessner - we've been working on intelligent concepts for over 65 years.

**www.graessner.de**

KB

KB Electronics manufacturers off the shelf and custom OEM AC Drives Inverters, DC Drives, Fan Speed Controls - motor drives from fractional to 30 HP.

**www.nidec.com/kbelectronics**

Nidec KATO ENGINEERING

Kato Engineering provides reliable, durable products for your specific power generation needs, along with expertise, product support, genuine parts, remanufacturing options, and training you can depend on.

**www.kato-engineering.com**

LEROY SOMER™

Leroy Somer design, develop and manufacture scalable, customised product & service solutions for OEMs supported by a global presence with operations and engineering & development teams in Europe, China, India & Americas.

**www.leroy-somer.com**

Nidec DRIVE SYSTEMS

Nidec Drive Systems (NDS) is a global manufacturing enterprise that provides custom engineered control, motor and drive system solutions for world class customers in electric vehicle, commercial floor care, material handling, aerial work platforms, water pumping, and renewable energy.

**www.nidec.com**

Nidec MOTION CONTROL

The Nidec Motion Control product line features a full line of high efficiency motors, large and small, which serve industrial, residential, and commercial markets.

**www.nidec.com**

RoboteQ

Welcome to the world's most innovative, complete and integrated Motion Contol, Navigation Sensors and Power Management solutions for mobile robots.

**www.roboteq.com**

Sankyo All for dreams

NIDEC SANKYO's portfolio includes micro motors, stepping motors, as well as card readers, industrial robots and a broad array of other equipment.

**www.nidec.com**

SHIMPO All for dreams

Providing high precision motion control speed reducers, Automatic Guided Vehicles (AGV's), power transmission equipment, press machines and measuring instruments.

**www.nidec.com**

WWW.CONTROLTECHNIQUES.COM

# THE WINNING MENTALITY OF
# ONE NIDEC

Nidec
All for dreams

| Type of Product | LOW VOLTAGE AC: General Purpose | LOW VOLTAGE AC: High Performance | LOW VOLTAGE AC: Freestanding | LOW VOLTAGE AC: Specialist | ULTRA LOW VOLTAGE AC: Servo | DC: DC Drives |
|---|---|---|---|---|---|---|
| Standard Software<br>CONTROL TECHNIQUES | | | | Applications Software | | |
| PLC / Controller<br>CONTROL TECHNIQUES | | PLC Controlled Motion | | IPC (MCs, MCe and MCz) | PLC Controlled Motion | |
| Accessories / Connection<br>CONTROL TECHNIQUES | | | | HMI, Remote I/O | | |
| Drives<br>CONTROL TECHNIQUES, Nidec DRIVE SYSTEMS, KB, Sankyo –All for dreams, RoboteQ | KB, Commander | Unidrive | DFS | Elevator E300, Pump Drive F600, HVAC Drive F600, ID300 | Digitax HD, Digitax SF, Roboteq, AGV & Robotic Solutions | Mentor MP |
| Motors<br>CTD, LEROY SOMER, Nidec MOTION CONTROL | Dyneo+, IMfinity | | | Dyneo+, E27 | Unimotor, Unimotor hd | CPLS |
| Gears<br>SHIMPO –All for dreams, GIRARD TRANSMISSIONS | | Dynabox | | | PowerGear, Geared Servo Motor | |

# OEMS



WWW.CONTROLTECHNIQUES.COM

## SMARTER RELATIONSHIPS

# STAY THE COURSE

**Control Techniques understand the tough challenges faced by Original Equipment Manufacturers (OEMs) and we will make it our priority and mission to take on those challenges and turn them into opportunities for you to excel and stand out from the crowd.**

**As an organisation we offer:**

- A deep focus on and knowledge of the key sectors in both process and discrete manufacturing industries
- An excellent global infrastructure which provides:
  i. Global manufacturing and R&D footprint
  ii. Local technical and sales support through our global Drive Centres, Distributors and Country Partners networks
- Highly flexible and comprehensive product ranges, with options and opportunities for customisation
- Technical & engineering expertise worldwide
- Well-formed, resourced and proven new product development processes

With dedicated OEM account managers, supported by our entire organisation, we can help you develop product and service solutions that add value to your business. This includes enhancing profitability, stream-lining your processes & supporting you to meet and exceed your commercial goals.

# DISTRIBUTORS



WWW.CONTROLTECHNIQUES.COM

## YOUR SUCCESS IS
# OUR SUCCESS

**We are committed to providing everything you need to succeed in your market including:**

- World Class-Leading Products
- Commercial support to gain market share
- Technical support and customer service tailored to your local needs
- Sales Tools & Training
- Investments in marketing, promotion & campaigns
- Our aim is to create prosperous and long-term partnerships with a focus on:
  i. Consistency & transparency
  ii. Working relationship based on trust & respect

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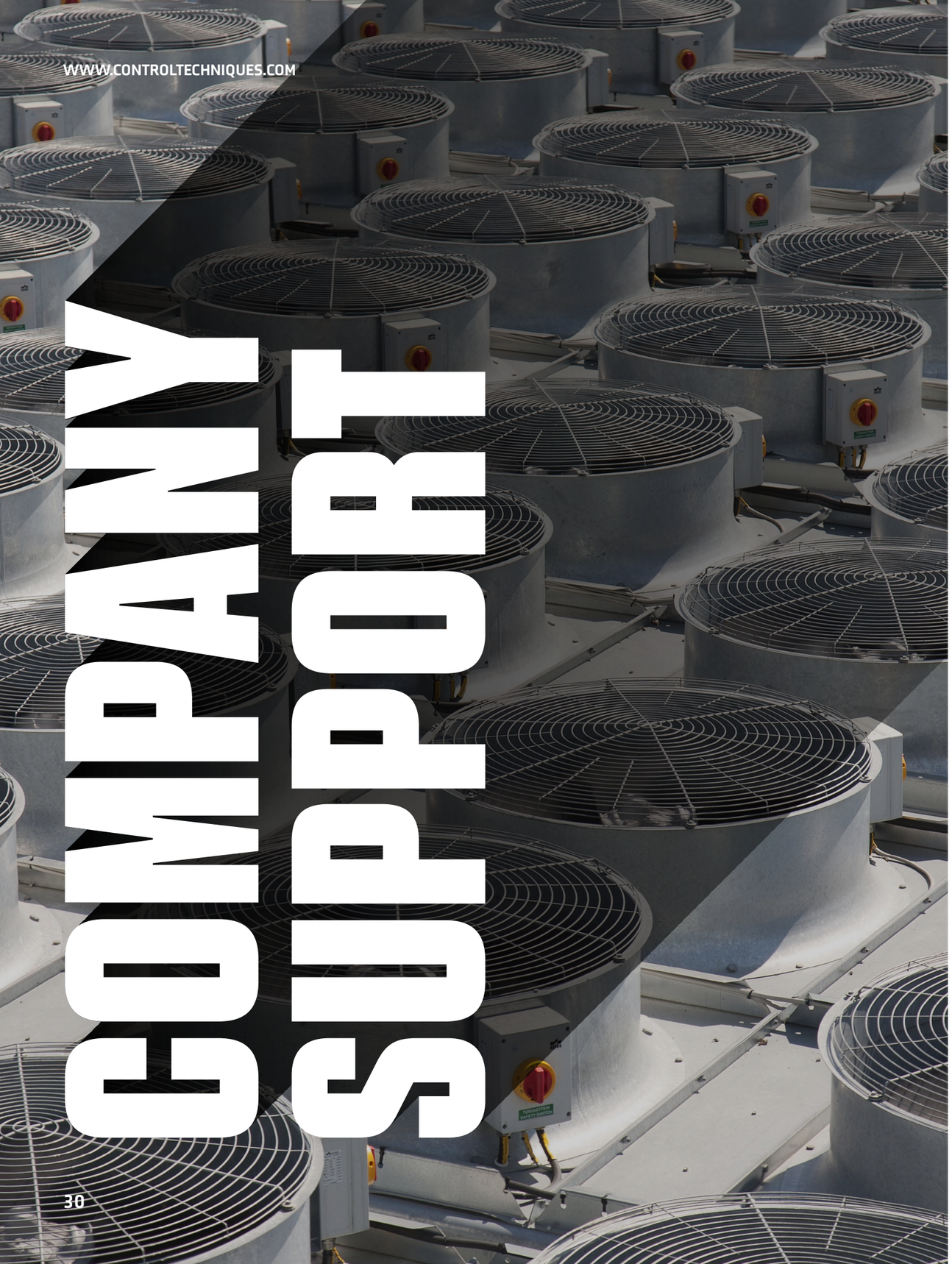
# END USERS

## LOCAL STOCK,
# GLOBAL SUPPORT

**Combine our global network of Drive Centres with an extensive collection of trusted distributors, systems integrators and partners, and you get the full Control Techniques experience.**

**Drives available quickly, when you need them most, with support to ensure you're up and running in no time.**

- Extensive local stocks via our global Drive Centres means product can be with you quicker than you think
- Expert local support and services available from drive obsessives in your region
- Flexible products which fit into any existing system thanks to our unique Open Architecture philosophy
- Comprehensive free warranty programme on selected products



# COMPANY SUPPORT





## HERE'S WHAT

# MAKES US DIFFERENT

### World-Class Performance

The outstanding performance of our drives is the fruit of over 45 years of engineering experience in drive design.

### Embedded Intelligence

Precision motor control is combined with the highest embedded intelligence, ensuring maximum productivity and efficiency of your machinery.

### Technology you can rely on

Robust design and the highest build quality ensure the enduring reliability of millions of our drives installed around the world.

### Open Design Architecture

Based on open design architecture, our drives integrate with all primary communication protocols.

### Reliability Process Control

Robust design and the highest build quality ensure the enduring reliability of millions of our drives installed around the world.

### Social Responsibility

Robust design and the highest build quality ensure the enduring reliability of millions of our drives installed around the world.

### Local Support, Global Reach

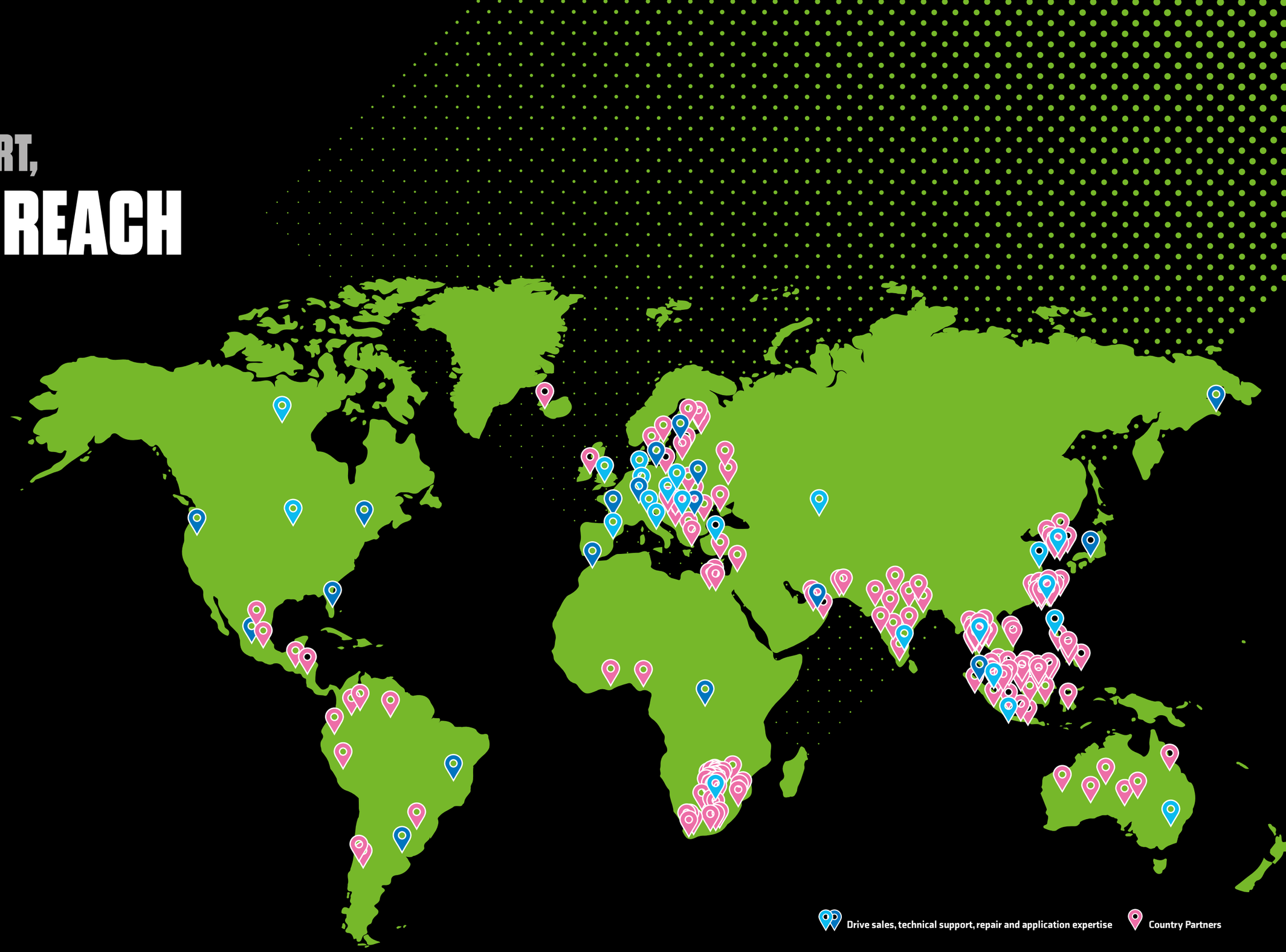
Highly experienced, locally based application engineers design and support drive technology to provide maximum value, wherever you are in the world.

### Website

You can find a variety of content on our website from product information and videos to latest news and downloads.

**www.controltechniques.com**
**www.driveobsessed.com**

# LOCAL SUPPORT,
# GLOBAL REACH



Discover all of our
worldwide locations here

Drive sales, technical support, repair and application expertise

Country Partners

# WORLD-CLASS PERFORMANCE

**The bread and butter of Control Techniques is honing our unique motor control algorithms, taking pride in our craft as any good craftsman would.**

This ensures that our drives offer the highest control stability and bandwidth for every industrial motor type. Our high performance drives enable maximum machine throughput in every application and with every motor, from standard AC induction motors to dynamic linear motors and from energy saving hybrid permanent-magnet motors to high performance servo motors.

# TECHNOLOGY YOU CAN RELY ON

**We design our drives to run at their optimum, even in the harshest of conditions from simple PLC logic of our general-purpose drives, to three axis decentralized control operating four times faster than a standalone PLC machine controller.**

Reliability through process control ensures consistency and peace of mind with drives tested up to 50 times during build stage.

### Ingress

- Conformal coating
- Patented air flow system
- Ingress protection

### Electrical

- Wide supply voltage tolerance, protects against:
  a. Load shedding
  b. Brownouts

### Temperature

- Adaptive thermal management
- Intelligent multi-speed fan





# EMBEDDED INTELLIGENCE

**Many of our drives incorporate an easy to use, on-board PLC which can execute programs for logic and sequencing with real-time tasks.**

Our flagship Unidrive M700 series integrates a 1.5 axes Advanced Motion Controller, allowing motion functions to be synchronously carried out on the drive at 250 µs cycle time, minimising system latencies and maximising performance. By implementing motion control on the drive, the system design can be liberated from being tied to specific PLC vendors, at the same time reducing the computational load on the external PLC or even replacing it altogether.

# OPEN DESIGN ARCHITECTURE

**Our drives communicate with all common protocols.**

- Total freedom to design your system without limitations
- A simple way to integrate with virtually any machine
- An opportunity to offer customisation without additional development costs
- No systems tie-ins

***"I would recommend these drives to other plants. They are good, tight drives with a flexible interface that makes communication with other equipment easy."***

PROFINET® Modbus ETHERNET POWERLINK Standardization Group EtherCAT® EtherNet/IP™ CANopen® DeviceNet™

# RELIABILITY PROCESS CONTROL

**Our modern R&D and manufacturing processes ensure consistency to give you peace of mind.**

## Test

- We test to destruction, running sample drives on a live rig –24hrs a day, 365 days a year
- Simulation tools diagnose hidden faults

## Manufacture

- All our staff receive IPC-A-610 training (world standard for ensuring consistency)
- Drives are tested up to 50 times throughout the build stages

# SOCIAL RESPONSIBILITY

**As a global operation, Control Techniques takes CSR seriously. We conform to the following management systems:**

**ISO 9001:2015**
Certificate No. Q05176

**ISO 14001:2015**
Certificate No. EMS54446

**RoHS**
WEEE

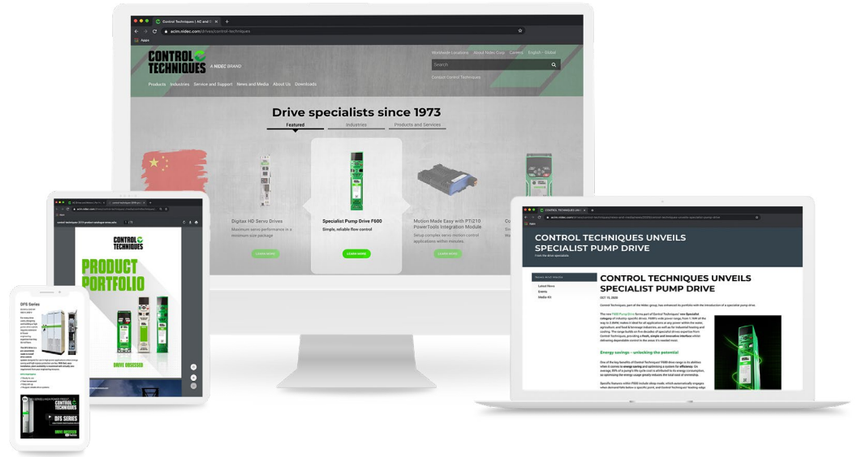




# WEBSITE

**You can find all of the following information and support on our website: www.controltechniques.com**

- Full Product Information
- Service & Support
- Videos
- News
- Downloads:
  - Case studies
  - Engineering guided
  - User guides
  - Brochures
  - Mobile Applications
  - Software Registration




Connect with us

# TOP SOLUTIONS





MANUFACTURING

## RAPID TURN AROUND SAVES THE DAY FOR CEILING TILE MANUFACTURER

**Country:** United Kingdom, Germany, Spain

**Product used:** Unidrive

### Key benefits

- Rapid delivery and excellent support
- Excellent control for motor speed
- Cost effective solution
- Improve machine performance



### Customer profile

Zentia, formerly known as Armstrong, delivers complete ceiling solutions with unsurpassed levels of value, quality, and reliability. The leading manufacturer of suspended ceiling tiles and grids boasts two production facilities in the North East of England and three distribution centres located in the UK, Germany, and Spain. With a rich heritage that spans over 150 years, the company is proud to be one of the building materials industry's greatest successes. Its products are specified in every environment, from schools and workplaces to hotels and hospitals.

### Solution

Zentia turned to their local Control Techniques' sales engineer for a solution. Kevin explains, "Our Control Techniques' sales engineer had visited previously to discuss past projects. So, when we were stuck for parts, he was the first to come to mind."

In less than four days from order, backed up by onsite support, the Control Techniques Unidrive M700 was installed, providing a super speedy solution. The M700 drive controls the speed of the agitator, maximising throughput with superior motor control. The motion functions are carried out 'on the drive' to boost system performance.

> **"Zentia replaced a soft start with a variable frequency drive giving them improved control of the motor speed and the ability to program the VFD to match the agitating process requirements. The added benefits include improved machine performance from a higher quality product with endless capabilities for customisation."**
>
> **Apostolos Papadopoulos**
> Control Techniques' Area Sales Manager UK

FANS & PUMPS

# SMART CONTROL SAVES ENERGY

**Country:** Singapore

**Product used:** Unidrive

## Customer profile

**Established for over 20 years, Singapore based company Navitech delivers innovative mechanical & electrical designs and installations that are cost-effective.**

Navitech prides itself on offering best-of-class solutions by utilising up to date technology for enterprise customers. Its clients include high-profile national organisations such as the Nanyang Technology University (NTU), Public Utilities Board (PUB), Housing & Development Board (HDB) and the Centre of Building Research.

## Solution

Navitech purchased eight Control Techniques' M200 Unidrives via Kimms Electrical to do the job.

Exploiting M200's communication flexibility, Navitech integrated the drives into the fountain control system via Ethernet IP. The variable speed drives control the compressors to regulate the jet sprays' height, using the Modbus protocol creating an attractive display.



M200's onboard PLC boosts the intelligent control. Engineers can now program the fountain display from a remote app, saving both time and resources.

Furthermore, Unidrive M200 has an easy-to-use fixed LED keypad and a useful, hard-to-miss parameter guide on the front of the drive, aiding set-up, relieving some of the pain points installers typically face.

## Key benefits

- 20-30% energy savings
- Smart Control
- Compact size relieves installtion pain points
- Excellent technical support

***"Our end customer received an excellent quality product that offers more functionality than they had previously. Our experience with Control Techniques has been superior; the team provided strong technical support and is always quick to respond to queries.""***



WWW.CONTROLTECHNIQUES.COM

TEST RIGS

# INCREASED CAPACITY AT MOTOR TEST FACILITY

**Country:** United Kingdom

**Product used:** DFS Drive

## Customer profile

Established in 1946, Rewinds & J. Windsor is one of the largest independently owned electric motor and rotating equipment repairers in the UK. Operating across three sites, the company offers a range of electrical, mechanical, and electronic engineering services across the UK and Ireland. The company's motor testing facility in Liverpool, tests, builds, and repairs a wide range of motors from wind turbines to big brand car motors.

## Solution

A 500 kW Control Techniques' DFS drive, was just the solution. The pre-assembled, ready to install drive cubicle system, is designed for use in high power applications where energy saving and high ingress protection are essential.

## Key benefits

- Increased capacity
- Extends the company's service offer
- Increased flexibility
- Easy to use




"The Control Techniques' DFS drive cubicle is doing everything we want. The upgrade to the new system has increased our flexibility as a firm. Moving from our old 250 kW drive to 500 kW means we can now test much bigger motors, up to 1 MW in-house, reducing our service costs. We can now take on more work and test and repair other companies motors."

**Paul Challoner**
Electrical Department Manager, Rewinds & J. Windsor

""The DFS drive provided Rewinds & J. Windsor with a fast and easy to install solution; the product was in stock and shipped within days from order."

**Apostolos Papadopoulos**
Area Sales Manager UK North West

PACKAGING

## CONVERTING FROM DC TO AC DRIVES

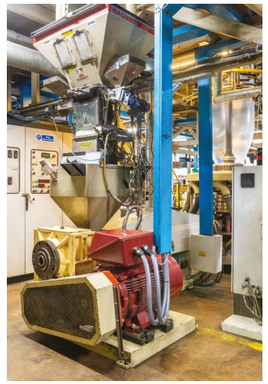
# BLOWS PACKAGING FIRM MAINTAINENCE ISSUES AWAY

**Country:** United Kingdom, Romania

**Product used:** Unidrive







### Customer profile

Established in 1946, Rewinds & J. Windsor is one of the largest independently owned electric motor and rotating equipment repairers in the UK. Operating across three sites, the company offers a range of electrical, mechanical, and electronic engineering services.

It repairs and maintains motors used in the manufacturing, power generation, renewables, and facilities management sectors.

### Solution

BPI Packaging Solutions and Rewinds & J. Windsor chose M700 for the job. Two extruders were all converted to Unidrive, Dyneo and Tec solutions.

### Key benefits

- Increased reliability
- Reduced maintenance costs
- 30% energy savings

"By swapping to AC, the customer benefits from 30% energy saving, lower maintenance cost and improved machine performance. We installed one TEC motor, and the comparison between that and the Dyneo solution highlighted the better performance of the Dyneo, in a smaller size and with minimum maintenance requirements."

**Apostolos Papadopoulos**
Area Sales Manager UK North West
for Control Techniques





STEEL

## UNIDRIVE HOISTS STAINLESS STEEL

# MANUFACTURER TO SUCCESS

**Country:** South Africa

**Product used:** Unidrive

### Customer profile

Founded in 1966, Columbus Stainless is Africa's only producer of stainless steel flat products. A member of the Spanish Acerinox S.A Group of Companies, its products can be found in everything from a kitchen sink to a quality wristwatch.

The Middelburg, Mpumalanga plant produces for various end customers, distributors, engineering shops, and mines globally.

### Key benefits

- Minimises downtime
- Increased productivity
- Compact size saves space and cost
- Local availability and accessibility of spares
- Full turnkey solution



### Solution

The solution for this application included two Unidrive M700 units connected in parallel, each driving a 250 kW 8-pole IMfinity premium efficiency induction motor.

Derek explains, "Our solution needed to fit into the same space as the existing system. Our compact technology put us ahead of the competition. We were able to engineer a system which met the demands of the facility without disrupting existing structures."

"The M700 AC drive is a high-performance motor control system which provides ultimate control flexibility in high specification industrial applications. We are confident that this solution will see Columbus Stainless remain industry leaders."

**Bruce Grobler**
Regional Manager, Control Techniques

PLASTICS & RUBBER

# 9 MILLION TYRES GET NEW LEASE OF LIFE



**Country:** South Africa

**Product used:** Unidrive

## Customer profile

**Based in Alrode, Johannesburg, Bandag SA is part of the global Bandag Group. This leading retread company specialises in giving new life to truck tyres, enabling them to perform like new but at a fraction of the cost.**

Truck fleets are its primary focus; new treads are applied to existing tyres to deliver more mileage over any terrain, using next-generation compounds that resist wear & tear. Worldwide, almost 9 million truck and bus tyres are fitted with Bandag retreads annually, establishing this company as a true industry leader.

Through a network of independent tyre franchises in South Africa, Bandag SA has been providing a much-needed service to the African logistics industry since the 1960s.

## Solution

**Having previously installed Control Techniques AC drives on the plant's extruder and Calendar Mill (a process that forms the exudates & processes cushion gum), Multispeed Transmissions concluded that the mixer operation would also benefit from a similar installation.**

The Unidrive M700 AC was selected. A high-performance motor control system that provides ultimate control flexibility in high specification industrial applications. Two Unidrive M700's are now connected to a common gearbox, which evenly shares the load throughout the operation.

## Key benefits

- 10% energy savings per month
- 5% increase in uptime
- 6% increase in productivity
- Future-ready solution





MANUFACTURING

CONTROL TECHNIQUES AT THE HEART OF

# HIGH RATED SLITTER MACHINES

**Country:** Canada

**Product used:** Unidrive, Commander



## Customer profile

Deacro, based in Ontario, Canada, is the industry leader in the manufacture of slitter rewinders, slitting machines, salvage rewinders and roll handling equipment for the converting industry. Its machines are widely used across several industries ranging from food to medical packaging.

## Solution

Control Techniques started to supply Deacro with Unidrive and Digitax. More recently it has switched to the latest Commander C300 and Unidrive M700 series.
By changing to the new drives, the Deacro machines no longer require a PLC. Machine control is provided via multiple MCi210 modules installed in the drives. The MCi210's power the Unidrives, Modbus TCP/IP Remote I/O's, and pneumatic valves on the machine.

## Key benefits

- Programming flexibility
- Ongoing support
- No requirement for PLC

**"The Control Techniques drives are the heart of Deacro's control system. They offer us exceptional flexibility, particularly with the winder block design and optional modules to add our specific features. We build the highest quality slitter rewinders in the industry. And, with the increasing needs of our customers for the latest technology and faster web speeds - up to 3000 fpm – we require the most innovative control technology that is only offered by Control Techniques. They help create the most technically advanced equipment for our customers."**

**Clarence Beishuizen**

Deacro president, Ontario, Canada

# PRODUCTS





## WE ARE
# DRIVE OBSESSED



# GENERAL PURPOSE DRIVES

## COMMANDER C
## COMMANDER S





## COMMANDER C

# FLEXIBILITY FOR COUNTLESS APPLICATIONS

**0.25kW - 132kW (0.33 hp to 200hp) 100V | 200V | 400V | 575V | 690V**
**Linear Linear V to F, Square V to F, Dynamic V to F, Set Point V to F, Stator Resistance Compensation, RFC-A (enhanced open-loop performance)**

**Commander C combines efficiency and reliability to offer optimum performance for a wide range of applications. With 9 frame sizes, it covers powers from 0.25 to 132 kW / 0.33 to 200 hp. Many features are built in, including PLC capabilities for simple programming needs, dual STO (C300 variants) safety function, braking transistor and PID control.**

### Applications:

- **Pumping, Ventilating & Compressing**
- **Conveying**
- **Lifting, Hoisting & Winching**
- **Access Control**
- **Processing**
  (Mixers, Crushers, Agitators, Centrifuges, Extruders)




5 YEAR FREE WARRANTY

### Free 5 year warranty

The Commander C series has a highly robust design to cope with harsh environments. It has proven exceptionally reliable and we feel so assured about this that we have given it a free 5 year warranty.

Now you can buy with the same confidence.

**Warranty terms and conditions apply.**

# SPECIFICATION

| Power & Control | |
|---|---|
| Supply Requirements | 100 V drive: 100 V to 120 V ±10 %<br>200 V drive: 200 V to 240 V ±10 %<br>400 V drive: 380 V to 480 V ±10 %<br>575 V drive: 500 V to 575 V ±10 %<br>690 V drive: 500 V to 690 V ±10 %<br>Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases) |
| Input Displacement Power Factor | 0.97 |
| Phase | 1 and 3 (model dependent) |
| Power Range | 0.25 to 132 kW / 0.33 to 200 hp |
| Input Frequency Range | 45 to 66 Hz |
| Output Frequency/Speed Range | 0 to 550 Hz |
| Switching Frequency | Size 1 - 4: 0.667, 1, 2, 3, 4, 6, 8 12 & 16 kHz<br>Size 5 - 9: 2, 3, 4, 6, 8 12 & 16 kHz<br>(Factory default = 3kHz) |
| Heavy Duty Overload Capability | 150 % for 60 s (open loop mode), 180 % for 3 s (RFC-A mode) |
| Operating Modes | Linear V to F<br>Square V to F<br>Dynamic V to F<br>Set Point V to F<br>Stator Resistance Compensation<br>RFC-A (enhanced open-loop performance) |
| Stopping Modes | Coast, Ramp, Ramp & DC Injection Braking, DC Injection Braking with 0 Hz detect, Timed DC Injection Braking<br>Built-in braking transistor, external resistor required |
| **Communication & Interfaces** | |
| Communications | Modbus RTU, EtherCAT, PROFIBUS, Ethernet, DeviceNET, CANopen, PROFINET, POWERLINK<br>(all available with AI/SI-options) |
| Keypads | Fixed LED keypad<br>Remote IP66 Keypad (available as an accessory)<br>Remote IP66 RTC Keypad (available as an accessory)<br>HMI (available as an accessory) |
| User Software Tools<br>(Free To Download) | Connect (PC commissioning & cloning tool)<br>Machine Control Studio for on-board PLC programming |
| **Inputs & Outputs** | |
| Analogue | 2 x Analogue input<br>Possible settings: 0-10 V, 0-20 mA, 4-20 mA (No Alarm), 4-20 mA (Alarm), 4-20 mA (Error)<br><br>1 x Analogue output<br>Possible settings: 0-10 V |
| Digital | 3 x Digital inputs (1 frequency input)<br>1 x Digital input / output programmable<br>1 x Digital input / output programmable (can be used as a frequency or PWM output to represent analogue value) |
| Digital Input Logic | Positive |
| Relay | 1 x Relay (single pole, double throw relay) |
| Accuracy | Frequency 0.02%, Analogue input 1: 11 bit plus sign, Analogue input 2: 11 bit. Current typical 2%. |
| Extra I/O with SI-I/O Option Module<br>(Available as an Accessory) | 3 x Analogue inputs (default) / Digital inputs programmable<br>4 x Digital input / output programmable<br>1 x Digital input<br>2 x Relays |
| **Mounting & Environment** | |
| IP Rating | IP20<br>Conduit Box UL Type 1 ingress protection (available as an accessory) |
| Storage Temperature | -40 °C to 60 °C (-4 °F to 140 °F) |
| Operating Temperature Without De-Rate | -20 °C to 40 °C (-4 °F to 104 °F) |
| Operating Temperature with De-Rate | -20 °C to 60 °C (-4 °F to 140 °F) Frames 1 to 4<br>-20 °C to 55 °C (-4 °F to 131 °F) Frames 5 to 9 |



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| Mounting & Environment continued | |
|---|---|
| Cooling | Integral cooling fan |
| Altitude | ≤3000 m (≤1000 m no de-rate; 1000 m to 3000 m derate 1 % every 100 m) |
| Humidity | 95 % non-condensing at 40 °C / 104 °F - EN61800-2(3k3) |
| Pollution | Pollution degree 2 - dry, non-conducting pollution only |
| Vibration | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3 |
| Mechanical Shock | Tested in accordance with IEC 60068-2-27 and IEC 60068-2-29 |
| Mounting Methods | Frame 1 to 4 – Surface mount via mounting holes or DIN Rail mount<br>Frame 5 to 9 – Surface mount via mounting brackets or through-panel mount via through-panel mounting kit |
| Mounting Clearance | 0 mm either side, 100 mm above and below |
| Overvoltage Category | Category III (IEC/EN/KN/UL 61800-5-1) |
| Corrosive Environments | EN 60721-3-3 ISO9223 Class C3 |
| Maximum Motor Cable Length | 75 m Frame 1<br>100 m Frames 2 to 4<br>200 m Frames 5 to 6<br>250 m Frames 7 to 9 |
| **Standards** | |
| Approvals | CE (European Union), cUL Listed (USA and Canada), DNV (marine applications), KC (Korea), RCM (Australia/ New Zealand), EAC (Russian Customs Union), UKCA (United Kingdom), C-Tick (Australia) |
| Product Safety Standards | IEC/EN/KN/UL 61800-5-1, CSA C22.2 No.274, GB12668.501-2013 |
| TÜV | C300 models only: The Safe Torque Off (STO) function may be used as a safety component of a machine.<br>Type examination certificates by TÜV Rheinland:<br>Frame sizes 1 - 4: No. 01/205/5383.03/18<br>Frame sizes 5 - 9: No. 01/205/5387.02/18<br>Functional safety parameters:<br>EN ISO 13849-1 - Cat 4, PLe<br>EN61800-5-2/EN62061/IEC 61508 - SIL 3<br>UL functional safety approval: FSPC E171230 |
| Product EMC Standards | IEC/ EN 61800-3 Immunity and Emissions<br>EN 61000-6-2: Immunity for industrial environments<br>EN 61000-6-4: Emissions for industrial environments<br>EN 61000-3-2: Harmonic current emissions<br>An EMC data sheet is available on request |
| RoHS | Complies with the Restriction of Hazardous Substances Directive (2011/65/EU) |
| Immunity Compliance | Second environment (Industrial) |
| ISO | Manufacturing facilities comply with ISO 9001:2015 and ISO 14001 |
| **Warranty** | |
| Warranty | 5 Years (warranty terms and conditions apply) |
| **Accessories** | |
| Remote Interfaces | Remote keypad IP66, Remote keypad RTC, HMI |
| Filters & Cables | External EMC filters, CT communications cable |
| Communication & Feedback, SI-Options | AI-485 24 V Adaptor, SI-EtherCAT, SI-PROFIBUS, SI-Ethernet , SI-DeviceNET, SI-CANopen, SI-PROFINET , SI-POWERLINK, SI-Encoder |

| | |
|---|---|
| **Back-up & Cloning** | AI-Back-up Adaptor<br>AI-Smart Adaptor |
| **Conduit Box** | For UL Type 1 ingress protection |
| **Protection** | |
| **Conformal Coating** | 100 % Coverage |
| **DC Bus Undervoltage Error Level** | 100 V models: 175 Vdc<br>200 V models: 175 Vdc<br>400 V models: 330 Vdc<br>575 V models: 435 Vdc<br>690 V models: 435 Vdc |
| **DC Bus Overvoltage Error Level** | Frame sizes 1 - 4:<br><br>100 V models: 510 Vdc<br>200 V models: 510 Vdc<br>400V models: 870 Vdc<br><br>Frame size 5 - 9:<br><br>200V models: 415 Vdc<br>400 V models: 830 Vdc<br>575 V models: 990 Vdc<br>690 V models: 1190 Vdc |
| **Drive Overload Error** | Programmable: Default settings: 180% for 3s,150% for 60s |
| **Instantaneous Overcurrent Error/Limit** | 220% of rated motor current |
| **Phase Loss Error** | DC Bus Ripple Threshold Exceeded |
| **Overtemperature Error** | Control Board Over Temperature, Inverter Model Temperature, Inverter Thermistor Temperature, Drive heatsink temperature exceeds 95°C (203°F) |
| **Short Circuit Error** | Protection against output phase-to-phase fault |
| **Ground Fault Error** | Protection against output phase-to-ground fault |
| **Motor Thermal Protection** | Electronically protects the motor from over-heating due to loading conditions |
| **Keep Running** | Parameter set to avoid errors and machine downtime (needs to be configured) |
| **Dedicated Thermistor Input** | Avoid downtime or machine damage due to overheated motor |
| **General** | |
| **Items supplied with the drive** | Step-By-Step Guide, Safety Information, Grounding bracket (Frames 1 to 4), Surface mounting brackets (frame 5 to 9) |



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# FUNCTIONALITY

| | |
|---|---|
| **Modbus RTU Communications (available with AI-485 Adaptor)** | |
| **Control Word Control** | ✓ |
| **Cloning** | ✓ |
| **Serial Baud Rate** | 600 to 115000 bps |
| **Modbus RTU Protocol** | 8.2NP, 8.1NP, 8.1EP, 8.1OP |
| **On Board PLC** | |
| **User Memory Space** | 30 KB |
| **User Software Tools (Free to Download)** | Machine Control Studio<br>• CODESYS based<br>• Included programming languages: ladder diagram, structure text, function block diagram, instruction list, sequential function chart, continuous function chart<br>• Function block libraries<br>• On-line monitoring of program variables with user defined watch windows<br>• Support for on-line change of program |
| **Pre-set Programs (Available on Request)** | Unbalanced Load Detection (Laundry Application) |
| **Reference** | |
| **Selectable References** | 4 (Selectable: Analogue Ref. 1, Analogue Ref. 2,<br>Pre-set Frequency Ref., Keypad Ref.) |
| **Jog Reference** | ✓ |
| **Up / Down % Reference (Motorised Pot)** | ✓ |
| **Bi-Polar Reference** | ✓ |
| **Pre-set Speeds** | 8 |
| **Pre-set Timer** | ✓ |
| **Skip Frequencies** | 3 |
| **Skip Frequencies Dead Band** | ✓ |
| **Local/Remote** | ✓ |
| **S-Ramp** | ✓ |
| **Acceleration Rates** | 8 |
| **Deceleration Rates** | 8 |
| **Frequency Input Reference (Pulse Train)** | 0 Hz to 100 kHz |
| **Run Reverse** | ✓ |
| **Torque Reference** | ✓ |
| **Application Specific** | |
| **PID Controller** | PI Control |
| **PID Feedforward** | ✓ |
| **PID Threshold Detector** | ✓ |
| **PID Slew Rate** | ✓ |

| | |
|---|---|
| Reference Configuration | ✓ |
| Run/Stop Configuration | ✓ |
| Input Scaling | ✓ |
| Run Permit (Latching Run) | ✓ |
| Limit Switches | ✓ |
| Additional Application Parameters | 64 |
| **Control** | |
| Control Mode: Linear V to F | ✓ (Definable Boost) |
| Control Mode: Square V to F | ✓ (Definable Boost) |
| Control Mode: Low Energy Mode (Dynamic V to F) | ✓ |
| Control Mode: Set Point V to F | ✓ |
| Control Mode: Stator Resistance Compensation | ✓ |
| Control Mode: RFC-A (Enhanced Open-Loop Performance) | ✓ |
| Motor Stability Optimiser | ✓ |
| Slip Compensation | ✓ |
| Auto-tune: Static | ✓ |
| Auto-tune: Rotating | ✓ |
| Switching Frequency | Size 1 - 4: 0.667, 1, 2, 3, 4, 6, 8 12 & 16 kHz<br>Size 5 - 9: 2, 3, 4, 6, 8 12 & 16 kHz<br>(Factory default = 3kHz) |
| Catch an Already Spinning Motor | ✓ |
| Speed Feedback via SI-Encoder Option | ✓ |
| Second Motor Set-up | ✓ |
| Motor Pre-Heat Control | ✓ |
| Stop Mode: Ramp | ✓ |
| Stop Mode: Coast | ✓ |
| Stop Mode: Ramp & DC Injection | ✓ |
| Stop Mode: DC Injection Braking with 0 Hz detect | ✓ |
| Stop Mode: Timed DC Injection Braking | ✓ |
| Built-in Braking Transistor (External Resistor Required) | ✓ |
| Brake Settings (DC bus) | ✓ |
| Programmable Braking in RFC-A Mode | ✓ |
| Mechanical Brake Controller | ✓ |
| Supply Loss Detection | ✓ |
| Low DC Link Operation | ✓ |





| | |
|---|---|
| Analogue Input Control | ✓ |
| Analogue Output Control | ✓ |
| Digital Input Control | ✓ |
| Digital Output Control | ✓ |
| Relay Control | ✓ |
| Logic Function Control | ✓ |
| Timer Function Control | ✓ |
| Limit Switch Control | ✓ |
| Variable Selector | ✓ |
| Temperature Monitoring | ✓ |
| Keypad Button Assignment | ✓ |
| Programmable Output Current Limit | ✓ |
| **General** | |
| Diagnostics | ✓ |
| Error History Log | 10 |
| Auto-Reset After Error | ✓ |
| Error Time Stamping | ✓ |
| Power Loss Ride Through | ✓ |
| Run Time Log | ✓ |
| Cloning | Via: Modbus RTU, SD Card, Connect |
| Energy Meter | ✓ |
| Security | 4-digit PIN protectionw |

# DIMENSIONS

## Commander C200/C300 Dimensions

| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Dia. | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| 1 | 160 | 75 | 130 | 6.30 | 2.95 | 5.1 | 143 | 53 | 5.7 | 2.08 | 5.0 | 0.20 | 0.75 | 1.65 |
| 2 | 205 | 75 | 150 | 8.07 | 2.95 | 5.9 | 194 | 55 | 7.63 | 2.17 | 5.0 | 0.20 | 1.3 | 3.0 |
| 3 | 226 | 90 | 160 | 8.90 | 3.54 | 6.3 | 215 | 70.7 | 8.46 | 2.80 | 5.0 | 0.20 | 1.5 | 3.3 |
| 4 | 277 | 115 | 175 | 10.90 | 4.50 | 6.9 | 265 | 86 | 10.43 | 3.40 | 6.0 | 0.23 | 3.13 | 6.9 |
| 5 | 391 | 143 | 200 | 15.39 | 5.63 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| 6 | 291 | 210 | 227 | 15.39 | 8.27 | 8.94 | 378 | 196 | 14.88 | 7.72 | 7.0 | 0.28 | 14.0 | 30.9 |
| 7 | 557 | 270 | 280 | 21.93 | 10.63 | 11.02 | 538 | 220 | 21.18 | 8.66 | 9.0 | 0.35 | 28.0 | 61.7 |
| 8 | 804 | 310 | 290 | 31.65 | 12.21 | 11.42 | 884 | 259 | 30.87 | 10.20 | 9.0 | 0.35 | 52.0 | 114.6 |
| 9A | 1069 | 310 | 290 | 42.09 | 12.21 | 11.42 | 1051 | 259 | 41.38 | 10.20 | 9.0 | 0.35 | 46.0 | 101.4 |
| 9E | 1108 | 310 | 290 | 43.62 | 12.21 | 11.42 | 1090 | 259 | 42.91 | 10.20 | 9.0 | 0.35 | 66.5 | 146.6 |




### Documentation & Downloads

Product documentation and PC tools available for download from:

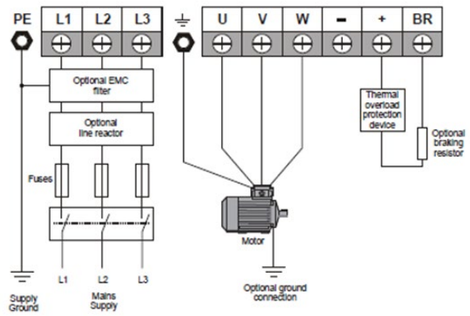
www.controltechniques.com/support



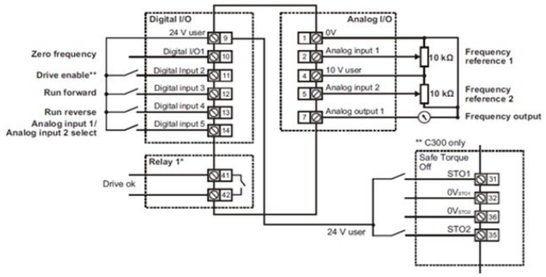


# CONNECTIONS

### Typical Power Connetions




### Default Control Connections




# PRODUCT CODES

**C200- 03 4 00073 A - 101 00 AB100**

**Model:**
C200 – The lead product for Commander C range
C300 – As C200 + dual STO

**Frame Size**
1 to 9

**Voltage Rating:**
1: 100 V drive (100 V to 120 V ±10 %)
2: 200 V drive (200 V to 240 V ±10 %)
4: 400 V drive (380 V to 480 V ±10 %)
5: 575 V drive (500 V to 575 V ±10 %)
6: 690 V drive (500 V to 690 V ±10 %)

**Current Rating:**
Heavy Duty current rating x 10

**Drive Format:**
A – AC in AC out
*E – AC in AC out, External line reactor

**CT Reserved**

**Regional Default Setting:**
00 – 50 Hz
01 – 60 Hz

**Product Variant:**
AB100- Standard

# MODEL NUMBER AND RATINGS

## Variants with C3 built-in EMC filter

| Product Code | Input Phases | Frame Size | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|---|
| | | | Max Continuous Current (A) | Motor Shaft Power (kW) | Motor Shaft Power (hp) | Max Continuous Current (A) | Motor Shaft Power (kW) | Motor Shaft Power (hp) |
| **100/120 Vac +/-10%** | | | | | | | | |
| C200-01100017A10100AB100 | 1 | 01 | 1.7 | 0.25 | 0.33 | | | |
| C200-01100024A10100AB100 | 1 | 01 | 2.4 | 0.37 | 0.5 | | | |
| C200-02100042A10100AB100 | 1 | 02 | 4.2 | 0.75 | 1 | | | |
| C200-02100056A10100AB100 | 1 | 02 | 5.6 | 1.1 | 1.5 | | | |
| **200/240 Vac +/-10%** | | | | | | | | |
| C200-01200017A10100AB100 | 1 | 01 | 1.7 | 0.25 | 0.33 | | | |
| C200-01200024A10100AB100 | 1 | 01 | 2.4 | 0.37 | 0.5 | | | |
| C200-01200033A10100AB100 | 1 | 01 | 3.3 | 0.55 | 0.75 | | | |
| C200-01200042A10100AB100 | 1 | 01 | 4.2 | 0.75 | 1 | | | |
| C200-02200024A10100AB100 | 1 \| 3 | 02 | 2.4 | 0.37 | 0.5 | | | |
| C200-02200033A10100AB100 | 1 \| 3 | 02 | 3.3 | 0.55 | 0.75 | | | |
| C200-02200042A10100AB100 | 1 \| 3 | 02 | 4.2 | 0.75 | 1 | | | |
| C200-02200056A10100AB100 | 1 \| 3 | 02 | 5.6 | 1.1 | 1.5 | | | |
| C200-02200075A10100AB100 | 1 \| 3 | 02 | 7.5 | 1.5 | 2 | | | |
| C200-03200100A10100AB100 | 1 \| 3 | 03 | 10 | 2.2 | 3 | | | |
| C200-04200133A10100AB100 | 1 \| 3 | 04 | 13.3 | 3 | 3 | | | |
| C200-04200176A10100AB100 | 3 | 04 | 17.6 | 4 | 5 | | | |
| C200-05200250A10100AB100 | 3 | 05 | 25 | 5.5 | 7.5 | 30 | 7.5 | 10 |
| C200-06200330A10100AB100 | 3 | 06 | 33 | 7.5 | 10 | 50 | 11 | 15 |
| C200-06200440A10100AB100 | 3 | 06 | 44 | 11 | 15 | 58 | 15 | 20 |
| C200-07200610A10100AB100 | 3 | 07 | 61 | 15 | 20 | 75 | 18.5 | 25 |
| C200-07200750A10100AB100 | 3 | 07 | 75 | 18.5 | 25 | 94 | 22 | 30 |
| C200-07200830A10100AB100 | 3 | 07 | 83 | 22 | 30 | 117 | 30 | 40 |
| C200-08201160A10100AB100 | 3 | 08 | 116 | 30 | 40 | 149 | 37 | 50 |
| C200-08201320A10100AB100 | 3 | 08 | 132 | 37 | 50 | 180 | 45 | 60 |
| C200-09201760A10100AB100 | 3 | 09 | 176 | 45 | 60 | 216 | 55 | 75 |
| C200-09202190A10100AB100 | 3 | 09 | 219 | 55 | 75 | 266 | 75 | 100 |
| C200-09201760E10100AB100 | 3 | 09 | 176 | 45 | 60 | 216 | 55 | 75 |
| C200-09202190E10100AB100 | 3 | 09 | 219 | 55 | 75 | 266 | 75 | 100 |
| **380/480 Vac +/-10%** | | | | | | | | |
| C200-02400013A10100AB100 | 3 | 02 | 1.3 | 0.37 | 0.5 | | | |
| C200-02400018A10100AB100 | 3 | 02 | 1.8 | 0.55 | 0.75 | | | |
| C200-02400023A10100AB100 | 3 | 02 | 2.3 | 0.75 | 1 | | | |
| C200-02400032A10100AB100 | 3 | 02 | 3.2 | 1.1 | 1.5 | | | |
| C200-02400041A10100AB100 | 3 | 02 | 4.1 | 1.5 | 2 | | | |
| C200-03400056A10100AB100 | 3 | 03 | 5.6 | 2.2 | 3 | | | |
| C200-03400073A10100AB100 | 3 | 03 | 7.3 | 3 | 3 | | | |
| C200-03400094A10100AB100 | 3 | 03 | 9.4 | 4 | 5 | | | |

For Normal Duty applications, use Heavy Duty ratings.

For Normal Duty applications, use Heavy Duty ratings.

For Normal Duty applications, use Heavy Duty ratings.





| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C200-04400135A10100AB100 | 3 | 04 | 13.5 | 5.5 | 7.5 | | | |
| C200-04400170A10100AB100 | 3 | 04 | 17 | 7.5 | 10 | | | |
| C200-05400270A10100AB100 | 3 | 05 | 27 | 11 | 20 | 30 | 15 | 20 |
| C200-05400300A10100AB100 | 3 | 05 | 30 | 15 | 20 | 30 | 15 | 20 |
| C200-06400350A10100AB100 | 3 | 06 | 35 | 15 | 25 | 38 | 18.5 | 25 |
| C200-06400420A10100AB100 | 3 | 06 | 42 | 18.5 | 30 | 48 | 22 | 30 |
| C200-06400470A10100AB100 | 3 | 06 | 47 | 22 | 30 | 63 | 30 | 40 |
| C200-07400660A10100AB100 | 3 | 07 | 66 | 30 | 50 | 79 | 37 | 50 |
| C200-07400770A10100AB100 | 3 | 07 | 77 | 37 | 60 | 94 | 45 | 60 |
| C200-07401000A10100AB100 | 3 | 07 | 100 | 45 | 75 | 112 | 55 | 75 |
| C200-08401340A10100AB100 | 3 | 08 | 134 | 55 | 100 | 155 | 75 | 100 |
| C200-08401570A10100AB100 | 3 | 09 | 157 | 75 | 125 | 184 | 90 | 125 |
| C200-09402000A10100AB100 | 3 | 09 | 200 | 90 | 150 | 221 | 110 | 150 |
| C200-09402240A10100AB100 | 3 | 09 | 224 | 110 | 150 | 266 | 132 | 200 |
| C200-09402000E10100AB100 | 3 | 09 | 200 | 90 | 150 | 221 | 110 | 150 |
| C200-09402240E10100AB100 | 3 | 09 | 224 | 110 | 150 | 266 | 132 | 200 |
| **500/575 Vac +/-10%** | | | | | | | | |
| C200-05500030A10100AB100 | 3 | 05 | 3 | 1.5 | 2 | 3.9 | 2.2 | 3 |
| C200-05500040A10100AB100 | 3 | 05 | 4 | 2.2 | 3 | 6.1 | 4 | 5 |
| C200-05500069A10100AB100 | 3 | 05 | 6.9 | 4 | 5 | 10 | 5.5 | 7.5 |
| C200-06500100A10100AB100 | 3 | 06 | 10 | 5.5 | 7.5 | 12 | 7.5 | 10 |
| C200-06500150A10100AB100 | 3 | 06 | 15 | 7.5 | 10 | 17 | 11 | 15 |
| C200-06500190A10100AB100 | 3 | 06 | 19 | 11 | 15 | 22 | 15 | 20 |
| C200-06500230A10100AB100 | 3 | 06 | 23 | 15 | 20 | 27 | 18.5 | 25 |
| C200-06500290A10100AB100 | 3 | 06 | 29 | 18.5 | 25 | 34 | 22 | 30 |
| C200-06500350A10100AB100 | 3 | 06 | 35 | 22 | 30 | 43 | 30 | 40 |
| C200-07500440A10100AB100 | 3 | 07 | 44 | 30 | 40 | 53 | 37 | 50 |
| C200-07500550A10100AB100 | 3 | 07 | 55 | 37 | 50 | 73 | 45 | 60 |
| C200-08500630A10100AB100 | 3 | 08 | 63 | 45 | 60 | 86 | 55 | 75 |
| C200-08500860A10100AB100 | 3 | 08 | 86 | 55 | 75 | 108 | 75 | 100 |
| C200-09501040A10100AB100 | 3 | 09 | 104 | 75 | 100 | 125 | 90 | 125 |
| C200-09501310A10100AB100 | 3 | 09 | 131 | 90 | 125 | 150 | 110 | 150 |
| C200-09501040E10100AB100 | 3 | 09 | 104 | 75 | 100 | 125 | 90 | 125 |
| C200-09501310E10100AB100 | 3 | 09 | 131 | 90 | 125 | 150 | 110 | 150 |
| **500/690 Vac +/-10%** | | | | | | | | |
| C200-07600190A10100AB100 | 3 | 07 | 19 | 15 | 20 | 23 | 18.5 | 25 |
| C200-07600240A10100AB100 | 3 | 07 | 24 | 18.5 | 25 | 30 | 22 | 30 |
| C200-07600290A10100AB100 | 3 | 07 | 29 | 22 | 30 | 36 | 30 | 40 |
| C200-07600380A10100AB100 | 3 | 07 | 38 | 30 | 40 | 46 | 37 | 50 |
| C200-07600440A10100AB100 | 3 | 07 | 44 | 37 | 50 | 52 | 45 | 60 |
| C200-07600540A10100AB100 | 3 | 07 | 54 | 45 | 60 | 73 | 55 | 75 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C200-08600630A10100AB100 | 3 | 08 | 63 | 55 | 75 | 86 | 75 | 100 |
| C200-08600860A10100AB100 | 3 | 08 | 86 | 75 | 100 | 108 | 90 | 125 |
| C200-09601040A10100AB100 | 3 | 09 | 104 | 90 | 125 | 125 | 110 | 150 |
| C200-09601310A10100AB100 | 3 | 09 | 131 | 110 | 150 | 150 | 132 | 175 |
| C200-09601040E10100AB100 | 3 | 09 | 104 | 90 | 125 | 125 | 110 | 150 |
| C200-09601310E10100AB100 | 3 | 09 | 132 | 110 | 150 | 150 | 132 | 175 |

Note: The listed ordering codes are for C200, 50 Hz default setting.

For C300 change the model digits **(C200-xxxxxxxxxxxxxxxxxxx)** from C200 to C300.

For 60 Hz change the Regional Default Setting digits **(xxxx-xxxxxxxxxxxx00xxxxx)** from 00 to 01.

## COMMANDER S AND MARSHAL

# MAKING SIMPLE APPLICATIONS, SIMPLE

**0.18 to 4 kW (0.25 to 5 hp)**
**1Φ 100 & 200 V, 3Φ 200 & 400 V**
**Linear V to F, Square V to F,**
**Resistance Compensation**




### Easy to install

The sleek curved design of Commander S optimises component layout for a small footprint and easy access to terminals. The click-on/click-off DIN rail mount makes installation remarkably easy.

### Easy to use

Using our new Marshal app (Android/iOS) your drive can be configured in under 60 seconds.

### Reliable

Durability is at the core of Commander S design, guaranteeing performance throughout its whole lifetime.

### Cost effective

Equipped with unique features designed to save you time, energy and money.

**Free 5 year warranty***

Our Commander S series is built and verified to be robust. In fact, it is so reliable we are confident enough to supply it with a free five-year warranty.

**Warranty terms and conditions apply.**

**Fan, Pump, Compressor Applications**

**Moving Applications**
conveyors,treadmills, automatic doors & barriers

**Processing Applications**
mixers, crushers, agitators, centrifuges, kneaders, spinning & braiding machines for textile





# SPECIFICATION

| | |
|---|---|
| **Power & Control** | |
| Supply Requirements | 100 V drive: 100 V to 120 V ±10 %<br>200 V drive: 200 V to 240 V ±10 %<br>400 V drive: 380 V to 480 V ±10 %<br>Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases) |
| Power Range | 0.18 to 4 kW / 0.25 to 5 hp |
| Supply Frequency Range | 45 to 66 Hz |
| Output Frequency/Speed Range | 0 to 300 Hz |
| Switching Frequency | 4 kHz or 12 kHz |
| Heavy Duty Overload Capability | 150 % for 60 s (from cold), 150 % for 8 s (from hot) |
| Operating Modes | Linear V to F, Square V to F, Resistance Compensation |
| Stopping Modes | Coast, Ramp, Ramp & DC Injection Braking, DC Injection Braking with 0 Hz detect, Timed DC Injection Braking, Distance Stop |
| **Communication & Interfaces** | |
| Communications | RJ45 for Modbus RTU,<br>NFC for app interface |
| Keypads | Fixed LED keypad,<br>Remote IP66 Keypad (available as an accessory)<br>HMI (available as an accessory) |
| User Software Tools (Free To Download) | Marshal (Mobile App),<br>Connect (PC commissioning tool) |
| **Inputs & Outputs** | |
| Analogue | 2 x Analogue input<br>Possible settings: 0-10 V, 0-20 mA, 4-20 mA (No Alarm), 4-20 mA (Alarm), 4-20 mA (Error), Digital<br><br>1 x Analogue output<br>Possible settings: 0-10 V, 0-20 mA, 4-20 mA |
| Digital | 4 x Digital inputs (1 frequency input)<br>1 x Digital input / output (can be used as a frequency or PWM output to represent analog value) |
| Digital Input Logic | Positive or Negative input logic (PNP or NPN sensors) |
| Relay | 1 x Relay (single pole, double throw relay) |
| Resolutions | Output frequency resolution: 0.1 Hz<br>Analogue input 1: 11 bit<br>Analogue input 2: 11 bit<br>Current: The resolution of the current feedback is 10 bit plus sign |
| **Mounting & Environment** | |
| IP Rating | IP20 |
| Storage Temperature | -40 °C to 60 °C (-40 °F to 140 °F) |
| Operating Temperature Without De-Rate | -10 °C to 40 °C (14 °F to 104 °F) |
| Operating Temperature With De-Rate | -10 °C to 60 °C (14 °F to 140 °F) |
| Cooling | Natural convection (frame 1 ≤0.25 kW / 0.33 hp), Integral cooling fan (all other drives) |
| Altitude | ≤3000 m (1000 m to 3000 m derate 1 % over 100 m) |
| Humidity | 95 % non-condensing at 40 °C / 104 °F - EN61800-2(3k3) |
| Pollution | Pollution degree 2 - dry, non-conducting pollution only |

| Mounting & Environment continued | |
|---|---|
| Vibration | Tested to IEC 60068-2-6 |
| Mounting Methods | Surface mount, click on/click off DIN rail mount |
| Mounting Clearance | 0 mm either side, 45 mm above and below (100 mm above and below for frame 1 drives ≤0.25 kW / 0.33 hp) |
| Overvoltage Category | Category III (IEC/EN/KN/UL 61800-5-1) |
| Corrosive Environments | EN 60721-3-3 ISO9223 Class C3 |
| Maximum Motor Cable Length | 50 m (All variants) |
| **Standards** | |
| Approvals | CE, UKCA, cUL, C-Tick, EAC, KC |
| Product Safety Standards | IEC/EN/KN/UL 61800-5-1, CSA C22.2 No.274, GB12668.501-2013, |
| Product Emc Standards | IEC/EN/KN 61800-3 Adjustable speed electrical power drive systems, Part 3: EMC requirements and specific test methods<br><br>GB12668.3-2012 |
| Immunity Compliance | Second environment (Industrial) |
| Emission Compliance | Category C3 (internal filters only)<br>Category C1 & C2 (external EMC filters)<br>Category C1, (internal filters only, for selected 1Φ 200 V variants) |
| Generic Immunity Compliance | EN61000-6-1: Generic immunity standard for residential, commercial and light industrial environments<br>EN 61000-6-2: Generic immunity standard for industrial environments |
| Generic Emission Compliance | EN 61000-6-4: Generic emission standard for industrial environments |
| Emission Compliance for Motor Cable Length up to 50 m | C2 with an external filter |
| Emission Compliance for Motor Cable Length up to 20 m | C1 with an external filter<br>C3 without a filter |
| Emission Compliance for Motor Cable Length up to 5 m | C1 only for drive variants with internal C1 filter (S100-xxxx1) |
| **Warranty** | |
| Warranty | 5 Years (warranty terms and conditions apply) |
| **Accessories** | |
| Remote Interfaces | Remote keypad IP66, HMI |
| Filters & Cables | EMC filter, Cable management bracket, CT comms cable |
| Environmental Protection | Fibre filter |
| **Protection** | |
| Conformal Coating | 100 % Coverage nano-coating |
| DC Bus Undervoltage Error Level | 100 V Drives= 175 V<br>200 V Drives = 175 V<br>400 V Drives = 330 V |
| DC Bus Overvoltage Error Level | 100 V Drives = 400 V<br>200 V Drives = 400 V<br>400 V Drives = 800 V |
| Instantaneous Overcurrent Error/Limit | 150 % Motor Rated Current (Programmable) |
| Phase Loss Error | DC Bus Ripple Threshold Exceeded |
| Overtemperature Error | Control Board Over Temperature, Inverter Model Temperature, Inverter Thermistor Temperature |
| Short Circuit Error | Protection against output phase-to-phase fault. |
| Motor Thermal Protection | Electronically protects the motor from over-heating due to loading conditions |
| Fire Mode | Run at a set frequency ignoring selected errors |
| Keep Running | Parameter defaults set to avoid errors and machine downtime. |



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# FUNCTIONALITY

| Marshal | |
|---|---|
| Offline Programming | Program the drive while it is still in the box |
| Cloning | Clone parameter sets from one drive to another |
| Faststart | Guided commissioning and motor rotation verification test |
| Guided Diagnostics | Easy fault finding |
| Parameter File Storage | Save parameter files to the device or cloud for future use |
| Share Project Configuration | Share to colleagues or to Control Techniques Technical Support for diagnostics |
| Pdf Parameter Set | Useful for sharing parameter sets for quick review |
| Wiring Diagram | Automatically generate a printable pdf of a custom wiring diagram for your installation |
| Non-Default Parameter | Show the parameters that have been changed from their default setting |
| Favourite Parameters | Favourite parameters visited often |
| Guides And Manuals | Quick access to drive documentation |
| **Modbus RTU Communications** | **Logic function control** |
| Control Word Control | ✓ |
| Cloning | ✓ |
| Serial Baud Rate | 600 to 115200 bps |
| Modbus Rtu Protocol | 8.2NP, 8.1NP, 8.1EP, 8.1OP |

| Reference | |
|---|---|
| Selectable References | 4 |
| Jog Reference | ✓ |
| Up / Down % Reference (Motorised Pot) | ✓ |
| Bi-Polar Reference | ✓ |
| Preset Speeds | 4 |
| Skip Frequencies | 1 |
| Skip Frequencies Dead Band | ✓ |
| Local/Remote | ✓ |
| S-Ramp | ✓ |
| Acceleration Rates | 2 |
| Deceleration Rates | 2 |
| Frequency Input Reference (Pulse Train) | 0 Hz to 100 kHz |
| Run Reverse | ✓ |

| Application Specific | |
|---|---|
| PID Controller | PI Control |
| PID Feedforward | ✓ |
| PID Threshold Detector | ✓ |
| PID Slew Rate | ✓ |
| Reference Configuration | ✓ |
| Run/Stop Configuration | ✓ |
| Input Scaling | 4-point |
| Run Permit (Latching Run) | ✓ |
| Limit Switches | ✓ |
| **Control** | |
| Control Mode: Linear V to F | ✓ (Definable Boost) |
| Control Mode: Square V to F | ✓ (Definable Boost) |
| Control Mode: Resistance Compensation | ✓ |
| Low Energy Mode (Dynamic V to F) | ✓ |
| Motor Stability Optimiser | ✓ |
| Slip Compensation | ✓ |
| Auto-Tune: Static | ✓ |
| Switching Frequency | 4 or 12 kHz |
| Catch An Already Spinning Motor | ✓ |
| Stop Mode: Ramp | ✓ |
| Stop Mode: Coast | ✓ |
| Stop Mode: Distance Stop | ✓ when selected it stops in the same distance from any speed based on the programmed deceleration rate |
| Dc Injection Braking | ✓ |
| Supply Loss Detection | ✓ |
| Programmable Output Current Limit | ✓ |
| **General** | |
| Diagnostics | ✓ |
| Error History Log | 4 |
| Parameters Saved On Error | 3 (Selectable) |
| Auto-Reset After Trip | ✓ |
| Power Loss Ride Through | ✓ |
| Security | 4-digit PIN protection |
| Cooling Fan | Fixed Speed (No fan on S100-01x13 or S100-01x23 drives) |





# DIMENSIONS

## How to select a drive

### Electrical Considerations

- What is the supply voltage?
- Single or three phase input power?
- What is the motor rating?
- Continuous current – FLA (Full Load Amps)

Frame 01 Frame 02 Frame 03



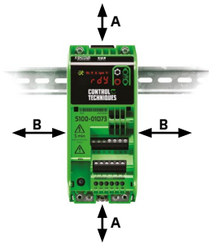
## Dimensions

| Model Number | Overall Dimensions (±0.5 mm) | | | | Mounting Dimensions (±0.5 mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Height | Width | Depth | Weight | DIN* | M1 | M2 | M3 | M4 | Φ |
| S100-01 | 156 mm 6.14 in | 68 mm 2.70 in | 130 mm 5.12 in | 0.7 kg 1.54 lb | 46 mm 1.81 in | 145 mm 5.71 in | 45 mm 1.77 in | 22.5 mm 0.89 in | 22.5 mm 0.89 in | 4.8 mm 0.19 in |
| S100-02 | 192 mm 7.56 in | 68 mm 2.70 in | 132 mm 5.20 in | 0.8 kg 1.76 lb | 46 mm 1.81 in | 180 mm 7.11 in | 45 mm 1.77 in | 22.5 mm 0.89 in | 22.5 mm 0.89 in | 4.8 mm 0.19 in |
| S100-03 | 192 mm 7.56 in | 90 mm 3.54 in | 132 mm 5.20 in | 1.0 kg 2.2 lb | 46 mm 1.81 in | 180 mm 7.11 in | 65 mm 2.56 in | 37.5 mm 1.48 in | 27.5 mm 1.08 in | 4.8 mm 0.19 in |

* No screws are required when mounting the drive onto a DIN rail.

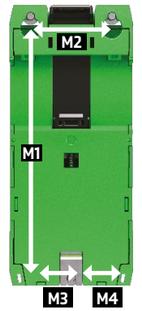



## Drive Clearances




| Drive Clearances | S100-01x13, S100-01x23 | All other drives |
|---|---|---|
| A | 100 mm (3.94 in) | 45 mm (1.77 in) |
| B | 0 mm (0 in) | |

Mounting Dimensions

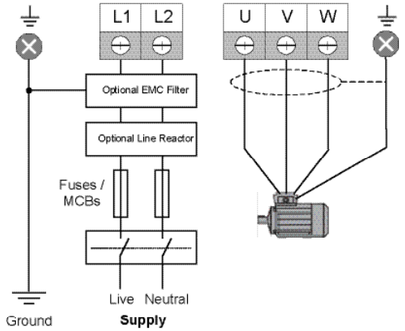



## Documentation & Downloads

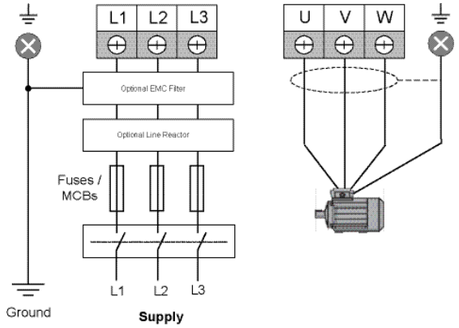
Product documentation and PC tools available for download from:
www.controltechniques.com/support

# CONNECTIONS

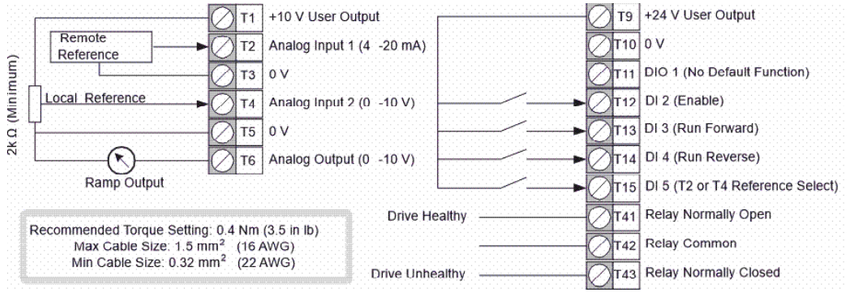
### Single Phase




### Three Phase




### Control Connections (Default Settings)




# PRODUCT CODES

**S100- 01 4 2 3 - 0 A 0000**

**Series:** S100-

**Frame Size**
01 – Frame 1
02 – Frame 2
03 – Frame 3

**Voltage Rating & Input Phase**
1 – 100V, 1Φ
2 – 200V, 3Φ
S – 200V, 1Φ
D – 200V, 1/3Φ
4 – 400V, 3Φ

**Frame Size, Power Step**

**Built-in EMC Filter**
1 - C1 Internal Filter
3 - C3 Internal Filter

**Generation Reference**
0 – 2022 Release

**Regional Defaults**
A – EMEA & APAC
B – America
C – LS
K – Customer Specific

**Reserved** 0000





# MODEL NUMBER AND RATINGS

## Variants with C3 built-in EMC filter

| Product Code | Input Phases | Frame Size | Internal EMC Filter Performance | Heavy Duty | | |
|---|---|---|---|---|---|---|
| | | | | Max Cont. Current (A) | Motor Shaft Power (kW) | Motor Shaft Power (hp) |
| **100/120 Vac +/-10%** | | | | | | |
| S100-01113-0A0000 | 1 | 01 | C3 | 1.2 | 0.18 | 0.25 |
| S100-01123-0A0000 | 1 | 01 | C3 | 1.4 | 0.25 | 0.33 |
| S100-01133-0A0000 | 1 | 01 | C3 | 2.2 | 0.37 | 0.5 |
| S100-03113-0A0000 | 1 | 03 | C3 | 3.2 | 0.55 | 0.75 |
| S100-03123-0A0000 | 1 | 03 | C3 | 4.2 | 0.75 | 1 |
| S100-03133-0A0000 | 1 | 03 | C3 | 6 | 1.1 | 1.5 |
| **200/240 Vac +/-10%** | | | | | | |
| S100-01S13-0A0000 | 1 | 01 | C3 | 1.4 | 0.18 | 0.25 |
| S100-01213-0A0000 | 3 | 01 | C3 | 1.4 | 0.18 | 0.25 |
| S100-01S23-0A0000 | 1 | 01 | C3 | 1.6 | 0.25 | 0.33 |
| S100-01223-0A0000 | 3 | 01 | C3 | 1.6 | 0.25 | 0.33 |
| S100-01S33-0A0000 | 1 | 01 | C3 | 2.4 | 0.37 | 0.50 |
| S100-01233-0A0000 | 3 | 01 | C3 | 2.4 | 0.37 | 0.50 |
| S100-01S43-0A0000 | 1 | 01 | C3 | 3.5 | 0.55 | 0.75 |
| S100-01243-0A0000 | 3 | 01 | C3 | 3.5 | 0.55 | 0.75 |
| S100-01S53-0A0000 | 1 | 01 | C3 | 4.6 | 0.75 | 1 |
| S100-01253-0A0000 | 3 | 01 | C3 | 4.6 | 0.75 | 1 |
| S100-01D63-0A0000 | 1\|3 | 01 | C3 | 6.6 | 1.1 | 1.5 |
| S100-01D73-0A0000 | 1\|3 | 01 | C3 | 7.5 | 1.5 | 2 |
| S100-03D13-0A0000 | 1\|3 | 03 | C3 | 10.6 | 2.2 | 3 |
| **380/480 Vac +/-10%** | | | | | | |
| S100-02413-0A0000 | 3 | 02 | C3 | 1.2 | 0.37 | 0.5 |
| S100-02423-0A0000 | 3 | 02 | C3 | 1.7 | 0.55 | 0.75 |
| S100-02433-0A0000 | 3 | 02 | C3 | 2.2 | 0.75 | 1 |
| S100-02443-0A0000 | 3 | 02 | C3 | 3.2 | 1.1 | 1.5 |
| S100-02453-0A0000 | 3 | 02 | C3 | 3.7 | 1.5 | 2 |
| S100-02463-0A0000 | 3 | 02 | C3 | 5.3 | 2.2 | 3 |
| S100-03413-0A0000 | 3 | 03 | C3 | 7.2 | 3 | 3 |
| S100-03423-0A0000 | 3 | 03 | C3 | 8.8 | 4 | 5 |

Note: The listed ordering codes are for 50 Hz default setting. For 60 Hz default setting change the ending digits from 0A0000 to 0B0000.

## Variants with C1 built-in EMC filter

| Product Code | Input Phases | Frame Size | Internal EMC Filter Performance | Heavy Duty | | |
|---|---|---|---|---|---|---|
| | | | | Max Cont. Current (A) | Motor Shaft Power (kW) | Motor Shaft Power (HP) |
| **200/240 Vac +/-10%** | | | | | | |
| S100-02S11-0A0000 | 1 | 02 | C1 | 1.2 | 0.18 | 0.25 |
| S100-02S21-0A0000 | 1 | 02 | C1 | 1.4 | 0.25 | 0.33 |
| S100-02S31-0A0000 | 1 | 02 | C1 | 2.2 | 0.37 | 0.5 |
| S100-02S41-0A0000 | 1 | 02 | C1 | 3.2 | 0.55 | 0.75 |
| S100-02S51-0A0000 | 1 | 02 | C1 | 4.2 | 0.75 | 1 |
| S100-02S61-0A0000 | 1 | 02 | C1 | 6 | 1.1 | 1.5 |
| S100-02S71-0A0000 | 1 | 02 | C1 | 6.8 | 1.5 | 2 |

Note: The listed ordering codes are for 50 Hz default setting. For 60 Hz default setting change the ending digits from 0A0000 to 0B0000.



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## Optional External Filters*

| Commander S Product Code | Motor Shaft Power (kW) | Motor Shaft Power (hp) | Commander S Optional External EMC Filters Product Code | Commander S Optional External Low Leakage Filter Product Code | Alternative Commander C Filter** Product Code |
|---|---|---|---|---|---|
| **100/120 Vac +/-10%** | | | | | |
| S100-01113-0A0000 | 0.18 | 0.25 | 4200-0026 | 4200-0038 | |
| S100-01123-0A0000 | 0.25 | 0.33 | 4200-0026 | 4200-0038 | |
| S100-01133-0A0000 | 0.37 | 0.50 | 4200-0026 | 4200-0038 | |
| S100-03113-0A0000 | 0.55 | 0.75 | 4200-0028 | 4200-0039 | |
| S100-03123-0A0000 | 0.75 | 1 | 4200-0028 | 4200-0039 | |
| S100-03133-0A0000 | 1.10 | 1.50 | 4200-0028 | 4200-0039 | |
| **200/240 Vac +/-10%** | | | | | |
| S100-01S13-0A0000 | 0.18 | 0.25 | 4200-0026 | 4200-0038 | 4200-1000 |
| S100-01213-0A0000 | 0.18 | 0.25 | 4200-0031 | 4200-0040 | 4200-2003 |
| S100-01S23-0A0000 | 0.25 | 0.33 | 4200-0026 | 4200-0038 | 4200-1000 |
| S100-01223-0A0000 | 0.25 | 0.33 | 4200-0031 | 4200-0040 | 4200-2003 |
| S100-01S33-0A0000 | 0.37 | 0.50 | 4200-0026 | 4200-0038 | 4200-1000 |
| S100-01233-0A0000 | 0.37 | 0.50 | 4200-0031 | 4200-0040 | 4200-2003 |
| S100-01S43-0A0000 | 0.55 | 0.75 | 4200-0026 | 4200-0038 | 4200-1000 |
| S100-01243-0A0000 | 0.55 | 0.75 | 4200-0031 | 4200-0040 | 4200-2003 |
| S100-01S53-0A0000 | 0.75 | 1 | 4200-0026 | 4200-0038 | 4200-1000 |
| S100-01253-0A0000 | 0.75 | 1 | 4200-0031 | 4200-0040 | 4200-2003 |
| S100-01D63-0A0000 | 1.10 | 1.50 | 4200-0026 (1 ph)<br>4200-0032 (3 ph) | 4200-0038 (1 ph)<br>4200-0040 (3 ph|) | 4200-2001 (1 ph)<br>4200-2003 (3 ph) |
| S100-01D73-0A0000 | 1.50 | 2 | 4200-0026 (1 ph)<br>4200-0032 (3 ph) | 4200-0038 (1 ph)<br>4200-0040 (3 ph) | 4200-2001 (1ph)<br>4200-2003 (3ph) |
| S100-03D13-0A0000 | 2.20 | 3 | 4200-0028 (1 ph)<br>4200-0033 (3 ph) | 4200-0039 (1 ph)<br>4200-0042 (3 ph) | 4200-4000 (1ph)<br>4200-4002 (3ph) |
| **380/480 Vac +/-10%** | | | | | |
| S100-02413-0A0000 | 0.37 | 0.50 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-02423-0A0000 | 0.55 | 0.75 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-02433-0A0000 | 0.75 | 1 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-02443-0A0000 | 1.10 | 1.50 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-02453-0A0000 | 1.50 | 2 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-02463-0A0000 | 2.20 | 3 | 4200-0034 | 4200-0041 | 4200-2005 |
| S100-03413-0A0000 | 3 | 3 | 4200-0033 | 4200-0042 | 4200-3008 |
| S100-03423-0A0000 | 4 | 5 | 4200-0033 | 4200-0042 | 4200-3008 |

*Commander S100 variants fitted with C3 EMC filter comply with IEC 61800-3 second environment. An additional external filter is required for Commander S100 variants fitted with C3 EMC filter to meet the higher requirements of IEC 61000-6-4 and IEC 61800-3 first environment.
The requirements of IEC 61000-6-4 and IEC 61800-3 first environment are met by Commander S100 variants fitted with C1 EMC filter without additional filtering.

**The alternative Commander C Filter does not support footprint mounting of the Commander S but does meet the levels specified in Table 10-4 with the following exception: The S100-01243 drive does not meet C1 at 4 kHz with a 20 m cable length.

# HIGH PERFORMANCE DRIVES

## UNIDRIVE





# PRODUCTS IN THIS RANGE

**M700/M701/M702 | M600 | M400 | HIGH POWER MODULAR DRIVES**




### UNIDRIVE Applications:

- Hoists
- Winding
- Cutting
- Woodworking
- Test Stands
- Printing
- Web Handling
- Textiles
- Packaging Machines
- Tyre Manufacturing
- Extrusion
- Metals
- Mining
- Marine
- Speed & Position Control (For Gearing & Ratio Control)

# UNIDRIVE M700, M701 & M702

# ADVANCED MOTOR CONTROL

**0.75 kW – 2.8 MW (1.0 - 4,200 hp) 200 V | 400 V | 575 V | 690 V**




## Performance control matched for every type of motor.

**Our Unidrive M700 drives offer the highest control stability and bandwidth for every industrial motor type.**

Unidrive M enables maximum machine throughput in every application and with every motor, from AC induction motors to dynamic linear motors and from energy saving hybrid permanent-magnet motors to high performance servo motors.

## Key Benefits:

- High bandwidth motor control
- Universally applicable to control multiple parts of the application
- Built-in ultra-flexible speed and position feedback interface
- Sensorless control of induction, permanent-magnet, and hybrid PM motors
- Integrated safety with optional motion safety functions
- Comprehensive communications supporting a multitude of control bus technologies
- Scalable machine control architecture
- Uncompromised high performance control at high powers





# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Jog | ✓ | Supply loss detection | ✓ |
| Bi-polar reference | ✓ | Low DC link operation | ✓ |
| Pre-set speeds | 8 | Analogue input control | 3 |
| Preset timer | ✓ | Analogue output control | 2 |
| Skip frequencies | 3 | Temperature monitoring | ✓ |
| Skip frequency dead bands | ✓ | Digital input control | 3 |
| Local/Remote | ✓ | Digital I/O programmable control | 3 |
| S-Ramp | ✓ | Relay control | 1 |
| Acceleration Rates | 8 | Mechanical Brake Controller | ✓ |
| Deceleration Rates | 8 | Keypad button assignment | ✓ |
| Torque reference | ✓ | Motorised pot | ✓ |
| Control mode: Linear V/f | ✓ | Logic function control | ✓ |
| Control mode: Open-loop vector | ✓ | Timer function control | ✓ |
| Control mode: Quadratic V/f | ✓ | Limit switch control | ✓ |
| Stator resistance compensation | ✓ | Variable selector | ✓ |
| Slip compensation | ✓ | PID Control Loops | 2 |
| Sensorless control of induction motors | ✓ | Energy meter | ✓ |
| Sensorless control of permanent magnet motors | ✓ | Trip time stamping | ✓ |
| Auto-tune static (including permanent magnet motors) | ✓ | Trip logging | 8 |
| Auto-tune rotating | ✓ | Run time log | ✓ |
| Catch a spinning motor | ✓ | Control word control | ✓ |
| Stop mode: Ramp | ✓ | Auto reset | ✓ |
| Stop mode: Coast | ✓ | Cloning | ✓ |
| Stop mode: Fast Ramp | ✓ | On-board PLC | 64kb |
| DC injection braking | ✓ | Additional Application parameters | 148 |
| Programmable braking | ✓ | Second motor set-up | ✓ |
| Motor Pre-heat control | ✓ | Speed feedback via options | ✓ |

For the analogue and digital I/O layout of the M702 variant, please refer to page 77 and page 79.

# SPECIFICATION

| Unidrive M700, M701 & M702 | |
|---|---|
| **Items supplied with the drive** | Control Getting Started Guide, Power Installation Guide, Safety Information, Quality Certificate, Control signal connectors, 24V power supply connector (frames 6 to 11), Grounding bracket, Surface mounting brackets, DC connection grommets (frames 3 to 6), Supply and motor connectors (frames 3 to 5), Nuts for supply and motor terminals (frames 6 to 11) |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz Open-loop/RFC-A, 6kHz RFC-S) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), DNV (marine applications), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety (Single STO function)** | Independently assessed by TÜV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PL e |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing at 40 °C (104 °F) |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 / NEMA1 / UL TYPE 1 (UL open class as standard, additional kit needed to achieve Type 1)<br>IP65 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 3 to 8)<br>IP55 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 9 to 11) |
| **Vibration** | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3. |
| **Mounting methods** | Frame 3 to 11 – Surface mount via supplied mounting brackets or through-panel mount via optional mounting brackets<br>Frame 3 to 5 – Tile mount via optional mounting brackets |
| **Output frequency/speed range** | 599Hz (Open-loop), 560Hz (RFC-A, RFC-S) |
| **Braking** | In-built braking transistor, optional internal resistor on frame 3 to 5 or external resistor (all frames) |
| **Operating modes** | Open-loop: Open-loop vector, fixed V/F, quadratic V/F<br>RFC-A: Rotor Flux Control for Asynchronous motors, with or without position feedback<br>RFC-S: Rotor Flux Control for Synchronous motors, with or without position feedback<br>Regen: For use as a regenerative front end for four quadrant operation |
| **Overload capability** | Normal duty (cold): Open-loop – 110% for 165s, RFC – 110% for 165s<br>Heavy duty (cold): Open-loop – 150% for 60s, RFC – 200% for 28s (size 8 and below)<br>Heavy duty (cold): Open-loop – 136% for 81s, RFC – 175% for 42s (size 9, 10, 11) |





| | | |
|---|---|---|
| **Overvoltage category** | Evaluated for OVC III. | |
| **Corrosive environments** | Concentrations of corrosive gases must not exceed the levels given in: Table A2 of EN 50178:1998, Class 3C2 of IEC 60721-3-3<br>This corresponds to the levels typical of urban areas with industrial activities and/or heavy traffic, but not in the immediate neighbourhood of industrial sources with chemical emissions. | |
| **Immunity Compliance** | IEC61800-3, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6,<br>IEC61000-4-8, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. | |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, EC61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 | |
| **Cooling** | Forced cooled | |
| **Safe Torque Off** | Single Channel STO, SIL3. M702 has Dual Channel STO, SIL3 | |
| **Communications** | M700 & M702: Ethernet, EtherNet/IP, Modbus/TCP, RTMoE and PROFINET RT<br>M701: RS485, Modbus RTU<br>SI Options: EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNet, CANopen, POWERLINK, MiS210 (for motion safety functions over safe networks) | |
| **Control I/O** | 3 x Analogue input (1 x differential, 2 x single ended), 2 x Analogue output, 3 x Digital I/O programmable, 3 x Digital input (including 2 x high speed – 250µs), 1 x NO relay 250Vac Max., 6 x 0V common, 1 x 24V supply input, 1 x 24V user output, 1 x 10V user output, 1 x Safe Torque Off input.<br>M702: 2 x Digital input, 2 x Digital output, 1 x NO relay 250Vac Max., 5 x 0V common, 1 x 24V supply input, 1 x 24V user output, 2 x Safe Torque Off input.<br>Additional I/O available with SI-I/O option module. | |
| **Supported Feedback Devices** | Supports a combination of up to two of the following encoders and a simulated encoder output from a single high density connector:<br>Quadrature incremental with/without marker pulse, with/without UVW commutation signals<br>Forward / reverse incremental with/without marker pulse, with/without commutation signals<br>Frequency / direction incremental with/without marker pulse, with/without UVW commutation signals<br>Sincos incremental with/without commutation signals<br>Heidenhain sincos incremental with EnDat absolute position | Stegmann sincos incremental with Hiperface absolute position<br>Sincos incremental with SSI absolute position<br>Sincos incremental with BiSS (type C) absolute position<br>Sincos incremental with sincos absolute position<br>SSI (Gray code or binary) absolute position<br>EnDat only absolute position<br>BiSS (type C) only absolute position<br>Resolver<br>UVW commutation only |
| **Resolution and Accuracy** | Frequency/speed accuracy: 0.01% (preset speed)<br>Open loop resolution – Preset reference: 0.1 Hz, Precision reference: 0.001 Hz<br>Closed loop resolution: Preset reference: 0.1 rpm, Precision reference: 0.001 rpm<br>Analog input 1: 11 bit plus sign, Analog input 2: 11 bit plus sign<br>Current resolution: 10 bit plus sign, Current accuracy: typical 2 % | |
| **On-board advanced motion controller** | Advanced 1.5 axis Motion Controller (key features include: – Real-time tasks – 250 µs cycle time – Motion profile generator – Electronic gearbox – Interpolated CAM – Homing functions – High speed position freeze) | |
| **On-board user program capability** | 64kB, IEC 61131-3 compliant | |

| | |
|---|---|
| **Optional Second Processor (PLC / Motion)** | SI-Applications Plus: allows existing SyPTPro application programs to be re-compiled for M70x<br>MCi200: Advanced Machine Controller using industry standard IEC61131-3 programming languages<br>MCi210: Extended Advanced Machine Controller using industry standard IEC61131-3 programming languages with simultaneous connectivity to 2 separate Ethernet networks |
| **Keypad** | Optional LCD keypad with or without real-time clock<br>Optional Remote LCD keypad with or without real-time clock |
| **Parameter backup and cloning** | Smartcard and SD card (using SD card adapter) |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| **Warranty** | 26 months |
| **Supported options** | RTC Remote Keypad, KI-485 Adapter, HMI, RS485-Communications lead, SI-EtherCAT, SI-PROFIBUS, SI-Ethernet, SI-DeviceNET, SI-CANopen, SI-PROFINET, SI-POWERLINK, SI-I/O, SI-Encoder (speed feedback), SI-Universal Encoder (speed feedback), SI-Applications Plus, SI-Applications Compact, MCi200, MCi210, SI-Safety, MiS210, Remote I/O, Smartcard, SD card (using SD card adapter) |
| **Accessories** | Through-hole IP65 mounting kit, UL type conduit kits, SP Retrofit mounting brackets, External EMC filters, Grounding bracket (supplied with the drive) |

# DIMENSIONS

| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H** | W | D | H** | W | D | H | W | H | W | | | | |
| **3** | 365 | 83 | 200 | 14.37 | 3.27 | 7.87 | 370 | 73 | 14.57 | 2.87 | 5 | 0.2 | 4.0*<br>4.5 | 8.8*<br>9.9 |
| **4** | 365 | 124 | 200 | 14.37 | 4.88 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6 | 0.23 | 6.5 | 14.3 |
| **5** | 365 | 143 | 200 | 14.37 | 5.63 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| **6** | 365 | 210 | 227 | 14.37 | 8.27 | 8.94 | 378 | 196 | 14.88 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| **7** | 508 | 270 | 280 | 20 | 10.63 | 11.02 | 538 | 220 | 21.18 | 8.66 | 9 | 0.35 | 28 | 61.7 |
| **8** | 753 | 310 | 290 | 29.65 | 12.21 | 11.42 | 884 | 259 | 30.87 | 10.2 | 9 | 0.35 | 52 | 114.6 |
| **9E / 10E** | 1010 | 310 | 290 | 39.7 | 12.21 | 11.42 | 1051 | 259 | 41.38 | 10.2 | 9 | 0.35 | 46 | 101.4 |
| **9A** | 1049 | 310 | 290 | 41.3 | 12.21 | 11.42 | 1090 | 259 | 42.91 | 10.2 | 9 | 0.35 | 66.5 | 146.6 |
| **11E** | 1190 | 310 | 312 | 46.9 | 12.2 | 48.9 | 1222 | 259 | 48.11 | 10.2 | 9 | 0.35 | 63 | 138.9 |
| **12** | 1750 | 295 | 526 | 68.90 | 11.61 | 20.71 | N/A | N/A | N/A | N/A | N/A | N/A | 130 | 287 |

*** 034300078, 034300100 weigh 4.5 kg (9.9 lbs), all other variants weigh 4.0 kg (8.8 lbs)**

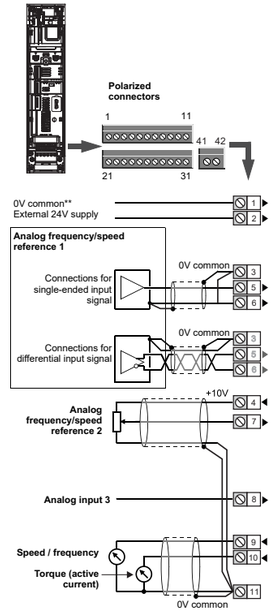
**** Overall dimensions do not include removable mounting brackets**

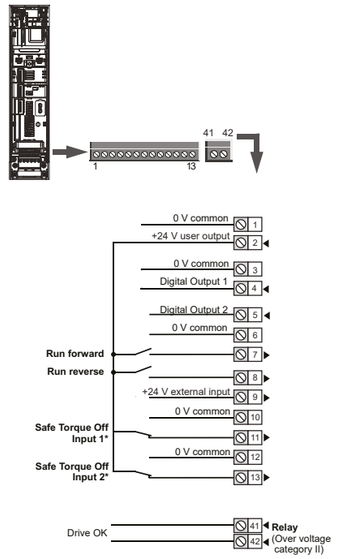




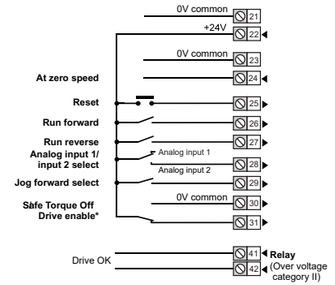



# CONNECTIONS

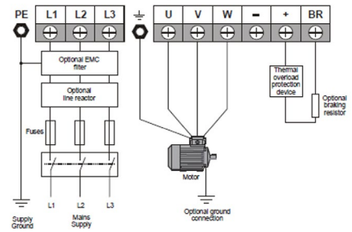



## M702: Default Control Connections




## M700/M701: Default Control Connections




## Typical Power Connections

# PRODUCT CODES

**M700 03 4 0073 A 10100A B 100**

- **M700** — Drive Range
  - M700 = Multi-protocol
  - M701 = RS485 Modbus RTU
  - M702 = Safety enhanced
  - M600 = Open loop
- **03** — Frame Size: 3 to 12
- **4** — Voltage Rating
  - 2 = 200V (200V-240V +/-10%)
  - 4 = 400V (380V-480V +/-10%)
  - 5 = 575V (500V-575V +/-10%)
  - 6 = 690V (500V-690V +/-10%)
- **0073** — Current Rating (A): Heavy Duty Rating x 10
- **A** — Build
  - A = AC in AC out (with internal line choke)
  - D = DC in AC out (inverter)
  - E = AC in AC out (external line choke required)
  - T = AC in AC out (12 pulse rectifier plus inverter)
- **10100A** — Control Pod
- **B** — Brake Transistor
  - B = Brake Transistor included
  - N = No Brake Transistor
- **100** — Flexible Code

***The flexible code of Frame 12 leaves M000 as the standard to add whatever Control Pod is required.**

# MODEL NUMBER AND RATINGS

## 200/240 VAC +/-10%

| Product Code M600/M700/M701/M702 | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|
| | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (HP) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (HP) |
| Mxxx - 03200050A | 3 | 5 | 0.75 | 1 | 6.6 | 1.1 | 1.5 |
| Mxxx - 03200066A | 3 | 6.6 | 1.1 | 1.5 | 8 | 1.5 | 2 |
| Mxxx - 03200080A | 3 | 8 | 1.5 | 2 | 11 | 2.2 | 3 |
| Mxxx - 03200106A | 3 | 10.6 | 2.2 | 3 | 12.7 | 3 | 3 |
| Mxxx - 04200137A | 3 | 13.7 | 3 | 3 | 18 | 4 | 5 |
| Mxxx - 04200185A | 3 | 18.5 | 4 | 5 | 24 | 5.5 | 7.5 |
| Mxxx - 05200250A | 3 | 25 | 5.5 | 7.5 | 30 | 7.5 | 10 |
| Mxxx - 06200330A | 3 | 33 | 7.5 | 10 | 50 | 11 | 15 |
| Mxxx - 06200440A | 3 | 44 | 11 | 15 | 58 | 15 | 20 |
| Mxxx - 07200610A | 3 | 61 | 15 | 20 | 75 | 18.5 | 25 |
| Mxxx - 07200750A | 3 | 75 | 18.5 | 25 | 94 | 22 | 30 |
| Mxxx - 07200830A | 3 | 83 | 22 | 30 | 117 | 30 | 40 |
| Mxxx - 08201160A | 3 | 116 | 30 | 40 | 149 | 37 | 50 |
| Mxxx - 08201320A | 3 | 132 | 37 | 50 | 180 | 45 | 60 |
| Mxxx - 09201760A | 3 | 176 | 45 | 60 | 216 | 55 | 75 |
| Mxxx - 09202190A | 3 | 219 | 55 | 75 | 266 | 75 | 100 |
| Mxxx - 09201760E | 3 | 176 | 45 | 60 | 216 | 55 | 75 |
| Mxxx - 09202190E | 3 | 219 | 55 | 75 | 266 | 75 | 100 |
| Mxxx - 10202830E | 3 | 283 | 75 | 100 | 325 | 90 | 125 |
| Mxxx - 10203000E | 3 | 300 | 90 | 125 | 360 | 110 | 150 |

## 380/480 VAC +/-10%

| Product Code M600/M700/M701/M702 | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|
| | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| Mxxx - 03400025A | 3 | 2.5 | 0.75 | 1 | 3.4 | 1.1 | 1.5 |
| Mxxx - 03400031A | 3 | 3.1 | 1.1 | 1.5 | 4.5 | 1.5 | 2 |
| Mxxx - 03400045A | 3 | 4.5 | 1.5 | 2 | 6.2 | 2.2 | 3 |
| Mxxx - 03400062A | 3 | 6.2 | 2.2 | 3 | 7.7 | 3 | 5 |
| Mxxx - 03400078A | 3 | 7.8 | 3 | 5 | 10.4 | 4 | 5 |
| Mxxx - 03400100A | 3 | 10 | 4 | 5 | 12.3 | 5.5 | 7.5 |
| Mxxx - 04400150A | 3 | 15 | 5.5 | 10 | 18.5 | 7.5 | 10 |
| Mxxx - 04400172A | 3 | 17.2 | 7.5 | 10 | 24 | 11 | 15 |
| Mxxx - 05400270A | 3 | 27 | 11 | 20 | 30 | 15 | 20 |
| Mxxx - 05400300A | 3 | 30 | 15 | 20 | 31 | 15 | 20 |
| Mxxx - 06400350A | 3 | 35 | 15 | 25 | 38 | 18.5 | 25 |
| Mxxx - 06400420A | 3 | 42 | 18.5 | 30 | 48 | 22 | 30 |
| Mxxx - 06400470A | 3 | 47 | 22 | 30 | 63 | 30 | 40 |
| Mxxx - 07400660A | 3 | 66 | 30 | 50 | 79 | 37 | 50 |
| Mxxx - 07400770A | 3 | 77 | 37 | 60 | 94 | 45 | 60 |
| Mxxx - 07401000A | 3 | 100 | 45 | 75 | 112 | 55 | 75 |
| Mxxx - 08401340A | 3 | 134 | 55 | 100 | 155 | 75 | 100 |
| Mxxx - 08401570A | 3 | 157 | 75 | 125 | 184 | 90 | 125 |
| Mxxx - 09402000A | 3 | 200 | 90 | 150 | 221 | 110 | 150 |
| Mxxx - 09402240A | 3 | 224 | 110 | 150 | 266 | 132 | 200 |
| Mxxx - 09402000E | 3 | 200 | 90 | 150 | 221 | 110 | 150 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mxxx - 09402240E | 3 | 224 | 110 | 150 | 266 | 132 | 200 |
| Mxxx - 10402700E | 3 | 270 | 132 | 200 | 320 | 160 | 250 |
| Mxxx - 10403200E | 3 | 320* | 160 | 250 | 361 | 200 | 300 |
| Mxxx - 11403770E | 3 | 377 | 185 | 300 | 437 | 225 | 350 |
| Mxxx - 11404170E | 3 | 417* | 200 | 350 | 487* | 250 | 400 |
| Mxxx - 11404640E | 3 | 464* | 250 | 400 | 507* | 280 | 450 |
| Mxxx - 12404800T | 3 | 480* | 250 | 400 | 608* | 315 | 500 |
| Mxxx - 12405660T | 3 | 566* | 315 | 450 | 660* | 355 | 550 |
| Mxxx - 12406600T | 3 | 660* | 355 | 550 | 755* | 400 | 650 |
| Mxxx - 12407200T | 3 | 720* | 400 | 600 | 865* | 500 | 700 |

*At 2 kHz switching frequency

## 500/575 VAC +/-10%

| Product Code M600/M700/M701/M702 | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|
| | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| Mxxx - 05500030A | 3 | 3 | 1.5 | 2 | 3.9 | 2.2 | 3 |
| Mxxx - 05500040A | 3 | 4 | 2.2 | 3 | 6.1 | 4 | 5 |
| Mxxx - 05500069A | 3 | 6.9 | 4 | 5 | 10 | 5.5 | 7.5 |
| Mxxx - 06500100A | 3 | 10 | 5.5 | 7.5 | 12 | 7.5 | 10 |
| Mxxx - 06500150A | 3 | 15 | 7.5 | 10 | 17 | 11 | 15 |
| Mxxx - 06500190A | 3 | 19 | 11 | 15 | 22 | 15 | 20 |
| Mxxx - 06500230A | 3 | 23 | 15 | 20 | 27 | 18.5 | 25 |
| Mxxx - 06500290A | 3 | 29 | 18.5 | 25 | 34 | 22 | 30 |
| Mxxx - 06500350A | 3 | 35 | 22 | 30 | 43 | 30 | 40 |
| Mxxx - 07500440A | 3 | 44 | 30 | 40 | 53 | 45 | 50 |
| Mxxx - 07500550A | 3 | 55 | 37 | 50 | 73 | 55 | 60 |
| Mxxx - 08500630A | 3 | 63 | 45 | 60 | 86 | 75 | 75 |
| Mxxx - 08500860A | 3 | 86 | 55 | 75 | 108 | 90 | 100 |
| Mxxx - 09501040A | 3 | 104 | 75 | 100 | 125 | 110 | 125 |
| Mxxx - 09501310A | 3 | 131 | 90 | 125 | 150 | 110 | 150 |
| Mxxx - 09501040E | 3 | 104 | 75 | 100 | 125 | 110 | 125 |
| Mxxx - 09501310E | 3 | 131 | 90 | 125 | 150 | 110 | 150 |
| Mxxx - 10501520E | 3 | 152 | 110 | 150 | 200 | 130 | 200 |
| Mxxx - 10501900E | 3 | 190 | 132 | 200 | 200 | 150 | 200 |
| Mxxx - 11502000E | 3 | 200 | 150 | 200 | 248 | 185 | 250 |





| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mxxx - 11502540E | 3 | 254* | 185 | 250 | 288* | 225 | 300 |
| Mxxx - 11502850E | 3 | 285* | 225 | 300 | 315* | 250 | 350 |
| Mxxx-12503150 | 3 | 315 | 250 | 350 | 360 | 250 | 350 |
| Mxxx-12503600 | 3 | 360 | 250 | 350 | 410 | 300 | 400 |
| Mxxx-12504100 | 3 | 410 | 300 | 400 | 460 | 330 | 450 |
| Mxxx-12504600 | 3 | 460 | 330 | 450 | 510 | 370 | 500 |

*At 2 kHz switching frequency

## 690 VAC +/-10%

| Product Code M600/M700/M701/M702 | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|
| | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| Mxxx - 07600190A | 3 | 19 | 15 | 20 | 23 | 18.5 | 25 |
| Mxxx - 07600240A | 3 | 24 | 18.5 | 25 | 30 | 22 | 30 |
| Mxxx - 07600290A | 3 | 29 | 22 | 30 | 36 | 30 | 40 |
| Mxxx - 07600380A | 3 | 38 | 30 | 40 | 46 | 37 | 50 |
| Mxxx - 07600440A | 3 | 44 | 37 | 50 | 52 | 45 | 60 |
| Mxxx - 07600540A | 3 | 54 | 45 | 60 | 73 | 55 | 75 |
| Mxxx - 08600630A | 3 | 63 | 55 | 75 | 86 | 75 | 100 |
| Mxxx - 08600860A | 3 | 86 | 75 | 100 | 108 | 90 | 125 |
| Mxxx - 09601040A | 3 | 104 | 90 | 125 | 125 | 110 | 150 |
| Mxxx - 09601310A | 3 | 131 | 110 | 150 | 150 | 132 | 175 |
| Mxxx - 09601040E | 3 | 104 | 90 | 125 | 125 | 110 | 150 |
| Mxxx - 09601310E | 3 | 131 | 110 | 150 | 155 | 132 | 175 |
| Mxxx - 10601500E | 3 | 150 | 132 | 175 | 172 | 160 | 200 |
| Mxxx - 10601780E | 3 | 178 | 160 | 200 | 197 | 185 | 250 |
| Mxxx - 11602100E | 3 | 210 | 185 | 250 | 225 | 200 | 250 |
| Mxxx - 11602380E | 3 | 238* | 200 | 250 | 275* | 250 | 300 |
| Mxxx-12603150 | 3 | 315 | 280 | 500 | 360 | 355 | 550 |
| Mxxx-12603600 | 3 | 360 | 355 | 550 | 410 | 400 | 600 |
| Mxxx-12604100 | 3 | 410 | 400 | 600 | 460 | 450 | 650 |
| Mxxx-12604600 | 3 | 460 | 450 | 650 | 510 | 500 | 700 |

*At 2 kHz switching frequency

# UNIDRIVE M600

# OPEN-LOOP CONTROL DRIVE

**0.75 kW – 2.8 MW (1.0 - 4,200 hp) 200 V | 400 V | 575 V | 690 V**

## High performance drive for induction and sensorless control of permanent magnet motors.

Unidrive M600 is the perfect choice for applications that require high performance open-loop control of induction or permanent magnet motors.

SI-Encoder option modules are available for applications that require more precise closed-loop velocity and digital lock/frequency following of induction motors.




## Key Benefits:

- Energy savings
- Minimise downtime and system set-up time with advanced keypad options
- Reduced system costs with direct integration
- Improve throughput with advanced open-loop motor control algorithms
- Conform to safety standards, maximise uptime and reduce costs by direct safety system integration





# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Jog | ✓ | Supply loss detection | ✓ |
| Bi-polar reference | ✓ | Low DC link operation | ✓ |
| Pre-set speeds | 8 | Analogue input control | 3 |
| Preset timer | ✓ | Analogue output control | 2 |
| Skip frequencies | 3 | Temperature monitoring | ✓ |
| Skip frequency dead bands | ✓ | Digital input control | 3 |
| Local/Remote | ✓ | Digital I/O programmable control | 3 |
| S-Ramp | ✓ | Relay control | 1 |
| Acceleration Rates | 8 | Mechanical Brake Controller | ✓ |
| Deceleration Rates | 8 | Keypad button assignment | ✓ |
| Torque reference | ✓ | Motorised pot | ✓ |
| Control mode: Linear V/f | ✓ | Logic function control | ✓ |
| Control mode: Open-loop vector | ✓ | Timer function control | ✓ |
| Control mode: Quadratic V/f | ✓ | Limit switch control | ✓ |
| Stator resistance compensation | ✓ | Variable selector | ✓ |
| Slip compensation | ✓ | PID Control Loops | 2 |
| Sensorless control of induction motors | ✓ | Energy meter | ✓ |
| Sensorless control of permanent magnet motors | ✓ | Trip time stamping (using real-time clock , if available) | ✓ |
| Auto-tune static (including permanent magnet motors) | ✓ | Trip logging | 8 |
| Auto-tune rotating | ✓ | Run time log | ✓ |
| Catch a spinning motor | ✓ | Control word control | ✓ |
| Stop mode: Ramp | ✓ | Auto reset | ✓ |
| Stop mode: Coast | ✓ | Cloning | ✓ |
| Stop mode: Fast Ramp | ✓ | On-board PLC | 64kb |
| DC injection braking | ✓ | Additional Application parameters | 148 |
| Programmable braking | ✓ | Second motor set-up | ✓ |
| Motor Pre-heat control | ✓ | Speed feedback via options | ✓ |

# SPECIFICATION

| Unidrive M600 | |
|---|---|
| **Items supplied with the drive** | Control Getting Started Guide, Power Installation Guide, Safety Information, Quality Certificate, Control signal connectors, 24V power supply connector (frames 6 to 11), Grounding bracket, Surface mounting brackets, DC connection grommets (frames 3 to 6), Supply and motor connectors (frames 3 to 5), Nuts for supply and motor terminals (frames 6 to 11) |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz Open-loop/RFC-A, 6kHz RFC-S) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), DNV (marine applications), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety (Single STO function)** | Independently assessed by TÜV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PL e |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing at 40 °C (104 °F) |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 / NEMA1 / UL TYPE 1 (UL open class as standard, additional kit needed to achieve Type 1)<br>IP65 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 3 to 8)<br>IP55 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 9 to 11) |
| **Vibration** | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3. |
| **Mounting methods** | Frame 3 to 11 – Surface mount via supplied mounting brackets or through-panel mount via optional mounting brackets<br>Frame 3 to 5 – Tile mount via optional mounting brackets |
| **Output frequency/speed range** | 599Hz (Open-loop), 560Hz (RFC-A, RFC-S) |
| **Braking** | In-built braking transistor, optional internal resistor on frame 3 to 5 or external resistor (all frames) |
| **Operating modes** | Open-loop: Open-loop vector, fixed V/F, quadratic V/F<br>RFC-A: Rotor Flux Control for Asynchronous motors, with or without position feedback<br>RFC-S: Rotor Flux Control for Synchronous motors, with or without position feedback<br>Regen: For use as a regenerative front end for four quadrant operation |
| **Overload capability** | Normal duty (cold): Open-loop – 110% for 165s, RFC – 110% for 165s<br>Heavy duty (cold): Open-loop – 150% for 60s, RFC – 200% for 28s (size 8 and below)<br>Heavy duty (cold): Open-loop – 136% for 81s, RFC – 175% for 42s (size 9, 10, 11) |





| | |
|---|---|
| **Overvoltage category** | Evaluated for OVC III. |
| **Corrosive environments** | Concentrations of corrosive gases must not exceed the levels given in: Table A2 of EN 50178:1998, Class 3C2 of IEC 60721-3-3<br>This corresponds to the levels typical of urban areas with industrial activities and/or heavy traffic, but not in the immediate neighbourhood of industrial sources with chemical emissions. |
| **Immunity Compliance** | IEC61800-3, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6,<br>IEC61000-4-8, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, EC61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| **Cooling** | Forced cooled |
| **Safe Torque Off** | Single Channel STO, SIL3. |
| **Communications** | RS485, Modbus RTU<br>SI Options: EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNet, CANopen, POWERLINK |
| **Control I/O** | 3 x Analogue input (1 x differential, 2 x single ended), 2 x Analogue output, 3 x Digital I/O programmable, 3 x Digital input (including 2 x high speed – 250µs), 1 x NO relay 250Vac Max., 6 x 0V common, 1 x 24V supply input, 1 x 24V user output, 1 x 10V user output, 1 x Safe Torque Off input. Additional I/O available with SI-I/O option module. |
| **Resolution and Accuracy** | Frequency/speed accuracy: 0.01% (preset speed)<br>Open loop resolution – Preset reference: 0.1 Hz, Precision reference: 0.001 Hz<br>Closed loop resolution: Preset reference: 0.1 rpm, Precision reference: 0.001 rpm<br>Analog input 1: 11 bit plus sign, Analog input 2: 11 bit plus sign<br>Current resolution: 10 bit plus sign, Current accuracy: typical 2 % |
| **On-Board user program capability** | 64kB, IEC 61131-3 compliant |
| **Keypad** | Optional LCD keypad with or without real-time clock<br>Optional Remote LCD keypad with or without real-time clock |
| **Parameter backup and cloning** | Smartcard and SD card (using SD card adapter) |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| **Warranty** | 26 months |
| **Supported options** | RTC Remote Keypad, KI-485 Adapter, HMI, RS485-Communications lead, SI-EtherCAT, SI-PROFIBUS, SI-Ethernet, SI-DeviceNET, SI-CANopen, SI-PROFINET, SI-I/O, SI -Encoder (speed feedback), SI-Universal Encoder (speed feedback), SI-Safety, Remote I/O, Smartcard, SD card (using SD card adapter) |
| **Accessories** | Through-hole IP65 mounting kit, UL type conduit kits, SP Retrofit mounting brackets, External EMC filters, Grounding bracket (supplied with the drive) |

# DIMENSIONS

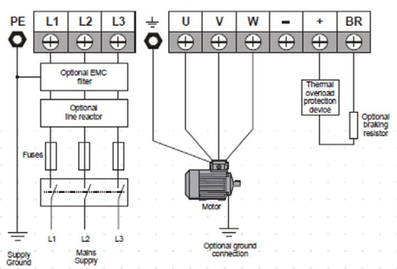
| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H** | W | D | H** | W | D | H | W | H | W | | | | |
| 3 | 365 | 83 | 200 | 14.37 | 3.27 | 7.87 | 370 | 73 | 14.57 | 2.87 | 5 | 0.2 | 4.0* | 8.8* |
| | | | | | | | | | | | | | 4.5 | 9.9 |
| 4 | 365 | 124 | 200 | 14.37 | 4.88 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6 | 0.23 | 6.5 | 14.3 |
| 5 | 365 | 143 | 200 | 14.37 | 5.63 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| 6 | 365 | 210 | 227 | 14.37 | 8.27 | 8.94 | 378 | 196 | 14.88 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| 7 | 508 | 270 | 280 | 20 | 10.63 | 11.02 | 538 | 220 | 21.18 | 8.66 | 9 | 0.35 | 28 | 61.7 |
| 8 | 753 | 310 | 290 | 29.65 | 12.21 | 11.42 | 884 | 259 | 30.87 | 10.2 | 9 | 0.35 | 52 | 114.6 |
| 9E / 10E | 1010 | 310 | 290 | 39.7 | 12.21 | 11.42 | 1051 | 259 | 41.38 | 10.2 | 9 | 0.35 | 46 | 101.4 |
| 9A | 1049 | 310 | 290 | 41.3 | 12.21 | 11.42 | 1090 | 259 | 42.91 | 10.2 | 9 | 0.35 | 66.5 | 146.6 |
| 11E | 1190 | 310 | 312 | 46.9 | 12.2 | 48.9 | 1222 | 259 | 48.11 | 10.2 | 9 | 0.35 | 63 | 138.9 |
| 12 | 1750 | 295 | 526 | 68.90 | 11.61 | 20.71 | N/A | N/A | N/A | N/A | N/A | N/A | 130 | 287 |



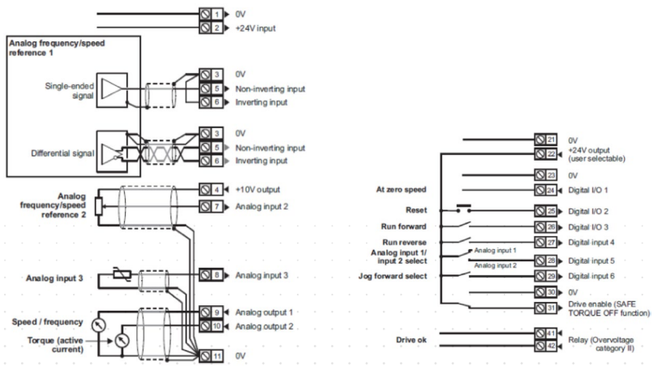

*** 034300078, 034300100 weigh 4.5 kg (9.9 lbs), all other variants weigh 4.0 kg (8.8 lbs)**

**** Overall dimensions do not include removable mounting brackets**

# CONNECTIONS




**Typical Power Connections**




**Default Control Connections**

**NOTE: DC- terminal is not accessible on frame 9E to 11E**





# PRODUCT CODES

M600 03 4 00078 A 10100A B 100

- **Model:** M600 = Open loop
- **Frame Size:** 03
- **Voltage Rating:** 2 = 200V (200V-240V +/-10%); 4 = 400V (380V-480V +/-10%); 5 = 575V (500V-575V +/-10%); 6 = 690V (500V-690V +/-10%)
- **Heavy Duty Current Rating x 10:** 00078
- **Drive Format:** A = AC in AC out, internal choke*; E = AC in AC out, external choke required
- **B = Brake Transistor included; N = No Brake Transistor:** B

***Frame 9 and below**

## Documentation & Downloads

Product documentation and PC tools available for download from:
www.controltechniques.com/support

# MODEL NUMBER AND RATINGS

| Product Code* | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| **200 V (200 - 240 V ± 10 %)** | | | | | | | | | | |
| M600-03200050A | 3 | 5 | 0.75 | 1 | 7.8 | 10 | 6.6 | 1.1 | 1.5 | 7.26 |
| M600-03200066A | 3 | 6.6 | 1.1 | 1.5 | 10.3 | 13.2 | 8 | 1.5 | 2 | 8.8 |
| M600-03200080A | 3 | 8 | 1.5 | 2 | 12.4 | 16 | 11 | 2.2 | 3 | 12.1 |
| M600-03200106A | 3 | 10.6 | 2.2 | 3 | 16.5 | 21.2 | 12.7 | 3 | 3 | 13.97 |
| M600-03200160A | 3 | 16 | 4 | 5 | 37.3 | 48 | 16 | 4 | 5 | 48 |

| Product Code* | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| **200 V (200 - 240 V ± 10 %)** | | | | | | | | | | |
| M600-04200137A | 4 | 13.7 | 3 | 3 | 21.3 | 27.4 | 18 | 4 | 5 | 19.8 |
| M600-04200185A | 4 | 18.5 | 4 | 5 | 28.8 | 37 | 25 | 5.5 | 7.5 | 27.5 |
| M600-05200250A | 5 | 25 | 5.5 | 7.5 | 38.9 | 50 | 30 | 7.5 | 10 | 33 |
| M600-06200330A | 6 | 33 | 7.5 | 10 | 51.3 | 66 | 50 | 11 | 15 | 55 |
| M600-06200440A | 6 | 44 | 11 | 15 | 68.4 | 88 | 58 | 15 | 20 | 63.8 |
| M600-07200610A | 7 | 61 | 15 | 20 | 94.9 | 122 | 75 | 18.5 | 25 | 82.5 |
| M600-07200750A | 7 | 75 | 18.5 | 25 | 116.7 | 150 | 94 | 22 | 30 | 103.4 |
| M600-07200800A | 7 | 80 | 22 | 30 | 124.5 | 166 | 80 | 30 | 40 | 128.7 |
| M600-07200830A | 7 | 83 | 22 | 30 | 129.1 | 166 | 117 | 30 | 40 | 128.7 |
| M600-08201160A | 8 | 116 | 30 | 40 | 180.4 | 232 | 149 | 37 | 50 | 163.9 |
| M600-08201320A | 8 | 132 | 37 | 50 | 205.3 | 264 | 180 | 45 | 60 | 198 |
| M600-09201760A/E | 9 | 176 | 45 | 60 | 239.6 | 308 | 216 | 55 | 75 | 237.6 |
| M600-09202190A/E | 9 | 219 | 55 | 75 | 298.1 | 383.25 | 266 | 75 | 100 | 292.6 |
| M600-10202830E | 10 | 283 | 75 | 100 | 385.2 | 495.25 | 325 | 90 | 125 | 357.5 |
| M600-10203000E | 10 | 300 | 90 | 125 | 408.3 | 525 | 360 | 110 | 150 | 396 |
| **400 V (380 - 480 V ± 10 %)** | | | | | | | | | | |
| M600-03400025A | 3 | 2.5 | 0.75 | 1 | 3.9 | 5 | 3.4 | 1.1 | 1.5 | 3.74 |
| M600-03400031A | 3 | 3.1 | 1.1 | 1.5 | 4.8 | 6.2 | 4.5 | 1.5 | 2 | 4.95 |
| M600-03400045A | 3 | 4.5 | 1.5 | 2 | 7 | 9 | 6.2 | 2.2 | 3 | 6.82 |
| M600-03400062A | 3 | 6.2 | 2.2 | 3 | 9.6 | 12.4 | 7.7 | 3 | 5 | 8.47 |
| M600-03400078A | 3 | 7.8 | 3 | 5 | 12.1 | 15.6 | 10.4 | 4 | 5 | 11.44 |
| M600-03400100A | 3 | 10 | 4 | 5 | 15.6 | 20 | 12.3 | 5.5 | 7.5 | 13.53 |
| M600-03400135A | 3 | 13.5 | 5.5 | 7.5 | 31.5 | 40.5 | 13.5 | 5.5 | 7.5 | 40.5 |
| M600-03400160A | 3 | 16 | 5.5 | 10 | 37.3 | 48 | 16 | 5.5 | 10 | 48 |
| M600-04400150A | 4 | 15 | 5.5 | 10 | 23.3 | 30 | 18.5 | 7.5 | 10 | 20.35 |
| M600-04400172A | 4 | 17.2 | 7.5 | 10 | 26.8 | 34.4 | 24 | 11 | 15 | 26.4 |
| M600-05400220A | 5 | 22 | 9 | 15 | 34.2 | 44 | 27 | 11 | 20 | 29.7 |
| M600-05400270A | 5 | 27 | 11 | 20 | 42 | 54 | 30 | 15 | 20 | 33 |
| M600-05400300A | 5 | 30 | 15 | 20 | 46.7 | 60 | 31 | 15 | 20 | 34.1 |
| M600-06400350A | 6 | 35 | 15 | 25 | 54.4 | 70 | 38 | 18.5 | 25 | 41.8 |
| M600-06400420A | 6 | 42 | 18.5 | 30 | 65.3 | 84 | 48 | 22 | 30 | 52.8 |
| M600-06400470A | 6 | 47 | 22 | 30 | 73.1 | 94 | 63 | 30 | 40 | 69.3 |
| M600-07400660A | 7 | 66 | 30 | 50 | 102.7 | 132 | 79 | 37 | 50 | 86.9 |
| M600-07400770A | 7 | 77 | 37 | 60 | 119.8 | 154 | 94 | 45 | 60 | 103.4 |
| M600-07401000A | 7 | 100 | 45 | 75 | 155.6 | 200 | 112 | 55 | 75 | 123.2 |
| M600-08401340A | 8 | 134 | 55 | 100 | 208.4 | 268 | 155 | 75 | 100 | 170.5 |
| M600-08401570A | 8 | 157 | 75 | 125 | 244.2 | 314 | 184 | 90 | 125 | 202.4 |
| M600-09402000A/E | 9 | 200 | 90 | 150 | 272.2 | 350 | 221 | 110 | 150 | 243.1 |
| M600-09402240A/E | 9 | 224 | 110 | 150 | 304.9 | 392 | 266 | 132 | 200 | 292.6 |
| M600-10402700E | 10 | 270 | 132 | 200 | 367.5 | 472.5 | 320 | 160 | 250 | 352 |
| M600-10403200E | 10 | 320 | 160 | 250 | 435.6 | 560 | 361 | 200 | 300 | 397.1 |
| M600-11403770E | 11 | 377 | 185 | 300 | 513.1 | 659.75 | 437 | 225 | 350 | 480.7 |
| M600-11404170E | 11 | 417 | 200 | 350 | 567.6 | 729.75 | 487 | 250 | 400 | 535.7 |
| M600-11404640E | 11 | 464 | 250 | 400 | 631.6 | 812 | 507 | 315 | 450 | 557.7 |





| Product Code* | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| M000-12404800T | 12 | 480 * | 250 | 400 | 672 | 672 | 608 * | 315 | 500 | 668 |
| M000-12405660T | 12 | 566 * | 315 | 450 | 792 | 792 | 660 * | 355 | 550 | 726 |
| M000-12406600T | 12 | 660 * | 355 | 550 | 924 | 924 | 755 * | 400 | 650 | 831 |
| M000-12407200T | 12 | 720 * | 400 | 600 | 1008 | 1008 | 865 * | 500 | 700 | 952 |
| **575 V (500 - 575 V ± 10 %)** | | | | | | | | | | |
| M600-05500030A | 5 | 3 | 1.5 | 2 | 4.7 | 6 | 3.9 | 2.2 | 3 | 4.29 |
| M600-05500040A | 5 | 4 | 2.2 | 3 | 6.2 | 8 | 6.1 | 4 | 5 | 6.71 |
| M600-05500069A | 5 | 6.9 | 4 | 5 | 10.7 | 13.8 | 10 | 5.5 | 7.5 | 11 |
| M600-06500100A | 6 | 10 | 5.5 | 7.5 | 15.6 | 20 | 12 | 7.5 | 10 | 13.2 |
| M600-06500150A | 6 | 15 | 7.5 | 10 | 23.3 | 30 | 17 | 11 | 15 | 18.7 |
| M600-06500190A | 6 | 19 | 11 | 15 | 29.6 | 38 | 22 | 15 | 20 | 24.2 |
| M600-06500230A | 6 | 23 | 15 | 20 | 35.8 | 46 | 27 | 18.5 | 25 | 29.7 |
| M600-06500290A | 6 | 29 | 18.5 | 25 | 45.1 | 58 | 34 | 22 | 30 | 37.4 |
| M600-06500350A | 6 | 35 | 22 | 30 | 54.4 | 70 | 43 | 30 | 40 | 47.3 |
| M600-07500440A | 7 | 44 | 30 | 40 | 68.4 | 88 | 53 | 45 | 50 | 58.3 |
| M600-07500550A | 7 | 55 | 37 | 50 | 85.6 | 110 | 73 | 55 | 60 | 80.3 |
| M600-08500630A | 8 | 63 | 45 | 60 | 98 | 126 | 86 | 75 | 75 | 94.6 |
| M600-08500860A | 8 | 86 | 55 | 75 | 133.8 | 172 | 108 | 90 | 100 | 118.8 |
| M600-09501040A/E | 9 | 104 | 75 | 100 | 141.6 | 182 | 125 | 110 | 125 | 137.5 |
| M600-09501310A/E | 9 | 131 | 90 | 125 | 178.3 | 229.25 | 150 | 110 | 150 | 165 |
| M600-10501520E | 10 | 152 | 110 | 150 | 206.9 | 266 | 200 | 130 | 200 | 220 |
| M000-12503150T | 12 | 315 * | 250 | 350 | 441 | 441 | 360 * | 250 | 350 | 396 |
| M000-12503600T | 12 | 360 * | 250 | 350 | 504 | 504 | 410 * | 300 | 400 | 451 |
| M000-12504100T | 12 | 410 * | 300 | 400 | 574 | 574 | 460 * | 330 | 450 | 506 |
| M000-12504600T | 12 | 460 * | 330 | 450 | 644 | 644 | 510 * | 370 | 500 | 561 |
| **690 V (500 - 690 V ± 10 %)** | | | | | | | | | | |
| M600-07600190A | 7 | 19 | 15 | 20 | 29.6 | 38 | 23 | 18.5 | 25 | 25.3 |
| M600-07600240A | 7 | 24 | 18.5 | 25 | 37.3 | 48 | 30 | 22 | 30 | 33 |
| M600-07600290A | 7 | 29 | 22 | 30 | 45.1 | 58 | 36 | 30 | 40 | 39.6 |
| M600-07600380A | 7 | 38 | 30 | 40 | 59.1 | 76 | 46 | 37 | 50 | 50.6 |
| M600-07600440A | 7 | 44 | 37 | 50 | 68.4 | 88 | 52 | 45 | 60 | 57.2 |
| M600-07600540A | 7 | 54 | 45 | 60 | 84 | 108 | 73 | 55 | 75 | 80.3 |
| M600-08600630A | 8 | 63 | 55 | 75 | 98 | 126 | 86 | 75 | 100 | 94.6 |
| M600-08600860A | 8 | 86 | 75 | 100 | 133.8 | 172 | 108 | 90 | 125 | 118.8 |
| M600-09601040A/E | 9 | 104 | 90 | 125 | 141.6 | 182 | 125 | 110 | 150 | 137.5 |
| M600-09601310A/E | 9 | 131 | 110 | 150 | 178.3 | 229.25 | 155 | 132 | 175 | 170.5 |
| M600-10601500E | 10 | 150 | 132 | 175 | 204.2 | 262.5 | 172 | 160 | 200 | 189.2 |
| M600-10601780E | 10 | 178 | 160 | 200 | 242.3 | 311.5 | 197 | 185 | 250 | 216.7 |
| M600-11602100E | 11 | 210 | 185 | 250 | 285.8 | 367.5 | 225 | 200 | 250 | 247.5 |
| M600-11602380E | 11 | 238 | 200 | 250 | 323.9 | 416.5 | 275 | 250 | 300 | 302.5 |
| M600-11602630E | 11 | 263 | 250 | 300 | 358 | 460.25 | 305 | 315 | 400 | 335.5 |
| M000-12603150T | 12 | 315 * | 280 | 500 | 441 | 441 | 360 * | 355 | 550 | 396 |
| M000-12603600T | 12 | 360 * | 355 | 550 | 504 | 504 | 410 * | 400 | 600 | 451 |
| M000-12604100T | 12 | 410 * | 400 | 600 | 574 | 574 | 460 * | 450 | 650 | 506 |
| M000-12604600T | 12 | 460 * | 450 | 650 | 644 | 644 | 510 * | 500 | 700 | 561 |

Note: Frame 12 is only available as an unassigned power module (M000) and a control module must also be ordered
Internal 125 kw brake chopper included as standard.
Continuous currents at 2 kHz switching frequency
Implement 2.8 MW drive systems by connecting this module in parallel
For more information on these features and the rest of the capabilities of the high power module, please see the latest issue of the High-Power Brochure

## HIGH POWER MODULAR DRIVES

# HIGHLY RELIABLE DRIVE MODULES

**M700 | M701 | M702 | M600 | Pump Drive F600 | HVAC Drive H300**

**The modular offering provides a flexible method of building compact, reliable high-power solutions.**

**Paralleled together, they can control asynchronous and permanent magnet motors in systems up to 2.8 MW (4,200 hp). The frame 12 is a 500 kW (700 hp) module that allows system builders to create high power solutions with the smallest number of components, keeping both footprint and costs to a minimum.**

Unidrive M differentiates itself on performance with extremely fast current control algorithms and high switching frequencies. Active Front End (AFE) solutions deliver unparalleled torque precision & power quality.

The Unidrive M modules can be paralleled into a wide range of flexible solutions to solve all system needs including Active Front End and multi-pulse rectifier configurations. They can be controlled by M700, M701, M702, M600, Pump Drive F600 or HVAC Drive H300 controllers.









F9, 10 & 11 A, E, T



F9, 10 & 11 D



F12 T



F12 D



RECT..A, RECT..T



Master Control, Standard Control



Follower Control

| Format | |
|---|---|
| A | AC in AC out module with integrated rectifier and line choke. Available in frame size 9 and can be paralleled up to 1.9 MW (2,100hp) (Unidrive SPMA replacement) |
| E | AC in AC out module with integrated rectifier. Available in frame sizes 9, 10 & 11 and can be paralleled up to 2.8 MW (4,200hp) |
| T | AC in AC out module with 12 pulse integrated rectifier. Available in frame size 9, 10,11 & 12 and can be paralleled up to 2.8 MW (4,200hp) |
| D | DC in AC out module. Available in frame size 9, 10, 11 & 12 and can be paralleled up to 2.8 MW (4,200hp) (Unidrive SPMD replacement) |
| RECT..A | AC in DC out rectifier 6 pulse module (Unidrive SPMC replacement). Available in frame size 9, 10 & 11 |
| RECT..T | AC in DC out rectifier 12 pulse module (Unidrive SPMC2 replacement). Available in frame size 9, 10 & 11 |
| Standard Control | M700, M701, M702, M600, F600, H300 controller for single module systems |
| Master Control | M700, M701, M702, M600, F600, H300 master controller for systems with more than one module |
| Follower Control | Follower controller for all paralleled modules |

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# DIMENSIONS & WEIGHTS




## Modular Drives

| Frame size | | 9A | 9E \| 9T | 10E \| 10T | 11E \| 11T | 12T | 9D | 10D | 11D | 12D | 10A | 11A | 11T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frame sizes available | M600 \| M700 | • | • | • | • | • | • | • | • | • | | | |
| Dimensions (H x W x D) | mm | 1049 x 310 x 290 | 1010 x 310 x 290 | 1010 x 310 x 290 | 1190 x 310 x 312 | 1750 x 295 x 526 | 714 x 310 x 290 | 714 x 310 x 290 | 804 x 310 x 312 | 1750 x 295 x 526 | 296 x 310 x 290 | 383 x 310 x 290 | 383 x 310 x 290 |
| | in | 41.3 x 12.2 x 11.4 | 39.7 x 12.2 x 11.4 | 39.7 x 12.2 x 11.4 | 46.9 x 12.2 x 12.3 | 68.90 x 11.61 x 20.71 | 28.11 x 12.2 x 11.4 | 28.11 x 12.2 x 11.4 | 31.7 x 12.2 x 12.3 | 68.90 x 11.61 x 20.71 | 11.7 x 12.2 x 11.4 | 15.1 x 12.2 x 11.4 | 15.1 x 12.2 x 11.4 |
| Weight | kg (lb) | 66.5 (146.6) | 46 (101.4) \| 60 (132.3) | 46 (101.4) \| 60 (132.3) | 63 (138.9) \| 65 (143.3) | 130 (287) | 34 (75) | 34 (75) | 42 (92.6) | 130 (287) | 12 (26.5) | 21 (46.3) | 23 (50.7) |
| AC line choke | Internal | • | | | | | | | | | | | |
| | External | | • | • | • | | | | | | • | • | • |

# MODEL RATINGS

| Frame size | | 9A | 9E \| 9T | 10E \| 10T | 11E \| 11T | 12T | 9D | 10D | 11D | 12D | 10A | 11A | 11T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max continuous heavy duty kW rating / A rating | @ 200 V | 45 kW – 55 kW (60 hp – 75 hp) | 45 kW - 55 kW (60 hp - 75 hp) | 75 kW - 90 kW (100 hp - 125 hp) | N/A | N/A | 45 kW - 55 kW (60 hp - 75 hp) | 75 kW - 90 kW (100 hp - 125 hp) | N/A | N/A | 413 A* | N/A | N/A |
| | @ 400 V | 90 kW – 110 kW (125 hp - 150 hp) | 90 kW - 110 kW (150hp) | 132 kW - 160 kW (200 hp - 250 hp) | 185 kW - 250 kW (300 hp - 400 hp) | 250 kW - 400 kW (400 to 600 hp) | 90 kW - 110 kW (150hp) | 132 kW - 160 kW (200 hp - 250 hp) | 185 kW - 250 kW (300 hp - 400 hp) | 250 kW - 400 kW (400 to 600 hp) | 455 A* | 689 A* | 2 x 400 A* |
| | @ 575 V | 75 kW – 90 kW (100 hp - 125 hp) | 75 kW - 90 kW (100 hp - 125 hp) | 110 kW - 132 kW (150 hp - 200 hp) | 150 kW - 225 kW (200 hp - 300 hp) | 250 kW - 330 kW (350 hp - 450 hp) | 75 kW - 90 kW (100 hp - 125 hp) | 110 kW - 132 kW (150 hp - 200 hp) | 150 kW - 225 kW (200 hp - 300 hp) | 250 kW - 330 kW (350 hp - 450 hp) | 246 A* | 387 A* | 2 x 380 A* |
| | @ 690 V | 90 kW – 110 kW (125 hp – 150 hp) | 90 kW - 110 kW (125 hp - 150 hp) | 132 kW - 160 kW (175 hp - 200 hp) | 185 kW - 250 kW (250 hp - 300 hp) | 280 kW - 450 kW (500 hp - 650 hp) | 90 kW - 110 kW (125 hp - 150 hp) | 132 kW - 160 kW (175 hp - 200 hp) | 185 kW - 250 kW (250 hp - 300 hp) | 280 kW - 450 kW (500 hp - 650 hp) | 251 A* | 411 A* | |

**Modular ratings up to 2.8 MW (4,200 hp) through parallel connected inverters.**

*** Maximum DC output current**

# HARDWARE SELECTION

## 90 to 400 kW / 150 to 600 hp Heavy Duty

Unidrive M's modular offering provides a flexible method of building compact, reliable high-power solutions.

| | Order Code | | No Overload | | | Heavy Duty | | | | Normal Duty | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Control Identifier & Electrical Specification M000 **, M700, M701, M702, M600, F600, H300 | Order Code -Format Identifiers | Motor Shaft Power | | Max Cont. Output Current | Motor Shaft Power | | Peak Output Current | | Max Cont. Output Current | Motor Shaft Power | | Peak Output Current | Rectifier for Modular '..D' Inverters | Input Choke | | Output Choke | |
| | | | | | | | | Open Loop | Rotor Flux Control | | | | | | | | | |
| | | | kW | hp | A | kW | hp | A | A | A | kW | hp | A | RECT-..A/T | Single | Dual | Single | Dual |
| 200/240 | -9201760 | A/E/T/D | - | - | 300 | 45 | 60 | 264 | 308 | 216 | 55 | 75 | 238 | -10204100A | INL401 | INL411 | OTL401 | OTL411 |
| | -9202190 | A/E/T/D | - | - | 200* | 55 | 75 | 328 | 383 | 266 | 75 | 100 | 293 | | | | OTL402 | OTL412 |
| | -10202830 | E/T/D | - | - | 224* | 75 | 100 | 424 | 495 | 325 | 90 | 125 | 358 | | INL402 | INL412 | OTL403 | OTL413 |
| | -10203000 | E/T/D | - | - | 270 | 90 | 125 | 450 | 525 | 360 | 110 | 150 | 396 | | | | OTL404 | OTL414 |
| | -9402000 | A/E/T/D | - | - | 320* | 90 | 150 | 300 | 350 | 221 | 110 | 150 | 243 | -10404520A | INL401 | INL411 | OTL401 | OTL411 |
| | -9402240 | A/E/T/D | - | - | 377* | 110 | 150 | 336 | 392 | 266* | 132 | 200 | 293 | | | | OTL402 | OTL412 |
| | -10402700 | E/T/D | - | - | 417* | 132 | 200 | 405 | 472 | 320 | 160 | 250 | 352 | | INL402 | INL412 | OTL403 | OTL413 |
| | -10403200 | E/T/D | - | - | 464* | 160 | 250 | 480 | 560 | 361 | 200 | 300 | 397 | | | | | OTL414 |
| | -11403770 | E/T/D | - | - | 480 * | 185 | 300 | 566 | 659 | 437* | 225 | 350 | 480 | | INL403L | | OTL405 | |
| 380/480 | -11404170 | E/T/D | - | - | 566 * | 200 | 350 | 626 | 729 | 487* | 250 | 400 | 535 | -11406840A -1142X400T | INL403 | | OTL407 | |
| | -11404640 | E/T/D | - | - | 660 * | 250 | 400 | 696 | 812 | 507* | 280 | 450 | 558 | | | | OTL407 | |
| | -12404800 | T/D | 315 | 500 | 720 * | 250 | 400 | 672 | 672 | 608 * | 315 | 500 | 668 | N/A | N/A | N/A | N/A | N/A |
| | -12405660 | T/D | 355 | 550 | 104 | 315 | 450 | 792 | 792 | 660 * | 355 | 550 | 726 | N/A | N/A | N/A | N/A | N/A |
| | -12406600 | T/D | 450 | 650 | 131 | 355 | 550 | 924 | 924 | 755 * | 400 | 650 | 831 | N/A | N/A | N/A | N/A | N/A |
| | -12407200 | T/D | 500 | 700 | 152 | 400 | 600 | 1008 | 1008 | 865 * | 500 | 700 | 952 | N/A | N/A | N/A | N/A | N/A |
| 500/575 | -9501040 | A/E/T/D | - | - | 190 | 75 | 100 | 156 | 182 | 125 | 110 | 125 | 138 | -10502430A | INL601 | INL611 | OTL601 | OTL611 |
| | -9501310 | A/E/T/D | - | - | 200* | 90 | 125 | 196 | 229 | 150 | 110 | 150 | 165 | | | | | OTL612 |
| | -10501520 | E/T/D | - | - | 254* | 110 | 150 | 228 | 266 | 200 | 130 | 200 | 220 | | INL602 | INL612 | OTL603 | OTL613 |
| | -10501900 | E/T/D | - | - | 285* | 132 | 200 | 285 | 332 | 200 | 150 | 200 | 220 | | | | | OTL614 |
| | -11502000 | E/T/D | - | - | 315 * | 150 | 200 | 300 | 350 | 248* | 185 | 250 | 273 | -11503840A 1162X380T | INL603 | | OTL605 | |
| | -11502540 | E/T/D | - | - | 360 * | 185 | 250 | 381 | 444 | 288* | 225 | 300 | 317 | | | | OTL607 | |
| | -11502850 | E/T/D | - | - | 410 * | 225 | 300 | 428 | 498 | 315* | 250 | 350 | 346 | | | | OTL607 | |
| | -12503150 | T/D | 250 | 350 | 460 * | 250 | 350 | 441 | 441 | 360 * | 250 | 350 | 396 | N/A | N/A | N/A | N/A | N/A |
| | -12503600 | T/D | 300 | 400 | 104 | 250 | 350 | 504 | 504 | 410 * | 300 | 400 | 451 | N/A | N/A | N/A | N/A | N/A |
| | -12504100 | T/D | 330 | 450 | 131 | 300 | 400 | 574 | 574 | 460 * | 330 | 450 | 506 | N/A | N/A | N/A | N/A | N/A |
| | -12504600 | T/D | 370 | 500 | 150 | 330 | 450 | 644 | 644 | 510 * | 370 | 500 | 561 | N/A | N/A | N/A | N/A | N/A |





| | Order Code | | No Overload | | | Heavy Duty | | | | Normal Duty | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Control Identifier & Electrical Specification M000 **, M700, M701, M702, M600, F600, H300 | Order Code -Format Identifiers | Motor Shaft Power | | Max Cont. Output Current | Motor Shaft Power | | Peak Output Current | | Max Cont. Output Current | Motor Shaft Power | | Peak Output Current | Rectifier for Modular '..D' Inverters | Input Choke | | Output Choke | |
| | | | | | | | | Open Loop | Rotor Flux Control | | | | | | | | | |
| | | | kW | hp | A | kW | hp | A | A | A | kW | hp | A | RECT-..A/T | Single | Dual | Single | Dual |
| 500/690 | -9601040 | A/E/T/D | - | - | 178 | 90 | 125 | 156 | 182 | 125 | 110 | 150 | 138 | -10602480A | INL601 | INL611 | OTL601 | OTL611 |
| | -9601310 | A/E/T/D | - | - | 210* | 110 | 150 | 196 | 229 | 155 | 132 | 175 | 171 | | | | | OTL612 |
| | -10601500 | E/T/D | - | - | 238* | 132 | 175 | 225 | 262 | 172 | 160 | 200 | 189 | | INL602 | INL612 | OTL603 | OTL613 |
| | -10601780 | E/T/D | - | - | 263* | 160 | 200 | 267 | 311 | 197 | 185 | 250 | 217 | | | | | OTL614 |
| | -11602100 | E/T/D | - | - | 315 * | 185 | 250 | 315 | 367 | 225* | 200 | 250 | 248 | -11604060A -1162X380T | INL603 | | OTL605 | |
| | -11602380 | E/T/D | - | - | 360 * | 200 | 250 | 357 | 416 | 275* | 250 | 300 | 303 | | | | OTL607 | |
| | -11602630 | E/T/D | - | - | 410 * | 250 | 300 | 394 | 460 | 305* | 280 | 400 | 335 | | | | OTL607 | |
| | -12603150 | T/D | 355 | 550 | 460 * | 280 | 500 | 441 | 441 | 360 * | 355 | 550 | 396 | N/A | N/A | N/A | N/A | N/A |
| | -12603600 | T/D | 400 | 600 | | 355 | 550 | 504 | 504 | 410 * | 400 | 600 | 451 | N/A | N/A | N/A | N/A | N/A |
| | -12604100 | T/D | 450 | 650 | | 400 | 600 | 574 | 574 | 460 * | 450 | 650 | 506 | N/A | N/A | N/A | N/A | N/A |
| | -12604600 | T/D | 500 | 700 | | 450 | 650 | 644 | 644 | 510 * | 500 | 700 | 561 | N/A | N/A | N/A | N/A | N/A |

**Notes:**

*** At 2 kHz Switching Frequency**

**** '-12..T/D only available as M000**

**For ratings at 'switching frequency' > 3 kHz (or 2 kHz for F11 & F12) refer to User Guide**

**For paralleling, a 5% derating should be applied**

# PART NUMBERS

| Control Identifier | Electrical Specification | | | Drive Format | | | Factory Use | Customer Code | Configure to Order Optional Build | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digit | Frame & Volts & Current | | | Power | Control | Spare | | | | | | | |
| 1 2 3 4 5 | 6 7 | 8 | 9 10 11 12 13 | 14 | 15 | 16 | 17 | 18 19 | 20 | 21 | 22 | 23 | 24 |
| **Mxxx-** | **10** | **4** | **03200** | **A** | **1** | **0** | **1** | **00** | **A** | **B** | **1** | **0** | **0** |

**Frame**

**Volts:**
2 = 200 V
4 = 400 V
5 = 575 V
6 = 690 V

**Current Rating:**
Heavy Duty rating x 10
RECT..T (twin rectifier):
2 x Heavy Duty rating

**Control (Inverter only):**
1 = Included
U = Not included; add separately

**Factory Use:**
1 = Standard
2 to 9 = Reserved

**Brake Transistor:**
B = Brake
N = No Brake
(only Frames 9,10 & 11)

**IP / NEMA Rating:**
1 = IP20 / NEMA 1

**Keypad:**
0 = No Keypad
3 = KI-HOA Keypad RTC included as standard

| Drive Range | Derivative Description |
|---|---|
| M700- | Multi-protocol and 1 x STO |
| M701- | Modbus RTU and 1 x STO |
| M702- | Multi-protocol and 2 x STO |
| M600 | Modbus RTU and 1 x STO |
| F600 | Pump Drive |
| H300 | HVAC Drive |
| M000- | Unassigned power – user fit control |
| RECT- | Rectifier for modular range |
| HS70- | High speed version of M700 |
| HS71- | High speed version of M701 |
| HS72- | High speed version of M702 |

| Control Module Range for Unassigned Modular Drives |
|---|
| Mxxx-STANDARD011100A0100 |
| Mxxx-MASTER00011100A0100 |
| M000-FOLLOWER011100A0100 |

| Format Identifier | Description | Frame | Power Range (Heavy Duty) | Access to DC bus |
|---|---|---|---|---|
| A | Integrated Rectifier and Inverter Internal Line Choke | 9 | "90 to 110 kW<br>125 to 150 hp<br>Up to 1.9 MW / 2,800hp in Parallel" | Yes |
| E | "Integrated Single Rectifier and Inverter External Line Choke" | 9, 10, 11 | w"90 to 250 kW<br>125 to 400 hp<br>Up to 2.8 MW / 4,200 hp in Parallel" | No |
| T | "Integrated Twin Rectifier and Inverter External Line Choke" | | | |
| T | "Integrated Twin Rectifier and Inverter No External Line Choke" | 12 | 250 to 400 kW / 400 to 600 hp<br>Up to 2.8 MW / 4,200 hp in Parallel | Yes |
| D | DC to AC Inverter | 9, 10, 11 | 90 to 250 kW<br>125 to 400 hp<br>Up to 2.8 MW / 4,200 hp in Parallel | Yes |
| D | DC to AC Inverter | 12 | 250 to 400 kW / 400 to 600 hp<br>Up to 2.8 MW / 4,200 hp in Parallel | |
| A | AC to DC Single Rectifier | 10, 11 | 90 to 250 kW / 125 to 400 hp | Yes |
| T | AC to DC Twin Rectifier | 10, 11 | | |



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# UNIDRIVE M400

# MINIMISE DOWNTIME & SYSTEM SETUP

**0.25 - 132 kW (0.33 - 200 hp) 100 V | 200 V | 400 V | 575 V | 690 V**

## Optimised throughput, open automation systems, maximum ease of use.

**Unidrive M400 is exceptional at combining the ease of use of our general purpose range with the capabilities of our high performance Unidrive M Series.**

The removable keypad with a real-text display makes it ideal for users who require extra diagnostic help when setting up parameters. Add in an impressive I/O count, dual Safe Torque Off (STO) and integrated PLC, all of which contribute to making Unidrive M400 an extremely capable drive.

Unidrive M400 combines the latest microprocessor technology with unique motor control algorithms to give maximum stability of induction motors at all powers. Current loop update rates up to 125 µs and complementary intelligent control features ensure that machine throughput and energy efficiency are maximised in all industrial applications.

## Key Benefits:

- Reduced system costs with direct integration
- Fast and easy access for commissioning, monitoring and diagnostics
- Flexible communications
- Energy efficiency
- High performance open-loop control








# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Jog | ✓ | Supply loss detection | ✓ |
| Bi-polar reference | ✓ | Low DC link operation | ✓ |
| Pre-set speeds | 8 | Analogue input control | 2 |
| Pre-set timer | ✓ | Analogue output control | 2 |
| Skip frequencies | 3 | Temperature monitoring | ✓ |
| Skip frequency dead bands | ✓ | Digital input control | 6 |
| Local/Remote | ✓ | Digital I/O programmable control | 2 |
| S-Ramp | ✓ | Relay control | 1 |
| Acceleration Rates | 8 | Mechanical Brake Controller | ✓ |
| Deceleration Rates | 8 | Keypad button assignment | ✓ |
| Pulse train frequency reference | 0 - 100kHz | Motorised pot | ✓ |
| Torque reference | ✓ | Logic function control | ✓ |
| Remote keypad with real time clock | ✓ | Timer function control | ✓ |
| Control mode: open loop vector mode | ✓ | Stop mode: Ramp | ✓ |
| Control mode: fixed V/F mode | ✓ | Stop mode: Coast | ✓ |
| Control mode: square V/F mode | ✓ | Stop mode: Fast Ramp | ✓ |
| Control mode: RFC-A mode | ✓ | PID Control | ✓ |
| On-board 'Scope function | ✓ | Limit switch control | ✓ |
| Stator resistance compensation | ✓ | Variable selector | ✓ |
| Slip compensation | ✓ | Energy meter | ✓ |
| Auto-tune static | ✓ | Trip time stamping | ✓ |
| Trip logging | ✓ | Run time log | ✓ |
| Auto-tune rotating | ✓ | Control word control | ✓ |
| Catch a spinning motor | ✓ | Auto reset | ✓ |
| DC injection braking | ✓ | Cloning | ✓ |
| Programmable braking | ✓ | On-board PLC | 16kb |
| Motor Pre-heat control | ✓ | Additional Application parameters | 65 |
| Speed feedback via options | ✓ | Second motor set-up | ✓ |

# SPECIFICATION

| Unidrive M400 | |
|---|---|
| Items supplied with the drive | Step-By-Step Guide, Safety Information, Grounding bracket (Frames 1 to 4), Surface mounting brackets (frame 5 to 9) |
| Storage temperature | -40°C to 60°C, -4°F to 140°F |
| Operating temperature without de-rate | -20°C to 40°C, -4°F to 140°F |
| Operating temperature with de-rate | 40°C to 60°C, 104°F to 140°F Frames 1 to 4<br>40°C to 55°C, 104°F to 131°F Frames 5 to 9 |
| Supply requirements | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| Switching frequency range | *0.66,*1,2,3,4,6,8,12,16kHz (Factory default = 3kHz) |
| Approvals | CE (European Union), cUL Listed (USA and Canada), DNV (marine applications), KC (Korea), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| Product safety standard | EN61800-5-1 |
| Functional safety (Dual STO function) | TÜV certified |
| Altitude | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| Humidity | 95% Non-condensing |
| Pollution | Degree 2. Dry, non-conducting pollution only |
| IP Rating | IP20 – Pollution degree 2 |
| Vibration | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3. |
| Mounting methods | Frame 1 to 4 – Surface mount, DIN Rail or mounting holes |
| | Frame 5 to 9 – Surface mount of through-panel mount via mounting brackets |
| Output frequency/speed range | 599Hz |
| Braking | In-built braking transistor, external resistor required. |
| Operating modes | Open-loop, RFC-A (enhanced open-loop performance) |
| Overload capability | Open-loop – 150% for 60s RFC-A 180% for 3s |
| Overvoltage category | Evaluated for OVC III. |
| Corrosive environments | Category C3 according to BS EN ISO 9223 |
| Immunity Compliance | IEC61800-3, EN60800-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| Emission compliance | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment Category C2 when installed with the recommended filters and line reactors. IEC61800-3, EC61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| Cooling | Forced cooled |
| Safe Torque Off | Dual STO channels. |
| Communications | RS485, Modbus RTU<br><br>SI Options: EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNet, CANopen, POWERLINK |
| Control I/O | 2 x analogue inputs, 2 x analog (or digital) outputs, 2 x digital I/O programmable, 6 x digital inputs (including 1 x frequency input, 1 x AB encoder input, 1 x PWM/frequency output, 1 x motor thermistor input), 1 x NO relay 250 Vac Max., 2 x 0V common, 2 x 24V user output, 1 x 10V user output, 2 x Safe Torque Off (STO) inputs<br>Additional I/O available with SI-I/O option module. |
| Accuracy | Frequency 0.02%, Analogue input 1: 11 bit plus sign, Analogue input 2: 11 bit. Current typical 2%. |





| | |
|---|---|
| On-Board user program capability | 16kB |
| Keypad | Fixed LED keypad, Remote keypad with Real-time clock available as option |
| PC Tools | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| Warranty | 2 years |
| Supported options | AI-Back-up Adaptor, SI-SMART Adaptor, AI-485 & 24V Back-up Adaptor, RTC Remote Keypad, HMI, RS485-Communications lead, SI-EtherCAT, SI-PROFIBUS, SI-Ethernet, SI-DeviceNET, SI-CANopen, SI-PROFINET, SI-I/O, SI-Encoder (speed feedback), Remote I/O. |
| Accessories | Through-hole IP65 mounting kits (frame 5 to 9), UL type conduit kits, SK Retrofit mounting brackets, External EMC filters (standard and low leakage up to and including frame 4), Grounding bracket (supplied with the drive) |

***Frames 1 to 4**

## Documentation & Downloads

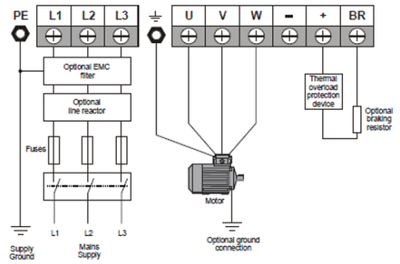
Product documentation and PC tools available for download from:
www.controltechniques.com/support

# DIMENSIONS

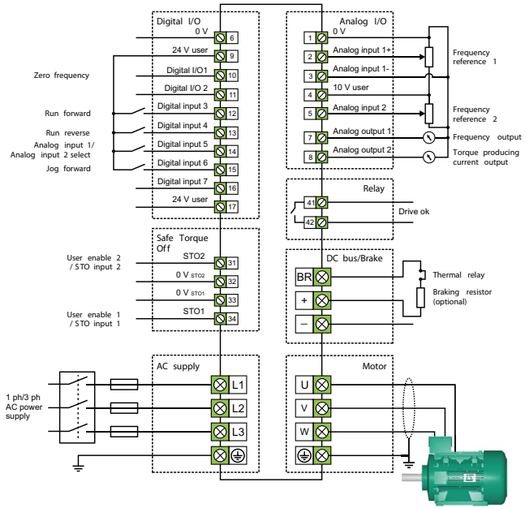
| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| 1 | 160 | 75 | 130 | 6.3 | 2.95 | 5.1 | 143 | 53 | 5.7 | 2.08 | 5 | 0.2 | 0.75 | 1.65 |
| 2 | 205 | 75 | 150 | 8.07 | 2.95 | 5.9 | 194 | 55 | 7.63 | 2.17 | 5 | 0.2 | 1.3 | 3 |
| 3 | 226 | 90 | 160 | 8.9 | 3.54 | 6.3 | 215 | 70.7 | 8.46 | 2.8 | 5 | 0.2 | 1.5 | 3.3 |
| 4 | 277 | 115 | 175 | 10.9 | 4.5 | 6.9 | 265 | 86 | 10.43 | 3.4 | 6 | 0.23 | 3.13 | 6.9 |
| 5 | 391 | 143 | 200 | 15.39 | 5.63 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| 6 | 291 | 210 | 227 | 15.39 | 8.27 | 8.94 | 378 | 196 | 14.88 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| 7 | 557 | 270 | 280 | 21.93 | 10.63 | 11.02 | 538 | 220 | 21.18 | 8.66 | 9 | 0.35 | 28 | 61.7 |
| 8 | 804 | 310 | 290 | 31.65 | 12.21 | 11.42 | 884 | 259 | 30.87 | 10.2 | 9 | 0.35 | 52 | 114.6 |
| 9A | 1069 | 310 | 290 | 42.09 | 12.21 | 11.42 | 1051 | 259 | 41.38 | 10.2 | 9 | 0.35 | 46 | 101.4 |
| 9E | 1108 | 310 | 290 | 43.62 | 12.21 | 11.42 | 1090 | 259 | 42.91 | 10.2 | 9 | 0.35 | 66.5 | 146.6 |



# CONNECTIONS




**Typical Power Connections**




**Default Control Connections**

# PRODUCT CODES

**M400 03 4 0073 A 10100A B 100**

**Frame Size**

**Heavy Duty Current Rating x 10**

**B = Brake Transistor included**
**N = No Brake Transistor**

**Model:**
M400

**Voltage Rating:**
1 = 100V (100V-120V +/-10%)
2 = 200V (200V-240V +/-10%)
4 = 400V (380V-480V +/-10%)
5 = 575V (500V-575V +/-10%)
6 = 690V (500V-690V +/-10%)

**Drive Format**
A = AC in AC out
*E = AC in AC out, external choke required

***Frame 9 only**





# MODEL NUMBER AND RATINGS

| Product Codes | Frame Size | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|---|
| | | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| **100V (100V-120V +/-10%)** | | | | | | | | |
| M400-01100017A | 1 | 1 | 1.7 | 0.25 | 0.33 | Heavy Duty rating only | | |
| M400-01100024A | 1 | 1 | 2.4 | 0.37 | 0.5 | | | |
| M400-01100042A | 1 | 1 | 4.2 | 0.75 | 1 | | | |
| M400-01100056A | 1 | 1 | 5.6 | 1.1 | 1.5 | | | |
| **200V (200V-240 +/-10%)** | | | | | | | | |
| M400-01200017A | 1 | 1 | 1.7 | 0.25 | 0.33 | | | |
| M400-01200024A | 1 | 1 | 2.4 | 0.37 | 0.50 | | | |
| M400-01200033A | 1 | 1 | 3.3 | 0.55 | 0.75 | | | |
| M400-01200042A | 1 | 1 | 4.2 | 0.75 | 1.0 | | | |
| M400-02200024A | 2 | 1/3 | 2.4 | 0.37 | 0.5 | | | |
| M400-02200056A | 2 | 1/3 | 4.2 | 0.75 | 1.0 | | | |
| M400-02200056A | 2 | 1/3 | 5.6 | 1.1 | 1.5 | | | |
| M400-02200056A | 2 | 1/3 | 7.5 | 1.5 | 2.0 | | | |
| M400-03200056A | 3 | 1/3 | 10.0 | 2.2 | 3.0 | | | |
| M400-04200056A | 4 | 1/3 | 13.3 | 3.0 | 3.0 | | | |
| M400-04200056A | 4 | 3 | 17.6 | 4.0 | 5.0 | | | |
| M400-05200056A | 5 | 3 | 25.0 | 5.5 | 7.5 | 30 | 7.5 | 10 |
| M400-06200056A | 6 | 3 | 33.0 | 7.5 | 10.0 | 50 | 11.0 | 15 |
| M400-06200056A | 6 | 3 | 44.0 | 11.0 | 15.0 | 58 | 15.0 | 20 |
| M400-07200056A | 7 | 3 | 61.0 | 15.0 | 20.0 | 75 | 18.5 | 25 |
| M400-07200056A | 7 | 3 | 75.0 | 18.5 | 25.0 | 94 | 22.0 | 30 |
| M400-07200056A | 7 | 3 | 83.0 | 22.0 | 30.0 | 117 | 30.0 | 40 |
| M400-08200056A | 8 | 3 | 116.0 | 30.0 | 40.0 | 149 | 37.0 | 50 |
| M400-08200056A | 8 | 3 | 132.0 | 37.0 | 50.0 | 180 | 45 | 60 |
| M400-09200056A/E | 9 | 3 | 176.0 | 45.0 | 60.0 | 216 | 55 | 75 |
| M400-09200056A/E | 9 | 3 | 210.0 | 55.0 | 75.0 | 266 | 75 | 100 |

| Model No. | Frame Size | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|---|
| | | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| **400V (380V-480V +/-10%)** | | | | | | | | |
| M400-02400013A | 2 | 3 | 1.3 | 0.37 | 0.5 | | | |
| M400-02400018A | 2 | 3 | 1.8 | 0.55 | 0.75 | | | |
| M400-02400023A | 2 | 3 | 2.3 | 0.75 | 1.0 | | | |
| M400-02400032A | 2 | 3 | 3.2 | 1.1 | 1.5 | | | |
| M400-02400041A | 2 | 3 | 4.1 | 1.5 | 2.0 | Heavy Duty rating only | | |
| M400-03400056A | 3 | 3 | 5.6 | 2.2 | 3.0 | | | |
| M400-03400073A | 3 | 3 | 7.3 | 3.0 | 3.0 | | | |
| M400-03400094A | 3 | 3 | 9.4 | 4.0 | 5.0 | | | |
| M400-04400135A | 4 | 3 | 13.5 | 5.5 | 7.5 | | | |
| M400-04400170A | 4 | 3 | 17.0 | 7.5 | 10.0 | | | |
| M400-05400270A | 5 | 3 | 27.0 | 11.0 | 20.0 | 30 | 15 | 20 |
| M400-05400300A | 5 | 3 | 30.0 | 15.0 | 20.0 | 31 | 15 | 20 |
| M400-06400350A | 6 | 3 | 35.0 | 15.0 | 25.0 | 38 | 18.5 | 25 |
| M400-06400420A | 6 | 3 | 42.0 | 18.5 | 30.0 | 48 | 22.0 | 30 |
| M400-06400470A | 6 | 3 | 47.0 | 22.0 | 30.0 | 63 | 30.0 | 50 |
| M400-07400660A | 7 | 3 | 66.0 | 30.0 | 50.0 | 79 | 37.0 | 60 |
| M400-07400770A | 7 | 3 | 77.0 | 37.0 | 60.0 | 94 | 45.0 | 75 |
| M400-07401000A | 7 | 3 | 100.0 | 45.0 | 75.0 | 112 | 55.0 | 75 |
| M400-08401340A | 8 | 3 | 134.0 | 55.0 | 100 | 155 | 75.0 | 100 |
| M400-08401570A | 8 | 3 | 157.0 | 75.0 | 125 | 184 | 90.0 | 125 |
| M400-09402000A/E | 9 | 3 | 200.0 | 90.0 | 150 | 221 | 110.0 | 150 |
| M400-09402240A/E | 9 | 3 | 224.0 | 110.0 | 150 | 266 | 132.0 | 200 |





| Model No. | Supply Phases | Heavy Duty | | | Normal Duty | | |
|---|---|---|---|---|---|---|---|
| | | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) | Max Cont. Current (A) | Motor Power (kW) | Motor Power (hp) |
| **500/575 Vac ±10 %** | | | | | | | |
| M400-055 00030 A | 3 | 3.0 | 1.5 | 2.0 | 3.9 | 2.2 | 3.0 |
| M400-055 00040 A | 3 | 4.0 | 2.2 | 3.0 | 6.1 | 4.0 | 5.0 |
| M400-055 00069 A | 3 | 6.9 | 4.0 | 5.0 | 10.0 | 5.5 | 7.5 |
| M400-065 00100 A | 3 | 10.0 | 5.5 | 7.5 | 12.0 | 7.5 | 10.0 |
| M400-065 00150 A | 3 | 15.0 | 7.5 | 10.0 | 17.0 | 11.0 | 15.0 |
| M400-065 00190 A | 3 | 19.0 | 11.0 | 15.0 | 22.0 | 15.0 | 20.0 |
| M400-065 00230 A | 3 | 23.0 | 15.0 | 20.0 | 27.0 | 18.5 | 25.0 |
| M400-065 00290 A | 3 | 29.0 | 18.5 | 25.0 | 34.0 | 22.0 | 30.0 |
| M400-065 00350 A | 3 | 35.0 | 22.0 | 30.0 | 43.0 | 30.0 | 40.0 |
| M400-075 00440 A | 3 | 44.0 | 30.0 | 40.0 | 53.0 | 37.0 | 50.0 |
| M400-075 00550 A | 3 | 55.0 | 37.0 | 50.0 | 73.0 | 45.0 | 60.0 |
| M400-085 00630 A | 3 | 63.0 | 45.0 | 60.0 | 86.0 | 55.0 | 75.0 |
| M400-085 00860 A | 3 | 86.0 | 55.0 | 75.0 | 108.0 | 75.0 | 100.0 |
| M400-095 01040 A | 3 | 104.0 | 75.0 | 100.0 | 125.0 | 90.0 | 125.0 |
| M400-095 01310 A | 3 | 131.0 | 90.0 | 125.0 | 150.0 | 110.0 | 150.0 |
| **500/690 Vac ±10 %** | | | | | | | |
| M400-076 00190 A | 3 | 19.0 | 15.0 | 20.0 | 23.0 | 18.5 | 25.0 |
| M400-076 00240 A | 3 | 24.0 | 18.5 | 25.0 | 30.0 | 22.0 | 30.0 |
| M400-076 00290 A | 3 | 29.0 | 22.0 | 30.0 | 36.0 | 30.0 | 40.0 |
| M400-076 00380 A | 3 | 38.0 | 30.0 | 40.0 | 46.0 | 37.0 | 50.0 |
| M400-076 00440 A | 3 | 44.0 | 37.0 | 50.0 | 52.0 | 45.0 | 60.0 |
| M400-076 00540 A | 3 | 54.0 | 45.0 | 60.0 | 73.0 | 55.0 | 75.0 |
| M400-086 00630 A | 3 | 63.0 | 55.0 | 75.0 | 86.0 | 75.0 | 100.0 |
| M400-086 00860 A | 3 | 86.0 | 75.0 | 100.0 | 108.0 | 90.0 | 125.0 |
| M400-096 01040 A | 3 | 104.0 | 90.0 | 125.0 | 125.0 | 110.0 | 150.0 |
| M400-096 01310 A | 3 | 131.0 | 110.0 | 150.0 | 150.0 | 132.0 | 175.0 |

# MODULAR POWER

# 500 KW DRIVE

**315 kW to 500 kW | Up to 865 A | 380 to 480 VAC (± 10%)**
with 110% Overload



## While low power accounts for most of the growth for variable speed drives, energy-saving applications are driving growth in high power drives.

Fans, pumps, compressors and extruders are common uses of drives that increasingly need a higher power option.

**Control Techniques' largest high power drive, offers 500 kW of power in a single module, but at 130kg is up to 60kg lighter than competitors drives.**

Its small footprint and pre-engineered accessories make it easy to install or retrofit in industry-standard cubicles.

## A choice of control module options

**This 500 kW drive can be fitted with a Unidrive M600/ M70X, Pump Drive F600 or HVAC Drive H300 control module and has a wide range of accessories available for easy installation.**

Alternatively, the frame can be provided pre-assembled in its own industry-standard cabinet, with user-selectable system components included.

This is the ready to use DFS series free standing version.



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# DIMENSIONS

| Width | Height | Depth |
|---|---|---|
| 295mm | 1750mm | 526mm |




### Documentation & Downloads

Product documentation and PC tools available for download from:
www.controltechniques.com/support

# DRIVE RATINGS AND ORDERING INFORMATION

| | Order Code Start | No Overload | | | Normal Duty (110% Overload) | | | | Heavy Duty (140% Overload) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max, Cont. Output Current | Motor Shaft Power | | Max Cont. Current | Peak Current | Motor Shaft Power | | Max Cont. Output Current | Peak Current | Motor Shaft Power | |
| | | A | kW | hp | A | A | kW | hp | A | A | kW | hp |
| 400 V | M000-12404800 | 635 | 315 | 500 | 608 | 668 | 315 | 500 | 480 | 672 | 250 | 400 |
| | M000-12405660 | 689 | 355 | 550 | 660 | 726 | 355 | 550 | 566 | 792 | 315 | 450 |
| | M000-12406600 | 788 | 450 | 650 | 755 | 831 | 400 | 650 | 660 | 924 | 355 | 550 |
| | M000-12407200 | 903 | 500 | 700 | 865 | 952 | 500 | 700 | 720 | 1008 | 400 | 600 |
| 575 V | M000-12503150 | 375 | 250 | 350 | 360 | 396 | 250 | 350 | 315 | 441 | 250 | 350 |
| | M000-12503600 | 426 | 300 | 400 | 410 | 451 | 300 | 400 | 360 | 504 | 250 | 350 |
| | M000-12504100 | 479 | 330 | 450 | 460 | 506 | 330 | 450 | 410 | 574 | 300 | 400 |
| | M000-12504600 | 530 | 370 | 500 | 510 | 561 | 370 | 500 | 460 | 644 | 330 | 450 |
| 690 V | M000-12603150 | 375 | 355 | 550 | 360 | 396 | 355 | 550 | 315 | 441 | 280 | 500 |
| | M000-12603600 | 426 | 400 | 600 | 410 | 451 | 400 | 600 | 360 | 504 | 355 | 550 |
| | M000-12604100 | 479 | 450 | 650 | 460 | 506 | 450 | 650 | 410 | 574 | 400 | 600 |
| | M000-12604600 | 530 | 500 | 700 | 510 | 561 | 500 | 700 | 460 | 644 | 450 | 650 |

Internal 125 kw brake chopper included as standard.
Continuous currents at 2 kHz switching frequency
40 °C ambient
Order Code Finish — Format
...TU0100AB100 — AC to AC
...DU0100AB100 — DC to AC

Implement 2.8 MW drive systems by connecting this module in parallel

Construct regenerative and low harmonic AFE systems with 'D' or DC to AC modules and a new integrated LCL filter

For more information on these features and the rest of the capabilities of this module. please see the latest issue of the High-Power Brochure

# FREE STANDING DRIVES

## DFS SERIES





## DFS SERIES

# PRE-ASSEMBLED CUBICLE DRIVES

### Efficient System Build.

**Designing and building a high power drive cubicle takes immense engineering knowhow. Most people don't have that expertise in-house. But we do. And we've put it all into our DFS freestanding drives.**

The cubicle system is designed to handle high power applications – maximum energy efficiency and ingress protection when you need it most. The drives are pre-assembled, they're easy to set up. Just install the cubicle and flick the switch. Maximum plant availability, minimum technical wizardry required.

**Fans & Pumps**

**General Automation**

**Compressors**



# SPECIFICATION

| Feature | Description |
|---|---|
| Enclosure rating | A = IP23 (Standard)<br>C = IP54 - Air inlet grill filters |
| Electrical environment | EMC filter to meet generic emission IEC 61000-6-4 or operate in the First Environment |
| | Remove internal EMC filter for use on un earthed supplies |
| | Remove MOV protection for use on un earthed supplies |
| AC Input Disconnect | A - Main switch with undervoltage release coil 230 VAC (MN)<br>B - Main switch with undervoltage release coil 24 VAC (MN)<br>C - Main switch with shunt trip voltage release coil 230 VAC (MX)<br>D - Main switch with shunt trip voltage release coil 24 VAC (MX)<br>2 x auxiliary contacts on main switch - supply and wiring |
| Emergency stop push button door mounted | For integration in your control system |
| Cubicle Options | Cabinet temperature-controlled roof fan<br>Plinth 200 mm. Standard plinth is 100 mm<br>Alternative 180 ° door hinges for improved access<br>Cylinder lock with key for extra cubicle security |
| F600 HMI | Dedicated interface to configure and monitor your Pump Drive F600<br>Supports F600 in Single Pump, Cascade and Multi-leader modes<br>Intuitive graphical interface gives real-time access to PID monitoring and historic trends<br>Pre-configured pages can be tailored for application customisation<br>Connect via Modbus RTU or Modbus TCP/IP |
| Energy Monitoring | A - kWh meter Conventional (IP54) with current transducers (non MID)<br>B - kWh meter Modbus RTU with current transducers (non MID)<br>C - kWh meter Profibus (400 V SUPPLY ONLY) with current transducers (non MID)<br>D - kWh meter Ethernet with current transducers (non MID) kWh meter pulse contacts in combination with A, B, C OR D kWh meters |
| 24 V back-up power | Supply wiring installed for external 24V backup power supply |
| Additional Cubicles | A - Integrated 400 mm empty cubicle with plinth, cable plates INCLUDING mounting plate - for your system equipment<br>B - Integrated 400 mm empty cubicle with plinth, cable plates and WITHOUT mounting plate - for your installation cable management |
| Packaging | Packaging for land freight as standard<br>Packaging for air freight available at extra cost |



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# DIMENSIONS

| Dimensions | |
|---|---|
| A | IP23 or IP54 up to 180 mm |
| B | 2000 mm |
| C | 100 or 200 mm |
| D | IP23 or IP54 – 600 mm |
| E | DFS1 – 400 mm<br>DFS2 – 1200 mm |



# PRODUCT CODES

| Drive Range | Format | Drive Specification | | | | | Primary Cubicle Options | |
|---|---|---|---|---|---|---|---|---|
| M70x- | DFS | 1 | 9 | 4 | E | N | S | A |

**Drive Range**
M70x Industrial Drive
Pump Drive F600
HVAC Drive H300

**Format**
Freestanding Drive

**DFS Range**

**Drive Specification**
Current Rating Step

**Supply Voltage:**
4 = 400 V; 6 = 690 V

**World Region:**
E = Europe

**Input Circuit:**
N = Rectifier - Single 6 Pulse

**Primary Cubicle Options**
Input Switch:
S = Load Switch

Enclosure Rating:
A = IP23 - Air Cooled
C = IP54 - Air Cooled

## Documentation & Downloads

Product documentation and PC tools available for download from:
www.controltechniques.com/support





# MODEL NUMBER AND RATINGS

## Drive selection for 380/480 VAC: Load switch, fuses and IP23 protection as standard 40°

| 35°C Ambient \| IP23 and IP54 | | | | |
|---|---|---|---|---|
| 380/480 VAC±10% \| 50 Hz | | | | |
| Product Code (Short) | Normal Duty 110 % | | Heavy Duty Open Loop = 150 % RFC = 175 % | |
| | xxxx = F600, H300, M700, M701, M702 | | xxxx = M700, M701, M702 | |
| | Max Cont. Current | Motor Shaft Power | Max Cont. Current | Motor Shaft Power |
| | (A) | (kW) | (A) | (kW) |
| xxxx-DFS1G4EN | 155 | 75 | 134 | 55 |
| xxxx-DFS1H4EN | 184 | 90 | 157 | 75 |
| xxxx-DFS1J4EN | 221 | 110 | 180<br>200 (2 kHz) | 90 |
| xxxx-DFS1K4EN | 255<br>266 (2 kHz) | 132<br>132 (2 kHz) | 211<br>224 (2 kHz) | 110<br>110 (2 kHz) |
| xxxx-DFS1L4EN | 320 | 160 | 270 | 132 |
| xxxx-DFS1M4EN | 361 | 200 | 307<br>320 (2 kHz) | 160<br>160 (2 kHz) |
| xxxx-DFS1N4EN | 437 | 225 | 377 | 200 |
| xxxx-DFS1P4EN | 460<br>487 (2 kHz) | 250<br>250 (2 kHz) | 417 | 225 |
| xxxx-DFS1Q4EN | 460<br>507 (2 kHz) | 250<br>280 (2 kHz) | 415<br>464 (2 kHz) | 225<br>250 (2 kHz) |
| xxxx-DFS2L4EN | 608 | 315 | 513 | 270 |
| xxxx-DFS2M4EN | 686 | 370 | 583<br>608 (2 kHz) | 315<br>315 (2 kHz) |
| xxxx-DFS2N4EN | 830 | 450 | 716 | 380 |
| xxxx-DFS2P4EN | 874<br>925 (2 kHz) | 470<br>500 (2 kHz) | 792 | 420 |
| xxxx-DFS2Q4EN | 874<br>963 (2 kHz) | 470<br>520 (2 kHz) | 789<br>882 (2 kHz) | 420<br>470 (2 kHz) |

**Notes:**

- 3kHz Switching Frequency except where stated otherwise
- "kW" are motor dependant and for indication only
- A braking transistor is included in all drives
- Remaining digits of order code generated automatically for customer selected cubicle options

| 40°C Ambient \| IP23 and IP54 | | | | |
|---|---|---|---|---|
| 380/480 VAC ±10% \| 50 Hz | | | | |
| Product Code (Short) | Normal Duty 110 % | | Heavy Duty Open Loop = 150 % RFC = 175 % | |
| | xxxx = F600, H300, M700, M701, M702 | | xxxx = M700, M701, M702 | |
| | Max Cont. Current | Motor Shaft Power | Max Cont. Current | Motor Shaft Power |
| | (A) | (kW) | (A) | (kW) |
| xxxx-DFS1G4EN | 155 | 75 | 134 | 55 |
| xxxx-DFS1H4EN | 184 | 90 | 152 | 75 |
| xxxx-DFS1J4EN | 221 | 110 | 180<br>200 (2 kHz) | 90 |
| xxxx-DFS1K4EN | 221<br>221 (2 kHz) | 132 | 180<br>200 (2 kHz) | 110 |
| xxxx-DFS1L4EN | 320 | 160 | 270 | 132 |
| xxxx-DFS1M4EN | 341 | 200 | 295<br>314 (2 kHz) | 160 |
| xxxx-DFS1N4EN | 426<br>437 (2 kHz) | 225 | 377 | 200 |
| xxxx-DFS1P4EN | 438<br>475 (2 kHz) | 250 | 398<br>416 (2 kHz) | 225 |
| xxxx-DFS1Q4EN | 438<br>485 (2 kHz) | 250<br>280 (2 kHz) | 398<br>441 (2 kHz) | 225<br>250 (2 kHz) |
| xxxx-DFS2L4EN | 608 | 315 | 513 | 270 |
| xxxx-DFS2M4EN | 648<br>669 (2 kHz) | 370 | 560<br>596 (2 kHz) | 315 |
| xxxx-DFS2N4EN | 809<br>830 (2 kHz) | 450 | 716 | 380 |
| xxxx-DFS2P4EN | 831<br>902 (2 kHz) | 470<br>500 (2 kHz) | 755<br>790 (2 kHz) | 420 |
| xxxx-DFS2Q4EN | 831<br>921 (2 kHz) | 470<br>520 (2 kHz) | 755<br>838 (2 kHz) | 420<br>470 (2 kHz) |

***Higher powers can be quoted on request**





## Drive selection for 500/690 VAC: Load switch, fuses and IP23 protection as standard

| 35°C Ambient \| IP23 and IP54 | | | | |
|---|---|---|---|---|
| 500/690 VAC \| ±10% \| 50 Hz | | | | |
| Product Code (Short) | Normal Duty 110 % | | Heavy Duty Open Loop = 150 % RFC = 175 % | |
| | xxxx =F600, H300, M700, M701, M702 | | xxxx = M700, M701, M702 | |
| | Max Cont. Current | Motor Shaft Power | Max Cont. Current | Motor Shaft Power |
| | (A) | (kW) | (A) | (kW) |
| xxxx-DFS166EN | 86 | 75 | 63 | 55 |
| xxxx-DFS176EN | 108 | 90 | 86 | 75 |
| xxxx-DFS186EN | 125 | 110 | 104 | 90 |
| xxxx-DFS196EN | 155 | 132 | 131 | 110 |
| xxxx-DFS1A6EN | 172 | 160 | 150 | 132 |
| xxxx-DFS1B6EN | 197 | 185 | 178 | 160 |
| xxxx-DFS1C6EN | 225 | 200 | 210 | 185 |
| xxxx-DFS1D6EN | 265<br>275 (2 kHz) | 235<br>250 (2 kHz) | 221<br>238 (2 kHz) | 185<br>200 (2 kHz) |
| xxxx-DFS1E6EN | 265<br>305 (2 kHz) | 235<br>280 (2 kHz) | 221<br>263 (2 kHz) | 185<br>250 (2 kHz) |
| xxxx-DFS2A6EN | 327 | 300 | 285 | 260 |
| xxxx-DFS2B6EN | 374 | 355 | 338 | 315 |
| xxxx-DFS2C6EN | 428 | 400 | 399 | 370 |
| xxxx-DFS2D6EN | 504<br>523 (2 kHz) | 440<br>490 (2 kHz) | 420<br>452 (2 kHz) | 370<br>420 (2 kHz) |
| xxxx-DFS2E6EN | 504<br>580 (2 kHz) | 440<br>540 (2 kHz) | 420<br>500 (2 kHz) | 370<br>460 (2 kHz) |

**Notes:**

- 3kHz Switching Frequency except where stated otherwise
- "kW" are motor dependant and for indication only
- A braking transistor is included in all drives
- Remaining digits of order code generated automatically for customer selected cubicle options

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# VARIANTS FOR EVERY APPLICATION

## DFS is available with a control stage to suit any application:

- Industrial automation systems based upon induction or servo motors, where control dynamics are key.
- HVAC/R systems where dedicated drive features provide overall system control.
- DFS supports the latest high-efficiency motors to maximise return on investment and minimise impact on the environment.

**Select from: Unidrive M700, M701, M702, Pump Drive F600 or HVAC Drive H300 control**

| | | | |
|---|---|---|---|
|  | **M700** | **Ethernet** | • Onboard real-time multi-protocol Ethernet<br>• 1 x Safe Torque Off (STO) certified to SIL3/PLe<br>• Analogue and digital I/O |
|  | **M701** | **Unidrive SP replacement** | • Designed to match Control Techniques' highly popular Unidrive SP feature-set.<br>• Modbus RTU over RS485 communications<br>• 1 x STO certified to SIL3/PLe<br>• Analogue and digital I/O |
|  | **M702** | **Safety enhanced** | • Onboard real-time multi-protocol Ethernet<br>• 2 x STO certified to SIL3/ PLe<br>• Digital I/O - If Analogue I/O is required, this can be provided by an SI-I/O option module |
|  | **F600** | **Pumping** | • Dedicated, specialist pump drive delivers precise, dependable flow control<br>• Comprehensive pump protection and energy saving features significantly reduce total cost of ownership |
|  | **H300** | **HVAC** | • Dedicated, specialist HVAC drive optimised for fan and compressor applications<br>• Modbus RTU and BACnet MS/TP communications provide seamless integration with Building Automation Systems |

**Please refer to the individual product brochures for full information**

## Output frequency

DFS drives have a maximum output frequency of 599Hz and are, therefore, not subject to special export controls.

# SPECIALIST DRIVES

## ELEVATOR | PUMP | HVAC





# PRODUCTS IN THIS RANGE

**ELEVATOR DRIVE E300 | PUMP DRIVE F600 | HVAC DRIVE H300**



## ELEVATOR DRIVE E300

# DEDICATED DRIVE FOR CLASS-LEADING RIDE COMFORT

### Your top choice for every project.

Our elevator drive solutions work for any size of building. Whether it's a small residential building or a luxury high rise, new build or modernization projects, we make every step of the process as easy as possible from product selection to installation, setup and service.

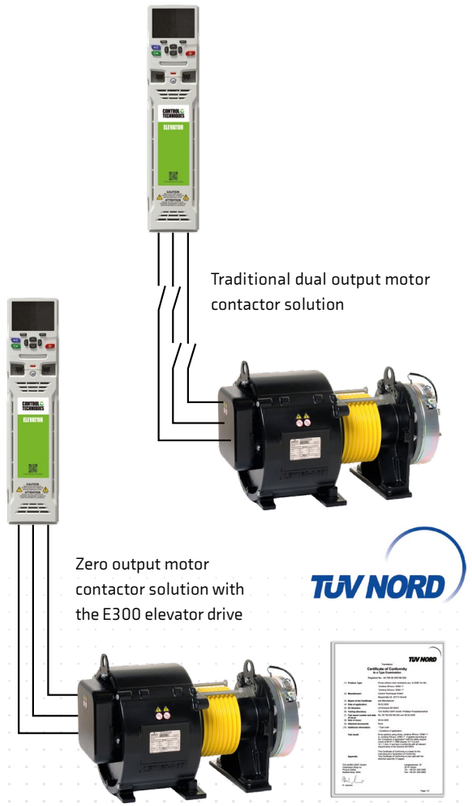
### Contactorless operation

Control Techniques' drive range provides contactorless operation in elevator applications.

Our EN81-20, EN81-50 TÜV certified Safe Torque Off (STO) function provides a highly dependable method for preventing the motor from being driven. This removes the need for both output motor contactors.

The benefits of switching to a contactorless solution include:

- Reduced EMC issues
- Reduced acoustic noise
- Improved system reliability
- Simplified electrical installation
- Lower system costs
- Minimised cabinet space allowing machine room-less installation




# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Creep-to-floor operation | ✓ | Active thermal management | ✓ |
| Direct-to-floor positioning | ✓ | Variable speed cooling fan | ✓ |
| Selectable speed reference | 10 | Supply loss detection | ✓ |
| Start optimizer | ✓ | Low DC link operation | ✓ |
| Start locking & pre-torquing | ✓ | 24 Vdc backup | ✓ |
| Selectable switching frequencies | Up to 16 kHz | Simple UPS connection with load direction signal | ✓ |
| Skip frequency dead bans | ✓ | Analogue input control | 3 |
| Local/Remote keypad | ✓ | Analogue output control | 2 |
| High resolution S-ramp | ✓ | Temperature monitoring | ✓ |
| Acceleration Rates | 8 | Digital input control | 3 |
| Deceleration Rates | 8 | Digital I/O programmable control | 3 |
| Control mode: analogue reference | ✓ | Safe Torque Off input | 1 |
| Control mode: digital binary | ✓ | Relay control | 1 |
| Control mode: control word | ✓ | Mechanical Brake Controller | ✓ |
| Control mode: analouge reference over comms | ✓ | Brake contact monitoring | ✓ |
| Control mode: DCP3 & DCP4 | ✓ | Adjustable break delays | ✓ |
| Control mode: CANopen-Lift | ✓ | Logic function control | ✓ |
| Stator resistance compensation | ✓ | Timer function control | ✓ |
| Slip compensation | ✓ | Limit switch control | ✓ |
| Selectable roping ratios | ✓ | Variable selector | ✓ |
| Auto-tune static | ✓ | Energy meter | ✓ |
| Auto-tune rotating | ✓ | Trip time stamping | ✓ |
| Tunable start, run & stop gains | ✓ | Trip logging | 8 |
| Fast stop | ✓ | Run time log | ✓ |
| Floor sensor correction | ✓ | Cloning | ✓ |
| DC injection braking | ✓ | Universal feedback port on-board | ✓ |
| Programmable braking | ✓ | Speed feedback via options | ✓ |

# SPECIFICATION

| Feature | Description |
|---|---|
| **Items supplied with the drive** | Safety Information, Quality Certificate, Control signal connectors, 24V power supply connector (frames 6 to 11), Grounding bracket, Surface mounting brackets, DC connection grommets (frames 3 to 6), Supply and motor connectors (frames 3 to 5), Nuts for supply and motor terminals (frames 6 to 11) |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | AC supply voltage:<br>200 V drive: 200 V to 240 V ±10 %<br>400 V drive: 380 V to 480 V ±10 %<br>575 V drive: 500 V to 575 V ±10 %<br>690 V drive: 500 V to 690 V ±10 %<br>Number of phases: 3<br>Maximum supply imbalance: 2 % negative phase sequence (3 % voltage imbalance between phases).<br>Frequency range: 45 to 66 Hz<br>For UL compliance only, the maximum supply symmetrical fault current must be limited to 100 kA |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 8kHz Open-loop/RFC-A/RFC-S) |
| **Approvals** | CE approval – Europe<br>RCM regulatory compliance mark – Australia<br>UL / cUL approval – USA & Canada<br>RoHS compliant – Europe<br>Functional safety – USA & Canada<br>Eurasian conformity – Eurasia |
| **Product safety standard** | EN 61800-5-1:2016 Adjustable speed electrical power drive systems - Part 5-2: Safety requirements – Functional<br>EN 61800-5-1:2016 (in extracts) Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy<br>EN 61800-3: 2004+A1:2012 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods<br>EN ISO 13849-1:2015 Safety of Machinery, Safety-related parts of control systems, General principles for design<br>EN 62061:2005 + AC:2010 + A1:2013 + A2:2015 Safety of machinery, Functional safety of safety related electrical, electronic and programmable electronic control systems<br>IEC 61508 Parts 1 - 7:2010 Functional safety of electrical/ electronic/programmable electronic safety-related systems |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing at 40 °C (104 °F) |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 / NEMA1 / UL TYPE 1 (UL open class as standard, additional kit needed to achieve Type 1)<br>IP65 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 3 to 8)<br>IP55 / NEMA4 / UL TYPE 12 rating on the rear of drive when through panel mounted (Frames 9 to 11) |



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| | |
|---|---|
| **Vibration** | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3. |
| **Mounting methods** | Frame 3 to 11 – Surface mount (supplied mounting brackets) or through-panel mount (optional mounting brackets). Frame 3 to 5 – Tile mount (optional mounting brackets) |
| **Output frequency/speed range** | 599Hz (Open-loop), 560Hz (RFC-A, RFC-S) |
| **Braking** | In-built braking transistor for use with external braking resistor (all frames) |
| **Operating modes** | Open-loop: Open-loop vector, fixed V/F<br>RFC-A: Rotor Flux Control for Asynchronous motors, with or without position feedback<br>RFC-S: Rotor Flux Control for Synchronous motors, with or without position feedback |
| **Overload capability** | Heavy duty: Open-loop 150% overload, RFC 175% overload with CT profile, RFC 200% max overload. |
| **Overvoltage category** | Evaluated for Over Voltage Category III. |
| **Corrosive environments** | Concentrations of corrosive gases must not exceed the levels given in: Table A2 of EN 50178:1998, Class 3C2 of IEC 60721-3-3<br>This corresponds to the levels typical of urban areas with industrial activities and/or heavy traffic, but not in the immediate neighbourhood of industrial sources with chemical emissions. |
| **Immunity Compliance** | IEC EN 61000-4-2 Electrostatic discharge<br>IEC EN 61000-4-3 Radio frequency radiated field<br>IEC EN 61000-4-4 Fast transient burst<br>IEC 61000-4-5 Surges<br>IEC EN 61000-4-6 Conducted radio frequency<br>IEC EN 61000-4-11 Voltage dips, short interruptions & variations<br>IEC EN 61000-6-1 Electromagnetic compatibility residential, commercial and light-industrial environments<br>IEC EN 61000-6-2 Electromagnetic compatibility for industrial environments<br>IEC 61800-3 Adjustable speed electrical power drive systems - Part 3: EMC requirements<br>EN12016:2013 Electromagnetic compatibility standard for lifts, escalators and moving walks Immunity with the recommended external filters and line reactors. |
| **Emission compliance** | Meets requirements of Equipment Category C3, C4 without external filters or line reactors.<br>Meets requirements of Equipment Category C2 with the recommended external filters and line reactors.<br>IEC 61800-3 Electromagnetic compatibility (EMC) requirements for power drive systems<br>IEC EN 61000-3-2 Electromagnetic compatibility - Limits for harmonic current emissions<br>IEC EN 61000-3-3 Electromagnetic compatibility Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems ≤ 16 A<br>IEC EN 61000-3-11 Electromagnetic compatibility Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems < 16 A < 75 A<br>IEC EN 61000-3-12 Electromagnetic compatibility Limits for harmonic currents produced by equipment connected to public low-voltage systems > 16 A and ≤ 75 A per phase<br>IEC EN 61000-6-4 Electromagnetic compatibility (EMC) Emission standard for industrial environments<br>EN 12015:2014, Electromagnetic compatibility standard for lifts, escalators and moving walks Emmission with the recommended external filters and line reactors. |
| **Cooling** | Variable speed forced controlled heatsink cooling fans |
| **Safe Torque Off** | Single STO channel. SIL 3 |
| **Communications** | Onboard: RS485, Modbus/TCP<br>SI Options: Ethernet, CANopen, DCP |
| **Control I/O** | 3 x Analogue input (1 x differential, 2 x single ended), 2 x Analogue output, 3 x Digital I/O programmable, 3 x Digital input (including 2 x high speed – 250µs), 1 x NO relay 250Vac Max., 6 x 0V common, 1 x 24V supply input (additional digital input), 1 x 24V user output (additional digital output), 1 x 10V user output, 1 x Safe Torque Off input. Additional I/O also available with SI-I/O option module. |

| | |
|---|---|
| **Supported Feedback Devices** | Supports a combination of main encoder feedback and a simulated encoder output from a single high-density connector:<br>AB (0) Quadrature incremental encoders with or without marker pulse<br>AB Servo (3) Quadrature incremental encoders with UVW commutation signals for absolute position for permanent magnet motors with or without marker pulse<br>FR (2) Forward / reverse incremental encoders with or without marker pulse<br>FR Servo (5) Forward / reverse incremental encoders with UVW commutation signals for absolute position for permanent magnet motors with or without marker pulse<br>FD (1) Frequency and direction incremental encoders with or without marker pulse<br>FD Servo (4) Frequency and direction incremental encoders with UVW commutation signals for absolute position for permanent magnet motors with or without marker pulse<br>SC (6) Sincos incremental encoders<br>SC Servo (12) Sincos incremental with commutation signals<br>SC EnDat (9) Heidenhain sincos encoders with EnDat comms for absolute position<br>SC Hiperface (7) Stegmann sincos encoders with Hiperface comms for absolute position<br>SC SSI (11) Sincos encoders with SSI comms for absolute position<br>SC BiSS (17) Sincos encoders with BiSS (type C) comms for absolute position<br>SC SC (15) Sincos incremental with absolute position from single sin and cosine signals<br>SSI (10) SSI encoders (Gray code or binary)<br>EnDat (8) EnDat communication only encoders<br>BiSS (13) BiSS (type C) communication only encoders<br>Resolver (14) Resolver<br>Commutation only (16) UVW commutation only encoders*<br>* This feedback device provides very low-resolution feedback |
| **Resolution and Accuracy** | Frequency/speed accuracy: 0.01% (preset speed)<br>Open loop resolution – Preset reference: 0.1 Hz, Precision reference: 0.001 Hz<br>Closed loop resolution: Preset reference: 0.1 rpm, Precision reference: 0.001 rpm<br>Differential Analog input 1: 12 bit (11 bit plus sign)<br>Single ended Analog input 2 & 3: 12 bit (11 bit plus sign) |
| **Onboard advanced motion controller** | N/A |
| **On-Board user program capability** | N/A |
| **Optional Second Processor (PLC / Motion)** | SI-Applications Plus: allows application programming to be used<br>MCi200: Advanced Machine Controller using industry standard IEC61131-3 programming languages<br>MCi210: Extended Advanced Machine Controller using industry standard IEC61131-3 programming languages with simultaneous connectivity to 2 separate Ethernet networks |
| **Keypad** | Remote-Keypad RTC with real-time clock |
| **Parameter backup and cloning** | Smartcard and NV Media Card (using NV Media Card adapter) |
| **PC Tools** | Connect: Commissioning and cloning tool<br>CT Scope: Oscilloscope<br>Machine Control Studio: Second processor programming<br>Drive Profiling Tool: Drive estimated thermal profiling |
| **Warranty** | 26 months |
| **Supported options** | Remote-Keypad RTC, KI-485 Adapter, RS485-Communications lead, SI-Ethernet, SI-CANopen, SI-DCP, SI-I/O, SI-Encoder, SI -Universal Encoder, SI-Applications Plus, SI-Applications Compact, MCi200, MCi210, Smartcard, NV Media Card (using NV Media Card adapter) |
| **Accessories** | Through-hole IP65 mounting kit, UL type conduit kits, SP Retrofit mounting brackets, External EMC filters, Grounding bracket (supplied with the drive) |





# DIMENSIONS

| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting hole Dia. | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H** | W | D | H** | W | D | H | W | H | W | | | | |
| **3** | 365 | 83 | 200 | 14.37 | 3.27 | 7.87 | 370 | 73 | 14.57 | 2.87 | 5 | 0.2 | 4.0*<br>4.5 | 8.8*<br>9.9 |
| **4** | 365 | 124 | 200 | 14.37 | 4.88 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6 | 0.23 | 6.5 | 14.3 |
| **5** | 365 | 143 | 200 | 14.37 | 5.63 | 7.87 | 375 | 106 | 14.76 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| **6** | 365 | 210 | 227 | 14.37 | 8.27 | 8.94 | 378 | 196 | 14.88 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| **7** | 508 | 270 | 280 | 20 | 10.63 | 11.02 | 538 | 220 | 21.18 | 8.66 | 9 | 0.35 | 28 | 61.7 |
| **8** | 753 | 310 | 290 | 29.65 | 12.21 | 11.42 | 884 | 259 | 30.87 | 10.2 | 9 | 0.35 | 52 | 114.6 |
| **9E / 10E** | 1010 | 310 | 290 | 39.7 | 12.21 | 11.42 | 1051 | 259 | 41.38 | 10.2 | 9 | 0.35 | 46 | 101.4 |
| **9A** | 1049 | 310 | 290 | 41.3 | 12.21 | 11.42 | 1090 | 259 | 42.91 | 10.2 | 9 | 0.35 | 66.5 | 146.6 |
| **11E** | 1190 | 310 | 312 | 46.9 | 12.2 | 48.9 | 1222 | 259 | 48.11 | 10.2 | 9 | 0.35 | 63 | 138.9 |
| **12** | 1750 | 295 | 526 | 68.90 | 11.61 | 20.71 | N/A | N/A | N/A | N/A | N/A | N/A | 130 | 287 |




*** 034300078, 034300100 weigh 4.5 kg (9.9 lbs), all other variants weigh 4.0 kg (8.8 lbs)**

**** Overall dimensions do not include removable mounting brackets**

## Documentation & Downloads

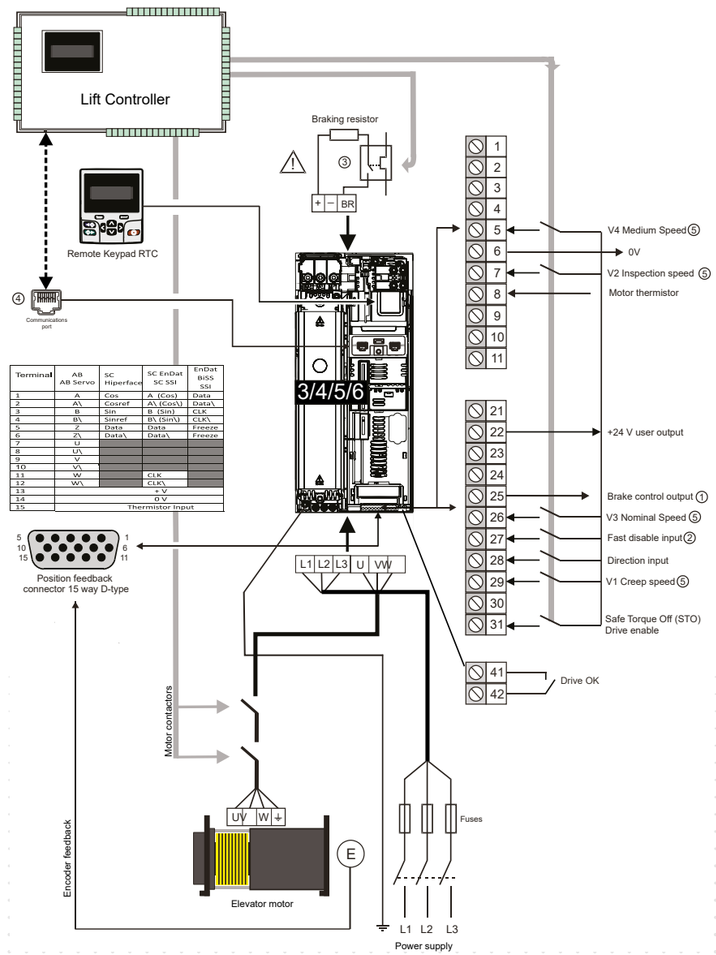
Product documentation and PC tools available for download from:
www.controltechniques.com/support

# CONNECTIONS

## Typical Power Connections & Default Control Connections

### Example for E300 Elevator drive Frame 3, 4, 5 or 6

1. Brake control optional from drive or Elevator controller.
2. Fast disable input only required for systems using output shorting contactor.
3. External protection for the braking circuit and the braking resistor.
4. Communications port E300 Elevator drive.
5. Speeds V1 to V4 are shown as examples.








# PART NUMBERS

E300 | 03 | 4 | 00078 | A | 10100A | B | 100

- **Model:** E300
- **Frame Size:** 3 to 11
- **Voltage Rating:**
  - 2 = 200V (200V-240V +/-10%)
  - 4 = 400V (380V-480V +/-10%)
  - 5 = 575V (500V-575V +/-10%)
  - 6 = 690V (500V-690V +/-10%)
- **Heavy Duty Current Rating x 10**
- **Drive Format**
  - A = AC in AC out, internal choke*
  - E = AC in AC out, external choke
- B = Brake Transistor included
  N = No Brake Transistor

***Frame 9 and below**

# MODEL NUMBER AND RATINGS

| Model | Heavy Duty | | | | |
|---|---|---|---|---|---|
| | Rated Current | Motor Shaft Power | | Peak Current Open Loop | Peak Current RFC |
| | A | kW | hp | A | A |
| **200V Rated Drives** | | | | | |
| E300-3200050 | 5 | 0.75 | 1 | 7.5 | 10 |
| E300-3200066 | 6.6 | 1.1 | 1.5 | 9.9 | 13.2 |
| E300-3200080 | 8 | 1.5 | 2 | 12 | 16 |
| E300-3200106 | 10.6 | 2.2 | 3 | 15.9 | 21.2 |
| E300-4200137 | 13.7 | 3 | 3 | 20.55 | 27.4 |
| E300-4200185 | 18.5 | 4 | 5 | 27.75 | 37 |
| E300-5200250 | 25 | 5.5 | 7.5 | 37.5 | 50 |
| E300-6200330 | 33 | 7.5 | 10 | 49.5 | 66 |
| E300-6200440 | 44 | 11 | 15 | 66 | 88 |
| E300-7200610 | 61 | 15 | 20 | 91.5 | 122 |
| E300-7200750 | 75 | 18.5 | 25 | 112.5 | 150 |

| Model | Heavy Duty | | | | |
|---|---|---|---|---|---|
| | Rated Current | Motor Shaft Power | | Peak Current Open Loop | Peak Current RFC |
| | A | kW | hp | A | A |
| E300-7200830 | 83 | 22 | 30 | 124.5 | 166 |
| E300-8201160 | 116 | 30 | 40 | 174 | 232 |
| E300-8201320 | 132 | 37 | 50 | 198 | 264 |
| E300-9201760 | 176 | 45 | 60 | 264 | 308 |
| E300-9202190 | 219 | 55 | 75 | 328.5 | 383.25 |
| E300-10202830 | 283 | 75 | 100 | 424.5 | 495.25 |
| E300-10203000 | 300 | 90 | 125 | 450 | 525 |
| **400V Rated Drives** | | | | | |
| E300-3400062 | 6.2 | 2.2 | 3 | 9.3 | 12.4 |
| E300-3400078 | 7.8 | 3 | 5 | 11.7 | 15.6 |
| E300-3400100 | 10 | 4 | 5 | 15 | 20 |
| E300-4400150 | 15 | 5.5 | 10 | 22.5 | 30 |
| E300-4400172 | 17.2 | 7.5 | 10 | 25.8 | 34.4 |
| E300-5400220 | 22 | 9 | 12 | 33 | 38.5 |
| E300-5400270 | 27 | 11 | 20 | 40.5 | 54 |
| E300-5400300 | 30 | 15 | 20 | 45 | 60 |
| E300-6400350 | 35 | 15 | 25 | 52.5 | 70 |
| E300-6400420 | 42 | 18.5 | 30 | 63 | 84 |
| E300-6400470 | 47 | 22 | 30 | 70.5 | 94 |
| E300-7400660 | 66 | 30 | 50 | 99 | 132 |
| E300-7400770 | 77 | 37 | 60 | 115.5 | 154 |
| E300-7401000 | 100 | 45 | 75 | 150 | 200 |
| E300-8401340 | 134 | 55 | 100 | 201 | 268 |
| E300-8401570 | 157 | 75 | 125 | 235.5 | 314 |
| E300-9402000 | 200 | 90 | 150 | 300 | 350 |
| E300-9402240 | 224 | 110 | 150 | 336 | 392 |
| E300-10402700 | 270 | 132 | 200 | 405 | 472.5 |
| E300-10403200 | 320 | 160 | 250 | 480 | 560 |
| E300-11403770 | 377 | 185 | 300 | 565.5 | 659.75 |
| E300-11404170 | 417 | 200 | 350 | 625.5 | 729.75 |
| E300-11404640 | 464 | 250 | 400 | 696 | 812 |

**575V and 690V ratings are also available on request.**



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| Product Code* | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| **380 - 480 V** | | | | | | | | | | |
| M000-12404800T | 12 | 480 * | 250 | 400 | 672 | 672 | 608 * | 315 | 500 | 668 |
| M000-12405660T | 12 | 566 * | 315 | 450 | 792 | 792 | 660 * | 355 | 550 | 726 |
| M000-12406600T | 12 | 660 * | 355 | 550 | 924 | 924 | 755 * | 400 | 650 | 831 |
| M000-12407200T | 12 | 720 * | 400 | 600 | 1008 | 1008 | 865 * | 500 | 700 | 952 |
| **500 - 575 V** | | | | | | | | | | |
| M000-12503150T | 12 | 315 * | 250 | 350 | 441 | 441 | 360 * | 250 | 350 | 396 |
| M000-12503600T | 12 | 360 * | 250 | 350 | 504 | 504 | 410 * | 300 | 400 | 451 |
| M000-12504100T | 12 | 410 * | 300 | 400 | 574 | 574 | 460 * | 330 | 450 | 506 |
| M000-12504600T | 12 | 460 * | 330 | 450 | 644 | 644 | 510 * | 370 | 500 | 561 |
| **500 - 690 V** | | | | | | | | | | |
| M000-12603150T | 12 | 315 * | 280 | 500 | 441 | 441 | 360 * | 355 | 550 | 396 |
| M000-12603600T | 12 | 360 * | 355 | 550 | 504 | 504 | 410 * | 400 | 600 | 451 |
| M000-12604100T | 12 | 410 * | 400 | 600 | 574 | 574 | 460 * | 450 | 650 | 506 |
| M000-12604600T | 12 | 460 * | 450 | 650 | 644 | 644 | 510 * | 500 | 700 | 561 |

**Notes:**
Frame 12 is only available as an unassigned power module (M000) and an F600 control module must also be ordered
Internal 125 kw brake chopper included as standard.
*Continuous currents at 2 kHz switching frequency
Implement 2.8 MW drive systems by connecting this module in parallel
For more information on these features and the rest of the capabilities of this module. please see the latest issue of the High-Power Brochure

# PUMP DRIVE F600

# THE SPECIALIST PUMP DRIVE

## Optimised control for your pump solutions




### The perfect mix of application-specific and energy saving features developed into a single solution.

Applications involving the flow of water demand extreme reliability and low energy consumption. Control Techniques' F600 drive, part of the newly introduced Specialist series of industry-specific drive technologies, builds on our company's five decades of drives expertise, delivering precise, dependable flow control.

Everything you need is baked into the drive itself. The F600 packs all of the features you'll need, presented using terminology you'll understand. This isn't a generic drive with pump features tacked on; it's a dedicated, specialist pump drive, designed from the ground up to deliver the reliability and efficiency you need.

5 YEAR FREE WARRANTY

### Free 5 year warranty

To share our confidence in the reliability of Control Techniques, drives in the F600 range are eligible for Control Techniques' extended warranty, at no extra cost.

It is a testament to our exceptional track record for reliability, giving you total peace of mind that your investment is protected and your site will continue to run uninterrupted.

**Free 5 year warranty covers drives up to and including frame 7**

**Warranty terms and conditions apply.**



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# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Pump multi-leader mode for up to 3 drives | ✓ | Low DC link operation | ✓ |
| Pump cascade mode for up to 4 assist pumps | ✓ | Analogue inputs | 2 |
| Control mode: Induction motor operation | ✓ | Analogue outputs | 2 |
| Control mode: Permanent magnet motor operation | ✓ | Temperature monitoring | ✓ |
| Pump pipe fill mode | ✓ | Digital inputs | 3-6 |
| Pump dry well detection | ✓ | Digital outputs | 0-3 |
| Pump low load detection | ✓ | Relays (normally open/normally closed) | 2 |
| Pump no-flow detection | ✓ | Optional motorised potentiometer | ✓ |
| Pump over-cycle protection | ✓ | PID Control | 2 |
| Pump cleaning function | ✓ | Energy meter | ✓ |
| Hand/Off/Auto control | ✓ | Trip time stamping | ✓ |
| Pump volume monitoring | ✓ | Trip logging | 10 |
| Pump flow monitoring | ✓ | Run time log | ✓ |
| Pump Wake/sleep operation | ✓ | Control word control | ✓ |
| Pump flow switch input | ✓ | Auto reset | ✓ |
| Pump assist over-cycle detection | ✓ | Cloning | ✓ |
| Auto-tune static | ✓ | SD card adapter | ✓ |
| Stop mode: Coast | ✓ | SMARTCARD | ✓ |
| Stop mode: Fast ramp | | Acceleration rates | 4 |
| Motor pre-heat mode | ✓ | Deceleration rates | 4 |
| Bi-polar reference | ✓ | Skip frequency dead bands | ✓ |
| Skip frequencies | ✓ | Guided set-up via 'Connect' commissioning software | ✓ |
| Fire Mode configurable over-ride function | ✓ | Sleep Mode | ✓ |
| HMI support | ✓ | Supply loss detection | ✓ |

# SPECIFICATION

| F600 | |
|---|---|
| **Items supplied with the drive** | Step-By-Step Guide, safety information, grounding bracket, grounding clamp, DC terminal cover grommets, terminal nuts, supply and motor connector, surface mounting brackets, control terminals, relay connectors, 24Vpower supply connector and finger guard grommets |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), RCM (Australia/ New Zealand), EAC (Russian Customs Union), UKCA |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety** | Single STO Function |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 – Pollution degree 2 |
| **Vibration** | Reference standard IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. |
| **Mounting methods** | Surface mount or through-panel mount via mounting brackets |
| **Output frequency/speed range** | 599Hz |
| **Braking** | In-built braking transistor, external resistor required. |
| **Operating modes** | Open Loop Induction Motor V/F, RFC-A (sensorless induction motor) RFC-S (Sensorless, and feedback via option module) |
| **Overload capability** | 110% for 165s from cold or for 9s from 100% load |
| **Overvoltage category** | Evaluated for OVC III. |



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| | |
|---|---|
| **Corrosive environments** | Concentrations not exceeding levels set in:<br>EN 50178:1998 Table A2<br>IEC 60721-3-3 Class 3C2 |
| **Immunity Compliance** | IEC61800-3, EN60800-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, |
| | IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without<br>external filters or line reactors. Capable of meeting the requirements of Equipment<br>Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, EN61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| **Cooling** | Forced cooled |
| **Safe Torque off** | Single STO. SIL 3 |
| **Communications** | RS485 with Modbus RTU<br>EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNET, POWERLINK and CANopen via option modules |
| **Control I/O** | 2 x analogue input, 2 x analogue outputs, 3 x Digital I/O programmable, 3 x Digital input, 2 x NO relay 250Vac Max., 5 x 0V common, 1 x 24V user output, 1 x 24V external input, 1 x STO input.<br>Additional I/O available with SI-I/O option module. |
| **Accuracy** | Frequency 0.01%, Analogue input 1 and 2: 11 bits plus sign,<br>Current accuracy typical 2%. |
| **On-Board user program capability** | N/A |
| **Keypad (LCD)** | KI- HOA keypad RTC (real time clock), optional HOA Remote Keypad |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for second processor module programming. |
| **Warranty** | 5 years |
| **Supported options** | HMI, Remote Keypad RTC, SI-I/O, Remote I/O, SI-Encoder (speed feedback), SI-Universal Encoder, MCi200 (second processor), MCi210 (second processor), SI-Ethernet, SI-EtherCAT, SI-DeviceNET, SI-PROFIBUS, SI-PROFINET, SI-POWERLINK, SI-CANopen, KI-485 comms adapter, SD card adapter, SMARTCARD |
| **Accessories** | Through-hole IP65 (frame 3 to 8) or IP55 (frame 9 to 11) mounting kits, UL type conduit kits, retrofit mounting brackets, external EMC filters and grounding bracket (supplied with the drive) |

## Documentation & Downloads

Product documentation and PC tools available for download from:
www.controltechniques.com/support

# DIMENSIONS

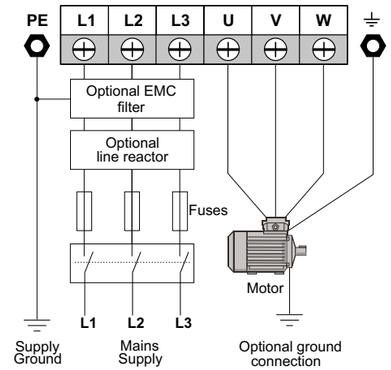



| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **3** | 382 | 83 | 200 | 15.03 | 3.26 | 7.87 | 365 | 73 | 14.37 | 2.87 | 5.5 | 0.21 | 4.5 | 9.92 |
| **4** | 391 | 124 | 200 | 15.39 | 4.88 | 7.87 | 365 | 106 | 14.37 | 4.17 | 6.5 | 0.26 | 6.5 | 14.33 |
| **5** | 391 | 143 | 200 | 15.39 | 5.63 | 7.87 | 365 | 106 | 14.37 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| **6** | 391 | 210 | 287 | 15.39 | 8.27 | 11.29 | 365 | 196 | 14.37 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| **7** | 552 | 270 | 280 | 21.73 | 10.63 | 11.02 | 508 | 220 | 20 | 8.66 | 9 | 0.35 | 28 | 61.70 |
| **8** | 804 | 310 | 290 | 31.65 | 12.21 | 11.42 | 753 | 259 | 29.64 | 10.20 | 9 | 0.35 | 52 | 114.6 |
| **9A** | 1108 | 320 | 290 | 43.62 | 12.59 | 11.42 | 1049 | 259 | 41.29 | 10.20 | 9 | 0.35 | 46 | 101.4 |
| **9E and 10E** | 1069 | 310 | 290 | 42.08 | 12.21 | 11.42 | 1010 | 259 | 39.76 | 10.20 | 9 | 0.35 | 46 | 101.4 |
| **11E** | 1242 | 310 | 313 | 48.89 | 12.21 | 12.32 | 1189 | 259 | 46.81 | 10.20 | 9 | 0.35 | 63 | 138.8 |
| **12** | 1750 | 295 | 526 | 68.90 | 11.61 | 20.71 | N/A | N/A | N/A | N/A | N/A | N/A | 130 | 287 |

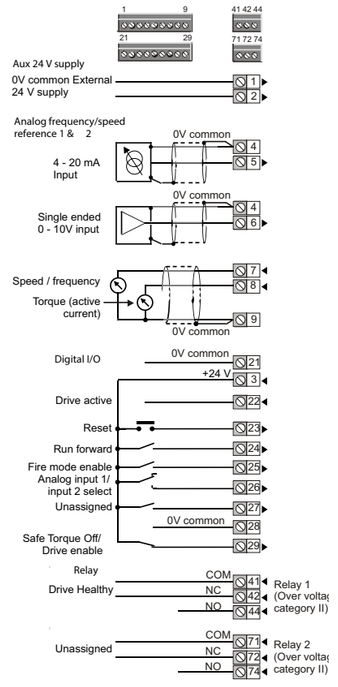


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# CONNECTIONS

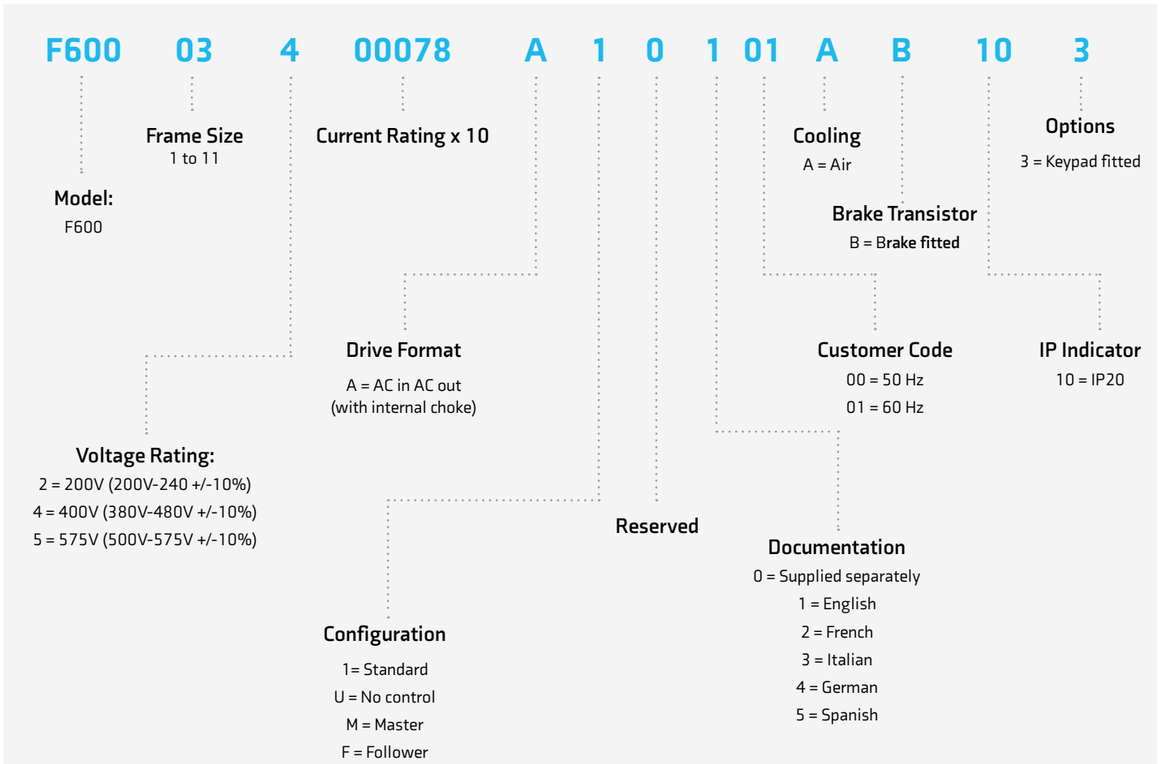



**Typical Power Connections**




**Default Control Connections**

# PART NUMBERS






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# MODEL NUMBER AND RATINGS

| 200/240 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| F600-03200066A | 6.6 | 1.1 | 1.5 |
| F600-03200080A | 8 | 1.5 | 2 |
| F600-03200110A | 11 | 2.2 | 3 |
| F600-03200127A | 12.7 | 3 | 3 |
| F600-04200180A | 18 | 4 | 5 |
| F600-04200250A | 25 | 5.5 | 7.5 |
| F600-05200300A | 30 | 7.5 | 10 |
| F600-06200500A | 50 | 11 | 15 |
| F600-06200580A | 58 | 15 | 20 |
| F600-07200750A | 75 | 18.5 | 25 |
| F600-07200940A | 94 | 22 | 30 |
| F600-07201170A | 117 | 30 | 40 |
| F600-08201490A | 149 | 37 | 50 |
| F600-08201800A | 180 | 45 | 60 |
| F600-09202160A | 216 | 55 | 75 |
| F600-09202660A | 266 | 75 | 100 |
| F600-09202160E | 216 | 55 | 75 |
| F600-09202660E | 266 | 75 | 100 |
| F600-10203250E | 325 | 90 | 125 |
| F600-10203600E | 360 | 110 | 150 |

| 380/480 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| F600-03400034A | 3.4 | 1.1 | 1.5 |
| F600-03400045A | 4.5 | 1.5 | 2 |
| F600-03400062A | 6.2 | 2.2 | 3 |
| F600-03400077A | 7.7 | 3 | 5 |
| F600-03400104A | 10.4 | 4 | 5 |
| F600-03400123A | 12.3 | 5.5 | 7.5 |
| F600-04400185A | 18.5 | 7.5 | 10 |
| F600-04400240A | 24 | 11 | 15 |
| F600-05400300A | 30 | 15 | 20 |
| F600-06400380A | 38 | 18.5 | 25 |
| F600-06400480A | 48 | 22 | 30 |
| F600-06400630A | 63 | 30 | 40 |
| F600-07400790A | 79 | 37 | 50 |
| F600-07400940A | 94 | 45 | 60 |
| F600-07401120A | 112 | 55 | 75 |
| F600-08401550A | 155 | 75 | 100 |
| F600-08401840A | 184 | 90 | 125 |
| F600-09402210A | 221 | 110 | 150 |
| F600-09402660A | 266 | 132 | 200 |
| F600-09402210E | 221 | 110 | 150 |
| F600-09402660E | 266 | 132 | 200 |
| F600-10403200E | 320 | 160 | 250 |
| F600-10403610E | 361 | 200 | 300 |
| F600-11404370E | 437 | 225 | 350 |
| F600-11404870E | 487 | 250 | 400 |
| F600-11405070E | 507 | 280 | 450 |

| 500/575 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **F600-05500039A** | 3.9 | 2.2 | 3 |
| **F600-05500061A** | 6.1 | 4 | 5 |
| **F600-05500100A** | 10 | 5.5 | 7.5 |
| **F600-06500120A** | 12 | 7.5 | 10 |
| **F600-06500170A** | 17 | 11 | 15 |
| **F600-06500220A** | 22 | 15 | 20 |
| **F600-06500270A** | 27 | 18.5 | 25 |
| **F600-06500340A** | 34 | 22 | 30 |
| **F600-06500430A** | 43 | 30 | 40 |
| **F600-07500530A** | 53 | 37 | 50 |
| **F600-07500730A** | 73 | 45 | 60 |
| **F600-08500860A** | 86 | 55 | 75 |
| **F600-08501080A** | 108 | 75 | 100 |
| **F600-09501250A** | 125 | 90 | 125 |
| **F600-09501550A** | 155 | 110 | 150 |
| **F600-09501250E** | 125 | 90 | 125 |
| **F600-09501500E** | 150 | 110 | 150 |
| **F600-10502000E** | 200 | 130 | 200 |
| **F600-11502480E** | 248 | 175 | 250 |
| **F600-11502880E** | 288 | 225 | 300 |
| **F600-11503150E** | 315 | 250 | 350 |

| 500/690 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **F600-07600230A** | 23 | 18.5 | 25 |
| **F600-07600300A** | 30 | 22 | 30 |
| **F600-07600360A** | 36 | 30 | 40 |
| **F600-07600460A** | 46 | 37 | 50 |
| **F600-07600520A** | 52 | 45 | 60 |
| **F600-07600730A** | 73 | 55 | 75 |
| **F600-08600860A** | 86 | 75 | 100 |
| **F600-08601080A** | 108 | 90 | 125 |
| **F600-09601250A** | 125 | 110 | 150 |
| **F600-09601500A** | 150 | 132 | 175 |
| **F600-09601250E** | 125 | 110 | 150 |
| **F600-09601550E** | 155 | 132 | 175 |
| **F600-10601720E** | 172 | 160 | 200 |
| **F600-10601970E** | 197 | 185 | 250 |
| **F600-11602250E** | 225 | 200 | 250 |
| **F600-11602750E** | 275 | 250 | 300 |
| **F600-11603050E** | 305 | 280 | 400 |

Note: Higher Power Ratings are available with modular drive solutions





| Product Code** | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| **380 - 480 V** | | | | | | | | | | |
| M000-12404800T | 12 | 480 * | 250 | 400 | 672 | 672 | 608 * | 315 | 500 | 668 |
| M000-12405660T | 12 | 566 * | 315 | 450 | 792 | 792 | 660 * | 355 | 550 | 726 |
| M000-12406600T | 12 | 660 * | 355 | 550 | 924 | 924 | 755 * | 400 | 650 | 831 |
| M000-12407200T | 12 | 720 * | 400 | 600 | 1008 | 1008 | 865 * | 500 | 700 | 952 |
| **500 - 575 V** | | | | | | | | | | |
| M000-12503150T | 12 | 315 * | 250 | 350 | 441 | 441 | 360 * | 250 | 350 | 396 |
| M000-12503600T | 12 | 360 * | 250 | 350 | 504 | 504 | 410 * | 300 | 400 | 451 |
| M000-12504100T | 12 | 410 * | 300 | 400 | 574 | 574 | 460 * | 330 | 450 | 506 |
| M000-12504600T | 12 | 460 * | 330 | 450 | 644 | 644 | 510 * | 370 | 500 | 561 |
| **500 - 690 V** | | | | | | | | | | |
| M000-12603150T | 12 | 315 * | 280 | 500 | 441 | 441 | 360 * | 355 | 550 | 396 |
| M000-12603600T | 12 | 360 * | 355 | 550 | 504 | 504 | 410 * | 400 | 600 | 451 |
| M000-12604100T | 12 | 410 * | 400 | 600 | 574 | 574 | 460 * | 450 | 650 | 506 |
| M000-12604600T | 12 | 460 * | 450 | 650 | 644 | 644 | 510 * | 500 | 700 | 561 |

## Notes:

** Frame 12 is only available as an unassigned power module (M000) and an F600 control module must also be ordered

- Internal 125 kW brake chopper included as standard.
- * Continuous currents at 2 kHz switching frequency
- Implement 2.8 MW drive systems by connecting this module in parallel

For more information on these features and the rest of the capabilities of this module. please see the latest issue of the High-Power Brochure



# PUMP DRIVE F600

# HIGH IP VARIANT

## Dust and water resistant

### Standard and High IP drives

The High IP drive will already be familiar to users of the F600, with all the same features that make commissioning effortless. The Hand-Off-Auto keypad with the built-in real-time clock is still available, sealed, and the protective casing has been designed with easy servicing and usability in mind.

IP65 rated enclosure.

### Save on installation

The F600 High IP drive is enclosed in a sturdy, protective yet light casing, providing a compact solution. This not only allows easy integration in harsh environments but wall mounting close to the pump reduces installation costs, through:

- No cabinet required
- Shorter cable lengths
- Less labour time/cost to install drive







### Free 5 year warranty

To share our confidence in the reliability of Control Techniques, drives in the F600 range are eligible for Control Techniques' extended warranty, at no extra cost.

It is a testament to our exceptional track record for reliability, giving you total peace of mind that your investment is protected and your site will continue to run uninterrupted.

**Free 5 year warranty covers drives up to and including frame 7**

**Warranty terms and conditions apply.**





# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Pump multi-leader mode for up to 3 drives | ✓ | Low DC link operation | ✓ |
| Pump cascade mode for up to 4 assist pumps | ✓ | Analogue inputs | 2 |
| Control mode: Induction motor operation | ✓ | Analogue outputs | 2 |
| Control mode: Permanent magnet motor operation | ✓ | Temperature monitoring | ✓ |
| Pump pipe fill mode | ✓ | Digital inputs | 3-6 |
| Pump dry well detection | ✓ | Digital outputs | 0-3 |
| Pump low load detection | ✓ | Relays (normally open/normally closed) | 2 |
| Pump no-flow detection | ✓ | Optional motorised potentiometer | ✓ |
| Pump over-cycle protection | ✓ | PID Control | 2 |
| Pump cleaning function | ✓ | Energy meter | ✓ |
| Hand/Off/Auto control | ✓ | Trip time stamping | ✓ |
| Pump volume monitoring | ✓ | Trip logging | 10 |
| Pump flow monitoring | ✓ | Run time log | ✓ |
| Pump Wake/sleep operation | ✓ | Control word control | ✓ |
| Pump flow switch input | ✓ | Auto reset | ✓ |
| Pump assist over-cycle detection | ✓ | Cloning | ✓ |
| Auto-tune static | ✓ | SD card adapter | ✓ |
| Stop mode: Coast | ✓ | SMARTCARD | ✓ |
| Stop mode: Fast ramp | | Acceleration rates | 4 |
| Motor pre-heat mode | ✓ | Deceleration rates | 4 |
| Bi-polar reference | ✓ | Skip frequency dead bands | ✓ |
| Skip frequencies | ✓ | Guided set-up via 'Connect' commissioning software | ✓ |
| Fire Mode configurable over-ride function | ✓ | Sleep Mode | ✓ |
| HMI support | ✓ | Supply loss detection | ✓ |

# SPECIFICATION

| F600 | |
|---|---|
| **Items supplied with the drive** | Step-By-Step Guide, safety information, grounding bracket, grounding clamp, DC terminal cover grommets, terminal nuts, supply and motor connector, surface mounting brackets, control terminals, relay connectors, 24Vpower supply connector, finger guard grommets, IP65 cover and IP65 mounting brackets |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety (Dual STO function)** | TuV |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP65 |
| **Vibration** | Reference standard IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. |
| **Mounting methods** | Surface mount or through-panel mount via mounting brackets |
| **Output frequency/speed range** | 599Hz |
| **Braking** | In-built braking transistor, external resistor required. |
| **Operating modes** | Open-loop, RFC-A (enhanced open-loop performance) RFC-S (permanent magnet motor) |
| **Overload capability** | 110% for 165s from cold or for 9s from 100% load |
| **Overvoltage category** | Evaluated for OVC III. |



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| | |
|---|---|
| **Corrosive environments** | Concentrations not exceeding levels set in:<br>EN 50178:1998 Table A2<br>IEC 60721-3-3 Class 3C2 |
| **Immunity Compliance** | IEC61800-3, EN60800-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment Category C2 when installed with the recommended filters and line reactors. IEC61800-3, EN61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| **Cooling** | Forced cooled |
| **Safe Torque off** | Single STO. SIL 3 |
| **Communications** | RS485, MODBUS RTU, PROFIBUS, Ethernet, EtherCAT, DeviceNET, CANopen and PROFINET |
| **Control I/O** | 2 x analog input, 2 x analog outputs, 3 x Digital I/O programmable, 3 x Digital input, 2 x NO relay 250Vac Max., 5 x 0V common, 1 x 24V user output, 1 x 24V external input, 1 x STO input.<br>Additional I/O available with SI-I/O option module. |
| **Accuracy** | Frequency 0.01%, Analogue input 1 and 2: 11 bits plus sign,<br>Current accuracy typical 2%. |
| **On-Board user program capability** | N/A |
| **Keypad (LCD)** | KI- HOA keypad RTC (real time clock), optional HOA Remote Keypad |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for second processor module programming. |
| **Warranty** | 5 years |
| **Supported options** | HMI, Remote Keypad RTC, SI-I/O, Remote I/O, SI-Encoder (speed feedback), SI-Universal Encoder, MCi200 (second processor), MCi210 (second processor), SI-Ethernet, SI-EtherCAT, SI-DeviceNET, SI-PROFIBUS, SI-PROFINET, SI-POWERLINK, SI-CANopen, KI-485 comms adapter, SD card adapter, SMARTCARD |
| **Accessories** | External EMC filters |

## Documentation & Downloads

Product documentation and PC tools available for download from:
**www.controltechniques.com/support**

# DIMENSIONS

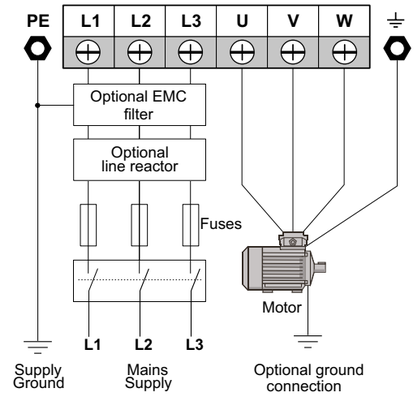



| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **3** | 571.4 | 255.8 | 220.7 | 22.49 | 10.7 | 8.7 | 465.5 | 73 | 18.32 | 2.87 | 4 x 6 | 0.23 | 7.5 | 16.5 |
| **4** | 571.4 | 255.8 | 220.7 | 22.49 | 10.7 | 8.7 | 470 | 106 | 18.5 | 4.17 | 4 x 7 | 0.27 | 9.3 | 20.5 |
| **5** | 570.7 | 255.8 | 220.7 | 22.46 | 10.7 | 8.7 | 467 | 110 | 18.38 | 4.38 | 4 x 7 | 0.27 | 10.0 | 22.0 |
| **6** | 573.79 | 316.68 | 247.3 | 22.59 | 9.73 | 9.8 | 478 | 196 | 18.81 | 7.72 | 6 x 7 | 0.27 | 16.9 | 37.3 |

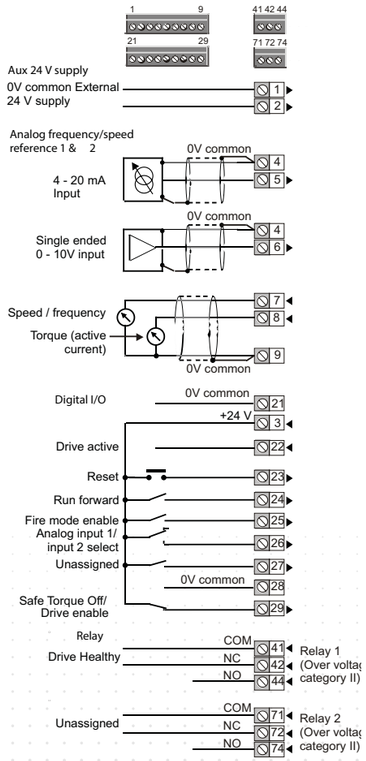




# CONNECTIONS

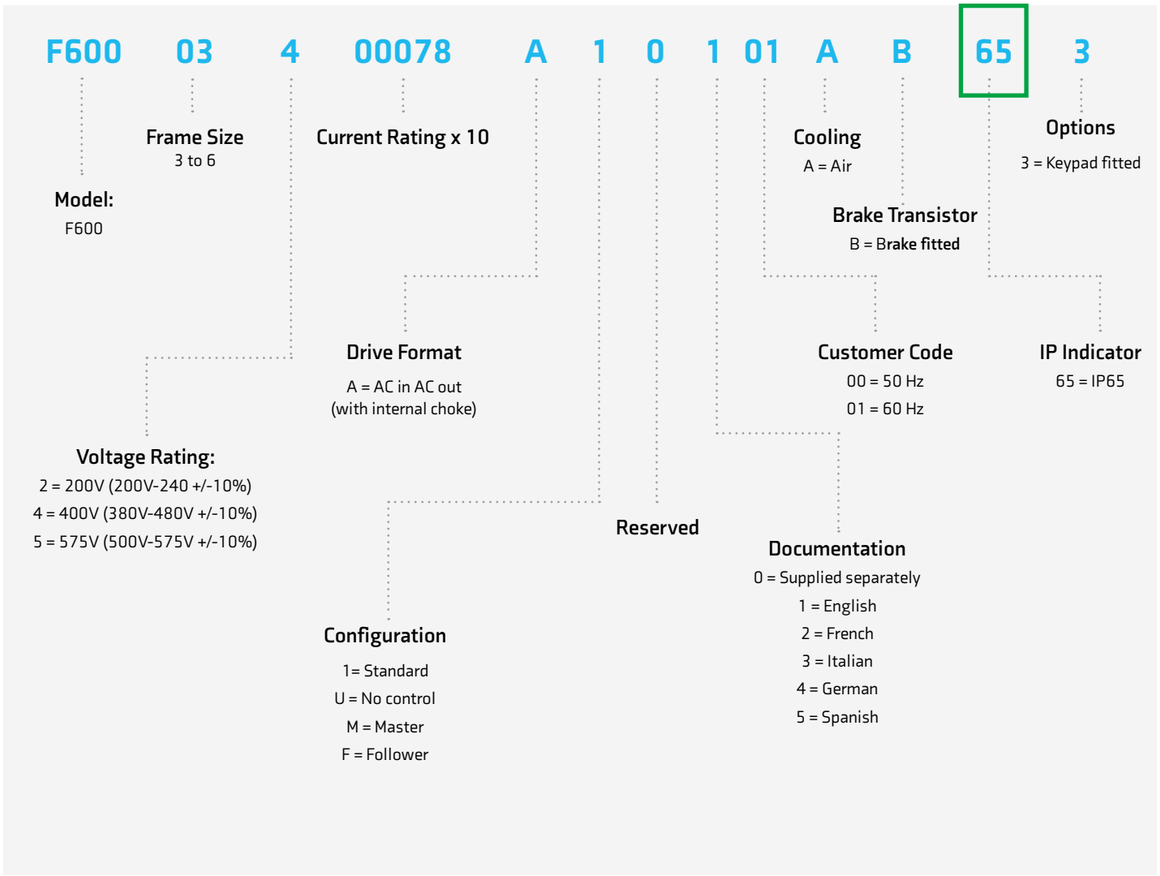



## Typical Power Connections




## Default Control Connections

# PART NUMBERS








# MODEL NUMBER AND RATINGS

| 200/240 Vac ±10% | | | | |
|---|---|---|---|---|
| | | Normal Duty | | |
| Product Code | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| F600-03200066 | 3 | 6.6 | 1.1 | 1.5 |
| F600-03200080 | 3 | 8 | 1.5 | 2 |
| F600-03200110 | 3 | 11 | 2.2 | 3 |
| F600-03200127 | 3 | 12.7 | 3 | 3 |
| F600-04200180 | 4 | 18 | 4 | 5 |
| F600-04200250 | 4 | 22 | 5.5 | 7.5 |
| F600-05200300 | 5 | 30 | 7.5 | 10 |
| F600-06200500 | 6 | 50 | 11 | 15 |

| 500/575 Vac ±10% | | | | |
|---|---|---|---|---|
| | | Normal Duty | | |
| Product Code | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| F600-05500039 | 5 | 3.9 | 2.2 | 3 |
| F600-05500061 | 5 | 6.1 | 4 | 5 |
| F600-05500100 | 5 | 10 | 5.5 | 7.5 |
| F600-06500120 | 6 | 12 | 7.5 | 10 |
| F600-06500170 | 6 | 17 | 11 | 15 |
| F600-06500220 | 6 | 22 | 15 | 20 |
| F600-06500270 | 6 | 27 | 18.5 | 25 |
| F600-06500340 | 6 | 34 | 22 | 30 |

| 380/480 Vac ±10% | | | | |
|---|---|---|---|---|
| | | Normal Duty | | |
| Product Code | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| F600-03400034 | 3 | 3.4 | 1.1 | 1.5 |
| F600-03400045 | 3 | 4.5 | 1.5 | 2 |
| F600-03400062 | 3 | 6.2 | 2.2 | 3 |
| F600-03400077 | 3 | 7.7 | 3 | 5 |
| F600-03400104 | 3 | 10.4 | 4 | 5 |
| F600-03400123 | 3 | 11 | 5.5 | 7.5 |
| F600-04400185 | 4 | 18.5 | 7.5 | 10 |
| F600-04400240 | 4 | 21 | 11 | 15 |
| F600-05400300 | 5 | 29 | 15 | 20 |
| F600-06400380 | 6 | 38 | 18.5 | 25 |
| F600-06400480 | 6 | 48 | 22 | 30 |

# HVAC DRIVE H300

# THE SPECIALIST HVAC DRIVE

## Optimised control for your HVAC solutions

**Control Techniques' HVAC Drive H300 variable frequency AC drive (VFD) is the result of extensive research and builds on our vast experience of the HVAC market.**

The HVAC Drive H300, part of the newly introduced Specialist series of industry-specific drive technologies, builds on our company's five decades of drives expertise, delivering precise, dependable flow control.

The HVAC Drive H300 dimensions are among the smallest in its class at every power rating. This saves valuable building real estate, makes the drives easy to handle, and maximizes mounting flexibility.




5 YEAR FREE WARRANTY

### Free 5 year warranty

To share our confidence in the reliability of Control Techniques, drives in the H300 range are eligible for Control Techniques' extended warranty, at no extra cost.

It is a testament to our exceptional track record for reliability, giving you total peace of mind that your investment is protected and your site will continue to run uninterrupted.

**Free 5 year warranty covers drives up to and including frame 7**

**Warranty terms and conditions apply.**



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# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Guided set-up via 'Connect' commissioning software | ✓ | Temperature monitoring | ✓ |
| On Board Comms ModBus RTU, BACnet MSTP | ✓ | Digital inputs | 3-6 |
| Control mode: Induction motor operation | ✓ | Digital outputs | 0-3 |
| Control Mode: Sensor-less RFCA Induction Motor Operation | ✓ | Relays (normally open/normally closed) | 2 |
| Control mode: Sensor-less Permanent magnet motor operation | ✓ | Motorised potentiometer | ✓ |
| Auto-tune static | ✓ | Logic function control | ✓ |
| Auto-tune rotating | ✓ | Timer function control | ✓ |
| Filter Change Timer | ✓ | Variable selector/ Threshold Detectors | ✓ |
| Time before Filter Change Due | ✓ | PID controllers | 2 |
| Hand/Off/Auto control | ✓ | Energy meter | ✓ |
| User Security Access | ✓ | Trip time stamping | ✓ |
| Supply loss detection | ✓ | Trip logging | 10 |
| Low DC link operation | ✓ | Skip frequency dead bands | ✓ |
| Catch a spinning motor | ✓ | Control word | ✓ |
| Stop mode: Ramp | ✓ | Auto reset | ✓ |
| Stop mode: Coast | ✓ | Parameter cloning | ✓ |
| Stop mode: Fast ramp | ✓ | Additional application parameters | 148 |
| Programmable braking | ✓ | On-board oscilloscope function | ✓ |
| Motor pre-heat mode | ✓ | On-board PLC | ✓ |
| Bi-polar references | ✓ | SD card adapter | ✓ |
| Skip frequencies | ✓ | SMARTCARD | ✓ |
| Fire Mode | ✓ | Acceleration rates | 4 |
| Demand based sleep mode | ✓ | Deceleration rates | 4 |
| Analogue inputs | 2 | S Ramp | ✓ |
| Analogue outputs | 2 | | |

# SPECIFICATION

| H300 | |
|---|---|
| **Items supplied with the drive** | Step-By-Step Guide, safety information, grounding bracket, grounding clamp, DC terminal cover grommets, terminal nuts, supply and motor connector, surface mounting brackets, control terminals, relay connectors, 24Vpower supply connector and finger guard grommets |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), RCM (Australia/ New Zealand), EAC (Russian Customs Union), UKCA |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety** | Single STO Function |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 – Pollution degree 2 |
| **Vibration** | Reference standard IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. |
| **Mounting methods** | Surface mount or through-panel mount via mounting brackets |
| **Output frequency/speed range** | 599Hz |
| **Braking** | In-built braking transistor, external resistor required. |
| **Operating modes** | Open Loop Induction Motor V/F, RFC-A (sensorless induction motor) RFC-S (sensorless, and feedback via option module) |
| **Overload capability** | 110% for 165s from cold or for 9s from 100% load |



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| | |
|---|---|
| **Overvoltage category** | Evaluated for OVC III. |
| **Corrosive environments** | Concentrations not exceeding levels set in:<br>EN 50178:1998 Table A2<br>IEC 60721-3-3 Class 3C2 |
| **Immunity Compliance** | IEC61800-3, EN60800-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6,<br>IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, EN61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| **Cooling** | Forced cooled |
| **Safe Torque off** | Single STO. SIL 3 |
| **Communications** | - RS485 with Modbus RTU<br>- BACnet MS/TP<br>- EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNET, POWERLINK and CANopen via option modules |
| **Control I/O** | 2 x analogue input, 2 x analogue outputs, 3 x Digital I/O programmable, 3 x Digital input, 2 x NO relay 250Vac Max., 5 x 0V common, 1 x 24V user output, 1 x 24V external input, 1 x STO input.<br>Additional I/O available with SI-I/O option module. |
| **Accuracy** | Frequency 0.01%, Analogue input 1 and 2: 11 bits plus sign,<br>Current accuracy typical 2%. |
| **On-Board user program capability** | N/A, Only via additional MCI200/ 210 Option Module |
| **Keypad (LCD)** | KI- HOA keypad RTC (real time clock), optional HOA Remote Keypad |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| **Warranty** | 5 years |
| **Supported options** | HMI, Remote Keypad RTC, SI-I/O, Remote I/O, SI-Encoder (speed feedback), SI-Universal Encoder, MCi200 (second processor), MCi210 (second processor), SI-Ethernet, SI-EtherCAT, SI-DeviceNET, SI-PROFIBUS, SI-PROFINET, SI-POWERLINK, SI-CANopen, KI-485 comms adapter, SD card adapter, SMARTCARD |
| **Accessories** | Through-hole IP65 (frame 3 to 8) or IP55 (frame 9 to 11) mounting kits, UL type conduit kits, retrofit mounting brackets, external EMC filters and grounding bracket (supplied with the drive) |

## Documentation & Downloads

Product documentation and PC tools available for download from:
www.controltechniques.com/support

# DIMENSIONS

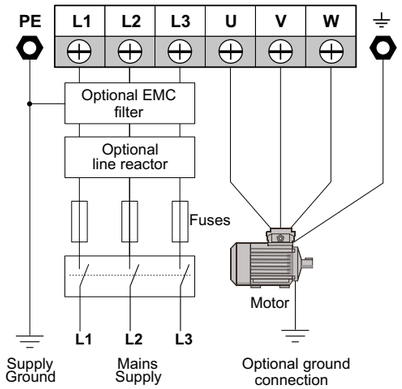



| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **3** | 382 | 83 | 200 | 15.03 | 3.26 | 7.87 | 365 | 73 | 14.37 | 2.87 | 5.5 | 0.21 | 4.5 | 9.92 |
| **4** | 391 | 124 | 200 | 15.39 | 4.88 | 7.87 | 365 | 106 | 14.37 | 4.17 | 6.5 | 0.26 | 6.5 | 14.33 |
| **5** | 391 | 143 | 200 | 15.39 | 5.63 | 7.87 | 365 | 106 | 14.37 | 4.17 | 6.5 | 0.26 | 7.4 | 16.3 |
| **6** | 391 | 210 | 287 | 15.39 | 8.27 | 11.29 | 365 | 196 | 14.37 | 7.72 | 7 | 0.28 | 14 | 30.9 |
| **7** | 552 | 270 | 280 | 21.73 | 10.63 | 11.02 | 508 | 220 | 20 | 8.66 | 9 | 0.35 | 28 | 61.70 |
| **8** | 804 | 310 | 290 | 31.65 | 12.21 | 11.42 | 753 | 259 | 29.64 | 10.20 | 9 | 0.35 | 52 | 114.6 |
| **9A** | 1108 | 320 | 290 | 43.62 | 12.59 | 11.42 | 1049 | 259 | 41.29 | 10.20 | 9 | 0.35 | 46 | 101.4 |
| **9E and 10E** | 1069 | 310 | 290 | 42.08 | 12.21 | 11.42 | 1010 | 259 | 39.76 | 10.20 | 9 | 0.35 | 46 | 101.4 |
| **11E** | 1242 | 310 | 313 | 48.89 | 12.21 | 12.32 | 1189 | 259 | 46.81 | 10.20 | 9 | 0.35 | 63 | 138.8 |
| **12** | 1750 | 295 | 526 | 68.90 | 11.61 | 20.71 | N/A | N/A | N/A | N/A | N/A | N/A | 130 | 287 |

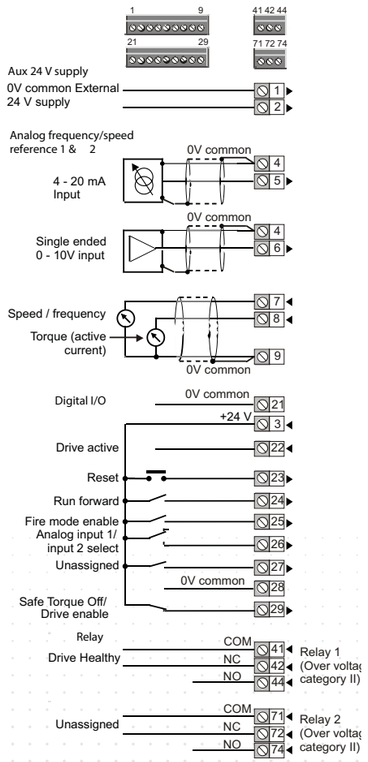




# CONNECTIONS




**Typical Power Connections**




**Default Control Connections**

# PART NUMBERS

H300 03 4 00078 A 1 0 1 01 A B 10 3

**Model:**
H300

**Frame Size**
1 to 12

**Current Rating x 10**

**Voltage Rating:**
2 = 200V (200V-240 +/-10%)
4 = 400V (380V-480V +/-10%)
5 = 575V (500V-575V +/-10%)

**Drive Format**
A = AC in AC out
(with internal choke)

**Configuration**
1= Standard
U = No control
M = Master
F = Follower

**Reserved**

**Documentation**
0 = Supplied separately
1 = English
2 = French
3 = Italian
4 = German
5 = Spanish

**Customer Code**
00 = 50 Hz
01 = 60 Hz

**Cooling**
A = Air

**Brake Transistor**
B = Brake fitted

**IP Indicator**
10 = IP20

**Options**
3 = Keypad fitted





# MODEL NUMBER AND RATINGS

| 200/240 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **H300-03200066A** | 6.6 | 1.1 | 1.5 |
| **H300-03200080A** | 8 | 1.5 | 2 |
| **H300-03200110A** | 11 | 2.2 | 3 |
| **H300-03200127A** | 12.7 | 3 | 3 |
| **H300-04200180A** | 18 | 4 | 5 |
| **H300-04200250A** | 25 | 5.5 | 7.5 |
| **H300-05200300A** | 30 | 7.5 | 10 |
| **H300-06200500A** | 50 | 11 | 15 |
| **H300-06200580A** | 58 | 15 | 20 |
| **H300-07200750A** | 75 | 18.5 | 25 |
| **H300-07200940A** | 94 | 22 | 30 |
| **H300-07201170A** | 117 | 30 | 40 |
| **H300-08201490A** | 149 | 37 | 50 |
| **H300-08201800A** | 180 | 45 | 60 |
| **H300-09202160A** | 216 | 55 | 75 |
| **H300-09202660A** | 266 | 75 | 100 |
| **H300-09202160E** | 216 | 55 | 75 |
| **H300-09202660E** | 266 | 75 | 100 |
| **H300-10203250E** | 325 | 90 | 125 |
| **H300-10203600E** | 360 | 110 | 150 |

| 380/480 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **H300-03400034A** | 3.4 | 1.1 | 1.5 |
| **H300-03400045A** | 4.5 | 1.5 | 2 |
| **H300-03400062A** | 6.2 | 2.2 | 3 |
| **H300-03400077A** | 7.7 | 3 | 5 |
| **H300-03400104A** | 10.4 | 4 | 5 |
| **H300-03400123A** | 12.3 | 5.5 | 7.5 |
| **H300-04400185A** | 18.5 | 7.5 | 10 |
| **H300-04400240A** | 24 | 11 | 15 |
| **H300-05400300A** | 30 | 15 | 20 |
| **H300-06400380A** | 38 | 18.5 | 25 |
| **H300-06400480A** | 48 | 22 | 30 |
| **H300-06400630A** | 63 | 30 | 40 |
| **H300-07400790A** | 79 | 37 | 50 |
| **H300-07400940A** | 94 | 45 | 60 |
| **H300-07401120A** | 112 | 55 | 75 |
| **H300-08401550A** | 155 | 75 | 100 |
| **H300-08401840A** | 184 | 90 | 125 |
| **H300-09402210A** | 221 | 110 | 150 |
| **H300-09402660A** | 266 | 132 | 200 |
| **F600-09402210E** | 221 | 110 | 150 |
| **H300-09402660E** | 266 | 132 | 200 |
| **H300-10403200E** | 320 | 160 | 250 |
| **H300-10403610E** | 361 | 200 | 300 |
| **H300-11404370E** | 437 | 225 | 350 |
| **H300-11404870E** | 487 | 250 | 400 |
| **H300-11405070E** | 507 | 280 | 450 |

| 500/575 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **H300-05500039A** | 3.9 | 2.2 | 3 |
| **H300-05500061A** | 6.1 | 4 | 5 |
| **H300-05500100A** | 10 | 5.5 | 7.5 |
| **H300-06500120A** | 12 | 7.5 | 10 |
| **H300-06500170A** | 17 | 11 | 15 |
| **H300-06500220A** | 22 | 15 | 20 |
| **H300-06500270A** | 27 | 18.5 | 25 |
| **H300-06500340A** | 34 | 22 | 30 |
| **H300-06500430A** | 43 | 30 | 40 |
| **H300-07500530A** | 53 | 37 | 50 |
| **H300-07500730A** | 73 | 45 | 60 |
| **H300-08500860A** | 86 | 55 | 75 |
| **H300-08501080A** | 108 | 75 | 100 |
| **H300-09501250A** | 125 | 90 | 125 |
| **H300-09501550A** | 155 | 110 | 150 |
| **H300-09501250E** | 125 | 90 | 125 |
| **H300-09501500E** | 150 | 110 | 150 |
| **H300-10502000E** | 200 | 130 | 200 |
| **H300-11502480E** | 248 | 175 | 250 |
| **H300-11502880E** | 288 | 225 | 300 |
| **H300-11503150E** | 315 | 250 | 350 |

| 500/690 Vac ±10% | | | |
|---|---|---|---|
| Product Code | Normal Duty | | |
| | IP20 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| **H300-07600230A** | 23 | 18.5 | 25 |
| **H300-07600300A** | 30 | 22 | 30 |
| **H300-07600360A** | 36 | 30 | 40 |
| **H300-07600460A** | 46 | 37 | 50 |
| **H300-07600520A** | 52 | 45 | 60 |
| **H300-07600730A** | 73 | 55 | 75 |
| **H300-08600860A** | 86 | 75 | 100 |
| **H300-08601080A** | 108 | 90 | 125 |
| **H300-09601250A** | 125 | 110 | 150 |
| **H300-09601500A** | 150 | 132 | 175 |
| **H300-09601250E** | 125 | 110 | 150 |
| **H300-09601550E** | 155 | 132 | 175 |
| **H300-10601720E** | 172 | 160 | 200 |
| **H300-10601970E** | 197 | 185 | 250 |
| **H300-11602250E** | 225 | 200 | 250 |
| **H300-11602750E** | 275 | 250 | 300 |
| **H300-11603050E** | 305 | 280 | 400 |

Note: Higher Power Ratings are available with modular drive solutions





| Product Code** | Frame Size | Heavy Duty | | | | | Normal Duty | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rated Current (A) | Motor Shaft Power | | Peak Current Open Loop (A) | Peak Current RFC (A) | Rated Current (A) | Motor Shaft Power | | Peak Current (A) |
| | | | (kW) | (HP) | | | | (kW) | (HP) | |
| **380 - 480 V** | | | | | | | | | | |
| M000-12404800T | 12 | 480 * | 250 | 400 | 672 | 672 | 608 * | 315 | 500 | 668 |
| M000-12405660T | 12 | 566 * | 315 | 450 | 792 | 792 | 660 * | 355 | 550 | 726 |
| M000-12406600T | 12 | 660 * | 355 | 550 | 924 | 924 | 755 * | 400 | 650 | 831 |
| M000-12407200T | 12 | 720 * | 400 | 600 | 1008 | 1008 | 865 * | 500 | 700 | 952 |
| **500 - 575 V** | | | | | | | | | | |
| M000-12503150T | 12 | 315 * | 250 | 350 | 441 | 441 | 360 * | 250 | 350 | 396 |
| M000-12503600T | 12 | 360 * | 250 | 350 | 504 | 504 | 410 * | 300 | 400 | 451 |
| M000-12504100T | 12 | 410 * | 300 | 400 | 574 | 574 | 460 * | 330 | 450 | 506 |
| M000-12504600T | 12 | 460 * | 330 | 450 | 644 | 644 | 510 * | 370 | 500 | 561 |
| **500 - 690 V** | | | | | | | | | | |
| M000-12603150T | 12 | 315 * | 280 | 500 | 441 | 441 | 360 * | 355 | 550 | 396 |
| M000-12603600T | 12 | 360 * | 355 | 550 | 504 | 504 | 410 * | 400 | 600 | 451 |
| M000-12604100T | 12 | 410 * | 400 | 600 | 574 | 574 | 460 * | 450 | 650 | 506 |
| M000-12604600T | 12 | 460 * | 450 | 650 | 644 | 644 | 510 * | 500 | 700 | 561 |

## Notes:

** Frame 12 is only available as an unassigned power module (M000) and an F600 control module must also be ordered

- Internal 125 kW brake chopper included as standard.
- * Continuous currents at 2 kHz switching frequency
- Implement 2.8 MW drive systems by connecting this module in parallel

For more information on these features and the rest of the capabilities of this module, please see the latest issue of the Modular Power Brochure



# HVAC DRIVE H300

# HIGH IP VARIANT

## Dust and water resistant

**The HVAC Drive H300 offers a full IP65 solution with exactly the same dedicated HVAC features & capabilities as the standard models.**

IP65 provides protection from total dust ingress and low pressure water jets from any direction, making it a simple choice for harsh environments and the outdoors*. The HVAC Drive H300 is now one of the most protected drives on the market, maximising uptime and productivity, while cutting maintenance costs.

## Standard and High IP drives

The High IP drive will already be familiar to users of the HVAC Drive H300, with all the same features that make commissioning effortless. The Hand-Off-Auto keypad with the built-in real-time clock is still available, sealed, and the protective casing has been designed with easy servicing and usability in mind.

This new variant enables customers to use both standard and high IP drives for the same project, so there is no longer any headache with mixing-and-matching vendors or product feature sets, making project qualification straightforward.

## Save on installation

The HVAC Drive H300 High IP drive is enclosed in a sturdy, protective yet light casing, providing a compact solution. This not only allows easy integration in harsh environments but wall mounting close to the motor reduces installation costs, through:

- No cabinet required
- Shorter cable lengths
- Less labour time/cost to install drive

## Free 5 year warranty

To share our confidence in the reliability of Control Techniques, the HVAC Drive H300 High IP product is also eligible for Control Techniques' extended warranty, at no extra cost.




*Shading to be ensured

Warranty terms and conditions apply.



WWW.CONTROLTECHNIQUES.COM

# KEY FUNCTIONS

| Function | | Function | |
|---|---|---|---|
| Guided set-up via 'Connect' commissioning software | ✓ | Temperature monitoring | ✓ |
| On Board Comms ModBus RTU, BACnet MSTP | ✓ | Digital inputs | 3-6 |
| Control mode: Induction motor operation | ✓ | Digital outputs | 0-3 |
| Control Mode: Sensor-less RFCA Induction Motor Operation | ✓ | Relays (normally open/normally closed) | 2 |
| Control mode: Sensor-less Permanent magnet motor operation | ✓ | Motorised potentiometer | ✓ |
| Auto-tune static | ✓ | Logic function control | ✓ |
| Auto-tune rotating | ✓ | Timer function control | ✓ |
| Filter Change Timer | ✓ | Variable selector/ Threshold Detectors | ✓ |
| Time before Filter Change Due | ✓ | PID controllers | 2 |
| Hand/Off/Auto control | ✓ | Energy meter | ✓ |
| User Security Access | ✓ | Trip time stamping | ✓ |
| Supply loss detection | ✓ | Trip logging | 10 |
| Low DC link operation | ✓ | Skip frequency dead bands | ✓ |
| Catch a spinning motor | ✓ | Control word | ✓ |
| Stop mode: Ramp | ✓ | Auto reset | ✓ |
| Stop mode: Coast | ✓ | Parameter cloning | ✓ |
| Stop mode: Fast ramp | ✓ | Additional application parameters | 148 |
| Programmable braking | ✓ | On-board oscilloscope function | ✓ |
| Motor pre-heat mode | ✓ | On-board PLC | ✓ |
| Bi-polar references | ✓ | SD card adapter | ✓ |
| Skip frequencies | ✓ | SMARTCARD | ✓ |
| Fire Mode | ✓ | Acceleration rates | 4 |
| Demand based sleep mode | ✓ | Deceleration rates | 4 |
| Analogue inputs | 2 | S Ramp | ✓ |
| Analogue outputs | 2 | | |

# SPECIFICATION

| H300 | |
|---|---|
| **Items supplied with the drive** | Step-By-Step Guide, safety information, grounding bracket, grounding clamp, DC terminal cover grommets, terminal nuts, supply and motor connector, surface mounting brackets, control terminals, relay connectors, 24Vpower supply connector, finger guard grommets, IP65 cover and IP65 mounting brackets |
| **Storage temperature** | -40°C to 55°C, -40°F to 131°F |
| **Operating temperature without de-rate** | -20°C to 40°C, -4°F to 104°F |
| **Operating temperature with de-rate** | 40°C to 55°C, 104°F to 131°F |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | 2,3,4,6,8,12,16kHz (Factory default = 3kHz) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), RCM (Australia/ New Zealand), EAC (Russian Customs Union), UKCA |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety** | Single STO Function |
| **Altitude** | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| **Humidity** | 95% Non-condensing |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP65 |
| **Vibration** | Reference standard IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. |
| **Mounting methods** | Surface mount or through-panel mount via mounting brackets |
| **Output frequency/speed range** | 599Hz |
| **Braking** | In-built braking transistor, external resistor required. |
| **Operating modes** | Open Loop Induction Motor V/F, RFC-A (sensorless induction motor) RFC-S (sensorless, and feedback via option module) |
| **Overload capability** | 110% for 165s from cold or for 9s from 100% load |





| | |
|---|---|
| **Overvoltage category** | Evaluated for OVC III. |
| **Corrosive environments** | Concentrations not exceeding levels set in:<br>EN 50178:1998 Table A2<br>IEC 60721-3-3 Class 3C2 |
| **Immunity Compliance** | IEC61800-3, EN60800-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, |
| | IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without<br>external filters or line reactors. Capable of meeting the requirements of Equipment<br>Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, EN61000-6-4, EN61000-3-2, EN61000-3-12, EN61000-3-3, EN12015 |
| **Cooling** | Forced cooled |
| **Safe Torque off** | Single STO. SIL 3 |
| **Communications** | - RS485 with Modbus RTU<br>- BACnet MS/TP<br>- EtherNet/IP, EtherCAT, PROFIBUS, PROFINET, DeviceNET, POWERLINK and CANopen via option modules |
| **Control I/O** | 2 x analogue input, 2 x analogue outputs, 3 x Digital I/O programmable, 3 x Digital input, 2 x NO relay 250Vac Max., 5 x 0V common, 1 x 24V user output, 1 x 24V external input, 1 x STO input.<br>Additional I/O available with SI-I/O option module. |
| **Accuracy** | Frequency 0.01%, Analogue input 1 and 2: 11 bits plus sign,<br>Current accuracy typical 2%. |
| **On-Board user program capability** | N/A, Only via additional MCI200/ 210 Option Module |
| **Keypad (LCD)** | KI- HOA keypad RTC (real time clock), optional HOA Remote Keypad |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| **Warranty** | 5 years |
| **Supported options** | HMI, Remote Keypad RTC, SI-I/O, Remote I/O, SI-Encoder (speed feedback), SI-Universal Encoder, MCi200 (second processor), MCi210 (second processor), SI-Ethernet, SI-EtherCAT, SI-DeviceNET, SI-PROFIBUS, SI-PROFINET, SI-POWERLINK, SI-CANopen, KI-485 comms adapter, SD card adapter, SMARTCARD |
| **Accessories** | Through-hole IP65 (frame 3 to 8) or IP55 (frame 9 to 11) mounting kits, UL type conduit kits, retrofit mounting brackets, external EMC filters and grounding bracket (supplied with the drive) |

## Documentation & Downloads

Product documentation and PC tools available for download from:
**www.controltechniques.com/support**

# DIMENSIONS

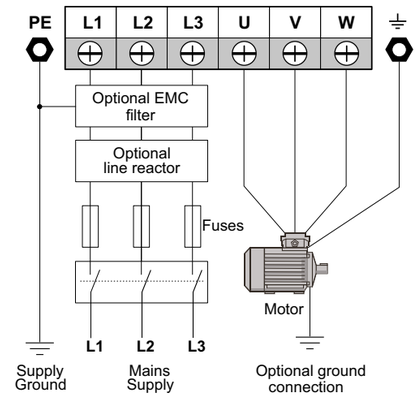



| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **3** | 571.4 | 255.8 | 220.7 | 22.49 | 10.7 | 8.7 | 465.5 | 73 | 18.32 | 2.87 | 4 x 6 | 0.23 | 7.5 | 16.5 |
| **4** | 571.4 | 255.8 | 220.7 | 22.49 | 10.7 | 8.7 | 470 | 106 | 18.5 | 4.17 | 4 x 7 | 0.27 | 9.3 | 20.5 |
| **5** | 570.7 | 255.8 | 220.7 | 22.46 | 10.7 | 8.7 | 467 | 110 | 18.38 | 4.38 | 4 x 7 | 0.27 | 10.0 | 22.0 |
| **6** | 573.79 | 316.68 | 247.3 | 22.59 | 9.73 | 9.8 | 478 | 196 | 18.81 | 7.72 | 6 x 7 | 0.27 | 16.9 | 37.3 |

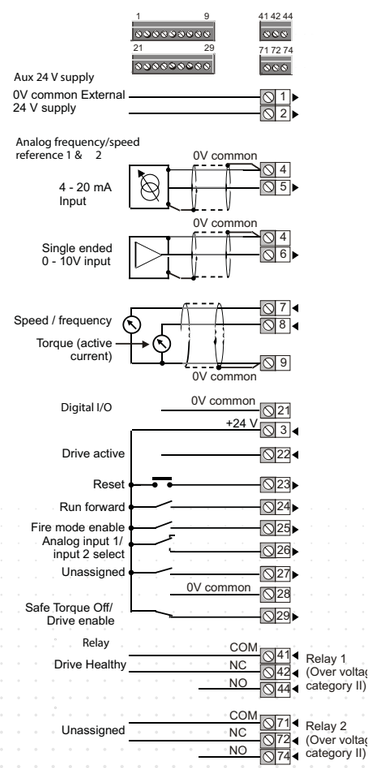




# CONNECTIONS

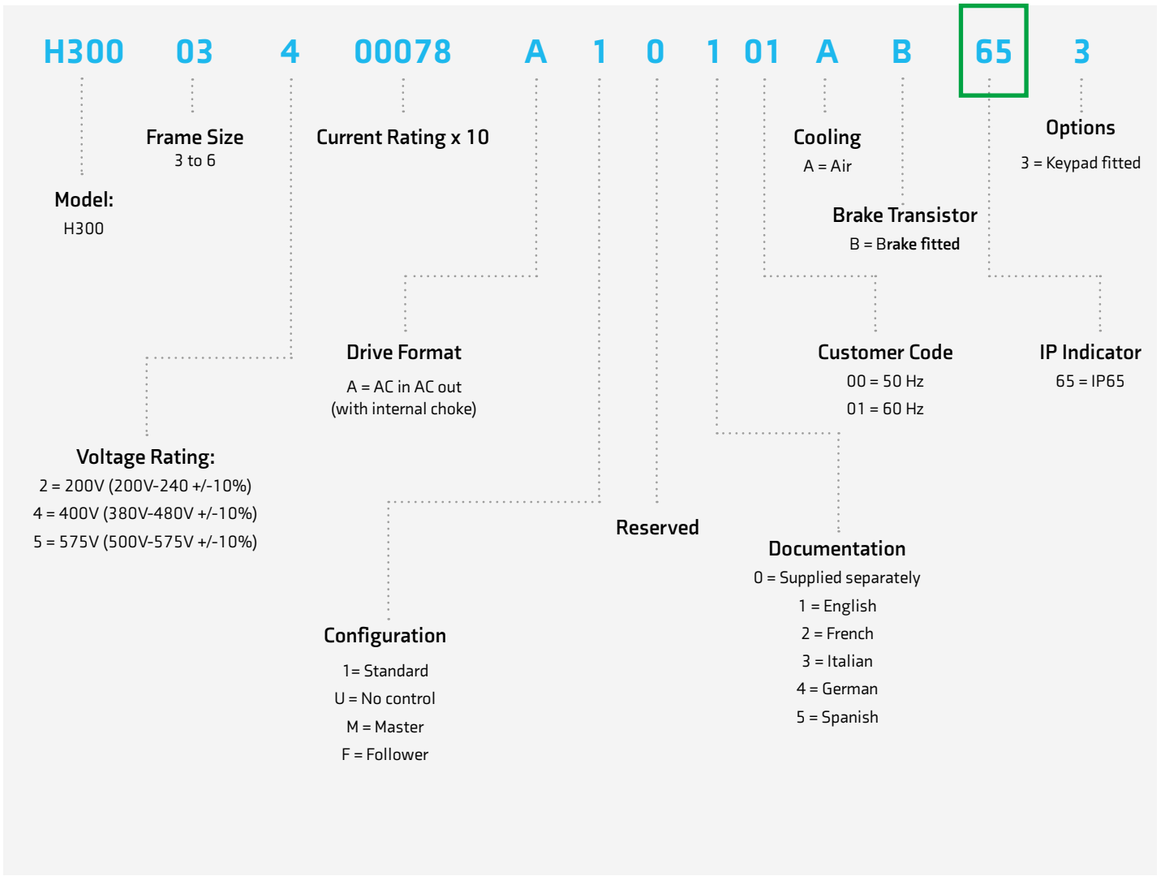



**Typical Power Connections**




**Default Control Connections**

# PART NUMBERS








# MODEL NUMBER AND RATINGS

| 200/240 Vac ±10% | | | | |
|---|---|---|---|---|
| Product Code | Normal Duty | | | |
| | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| H300-03200066 | 3 | 6.6 | 1.1 | 1.5 |
| H300-03200080 | 3 | 8 | 1.5 | 2 |
| H300-03200110 | 3 | 11 | 2.2 | 3 |
| H300-03200127 | 3 | 12.7 | 3 | 3 |
| H300-04200180 | 4 | 18 | 4 | 5 |
| H300-04200250 | 4 | 22 | 5.5 | 7.5 |
| H300-05200300 | 5 | 30 | 7.5 | 10 |
| H300-06200500 | 6 | 50 | 11 | 15 |

| 500/575 Vac ±10% | | | | |
|---|---|---|---|---|
| Product Code | Normal Duty | | | |
| | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| H300-05500039 | 5 | 3.9 | 2.2 | 3 |
| H300-05500061 | 5 | 6.1 | 4 | 5 |
| H300-05500100 | 5 | 10 | 5.5 | 7.5 |
| H300-06500120 | 6 | 12 | 7.5 | 10 |
| H300-06500170 | 6 | 17 | 11 | 15 |
| H300-06500220 | 6 | 22 | 15 | 20 |
| H300-06500270 | 6 | 27 | 18.5 | 25 |
| H300-06500340 | 6 | 34 | 22 | 30 |

| 380/480 Vac ±10% | | | | |
|---|---|---|---|---|
| Product Code | Normal Duty | | | |
| | Frame size | IP65 Max continuous current (A) | Motor shaft power (kW) | Motor shaft power (hp) |
| H300-03400034 | 3 | 3.4 | 1.1 | 1.5 |
| H300-03400045 | 3 | 4.5 | 1.5 | 2 |
| H300-03400062 | 3 | 6.2 | 2.2 | 3 |
| H300-03400077 | 3 | 7.7 | 3 | 5 |
| H300-03400104 | 3 | 10.4 | 4 | 5 |
| H300-03400123 | 3 | 11 | 5.5 | 7.5 |
| H300-04400185 | 4 | 18.5 | 7.5 | 10 |
| H300-04400240 | 4 | 21 | 11 | 15 |
| H300-05400300 | 5 | 29 | 15 | 20 |
| H300-06400380 | 6 | 38 | 18.5 | 25 |
| H300-06400480 | 6 | 48 | 22 | 30 |

# SERVO DRIVES AND MOTORS

## DIGITAX





# PRODUCTS IN THIS RANGE

DIGITAX HD | UNIMOTOR HD | DIGITAX SF

**DIGITAX Applications:**

- Hoists
- Winding
- Cutting
- Woodworking
- Printing
- Web Handling
- Textiles
- Packaging Machines
- Tyre Manufacturing
- Extrusion
- Metals
- Mining
- Marine
- Speed & Position Control (For Gearing & Ratio Control)







# DIGITAX HD

# MINIMUM SIZE MAXIMUM PERFORMANCE

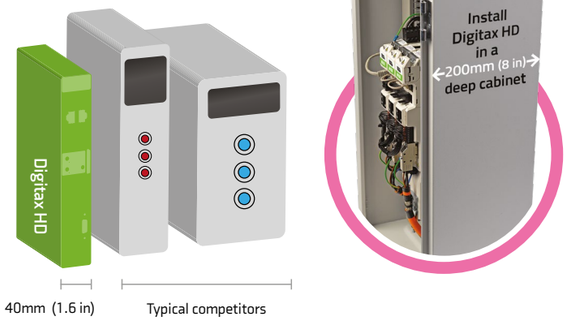
**1.5 A – 16 A with 48 A peak | 200 V | 400 V | 0.25 kW - 7.5 kW**

## Downsize cost and upsize floor space.

**With a tiny footprint but exceptional power density, Digitax HD is one of the smallest servo drives on the market today. Build the most compact cabinets possible.**

## The market's narrowest servo drive

- Digitax HD is just 40mm (1.6 in) wide
- 25 drives, up to 16A per drive, can fit in just 1 metre(40 in) of cabinet space







## Drive dimensions

| Frame size | Dimensions H x W x D mm (in) | Weight kg (lb) | Nominal current @ 400V | Peak current @ 400V |
|---|---|---|---|---|
| 1 | 233 x 40 x 174 (9.17 x 1.57 x 6.85) | 0.75 (1.65) | 4.2A | 12.6A |
| 2 | 278 x 40 x 174 (11.0 x 1.57 x 6.85) | 1.3 (3.0) | 10.5A | 31.5A |
| 3 | 328 x 40 x 174 (12.9 x 1.57 x 6.85) | 1.5 (3.3) | 16A | 48A |

Actual size




Just 40 mm (1.6 in)





# KEY SERVO FEATURES

| Servo Series | | M753 EtherCAT | M751 Base | M750 EtherNet | M754 MCi |
|---|---|---|---|---|---|
| Interface | Onboard Communications | 2-port EtherCAT switch | 2-port RS485 | 2-port EtherNet switch | 2-port EtherNet switch |
| | Fieldbus | EtherCAT | Modbus RTU | Modbus TCP/IP, EtherNet/IP, PROFINET RT | Modbus TCP/IP |
| | Real Time Motion | EtherCAT (CoE) | None | RTMoE | RTMoE |
| | Analog I/O | 1 Analog Input ± 10V, 12 bits (11 bits + sign) | | | |
| | Digital I/O | 2 DI, 2 DO (100 mA), 1 motor brake output (1 A, max 1.3 A) | | | |
| | Pulse Train Input | Frequency/Direction 5 V differential, 500 kHz | | | |
| | Encoder Feedback | 2 x Encoder input and 1 simulated encoder output | | | |
| | Supported Encoders | Resolver, Quadrature, AB Servo, SinCos, EnDat (2.1/2.2), SSI, BiSS, Hiperface | | | |
| | Safety | 2 x Safe Torque Off (STO) via terminal, PLe, SIL3 | | | |
| Control | Motor Control Modes | V/F, Open loop vector, RFC-A (Sensorless or with feedback 'Closed Loop'), RFC-S (Sensorless or with feedback 'Closed Loop') | | | |
| | Control Modes | Position control, speed control, torque control | | | |
| | Control Features | Stationary autotune for permanent magnet motors | | | |
| | | Advanced bi-quad filters for suppression of mechanical resonances | | | |
| Onboard Intelligence | Motion | Advanced Motion Controller | | | MCi |
| | | Parameterised motion | | | Programmable motion |
| | | 1.5 Axes | | | Up to 5 Axes |
| | | Positioning digital lock control | | | Positioning digital lock control camming |
| | | Real-time tasks | | | |
| | PLC | Onboard PLC | | | Onboard Machine Controller |
| | | IEC61131-3 programming (IL, LD, FBD, SFC, ST, CFC) | | | |
| Performance | Update Rates | Current Loop Update: 62 µs | | | |
| | | Speed Loop Update: 250 µs | | | |
| | | Position Loop Update: 250 µs | | | |
| | Overload | *Closed-loop Overload: Maximum closed loop peak current for 0.25 s (from cold: 300 % for 8 s or 200 % for 60 s) | | | |
| | | *Open-loop Overload: Maximum open loop peak current for 8 s (from cold: 150 % for 100 s) | | | |
| | Max Output Frequency | 550 Hz (RFC-A and RFC-S) 599 Hz (Open Loop) | | | |
| | Switching Frequency | Configurable range: 2, 3, 4, 6, 8, 12, 16 kHz | | | |
| | | Default: 8kHz | | | |

**RFC-S: Rotor Flux Control for Synchronous (permanent magnet brushless) motors**
**RFC-A: Rotor Flux Control for Asynchronous (induction) motors**
*** The stated percentages apply only to three phase continuous current**

# SPECIFICATION

| Digitax HD | |
|---|---|
| **Items supplied with the drive** | Documents: Quick Start Guide, Safety Information Booklet, Certificate of Quality.<br>Accessories: Power input connector, Brake connector, I/O connector, 24 Vdc supply connector, cable screen bracket, 3 x M4x8 screws (motor earth, supply earth, cable screen bracket), motor connector. |
| **Storage temperature** | -40°C to 55°C (-40°F to 131°F) |
| **Operating temperature without de-rate** | -20°C to 40°C (-4°F to 104°F) |
| **Operating temperature with de-rate** | 40°C to 55°C (104°F to 131°F) |
| **Supply requirements** | 200 V to 240 V ± 10% single or three phase.<br>380 V to 480 V ± 10% three phase. |
| **Switching frequency range** | 2,3,4,6,8,12,16 kHz (Factory default = 8 kHz) |
| **Approvals** | CE (European Union), cUL Listed (USA and Canada), KC (Korea), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety (single STO function)** | Independently assessed by TUV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PL e |
| **Altitude** | 1000 m to 3000 m (3300 ft to 9900 ft). 1% de-rate per 100 m (330 ft) above 1000 m (3300 ft) |
| **Humidity** | 95% Non-condensing at 40°C (104°F) |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IP20 – Pollution degree 2 |
| **Vibration** | Maximum recommended continuous (random) vibration level 0.14 g r.m.s. broadband 5 to 200 Hz.<br>Reference standard IEC60068-2-27 (bump test), IEC60068-2-64 (random vibration test), IEC60068-2-6, EN61800-5-1 (sinusoidal vibration test). Tested to Environmental Category ENV3. |
| **Mounting methods** | Horizontal or vertical surface mounting with DIN rail alignment. |
| **Output frequency/speed range** | 550 Hz (RFC-A/RFC-S); 599 Hz (Open loop) |
| **Braking** | In-built braking transistor, external resistor required (drive mountable resistor or external resistor) |
| **Operating modes** | Open-loop, RFC-A (enhanced open-loop performance), RFC-S (servo mode) |
| **Overload capability** | Open-loop (from cold) 150 % for 100 s, Open-loop (from 100%) 150 % for 8 s. RFC (from cold) 300% for 8 s, RFC (from 100%) 300% for 0.25 s |
| **Overvoltage category** | Evaluated for OVC III. |
| **Corrosive environments** | Concentrations of corrosive gases must not exceed the levels given in: Table A2 of EN 50178:1998, Class 3C2 of IEC 60721-3-3<br>This corresponds to the levels typical of urban areas with industrial activities and/or heavy traffic, but not in the immediate neighbourhood of industrial sources with chemical emissions. |



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| | |
|---|---|
| **Immunity Compliance** | IEC61800-3, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment<br>Category C1 when installed with the recommended filters (dependant on switching frequency). EN61000-6-2, EN61000-6-4, EN61000-3-2, EN61000-3-3 |
| **Cooling** | Ultraflow™ rear venting option available |
| **Safe Torque off** | Dual STO channels. SIL3/PLe compliant |
| **Communications** | M750 – EtherNet (multiprotocol)<br>M751 – RS-485<br>M753 – EtherCAT<br>M754 - EtherNet<br>SI Options - EtherCAT, PROFIBUS, Ethernet, DeviceNet, CANopen, PROFINET V2 |
| **Control I/O** | 1 x Analogue input, 2 x Digital input, 2 x Digital output, 1 x Motor brake output, 7 x 0 V common, 1 x 24V user output. Pluggable control connector with push in spring connection.<br>(Additional I/O available with SI-I/O option module).<br>2 x External 24 Vdc User supplied ports for control supply. Pluggable connector with screw connection. |
| **Accuracy** | Frequency 0.01%, Analog input 1: 11 bit plus sign. Current typical 2%. |
| **On-Board advanced motion controller** | Advanced 1.5 axes Motion Controller, key features include: – Real-time tasks – 250 µs cycle time – Motion profile generator – Electronic gearbox – Interpolated CAM – Homing functions – High speed position freeze |
| **Keypad** | Single 7 segment display with 2 x rotary dials for node address setting. Remote keypad with Real-time clock available as option (Optional on M751). |
| **Parameter backup and cloning** | Smartcard and SD card (using SD card adapter) |
| **PC Tools** | 'Connect' commissioning and cloning tool including CT Oscilloscope, Machine Control Studio for On-board PLC programming. |
| **Warranty** | 2 years |
| **Supported options** | SI-EtherCAT, SI-PROFIBUS, SI-Ethernet, SI-DeviceNET, SI-CANopen, SI-PROFINET, SI-I/O, SI-Encoder (speed feedback), Remote I/O, SI-Powerlink, SI-Universal Encoder, MCi200, MCi210, SI-Apps Compact and PTi210. |
| **Accessories** | Rear vent, Compact brake resistor & External brake resistors, Encoder breakout connector, KI-485 adaptor, KI compact display (supplied with M750, M753, and M754 Drives), Digitax ST retrofit brackets, SI-Option module mounting kit. External EMC filters, Fan replacement kits, Remote Keypad RTC, Multi-axis kits (24Vdc link, DC bus link, Comms link), Unidrive M to Digitax HD DC busbar adaptor kits, Capacitor Module to extend DC bus capacity and Cable grommet kit. |

## Documentation & Downloads

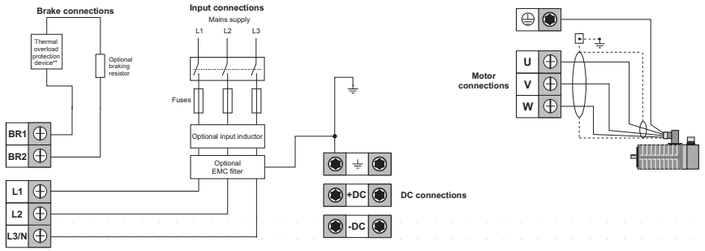
Product documentation and PC tools available for download from:
www.controltechniques.com/support

# DIMENSIONS

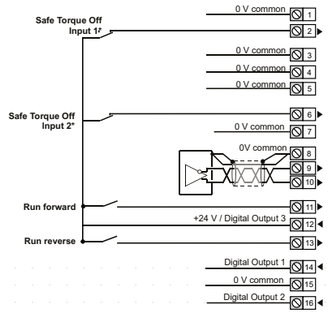
| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| 1 | 233 | 40 | 174 | 9.17 | 1.58 | 6.85 | 222 | 12 | 8.74 | 0.47 | 5.2 | 0.21 | 1.9 | 4.2 |
| 2 | 278 | 40 | 174 | 10.95 | 1.58 | 6.85 | 267 | 12 | 10.51 | 0.47 | 5.2 | 0.21 | 2.3 | 5.1 |
| 3 | 328 | 40 | 174 | 12.91 | 1.58 | 6.85 | 317 | 12 | 12.48 | 0.47 | 5.2 | 0.21 | 2.5 | 5.5 |




# CONNECTIONS




**Typical Power Connections**




**Default Control Connections**

# PART NUMBERS

| Derivative | Electrical Specification | | Configuration | | Encoder Interface | Documentation | Default | Optional build | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M753 | 01 | 2 | 00022 | A | 1 | 0 | 1 | 00 | A | B | 1 | 0 | 1 |

**Digitax HD range**

| | |
|---|---|
| M750 | Ethernet |
| M751 | Base |
| M753 | EtherCAT |
| M754 | MCi |

**Frame Size**

| | |
|---|---|
| 01 | Frame 1 |
| 02 | Frame 2 |
| 03 | Frame 3 |

**Voltage Rating**

| |
|---|
| 2-200 V (200-240 ± 10%) |
| 4-400 V (380-480 ± 10%) |

**Current Rating**

Nominal current rating x 10

**Safety**

1 – Standard (2 x STO)

**Region**

| | |
|---|---|
| 00 | 50 Hz |
| 01 | 60 Hz |

**Option module support:**

| | |
|---|---|
| AB10 | Not fitted (M750,M753,M754) |
| AB11 | Fitted (M751 only) |

**Documentation**

1 – Multilingual

**Display Option**

| | |
|---|---|
| 0 | KI-Compact Display not fitted (M751 only) |
| 1 | KI-Compact Display fitted (M750, M753, M754) |

**Encoder Interface:**

0 – Standard

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# MODEL NUMBER AND RATINGS

## 200 V Single Phase

| Frame Size<br>W x D x H mm (in) | Frame Size 01<br>40 x 174 x 233 (1.57 x 6.85 x 9.17) | | | Frame Size 02<br>40 x 174 x 278 (1.57 x 6.85 x 10.94) | | Frame Size 03<br>40 x 174 x 328<br>(1.57 x 6.85 x 12.91) |
|---|---|---|---|---|---|---|
| Line Supply | Single Phase AC 200 V...240 V (± 10%) @ 45...66 Hz | | | | | |
| M75X-... | 01200022 | 01200040 | 01200065 | 02200090 | 02200120 | 03200160 |
| **Output Servo** | | | | | | |
| Rated Current (A) | 1.1 | 2.2 | 3.5 | 5.6 | 7.5 | 10.8 |
| Max Peak Current (A) | 6.6 | 12 | 19.5 | 27 | 36 | 48 |
| **Output AC Induction** | | | | | | |
| Max Continuous Current (A) | 1.1 | 2.2 | 3.5 | 5.6 | 7.5 | 10.8 |
| Open Loop Peak Current (A) | 3.3 | 6 | 9.8 | 13.5 | 18 | 24 |
| Closed Loop Peak Current (A) | 6.6 | 12 | 19.5 | 27 | 36 | 48 |
| Motor Power at 230 V (kW) | 0.18 | 0.37 | 0.75 | 1.1 | 1.5 | 2.2 |
| Motor Power at 230 V (hp) | 0.25 | 0.5 | 1.0 | 1.5 | 2.0 | 3.0 |
| **Overload** | | | | | | |
| Closed-loop Overload | Maximum closed loop peak current for 0.25 s | | | | | |
| Open-loop Overload | Maximum open loop peak current for 8 s | | | | | |

## 200 V Three Phase

| Frame Size<br>W x D x H mm (in) | Frame Size 01<br>40 x 174 x 233 (1.57 x 6.85 x 9.17) | | | Frame Size 02<br>40 x 174 x 278 (1.57 x 6.85 x 10.94) | | Frame Size 03<br>40 x 174 x 328<br>(1.57 x 6.85 x 12.91) |
|---|---|---|---|---|---|---|
| Line supply | Three Phase AC 200 V...240 V (± 10%) @ 45...66 Hz | | | | | |
| M75X-... | 01200022 | 01200040 | 01200065 | 02200090 | 02200120 | 03200160 |
| **Input** | | | | | | |
| Max Power (kW) | 4 | | | 5.3 | | 10* |
| **Output Servo** | | | | | | |
| Rated Current (A) | 2.2 | 4 | 6.5 | 9 | 12 | 16 |
| Max Peak Current (A) | 6.6 | 12 | 19.5 | 27 | 36 | 48 |
| **Output AC Induction** | | | | | | |
| Max Continuous Current (A) | 2.2 | 4 | 6.5 | 9 | 12 | 16 |
| Open Loop Peak Current (A) | 3.3 | 6 | 9.8 | 13.5 | 18 | 24 |
| Closed Loop Peak Current (A) | 6.6 | 12 | 19.5 | 27 | 36 | 48 |
| Motor Power at 230 V (kW) | 0.37 | 0.75 | 1.1 | 2.2 | 2.2 | 4.0 |
| Motor Power at 230 V (hp) | 0.5 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| **Overload** | | | | | | |
| Closed-loop Overload | 300 % for 0.25 s or 200 % for 4 s | | | | | |
| Open-loop Overload | 150 % for 8 s | | | | | |

## 400 V Three Phase

| Frame Size<br>W x D x H mm (in) | Frame Size 01<br>40 x 174 x 233 (1.57 x 6.85 x 9.17) | | | Frame Size 02<br>40 x 174 x 278 (1.57 x 6.85 x 10.94) | | | Frame Size 03<br>40 x 174 x 328<br>(1.57 x 6.85 x 12.91) | |
|---|---|---|---|---|---|---|---|---|
| Line supply | Three Phase AC 380 V...480 V (± 10%) @ 45...66 Hz | | | | | | | |
| M75X-... | 01400015 | 01400030 | 01400042 | 02400060 | 02400080 | 02400105 | 03400135 | 03400160 |
| **Input** | | | | | | | | |
| Max Power (kW) | 6.5 | | | 8.7 | | | 10/13* | |
| **Output Servo** | | | | | | | | |
| Rated Current (A) | 1.5 | 3 | 4.2 | 6 | 8 | 10.5 | 13.5 | 16 |
| Max Peak Current (A) | 4.5 | 9 | 12.6 | 18 | 24 | 31.5 | 40.5 | 48 |
| **Output AC Induction** | | | | | | | | |
| Max Continuous Current (A) | 1.5 | 3 | 4.2 | 6 | 8 | 10.5 | 13.5 | 16 |
| Open Loop Peak Current (A) | 2.3 | 4.5 | 6.3 | 9 | 12 | 15.8 | 20.3 | 24 |
| Closed Loop Peak Current (A) | 4.5 | 9 | 12.6 | 18 | 24 | 31.5 | 40.5 | 48 |
| Motor Power at 400 V (kW) | 0.37 | 0.75 | 1.5 | 2.2 | 3.0 | 4.0 | 5.5 | 5.5 |
| Motor Power at 400 V (hp) | 0.75 | 1.5 | 2.0 | 3.0 | 5.0 | 5.0 | 7.5 | 10.0 |
| **Overload** | | | | | | | | |
| Closed-loop Overload | 300 % for 0.25 s or 200 % for 4 s | | | | | | | |
| Open-loop Overload | 150 % for 8 s | | | | | | | |

DIGITAX SF

# EASY TO USE LOW POWER SERVO

0.05 kW - 2 kW | 200 V

DRIVE

DIGITAX SF

## The perfect choice for low powered precision servo solutions with its dedicated servo range from 50W to 2 kW.

With 17-bit resolution, robust magnetic encoder technology and pulse train or analogue control interface, Digitax SF offers a cost effective servo solution, without compromising on performance.

## Key Benefits:

- Magnetic encoder technology
- Versatile analogue or pulse train interface
- Built-in keypad
- Standalone operation
- PC-USB interface
- Multiple motor inertia levels available





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# KEY DRIVE FEATURES

| Function | | Function | |
|---|---|---|---|
| Operation mode: Position | ✓ | Command Mode: Pulse Train (Position) | ✓ |
| Operation mode: Velocity | ✓ | Command Mode: Analog (Velocity, Torque) | ✓ |
| Operation mode: Torque | ✓ | Command Mode: Internal (Position, Velocity) | ✓ |
| Pulse train input pulse form: Pulse/Direction | ✓ | Pulse train input pulse form: Quadrature Encoder Pulse | ✓ |
| Pulse train input pulse form: CCW/CW | ✓ | Analog Input Filter | ✓ |
| Position Command Filter | ✓ | Torque Limit | ✓ |
| Torque Command Filter | ✓ | Inching | ✓ |
| Jog | ✓ | Supply loss detection | ✓ |
| Bi-polar analog reference | ✓ | Analogue input control | ✓ |
| Internal Pre-set speeds | 8 | Homing to sensor | ✓ |
| Internal Point Moves | 16 | Homing to encoder z-pulse | ✓ |
| Homing to torque limit/stopper | ✓ | Temperature monitoring | ✓ |
| Acceleration Rates (Mode Dependent) | 1 to 16 | Digital input control | ✓ |
| Deceleration Rates (Mode Dependent) | 1 to 16 | Digital output control | ✓ |
| Command pulse frequency RS-422 max | 4Mpps | Limit switch control | ✓ |
| Command pulse frequency open-collector max | 200kpps | Analog Input filters | ✓ |
| Auto-tune rotating | ✓ | Pulse train input filter | ✓ |
| Energy meter | ✓ | Run time log | ✓ |
| Alarm time stamping | ✓ | Alarm logging | 10 |
| Auto reset | ✓ | Control word control | ✓ |
| Cloning | ✓ | Mechanical brake controller | ✓ |
| Stop mode: Coast | ✓ | Stop Mode: Emergency Stop Brake | ✓ |
| Stop mode: Quick Stop | ✓ | Stop mode: Short Brake | ✓ |

# SPECIFICATION

| Digitax SF | |
|---|---|
| **Items supplied with the drive** | Safety information, power input connector, encoder connector |
| **Storage temperature** | -20°C to 65°C, -4°F to 149°F |
| **Operating temperature without de-rate** | 0°C to 50°C, 32°F to 122°F |
| **Operating temperature with de-rate** | N/A |
| **Supply requirements** | Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases). Input frequency 45 to 66Hz |
| **Switching frequency range** | N/A |
| **Approvals** | CE (European Union), UL (508C if installed in appropriate environment), KC (Korea) |
| **Product safety standard** | EN61800-5-1 |
| **Functional safety (Dual STO function)** | N/A |
| **Altitude** | ≤1000m |
| **Humidity** | 20 – 85% RH or less (Non-condensing) |
| **Pollution** | Degree 2. Dry, non-conducting pollution only |
| **IP Rating** | IPXX – Pollution degree 2 |
| **Vibration** | ≤5.8m/s (0.6G)<br>10 to 60Hz (no continuous operation allowed at resonant frequency |
| **Mounting methods** | Surface mount, mounting holes only |
| **Output frequency/speed range** | 0 - 500Hz (50W - 750W), 0 – 250Hz (1kW – 2kW) |
| **Braking** | Mechanical brake control, no internal braking resistor but an external emergency stop braking unit can be fitted |
| **Operating modes** | Position, Velocity, Torque |
| **Overload capability** | 350% (50W to 100W), 300% (200W to 2kW) |
| **Overvoltage category** | II |
| **Corrosive environments** | Never use the product in an environment containing explosive or flammable gases, chloride, acidic or alkaline corrosive environment such as sulfur dioxide, chlorine, ammonia and so on |
| **Immunity Compliance** | EN 61000-6-2:2005 |
| **Emission compliance** | EN55011:2009+A1:2010 |



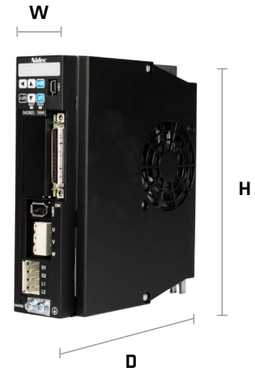
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| | |
|---|---|
| **Cooling** | Forced cooled |
| **Safe Torque off** | None |
| **Communications** | RS-485 |
| **Control I/O** | 1 x Analogue Input, 1 x Analog Ground 8 x Digital Input Programmable, 6 x Digital Output, 2 x independent digital output, 1 x Control 24V Power Input, 1 x Control Ground, 1 x I/O COM +, 1 X I/O COM-, 7 x simulated encoder output, 3 x RS485 terminals, 8 x Position Pulse Inputs |
| **Accuracy** | Command pulse -paired ratio: 1/1000 < A/B < 1000, Analogue input: Single Ended ±10V |
| **On-Board user program capability** | N/A |
| **Keypad** | Fixed LED keypad |
| **PC Tools** | 'Digitax SF Connect' commissioning, waveform monitor and point table setup. |
| **Warranty** | |
| **Supported options** | N/A |
| **Accessories** | Input / Output (I/O) terminal block and cable assembly; Input / Output Interface Connector; Surge absorber / protector; EMC filter |
| **Encoder** | 17-bit single or multi-turn (incremental) |
| **Encoder Multi-turn count** | 65536 |

# DIMENSIONS

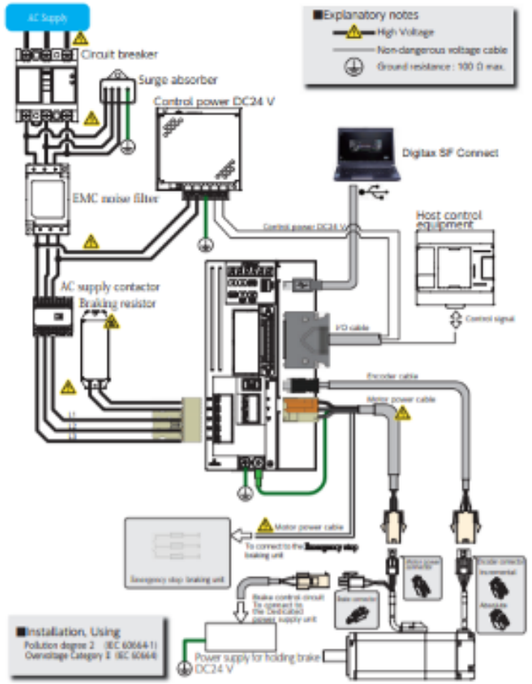
| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **1** | 160 | 40 | 130 | 6.3 | 1.57 | 5.12 | 150 | 30 | 5.91 | 1.18 | 5.5 | 0.22 | 0.7 | 1.54 |
| **2** | 160 | 48 | 130 | 6.3 | 1.89 | 5.12 | 150 | 30 | 5.91 | 1.18 | 5.5 | 0.22 | 0.8 | 1.76 |
| **3** | 160 | 68 | 130 | 6.3 | 2.68 | 5.12 | 150 | 44 | 5.91 | 1.73 | 5.5 | 0.22 | 1 | 2.2 |
| **4** | 160 | 84 | 130 | 6.3 | 3.31 | 5.12 | 150 | 61.7 / 69 * | 5.91 | 2.72 / 2.43 | 5.5 | 0.22 | 1.6 | 3.53 |

*** Mounting hole separation: 61.7mm at the top, 69mm at the bottom**

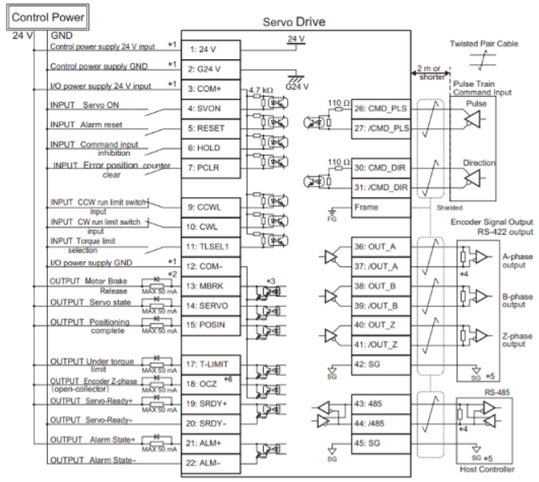


# CONNECTIONS

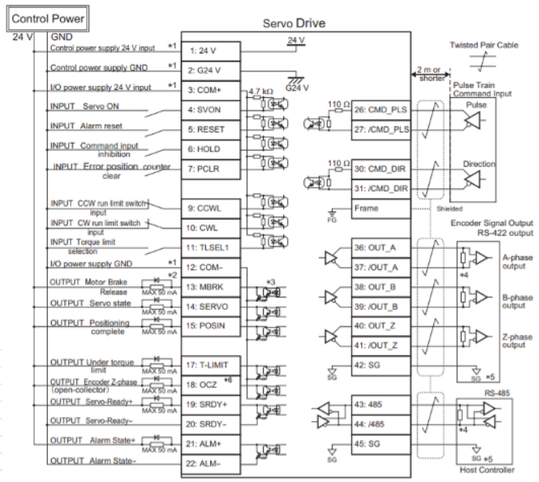
## Typical Power Connections




## Default Control Connections




Pulse Train Command




Analog Velocity Command





# PART NUMBERS

**DA** — Series

**2** — Input Power Supply:
2: AC 200V-240V
(50W - 750W: Single-phase)
1kW: Single-phase/three-phase
1.5kW, 2kW: Three-phase

**Y** — Compatible Motor:
Y: Mx500x2xx, Z: Mx101x2xx
1: Mx201x2xx, 2: Mx401x2xx
3: Mx751x2xx, 4: Mx102x2xx
6: Mx152x2xx, 8: Mx202x2xx

**Z** — Main Circuit Power Supply:
Z: 50W, 1: 100W, 2: 200W, 4: 400W,
8: 750W, A: 1kW, B: 1.5kW, C: 2kW

# MODEL NUMBER AND RATINGS

| Model No. | Frame Size | Supply Phases | Rated Current (A) | Motor Power (kW) | Motor Power (hp) | Compatible Motor | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Model No. | Motor Flange Size (mm) | Motor Inertia |
| **200V (200-240V +/-10%)** | | | | | | | | |
| DA2YZ | 1 | 1 | 0.7 | 0.05 | 0.07 | Mx500x2xx | 40 | Middle |
| DA2Z1 | 1 | 1 | 1 | 0.1 | 0.13 | Mx101x2xx | 40 | Middle |
| DA212 | 1 | 1 | 1.7 | 0.2 | 0.27 | Mx201x2xx | 60 | Low, High |
| DA224 | 1 | 1 | 2.7 | 0.4 | 0.53 | Mx401x2xx | 60 | Low, High |
| DA238 | 2 | 1 | 4.3 | 0.75 | 1 | Mx751x2xx | 80 | Low, High |
| DA24A | 3 | 01-Mar | 5.6 | 1 | 1.3 | Mx102x2xx | 130 | Middle, High |
| DA26B | 4 | 3 | 9.9 | 1.5 | 2 | Mx152x2xx | 130 | Middle, High |
| DA28C | 4 | 3 | 12.2 | 2 | 2.7 | Mx202x2xx | 130 | Middle |

### Documentation & Downloads

Product documentation and PC tools available for download from:
**www.controltechniques.com/support**

MOTOR

DIGITAX SF

# SPECIFICATION

| Digitax SF Motor | |
|---|---|
| **Ambient temperature for operation** | 0 to 40°C |
| **Ambient humidity for operation** | 20 to 85% RH (no condensation) |
| **Ambient temperature for storage** | -20 to 65°C (no condensation) |
| | (not subjected to direct sunlight) 80°C for 72 hours |
| **Ambient humidity for storage** | 20 to 85% RH (no condensation) |
| **Atmosphere for operation/storage** | Indoors (not subject to direct sunlight) |
| | Free from corrosive gases, flammable gases, oil must, dust, flammables, grinding fluid |
| **Insulation resistance** | ≥5MΩ at 1,000VDC |
| **Dielectric strength** | AC 1500V for one minute across the primary Ground/Earth FG |
| **Operating altitude** | ≤1000m |
| **Vibration class** | V15 (JEC2121) |
| **Vibration resistance** | 49m/s2 (5G) |
| **Impact resistance** | 98m/s2 (10G) |
| **Protective structure** | IP65: 50W to 750W |
| | IP67: 1kW to 2kW |
| **Electric shock protection** | Class I (Mandatory grounding) |
| **Overvoltage category** | II |
| **Installation environment** | Pollution degree 2 |

## Documentation & Downloads

Product documentation and PC tools available for download from:
**www.controltechniques.com/support**

| Digitax SF Encoder | Mxxxxx2xN | Mxxxxx2xA |
|---|---|---|
| Resolution | Incremental 17-bit | Absolute 17-bit |
| Ambient operating temperature | 0 to 85°C | |
| External disturbance magnetic field | ±2mT (20G) or below | |
| Power supply voltage | DC 4.5 to 5.5V (Power supply ripple ≤5%) | |
| Power supply current consumption | 160mA (Not including inrush current) | |
| External battery voltage | - | DC 2.4 to 4.2V |
| External battery current consumption | - | 10µA |
| Multi-turn count | - | 65,536 counts |
| Maximum revolving speed | 6,000rpm | |
| Count-up direction | Counter-clockwise viewed from load-side shaft end | |
| Input/output type | Differential | |
| Communication transmission method | Half-duplex asynchronous serial communication | |
| Communication speed | 2.5Mbps | |

# PART NUMBERS

| MX | | 201 | | N | | 2 | | S | | | N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Series | Code | Rated Output | Code | Holding Brake | Code | Voltage Specification | Code | Shaft End | Oil Seal | Code | Encoder Type |
| MX | Low Inertia | 500 | 50W | N | Without | 2 | AC200V to 240V | S (P) | Straight | Without | N | 17bit (incremental) |
| | | 101 | 100W | | | | | | | | | |
| MY | Middle Inertia | 201 | 200W | | | | | K (H) | Key | Without | | |
| | | 401 | 400W | | | | | | | | | |
| MM | | 751 | 750W | A | With | | | T (R) | Straight | With | A | 17bit (absolute) |
| MZ | High Inertia | 102 | 1kW | | | | | | | | | |
| | | 152 | 1.5kW | | | | | L (J) | Key | With | | |
| MH | | 202 | 2kW | | | | | | | | | |





# MODEL NUMBER AND RATINGS

| | | MY500x2xx | MY101x2xx | MX201x2xx | MZ201x2xx | MX401x2xx | MZ401x2xx | MX751x2xx | MZ751x2xx | MM102x2xx | MH102x2xx | MM152x2xx | MH152x2xx | MM202x2xx |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Units | | | | | | | | | | | | | |
| Inertia level | - | Middle | Middle | Low | High | Low | High | Low | High | Middle | High | Middle | High | Middle |
| Fitting flange size | mm | 40 sq. | | 60 sq. | | | | 80 sq. | | | | 130 sq. | | |
| Motor length (without brake or oil seal) | | 66.4 | 82.4 | 76.5 | | 93.5 | | 110.5 | 107.3 | 122.3 | 128 | 163 | 145.5 | 180.5 | 163 |
| Motor length (without brake, with oil seal) | | 72 | 88 | | | | | | | | | | | |
| Motor length (with brake, without oil seal) | | 106.8 | 122.8 | 113 | | 130 | | 147 | 144.3 | 159.3 | 153 | 188 | 170.5 | 205.5 | 188 |
| Motor length (with brake and oil seal) | | 112.4 | 128.4 | | | | | | | | | | | |
| Approximate mass (without brake) | kg | 0.4 | 0.5 | 0.8 | 1 | 1.3 | 1.5 | 2.2 | 2.5 | 5.6 | 7.6 | 7 | 9 | 8.4 |
| Approximate mass (with brake) | kg | 0.6 | 0.8 | 1.3 | 1.5 | 1.8 | 2 | 3 | 3.3 | 7 | 9 | 8.4 | 10.4 | 9.8 |
| Compatible drive model number | - | DA2YZ | DA2Z1 | DA212 | | DA224 | | DA238 | | DA24A | | DA26B | | DA28C |
| Voltage | V | AC200 to 240V | | | | | | | | | | | | |
| Rated output power | W | 50 | 100 | 200 | | 400 | | 750 | | 1000 | | 1500 | | 2000 |
| Rated torque | Nm | 0.16 | 0.32 | 0.64 | | 1.27 | | 2.39 | | 4.77 | | 7.16 | | 9.55 |
| Instantaneous maximum torque | Nm | 0.56 | 1.12 | 1.91 | | 3.82 | | 7.1 | | 14.3 | | 21.5 | | 28.6 |
| Rated current (stall current) | A | 0.68 | 0.97 | 1.7 | | 2.7 | | 4.2 | | 5.6 | | 9 | | 11.9 |
| Instantaneous maximum current | A | 2.4 | 3.3 | 5.2 | | 8.5 | | 12.2 | | 16.8 | | 27 | | 35.7 |
| Rated revolving speed | rpm | 3000 | | | | | | | | | | 2000 | | |
| Maximum revolving speed | rpm | 6000 | | | | | | | | | | 3000 | | |
| Torque constant | Nm/A | 0.25 | 0.35 | 0.41 | | 0.49 | | 0.63 | | 0.88 | | 0.81 | | 0.85 |
| Induced Voltage Constant per Phase | mV/rpm | 8.8 | 12.3 | 14.3 | | 17.1 | | 21.9 | | 30.9 | | 28.4 | | 29.6 |
| Rated power rate (without brake) | kW/s | 6.5 | 16.5 | 28.2 | 9.1 | 69.4 | 23 | 76.6 | 35.4 | 50 | 9.2 | 76.9 | 13.8 | 104.9 |

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| Item | Units | MY500x2xx | MY101x2xx | MX201x2xx | MZ201x2xx | MX401x2xx | MZ401x2xx | MX751x2xx | MZ751x2xx | MM102x2xx | MH102x2xx | MM152x2xx | MH152x2xx | MM202x2xx |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated power rate (with brake) | kW/s | 5.4 | 14.6 | 23.5 | 8.6 | 61.8 | 22.1 | 60.7 | 31.6 | 36.5 | 8.6 | 61.4 | 13.3 | 87.9 |
| Mechanical time constant (without brake) | ms | 1.92 | 1.17 | 0.72 | 2.23 | 0.47 | 1.42 | 0.4 | 0.86 | 0.76 | 4.17 | 0.6 | 3.32 | 0.58 |
| Mechanical time constant (with brake) | ms | 2.31 | 1.32 | 0.87 | 2.38 | 0.53 | 1.47 | 0.5 | 0.96 | 1.05 | 4.43 | 0.75 | 3.46 | 0.69 |
| Electrical time constant | ms | 0.74 | 0.89 | 2.53 | | 2.92 | | 4.6 | | 10.1 | | 12.2 | | 12.2 |
| Rotor moment of inertia (without brake) | x10-4 kgm2 | 0.039 | 0.061 | 0.14 | 0.44 | 0.23 | 0.71 | 0.74 | 1.61 | 4.56 | 24.9 | 6.67 | 37.12 | 8.7 |
| Rotor moment of inertia (with brake) | x10-4 kgm2 | 0.047 | 0.069 | 0.17 | 0.47 | 0.26 | 0.73 | 0.94 | 1.81 | 6.24 | 26.4 | 8.35 | 38.65 | 10.38 |
| Permissible radial load | N | 68 | | | 245 | | | 392 | | | | 490 | | |
| Permissible axial load | N | 58 | | | 98 | | | 147 | | | | 196 | | |

# MODEL NUMBER AND BRAKE RATINGS

| Item | Units | MY500A2xx | MY101A2xx | MX201A2xx | MZ201A2xx | MX401A2xx | MZ401A2xx | MX751A2xx | MZ751A2xx | MM102A2xx | MH102A2xx | MM152A2xx | MH152A2xx | MM202A2xx |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Usage | - | Holding | | | | | | | | | | | | |
| Rated voltage | V | DC 24V ± 10% | | | | | | | | | | | | |
| Rated current | A | 0.25 | | | 0.3 | | | 0.4 | | | | 1.0 | | |
| Static friction torque | Nm | ≥0.16 | ≥0.32 | | ≥1.27 | | | ≥2.39 | | | | ≥9.55 | | |
| Engage time | ms | ≤35 | | | ≤50 | | | ≤70 | | | | ≤120 | | |
| Release time | ms | ≤20 | | | ≤15 | | | ≤20 | | | | ≤30 | | |
| Release voltage | V | ≥DC 1V | | | | | | | | | | | | |

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# UNIMOTOR HD

# HIGH DYNAMIC SERVO MOTOR

## For pulse duty applications

**Unimotor hd is a high dynamic brushless AC servo motor range designed for use in pulse duty applications where rapid acceleration and deceleration are required.**

The motors are available in frame sizes from 060 to 190.

### Features

- Torque range: from 0.64 Nm to 85 Nm
- High torque to inertia ratio for high dynamic performance
- Compact but powerful
- High energy dissipation parking brakes
- IP65 conformance; sealed against water spray and dust when mounted and connected
- Segmented stator design
- World class performance
- Supported by rigorous testing for performance and reliability
- Winding voltage for inverter supply of 400 V and 220 V
- Rated speeds from 1,000 to 6,000 rpm
- Larger shafts to increase torsional rigidity
- Thermal protection by PTC thermistor/optional
- KTY84.130 sensor







Conformance and standards

| Quick reference table | | | | |
|---|---|---|---|---|
| Frame size | PCD (mm) | Stall (Nm) | Inertia (kg.cm²) Standard | Inertia (kg.cm²) High* |
| 060 | 070 | 0.64 1.92 | 0.18 0.48 | N/A |
| 067 | 075 | 1.44 4.72 | 0.3 0.94 | 1.15 1.96 |
| 089 | 100 | 3.2 10.3 | 0.87 3.2 | 3.2 6.25 |
| 115 | 130 | 5.8 18.5 | 2.4 8.38 | 7.8 16.6 |
| 142 | 165 | 10.1 38.0 | 5.6 27.2 | 23.4 56.8 |
| 190 | 215 | 18.8 85.0 | 22.0 103.5 | 89.6 227.9 |

# ORDERING INFORMATION

Use the information below in the illustration to create an order code for a Unimotor hd.

| 060 | UD | B | 60 | 0 | T |
|---|---|---|---|---|---|
| Frame size | Motor voltage | Stator length | Rated speed* | Brake | Connection type** |
| | **060 - 190 frame** | **060 frame** | **060 frame** | **060 – 190 frame** | **060 frame** |
| 060 | ED = 220V | A to C | 60 = 6000 rpm | 0 = Not fitted (Std) | S = Single cable, power & signal combined |
| 067 | UD = 400V | **067 - 115 frame** | **067 frame** | **060 frame** | T = YTEC type connector (std) |
| 089 | | A to D | 30 = 3000 rpm | 5 = Parking brake | **Size 1** |
| 115 | | **142 frame** | 60 = 6000 rpm | **067 – 142B frame** | B = Power and signal 90° rotatable |
| 142 | | A to E | **089 frame** | 6 = Parking brake | D = Single cable, power & signal combined, 90° rotatable |
| 190 | | **190 frame** | 30 = 3000 rpm | **142C – 190 frame** | |
| | | A to F | 40 = 4000 rpm | 5 = Parking brake | **Size 1.5** |
| | | **60 = 6000 rpm** | | - | J = Power and signal 90° rotatable |
| | | **115 - 142 frame** | | | E = Single cable, power & signal combined, 90° rotatable |
| | | 20 = 2000 rpm | | | |
| | | 30 = 3000 rpm | | | |
| | | 40 = 4000 rpm | | | |
| | | 60 = 6000 rpm | | | |
| | | **190 frame** | | | |
| | | 10 = 1000 rpm | | | |
| | | 15 = 1500 rpm | | | |
| | | 20 = 2000 rpm | | | |
| | | 30 = 3000 rpm | | | |

Additional options are available upon request but may require a longer lead time to complete, please check with the Drive Centre.



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| A | CT | | A |
|---|---|---|---|
| Output shaft | Feedback device | | Thermistor |
| **060 frame** | **060 Frame** | **Single Cable** | **060 – 190 frame** |
| A = Key | AR = Resolver | No | A = PTC Thermistor (DIN44082) |
| F = Key and half key supplied seperately | CT = Incremental Encoder | No | C = KTY Thermistor (KTY84.130) |
| **067 – 190 frame** | EG = Inductive EnDat Multi-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| B = Plain Shaft | FG = Inductive EnDat Single-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| A = Key | **067 frame** | | |
| F = Key and half key supplied seperately | AR = Resolver | No | |
| | CR = Incremental Encoder | No | |
| | CT = Incremental Encoder | No | |
| | EM = Inductive EnDat SinCos Multi-turn | No | |
| | FM = Inductive EnDat SinCos Single-turn | No | |
| | EG = Inductive EnDat Multi-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| | FG = Inductive EnDat Single-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| | **089 – 190 frame** | | |
| | AE = Resolver | No | |
| | CA = Incremental Encoder | No | |
| | CT = Incremental Encoder | No | |
| | EC = Inductive EnDat SinCos Multi-turn | No | |
| | FC = Inductive EnDat SinCos Single-turn | No | |
| | EF = Inductive EnDat Multi-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| | FF = Inductive EnDat Single-turn (functional safety option available upon request, contact drive center for more information) | Yes | |
| | GB = ROHS EnDat Multi-turn Size 58 | Yes | |
| | HB = ROHS EnDat Single-turn Size 58 | Yes | |

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# DIMENSIONS

## Frame size 060

| Motor frame size (mm) | | 060ED | | |
|---|---|---|---|---|
| Voltage (Vrms) | | 200-240 | | |
| Frame length | | A | B | C |
| Continuous stall torque (Nm) | | 0.64 | 1.28 | 1.92 |
| Peak torque (Nm) | | 2.24 | 4.48 | 6.72 |
| Standard inertia (kg cm²) | | 0.18 | 0.33 | 0.48 |
| Standard motor weight (kg) | | 1.6 | 2.0 | 2.2 |
| Number of poles | | 10 | 10 | 10 |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | 0.47 28.5 | |
| Rated torque (Nm) | | 0.64 | 1.28 | 1.92 |
| Stall current (A) | | 1.36 | 2.72 | 4.09 |
| Rated power (kW) | | 0.4 | 0.8 | 1.2 |
| R (ph-ph) (Ohms) | | 5.15 | 1.90 | 1.15 |
| L (ph-ph) (mH) | | 23.8 | 11.1 | 7.3 |
| Recommended power conn' size | | Y-TEC | | |

| Motor frame size (mm) | | 060UD | | |
|---|---|---|---|---|
| Voltage (Vrms) | | 380-480 | | |
| Frame length | | A | B | C |
| Continuous stall torque (Nm) | | 0.64 | 1.28 | 1.92 |
| Peak torque (Nm) | | 2.24 | 4.48 | 6.72 |
| Standard inertia (kg cm²) | | 0.18 | 0.33 | 0.48 |
| Standard motor weight (kg) | | 1.6 | 2.0 | 2.2 |
| Number of poles | | 10 | 10 | 10 |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | 0.8 49 | |
| Rated torque (Nm) | | 0.64 | 1.28 | 1.92 |
| Stall current (A) | | 0.8 | 1.6 | 2.4 |
| Rated power (kW) | | 0.4 | 0.8 | 1.2 |
| R (ph-ph) (Ohms) | | 24.00 | 10.10 | 5.90 |
| L (ph-ph) (mH) | | 91.5 | 46.8 | 32.6 |
| Recommended power conn' size | | Y-TEC | | |

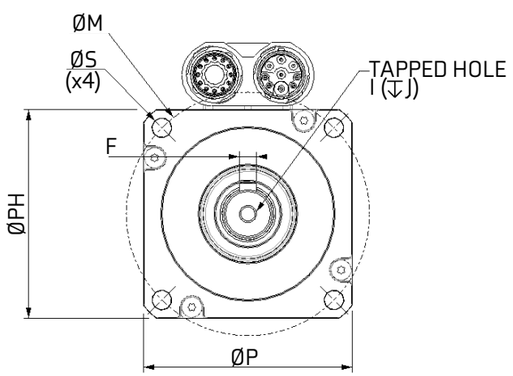
All data subject to +/-10% tolerance
Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12 kHz drive switching frequency
All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

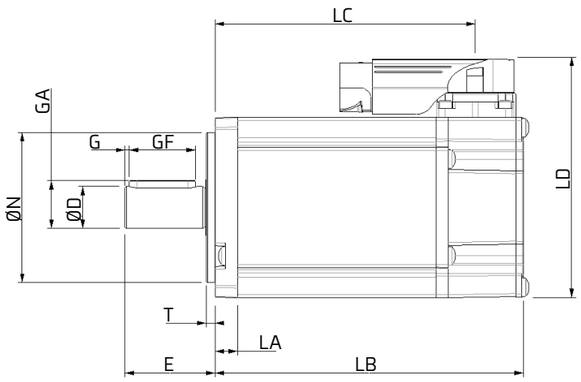
| Motor Dimension | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feedback CT, AR | | | | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts | |
| | Unbraked length | | Braked length | | | | | | | | | | | |
| | LB (± 0.9) | LC (± 1.0) | LB (± 1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | | |
| 060A | 82.5 | 66.5 | 119.5 | 103.5 | 7.5 | 3 | 50 | 80 | 60 | 5.5 | 70 | 60 | M5 | mm |
| 060B | 102.5 | 86.5 | 139.5 | 123.5 | | | | | | | | | | |
| 060C | 122.5 | 106.5 | 159.5 | 143.5 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 14.0 Std | 14 | 30 | 16 | 22 | 1.5 | 5 | M5 x 0.8 | 10 | mm |

| Feedback EG, FG | | |
|---|---|---|
| | Unbraked length | Braked length |
| | LB (± 0.9) | LB (± 0.9) |
| 060A | 100 | 137 |
| 060B | 120 | 157 |
| 060C | 140 | 177 |

- All data subject to +/-10% tolerance.
- Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12 kHz drive switching frequency.
- All other figures relate to a 20°C motor temperature.
- Maximum intermittent winding temperature is 140°C.



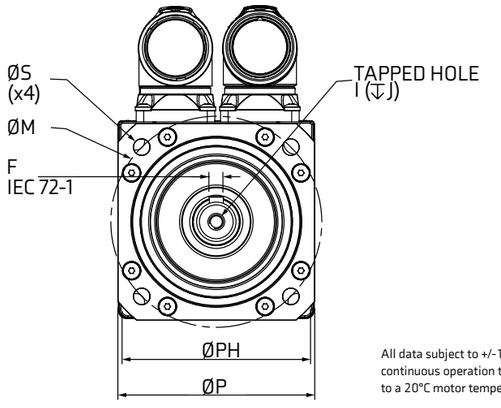



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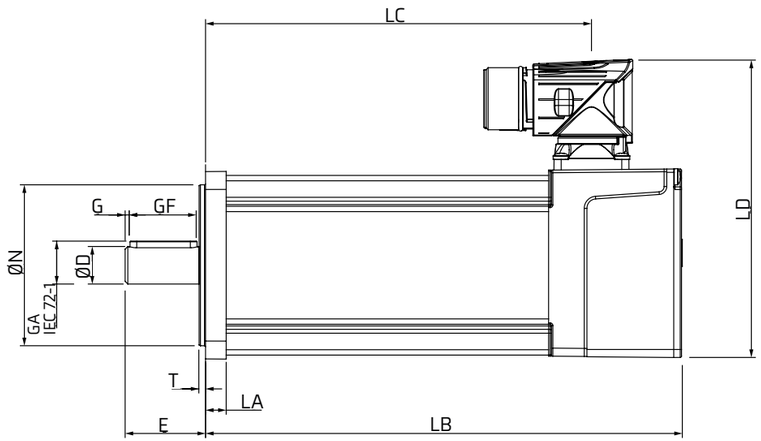
# Frame size 067

| Motor frame size (mm) | | 067ED | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 200-240 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 1.44 | 2.55 | 3.70 | 4.72 |
| Peak torque (Nm) | | 4.35 | 7.65 | 11.10 | 14.60 |
| Standard inertia (kg cm²) | | 0.30 | 0.53 | 0.75 | 0.94 |
| Winding thermal time constant (sec) | | 54 | 61 | 65 | 68 |
| Standard motor weight (kg) | | 1.96 | 2.56 | 3.16 | 3.80 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.93 57 | | | |
| Rated torque (Nm) | | 1.40 | 2.45 | 3.50 | 4.60 |
| Stall current (A) | | 1.55 | 2.74 | 3.98 | 5.08 |
| Rated power (kW) | | 0.44 | 0.77 | 1.10 | 1.45 |
| R (ph-ph) (Ohms) | | 15.16 | 5.85 | 3.33 | 2.32 |
| L (ph-ph) (mH) | | 46.7 | 20.6 | 12.7 | 10.6 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.47 28.5 | | | |
| Rated torque (Nm) | | 1.3 | 2.2 | 3.1 | 4.0 |
| Stall current (A) | | 3.06 | 5.43 | 7.87 | 10.04 |
| Rated power (kW) | | 0.82 | 1.38 | 1.95 | 2.51 |
| R (ph-ph) (Ohms) | | 3.79 | 1.46 | 0.76 | 0.54 |
| L (ph-ph) (mH) | | 11.7 | 5.2 | 3.6 | 2.03 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |

| Motor frame size (mm) | | 067UD | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 380-480 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 1.44 | 2.55 | 3.70 | 4.72 |
| Peak torque (Nm) | | 4.35 | 7.65 | 11.10 | 14.60 |
| Standard inertia (kg cm²) | | 0.30 | 0.53 | 0.75 | 0.94 |
| Winding thermal time constant (sec) | | 54 | 61 | 65 | 68 |
| Standard motor weight (kg) | | 1.96 | 2.56 | 3.16 | 3.80 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.8 49 | | 1.6 98 | |
| Rated torque (Nm) | | 1.40 | 2.45 | 3.50 | 4.60 |
| Stall current (A) | | 1.80 | 1.59 | 2.31 | 2.95 |
| Rated power (kW) | | 0.44 | 0.77 | 1.10 | 1.45 |
| R (ph-ph) (Ohms) | | 11.69 | 18.55 | 10.70 | 6.42 |
| L (ph-ph) (mH) | | 35.2 | 65.6 | 40.8 | 31.2 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.8 49 | | | |
| Rated torque (Nm) | | 1.3 | 2.2 | 3.1 | 4.0 |
| Stall current (A) | | 1.80 | 3.19 | 4.63 | 5.90 |
| Rated power (kW) | | 0.82 | 1.38 | 1.95 | 2.51 |
| R (ph-ph) (Ohms) | | 11.69 | 4.64 | 2.73 | 1.60 |
| L (ph-ph) (mH) | | 35.2 | 16.4 | 10.2 | 7.8 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |




All data subject to +/-10% tolerance. Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency. All other figures relate to a 20°C motor temperature. Maximum intermittent winding temperature is 140°C




| Motor Dimension | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feedback AR, CR, EM, FM, EG, FG | | | | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts | |
| | Unbraked length | | Braked length | | | | | | | | | | | |
| | LB (± 0.9) | LC (± 1.0) | LB (±1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | | |
| 067A | 142.9 | 109 | 177.9 | 144 | 7.7 | 2.5 | 60 | 111.5 | 70 | 5.8 | 75 | 67 | M5 | mm |
| 067B | 172.9 | 139 | 207.9 | 174 | | | | | | | | | | |
| 067C | 202.9 | 169 | 237.9 | 204 | | | | | | | | | | |
| 067D | 232.9 | 199 | 267.9 | 234 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 14.0 Std | 14 | 30 | 16 | 25 | 1.5 | 5 | M5 x 0.8 | 13.5 | mm |

19mm shaft and 90mm flange options are available. Refer to factory for more information.

# Frame size 089

| Motor frame size (mm) | | 089ED | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 200-240 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 3.2 | 5.5 | 8.0 | 10.3 |
| Peak torque (Nm) | | 9.6 | 16.5 | 24.0 | 30.9 |
| Standard inertia (kg cm²) | | 0.87 | 1.61 | 2.34 | 3.20 |
| Winding thermal time constant (sec) | | 85 | 93 | 98 | 103 |
| Standard motor weight (kg) | | 3.18 | 4.28 | 5.38 | 6.48 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.93 57 | | | |
| Rated torque (Nm) | | 3.00 | 4.85 | 6.90 | 8.50 |
| Stall current (A) | | 3.44 | 5.91 | 8.60 | 11.08 |
| Rated power (kW) | | 0.94 | 1.52 | 2.17 | 2.67 |
| R (ph-ph) (Ohms) | | 4.1 | 1.64 | 0.93 | 0.45 |
| L (ph-ph) (mH) | | 25.0 | 11.8 | 7.1 | 13.7 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.70 42.75 | | | |
| Rated torque (Nm) | | ♦ | 4.55 | 6.35 | ♦ |
| Stall current (A) | | ♦ | 7.86 | 11.43 | ♦ |
| Rated power (kW) | | ♦ | 1.91 | 2.66 | ♦ |
| R (ph-ph) (Ohms) | | ♦ | 0.82 | 0.56 | ♦ |
| L (ph-ph) (mH) | | ♦ | 6 | 4.3 | ♦ |
| Recommended power conn' size | | ♦ | 1 | 1 | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.47 28.5 | | | |
| Rated torque (Nm) | | 2.65 | 3.80 | 5.00 | ♦ |
| Stall current (A) | | 6.93 | 11.70 | 17.02 | ♦ |
| Rated power (kW) | | 1.67 | 2.39 | 3.14 | ♦ |
| R (ph-ph) (Ohms) | | 1.03 | 0.41 | 0.24 | ♦ |
| L (ph-ph) (mH) | | 6.2 | 2.96 | 1.77 | ♦ |
| Recommended power conn' size | | 1 | 1 | 1 | ♦ |

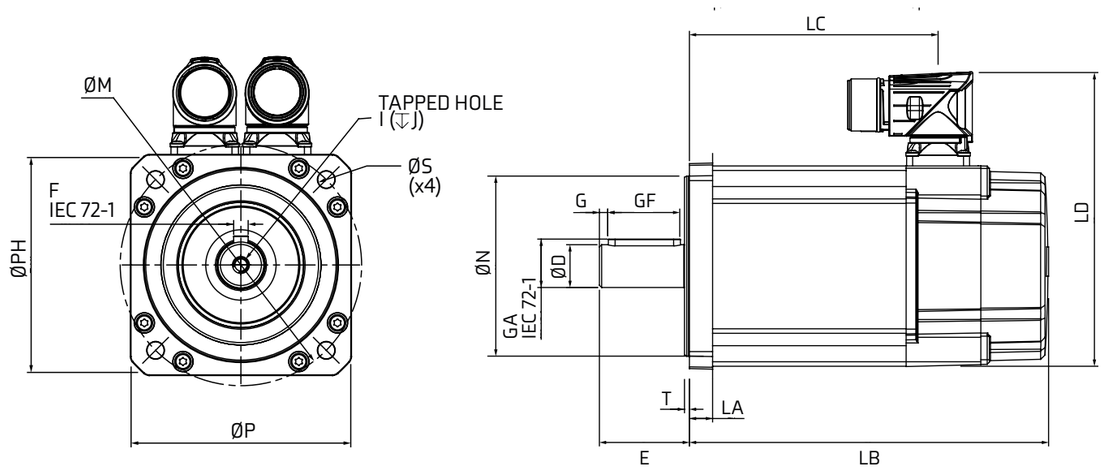
| Motor frame size (mm) | | 089UD | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 380-480 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 3.2 | 5.5 | 8.0 | 10.3 |
| Peak torque (Nm) | | 9.6 | 16.5 | 24.0 | 31.5 |
| Standard inertia (kg cm²) | | 0.87 | 1.61 | 2.34 | 3.20 |
| Winding thermal time constant (sec) | | 85 | 93 | 98 | 103 |
| Standard motor weight (kg) | | 3.18 | 4.28 | 5.38 | 6.48 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 1.6 98 | | | |
| Rated torque (Nm) | | 3.00 | 4.85 | 6.90 | 8.50 |
| Stall current (A) | | 2.00 | 3.44 | 5.00 | 6.44 |
| Rated power (kW) | | 0.94 | 1.52 | 2.17 | 2.67 |
| R (ph-ph) (Ohms) | | 10.80 | 5.18 | 2.79 | 1.89 |
| L (ph-ph) (mH) | | 66.8 | 36.7 | 21.7 | 17.5 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 1.2 73.5 | | | |
| Rated torque (Nm) | | ♦ | 4.55 | 6.35 | ♦ |
| Stall current (A) | | ♦ | 4.58 | 6.67 | ♦ |
| Rated power (kW) | | ♦ | 1.91 | 2.66 | ♦ |
| R (ph-ph) (Ohms) | | ♦ | 2.60 | 1.80 | ♦ |
| L (ph-ph) (mH) | | ♦ | 18.8 | 13.4 | ♦ |
| Recommended power conn' size | | ♦ | 1 | 1 | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.8 49 | | | |
| Rated torque (Nm) | | 2.65 | 3.80 | 5.00 | ♦ |
| Stall current (A) | | 4.00 | 6.88 | 10.00 | ♦ |
| Rated power (kW) | | 1.67 | 2.39 | 3.14 | ♦ |
| R (ph-ph) (Ohms) | | 2.70 | 1.30 | 0.67 | ♦ |
| L (ph-ph) (mH) | | 16.7 | 9.2 | 5.4 | ♦ |
| Recommended power conn' size | | 1 | 1 | 1 | ♦ |

♦ Not available

All data subject to +/-10% tolerance. Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency. All other figures relate to a 20°C motor temperature. Maximum intermittent winding temperature is 140°C








| Motor Dimension | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feedback EC, FC, EF, FF | | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts | |
| | Unbraked length | Braked length | | | | | | | | | | |
| | LB (± 0.9) | LC (± 1.0) | LB (±1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | | |
| 089A | 147.8 | 110.5 | 187.9 | 150.6 | 10.3 | 2.2 | 80 | 130.5 | 91 | 7 | 100 | 89 | M6 | mm |
| 089B | 177.8 | 140.5 | 217.9 | 180.6 | | | | | | | | | | |
| 089C | 207.8 | 170.5 | 247.9 | 210.6 | | | | | | | | | | |
| 089D | 237.8 | 200.5 | 2779 | 240.6 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 19.0 Std | 19 | 40 | 21.5 | 32 | 3.7 | 6 | M6 x 1 | 17 | mm |

24mm shaft and 115mm flange options are available. Refer to factory for more information.

| | Feedback CA, GB, HB | | Feedback AE | | |
|---|---|---|---|---|---|
| | Unbraked length | Braked length | Unbraked length | Braked length | |
| | LB (± 0.9) | LB (± 0.9) | LB (± 0.9) | LB (± 0.9) | |
| 089A | 160.8 | 200.9 | 137.8 | 177.9 | mm |
| 089B | 190.8 | 230.9 | 167.8 | 207.9 | |
| 089C | 220.8 | 260.9 | 197.8 | 237.9 | |
| 089D | 250.8 | 290.9 | 227.8 | 267.9 | |

# Frame size 115

| Motor frame size (mm) | | 115ED | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 200-240 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 5.8 | 10.2 | 14.6 | 18.8 |
| Peak torque (Nm) | | 17.4 | 30.6 | 43.8 | 56.4 |
| Standard inertia (kg cm²) | | 2.40 | 4.41 | 6.39 | 8.38 |
| Winding thermal time constant (sec) | | 161 | 164 | 168 | 175 |
| Standard motor weight (kg) | | 5.20 | 6.95 | 8.72 | 10.49 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 2000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 1.4 85.5 | | | |
| Rated torque (Nm) | | ♦ | ♦ | 11.9 | 15.6 |
| Stall current (A) | | ♦ | ♦ | 10.43 | 13.43 |
| Rated power (kW) | | ♦ | ♦ | 2.49 | 3.27 |
| R (ph-ph) (Ohms) | | ♦ | ♦ | 0.77 | 0.61 |
| L (ph-ph) (mH) | | ♦ | ♦ | 7.9 | 6.6 |
| Recommended power conn' size | | ♦ | ♦ | 1 | 1 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.93 57 | | | |
| Rated torque (Nm) | | 4.8 | 7.7 | 10.5 | ♦ |
| Stall current (A) | | 6.24 | 10.97 | 15.70 | ♦ |
| Rated power (kW) | | 1.51 | 2.42 | 3.30 | ♦ |
| R (ph-ph) (Ohms) | | 1.59 | 0.58 | 0.39 | ♦ |
| L (ph-ph) (mH) | | 12.8 | 5.4 | 4.0 | ♦ |
| Recommended power conn' size | | 1 | 1 | 1 | ♦ |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.7 42.75 | | | |
| Rated torque (Nm) | | ♦ | ♦ | 8.7 | ♦ |
| Stall current (A) | | ♦ | ♦ | 20.86 | ♦ |
| Rated power (kW) | | ♦ | ♦ | 3.64 | ♦ |
| R (ph-ph) (Ohms) | | ♦ | ♦ | 0.12 | ♦ |
| L (ph-ph) (mH) | | ♦ | ♦ | 4 | ♦ |
| Recommended power conn' size | | ♦ | ♦ | 1 | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.47 28.5 | | | |
| Rated torque (Nm) | | 3.6 | 4.8 | ♦ | ♦ |
| Stall current (A) | | 12.34 | 21.70 | ♦ | ♦ |
| Rated power (kW) | | 2.26 | 3.02 | ♦ | ♦ |
| R (ph-ph) (Ohms) | | 0.40 | 0.09 | ♦ | ♦ |
| L (ph-ph) (mH) | | 3.2 | 2.8 | ♦ | ♦ |
| Recommended power conn' size | | 1 | 1 | ♦ | ♦ |

| Motor frame size (mm) | | 115UD | | | |
|---|---|---|---|---|---|
| Voltage (Vrms) | | 380-480 | | | |
| Frame length | | A | B | C | D |
| Continuous stall torque (Nm) | | 5.8 | 10.2 | 14.6 | 18.8 |
| Peak torque (Nm) | | 17.4 | 30.6 | 43.8 | 56.4 |
| Standard inertia (kg cm²) | | 2.40 | 4.41 | 6.39 | 8.38 |
| Winding thermal time constant (sec) | | 161 | 164 | 168 | 175 |
| Standard motor weight (kg) | | 5.20 | 6.95 | 8.72 | 10.49 |
| Number of poles | | 10 | 10 | 10 | 10 |
| Speed 2000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 2.4 147 | | | |
| Rated torque (Nm) | | ♦ | ♦ | 11.9 | 15.6 |
| Stall current (A) | | ♦ | ♦ | 6.08 | 7.83 |
| Rated power (kW) | | ♦ | ♦ | 2.49 | 3.27 |
| R (ph-ph) (Ohms) | | ♦ | ♦ | 2.41 | 1.80 |
| L (ph-ph) (mH) | | ♦ | ♦ | 24.7 | 19.5 |
| Recommended power conn' size | | ♦ | ♦ | 1 | 1 |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 1.6 98 | | | |
| Rated torque (Nm) | | 4.8 | 7.7 | 10.5 | 13.6 |
| Stall current (A) | | 3.63 | 6.38 | 9.13 | 11.75 |
| Rated power (kW) | | 1.51 | 2.42 | 3.30 | 4.27 |
| R (ph-ph) (Ohms) | | 5.00 | 1.90 | 1.21 | 0.78 |
| L (ph-ph) (mH) | | 40.3 | 18.0 | 12.7 | 8.7 |
| Recommended power conn' size | | 1 | 1 | 1 | 1 |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 1.2 73.5 | | | |
| Rated torque (Nm) | | ♦ | ♦ | 8.7 | ♦ |
| Stall current (A) | | ♦ | ♦ | 12.1 | ♦ |
| Rated power (kW) | | ♦ | ♦ | 3.64 | ♦ |
| R (ph-ph) (Ohms) | | ♦ | ♦ | 0.6 | ♦ |
| L (ph-ph) (mH) | | ♦ | ♦ | 6.6 | ♦ |
| Recommended power conn' size | | ♦ | ♦ | 1 | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | 0.8 49 | | | |
| Rated torque (Nm) | | 3.6 | 4.8 | ♦ | ♦ |
| Stall current (A) | | 7.25 | 12.75 | ♦ | ♦ |
| Rated power (kW) | | 2.26 | 3.02 | ♦ | ♦ |
| R (ph-ph) (Ohms) | | 1.25 | 0.47 | ♦ | ♦ |
| L (ph-ph) (mH) | | 10.1 | 4.5 | ♦ | ♦ |
| Recommended power conn' size | | 1 | 1 | ♦ | ♦ |

♦ Not available

All data subject to +/-10% tolerance. Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency. All other figures relate to a 20°C motor temperature. Maximum intermittent winding temperature is 140°C

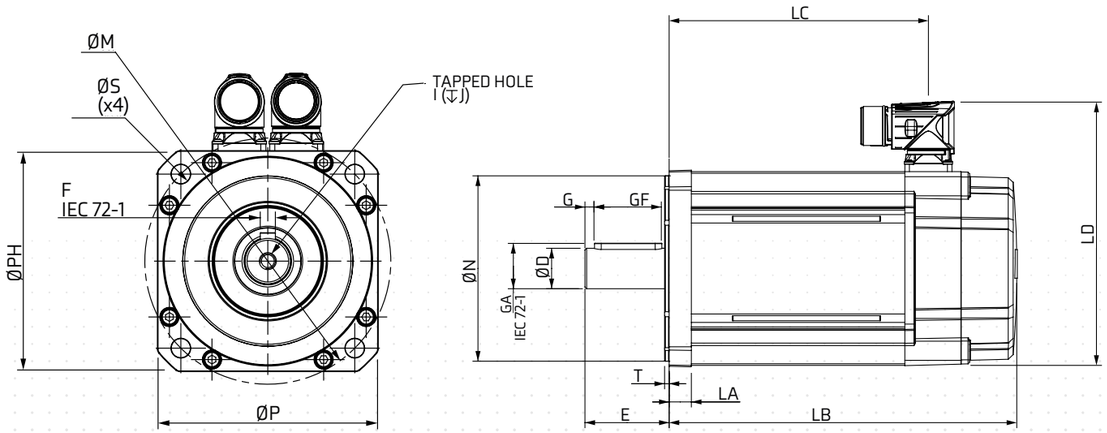




| Motor Dimension | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feedback EC, FC, EF, FF | | | | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts | |
| | Unbraked length | | Braked length | | | | | | | | | | | |
| | LB (± 0.9) | LC (± 1.0) | LB (± 1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | | |
| 115A | 163.8 | 124 | 200.9 | 161.1 | 13.2 | 2.7 | 110 | 156.5 | 116 | 10 | 130 | 115 | M8 | mm |
| 115B | 193.8 | 154 | 230.9 | 191.1 | | | | | | | | | | |
| 115C | 223.8 | 184 | 260.9 | 221.1 | | | | | | | | | | |
| 115D | 253.8 | 214 | 290.9 | 251.1 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 24.0 Std | 24 | 50 | 27 | 40 | 5.3 | 8 | M8 x 1.25 | 20 | mm |

| | Feedback CA, GB, HB | | Feedback AE | | |
|---|---|---|---|---|---|
| | Unbraked length | Braked length | Unbraked length | Braked length | |
| | LB (± 0.9) | LB (± 0.9) | LB (± 0.9) | LB (± 0.9) | |
| 115A | 176.8 | 213.9 | 153.8 | 190.9 | mm |
| 115B | 206.8 | 243.9 | 183.8 | 220.9 | |
| 115C | 236.8 | 273.9 | 213.8 | 250.9 | |
| 115D | 266.8 | 303.9 | 243.8 | 280.9 | |



# Frame size 142

| Motor frame size (mm) | | 142ED | | | | |
|---|---|---|---|---|---|---|
| Voltage (Vrms) | | 200-240 | | | | |
| Frame length | | A | B | C | D | E |
| Continuous stall torque (Nm) | | 10.1 | 17.4 | 25.0 | 31.5 | 38.0 |
| Peak torque (Nm) | | 30.3 | 52.2 | 75.0 | 94.5 | 114.0 |
| Standard inertia (kg cm²) | | 5.6 | 11.0 | 17.0 | 22.1 | 27.2 |
| Winding thermal time constant (sec) | | 235 | 240 | 245 | 251 | 256 |
| Standard motor weight (kg) | | 7.40 | 10.10 | 12.74 | 15.39 | 18.04 |
| Number of poles | | 10 | 10 | 10 | 10 | 10 |
| Speed 2000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 1.4 85.5 | | |
| Rated torque (Nm) | | 8.6 | 15.3 | 21.4 | ♦ | ♦ |
| Stall current (A) | | 7.21 | 12.43 | 17.86 | ♦ | ♦ |
| Rated power (kW) | | 1.80 | 3.20 | 4.48 | ♦ | ♦ |
| R (ph-ph) (Ohms) | | 0.85 | 0.34 | 0.24 | ♦ | ♦ |
| L (ph-ph) (mH) | | 14.3 | 5.9 | 3.7 | ♦ | ♦ |
| Recommended power conn' size | | 1 | 1 | 1.5 | ♦ | ♦ |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 0.93 57 | | |
| Rated torque (Nm) | | 8.2 | 14.0 | 18.4 | 20.9 | ♦ |
| Stall current (A) | | 10.86 | 18.71 | 26.88 | 33.87 | ♦ |
| Rated power (kW) | | 2.58 | 4.40 | 5.78 | 6.57 | ♦ |
| R (ph-ph) (Ohms) | | 0.38 | 0.22 | 0.12 | 0.09 | ♦ |
| L (ph-ph) (mH) | | 6.3 | 2.8 | 1.9 | 1.6 | ♦ |
| Recommended power conn' size | | 1 | 1.5 | 1.5 | 1.5 | ♦ |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 0.7 42.75 | | |
| Rated torque (Nm) | | ♦ | 11.7 | ♦ | ♦ | ♦ |
| Stall current (A) | | ♦ | 24.86 | ♦ | ♦ | ♦ |
| Rated power (kW) | | ♦ | 4.90 | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | | ♦ | 0.08 | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | | ♦ | 4.5 | ♦ | ♦ | ♦ |
| Recommended power conn' size | | ♦ | 1.5 | ♦ | ♦ | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 0.47 28.5 | | |
| Rated torque (Nm) | | ♦ | ♦ | ♦ | ♦ | ♦ |
| Stall current (A) | | ♦ | ♦ | ♦ | ♦ | ♦ |
| Rated power (kW) | | ♦ | ♦ | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | | ♦ | ♦ | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | | ♦ | ♦ | ♦ | ♦ | ♦ |
| Recommended power conn' size | | ♦ | ♦ | ♦ | ♦ | ♦ |

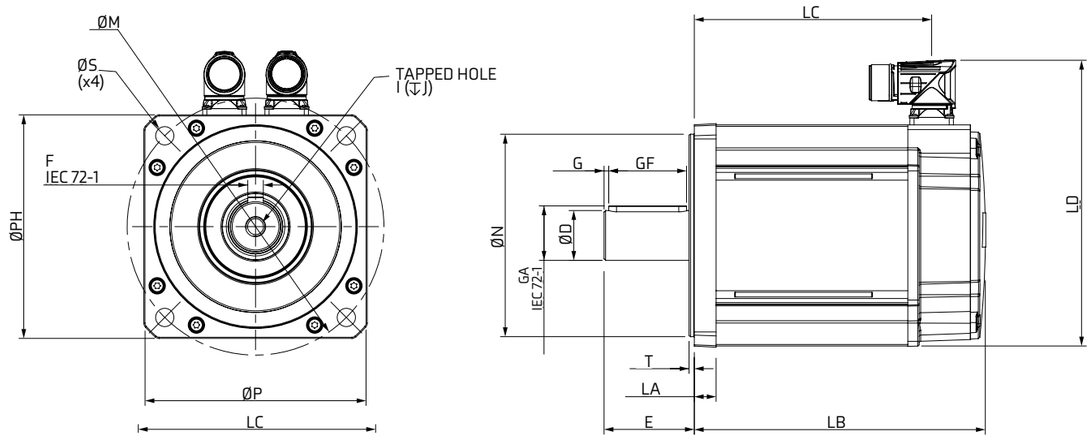
| Motor frame size (mm) | | 142UD | | | | |
|---|---|---|---|---|---|---|
| Voltage (Vrms) | | 380-480 | | | | |
| Frame length | | A | B | C | D | E |
| Continuous stall torque (Nm) | | 10.1 | 17.4 | 25.0 | 31.5 | 38.0 |
| Peak torque (Nm) | | 30.3 | 52.2 | 75.0 | 94.5 | 114.0 |
| Standard inertia (kg cm²) | | 5.6 | 11.0 | 17.0 | 22.1 | 27.2 |
| Winding thermal time constant (sec) | | 235 | 240 | 245 | 251 | 256 |
| Standard motor weight (kg) | | 7.40 | 10.10 | 12.74 | 15.39 | 18.04 |
| Number of poles | | 10 | 10 | 10 | 10 | 10 |
| Speed 2000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 2.4 147 | | |
| Rated torque (Nm) | | 8.6 | 15.3 | 21.4 | ♦ | ♦ |
| Stall current (A) | | 4.21 | 7.25 | 10.42 | ♦ | ♦ |
| Rated power (kW) | | 1.80 | 3.20 | 4.48 | ♦ | ♦ |
| R (ph-ph) (Ohms) | | 3.90 | 1.53 | 0.79 | ♦ | ♦ |
| L (ph-ph) (mH) | | 46.28 | 20.97 | 12.15 | ♦ | ♦ |
| Recommended power conn' size | | 1 | 1 | 1 | ♦ | ♦ |
| Speed 3000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 1.6 98 | | |
| Rated torque (Nm) | | 8.2 | 14.0 | 18.4 | 20.9 | 23.0 |
| Stall current (A) | | 6.31 | 10.88 | 15.63 | 19.69 | 23.75 |
| Rated power (kW) | | 2.58 | 4.40 | 5.78 | 6.57 | 7.23 |
| R (ph-ph) (Ohms) | | 1.50 | 0.63 | 0.34 | 0.24 | 0.18 |
| L (ph-ph) (mH) | | 18.1 | 8.6 | 5.3 | 3.8 | 2.9 |
| Recommended power conn' size | | 1 | 1 | 1 | 1.5 | 1.5 |
| Speed 4000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 1.2 74 | | |
| Rated torque (Nm) | | ♦ | 11.7 | ♦ | 14.9 | ♦ |
| Stall current (A) | | ♦ | 14.50 | ♦ | 26.25 | ♦ |
| Rated power (kW) | | ♦ | 4.90 | ♦ | 6.24 | ♦ |
| R (ph-ph) (Ohms) | | ♦ | 0.36 | ♦ | 0.16 | ♦ |
| L (ph-ph) (mH) | | ♦ | 7.1 | ♦ | 2.4 | ♦ |
| Recommended power conn' size | | ♦ | 1 | ♦ | 1.5 | ♦ |
| Speed 6000 (rpm) | Kt (Nm/A) = Ke (V/krpm) = | | | 0.8 49 | | |
| Rated torque (Nm) | | ♦ | 7 | ♦ | ♦ | ♦ |
| Stall current (A) | | ♦ | 21.75 | ♦ | ♦ | ♦ |
| Rated power (kW) | | ♦ | 4.4 | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | | ♦ | 0.17 | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | | ♦ | 3.2 | ♦ | ♦ | ♦ |
| Recommended power conn' size | | ♦ | 1.5 | ♦ | ♦ | ♦ |

♦ Not available

All data subject to +/-10% tolerance. Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency. All other figures relate to a 20°C motor temperature. Maximum intermittent winding temperature is 140°C








| Motor Dimension | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unbraked length | Braked length | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts | |
| | LB (± 0.9) | LC (± 1.0) | LB (± 1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | | |
| 142A | 157 | 122.5 | 222.5 | 188 | 14 | 3.4 | 130 | 183.5 (Size 1) | 142 | 12 | 165 | 142 | M10 | mm |
| 142B | 187 | 152.5 | 252.5 | 218 | | | | | | | | | | |
| 142C | 217 | 182.5 | 282.5 | 248 | | | | 204.5 (Size 1.5) | | | | | | |
| 142D | 247 | 212.5 | 312.5 | 278 | | | | | | | | | | |
| 142E | 277 | 242.5 | 342.5 | 308 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 32.0 Std | 32 | 58 | 35 | 50 | 3 | 10 | M12 x 1.75 | 29 | mm |

24mm shaft and 200mm flange options are available. Refer to factory for more information.

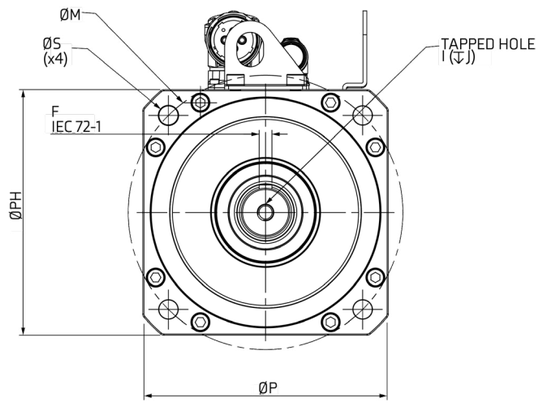
# Frame size 190

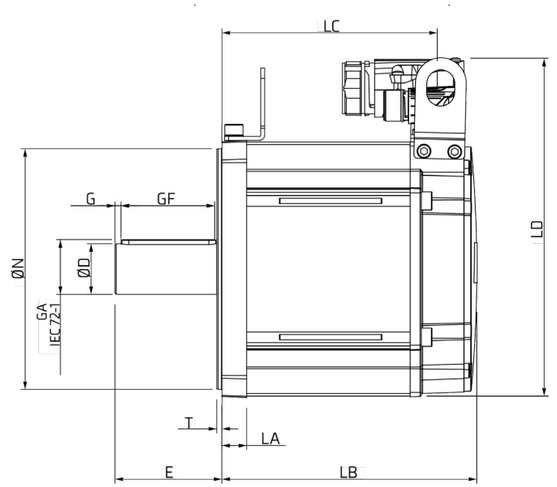
| Motor frame size (mm) | | | 190ED | | | |
|---|---|---|---|---|---|---|
| Voltage (Vrms) | | | 200-240 | | | |
| Frame length | A | B | C | D | E | F |
| Continuous stall torque (Nm) | 18.5 | 32.7 | 52.0 | 62.0 | 73.5 | 85.0 |
| Peak torque (Nm) | 55.5 | 98.10 | 156 | 186 | 220.5 | 255 |
| Standard inertia (kg cm²) | 22.0 | 38.3 | 54.6 | 70.9 | 87.2 | 103.5 |
| Winding thermal time constant (sec) | 286 | 292 | 300 | 308 | 316 | 324 |
| Standard motor weight (kg) | 14.60 | 21.20 | 27.74 | 34.30 | 40.90 | 47.42 |
| Number of poles | 10 | 10 | 10 | 10 | 10 | 10 |
| Speed 1000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 2,8 171 | | | |
| Rated torque (Nm) | 17.6 | ♦ | 49.0 | 56.5 | ♦ | 77.5 |
| Stall current (A) | 6.61 | ♦ | 18.57 | 22.14 | ♦ | 30.36 |
| Rated power (kW) | 1.84 | ♦ | 5.13 | 5.92 | ♦ | 8.12 |
| R (ph-ph) (Ohms) | 1.23 | ♦ | 0.30 | 0.27 | ♦ | 0.15 |
| L (ph-ph) (mH) | 34.1 | ♦ | 10.0 | 7.1 | ♦ | 4.8 |
| Recommended power conn' size | 1.5 | ♦ | 1.5 | 1.5 | ♦ | 1.5 |
| Speed 1500 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 1.86 114 | | | |
| Rated torque (Nm) | ♦ | ♦ | 46.2 | ♦ | ♦ | ♦ |
| Stall current (A) | ♦ | ♦ | 25.97 | ♦ | ♦ | ♦ |
| Rated power (kW) | ♦ | ♦ | 7.26 | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | ♦ | ♦ | 0.11 | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | ♦ | ♦ | 3.5 | ♦ | ♦ | ♦ |
| Recommended power conn' size | ♦ | ♦ | 1.5 | ♦ | ♦ | ♦ |
| Speed 2000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 1.4 85.5 | | | |
| Rated torque (Nm) | ♦ | ♦ | 42.5 | ♦ | ♦ | ♦ |
| Stall current (A) | ♦ | ♦ | 37.14 | ♦ | ♦ | ♦ |
| Rated power (kW) | ♦ | ♦ | 8.9 | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | ♦ | ♦ | 0.09 | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | ♦ | ♦ | 2.5 | ♦ | ♦ | ♦ |
| Recommended power conn' size | ♦ | ♦ | 1.5 | ♦ | ♦ | ♦ |
| Speed 3000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 0.93 57 | | | |
| Rated torque (Nm) | 15.5 | 25.0 | 32.8 | ♦ | ♦ | ♦ |
| Stall current (A) | 19.89 | 35.16 | 55.91 | ♦ | ♦ | ♦ |
| Rated power (kW) | 4.87 | 7.85 | 10.30 | ♦ | ♦ | ♦ |
| R (ph-ph) (Ohms) | 0.20 | 0.05 | 0.03 | ♦ | ♦ | ♦ |
| L (ph-ph) (mH) | 3.1 | 1.6 | 1.2 | ♦ | ♦ | ♦ |
| Recommended power conn' size | 1.5 | 1.5 | 1.5 | ♦ | ♦ | ♦ |

| Motor frame size (mm) | | | 190UD | | | |
|---|---|---|---|---|---|---|
| Voltage (Vrms) | | | 380-480 | | | |
| Frame length | A | B | C | D | E | F |
| Continuous stall torque (Nm) | 18.5 | 32.7 | 52.0 | 62.0 | 73.5 | 85.0 |
| Peak torque (Nm) | 55.5 | 98.10 | 156 | 186 | 220.5 | 255 |
| Standard inertia (kg cm²) | 22.0 | 38.3 | 54.6 | 70.9 | 87.2 | 103.5 |
| Winding thermal time constant (sec) | 286 | 292 | 300 | 308 | 316 | 324 |
| Standard motor weight (kg) | 14.60 | 21.20 | 27.74 | 34.30 | 40.90 | 47.42 |
| Number of poles | 10 | 10 | 10 | 10 | 10 | 10 |
| Speed 1000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 4.8 296 | | | |
| Rated torque (Nm) | 17.6 | ♦ | ♦ | ♦ | ♦ | 78.3 |
| Stall current (A) | 3.85 | ♦ | ♦ | ♦ | ♦ | 17.71 |
| Rated power (kW) | 1.83 | ♦ | ♦ | ♦ | ♦ | 8.12 |
| R (ph-ph) (Ohms) | 3.70 | ♦ | ♦ | ♦ | ♦ | 0.53 |
| L (ph-ph) (mH) | 101.4 | ♦ | ♦ | ♦ | ♦ | 15.8 |
| Recommended power conn' size | 1.5 | ♦ | ♦ | ♦ | ♦ | 1.5 |
| Speed 1500 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 3.2 196 | | | |
| Rated torque (Nm) | ♦ | ♦ | 46.2 | ♦ | ♦ | 68.5 |
| Stall current (A) | ♦ | ♦ | 16.25 | ♦ | ♦ | 26.56 |
| Rated power (kW) | ♦ | ♦ | 7.26 | ♦ | ♦ | 10.76 |
| R (ph-ph) (Ohms) | ♦ | ♦ | 0.55 | ♦ | ♦ | 0.23 |
| L (ph-ph) (mH) | ♦ | ♦ | 14.2 | ♦ | ♦ | 6.8 |
| Recommended power conn' size | ♦ | ♦ | 1.5 | ♦ | ♦ | 1.5 |
| Speed 2000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 2.4 147 | | | |
| Rated torque (Nm) | ♦ | ♦ | 42.5 | 45.3 | 52.9 | 56 |
| Stall current (A) | ♦ | ♦ | 21.67 | 25.83 | 30.63 | 35.42 |
| Rated power (kW) | ♦ | ♦ | 8.90 | 9.49 | 11.08 | 11.73 |
| R (ph-ph) (Ohms) | ♦ | ♦ | 0.32 | 0.17 | 0.16 | 0.14 |
| L (ph-ph) (mH) | ♦ | ♦ | 8.2 | 5.1 | 4.6 | 4.3 |
| Recommended power conn' size | ♦ | ♦ | 1.5 | 1.5 | 1.5 | 1.5 |
| Speed 3000 (rpm) — Kt (Nm/A) = Ke (V/krpm) = | | | 1.6 98 | | | |
| Rated torque (Nm) | 15.5 | 25.0 | 32.8 | 39.0 | ♦ | ♦ |
| Stall current (A) | 11.56 | 20.44 | 32.50 | 38.75 | ♦ | ♦ |
| Rated power (kW) | 4.87 | 7.85 | 10.30 | 12.25 | ♦ | ♦ |
| R (ph-ph) (Ohms) | 0.57 | 0.23 | 0.11 | 0.11 | ♦ | ♦ |
| L (ph-ph) (mH) | 11.6 | 5.7 | 3.1 | 2.7 | ♦ | ♦ |
| Recommended power conn' size | 1.5 | 1.5 | 1.5 | 1.5 | ♦ | ♦ |

♦ Not available

All data subject to +/-10% tolerance. Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency. All other figures relate to a 20°C motor temperature. Maximum intermittent winding temperature is 140°C




| Motor Dimension | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unbraked length | Braked length | Flange thickness | Register length | Register diameter | Overall height | Flange square | Fixing hole diameter | Fixing hole PCD | Motor housing | Mounting bolts |
| | LB (± 0.9) | LC (± 1.0) | LB (± 1.0) | LC (± 1.0) | LA (± 0.5) | T (± 0.1) | N (j6) | LD (± 0.3) | P (± 0.3) | S (H14) | M (± 0.5) | PH (± 0.5) | |
| 190A | 160.6 | 131.1 | 259.1 | 229.6 | 18.5 | 3.9 | 180 | 252.5 | 190.3 | 14.5 | 215 | 190 | M12 | mm |
| 190B | 190.6 | 161.1 | 289.1 | 259.6 | | | | | | | | | | |
| 190C | 220.6 | 191.1 | 319.1 | 289.6 | | | | | | | | | | |
| 190D | 250.6 | 221.1 | 349.1 | 319.6 | | | | | | | | | | |
| 190E | 280.6 | 251.1 | 379.1 | 349.6 | | | | | | | | | | |
| 190F | 310.6 | 281.1 | 409.1 | 379.6 | | | | | | | | | | |

| Shaft Dimension | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Shaft diameter | Shaft length | Key height | Key length | Key to shaft end | Key width | Tapped hole thread size | Tapped hole depth | |
| | D(j6) | E | GA | GF | G | F(h9) | I | J(±1) | |
| 38.0 Std | 38 | 80 | 41 | 70 | 4.6 | 10 | M12 x 1.75 | 29 | mm |

42mm shaft and 235mm flange options are available. Refer to factory for more information.

# DC DRIVES

## MENTOR MP





MENTOR MP

# OPTIMUM PERFORMANCE, FLEXIBLE SYSTEM

25A to 7400A Two or four quadrant operation (regenerative)

24V - 480V | 500V - 575V | 500V - 690V

### The ultimate DC drive

**As a world leader in DC drive technology, our innovative products are used in the most demanding applications requiring performance, reliability & energy efficiency.**

Mentor MP integrates the control platform from the world's leading intelligent AC drive technology making it the most advanced DC drive available. With optimum performance and flexible system interfacing capability, the Mentor MP drive allows you to maximize motor performance & enhance system reliability. Interface digitally with modern control equipment using Ethernet & fieldbus networks. Mentor MP power connection positions are compatible with Mentor II to simplify retrofit.

**Benefits:**

- Easy to set-up and commission
- Drive intelligence and system integration
- Machine communications flexibility



# KEY FUNCTIONS

| Function | | Function | | Function | |
|---|---|---|---|---|---|
| Jog | ✓ | Autotune continuous | ✓ | Motorised potentiometer | ✓ |
| Bi-polar reference | ✓ | Catch a spinning motor | ✓ | Logic function control | ✓ |
| Pre-set speeds | 8 | Stop mode: Ramp | ✓ | Timer function control | ✓ |
| Preset timer | ✓ | Stop mode: Coast | ✓ | Limit switch control | ✓ |
| Skip speed | 3 | Stop mode: Fast ramp | ✓ | Variable selector | ✓ |
| Skip speed bands | ✓ | Regen braking (four quadrant drives) | ✓ | PID Control | ✓ |
| Local/Remote | ✓ | Programmable braking | ✓ | Energy meter | ✓ |
| S-Ramp | ✓ | Field economy control | ✓ | Trip time stamping | ✓ |
| Acceleration rates | 8 | Field weakening control mode | ✓ | Trip logging | 8 |
| Deceleration rates | 8 | DC contactor control | ✓ | Run time log | ✓ |
| Pulse train frequency reference | 0 - 500kHz | Supply loss detection | ✓ | Parallel 6, 12 and 24 pulse operation | ✓ |
| Torque reference | ✓ | Low voltage operation | ✓ | Control word control | ✓ |
| Control mode: speed | ✓ | Analogue input control | ✓ | Auto reset | ✓ |
| Control mode: torque | ✓ | Analogue output control | ✓ | Cloning | ✓ |
| Control mode: torque control with speed override | ✓ | Temperature monitoring | ✓ | On-board PLC | 6kB |
| Control mode: winder (torque control) | ✓ | Digital input control | ✓ | Additional application parameters | 64 |
| Armature voltage drop compensation | ✓ | Digital output control | ✓ | Second motor set-up | ✓ |
| Inertia compensation | ✓ | Relay control | ✓ | Speed feedback via options | ✓ |
| Auto-tune static | ✓ | Mechanical brake controller | ✓ | Field voltage control mode | ✓ |
| Auto-tune rotating | ✓ | Keypad button assignment | ✓ | Position controller | ✓ |



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# SPECIFICATION

| Mentor MP | |
|---|---|
| Items supplied with the drive | The drive is supplied with a Short Form Guide, a SMARTCARD, safety information, grounding bracket, power terminal shrouds (for sizes 1, 2A and 2B) and mounting feet brackets for size 1 drives. |
| Storage temperature | -40°C to 55°C, -40°F to 131°F |
| Operating temperature without de-rate | 0°C to 40°C, 32°F to 104°F |
| Operating temperature with de-rate | 0°C to 55°C, 32°F to 131°F |
| Supply requirements | 480 V: 24 V to 480 V -20 % +10 %<br>575 V: 500 V to 575 V -10 % +10 %<br>690 V: 500 V to 690 V -10 % +10 % |
| Switching frequency range | N/A |
| Approvals | CE (European Union), cUL Listed (USA and Canada), KC (Korea), RCM (Australia/ New Zealand), EAC (Russian Customs Union) |
| Product safety standard | EN61800-5-1 |
| Functional safety (Dual STO function) | N/A |
| Altitude | 1000m – No de-rate. 1000m to 3000m - 1% de-rate/100m |
| Humidity | 95% Non-condensing at 40°C |
| Pollution | Degree 2. Dry, non-conducting pollution only |
| IP Rating | Frame 1 - IP20<br>Frame 2A and 2B – IP10<br>Frame 2C and 2D – IP00 |
| Vibration | Shock test: Referenced standard: BS EN 60068-2-27<br>Bump Test: Referenced standard: IEC 60068-2-29<br>Random vibration test: Referenced standard: IEC 60068-2-64<br>Sinusoidal vibration test: Referenced standard: IEC 60068-2-6, EN 61800-5-1:2007 |
| Mounting methods | Surface mount |
| Output frequency/speed range | N/A |
| Braking | Regen braking with four quadrant drives. |
| Operating modes | Estimated speed (open loop), tacho feedback (closed loop) and encoder feedback (closed loop) |
| Overload capability | 150% for 30seconds |
| Overvoltage category | IEC 60664-1. Evaluated for OVC III. |

| | |
|---|---|
| **Corrosive environments** | Referenced standard: EN 50178:1998: Table A2<br>Referenced standard: IEC 60721-3-3 Class 3C2 |
| **Immunity compliance** | IEC61800-3, IEC 61000-4-2, IEC 61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6,<br>IEC61000-4-8, IEC61000-4-11, IEC61000-6-1, IEC 61000-6-2. |
| **Emission compliance** | Capable of meeting the requirements of Equipment Category C3 without external filters or line reactors. Capable of meeting the requirements of Equipment<br>Category C2 when installed with the recommended filters and line reactors.<br>IEC61800-3, IEC61800-6-3, IEC61000-6-4 |
| **Cooling** | Forced cooled |
| **Safe Torque off** | N/A |
| **Communications** | RS485, EtherCAT, PROFIBUS, Ethernet, DeviceNET, CANopen, Interbus |
| **Control I/O** | 3 x Analogue input, 2 x Analog output, 3 x Digital I/O programmable, 4 x Digital input, 2 x NO relay 250Vac Max., 6 x 0V common, 1 x 24V user output, 1 x 10V user output, 1 x 24V external input. Additional I/O available with SM-I/O option modules. |
| **Resolution/Accuracy** | Analogue input 1: 14 bits plus sign, Analogue input 2 and 3: 10 bits plus sign.<br>Analog output: 10 bits plus sign.<br>Speed control typically 5% in estimated speed mode and dependent on the feedback device in closed loop mode.<br>Current control typical 5%. |
| **On-Board user program capability** | 6kB |
| **Keypad** | LED keypad, LCD keypad |
| **PC Tools** | 'CTSoft' commissioning and cloning tool |
| **Warranty** | 2 years |
| **Supported options** | RS485-Communications lead, SM-EtherCAT, SM-PROFIBUS, SM-Ethernet, SM-DeviceNET, SM-CANopen, SM-I/O Plus, SM-I/O 32, SM-I/O Lite, SM-I/O Timer, SM-I/O PELV, SM-I/O 120V, SM-I/O 24V Protected, SM-Universal Encoder Plus, SM-Encoder Plus, SM-Encoder Output Plus, Single ended encoder interface, SM-Applications Plus, SM-Applications Lite V2 SM-Register, FXMP25 (25A field controller). |
| **Accessories** | External EMC filters, Grounding bracket (supplied with the drive) |



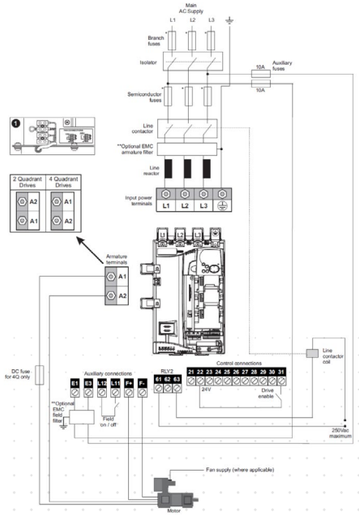


# DIMENSIONS

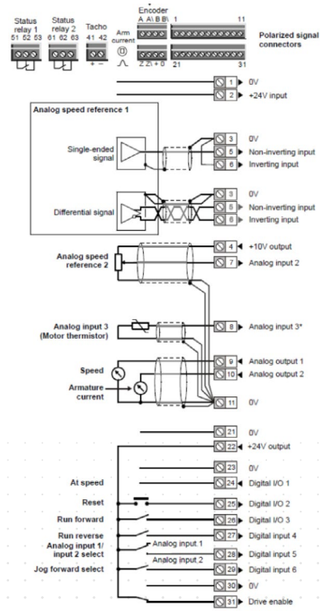
| Frame Size | Overall Dimensions | | | | | | Mounting Dimensions | | | | Mounting Hole Diameter | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | | | in | | | mm | | in | | mm | in | kg | lb |
| | H | W | D | H | W | D | H | W | H | W | | | | |
| **1A** | 444 | 293 | 222 | 17.48 | 11.54 | 8.74 | 380 | 170 | 14.96 | 6.69 | 6.6 | 0.26 | 10.5 | 23.1 |
| **1B** | 444 | 293 | 251 | 17.48 | 11.54 | 9.88 | 380 | 170 | 14.96 | 6.69 | 6.6 | 0.26 | 13 | 28.7 |
| **2A** | 640 | 495 | 301 | 25.2 | 19.49 | 11.85 | 225 | 472 | 8.86 | 18.58 | 9 | 0.35 | 38 | 83.8 |
| **2B** | 640 | 495 | 301 | 25.2 | 19.49 | 11.85 | 225 | 472 | 8.86 | 18.58 | 9 | 0.35 | 46 | 101.4 |
| **2C** | 1050 | 555 | 611 | 41.34 | 21.85 | 24.06 | 605 | 394 | 23.82 | 15.51 | 11 | 0.43 | 100 | 220.5 |
| **2D** | 1510 | 555 | 611 | 59.45 | 21.85 | 24.06 | 1065 | 394 | 41.93 | 15.51 | 11 | 0.43 | 138 | 304.2 |




# CONNECTIONS



**Typical Power Connections**




**Default Control Connections**

***Thermistor is not selected with USA defaults**

# PART NUMBERS

**DC Drive**

**MP** **1200A** **4** **R**

- **1200A** — Maximum continuous armature current
- **4** — Supply Voltage:
  - 4 = 480 V 24 V to 480 V -20 % +10 %
  - 5 = 575 V 500 V to 575 V-10 % +10 %
  - 6 = 690 V 500 V to 690 V-10 % +10 %
- **R** — R - 4 quadrant operation; Blank - 2 quadrant operation
- **MP** — Mentor Platform
  - M70x Industrial Drive
  - F600 Pump Drive

**External Field**

**FX** **MP** **25**

- **MP** — Mentor Platform
- **FX** — External Field
- **25** — Maximum Field Current (A)

**Note:** At the time of ordering, please select the required interface option.

# MODEL NUMBER AND RATINGS

| Model Number | Frame Size | Max. Armature Current | Motor Power | | Max. Field Current |
|---|---|---|---|---|---|
| | | (A) | (kW) | (HP) | (A) |
| MP25A4(R) | 1A | 25 | 9 | 15 | 8 |
| MP45A4(R) | 1A | 45 | 15 | 27 | 8 |
| MP75A4(R) | 1A | 75 | 27 | 45 | 8 |
| MP105A4(R) | 1B | 105 | 37.5 | 60 | 8 |
| MP155A4(R) | 1B | 155 | 56 | 90 | 8 |
| MP210A4(R) | 1B | 210 | 75 | 125 | 8 |
| MP350A4(R) | 2A | 350 | 125 | 200 | 20 |
| MP420A4(R) | 2A | 420 | 150 | 250 | 20 |
| MP550A4(R) | 2A | 550 | 200 | 300 | 20 |
| MP700A4(R) | 2B | 700 | 250 | 400 | 20 |
| MP825A4(R) | 2B | 825 | 300 | 500 | 20 |
| MP900A4(R) | 2B | 900 | 340 | 550 | 20 |
| MP1200A4(R) | 2C/D | 1200 | 450 | 750 | 20 |



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| Model Number | Frame Size | Max. Armature Current | Motor Power | | Max. Field Current |
|---|---|---|---|---|---|
| | | (A) | (kW) | (HP) | (A) |
| MP1850A4(R) | 2C/D | 1850 | 700 | 1150 | 20 |
| MP25A5(R) | 1A | 25 | 14 | 18 | 8 |
| MP45A5(R) | 1A | 45 | 25 | 33 | 8 |
| MP75A5(R) | 1A | 75 | 42 | 56 | 8 |
| MP105A5(R) | 1B | 105 | 58 | 78 | 8 |
| MP155A5(R) | 1B | 155 | 88 | 115 | 8 |
| MP210A5(R) | 1B | 210 | 120 | 160 | 8 |
| MP350A5(R) | 2A | 350 | 195 | 260 | 20 |
| MP470A5(R) | 2A | 470 | 265 | 355 | 20 |
| MP700A5(R) | 2B | 700 | 395 | 530 | 20 |
| MP825A5(R) | 2B | 825 | 465 | 620 | 20 |
| MP1200A5(R) | 2C/D | 1200 | 680 | 910 | 20 |
| MP1850A5(R) | 2C/D | 1850 | 1045 | 1400 | 20 |
| MP350A6(R) | 2A | 350 | 240 | 320 | 20 |
| MP470A6(R) | 2A | 470 | 320 | 425 | 20 |
| MP700A6(R) | 2B | 700 | 480 | 640 | 20 |
| MP825A6(R) | 2B | 825 | 650 | 850 | 20 |
| MP1200A6(R) | 2C/D | 1200 | 850 | 1150 | 20 |
| MP1850A6(R) | 2C/D | 1850 | 1300 | 1750 | 20 |

## Documentation & Downloads

Product documentation and PC tools available for download from:
**www.controltechniques.com/support**

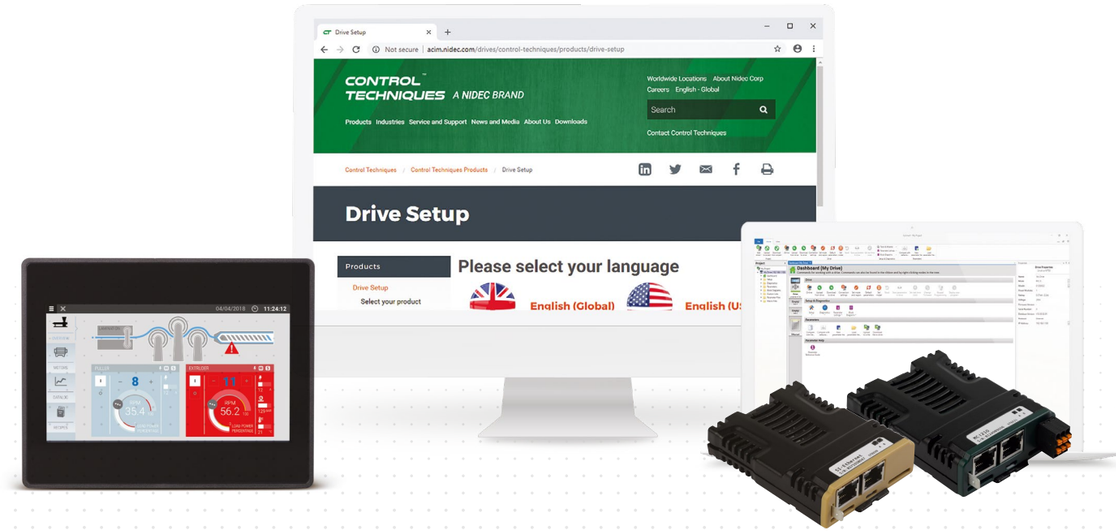
# INDUSTRIAL CONTROL





# PRODUCTS IN THIS RANGE

PLC CONTROLLED MOTION | MCh040, MCh070, MChMOBILE | REMOTE I/O | INTEGRATION MODULES | CONTROLLERS



# PLC CONTROLLED MOTION

# SIMPLIFIES THE INTEGRATION OF DRIVES INTO MAJOR SYSTEMS

**Control Techniques has set the standards in motor control since 1973.**

Composed of two parts, a function block for the PLC and a guided setup within the Connect PC tool, the process of creating the PLC control logic and configuring the powerful onboard motion capabilities of the drive is greatly simplified.

## Application Benefits

**Utilising the high-performance Advanced Motion Controller (AMC) inside the drive not only yields significant performance benefits but gives the possibility to create complex and high-performance motion without the need to use very powerful PLCs.**

All common control and commissioning parameters can be adjusted from the PLC reducing the need to leave the programming environment.

Ladder logic is used extensively in the implementation to ease understanding and facilitate debugging of the application logic. A level of customisation is also possible by the application developer should the function blocks provided not quite meet the needs of the application.




## Installation and Configuration

**A single installation will load all the function blocks and documentation required, as well as example projects to get the application up and running as quickly as possible.**

Also included, is a library of utility function blocks that may be used to further reduce application development time.

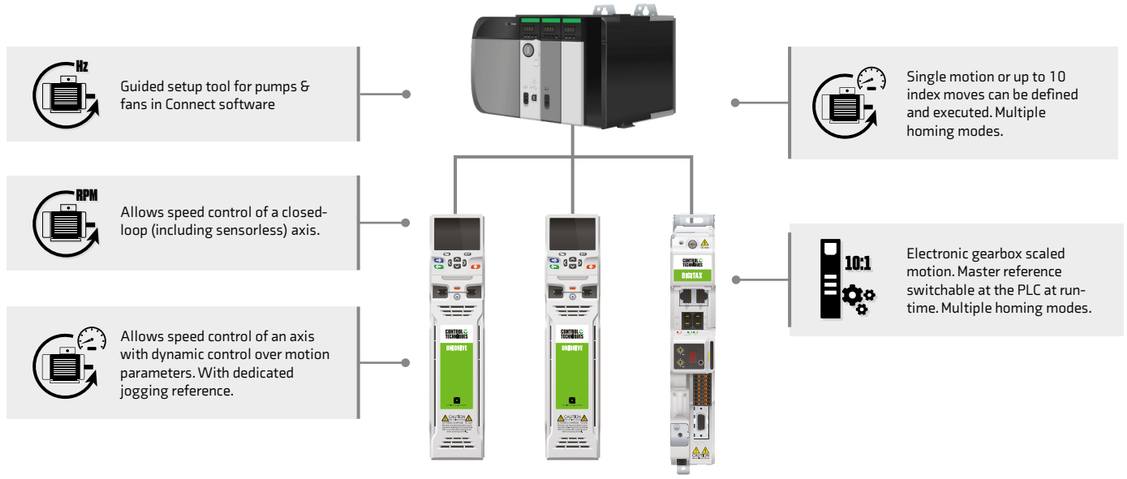
PLC Controlled Motion fully configures the Ethernet/IP links thus reducing setup time and leaving more time to focus on the application development.





## Motion configuration

Five function blocks provide functionality to support applications across the motion spectrum.

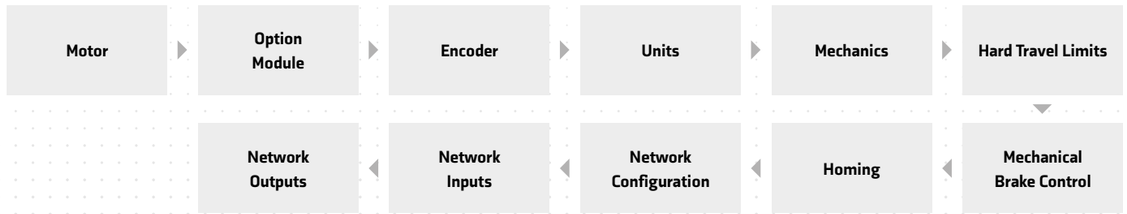



## Machine mechanics

Entering the machine mechanics allows the use of user selectable units across the application; removing the burden of scaling calculations.




PLC controlled motion will guide you through the steps needed to easily configure your application.



## HMI PANELS AND SOFTWARE

# POWERFUL, FLEXIBLE AND EASY TO USE

### MCh040 | MCh070 | MChMOBILE

**Control Techniques has set the standards in motor control since 1973.**

The MCh040 & MCh070 panels and MChMobile Software have been designed for the easy development of HMI applications including factory and building automation.

MCh040 features a bright 4.3" TFT widescreen (16:9) display and MCh070 features a bright 7" TFT widescreen (16:9) display with a fully dimmable LED backlight.






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## Key Benefits

Full vector graphic support. Native support of SVG graphic objects, transparency and alpha blending.

Multi-language applications with TrueType fonts. Easily create, install and maintain applications in multiple languages to meet global requirements.

Rich set of state-of-the-art HMI features: data acquisition and logging, trend presentation, alarm handling, scheduler and timed actions (daily and weekly schedulers, exception dates), recipes, security and user management, e-mail and RSS feeds.

Screen object dynamics: control visibility and transparency, move, resize and rotate any object on screen. Change properties of basic and complex objects.

Powerful scripting language for automating HMI applications. Efficient script debugger improves productivity in application development.

Wide selection of communication drivers available to communicate with our drives with multiple-driver communication capability.

Data display in numerical, text, bargraph, analogue gauges and image formats.

Remote monitoring and control with Client-Server functionality.

Off-line and on-line simulation.

Rich gallery of objects and symbols.

**Standard Modbus**

- Modbus RTU
- Modbus RTU server
- Modbus TCP
- Modbus TCP server

**CT Modbus**

- CT Modbus TCP

**Others**

- OPC UA Clien
- Ethernet/IP CIP
- A-B DF1
- A-B DH485
- A-B ENET

# SPECIFICATION

| System Resources | MCh040 | MCh070 |
|---|---|---|
| **Display - Colors** | 4.3" TFT 16:9 - 64K | 7" TFT 16:9 - 64K |
| **Resolution** | 480x272 | 800x480, WVGA |
| **Brightness** | 200 Cd/m² typ. | 200 Cd/m² typ. |
| **Dimming** | Yes | Yes |
| **Touchscreen** | Resistive | Resistive |
| **CPU** | ARM Cortex-A8 - 300 MHz | ARM Cortex-A8 - 1 GHz |
| **Operating System** | Linux 3.12 | Linux 3.12 |
| **Flash** | 2 GB | 4 GB |
| **RAM** | 256 MB | 512 MB |
| **Real Time Clock, RTC Back-up, Buzzer** | Yes | Yes |
| **Interface** | | |
| **Ethernet port** | 1 (port 0 - 10/100) | 1 (port 0 - 10/100) |
| **USB port** | 1 (Host v. 2.0, max. 500 mA) | 1 (Host v. 2.0, max. 500 mA) |
| **Serial port 1** | 1 (RS-232, RS-485, RS-422, software configurable) | 1 (RS-232, RS-485, RS-422, software configurable) |
| **SD card** | No | No |
| **Expansion** | No | No |
| **Ratings** | | |
| **Power supply** | 24 Vdc (10 to 32 Vdc) | 24 Vdc (10 to 32 Vdc) |
| **Current Consumption** | 0.25 A max. at 24 Vdc | 0.3 A max. at 24 Vdc |
| **Input Protection** | Automatic | Automatic |
| **Battery** | Yes (Supercapacitor) | Yes (Supercapacitor) |
| **Environment Conditions** | | |
| **Operating Temperature** | 0 to 50 °C (vertical installation) | 0 to 50 °C (vertical installation) |
| **Storage Temperature** | -20°C to +70°C | -20°C to +70°C |
| **Operating / Storage Humidity** | 5-85% RH, non condensing | 5-85% RH, non condensing |
| **Protection Class** | IP66, Type 2 and 4X (front); IP20 (rear) | IP66, Type 2 and 4X (front); IP20 (rear) |
| **Approvals** | | |
| **CE** | Emission EN 61000-6-4, Immunity EN 61000-6-2 for installation in industrial environments<br>Emission EN 61000-6-3, Immunity EN 61000-6-1 for installation in residential environments | |
| **UL** | cULus: UL508 | cULus: UL508 |
| **UL** | cULus: Class 1 Div 2 | cULus: Class 1 Div 2 |



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# DIMENSIONS & WEIGHTS

| | MCh040 | MCh070 |
|---|---|---|
| **Faceplate LxH** | 147x107 mm (5.78x4.21") | 187x147 mm (7.36x5.79") |
| **Cutout AxB** | 136x96 mm (5.35x3.78") | 176x136 mm (6.93x5.35") |
| **Depth D+T** | 29+5 mm (1.14+0.19") | 29+5 mm (1.14+0.19") |
| **Weight** | Approx 0.4 kg | Approx 0.6 kg |

# MODEL NUMBER

| Ordering Guide | MCh040 | MCh070 |
|---|---|---|
| **Part number** | eSMART04-MCh040 | eSMART07M-MCh070 |

## ETHERCAT REMOTE I/Os

# EASY CONNECTION OF ANALOGUE AND DIGITAL INPUT & OUTPUT SIGNALS




### I/O Modules enable industrial automation control

Industrial automation control applications often use a PLC system to manage the process, using I/O to communicate with sensors attached to the machines involved.

Control Techniques now have a series of EtherCAT Remote I/O modules that can be used with our own or any other brand PLC/ Controllers.

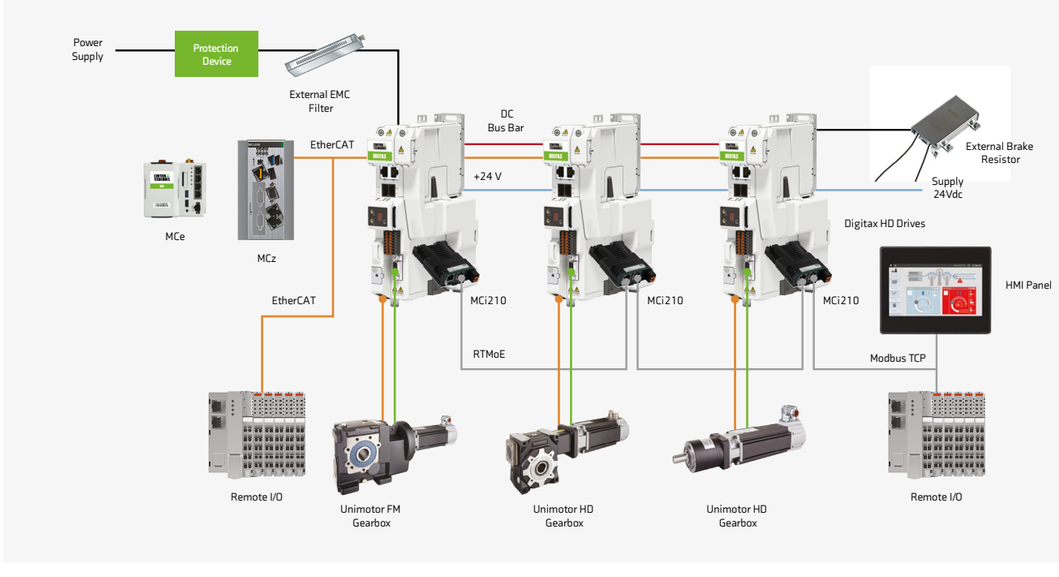
### EtherCAT Remote I/Os

In this configuration, add-on EtherCAT Remote I/O modules connect via the on-board EtherCAT port of the MCe or MCz controllers, or through any EtherCAT port on any PLC or controller.

A typical scalable configuration (as shown below) would feature the EtherCAT Remote I/O module, used together with MCe or MCz controllers, MCi2XX Machine Control option modules, Machine Control Studio software and the MCh040/MCh070 HMI Panels. All sensor inputs and outputs can be controlled, including LEDs, pushbuttons, temperature controls, machine status indicators and fluid flow sensors.








### Supported slices and model number

| Network Adapter | Part Number |
|---|---|
| EtherCAT Network Adapter | IO201-BC |
| **System Module** | **Part Number** |
| 8 Channels, Shield Module, ID Type, 10RTB | RT-7008 |
| 8 Channels, Common Module, 0 Vdc, ID Type, 10RTB | RT-7108 |
| 1 Channel, Expansion Power, Input 24 Vdc, Output 1.0 A/5 Vdc, ID Type, 10RTB | RT-7111 |
| 8 Channels, Common Module, 24 Vdc, ID Type, 10RTB | RT-7118 |
| 8 Channels, Common, 0V dc/24 Vdc, ID Type, 10RTB | RT-7188 |
| Field Power Distribution, 5Vdc, 24Vdc, 48Vdc, 110Vac, 220Vac, ID Type, 10RTB | RT-7241 |
| **Digital Input** | **Part Number** |
| DI 8 PTs, Universal (Sink or Source), 24Vdc, 10RTB | RT-1238 |
| DI 16 PTs, Universal (Sink or Source), 24Vdc, 18RTB | RT-12DF |
| DI 32 PTs, Universal (Sink or Source), 24Vdc, 40PTs Connector | RT-12FA |
| **Digital Output** | **Part Number** |
| DO 8 PTs, Sink, 24Vdc/0.5A, 10RTB | RT-2318 |
| DO 8 PTs, Source, 24Vdc/0.5A, 10RTB | RT-2328 |
| DO 16 PTs, Sink, 24Vdc/0.3A, 18RTB | RT-225F |
| DO 16 PTs, Source, 24Vdc/0.3A, 18RTB | RT-226F |
| DO 32 PTs, Sink, 24Vdc/0.3A, 40PTs Connector | RT-22BA |
| DO 32 PTs, Source, 24Vdc/0.3A, 40PTs Connector | RT-22CA |
| Relay Output 4 PTs, 24Vdc/2A, 240Vac/2A, 10RTB | RT-2744 |

| Analogue Input | Part Number |
|---|---|
| AI, 4 CHs, 0~20, 4~20mA, 12Bits, 10RTB | RT-3114 |
| AI, 4 CHs, 0~20, 4~20mA, 16Bits, 10RTB | RT-3154 |
| AI, 8 CHs, 0~20, 4~20mA, 12Bits, 10RTB | RT-3118 |
| AI, 4 CHs, 0~10, 0~5, 1~5Vdc, 12Bits, 10RTB | RT-3424 |
| AI, 4 CHs, 0~10, 0~5, 1~5Vdc, 16Bits, 10RTB | RT-3464 |
| AI, 8 CHs, 0~10, 0~5, 1~5Vdc, 12Bits, 10RTB | RT-3428 |
| AI, 4 CHs, RTD, 10RTB | RT-3704 |
| AI, 4 CHs, Thermocouple, 10RTB | RT-3804 |
| Differential type, 4 CHs, 0~20, 4~20, +/-20mA, 12Bits, 10RTB | RT-3914 |
| Differential type, 4 CHs, 0~20, 4~20, +/-20mA, 16Bits, 10RTB | RT-3934 |
| Differential type, 4 CHs, 0~5, 0~10, +/-5, +/-10Vdc, 12Bits, 10RTB | RT-3924 |
| Differential type, 4 CHs, 0~5, 0~10, +/-5, +/-10Vdc, 16Bits, 10RTB | RT-3944 |
| **Analogue Output** | **Part Number** |
| AO, 4 CHs, 0~20mA, 12Bits, 10RTB | RT-4114 |
| AO, 4 CHs, 0~20mA, 16Bits, 10RTB | RT-4154 |
| AO, 8 CHs, 0~20mA, 12Bits, 10RTB | RT-4118 |
| AO, 8 CHs, 0~20mA, 16Bits, 10RTB | RT-4158 |
| AO, 4 CHs, 0~10Vdc, 12Bits, 10RTB | RT-4424 |
| AO, 4 CHs, 0~10Vdc, 16Bits, 10RTB | RT-4464 |
| AO, 8 CHs, 0~10Vdc, 12Bits, 10RTB | RT-4428 |
| AO, 8 CHs, 0~10Vdc, 16Bits, 10RTB | RT-4468 |

# RTMOE OR MODBUS TCP REMOTE I/Os

# THE MOST WIDELY USED NETWORK PROTOCOL

## I/O Modules enable industrial automation control without PLCI

Industrial automation control applications often use a PLC system to manage the process, using I/O to communicate with sensors attached to the machines involved.

Now, a series of I/O modules is available for Control Techniques' drives. They are designed to enable applications of moderate complexity to be managed without the need for a PLC system, but directly using the drive itself.



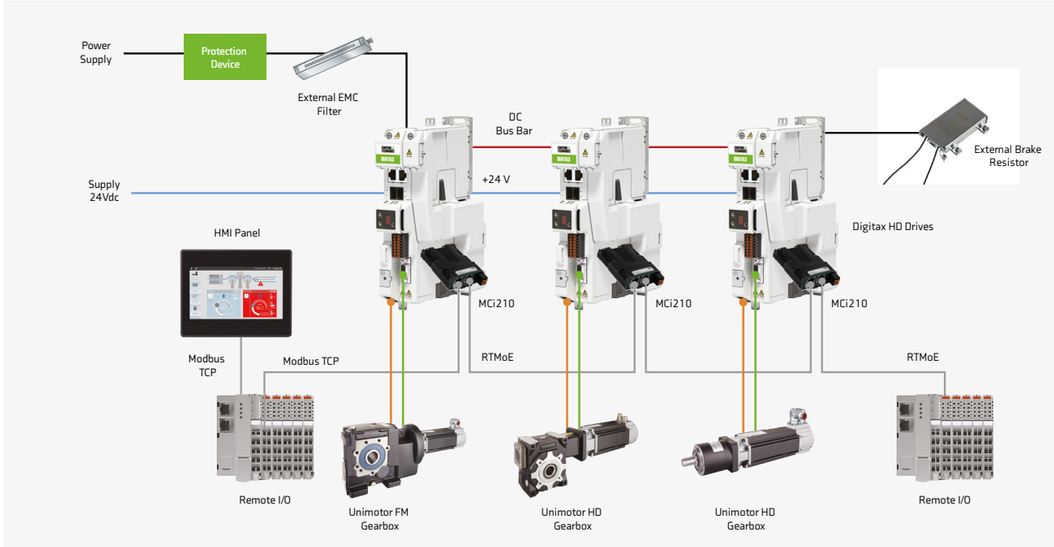

## RTMoE or Modbus TCP Remote I/Os

In this configuration, add-on RTMoE or Modbus TCP Remote I/O modules connect directly via the on-board Ethernet port of the M7XX series drives, or via the on-board Ethernet port of the MCi210 Machine Control option modules.

A typical configuration (as shown below) would include MCi2XX Machine Control option modules, Machine Control Studio software and the MCh040/MCh070 HMI Panels. All sensor inputs and outputs can be controlled, including LEDs, pushbuttons, temperature controls, machine status indicators and fluid flow sensors.








### Supported slices and model number

| Network Adapter | Part Number |
|---|---|
| RTMoE & MODBUS TCP Network Adapter | IO210-BC |
| **System Module** | **Part Number** |
| 8 Channels, Shield Module, ID Type, 10RTB | GT-7408 |
| 8 Channels, Common Module, 0 Vdc, ID Type, 10RTB | GT-7508 |
| 1 Channel, Expansion Power, Input 24 Vdc, Output 1.0 A/5 Vdc, ID Type, 10RTB | GT-7511 |
| 8 Channels, Common Module, 24 Vdc, ID Type, 10RTB | GT-7518 |
| 8 Channels, Common, 0V dc/24 Vdc, ID Type, 10RTB | GT-7588 |
| Field Power Distribution, 5Vdc, 24Vdc, 48Vdc, 110Vac, 220Vac, ID Type, 10RTB | GT-7641 |
| **Digital Input** | **Part Number** |
| DI 8 PTs, Universal (Sink or Source), 24Vdc, 10RTB | GT-1238 |
| DI 16 PTs, Universal (Sink or Source), 24Vdc, 18RTB | GT-12DF |
| DI 32 PTs, Universal (Sink or Source), 24Vdc, 40PTs Connector | GT-12FA |
| **Digital Output** | **Part Number** |
| DO 8 PTs, Sink, 24Vdc/0.5A, 10RTB | GT-2318 |
| DO 8 PTs, Source, 24Vdc/0.5A, 10RTB | GT-2328 |
| DO 16 PTs, Sink, 24Vdc/0.3A, 18RTB | GT-225F |
| DO 16 PTs, Source, 24Vdc/0.3A, 18RTB | GT-226F |
| DO 32 PTs, Sink, 24Vdc/0.3A, 40PTs Connector | GT-22BA |
| DO 32 PTs, Source, 24Vdc/0.3A, 40PTs Connector | GT-22CA |
| Relay Output 4 PTs, 24Vdc/2A, 240Vac/2A, 10RTB | GT-2744 |

| Analogue Input | Part Number |
|---|---|
| AI, 4 CHs, 0~20, 4~20mA, 12Bits, 10RTB | GT-3114 |
| AI, 4 CHs, 0~20, 4~20mA, 16Bits, 10RTB | GT-3154 |
| AI, 8 CHs, 0~20, 4~20mA, 12Bits, 10RTB | GT-3118 |
| AI, 8 CHs, 0~20, 4~20mA, 16Bits, 10RTB | GT-3158 |
| AI, 4 CHs, 0~10, 0~5, 1~5Vdc, 12Bits, 10RTB | GT-3424 |
| AI, 4 CHs, 0~10, 0~5, 1~5Vdc, 16Bits, 10RTB | GT-3464 |
| AI, 8 CHs, 0~10, 0~5, 1~5Vdc, 12Bits, 10RTB | GT-3428 |
| AI, 8 CHs, 0~10, 0~5, 1~5Vdc, 16Bits, 10RTB | GT-3468 |
| AI, 4 CHs, RTD, 10RTB | GT-3704 |
| AI, 4 CHs, Thermocouple, 10RTB | GT-3804 |
| Differential type, 4 CHs, 0~20, 4~20, +/-20mA, 12Bits, 10RTB | GT-3914 |
| Differential type, 4 CHs, 0~20, 4~20, +/-20mA, 16Bits, 10RTB | GT-3934 |
| Differential type, 4 CHs, 0~5, 0~10, +/-5, +/-10Vdc, 12Bits, 10RTB | GT-3924 |
| Differential type, 4 CHs, 0~5, 0~10, +/-5, +/-10Vdc, 16Bits, 10RTB | GT-3944 |
| **Analogue Output** | **Part Number** |
| AO, 4 CHs, 0~20mA, 12Bits, 10RTB | GT-4114 |
| AO, 4 CHs, 0~20mA, 16Bits, 10RTB | GT-4154 |
| AO, 8 CHs, 0~20mA, 12Bits, 10RTB | GT-4118 |
| AO, 8 CHs, 0~20mA, 16Bits, 10RTB | GT-4158 |
| AO, 4 CHs, 0~10Vdc, 12Bits, 10RTB | GT-4424 |
| AO, 4 CHs, 0~10Vdc, 16Bits, 10RTB | GT-4464 |
| AO, 8 CHs, 0~10Vdc, 12Bits, 10RTB | GT-4428 |
| AO, 8 CHs, 0~10Vdc, 16Bits, 10RTB | GT-4468 |

# PTi210 POWERTOOLS

# MOTION MADE EASY®

More than 45 years later, we're still in pursuit of the best Motion Made Easy for servo motion control applications. Enter our next generation of Motion Made Easy for Digitax HD and Unidrive M servo drive platforms. The PTi210 enables Control Techniques' PowerTools Studio software interface.

Setup complex applications within minutes. It's flexible, versatile and up to whatever challenging application you want to throw at it.



## PTi210 PowerTools Integration Module

**PTi210 is a cost effective way to provide simple, fast and effective motion control solutions.**

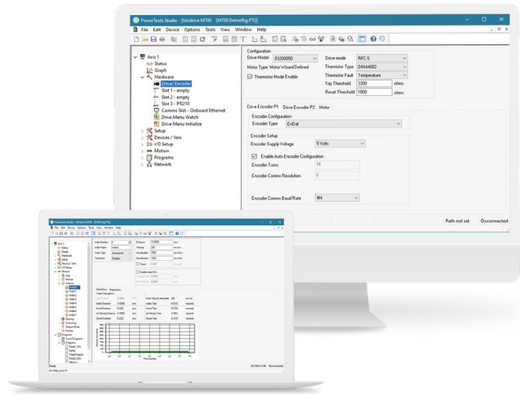
- Precise reliable motion controller
- 5 high speed digital I/O points (3 inputs & 2 outputs) in addition to the on-board drive I/O
- 1.5 axis synchronized encoder following with an optional encoder system integration module
- Rapid integration for applications such as:
  - Conveyor Synchronization
  - Parts Alignment
  - Rotary Knife
  - Electronic Gearing
  - Phase Synchronization
  - Slip Compensation
  - Feed to Sensor/Torque
  - Point-To-Point Positioning
  - Thermoforming
  - Flying Cutoff
  - Product Spacing
  - Traverse Winding
  - Labelling and Printing
  - Random Infeed Control
  - Web Control
  - Multi-Lane Merge Control
  - Registration Control

**and many more!**





## PowerTools Studio software



PowerTools Studio provides an unparalleled setup and commissioning experience suitable for all skill levels. Professional motion control software engineers, infrequent users, or someone with no servo experience can equally use this interface to program drives.

- Easily program the Digitax HD or Unidrive M using a Modbus RTU serial port or on-board Ethernet depending on your model
- Simple configuration and programming visual interface
  - Fill-in-the-blank
  - Point-and-Click
  - Drop down menu selection
  - Drag-and-Drop parameters and I/O assignments
- Instant access to all parameters through the project tree view
- As always with Control Techniques, the software is freely available for download.

### 1 Hardware

Enter the drive, motor and feedback data through an easy to understand visual interface.

### 2 Setup

Establish the units used for setting up distance, velocity and acceleration and other key optional drive settings such as tuning and system limits.

### 3 I/O Setup

Assignments setup works like virtual wires to define how the system operates. Drag and drop drive input (source) functions with drive output (destination) functions. The assignment functions include both physical hardware I/O and virtual internal I/O.



### 4 Motion Setup

Motion setup provides a visual interface to setup a home reference move, point-to-point indexing moves, jog moves, electronic gearing and camming, and a profiling feature that allows a user to simultaneously execute any two motion types together for a summed profile which is important for phasing applications such as random infeed, rotary knife or smart conveyor systems.

### 5 Programs (if required)

Combine program flow and motion instructions to create fully customized user programs of up to 1,000 lines of code. Conditional branching, wait for, program calls, formulas, user variables and numerous motion instructions are available to facilitate a variety of applications, from simple to complex.

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## APPLICATIONS

# SI-APPLICATIONS PLUS
# SI-APPLICATIONS COMPACT

**SI-Applications modules allow SyPTPro application programs to be recompiled and executed with Unidrive M700 and Digitax HD to enable rapid and simple upgrade to users.**

Applications comprising networked drives with SM-Applications using CTNet or CTSync for real-time control can be quickly replaced with Unidrive M and Digitax HD and the SI-Applications module without any compromise to system performance.




**SI-Applications Plus**
Can be used with Unidrive M only in option slot 3



**SI-Applications Compact**
Can be used with Unidrive M and Digitax HD in any option slot

### Features include:

- Enhanced high speed dedicated microprocessor
- 384 kB Flash memory for user program
- 80 kB user program memory
- EIA-RS485 port offering ANSI, Modbus-RTU follower and master and Modbus-ASCII follower and master protocols
- CTNet high speed network connection offering up to 5 Mbit/s data rate
- Two 24 V digital inputs
- Two 24 V digital outputs
- Task based programming system for real-time control
- CTSync distributes a master position to multiple drives on a network. Hardware synchronization of speed, position and torque loops achieving a time base of 250 µs

### Terminal Descriptions

1 2 3 4 5 6 7 8 9 10 11 12 13

| Terminal | Function | Description |
|---|---|---|
| 1 | 0 V SC | 0 V connection for EIA-RS485 port |
| 2 | /RX | EIA-RS485 Receive line (negative). Incoming |
| 3 | RX | EIA-RS485 Receive line (positive). Incoming |
| 4 | /TX | EIA-RS485 Transmit line (negative). Outgoing |
| 5 | TX | EIA-RS485 Transmit line (positive). Outgoing |
| 6 | CTNET A | CTNet data line |
| 7 | CTNET Shield | Shield connection for CTNet |
| 8 | CTNET B | CTNet data line |
| 9 | 0 V | 0 V connection for digital I/O |
| 10 | DIO | Digital input 0 |
| 11 | DI1 | Digital input 1 |
| 12 | DO0 | Digital output 0 |
| 13 | DO1 | Digital output 1 |

# MCi200 & MCi210

# MACHINE CONTROL MODULES

**Unidrive M's MCi200 and MCi210 modules extend machine control capability when combined with the Advanced Motion Controller embedded in Unidrive M700.**

Enabling easy connectivity of additional machine components and application software, MCi200 and MCi210 create a complete application solution. As a result of the highly flexible plug-in option module format, system design is streamlined by removing the need for PLCs and additional external equipment. Machine control is fast and easy to achieve thanks to Unidrive M's user friendly programming software - Machine Control Studio - utilizing the industry-standard open IEC 61131-3 programming environment.



MCi200



MCi210

## Build high performance systems and productive machines

- MCi modules execute comprehensive programs that can control multiple drives and motors simultaneously across real-time networks.
- M700's onboard Ethernet using RTMoE (Real Time Motion over Ethernet) provides synchronization and communication between drives using the Precision Time Protocol as defined by IEEE1588 V2.
- Performance is optimized by having a motion controller embedded in each networked drive.





## The MCi200 and MCi210 machine control modules provide:

- **High performance machine control:** High speed communications of 250 µs enables optimum performance.
- **High bandwidth:** Control multiple drive and motor axes thanks to MCi210's second Ethernet port.
- **Optimum ease of use:** Rapidly create machine control programs with Unidrive M's programming software, developed with extensive human centred design research and based on the industry-standard IEC 61131-3 programming environment.
- **Open environment:** Standard IEEE 1588 Ethernet and IEC 61131 software enable open machine control programming, boosting the choice of component connectivity.
- **Streamlined machine design:** Plug-in option module format means less wiring, less physical space required & less financial cost, while increasing design simplicity.
- **User programming:** The MCi200 and MCi210 modules are capable of running Machine Control Studio programs. It is an integrated development environment that supports all five of the programming languages of the IEC 61131-3 standard, including Structured Text (ST), Ladder Diagram (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC) and Instruction List (IL). Continuous Function Chart (CFC) is also supported.
- **Optimum connectivity:** Simple integration with external components such as I/O, HMIs and other networked drives can be achieved using Unidrive M's integrated standard Ethernet ports (with RTMoE or standard protocols), or fieldbuses supported by SI option modules (EtherCAT, PROFINET, PROFIBUS, CANopen).

**The user has a number of tasks available to them as shown in the following table.**

| Task | Interval |
|---|---|
| Initial | Executes once when the user program starts |
| Freewheeling | No timebase |
| Clock0 | User-specified timebase from 1 ms to 24 hours in 1 ms increments |
| Clock1 | |
| Clock2 | |
| Clock3 | |
| Position | User-specified timebase from 250 µs to < 8 ms in 250 µs increments |
| Event0 | No timebase. This task is triggered (e.g. by the Timer Unit, Ethernet cyclic data etc.) |
| Event1 | |
| Event2 | |
| Event3 | |
| ErrorTask | No timebase. This task is triggered on a user program error |

The Clock and Position tasks are cyclic and will run at an interval set by the user. The Freewheeling task is the lowest priority task and will run when processor resource allows.

### MCi210 ensures higher performance by delivering:

- Two additional Ethernet ports with an internal switch
- Support for standard Ethernet protocols, along with RTMoE for PTP (IEEE 1588) synchronization
- Modbus TCP/IP master (up to 5 nodes)
- Parallel interface with drive processor provides faster data exchange
- Machine control over two segregated Ethernet networks enables greater flexibility in machine design
- Extends connectivity with 3 x digital inputs, 1 x digital output and 1 x digital I/O

MCe200

# MACHINE CONTROLLER WITH HIGH PERFORMANCE MOTION FEATURES

## Fast machine development due to integration of logic, motion and visualisation

The Control Techniques solution provides an environment for programming controllers in all key programming languages with seamless support for the generation of visualisations.

## Ease of use open standards

The use of standard Codesys provides ease-of-use. This package is supported by the majority of automation vendors, and most automation engineers are trained to use it.

## Maximum choice for component integration due to PC based architecture

PC based architecture, including the Windows 10™ operating system, allows for the easy integration of third party components. This provides machine builders flexibility to choose best-in-class components for all applications.

## Simple application integration due to standard onboard interfaces

Standard onboard interfaces including four Ethernet ports and two USB ports, mean that the Embedded Controller can be easily integrated with any application or machine.

## Robustness due to rugged design

The Embedded Controller does not contain rotating fans or internal cabling, and is designed to operate in elevated temperatures. This increases reliability and reduces the need for maintenance, even in dusty environments.





Our Embedded Controllers are stand-alone Machine Controllers with high performance Motion features that can manage every aspect of any industrial solution.

Our Embedded Controllers run on the Windows 10™ operating system and use standard Codesys V3.5 SP16 or newer, and so are fully compatible with third party software or hardware.




## Hardware Specifications

- Latest generation processor Intel® Atom E3825 Dual Core 1.33 GHz
- Windows 10
- Inbuilt NVRAM
- 8GB solid state hard drive
- Multiple 1GB Ethernet ports
- Multiple USB ports
- Real time clock
- SD Card storage for application
- Fanless
- Operating temp: -20°C to 60°C

**Support for multiple communication protocols:**

- EtherCAT Client (PLCopen)
- Profinet Server
- Ethernet/IP Client & Server
- Modbus TCP/IP Client & Server
- OPC UA Server

**Programmed via standard CODESYS V3.5 SP16 with these licences included**

- Softmotion
- Web Visu

## Ordering Guide

| MCe200 | Order Code |
|---|---|
| MCe200 | MCe200-100W10G002G016G00 |

**Supported by our Remote I/Os & HMI Panels:**



# MCz201 & MCz601

# INDUSTRIAL PC MAKING MACHINE CONTROL EFFORTLESS

Our Industrial PC Machine Controllers are general purpose computers that can manage every aspect of any industrial process, as well as a variety of wider tasks within your factory or business such as big data analysis. Our IPCs run on the Windows operating system and use standard Codesys V3.5 SP16 or newer, and so are fully compatible with third party software and hardware but have been optimized to work with other Control Techniques' products as a complete solution. The result is increased throughput for all machines.

There is increasing pressure on machine builders to develop new and more flexible products fast. That is why the MCz601 and MCz201 Industrial PC Machine Controllers have been designed to be quick and easy to install and commission. They have a robust, flexible and reliable design that allows for easy development and use, as well as for easy component and application integration.








## Fast machine development due to integration of logic, motion and visualisation

The Control Techniques solution provides an environment for programming controllers in all key programming languages with seamless support for the generation of visualisations.

## Ease of use open standards

The use of standard Codesys provides ease-of-use. This package is supported by the majority of automation vendors, and most automation engineers are trained to use it.

## Maximum choice for component integration due to PC based architecture

PC based architecture, including the Windows 10™ operating system, allows for the easy integration of third party components. This provides machine builders flexibility to choose best-in-class components for all applications.

## Simple application integration due to standard onboard interfaces

Standard onboard interfaces including four Ethernet ports and up to six USB ports, mean that the Industrial PC Machine Controller can be easily integrated with any application or machine.

## Robustness due to rugged design

The Industrial PC Machine Controller does not contain rotating fans and is designed to operate in elevated temperatures. This increases reliability and reduces the need for maintenance, even in dusty environments.

## Specifications

| Description | MCz201 | MCz601 |
|---|---|---|
| CPU | 8th/9th Generation Intel® processor via COM Express® type 6: Celeron® G4930E 2x 2.4 GHz, 2 MByte cache | 8th/9th Generation Intel® processor via COM Express® type 6: Core™ i7-9850HE: 6x 2.7 GHz, 9 MByte cache |
| Ethernet ports | 4x 10/100/1000 MBit/s Ethernet with IEEE1588 support, WOL | 4x 10/100/1000 MBit/s Ethernet with IEEE1588 support, WOL |
| USB ports | 3x USB 3.0, 3x USB 2.0 | 3x USB 3.0, 3x USB 2.0 |
| 485/232 ports | 1x RS232/RS422/RS485, 2nd COM port optional via adapter module | 1x RS232/RS422/RS485, 2nd COM port optional via adapter module |
| 24V | 24 VDC (17-36 VDC), up to 20 ms hold-up 2nd 24 VDC power input optional via adapter module | 24 VDC (17-36 VDC), up to 20 ms hold-up 2nd 24 VDC power input optional via adapter module |
| Temp range | 0 °C to + 50 °C (32 °F to 122 °F) planned | 0 °C to + 50 °C (32 °F to 122 °F) planned |
| RAM | Memory 4GB RAM | Memory 4GB RAM |
| SSD | SSD 128GB 2.5" | SSD 128GB 2.5" |
| NVRAM | NVRAM mPCIE with 1MB MRAM | NVRAM mPCIE with 1MB MRAM |
| Video ports | 2x DisplayPort, optional 3rd | 2x DisplayPort, optional 3rd |
| OS | Windows 10™ | Windows 10™ |
| Codesys V3.5 SP16 Licences | • Softmotion<br>• Web Visu<br>• Target Visu | • Softmotion<br>• Web Visu<br>• Target Visu |

## Ordering Guide

| MCz | Order Code |
|---|---|
| MCz201 | MCz201-100W10G004G128G00 |
| MCz601 | MCz601-100W10G004G128G00 |

**Supported by our Remote I/Os & HMI Panels:**





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# OPTION MODULES

## Communication



SI-Ethernet



SI-EtherCAT



SI-PROFINET V2



SI-CANopen



SI-PROFIBUS



SI-Encoder



SI-Interbus



SI-POWERLINK



SI-DCP



SI-CiA417

## Feedback



SI-Encoder



SI-Universal Encoder

## Safety



MiS210



SI-Safety

## I/O



SI-I/O

# PC TOOLS





# PRODUCTS IN THIS RANGE

| Category | PC Tool/App | Description |
|---|---|---|
| Connect | Commissioning/Set-up | Drive Commissioning tool for Uni M, Commander, Powerdrive, Pump Drive, Elevator, HVAC, and Digitax HD. |
| Connect | Diagnostics | Fault Log, Monitoring, Drive status views. |
| CT Energy Savings Estimator | Application | Estimates energy consumption for fan and pumps applications when using and AC motor with a CT Drive. |
| CTSafePro | Safety | Graphical program editor used to prepare function-block programs for the SM & SI safety module. |
| CTScope | Commissioning/Set-up | CTScope is a single oscilloscope display on which a number of channels can be displayed. A feature set (and look and feel) similar to that of a hardware oscilloscope is provided. |
| CTScope | Diagnostics | Eight analogue channels (drive or option module parameters) of data can be recorded. |
| CTSoft | Commissioning/Set-up | Drive commissioning tool for CT Affinity, Unidrive Classic, Unidrive SP, Unidrive ES, Unidrive PV, Commander GP20, Commander SK, Digitax ST series and Mentor MP ranges of drives. |
| CTSoft | Diagnostics | Fault Log, Monitoring, Drive status views. |
| Digitax SF Connect | Commissioning/Set-up | 3rd party commissioning tool for Digitax SF Drive. |
| Machine Control Studio | Programming | Machine Control Studio provides a IEC 61131-3 programming environment for the Unidrive M / Commander drive and MCi2x0 option module range from Control Techniques. |
| Machine Control, Studio | Diagnostics | Trace watch functionality. |
| PowerTools Pro | Programming | For the Epsilon EP, FM-3E and FM-4E modules, and for Control Techniques' Unidrive SP and Digitax ST-Z drives (with the SM-EZMotion Option Module).. CT-USA Developed product. |
| PowerTools Pro | Commissioning/Setup | Epsilon EP, FM-3E and FM-4E modules, and for Control Techniques' Unidrive SP and Digitax ST-Z drives (with the SM-EZMotion Option Module). |
| SyPTLite | Programming | Unidrive, SP, Digitax series, Commander SK Onboard PLC programming tool. |
| SyPTPro | Programming | SM/SI-Applications / Plus, allows user programs to be developed for multiple nodes in DPL, Ladder and Function Block programming languages. DPL (Drive Programming Language) is a high level language as easy to use as BASIC but optimised for drive applications. SYPT also allows user programs to be downloaded to nodes and the runtime operation of the programs to be monitored. Contains SyPTLite. |
| MChMobile | Programming | Development of HMI applications with the MCh040 and MCh070 HMI panels. |

# ACCESSORIES







# HIGH PERFORMANCE, HIGH SPEED.

## Integrate, automate, communicate with an extensive range of options

Control Techniques' drives support a wide range of optional click-in System Integration modules that allow them to integrate seamlessly with existing Manufacturing Automation systems and other vendor supplied equipment. These include communications, I/O, feedback devices, enhanced safety features and onboard PLCs.

Control Techniques' high performance drives use a high speed parallel bus between the drive and SI modules which removes delays, improving the drive's reaction time. Communications interfaces are independently certified for conformance with the relevant standards to ensure performance and interoperability.

## Drive installation, set-up, configuration and monitoring

Our drives are quick and easy to set-up and can be configured using a selection of keypads, SD or Smartcards. We can also provide standard engineered accessories such as external EMC filters (for compliance with EN 61000-6-4) chokes and motor cables. Control Techniques can also provide all the mounting brackets required to meet your specific application requirements whether retrofitting old systems or designing new ones to meet specific IP ratings.

***All of what we offer can be found in the following pages.***

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| Optimal Drives Programming and Operator Interface | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Connect | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Remote Keypad | | 82500000000001 | ✓ | ✓ | | ✓ | ✓ | ✓ | | | | |
| Remote keypad RTC | | 82400000019600 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ Recommended | | ✓ | | |
| KI-Keypad | | 82400000016000 | | | | ✓ | ✓ | ✓ | | | | |
| KI-Keypad RTC | | 82400000016300 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| KI-HOA Keypad RTC - Green F600 | | 82400000018500 | | | | | | | ✓ | | | |
| KI-Compact Display | | 82700000020400 | | | | | | | | ✓ | | |
| Remote HOA Keypad RTC | | 82400000019700 | | | | | | | ✓ | | | |
| CI-Keypad | | 82500000000000 | | | ✓ | | | | | | | |
| MP-Keypad LCD with MP Firmware | | 82300000015300 | | | | | | | | | | ✓ |
| SM-Keypad LED standard | | 82000000010900 | | | | | | | | | | ✓ |
| Operator Interface (HMI) | | eSMART04-MCh040<br>eSMART07M-MCh070 | ✓ using the AI-485 Adaptor | ✓ using the AI-485 Adaptor | ✓ using the AI-485 Adaptor | ✓ | ✓ | | ✓ | ✓ M753 with an option module | | ✓ |
| REMOTE I/O | | | | | | | ✓ M700 & M702 | | | ✓ M750 | | |
| Smartcard | | 2214-0010 | | | | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| SD card using SD Card Adaptor | | 82400000016400 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| AI-485 Adaptor | | 82500000000003 | | | | ✓ | ✓ | | | | | |
| KI-485 Adaptor | | 82400000016100 | | | | | | ✓ | ✓ | | | |

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| Optimal Drives Programming and Operator Interface | | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AI-Back-up Adaptor |  | | 82500000000004 | ✓ | ✓ | ✓ | | | | | | | |
| AI-485 Adaptor |  | | 82500000000003 | ✓ | ✓ | ✓ | | | | | | | |
| AI-Smart Adaptor |  | | 82500000018500 | ✓ | ✓ | ✓ | | | | | | | |
| RS485 Cable |  | | 4500-0096 | ✓ | ✓ | | | | ✓ | | ✓ | | |
| AI-485 24 V Adaptor |  | | 82500000019700 | | ✓ | | | | | | | | |
| AI-485 24 V Adaptor |  | | 82500000019700 | | | ✓ | | | | | | | |
| AI-485 Adaptor |  | | 82500000000003 | ✓ | ✓ | ✓ | | | | | | | |
| CI-485 Adaptor |  | | 82500000000002 | | | ✓ | | | | | | | |
| **SI Option Modules** | | | | | | | | | | | | | |
| **Machine Control** | | | | | | | | | | | | | |
| MCi200 |  | | 82400000017000 | | | | | ✓ | ✓ | ✓ | ✓ | | |
| MCi210 |  | | 82400000016700 | | | | | ✓ | ✓ | | ✓ | | |
| SI-Applications Plus |  | | 82400000016500 | | | | | ✓ (Only slot 3) | ✓ (Only slot 3) | | | | |
| SI-Applications Compact |  | | 82400000020700 | | | | | ✓ (Only slot 3) | ✓ (Only slot 3) | | ✓ | | |
| PTi210 |  | | 82400000021400 | | | | | ✓ | | | ✓ | | |

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| SI Option Modules | | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Safety** | | | | | | | | | | | | | |
| SI-Safety |  | | 82400000018400 | | | ✓ | ✓ | | | | | | |
| MiS210 |  | | 82400000021100 | | | | ✓ | ✓ | | | | | |
| **Communications** | | | | | | | | | | | | | |
| SI-Ethernet |  | | 82400000017900 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| SI-PROFINET RT V2 |  | | 82500000018200 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-EtherCAT |  | | 82400000018000 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-CANopen V2 |  | | 82400000017600 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| SI-PROFIBUS |  | | 82400000017500 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-POWERLINK |  | | 82400000021600 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| SI-DeviceNet |  | | 82400000017700 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-Interbus 500kBd |  | | 82400000021220 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-Interbus 2MBb | | | 82400000021230 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| SI-DCP*<br>*Support of DCP3 & DCP |  | | 82400000019900 | | | | | | ✓ | | | | |
| SI-CiA417 |  | | 82400000021700 | | | | | | ✓ | | | | |

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| SI Option Modules | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Feedback** | | | | | | | | | | | | |
| SI-Encoder |  | 82400000018100 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| SI-Univeral Encoder |  | 82400000018300 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| **Additional I/O** | | | | | | | | | | | | |
| SI I/O |  | 82400000017800 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | |

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| | | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input / Output (I/O) terminal block and cable assembly |  | | 2216-0211 | | | | | | | | | ✓ | |
| Input / Output: Interface Connector |  | | 3412-0050 | | | | | | | | | ✓ | |
| Surge absorber/protector | | | 2490-2754 | | | | | | | | | ✓ | |
| | | | 2490-0004 | | | | | | | | | ✓ | |
| Internal brake resistor | | 3 | 1220-2752 | | | | ✓ | ✓ | | | | | |
| | | 4 & 5 | 1299-0003 | | | | ✓ | ✓ | | | | | |
| DC bus paralleling kit | | 3 | 3470-0048 | | | | ✓ | ✓ | | ✓ | | | |
| | | 4 | 3470-0061 | | | | ✓ | ✓ | | ✓ | | | |
| | | 5 | 3470-0068 | | | | ✓ | ✓ | | ✓ | | | |
| | | 6 | 3470-0063 | | | | ✓ | ✓ | | ✓ | | | |
| | | 6 (connect to frame 3,4 & 5) | 3470-0111 | | | | ✓ | ✓ | | ✓ | | | |
| Through hole IP65 kit<br><br>IP65 / UL TYPE 12 rating is achieved on the rear of the drive when through panel mounted using the following kits. | | 3 | 3470-0053 | | | ✓ | ✓ | ✓ | ✓ | | | | |
| | | 4 | 3470-0056 | | | ✓ | ✓ | ✓ | ✓ | | | | |
| | | 5 | 3470-0067 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| | | 6 | 3470-0055 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| | | 7 | 3470-0079 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| | | 8 | 3470-0083 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| Through hole IP65 kit<br><br>IP55 / UL TYPE 12 rating can be achieved for frame sizes 9A and 9E using the following kits: | | 9A | 3470-0119 | ✓ | ✓ | ✓ | | ✓ | | | | | |
| | | 9E & 10D | 3470-0105 | ✓ (9E only) | ✓ (9E only) | ✓ (9E only) | ✓ | ✓ | | | | | |
| | | 10 Inverter | 3470-0108 | | | | ✓ | ✓ | | | | | |
| | | 10 Rectifier | 3470-0106 | | | | ✓ | ✓ | | | | | |
| Through hole IP65 kit | | 11E & 11T | 3470-0126 | | | | | ✓ | | | | | |
| | | 11 D Inverter | 3470-0130 | | | | | ✓ | | | | | |
| | | 11 & 11 Rectifier | 3470-0123 | | | | ✓ | ✓ | | | | | |
| Through-hole IP55 kits | | 9A | 3470- 0119 | | | | ✓ | ✓ | ✓ | | | | |
| | | 9E/10E | 3470-0105 | | | | ✓ | ✓ | ✓ | | | | |
| | | 10 Inverter | 3470-0108 | | | | ✓ | ✓ | ✓ | | | | |
| | | 10 Rectifier | 3470-0106 | | | | ✓ | ✓ | ✓ | | | | |
| | | 11E & 11T | 3470-0126 | | | | ✓ | ✓ | ✓ | | | | |
| | | 11D Inverter | 3470-0130 | | | | ✓ | ✓ | ✓ | | | | |
| | | 11 Rectifier | 3470-0123 | | | | ✓ | ✓ | ✓ | | | | |

| | | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line reactor | | 9E (400 V) | 7022-0063 | ✓ | ✓ | | | | | | | | |
| | | 9E (200 V/400 V) | 4401-0181 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 9E (575 V/600 V) | 4401-0183 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 10 (200 V/400 V) | 4401-0182 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 10 (575 V/600 V) | 4401-0184 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 11 (400 V) | 4401-0259 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 11 (575 V/600 V) | 4401-0261 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| Finger Guard Grommet | | 9A / 9E | 3470-0107 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 9 & 10 | 3470-0107 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Lifting Tool | | 8 & 9A | 3470-0107 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 9A | 7778-0045 | ✓ | ✓ | | | | | | | | |
| | | 9E | 7778-0016 | ✓ | ✓ | | | | | | | | |
| | | 9E, 10 & 11 | 7778-0016 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Fan Replacement Kit | | 1 | 3470-0092 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 2 | 3470-0095 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 3 | 3470-0099 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 4 | 3470-0103 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 1 & 2 | 9500-1053 | | | | | | | | ✓ | | |
| | | 3 | 9500-1054 | | | | | | | | ✓ | | |
| Cable grommet kit | | 7 | 3470-0086 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 8 - Single cable | 3470-0089 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 8 - Dual cable | 3470-0090 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | | 9A, 9E, 10* & 11* (*M600/ M700 only) | 3470-0107 | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Tile mount kit | | 3 | 3470-0049 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 4 | 3470-0060 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 5 | 3470-0073 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| General kit items | | Keypad blanking cover (10 pieces in pack) | 3470-0058 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | Frame size 3 & 4 power connector split kit | 3470-0064 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | I/O commissioning extender adaptor | 3000-0009 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| Optional external EMC filters | All | 1 | 4200-1000 | ✓ | ✓ | | | | | | | | |

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| | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | | 4200-1001 | ✓ | ✓ | | | | | | | | |
| 100 V | 2 | 4200-2000 | ✓ | ✓ | | | | | | | | |
| 200 V | | 4200-2001 | ✓ | ✓ | | | | | | | | |
| | | 4200-2002 | ✓ | ✓ | | | | | | | | |
| | | 4200-2003 | ✓ | ✓ | | | | | | | | |
| | | 4200-2004 | ✓ | ✓ | | | | | | | | |
| 400 V | | 4200-2005 | ✓ | ✓ | | | | | | | | |
| | | 4200-2006 | ✓ | ✓ | | | | | | | | |
| 200 V | 3 | 4200-3000 | ✓ | ✓ | | | | | | | | |
| | | 4200-3001 | ✓ | ✓ | | | | | | | | |
| | | 4200-3004 | ✓ | ✓ | | | | | | | | |
| | | 4200-3005 | ✓ | ✓ | | | | | | | | |
| 400 V | | 4200-3008 | ✓ | ✓ | | | | | | | | |
| | | 4200-3009 | ✓ | ✓ | | | | | | | | |
| 200 V | 3 | 4200-3230 | | | | | | | ✓ | | | |
| 400 V | | 4200-3480 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V | 4 | 4200-4000 | ✓ | ✓ | | | | | | | | |
| | | 4200-4001 | ✓ | ✓ | | | | | | | | |
| | | 4200-4002 | ✓ | ✓ | | | | | | | | |
| | | 4200-4003 | ✓ | ✓ | | | | | | | | |
| 400 V | | 4200-4004 | ✓ | ✓ | | | | | | | | |
| | | 4200-4005 | ✓ | ✓ | | | | | | | | |
| 200 V | 4 | 4200-0272 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 400 V | | 4200-0252 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V | 5 | 4200-0312 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 400 V | | 4200-0402 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V | | 4200-0122 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 400 V | 6 | 4200-2300 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V & 400 V | | 4200-4800 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 575 V & 690 V | | 4200-3690 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V & 400 V | 7 | 4200-1132 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 575 V & 690 V | | 4200-0672 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V & 400 V | 8 | 4200-1972 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 575 V & 690 V | | 4200-1662 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V & 400 V | 9A | 4200-3021 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | | |
| 575 V & 690 V | | 4200-1660 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 200 V & 400 V | 9E & 10 | 4200-4460 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| 575 V & 690 V | | 4200-2210 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | 11 | 4200-0400 | | | | ✓ | ✓ | ✓ | ✓ | | | |
| | | 4200-0690 | | | | ✓ | ✓ | ✓ | ✓ | | | |

Unidrive M built-in EMC filter complies with EN 61800-3. External EMC filters are required for compliance with EN 61000-6-4.

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| Frame 12 Kits and Accessories ordering information | Frame Size | Part No. | Commander C200 | Commander C300 | Unidrive M400 | Unidrive M600 | Unidrive M700 | Elevator Drive E300 | Pump Drive F600 | Digitax HD | Digitax SF | Mentor MP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input wiring kit | | 6772-0006 | | | | ✓ | ✓ | | | | | |
| Output wiring kit | | 6772-0007 | | | | ✓ | ✓ | | | | | |
| Earthing kit | | 6772-0008 | | | | ✓ | ✓ | | | | | |
| Cubicle fitting kit | | 6772-0009 | | | | ✓ | ✓ | | | | | |
| | | 6772-0010 | | | | ✓ | ✓ | | | | | |
| Pallet truck lifting kit and ramp | | 6500-0150 | | | | ✓ | ✓ | | | | | |
| Fixed ramp | | 6500-0151 | | | | ✓ | ✓ | | | | | |
| | | 6500-0158 | | | | ✓ | ✓ | | | | | |
| Pallet truck lifting and ramp | | 6500-0159 | | | | ✓ | ✓ | | | | | |
| External EMC filter (All 3 models) | | FN 3311-1000-99-C16-R55 Shaffner | | | | ✓ | ✓ | | | | | |
| | | HLD 103-500/1000 Block | | | | ✓ | ✓ | | | | | |

## Digitax Only

| Optional Drives Programming and Operator Interface | | Part No. | Digitax HD |
|---|---|---|---|
| Multi-axis Kit (standard – without SI-Option Mounting Kit fitted) |  | 9500-1047 | ✓ |
| Multi-axis Kit (with SI-Option Mounting Kit fitted) | | 9500-1048 | ✓ |
| External Cable Grommet Kit up to 6mm² |  | 3470-0145 | ✓ |
| Multi-axis Kit (with SI-Option Mounting Kit fitted) |  | 9500-1050 | ✓ |
| KI-Compact 485 Adaptor |  | 82700000020300 | ✓ |
| Input Line Choke |  | 4401-0236 | ✓ |
| Frame 1 Rear Ultraflow™ Vent Kit |  | 3470-0158 | ✓ |
| Frame 2/3 Rear Ultraflow™ Vent Kit | | 3470-0181 | ✓ |
| Retrofit Kit – Epsilon 202-206 |  | 3470-0185 | ✓ |
| Retrofit Kit – Epsilon 209-216 | | 3470-0184 | ✓ |
| Retrofit Kit – Digitax ST/SP0 | | 3470-0182 | ✓ |
| Retrofit Kit – M'Ax | | 3470-0183 | ✓ |
| Drive - Mountable Brake Resistor | | | |
| Compact Brake Resistor Kit – 50 W, 70 Ω |  | 9500-1049 | ✓ |
| External Brake Resistor | | | ✓ |
| External Brake Resistor – DBR 100 W, 20 Ω |  | 1220-2201 | ✓ |
| External Brake Resistor – DBR 100 W, 40 Ω | | 1220-2401 | ✓ |
| External Brake Resistor – DBR 100 W, 80 Ω | | 1220-2801 | ✓ |
| Encoder Breakout Kit | | 8270000020200 | ✓ |
| SI-Option Mounting Kit |  | 9500-1055 | ✓ |





| | | | |
|---|---|---|---|
| DC bus conn. kit - Unidrive M fr03 (panel mount) |  | 3470-0146 | ✓ |
| DC bus conn. kit - Unidrive M fr03 (through mount) |  | 3470-0147 | ✓ |
| DC bus conn. kit - Unidrive M fr06 (panel mount) |  | 3470-0148 | ✓ |
| DC bus conn. kit - Unidrive M fr06 (through mount) |  | 3470-0149 | ✓ |

| Digitax HD EMC Filters | Voltage | Model (M75X-...) | Order Code | Digitax HD |
|---|---|---|---|---|
| | 200 V | 1200022 | 4200-3503 | ✓ |
| | | 1200040 | 4200-3503 | ✓ |
| | | 1200065 | | ✓ |
| | | 2200090 | 4200-5033 | ✓ |
| | | 2200120 | | ✓ |
| | | 3200160 | 4200-6034 | ✓ |
| | | 1200022 | 4200-8744 | ✓ |
| | | 1200040 | 4200-6002 | ✓ |
| | | 1200065 | 4200-6001 | ✓ |
| | | 2200090 | 4200-5833 | ✓ |
| | | 2200120 | 4200-5833 | ✓ |
| | | 3200160 | 4200-5833 | ✓ |
| | 400 V | 01400015 to 01400042 | 4200-8744 | ✓ |
| | | 02400060 to 02400105 | 4200-1644 | ✓ |
| | | 03400135 to 03400160 | 4200-5833 | ✓ |
| | | * Multi-axis up to 46 A | 4200-0033 | ✓ |
| | | * Multi-axis up to 60.2 A | 4200-5534 | ✓ |
| | | * Multi-axis up to 82.2 A | 4200-7534 | ✓ |
| | | * Multi-axis up to 109.5 A | 4200-0035 | ✓ |

| Digitax SF EMC Filters | Voltage | Model (M75X-...) | Order Code | Digitax SF |
|---|---|---|---|---|
| | Rated Voltage (V): 250 Vac | | 4200-0056 | ✓ |
| | | | 4200-3106 | ✓ |

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## Mentor MP Only

| SM Option Modules | | Mentor MP |
|---|---|---|
| **Machine Control** | | |
| SM-Applications Lite V2 | 82000000014100 | ✓ |
| SM-Applications Plus | 82000000014000 | ✓ |
| SM-Register | 82000000015000 | ✓ |
| **Communications** | | |
| SM-EtherNet | 82000000013200 | ✓ |
| SM-PROFINET | 82000000015800 | ✓ |
| SM-EtherCAT | 82000000014900 | ✓ |
| SM-CANopen | 82000000012000 | ✓ |
| SM-Profibus DP-V1 | 82000000011000 | ✓ |
| SM-DeviceNet | 82000000011100 | ✓ |
| SM-Interbus | 500 kBd: 82000000011600<br>2MBd: 82000000015200 | ✓ |
| **Feedback** | | |
| SM-Encoder Plus | 82000000011700 | ✓ |
| SM-Universal Encoder Plus | 82000000011310 | ✓ |
| SM-Encoder Output Plus | 82000000013900 | ✓ |
| **Additional I/O** | | |
| SM-I/O 32 | 82000000014700 | ✓ |
| SM-I/O Plus | 82000000011200 | ✓ |
| SM-I/O Lite | 82100000012500 | ✓ |
| SM-I/O Timer | 82100000012600 | ✓ |
| SM-I/O 120 V | 82000000013300 | ✓ |
| SM-PELV | 82000000012900 | ✓ |

# CERTIFICATIONS

| | Description | Commander | | Unidrive | | | | | Digitax | | | | Elevator | Pump | Mentor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C200 | C300 | M600 | M700 | M701 | M702 | M400 | M750 | M751 | M753 | Digitax SF | | | |
| | RCM - Australia and New Zealand:<br>RCM Marking ensures the safety and performance of telecoms, electrical, and wireless devices. By placing an RCM Mark on products and equipment, manufacturers certify that their devices meet all applicable standards required for product safety and performance. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| CE | A CE Mark is a symbol that must be affixed to many products before they can be sold on the European market. The mark indicates that a product: Fulfills the requirements of relevant European product directives. Meets all the requirements of the relevant recognized European harmonized performance and safety standards. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| c UL us LISTED | The UL Listed seal means that the product has been tested by UL to nationally recognized safety and sustainability standards. Additionally, it has been found to be free from a reasonably foreseeable risk of fire, electric shock in a Division 2 environment. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| EAC | Russian Customs Union:<br>The Eurasian Conformity mark (EAC, Russian: Евразийское соответствие (EAC) is a certification mark to indicate products that conform to all technical regulations of the Eurasian Customs Union. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 2 YEAR FREE WARRANTY | 2 Year Warranty<br>All products except Commander and Pump drives. | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● |
| 5 YEAR FREE WARRANTY | 5 Year Warranty<br>Commander and Pump drives only. | ● | ● | | | | | | | | | | | ● | |
| DNV GL | DNV GL is the world's leading classification society and a recognized advisor for the maritime industry. We enhance safety, quality, energy efficiency to make the maritime industry safer, smarter and greener. | Pending | | ● | ● | ● | ● | | | | | | | Pending | |
| SIL | SIL is a relative level of risk reduction provided by a safety function. SIL ratings correlate to frequency and severity of hazards. They determine the performance required to maintain and achieve safety — and the probability of failure. | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | |
| TÜVRheinland® Precisely Right. | A TUV certification means a sampling of the product has been tested for safety and found to meet the minimum requirements of the German Equipment and Product Safety Act. | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | |
| c US | This is the switch standard for Canada designed to go into other low voltage (below 600V) appliances. This standard is equivalent to the CSA mark. This receive the “cUR Mark” or if combined with a USA approval, the “cURus Mark” | | | | | | | | | | | ● | | | |
| KC | The KC (Korea Certification) mark signifies compliance with Korea’s product safety requirements for electrical and electronic equipment and is issued by Korea-based certification bodies that have been approved by the Korea Standards Association. Manufacturers and distributors of electronic goods may apply a KC mark to their goods once they have completed the standard procedure. | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | | | ● |
| PLe | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | |
| UK CA | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

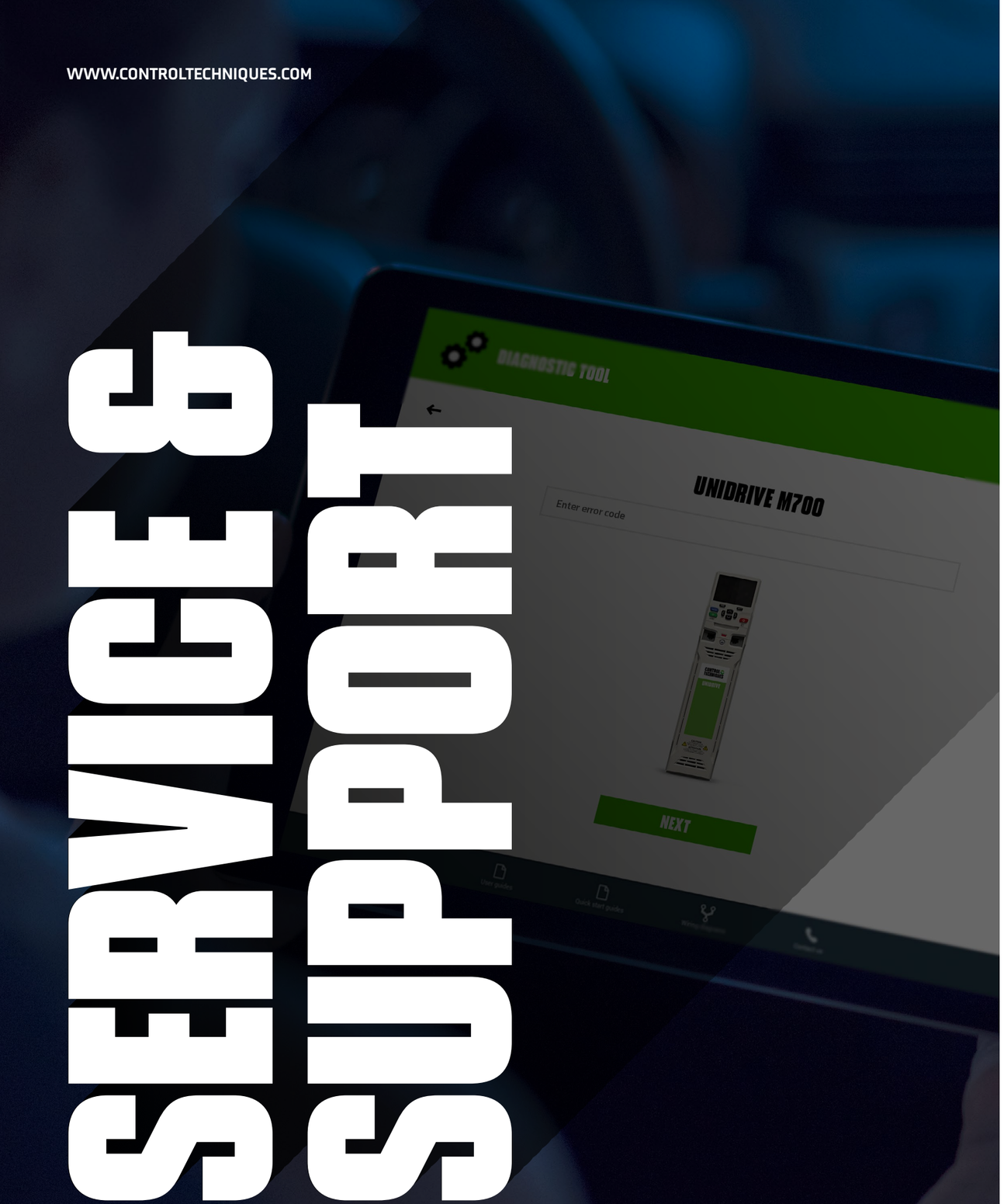


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# STANDARDS

| | Commander | | Unidrive | | Unidrive | | | Digitax | | | | Elevator | Pump | Mentor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C200 | C300 | M600 | M700 | M701 | M702 | M400 | M750 | M751 | M753 | Digitax SF | | | |
| EtherNet/IP | | | | • | | • | | • | | | | | | |
| PROFINET® | | | | • | | • | | • | | | | | | |
| Modbus | | | • | • | • | • | | • | • | | | • | • | • |
| EtherCAT® | | | | | | | | | | • | | | | |
| RTMoE | | | | • | | • | | • | | | | | | |




# SERVICE & SUPPORT





Control Techniques' 94 subsidiary Drive Centers and Resellers offer customers **local technical sales, service and design expertise; many also offer a comprehensive system design and build service including local and bespoke training courses.**

### Technical Support

Our global Drive Centre and Distributor network offers local technical support. Find your local support location.
**www.controltechniques.com**

### Drive Set-up

FREE DOWNLOAD

Everything you need for quick and easy installation in our free-to-access online guides:
**www.drive-setup.com**

### Diagnostic Tool

FREE DOWNLOAD

Quickly solve any error codes that the drive may show. Download:
**controltechniques.com/mobile-applications**

Get it from Microsoft | Download on the App Store | GET IT ON Google Play

***For Microsoft users, please note that this mobile app operates with Windows 10 only.**

### 5 Year Warranty

5 YEAR FREE WARRANTY

Guaranteed for products listed below:

- Commander C / Commander S
- Pump Drive F600 / HVAC Drive H300

**Warranty terms and conditions apply.**

### Technical Documentation

Product support downloads including user guides, software, firmware etc.

### Services & Repairs

Our certified Service and Repair Centers have extensive product knowledge and provide a prompt, professional, guaranteed repair service.

### Drive Systems

Fully designed, built & commissioned automation systems for your drive applications.

### Training

Control Techniques Global Training Centers offer a unique program of drive, servo and software training solutions.

### Commander C Virtual Demo

The Commander C Virtual Demo Tool provides a safe and accessible first experience with Commander C variable speed drives and allows you to get familiar with the Commander C keypad and menu structure.

# TECHNICAL SUPPORT

**Whatever your technical question, we have the tools and teams to support you. Access professionally qualified engineers with many years of product knowledge and field experience.**

Support Suite is our online tool with masses of technical information that you can access whenever you need to. You can submit enquires to the Control Techniques technical support network and share enquires within your own organisation. These can be prioritised for a fast response.

It also gives you access to a vast amount of technical information and the Knowledge base Library, including product documentation, application notes, approvals and certifications, PC tools and web based diagnostics. You can receive automated e-mail updates relating to products and documentation, and Support Suite can also be configured in your local language.

Or speak to a drive obsessive. If you can't find the information online, your local Drive Centre or the Global Technical Support team are on hand to help.

We can guarantee a fast, accurate response to your enquiry in your local language and time zone.

**controltechniques.com/academy**



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# DRIVE SET-UP

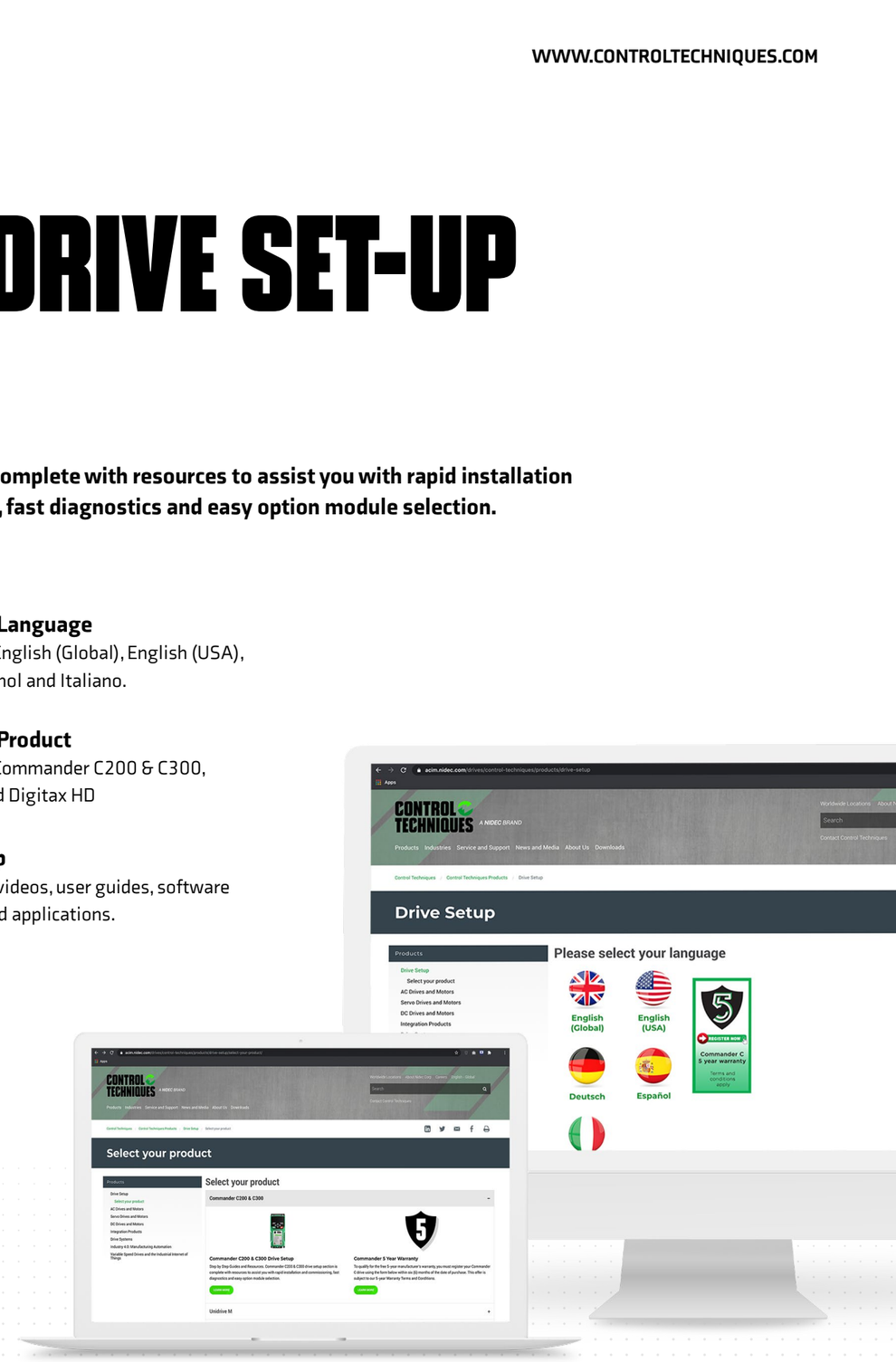
**Our drive set-up is complete with resources to assist you with rapid installation and commissioning, fast diagnostics and easy option module selection.**

**How it works:**

1. **Select your Language**
   Choose from English (Global), English (USA), Deutsch, Espanol and Italiano.

2. **Select your Product**
   Choose from Commander C200 & C300, Unidrive M and Digitax HD

3. **Step by Step**
   Get access to videos, user guides, software downloads and applications.



# DIAGNOSTIC TOOL

**Diagnostic Tool is a fast and simple tool, which allows users of Control Techniques' drives to quickly solve any error codes that the drive may show.**

Built within the app are easy to locate wiring diagrams for first time setup and fault finding with links to the relevant comprehensive manuals. The app also has full contact details of the technical support teams around the world to aid you with technical assistance.

## Download from the below app stores for free.

**Microsoft:**

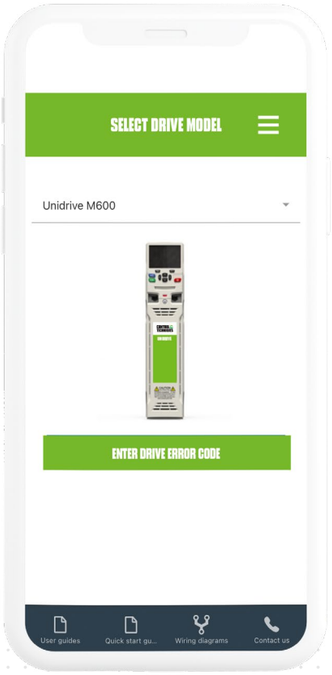
Get it from Microsoft

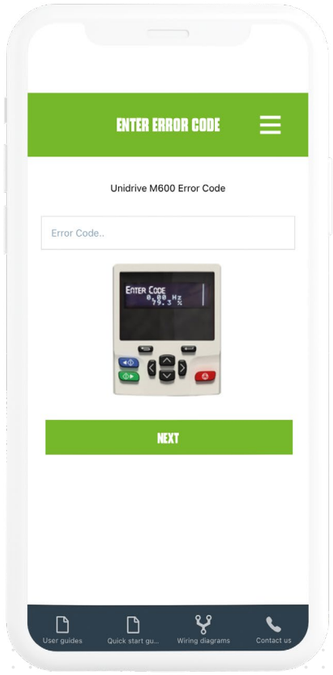
**Apple:**

Download on the App Store

**Google:**

GET IT ON Google Play




***For Microsoft users, please note that this mobile app operates with Windows 10 only.**





# 5 YEAR WARRANTY

**Control Techniques' free 5 year warranty is another testament of our exceptional track record for reliability and durability.**

With 5 years guarantee, rest assured your application will continue to run uninterrupted, giving an unbeatable total cost of ownership.

## Commander C

Our Commander C series is built to cope with harsh environments. In fact, it is so reliable we are confident enough to supply it with a free five-year warranty.

Now you can buy with the same confidence.

## Pump Drive F600

All F600s up to 55kW can register to extend the warranty from the standard two years to five at no extra cost.

For the past 45 years we have brought new technology and innovations to the world of automation. You can buy a F600 with confidence, safe in the knowledge that your purchase comes with the security a 5 year warranty offers.




**Warranty terms and conditions apply.**

# DOCUMENTATION

**You may want support throughout a project, or enjoy the peace of mind knowing someone is here to help if you need it.**

Our goal is to make it easy for you tap into specialist knowledge, helping to take some of the pressure off your design team.

Learn how Control Techniques drives and motors can help your business achieve energy savings and improve operating efficiency.

## Brochures:

- Product Portfolio
- High Performance Drives
- General Purpose Drives
- Specialist Drives
- DC Drives
- Servo Drives and Motors
- Integration Products

## User Guides and Software:

- Manuals
- Software
- Firmware
- Installation Guides
- 2D Drawings
- 3D Drawings
- Technical Data
























# SERVICES & REPAIRS

**Should you ever experience a Control Techniques drive failure, minimizing the impact on your plant is our main concern. High levels of performance and reliability are a feature of our product range but, occasionally, failures do occur. When this happens, help is at hand from our certified Service and Repair Centers.**

These centers have extensive product knowledge and provide a prompt, professional, guaranteed repair service. Contact our Service and Repair Centers for any Control Techniques products, including Unidrive M, Commander, Digitax and Mentor.

## Exceptional service

- All drive repairs carry a new 1-year parts and labour warranty on the work done.
- Fast turnaround is standard and even faster turnaround is available at a reasonable extra charge. In addition, our Service Centers carry stock for our major product lines of refurbished drives. These are usually available for immediate shipping and are exchanged for your failed product.
- The drives are returned in a clean state with any damaged components replaced, including plastics and metalwork.
- Each product has a fixed repair cost regardless of the fault. This allows us to tell you immediately what our service will cost and the processing time of your order.
- On request, and where possible, the repaired drive is returned with the same parameter configuration as the failed unit to allow you to get the machine operational as quickly as possible.

## Future reliability

- All useful specification upgrades are made to repaired drives enhancing performance and installed life time operation.
- Reliability is maintained with every aspect of the drives operation being checked.
- Only Control Techniques Engineering and Development certified components are used for repairs.
- Failure data feedback to Engineering and Development enhances future reliability.

## The environment

- Waste materials are recycled to reduce any harmful impact on the environment.

## Safety

- High voltage insulation testing ensures the continuing safe operation of the drive (2kV for a 400V product).
- High current earth bond test is completed on every unit.



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# DRIVE SYSTEMS

**Custom design, build and commissioning.**

Through our worldwide Automation Centers we have over 30 years' experience in providing complete solutions for thousands of applications from a control system for an automatic welder through to the complete line control in a paper, timber or steel mill.

## Range of services:

- Industry leading applications engineering experience
- In-house project design and management
- Comprehensive software development and engineering support
- Panel-building, installation and project commissioning
- First class service and support
- Worldwide network of Automation Centers for ongoing support of overseas contracts

- **Consultation and site meeting**
- **From Concept to ePlan**
- **Design**
- **Software services**
- **Communications**
- **Trouble-free operation with other manufacturers' equipment**
- **High-speed deterministic control**
- **Manufacturing**
- **Installation, commissioning & after sales support**

# TRAINING

**Control Techniques Global Training Centers offer a unique program of drive, servo and software training solutions.**

Train in a safe and dedicated environment with highly qualified and experienced trainers for a great mix of classroom and practical 'hands-on' learning experience. Most Automation Centers offer both standard and bespoke courses. To find out about training courses near you, locate your nearest Automation Center or Reseller.

## UK and Worldwide Training

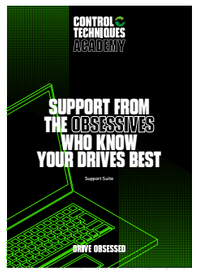
For UK training enquiries please contact the Control Techniques Academy:

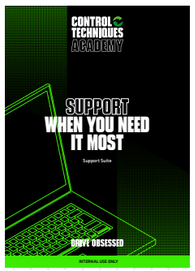
**Tel:** 01686 612900

**Fax:** 01686 612999

**Email:** controltechniques.academy@mail.nidec.com

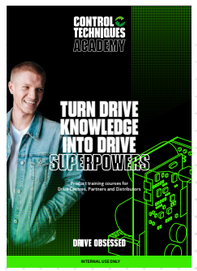
## Training Flyers:














# VIRTUAL DEMO

**The Commander C Virtual Demo Tool provides a safe and accessible first experience with Commander C variable speed drives and allows you to get familiar with the Commander C keypad and menu structure.**

This digital replica of a Commander C drive, motor and control allows you to use the virtual keypad to set-up the drive parameters for commissioning just like in a real situation. Once the key parameters have been set, the drive can be enabled and the motor shaft will spin.

To see just how easy it is to set-up the drive, visit: **virtualdemo.controltechniques.com**

Scan here to see how the drive is set up



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# DRIVE CENTRES

### Australia
**Nidec Industrial Automation Australia Pty Ltd**
ABN 12 003 815 281, 16 - 18 Tucks Road, Seven Hills NSW 2147

### Belgium
**Nidec Industrial Automation Belgium NV**
Blarenberglaan A23/bus1, Industriepark Noord, Mechelen 2800

### Canada
**Control Techniques & KB Electronics Canada - a division of Nidec Industrial Automation**
Canadian Sales Office, Unit 1, 752 Cochrane Drive, Markham, ON L3R 8E1

### China
**Control Techniques, Leroy Somer Electro - Technique (Fuzhou) Co., Ltd. Beijing Branch**
1st Floor Machinery Building, EVOC Science & Technology Park, No. 11 West Gaoxin Road, Guangming District, Shenzhen 518000

### Czech Republic
**Control Techniques Brno s.r.o.**
Podnikatelska 2b, CZ 61200, Brno

### Germany (including Austria)
**Control Techniques GmbH**
Meysstrasse 20, Hennef D-53773

### India
**Control Techniques India Private Limited**
117B Developed Plot Industrial Estate, Perungudi, Chennai, Tamilnadu 600 096

### Italy
**Nidec Industrial Automation Italy SpA**
Via Idiomi 3/6, Assago, MI 20090

### Korea
**Nidec Korea Corporation - Seongnam Sales Office**
Room 1101, 11th Floor, Sicox Tower - (Sangdaewon-dong), 484, Dunchon-daero, Jungwon-gu, Seongnam 13229

### Malaysia
**Nidec Precision Malaysia Sdn Bhd**
C/O Control Techniques - Leroy Somer, 11.08, Amcorp Tower 18, Persiaran Barat, 46050 Petaling Jaya, Selangor 46050

### Netherlands
**Nidec Netherlands B.V.**
Kubus 155, 3364 DG, Sliedrecht

### Philippines
**Nidec Motor Philippines Corporation**
9F North Tower Rockwell Business Center Sheridan, Sheridan Corner United Street, Mandaluyong City 1550

### Poland
**Nidec Industrial Automation Poland**
ul. Baltycka 6, Poznań, 61-014

### Romania
**Nidec Oradea**
20 Petre P. Carp Street, Oradea 410605

### Singapore
**Control Techniques Singapore Pte Ltd**
36 Lok Yang Way 628641

### South Africa
**Nidec Industrial Automation Southern Africa (Pty) Ltd**
Stand 331& 333, Corner Olympic Duel and Angus Cresent, Northlands Business Park, Newmarket Street, Northriding, Johanesburg 2162

### Spain
**Nidec Industrial Automation Iberia, S.A. (Barcelona AC)**
Pol Ind Pedrosa, Carrer Primer de Maig, 41, Entrada Almacen por C/Rafael Barradas 1 L'Hospitalet de Llobregat, Barcelona 8908

### Switzerland
**Control Techniques AG**
Lindächerstrasse 1, Birmenstorf CH-5413

### Taiwan
**Nidec Taiwan Corporation**
Room 1001, 10F, No 88, Sec 2, ZhongXiao E. Rd, Taipei 10050

### Thailand
**Nidec (Thailand) Co Ltd**
200 Moo 4, Jasmine International Tower, 26th Floor, Unit 2601, Chaengwatana Road, Pakkred, Nonthaburi 11120

### Turkey
**Control Techniques A.Ş.**
İçerenköy Mah. Topçu İbrahim Sk. No:13 K:2 34752, Ataşehir, Istanbul

### United Kingdom
**Nidec Industrial Automation UK Ltd**
Stafford Park 4, Telford TF3 3BA

### USA
**Control Techniques - a Nidec Motor Corporation business**
Americas Headquarters, 12095 NW 39th Street, Coral Springs, FL 33065

Sales Office, 7777 Golden Triangle Drive, Suite 250, Eden Prairie, MN 55344

# FAQS





## GENERAL

| Question | Answer |
|---|---|
| **What are Electric Drives?** | "In the Industrial and Commercial sectors, electric drives are devices that are connected to fixed electrical supply systems and provide variable electric power supplies for electric motor control.<br><br>Different electric drives are available to control different electric motor types such as DC motors, AC induction motors and AC permanent motors. Some electric drives can be applied to more than one type of motor." |
| **What are VFD Packaged Solutions?** | "Packaged drive solutions are electric drives mounted in industrial enclosures and are typically high power and available with a range of power and control accessories including HMIs, line reactors, fuse protection and cooling systems.<br><br>These large packaged AC drives are typically pre-engineered and configurable and provide robust and reliable solutions for motor control applications." |
| **What is a VFD?** | "A variable frequency drive or VFD is an electronic controller used to vary the frequency applied to an AC motor in order to control the motor speed. Other names for such devices include variable speed drive or VSD, adjustable speed drive or ASD and inverter.<br><br>VFDs are commonly used in automation systems and for machine control and productivity and in building automation systems for energy savings." |
| **What is an AC Drive?** | "An AC Drive is a device that is used to control the speed of an AC motor. AC drives range from variable frequency drives for basic speed control to closed loop vector drives for precision speed and torque control.<br><br>AC drives are available with a wide range of control, feedback and networking options. Working with a trusted drive specialist is the best way to select the optimum drive for your application." |
| **What is Motor Control?** | "Motor control refers to devices that are used to control the torque, speed or position of an electric motor. Examples of electronic motor controls are soft starters that limit the electrical and mechanical shock applied to a system when an AC motor is started and VFDs and servo drives that control motor speed and position across the working design range of the motor.<br><br>It is important that the motor and motor controls are matched for long term reliable operation." |
| **What is a DC Drive?** | "A DC drive is an electronic controller used to vary the voltage and current applied to a DC motor in order to control the motor speed and torque. Other names for such devices include variable speed drive or VSD, adjustable speed drive or ASD.<br><br>DC Drives are not commonly used in modern automation systems today but can be found in older machines." |
| **What is a motion controller?** | "The term motion control is commonly used to describe machinery where the position of the machine parts are controlled. Motion controllers can be in the form of standalone electronic hardware devices or embedded in PLCs (Programmable Logic Controllers), PCs or drives.<br><br>Servo drives and motors are most commonly used in these applications but AC drives and motors can also be used depending on the machine type." |
| **What is a servo drive?** | A servo drive is an electronic controller used to precisely control the torque, speed and position of a servo motor or actuator in motion control applications. The term servo amplifiers is also used. Most servo drive systems include motor feedback devices that the servo drive uses to continuously vary its output to meet the machine demands. |
| **What is a servo motor?** | A servo motor is a type of permanent magnet motor used most commonly in motion control positioning applications. Compared to standard AC induction motors servo motors are typically smaller and lighter and can be controlled for highly dynamic and high precision applications. Most servo motors are supplied with a feedback device for closed loop speed and position control systems. |

# COMMANDER C

| Question | Answer |
|---|---|
| **General Topics** | |
| **How do I clear the Digital Output Overload (O.Ld1) fault on my Commander C200/C300 drive?** | Reduce the total load on digital output (DO) and the 24VDC terminal rail to below 100 mA. Check for incorrect wiring and damages or re evaluated the loads that are supported from the digital outputs. |
| **How can I change the direction of my motor running in open loop from a drive?** | "To change the direction of the motor by phase output (where you want to change the positive direction of the motor), with the drive powered down do either:<br>1. Swap the installation location of 2 of the motor leads at the drive output terminal.<br>2. Set Pr. 5.042 to ""On"" to reverse the output phase sequence.<br>To change the direction of the motor where you want the drive to run in the opposite direction (reversing) on command, you can do any of the following:<br>1. Change the digital input destination that is running the drive from ""Run Forward (Pr 6.030)"" to ""Run Reverse (Pr 6.032)"".<br>2. If controlling from a fieldbus with the control word, use Bit 3 instead of Bit 1 to issue the run command." |
| **What is a PH.LO trip on my drive? How can I check what is causing it?** | "The Ph.Lo fault is an indication of an input phase loss or large supply imbalance.<br>Check phase to phase, phase to ground and do the same on the output side to see if one or more phases are dipping right before the drive trips compared to the other two legs. Also, measure the DC Bus Link (between: DC+ and DC- when meter is set for an AC mode) to confirm if there is a significant ripple input/output voltage imbalance." |
| **What are the best ways to troubleshoot an OV trip on a Commander drive, and what does this mean?** | DC bus voltage has exceeded the peak level or maximum continuous level for 15 seconds. The OV trip indicates that the DC bus voltage has exceeeded the maximum limit. Possible solutions:<br>Increase Deceleration Rate (Pr 04)<br>Decrease the braking resistor value (staying above the minimum value)<br>Check norminal AC supply level<br>Check for supply disturbances which could cause the DC bus to rise<br>Check motor insulation using insulation tester |
| **What are the best ways to troubleshoot an OIAC trip on a Commander drive, and what does this mean?** | Instances output over current detected.<br>The instantaneous drive output current has exceeded the set limit. Possible solutions:<br>Increase acceleration/deceleration rate<br>If seen during autotune reduce the voltage boost<br>Check for short circuit on the output cabling<br>Check integrity of the motor insulation using an insulation tester<br>Reduce the values in the current loop gain parameters. |
| **How do I use the AI-Backup adapter with an SD card to transfer parameter sets between Commander drives?** | NV Media Card Operation<br>**Installing the AI-Backup Adaptor (SD Card):**<br>1. Identify the two plastic fingers on the underside of the AI-Backup adaptor (1) - then insert the two fingers into corresponding slots in the spring-loaded sliding cover on the top of the drive.<br>2. Hold the adaptor firmly and push the spring-loaded protective cover towards the back of the drive to expose the connector block (2) below.<br>Press the adaptor downwards (3) until the adaptor connector locates into the drive connection below.<br>**Basic NV Media Card Operation:**<br>The whole card may be protected from writing or erasing the setting that read-only flag, refer to the Control User Guide for further information. The card should not be removed during data transfer, as the drive will produce a trip. If this occurs then either the transfer should be reattempted or in the case of a card to drive transfer, defalt parameters should be loaded.<br>**Note:** The drive suports SD cards formatted with the FAT32 file system only. |



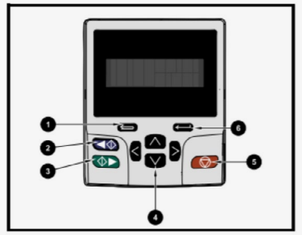


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| **How do I remove the drive terminal cover from a C200/C300?** | Using a flat bladed screwdriver, turn the terminal cover locking anti-clockwise by approximately 30 degrees, and then pull the cover off, starting on the top edge.<br>1. Using a flat bladed screwdriver, turn the terminal cover locking clip anti-clockwise by approximately 30°.<br>2. Slide the terminal cover down.<br>3. Remove terminal cover in direction shown. |
| **What is an "rS" trip, and how do I clear it?** | This typically means that resistance in the motor stator is likely more than recommended for this drive. This can be solved by using a more suitable motor, or by changing the drive into "Fixed" mode by setting Pr. 0.041 to "FD" and 0.042 to 1.0 . |
| **How do I clear the "INH" or "INHIBIT" message on my Commander keypad?** | Make sure the Drive enable terminal ( T11) on C200 (or M100-M200) or the Safe Torque OFF inputs on the C300 (M300-M400) drive are energized with a 24VDC supply from T9 or T17, or an external 24VDC supply that shares a same common reference with the drive IO. |
| **How do I configure S Ramps in my Unidrive M or Commander C drive to control jerk and acceleration?** | https://youtu.be/A6sGH5GPMp8 |
| **How do I configure the Unidrive M or Commander C relay contacts?** | https://youtu.be/n2r3bBZpePQ |
| **How do I configure the onboard PID controller in Menu 14 of my drive?** | https://youtu.be/2N-rNWNrU_U |
| **Using the Drive Keypad** | |
| **What do I do if my remote keypad is stuck displaying "Initializing"?** | "For a remote keypad to work, first the serial port communication parameters must be modified so that the remote keypad can access the drive parameters. This can be done by a drive mounted keypad or through Connect software. Make the following parameter changes, and then save them to the drive:<br>1. Pr. 11.023 (Serial Address) = 1<br>2. Pr. 11.024 (Serial Mode) = "8 1 NP M" or (5)<br>3. Pr. 11.025 (Baud Rate) = "115200" or (10)<br>4. Pr. 11.020 (Reset Comms)" |
| **How do I change the status parameter on the drive keypad that displays during normal operation?** | "Use the status mode parameters 11.018 and 11.019 to setup a display readout by changing their value pointers.<br>For example, if you want to have the drive keypad to display RPM speed value, then you will set Pr. 11.018 to 5.004, then SAVE parameters." |
| **How do I save my parameter set to my drive from the keypad?** | Saving Parameters<br>When changing a parameter in Menu 0, the new value is saved when pressing the Enter button to return to parameter mode from parameter edit mode.<br>If parameters have been changed in the advanced menus, then the change will not be saved automatically. A save function must be carried out.<br>Procedure<br>1. Select 'Save' in Pr 00 or Pr mm.000 (alternativel enter a value 1001 in Pr 00 or Pr mm.000).<br>2. Either:<br>Press the red reset button.<br>Carry out a drive reset through serial communications by setting Pr 10.038 to 100. |
| **How can I setup my C300 defaults the match the defaults of my old M300 from the keypad?** | https://youtu.be/lq3u-i7GdT8 |
| **How do I migrate from an M300 to a C300 using an SD card?** | https://youtu.be/YZc0n0vMB6c |

| Quick Start | |
|---|---|
| I just received my first Unidrive M400, how do I get it running with my motor? | https://youtu.be/jRVi20bQ90k |
| I just received my first Unidrive M300, how do I get it running with my motor? | https://youtu.be/rEqJjvG48EY |
| I just received my first Unidrive M200, how do I get it running with my motor? | https://youtu.be/ZKhVcH9hN7E |
| How do I configure the digital IO on my Unidrive M or Commander C drive? | https://youtu.be/d9OjecE2zYw |
| I just received my first C200, how do I get it running with my motor? | https://youtu.be/QzQacmfRQJI<br>https://youtu.be/BEi29-ILzu8 |
| I just received my first C300, how do I get it running with my motor? | https://youtu.be/mnZo15UksCo<br>https://youtu.be/laQTufDIUPc |
| **Drive Software** | |
| How can I transition my M300 drive to a C300 drive using Connect software? | https://youtu.be/8A-8LfbNKY0 |

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# UNIDRIVE M700

| Question | Answer |
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| **General Topics** | |
| How do I use the buttons on a KI Keypad, and what are the symbols that appear on the display? | <br>1. Escape button<br>2. Start reverse (Auxiliary button)<br>3. Start forward<br>4. Navigation keys (x4)<br>5. Stop/Reset (red) button<br>6. Enter Button<br>**NOTE:** The red stop button is also used to reset the drive. |
| **What kind of torque performance can I expect from my Unidrive M700 in Open Loop mode?** | Open loop mode<br>The drive applies power to the motor frequencies varied by the user. The motor speed is a result of the output frequency of the drive and slip due to the mechanical load. The drive can improve the speed control of the motor by applying the slip compensation. The performance at low speed depends on whether V/F mode or open loop vector mode is selected.<br>Open loop vector mode<br>The voltage applied to the motor is directly proportional to the frequency except at low speed where the drive uses motor parameters to apply the correct voltage to keep the flux constant under varying load conditions.<br>Fixed V/F mode<br>The voltage applied to the motor is directly proportional to the frequency except at low speed where the voltage boost is provided which is set by the user. This mode can be used for multi-motor applications.<br>Typically 100% torque is available down to 4 Hz for a Hz motor.<br>Quadratic V/F mode<br>The voltage applied to the motor is directly proportional to the square of the frequency except at low speed where the voltage boost is provided which is set by the user. The mode can be used for running fan or pump applications with quadratic load characteristics or for multi-motor applications. This mode is not suitable for applications requiring a high starting torque. |
| **Is it possible to program or setup a drive parameter file without line voltage on the drive?** | Yes, you can apply a 24 VDC power to the drive to power the drive processor (please see user manual for the specific drive). This will allow you to save parameters and files from the drive in the event of a power stage failure, or so that the drive can be programmed before it is installed in the equipment panel. |

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| **What is the difference between RFC-A and RFC-S mode on my Unidrive M700?** | "RFC-A mode stands for ""Rotor Flux Control Asynchronous"" mode, and is used to control AC induction motors. Using RFC-A mode in ""sensorless"" control means that the drive is reading the rotor speed from the EMF on the rotor itself to do closed loop control. Using RFC-A mode in ""closed loop"" or ""vector control"" typically means that the the drive is using a physical speed feedback device to perform closed loop control.<br>RFC-S mode stands for ""Rotor Flux Control Synchronous"" mode, and is used to control AC servo motors with permanent magnet rotors (power factor of ""1""). Using RFC-S mode in ""sensorless"" control means that the drive is reading the rotor speed from the EMF on the magnets on the rotor itself to do closed loop control. Using RFC-S mode in ""closed loop"" means that the drive is using a physical speed feedback device to perform closed loop control, along with hall sensors to determine proper commutation." |
| **How do I troubleshoot at Over Voltage (OV) trip on my Unidrive M?** | "This trip is generated when the DC Bus Voltage level rises above a set level. Generally, this trip occurs when a "overhauling load", or high-inertia condition exists during deceleration. In basic terms, the motor is converting mechanical energy into electricity, or acting like a generator. This energy must have somewhere to go, which is usually back into the drives DC Bus circuit.<br>There are several ways to prevent this depending on the severity of the mechanical load on the motor, (adjusting Regeneration Current limit, dynamic braking resistor or using a regenerative drive or add-on module). General troubleshooting steps:<br>Parameter 2.004 is set to "Standard" without a DBR.<br>Parameter 2.004 is set to "Fast" if a DBR is being used.<br>Increasing the Deceleration rate in Parameter 2.021<br>Tuning the current gains in Parameters 4.013 & 4.014 to higher values (i.e. doubled from the autotune)<br>Checking the DBR parameter settings<br>Determine if DBR is sized properly" |
| **I am getting a "Brake R Too Hot" trip on my drive, but I am not using a braking resistor. How do I clear this trip?** | If you do not have a brake resistor physically wired to the drive set Pr. 10.030, Pr. 10.031 and Pr. 10.061 all to "0". This will disable the braking resistor thermal modelling which in turn will disable the Brake R Too Hot trip. |
| **Quick Start** | |
| **How do I default my Undirive M700 back to it's factory parameter defaults?** | Restoring parameter defaults<br>Restoring parameter defaults by this method saves the default values in the drives memory. User security status (00.049) and User security code (00.034) are not affected by this procedure).<br>Procedure<br>1. Ensure the drive is not enabled, i.e. terminal 31 is open or Pr 06.015 is OFF (0)<br>2. Select 'Reset 50 Hz Defs' or 'Reset 60 Hz Defs' in Pr mm.000. (alternatively, enter 1233 (50 Hz settings) or 1244 (60 Hz settings) in Pr mm.000).<br>3. Either:<br>Press the red reset button<br>Toggle the reset digital input<br>Carry out a drive reset through communications interface by setting Pr 10.038 to 100. |



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| **How do I change the operating mode on my Unidrive M700?** | Changing the operating mode returns all parameters to their default value, including the motor parameters. User security status (00.049) and User Security code (00.034) are not affected by this procedure.<br>Procedure<br>1. Use the following procedure only if the drive is not enabled. i.e. terminal 31 is open or Pr 06.015 is OFF (0)<br>2. Enter either the following values in Pr mm.000, as appropriate: 1253 (50 Hz AC supply frequency) or 1254 (60 Hz AC supply frequency)<br>3. Change the setting Pr 00.048.<br>4. Either:<br>Press the red reset button<br>Toggle the reset digital input<br>Carry out a drive reset through the communications interface by setting Pr 10.0378 to 100.<br>**NOTE:** Entering 1253 or 1254 in Pr mm.000 will only load defaults if the setting or Pr 00.048 has been changed. |
| **Communications** | |
| **What is the difference between a Unidrive M700 and an M701?** | On a Unidrive M700, the communication ports below the keypad are Ethernet communication ports, supporting Modbus TCP and Ethernet IO. On a Undirive M701, the communication ports below the keypad are RS485 serial communication ports, supporting Modbus RTU. |

# DIGITAX HD

| Question | Answer |
|---|---|
| **General Topics** | |
| **Where can I find Add On Instructions (AOI's) for PLC Controlled Motion for Digitax HD for my PLC?** | All of these can be found at our website at the following link:<br>PLC Controlled Motion Downloads:<br>https://acim.nidec.com/en-us/drives/control-techniques/products/integration-products/plc-controlled-motion |
| **What is the difference between a Digitax HD and a Unidrive M750, M751, and M753?** | The Digitax HD is the newest and highest performing servo drive that Control Techniques has to offer. It is offered in 3 derivatives, noted by the M750, M751, and M753.<br>The M751 offers onboard serial communications (RS485).<br>The M750 offers onboard Ethernet communications (TCP, Modbus TCP, and Ethernet IP).<br>The M753 offers onboard EtherCAT communications.<br>All of these derivatives of the Digitax HD offer 2 option module slots for additional SI Option Modules. |
| **Drive Configuration** | |
| **What baud rate should I set in Menu 3 when I am using the "Single Cable Solution" for my servo motor wired to the drive?** | Set 3.037 = 4M Baud if feedback is wired to feedback position P1.<br>Set 3.137 = 4M Baud if feedback is wired to feedback position P2.<br>This setting would apply to both M700 and Digitax HD drives with encoder feedback. |
| **Using the Drive Keypad** | |
| **How do I use and install the KI Compact Display and the KI Compact 485 Adapter on my Digitax HD?** | https://youtu.be/yXKY0ZWVWHhY |
| **Hardware Installation** | |
| **How do I install SI Option modules on my Digitax HD using the SI-Option Mounting Kit?** | https://youtu.be/L5ReY_khbhQ |
| **How do I connect a paralleled DC system using the multi-axis kit with the Digitax HD drive?** | https://youtu.be/SgfyCuWdC88 |
| **How do I connect my Digitax HD drive in a DC paralleling installation?** | https://youtu.be/AcaijhMkNXc |
| **How do I fit the onboard compact braking resistor to my Digitax HD drive?** | https://youtu.be/1tsCFw_jgDw |



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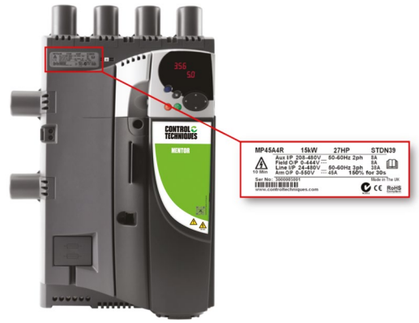
# MENTOR MP

| Question | Answer |
|---|---|
| **General Topics** | |
| **Does the Mentor MP drives have jumpers, tachogenerator pots, and PCB switches that need manual configuration, same as the Mentor II?** | No, these settings for the Mentor MP are setup using the keypad or CTSoft configuration software as setup parameters. |
| **Our production line has some of your Mentor II drives that talk to each other using CTNet, do you still support this with the Mentor MP drives?** | Yes, our drives can still be integrated on the CTNet interface using the SM-Application Plus option module with the Mentor MP. This includes the capability to host different generations of CT products on the same CTNet network, where a customer would like to have both Mentor II and Mentor MP on the same drive network. |
| **We have a damaged Mentor II drive that has the MD29 programmed applications board, what is available for updating the MD29 when we replace the Mentor II with a Mentor MP drive?** | The MD29 has been replaced by the SM-Applications option module in the Mentor MP. The SM-Application module supports programming in ladder, function blocks and the DPL (text based Drive Programming Language). We can provide field services from CT to assist with the upgrade from the MD29 to an SM-Applications Module.<br>SM Applications Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/options-and-accessories/intelligence-option-modules/sm-applications-plus**<br>Field Service Request<br>**https://acim.nidec.com/en-us/drives/control-techniques/service-and-support/field-service** |
| **We have the FXM5, Field Control Units which we would like to replace, do you still stock these?** | We have a "drop-in" replacement which is the FXMP25 Field Controller. It can be installed using the same mounting holes as the FXM5 and supports our CTSoft configuration and parameter software.<br>FXMP25 Field Controller Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/fxmp25** |
| **Our Mentor II drives communicated with an HMI using a serial cable, we know this is becoming obsolete, do you have a recommendation for upgrading and what protocols do you have available?** | The Mentor II provides a RS422 connection, which is a legacy serial protocol for Control Techniques.<br>The Mentor MP drives have a built in RS485 port but additional option modules can be added. The MP has a total of three slots for option modules. The most popular communication protocols that can be used with the Mentor MP by attaching an SM option module are EtherNet/IP, EtherCat, Modbus TCP/IP and DeviceNet. |
| **I have a Mentor II drive and need spares or parts.**<br>**Can I still get these?** | The Mentor II drives were discontinued but we do have a retrofit replacement which is the "Mentor MP / Quantum MP" drive. We offer them in Regenerative and Non-Regenerative configurations.<br>Control Techniques Current Products - DC Drives<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives**<br>Our Quantum MP drives are Mentor MP drives configured with a DC contactor, input and output fusing and a dynamic braking contactor up to the 400A model. |
| **General Topics** | |
| **Do your Mentor MP drives have embedded PLC capabilities?** | Yes, the drives have a built-in programmable controller that has ladder logic. It is configured using SyPTLite which is complimentary to use software.<br>Mentor MP Documentation<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |

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| **How do I transfer the parameters from one Mentor MP to another?** | You can use the commissioning software CTSoft to create, save, and load parameter files. You can download CTSoft from our website You will also need the communications cable, CT-USB-CABLE.<br><br>Control Techniques Software Tools Downloads<br>**https://acim.nidec.com/en-us/drives/control-techniques/downloads/software-tools**<br><br>You can alternatively use the SMARTCARD that comes with the drive to externally save the drive's parameters and transfer them to other drives. To save parameters on the SMARTCARD insert it into the SMARTCARD slot on the front of the drive. Navigate to parameter 0.30 (or SE09 in the sub-block menu) and change the value to Prog. Press the red reset button on the keypad. This will write the parameters in the drive onto the card.<br><br>To transfer the parameters from the SMARTCARD onto a drive, insert the SMARTCARD into the desired drive. Navigate to parameter 0.30 (or SE09 in the sub-block menu) and change the value to READ. Press the red reset button on the keypad. This will write the parameters on the SMARTCARD onto the drive. Perform a parameter save.<br><br>Follow link for more detailed information on SMARTCARD use.<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/article_attachments/360068198714/Mentor_MP_Using_Smartcard.pdf** |
| **How do I size an enclosure for my Mentor MP DC Drive?** | See section 3.6 of the Mentor MP user guide or section 3.5 of the Quantum MP user guide for the information and equation needed to calculate the size of a sealed enclosure. |
| **How do I select an external suppression resistor for my Mentor MP DC Drive?** | See section 4.7 of the Mentor MP user guide or section 4.10 of the Quantum MP user guide for information on sizing an external suppression resistor for your drive. |
| **What cable size and fusing should I use with my Mentor MP DC drive?** | See section 4.6 of the Mentor MP user guide or section 4.9 of the Quantum MP user guide for information on cable and fuse sizing, compiled in the pdf link below.<br><br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/article_attachments/360069318613/Mentor_MP_Cable_and_Fuse_Sizing.pdf** |
| **What size line reactor or choke should I use with my Mentor MP DC Drive?** | See section 4.4 of the Mentor MP user guide, or the Quantum MP user guide for information on sizing line reactors for your drive. |
| **How do I clear the "inh" status on my Mentor MP keypad display?** | Apply 24 vdc to drive terminal 31, the enable terminal. Parameter 8.09 will show the status of the enable terminal, and parameter 6.29 will show if the drive is enabled or not.<br><br>If 24 vdc is present at terminal 31, but the drive still shows Inh on the status screen check parameter 6.15 (the software enable). 6.15 should read ON. If it shows on, but the drive is still in the Inhibit state, turn 6.15 OFF and then turn it back ON again. You can also remove the 24 vdc from terminal 31 and reapply it for the same effect.<br><br>See parameters 6.15, 6.29, and 8.09 in the Advanced User Guide Mentor MP for additional information. You can also find more details in sections 4.14 of the Mentor MP user guide, and section 4.16 of the Quantum MP user guide. |
| **How do I reprogram the Mentor MP drive's analog input parameter destination from the default control setting?** | First use figure 4-21 in the Mentor MP user guide to determine which analog input (input 1, input 2, or input 3) you are looking to reprogram.<br><br>Next use section 11.7 of the Mentor MP or Quantum MP user guide to identify the destination parameter for your desired terminal (i.e. for analog input 1 it is parameter 7.10). Navigate to that parameter and edit the value to match the parameter you would like your selected analog input to point to.<br><br>Press the red reset button on the keypad to make the change take effect.<br><br>Perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513**<br><br>Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |



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| **Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?** | The Mentor MP user guide and Quantum MP user guide covers safety information, product information, drive installation, basic drive and keypad operation, basic parameters, quick start commissioning, optimization, SMARTCARD operation, onboard PLC programming, advanced parameter menus, technical data, diagnostics, and UL information for their respective drives. The user guides can be downloaded from our website through the links below:<br><br>Mentor MP Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/mentor-mp**<br><br>Quantum MP Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/quantum-mp**<br><br>FXMP25 Product Page<br>**https://acim.nidec.com/drives/control-techniques/products/dc-drives/fxmp25**<br><br>The Advanced User Guide Mentor MP covers parameter structure, the keypad and display, parameter xx.00, the parameter reference guide, serial communications protocol, and performance for both the Mentor MP and Quantum MP drives. It can be also downloaded from the links above. |
| **Where can I find the part number, voltage, and power rating information label on my Mentor MP Drive or Quantum MP?** | The rating label can be found on the upper left hand corner of the drive cover.<br><br> |
| **How do I restore my Quantum MP drive back to factory default settings?** | For the Quantum MP, first follow the steps required to set the Mentor MP back to factory default settings, through the link below:<br><br>How do I restore my Mentor MP back to factory default settings?<br><br>Next, look at section 5.9 of the QMP user guide. |
| **Where can I find documented safety information about my Mentor MP or Quantum MP drive?** | All safety information can be found in Chapter 1 of the Mentor MP or Quantum MP user guide. Please follow one of the links below to be taken to the respective product page to download the applicable manual.<br><br>Mentor MP Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/mentor-mp**<br><br>Quantum MP Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/quantum-mp** |
| **How do I restore my Mentor MP back to factory default settings?** | For the Mentor MP navigate to parameter 00 in any menu. Press the mode button to enter edit mode and scroll up to find the parameter value that reads USA (or EUR for European defaults). Press the red reset button on the keypad. Then perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513** |

| Using the Mentor Drive IO | |
|---|---|
| **In our existing DC Drive installation some of our I/O devices are 120VAC and we prefer to use the existing devices, is this possible when we install the new Quantum or Mentor MP drive?** | Yes, the Quantum MP drive as one slot designated for the 120VAC I/O option module. This option module can also be used on a Mentor MP (SM IO 120V).<br><br>SM IO 120V Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/options-and-accessories/inputs-outputs-option-modules/sm-io-120v** |
| **How do I reconfigure the function of one of my Mentor MP drive's digital outputs?** | First use figure 4-21 in the Mentor MP user guide to determine which digital I/O (I/O 1, I/O 2, or I/O 3) you are looking to reprogram. (Note that some Digital IO can be configured as Inputs or Outputs via parameter 8.31, 8.32, or 8.33).<br><br>Next use section 11.8 of the Mentor MP or Quantum MP user guide to identify the corresponding output select parameter to make the I/O point an output (make sure that parameter is ON to make the terminal in question an output). Use section 11.8 of the Mentor MP or Quantum MP user guide to identify the corresponding source parameter (i.e. for digital I.O 1 it is parameter 8.21). Once that is done navigate to source pointer parameter that matches your terminal and edit the value to your desired parameter source. Press the red reset button on the keypad to make the change take effect.<br><br>Perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513**<br><br>Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |
| **How do I change the output scaling factor of my Mentor MP drive's analog output?** | First use figure 4-21 in the Mentor MP user guide to determine which analog output (output 1, or output 3) you are looking to adjust the scaling on.<br><br>Next use section 11.7 of the Mentor MP or Quantum MP user guide to identify the output scaling parameter for your desired terminal (i.e. for analog output 1 it is scaling parameter is 7.20). Navigate to that parameter and edit the value to match the source parameter for your analog output. Press the red reset button on the keypad to make the change take effect.<br><br>Perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513**<br><br>Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |
| **How do I reprogram my Mentor MP drive's analog output from the factory setting?** | First use figure 4-21 in the Mentor MP user guide to determine which analog output (output 1, or output 2) you are looking to reprogram.<br><br>Next use section 11.7 of the Mentor MP or Quantum MP user guide to identify the source parameter for your desired terminal (i.e. for analog output 1 it is parameter 7.19 which is defaulted to 3.02). Navigate to that parameter and edit the value to match the source parameter for your analog output. Press the red reset button on the keypad to make the change take effect.<br><br>Perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513**<br><br>Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |





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|---|---|
| **How do I change the input scaling of the drive's analog input on an Mentor MP?** | First use figure 4-21 in the Mentor MP user guide to determine which analog input (input 1, input 2, or input 3) you are looking to reprogram.<br><br>Next use section 11.7 of the Mentor MP or Quantum MP user guide to identify the input scaling parameter for your desired terminal (i.e. for analog input 1 it is scaling parameter is 7.08). Navigate to that parameter and edit the value to match the scaling you require on the analog input. Press the red reset button on the keypad to make the change take effect.<br><br>Perform a parameter save.<br><br>How do I save the parameters to my Mentor MP drive?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047288513**<br><br>Where can I find user guides (basic and advanced) for the Mentor MP, Quantum MP, or FXMP25?<br>**https://controltechniquesfaqhelp.zendesk.com/hc/en-us/articles/360047541293** |
| **Using the Mentor Keypad** | |
| **How do I switch between the sub block menus and linear menus on the keypad for a Mentor MP?** | In the sub-block menu navigate to parameter SE14. Press the mode button to enter edit mode and change the value from L1 to L2. You will now be in the linear menu on parameter 0.35.<br><br>In the linear menu navigate to either parameter 0.35 or 11.44. Press the mode button to enter edit mode and change the value from L2 to L2. You will now be in the sub-block menu on parameter SE14.<br><br>See sections 5.3 – 5.7 of the Mentor MP or Quantum MP user guide for more details.<br><br>Mentor MP Product Page<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/dc-drives/mentor-mp** |
| **How do I save the parameters to my Mentor MP drive?** | If you are making changes in either the sub-block menus, or menu 0 of the linear menus then all parameter changes are automatically saved.<br><br>If you are in the advanced menus then after you have made your changes, navigate to parameter 00 in any menu. The user guides will display this as xx.00. Press the mode button to enter edit mode, scroll up, and find the parameter value that reads SAVE. Press the red reset button on the keypad to complete the save. |
| **How do I use the keypad on my Mentor MP DC drive?** | The left and right arrow keys on the keypad will move you through the menus/headers. The up and down arrow keys on the key-pad will move you through the parameters of the menu/header you are currently on.<br><br>The mode button (black button with an M on it) will cycle you through the display modes – parameter view, parameter edit, and status screen. When an item is blinking on the screen, the arrows will allow you to edit the value. |

# PTi210

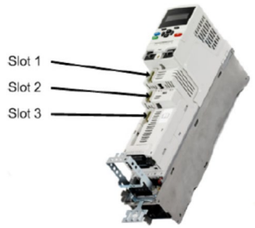
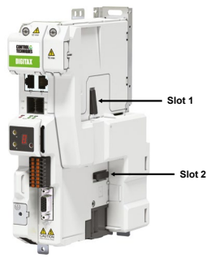
| Question | Answer |
|---|---|
| **Mobile Inputs and Outputs** | |
| **What voltage will cause the PTi210 inputs to turn on?** | The input turn-on voltage is 15 Vdc +/- 0.5 Vdc |
| **What are the PTi210 digital input voltage ratings?** | The inputs are rated for +24 Vdc with a maximum input voltage of +30 Vdc. |
| **What are the current ratings for the PTi210 digital outputs?** | The 2 outputs are rated for 20 mA total. |
| **Are the PTi210 I/O sinking or sourcing?** | The PTi210 are electrically sourcing I/O. All I/O utilize positive logic meaning they are active when a positive voltage is applied. Refer to Figure 3-2 in the PTi210 user guide for a wiring diagram.<br>The PTi210 module has a single terminal block allowing screwless terminal access to the digital I/O.<br>The terminals are numbered from Terminal 1 to 3 on the upper row (left to right) and Therminals 4 to 6 on the bottom row (left to right). |
| **How many inputs and outputs are on the PTi210?** | The PTi210 has 3 digital inputs and 2 digital outputs. The first two digital inputs are designed for high speed capture, but they can also be used as a regular input. |
| **Hardware Installation** | |
| **I just replaced a drive that had a PTi210 module fitted to one of the drive slots. Do I need to fit the PTi210 module in the same slot where it was removed from?** | Yes, when replacing a drive that has a PTi210 and any other working solutions modules each module needs to be put back into the exact same drive slot in the new drive. |
| **Are PTi210 modules hot swappable?** | No, remove all power from the drive before removing or adding PTi210 or any other solutions option modules. |
| **Do I need any additional options to install a PTi210 to a Digitax HD (M750 or M751) drive?** | Yes, the SI-Option Mounting kit order code 9500-1055 must be ordered separately to allow proper fitting of the PTi210 and any other option modules to the drive. |
| **Do I need any additional options to install a PTi210 to a Unidrive M700, M701 or M702?** | No, any empty drive slot can be used to fit the PTi210 module. |
| **Module Programming** | |
| **How do I control the brake on a motor with PowerTools Studio and the PTi210 on a Digitax HD?** | First, modify the drive initialization file in PowerTools Studio. The Drive Initialization File can be found under the Hardware tree in PowerToolsStudio. If it is not there, enable it to be view or edited by selecting Options/Preferences/Show Advanced Views.<br>Next, insert the following lines into the code:<br>Menu.12.41=1 - this instruction set the brake control to Enable.<br>Menu.8.22=12.040 - this sets the Digitax HD Brake Release function to be the source of the SP Relay.<br>Next, remove or comment out the following line:<br>`Menu.8.21 = 18.039 'IO 1 Source Destination`<br>`'Menu.8.22 = 18.040 'IO 2 Source Destination`<br>`Menu.8.24 = 0.00 'Input 4 Source Destination`<br>`Menu.8.25 = 0.00 'Input 5 Source Destination`<br>`Menu.8.28 = 0.00 '24V output Source Destination`<br>`Menu.12.041 = 1 'Enable Brake control to On`<br>`Menu.8.22 = 12.040 'IO 2 Source Destination for the Brake status`<br>Menu.8.22=18.040 - IO 2 Source Destination.<br>This is the preferred method of controlling the brake when PTi210 is used. In actuality, the Digitax HD is doing all the control, and PTi210 is simply telling the drive to take over. |





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| **How do I erase the program and reset a PTi210 back to factory default defaults?** | The user will need a drive keypad or Connect software. Set 18.001 = 19237 and cycle power to the drive. After the drive has completed powering back up there should be a Slot Error for the slot where the PTi210 is fitted indicating there is no program in the module. |
| **Can I download a program to a PTi210 while the drive is enabled in a Ready or Run state?** | No, the drive must be disabled / inhibited to download a program to a PTi210. |
| **I just installed a new drive and am reusing the PTi210 module from the drive that failed since it is still functional. Do I need to re-program the PTi210?** | No, the program for the PTi210 resides in the module NVM. If the same exact program is going to be used downloading is not required. |
| **Can I use "Upload" to go online with a new out of box PTi210?** | No. There is no program in a brand new PTi210 module so a program must be downloaded first to a new PTi210 before upload can be used to go online with the module. |
| **Do I have to save parameters in the drive after downloading a program to the PTi210?** | No, the PTi210 has its own microprocessor, and performing a download to the PTi210 writes the program contents directly to NVM (non-volatile memory). |
| **Can I pre-program a PTi210 module for later use on a compatible drive?** | Yes, it is recommended to pre-program the module by fitting the PTi210 to the same drive type and size that it will be used on by downloading the desired program using PowerTools Studio software. After downloading the program to the PTi210 it can be removed for use later time in the same drive slot that it was originally programmed in. |
| **I cannot find my SI module in the PowerTools Studio Slot Configuration Module Type drop down list. How do I program this module?** | For Module Type select 'Empty Slot' for the Slot # where this module is fitted to the drive. The module can then be setup using the drive keypad or Connect software. |
| **How do I change the Ethernet IP address on a drive that has a PTi210?** | In PowerTools studio click on the '>' next to Hardware and then click on Comms Slot – Onboard Ethernet for M700, M702 or M750 drives and enter the new IP address in Setup, and check the box next to Change Ethernet Settings. Download the changes.<br>For M701 or M751 drives with SI-Ethernet fitted to one of the drive slots click on the '>' next to Hardware and then click on the Slot # where SI-Ethernet is fitted and enter the new IP address in Setup, and check the box next to Change Ethernet Settings. Download the changes. |
| **My drive with a PTi210 keeps losing it's IP address on a power cycle. Why is this happening?** | The IP address is stored in the PTi210 module settings and must be changed using the PowerTools Studio software. |
| **How many drive slots are available in PowerTools Studio software for Solutions Integration (SI) modules?** | The number of available drive slots depends on the drive being used with the PTI210.<br>For M700, M701 & M702 there are 2 drive slots available for other SI-Modules after installing the PTi210.<br>For the M750 & M751 there is one drive slot available after installing the PTi210. |
| **What programming cable is needed to program a M700, M702 or M750 with PTi210 using PowerTools Studio software via Ethernet?** | A standard Cat5e or Cat6 Ethernet patch cable can be used.<br>For M701 or M751 drives that have SI-ETHERNET fitted to the drive a standard Cat5e or Cat6 Ethernet patch cable can be used to program the drive. |
| **What programming cable is needed to program a M701 or M751 drive using PowerTools Studio that has no SI modules fitted to the drive?** | You can use the standard CT-USB-CABLE serial programming cable as a USB to Serial interface from your local PC. |
| **Where can I download PowerTools Studio software?** | You will be able to download PowerTools Studio software at the Software Downloads section of Control Techniques' website when it is fully released later in 2020. |
| **Does PowerTools Pro v6.0 work with the PTi210 Motion Made easy module?** | No, it does not. You will need to use PowerTools Studio software for programming and commissioning the PTi210 Motion Made Easy module. |

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| General Topics | |
|---|---|
| **Do I need AC Input supply power on my drive to program or go online with a PTI210?** | No, the user can provide external +24 Vdc to the appropriate drive terminals to go online with or program a new or existing PTi210 module. |
| **Can I use a SD card to back up my PowerTools Studio program?** | No, the SD card cannot be used to save a PowerTools Studio program. The user must use PowerTools Studio software to save a program for the PTi210. |
| **How can I visually tell if the PTi210 is being used with my drive?** | The picture below shows the 3 drive slots for M700, M701 and M702 drives:<br><br>The picture below with 2 drive slots show slot locations for M750 and M751 drives:<br><br>Look for any SI module with royal blue plastic on the bottom of the module; this color is used to identify the PTi210 as seen below:<br> |
| **How can I tell if my drive has a PTi210 module fitted to one of the dive slots using the drive keypad?** | For M700, M701 and M702 drives, navigate to drive parameters 15.001, 16.001 & 17.001; if any of these parameters equals 320 this indicates PTi210 is fitted to the respective drive slot. 15.001 is drive Slot 1 Module ID, 16.001 is drive Slot 2 Module ID & 17.001 is drive Slot 3 Module ID.<br>For M750 (Digitax HD) and M751 (Digitax HD) drives, navigate to drive parameters 15.001, 16.001; if either of these parameters equals 320 this indicates PTi210 is fitted to the respective drive slot. 15.001 is drive Slot 1 Module ID and 16.001 is drive Slot 2 Module ID. |
| **Do I need to provide an external +24 Vdc power supply to use the PTi210 I/O?** | Yes, the user must provide an eternal +24 Vdc power supply. |
| **If my computer supports it, can I use a standard serial cable to program a Digitax HD (M751) or M701 drive using PowerTools Studio software?** | No, the CT-USB-CABLE has a built in RS232 to RS485 converter that is needed to program a drive. Also note that the drive must have a PTi210 module attached to it to support PowerTools Studio. |
| **How can I get my saved .EZM or .EZME file to work with the PTi210?** | You will need to open a new file in PowerTools Studio software and manually recreate your program. You can use Cut/Copy-Paste for user programs, however, be careful of any references made to drive or module inputs, drive or module outputs or menu parameters as the syntax may have changed. For example: 18.01 is now 18.001 in the PTi210.<br>File –> Import is a feature that is being slated for a future release of PowerTools Studio software for importing file types .EZM and .EZME into PowerTools Studio. Please check back soon for future updates supporting this feature. |
| **Will PowerTools Studio software open my saved program I am using with SM-EZ Motion?** | No, it will not. PowerTools Pro v6.0 is needed to open any .EZM or .EZME file types. |
| **Where do I find information about Digitax HD with PTi210?** | Please visit our control techniques website to find information for the following drives:<br>**https://acim.nidec.com/en-us/drives/control-techniques/products/servo-drives/digitax-hd/digitax-m750-ethernet**<br>Servo - Digitax HD<br>High Performance - Unidrive M700<br>General Purpose - Commander C |

# SOFTWARE TOOLS

| Question | Answer |
|---|---|
| **CT Scope Software** | |
| How do I setup different channels to monitor multiple parameters through CTScope in my Control Techniques drive? | https://youtu.be/5m58PGZdFyc |
| How do I use CTScope to monitor parameters and settings in my Control Techniques drive? | https://youtu.be/Udib-lPgrPI |
| **Machine Control Studio** | |
| How can I start a new Machine Control Studio project for an MCi200 or MCi210? | https://youtu.be/QWX13-UG6Sk |
| How can I access SI-IO option module parameters through Machine Control Studio for use in my drive program? | https://youtu.be/JkoHGWK_5Ts |
| **Connect Software** | |
| Where can I download Connect, CT Scope, or Machine Control Studio Software? | Please visit the "download" section of our Control Techniques website via the link below:<br>Control Techniques Software Downloads:<br>https://acim.nidec.com/en-us/drives/control-techniques/downloads/software-tools |
| If I want to copy or clone one drive to another existing drive, how can I use Connect software to do so? | https://youtu.be/rM1vyloneMM |
| How do I use Connect software to compare the settings in my drive to the default settings for the drive, and produce me a detailed list? | https://youtu.be/lqzlHzK0EPg |
| How can I update the option module firmware for an option module attached to my Control Techniques drive? | https://youtu.be/IzXln-DH4iw |
| How can I update my drive firmware on my Control Techniques drive using Connect software? | https://youtu.be/tw2FIlvFvR8 |
| How can I save, upload, or backup parameter files from my Control Techniques drive to my computer? | https://youtu.be/2hPntRaCU2I |
| How can I program my KI-Keypad for a different language using Connect software? | https://youtu.be/61PmYMlzddI |



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# OTHER TOPICS

| Question | Answer |
|---|---|
| **Other Topics** | |
| Where can I get drawings for Nidec US Motors brand motors? | Please visit the US Motors "MotorBoss" page by following the link below:<br>Motor Boss E-Catalog: http://ecatalog.motorboss.com |
| Can I use a single phase motor with my CT drive? | CT drives are not intended for single phase output operation. |
| How do I find my drive model or serial number? | All drive model numbers and serial numbers are located on the drive identification label, typically near the top of the drive. Note, you may need to remove an option module or keypad to find this label. |
| How do I find out where I can purchase CT drives and components? | Find your local distributor(s) by following the link below:<br>CT Distributor Locator: https://acim.nidec.com/en-us/drives/control-techniques/distributor-locator<br>or email us at: customerservice.cta@mail.nidec.com |
| **Drive Diagnostics** | |
| Where can I download CT's "Diagnostic Tool" to troubleshoot drive trips right from my phone? | The CT Drive Diagnostic tool can be installed on any mobile device, and provides the user with quickstart guides, wiring diagrams, and quick access to the explanation for any drive error code for fast any easy troubleshooting.<br>Please use the link below to be directed to CT's website, or you can find the application on your mobile app store.<br>CT Drive Diagnostic Tool: https://acim.nidec.com/en-us/drives/control-techniques/downloads/mobile-applications |
| **Field Service** | |
| I need a Control Techniques engineer or technician to come to my site to help setup or troubleshoot my drive. How do I start that process? | Please fill out our online request form, you should receive a quote or feedback within a few hours for onsite assistance or virtual support via Teamviewer or Webex.<br>Field Service Request Page: https://acim.nidec.com/en-us/drives/control-techniques/service-and-support/field-service |
| **Drive Communications** | |
| How do I determine the Modbus address for a parameter on my drive? | **IMPORTANT!** To access parameters in a drive menu (not a slot menu), a Modbus Unit Identifier must be used and set to either 0 or 255 from the master device.<br>The Modbus addressing method is chosen using Pr. 4.15.013. Default is ""0"" for Standard Addressing.<br>Change Pr. 4.15.013 to ""1"" to use Modified Addressing. Use Modified mode when accessing parameter numbers that are greater than ""99"" within their menu.<br>To access parameters in drive slots 1, 2 or 3 you must change the Modbus Unit Identifier to match the Slot Number.<br>For example: To access a parameter in slot #3, change the Modbus Unit Identifier to ""3"".<br>Option Slot parameters are addressed using Standard mode only. (4.15.013 = 0/Standard).<br>See table below for parameter mapping examples, note the addressing differences between 16-bit and 32-bit parameters. |
| What cable do I need to communicate with my CT drive via a serial link from my computer? | We recommend acquiring a CT-USB-CABLE to communicate or go online with the drive via a serial link. If your selected drive Commander C or Unidrive M) does not already have an RS485 communication port, you may also need to purchase a AI-485 Adapter. |
| What kind of add on communication option modules are available for my CT drive? | The best place to find this information is on our Control Techniques website, please follow the link below:<br>Control Techniques Option Modules: https://acim.nidec.com/en-us/drives/control-techniques/products/options-and-accessories |
| Can you show me in a video how I can access drive parameters using Modbus TCP or Modbus RTU from a communication master? | https://youtu.be/ZAL3YhEVyuk |
| **Drive Training** | |
| How can I sign up for the Control Techniques Online Learning Center? | https://youtu.be/JvnbY2fyTzI |




# DISCOVER MORE





## BIG BOOKS




### THE 100

The Big Book of Case Studies for every one of our solutions.




### THE HERO'S JOURNEY

The Big Book about our Drives being the unsung heroes.




### THE ORIGIN

The Big Book of the full Control Technqiues History.

## GREEN BOOKS




### ELECTROMAGNETIC COMPATIBILITY




### HARMONICS




### SAFE TORQUE OFF



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