UNIDRIVE M Overview

NEW

AC and Servo Drive Family for Manufacturing Automation

- Unidrive M100
- Unidrive M200
- Unidrive M300
- Unidrive M400
- Unidrive M600
- Unidrive M700
- Unidrive M800

0.25 kW - 2.8 MW Heavy Duty
(0.33 hp - 4,200 hp)
100 V | 200 V | 400 V | 575 V | 690 V

CONTROL TECHNIQUES

EMERSON
Industrial Automation

Control Techniques - a global leader in motor control and power conversion technology

As part of Emerson (NYSE: EMR), Control Techniques is a global leading manufacturer of motor control and power conversion technology for commercial and industrial applications. Our innovative products are used in the most demanding applications requiring performance, reliability and energy efficiency.

With Manufacturing and Engineering & Design facilities in Europe, the USA and Asia, our 93 subsidiary Drive Centers and resellers in 70 countries offer customers local technical sales, service and design expertise. Many also offer a comprehensive system design and build service.

Emerson - a legacy of performance

Emerson is a diversified global manufacturing and technology company, ranked number 120 in the 2012 Fortune 500® annual list of America's largest corporations. We offer a wide range of products and services in the industrial, commercial and consumer markets through our Process Management, Industrial Automation, Network Power, Climate Technologies and Commercial & Residential Solutions businesses. Recognized widely for our engineering capabilities and management excellence, Emerson has approximately 133,000 employees and 235 manufacturing locations worldwide.

The Unidrive M Manufacturing Automation drive family

Unidrive M – The Manufacturing Automation drive family tailored to customer needs

Unidrive M is designed specifically for Manufacturing Automation applications which is Control Techniques' traditional area of expertise. Led by the results of extensive customer-driven market research, we have tailored each Unidrive M model to specific application needs identified within Manufacturing Automation, taking customer choice to new heights. Unidrive M is evolving the future of Manufacturing Automation with the latest drive technology which includes over 30 patents pending; a global achievement combining Control Techniques' worldwide Engineering & Design resource and product testing processes.

Download the 'Discover Unidrive M' App from the App Store, Android and online via www.UnidriveM.com.

CODESYS

Ethernet Onboard

SIL3 Safety Integrity Level

RoHS Compliant

N1652

2+ YEAR Worldwide Warranty

BSI REGISTERED Certificate No. EMS 64446 UKAS ENVIRONMENTAL MANAGEMENT 003

BSI REGISTERED Certificate No. Q 05176 UKAS QUALITY MANAGEMENT 003

c UL us E171230

Plastic production line

Unidrive M – the world's most comprehensive class leading family of drives dedicated to Manufacturing Automation. Control Techniques' exciting new Unidrive M offers the widest possible variety of functionality and solutions for motor control applications with a range of 0.25 kW to 2.8 MW.

Unidrive M delivers seven function-focused drive models, all with superior motor performance and an individual feature-set to best match the customer's application and system connectivity needs. Easily create faster, more productive systems, with reduced development time and countless possibilities within the Machine Automation industry.

Key family benefits include:

Customer choice taken to new heights

- Precise functionality to suit your needs – select from seven levels to optimize your time, design simplicity and investment.
- Ultimate drive family for new customers – widest functionality, power choice and minimized dimensions for Manufacturing Automation applications.

Intelligent Machine Architecture (IMA) – programmable control devices linked together through open standard Ethernet

- IMA enables the selection and easy integration of the world's best products into your machine design.
- Accelerated machine development and innovation through integrated industry standard CODESYS (IEC 61131-3) for motion and PLC programming.

World leading drive performance

- Increased throughput – exceptional motor control using standard induction, permanent magnet, servo and linear motors in open or closed loop configuration for total design flexibility.

Control Techniques' new Unidrive M family incorporates extensive feedback from hundreds of machine builders and end users in Asia, Europe and the Americas to create a unique range that enhances machine performance, reduces commissioning and diagnostic times, lowers machine costs and provides the flexibility for every application.

- Increased productivity through better machine control – onboard real-time Ethernet with hardware-based Precision Time Protocol (IEEE 1588 V2) provides fast and flexible communications and synchronization.

Ease of use

- Fast installation and start-up – intuitive keypads, software tools and easy cable management minimizes work.
- Simple upgrade – fits existing mountings and cable connections, with trouble-free parameter transfer for existing Control Techniques' Unidrive SP and Commander SK users.

Heavy Duty power range:

- Panel mount: 0.25 to 250 kW (0.33 to 400 hp)
- Modular range: Ratings up to 2.8 MW (4,200 hp)

Voltage ranges:

- 100 V (100 V - 120 V ± 10 %)
- 200 V (200 V - 240 V ± 10 %)
- 400 V (380 V - 480 V ± 10 %)
- 575 V (500 V - 575 V ± 10 %)
- 690 V (500 V - 690 V ± 10 %)

Unidrive M scalable Manufacturing Automation drive family

Each Unidrive M model offers an incremental level of functionality, designed to solve more advanced application needs. The family is designed to provide exactly the right drive feature-set for each Manufacturing application, sharing a common software foundation and range of common click-in optional modules.

M100

Value drive with quality and performance for open loop applications

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M200

Flexible machine integration through communications

(Commander SK equivalent)

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M300

Enhance throughput with Machine Safety

Page 14

M400

Fast set-up and diagnosis with real-text display, plus integrated CODESYS based PLC

(Commander SK with LogicStick and extended power range equivalent)

CODESYS

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Up to 7.5 kW (10 hp)

Up to 22 kW (30 hp)

Up to 110 kW (150 hp)

Open loop vector or V/Hz induction motor control

Enhanced open loop Rotor Flux Control for induction motors (RFC-A)

M600

High performance drive for induction and sensorless permanent magnet motors

CODESYS

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M700

Class leading induction and permanent magnet servo motor performance, with real-time Ethernet

(Unidrive SP equivalent)

CODESYS

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M800

Ultimate performance through advanced onboard machine control

CODESYS

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Functionality, Performance & Flexibility

Up to 2.8 MW (4,200 hp)

Programmable using Machine Control Studio software, powered by CODESYS

Open loop vector or V/Hz induction motor control

Enhanced open loop Rotor Flux Control for induction motors (RFC-A)

Open loop permanent magnet motor control (RFC-S)

Active Front End (AFE) power quality convertor

Closed loop Rotor Flux Control for induction motors (RFC-A)
(M600 requires SI-Encoder option)

Closed loop permanent magnet/servo motor control (RFC-S)

Unidrive M highlights

Performance control for every motor

Control Techniques' unique motor control algorithms combined with the latest microprocessor technology ensure that Unidrive M drives offer the highest stability and bandwidth for all industrial motor types. This enables you to maximize machine throughput in every application and with every motor; from standard AC induction motors to dynamic linear motors and from energy saving permanent magnet motors to high performance servo motors.

Bottling line

Motor control options available include:

Control Mode	Control Strategy	Features	Applies to
Open loop vector or V/Hz induction motor control	Frequency Speed	Open loop motor control for induction motors. Easiest configuration. V/Hz can be used in multi-motor systems.	All
Enhanced open loop Rotor Flux Control for induction motors (RFC-A)	Speed Torque	Vector algorithm utilizing closed loop current control to greatly enhance performance for all induction motor sizes.	M200 - M800
New open loop permanent magnet motor control (RFC-S)	Speed Torque Position	Open loop motor control for permanent magnet motors utilizing closed loop current control. This mode offers good dynamic performance and enables more compact and higher efficiency motor technologies to be used. This mode also supports simple positioning without the need for encoder position feedback.	M600 - M800
Enhanced closed loop Rotor Flux Control for induction motors (RFC-A)	Speed Torque Position	Dynamic speed or position control of induction motors, supporting a wide range of feedback devices.	M600 - M800
Enhanced closed loop permanent magnet/servo motor control (RFC-S)	Speed Torque Position	Closed loop control of high efficiency and servo permanent magnet motors supporting a wide range of feedback devices. This mode also supports the control of Synchronous Reluctance Motors.	M700 - M800
Enhanced Active Front End (AFE) Power Quality Convertor	Regenerative	Active Front End (AFE) to return excess braking energy back onto the power line, reducing energy costs instead of dissipating this energy as heat. The AFE provides power factor control for power quality management and greatly reduces unwanted power harmonics.	M600 - M800

Intelligent Machine Architecture - open automation systems

Unidrive M maximizes machine throughput. This is achieved through a synchronized high performance network of intelligent control devices, sensors and actuators, linked together through open standard Ethernet.

Open Ethernet networking

The Unidrive M family uses standard Ethernet for high performance automation and motion control. This network is open and uses many protocols including EtherNet/IP, Modbus TCP/IP and PROFINET RT*, which enables flexible communication between drives, I/O, PCs and other automation components in a system.

IEC 61131-3 motion and automation programming

IEC 61131-3 is the international standard that specifies five programming languages optimized for use in automation equipment. Over recent years IEC 61131-3 has become widely used and is supported by the majority of automation vendors providing access to an enormous talent pool of engineers. The system is configured using our Machine Control Studio software tool which is IEC 61131-3 compliant and powered by CODESYS, the leading industry programming environment.

CODESYS

Fieldbus compliance

Using onboard functions and click-in System Integration (SI) option modules, Unidrive M offers connectivity to all common fieldbus communications such as PROFIBUS, DeviceNet, CANopen and EtherCAT*. Our SI modules are certified by third parties to ensure full compliance with standards and trouble-free configuration and operation.

* Future availability

Onboard safety

Machine safety features enhance machine throughput while protecting people and assets, helping to meet SIL3 (Safety Integrity Level 3) and PLe. Different Unidrive M models offer alternative levels of integrated safety functions to suit various manufacturing needs, reducing external components and machine costs.

- Single Safe Torque Off (STO) inputs provide an easy entry level for safety integration.
- Dual Safe Torque Off (STO) inputs provide enhanced safety functionality.
- Advanced safety* to meet the IEC 61800-5-2 functional safety standard, covering numerous functions including STO, Safe Stop 1 and 2, Safe Limited Speed, Safe Limited Position.

* Future availability

Extend the lifetime of your machine with ease

As well as easily retrofitting existing applications that use Commander SK and Unidrive SP, Unidrive M provides an immediate performance upgrade, extending the lifetime and throughput of your machine.

- Unidrive M200 and M400 provide a direct upgrade path from Commander SK.
- As a variant of Unidrive M700, M701 provides a direct upgrade path from Unidrive SP.
- All variants of Unidrive M700 are able to take a Smartcard (parameter copying device) from Unidrive SP and import drive settings.
- Unidrive M700 and M701 have the same control connector terminal layout as Unidrive SP.
- The SI-Applications Plus module allows existing Unidrive SP SyPTPro programs to be easily recompiled for Unidrive M700.
- Unidrive M enables easy retrofit as existing fixing points for Unidrive SP or Commander SK installations can be used with conversion plates available where required.

Energy efficiency

Unidrive M is designed to enhance the energy efficiency of manufacturing machinery:

- Low losses, up to 98% efficient.
- Low power standby mode. In some applications, drives can sit idle for significant periods; Unidrive M's reduced standby power saves energy.
- Easy common DC bus configuration enables braking energy to be recycled within the drive system, reducing energy usage and eliminating external supply components.
- Unidrive M supports sensorless (open loop) control of compact high efficiency permanent magnet motors.

Highly efficient permanent magnet motors from Leroy Somer

Control Techniques matched servo motors

Control Techniques offer two ranges of AC brushless servo motors to match Manufacturing Automation application needs

Unimotor fm
Flexible high performance AC brushless servo motor
0.72 Nm – 136 Nm (408 Nm Peak)

Unimotor fm is a flexible high performance AC brushless servo motor range matched for use with Unidrive M. The motors are available in seven frame sizes with various mounting arrangements, motor lengths and a wide range of feedback options.

Unimotor hd
Compact servo motor for demanding applications
0.72 Nm - 85.0 Nm (255 Nm peak)

Unimotor hd is Control Techniques' high dynamic servo motor range, designed for maximum torque density. This brushless AC servo motor range provides an exceptionally compact, low inertia solution for applications where very high torque is required during rapid acceleration and deceleration profiles.

Control Techniques Unimotor hd high dynamic brushless AC servo motor range

Packaging application

Unidrive M is the embodiment of extensive market research into real customer needs and an innovative global engineering and design collaboration. This has embraced cutting edge modern development and testing methods, resulting in 30 patents pending ...and counting.

Textile machine

Unidrive M100 AC drive

Voltage ratings	
100 V (100 V - 120 V ± 10%)	✓
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	
690 V (500 V - 690 V ± 10%)	

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	
Open loop permanent magnet motor control (RFC-S)	
Closed loop Rotor Flux Control for induction motors (RFC-A)	
Closed loop permanent magnet motor control (RFC-S)	
Active Front End (AFE) power quality convertor	

Value drive with quality and performance for open loop applications

M100 delivers an economical open loop drive for general Manufacturing Automation applications, with Control Techniques' proven quality and class leading motor operation.

Other Unidrive M100 benefits include:

Quick and easy to install and configure

- Simple and easy-to-read high brightness LED keypad as standard.
- No unnecessary features.
- 10 most commonly used parameters listed on front of drive.

Reduce machine size and cost

- Compact drive dimensions, among the smallest in class at every power rating.

Save energy

- Low losses up to 98% efficient.
- Low power standby mode.

Robust design for manufacturing environments

- Conformal coating supported through extensive environmental testing and certification.

Typical applications:

- Frequency control for conveyors, fans, pumps and mixers.

M101 variant

Provides a speed reference potentiometer keypad to enhance customer choice and ease of use.

Key data

Heavy Duty rating:	0.25 – 7.5 kW (0.33 - 10 hp)
Supply phases:	110 V drives – 1 phase 230 and 400 V drives - 1 or 3 phase
Standard features	
Keypad:	M100: Fixed LED M101: Fixed LED with speed reference potentiometer
Parameter cloning via:	SD card
Options	
Adaptor:	AI-Back-up Adaptor

Unidrive M200 AC drive

Voltage ratings	
100 V (100 V - 120 V ± 10%)	✓
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	
Closed loop Rotor Flux Control for induction motors (RFC-A)	
Closed loop permanent magnet motor control (RFC-S)	
Active Front End (AFE) power quality convertor	

Flexible machine integration through communications

- M200 adds useful networking capability, additional I/O and improved motor control performance.
- Easy upgrade for existing Commander SK users.

M200 delivers substantial communication and application integration through optional RS485 plus a wide range of industry standard fieldbus and I/O SI modules. Enhances machine up-time and performance with its remote control monitoring and diagnostics possibilities.

Other Unidrive M200 benefits include:

Enhance up-time and system flexibility

- Reduce machine down-time through communications for remote diagnostics.
- Application flexibility through configurable I/O.
- Enhanced system integration through a selection of optional click-in Ethernet, fieldbus and additional I/O SI modules.

Improved motor control

- Greatly enhanced performance through our RFC-A vector algorithm, utilizing closed loop current control.

Typical applications:

- Speed control for conveyors, fans, positive displacement pumps and mixers, where their functions are controlled remotely via fieldbus or Ethernet communications.

M201 variant

Provides a speed reference potentiometer keypad to enhance customer choice and ease of use.

Key data

Heavy Duty rating:	0.25 - 22 kW (0.33 - 30 hp)
Supply phases:	Size 1 to 4: 110 V drives – 1 phase 230 & 400 V drives - 1 or 3 phase Size 5 upwards: 3 phase
Standard features	
Keypad:	M200: Fixed LED M201: Fixed LED with speed reference potentiometer
Option slots:	1 (Size 2 and above)
Parameter cloning via:	PC tools, SD card
Options	
Keypad:	Remote mountable plain text multi-language LCD (and adaptor plate)
SI Modules:	Communications, additional I/O
Adaptors:	AI-Back-up Adaptor & AI-485 Adaptor

Unidrive M300 AC drive

Voltage ratings	
100 V (100 V - 120 V ± 10%)	✓
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	
Closed loop Rotor Flux Control for induction motors (RFC-A)	
Closed loop permanent magnet motor control (RFC-S)	
Active Front End (AFE) power quality convertor	

Enhance throughput with Machine Safety

- M300 adds integrated Machine Safety

M300 helps machine builders maximize up-time and meet modern functional safety standards. Dual onboard Safe Torque Off (STO) inputs offer easy SIL3/PLe conformity and reduce the need for external components, minimizing overall machine dimensions and costs.

Other Unidrive M300 benefits include:

Enhance productivity through integration with the automation system and reduce machine downtime

- Optional RS485 and a wide range of fieldbus communication SI modules allow remote control and diagnostics with different networks.
- Flexible I/O.

Quick and easy to install and configure

- Simple fixed LED keypad as standard.
- 10 most commonly used parameters listed on front of drive.

Reduce machine size and cost

- Compact drive dimensions, among the smallest in class at every power rating.

Save energy

- Low losses up to 98% efficient.
- Low power standby mode.

Typical applications:

- Speed control for material transport, cutting, woodworking, machine tools; where protection to people or assets is required.

Key data

Heavy Duty rating: 0.25 - 22 kW (0.33 - 30 hp)
Supply phases: Size 1 to 4: 110 V drives – 1 phase
230 & 400 V drives - 1 or 3 phase
Size 5 upwards: 3 phase

Standard features
Machine safety: 2 x Safe Torque Off terminals
SIL3/PLe compliant
Keypad: Fixed LED
Option slots: 1 (Size 2 and above)
Parameter cloning via: PC tools, SD card

Options
Keypad: Remote mountable plain text multi-language LCD
SI Modules: Communications, additional I/O, advanced safety*
Adaptors: AI-Back-up Adaptor & AI-485 Adaptor

*Future availability

Unidrive M400 AC drive

M100 M200 M300 M400 M600 M700 M800

Voltage ratings	
100 V (100 V - 120 V ± 10%)	✓
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	✓

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	
Closed loop Rotor Flux Control for induction motors (RFC-A)	
Closed loop permanent magnet motor control (RFC-S)	
Active Front End (AFE) power quality convertor	

Fast set-up and diagnosis with real-text display, plus integrated CODESYS based PLC

- M400 adds an optional enhanced LCD keypad, precise frequency following and onboard Programmable Logic Control (PLC).
- Easy upgrade for existing Commander SK users with LogicStick.

CODESYS

M400 minimizes machine downtime with its optional intuitive advanced LCD keypad which offers real-text multi-language display for rapid set-up and superior diagnostics. Onboard CODESYS based PLC with a real-time task can be used for simple logic control to enhance drive application capability.

Other Unidrive M400 benefits include:

Maximize throughput while protecting people and machinery, and easily meet machine safety requirements

- Dual STO for safety system integration , eliminating external components.

Enhance productivity through integration with the automation system and reduce machine downtime

- Optional RS485 and a wide range of fieldbus communication SI modules allow remote control and diagnostics across different networks.
- I/O can be configured to accept an encoder or frequency/direction inputs for frequency following.

Reduce machine size and cost

- Compact drive dimensions, among the smallest in class at every power rating.
- Enhanced functionality with onboard PLC programming provides a low cost solution, minimizing additional equipment such as PLCs and safety contactors.

Save energy

- Low losses up to 98% efficient and low power standby mode.

Typical applications:

- Speed control for conveyors, positive displacement pumps, material transport, cutting, woodworking, where fast diagnostics are required.

Key data

Heavy Duty rating:	0.25 - 110 kW (0.33 - 150 hp)
Supply phases:	Size 1 to 4: 110 V drives – 1 phase 230 and 400 V drives - 1 or 3 phase. Size 5 upwards: 3 phase
Standard features	
Intelligence:	Onboard PLC
Feedback:	Encoder input – Speed follower
Machine safety:	2 x Safe Torque Off terminals SIL3/PLe compliant
Keypad:	No keypad as standard
Option slots:	1 (Size 2 and above)
Parameter cloning via:	PC tools, SD card
Options	
Keypad:	Removable plain text multi-language LCD Remote mountable plain text multi-language LCD
SI Modules:	Communications, additional I/O, advanced safety*
Adaptors:	AI-Back-up Adaptor & AI-485 Adaptor

*Future availability

Unidrive M600 AC drive

High performance drive for induction and sensorless permanent magnet motors

- M600 adds enhanced motor control, higher performance onboard PLC with CODESYS programming and greater system expansion capability.

M600 delivers increased machine performance with sensorless induction and sensorless permanent magnet motor control, for dynamic and efficient machine operation. An optional encoder port can be used for precise closed loop velocity applications and digital lock/frequency following. Additional I/O, global fieldbus communications and encoder feedback options maximize system connectivity and flexibility.

Other Unidrive M600 benefits include:

Enhanced onboard PLC

- Onboard CODESYS based PLC with a real-time task can be used for basic logic control, speed following and digital lock to enhance drive application capability.

Maximize productivity with high performance control with all AC motors

- Advanced RFC control algorithm for maximum stability and control, especially with high power motors.
- High bandwidth motor control algorithm with 62.5 µs current loop update rates.
- 200% motor overload for heavy industrial machinery applications.

Save energy

- High performance control of open loop energy efficient industrial permanent magnet motors , with dynamic control and high starting torque.
- Low losses up to 98% efficient.
- Low power standby mode.

Reduce machine size and cost

- Compact drive dimensions, among the smallest in class at every power rating.
- Onboard programmable automation for simple applications.

Flexible integration with automation systems

- Fit up to three SI modules to add speed feedback, I/O and fieldbus communications.

Easy-to-use interface

- Optional plain text LCD keypad with up to 4 lines of text.

Typical applications:

- Speed control with high starting torque for extruders, slitters, material transport, compressors, manufacturing cranes, hydraulic replacement, ratio control, gearing, winding (coilers), web handling, metal cutting.

Winder on a metal processing line

Key data

Heavy Duty rating:	0.75 kW – 2.8 MW (1.0 hp - 4,200 hp)
Supply phases:	3 phase
Standard features	
Intelligence:	Onboard PLC and Digital Lock Control
Onboard comms:	RS485
Machine safety:	1 x Safe Torque Off (STO) terminal SIL3/PLe compliant
Keypad:	No keypad as standard
Option slots:	3
Parameter cloning via:	PC tools, Smartcard, SD card
Options	
Keypad:	Advanced plain text multi-language LCD with or without real-time clock Remote mountable plain text multi-language LCD
SI Modules:	Communications, additional I/O, speed feedback and additional safety
Adaptor:	SD Card Adaptor

Voltage ratings	
100 V (100 V - 120 V ± 10%)	
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	✓

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	✓
Closed loop Rotor Flux Control for induction motors (RFC-A)	Opt
Closed loop permanent magnet motor control (RFC-S)	
Active Front End (AFE) power quality convertor	✓

Unidrive M700 AC drive

Class leading induction and permanent magnet servo motor performance, with real-time Ethernet

- M700 adds onboard Ethernet, comprehensive position feedback and high performance control of dynamic permanent magnet servo motors.
- Fully compatible upgrade for existing Unidrive SP users.

M700 delivers maximum machine throughput through greater control with single and multi-axis network synchronization. Onboard real-time Ethernet (IEEE 1588 V2), advanced motion control and high speed I/O for position capture enables machine builders to easily create more sophisticated and flexible machines.

Other Unidrive M700 benefits include:

Maximize machine productivity through integration with centralized control systems

- Ethernet IEEE 1588 V2 hardware implementation for maximum synchronization accuracy.
- Integrated dual port Ethernet switch for easy connectivity.
- Up to three SI modules to add position feedback, I/O and fieldbus communications.

Maximize machine productivity through shaft performance with any motor technology

- High bandwidth motor control algorithm for open and closed loop induction, synchronous reluctance and PM servo motors with up to 3,300 Hz current loop bandwidth and 250 Hz speed loop bandwidth.
- Flexible feedback from robust resolvers to high resolution encoders.

Flexible universal encoder port

Increase flexibility and reduce system costs through simultaneously connecting up to three* high performance encoder channels as standard. As an example, the drive can interface with a feedback encoder, reference encoder and provide a simulated encoder output without the need for additional option modules.

- Two universal encoder input channels
  - Support for standard incremental and SinCos encoders, including those with absolute commutation signals.
  - Support for communications based encoders with up to 4 Mb rate and line compensation to support long cable lengths of up to 100m.
    - Support includes BiSS C, EnDat 2.2, HIPERFACE and SSI.
  - Support for Resolver for feedback in harsh environments.
- One simulated encoder output
  - Position reference for CAMs, digital lock and electronic gearbox applications.
  - Implemented through hardware to maximize performance.

*The functionality is dependent upon the encoder types being used

Onboard PLC and Advanced Motion Controller

Simple onboard CODESYS based PLC with a real-time task for interfacing with the drives 1.5 axis Advanced Motion Controller. Key features include:

- 250 µs cycle time
- Motion profile generator
- Electronic gearbox
- Interpolated CAM
- Homing function
- High speed position freeze

Typical applications:

- Speed and position control for gearing and ratio control, winding (coilers), web handling, metal cutting, flying shear, rotary knife, test stands, printing, packaging machines, textiles, woodworking, tire manufacturing.

Select the M700 feature-set for your application

To even more closely match customer needs, the M700 offers the following 3 variants:

M700 - Ethernet

Onboard real-time Ethernet is included on the standard M700, with 1 x Safe Torque Off (STO) and both analog and digital I/O, making it an incredibly versatile high performance AC drive.

M701 - Unidrive SP replacement

Designed to match Control Techniques' highly popular Unidrive SP feature-set. This includes RS485 communications, 1 x STO, analog and digital I/O, identical control connectors, with Unidrive SP Smartcard parameter sets supported to make upgrading to Unidrive M as simple as possible.

M702 - Safety Enhanced

The safety enhanced M702 has 2 x STO, onboard real-time Ethernet and digital I/O; where easy integration with modern control and safety systems is paramount. If analog I/O is required, this can be provided by an SI-I/O option module.

Key data

Heavy Duty rating:	0.75 kW – 2.8 MW (1.0 hp - 4,200 hp)
Supply phases:	3 phase
Standard features	
Intelligence:	Onboard PLC and Advanced Motion Controller
Onboard comms:	M700 & M702 – Ethernet, M701 – RS485
Feedback:	2 x Encoder inputs 1 x Simulated encoder output
Machine safety:	M700 & M701 - 1 x Safe Torque Off (STO) terminal M702 – 2 x STO terminals SIL3/PLe compliant
Keypad:	No keypad as standard
Option slots:	3
Parameter cloning via:	PC tools, Smartcard, SD card
Options	
Keypad:	Advanced plain text multi-language LCD with or without real-time clock Remote mountable plain text multi-language LCD
SI Modules:	Communications, additional I/O, position feedback, legacy SyPT applications, advanced machine control processing (with or without Ethernet) and additional safety
Adaptor:	SD Card Adaptor

Voltage ratings	
100 V (100 V - 120 V ± 10%)	
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	✓

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	✓
Closed loop Rotor Flux Control for induction motors (RFC-A)	✓
Closed loop permanent magnet motor control (RFC-S)	✓
Active Front End (AFE) power quality convertor	✓

Unidrive M800 AC drive

Ultimate performance through advanced onboard machine control

- M800 adds a powerful second onboard micro processor for high performance CODESYS based machine control.

M800 and M810 deliver our most powerful advanced onboard machine control, encompassing a 1.5 axis motion controller, real-time drive-to-drive synchronization, high speed digital I/O and integrated safety features, greatly reducing the need for expensive external components.

Comprehensive application programs are intuitively written using Machine Control Studio (based on the industry standard CODESYS environment) to build highly flexible and productive machines quickly.

CODESYS

Other Unidrive M800 benefits include:

Optimize machine productivity with powerful networked onboard automation and motion control

- Standard onboard MCi co-processor based machine controller.
- MCi machine controller configured using industry standard IEC 61131-3 programming languages within the CODESYS programming environment.
- Additional MCi click-in modules can be added for multi-processing, giving even greater machine control capability.
- Access to a comprehensive library of drive and machine control function blocks and applications allows the user to achieve performance without effort.

Open Ethernet communications with IEEE 1588 V2 network synchronization

- IEEE 1588 V2 hardware implementation with sub microsecond synchronization accuracy.
- Integrated dual port switches for easy connectivity.
- Integration with external I/O and control of non-intelligent drives.

Maximizes machine productivity through shaft performance with any motor technology

- High bandwidth motor control algorithm, including servo control with up to 3,300 Hz current loop bandwidth and 250 Hz speed loop bandwidth.
- Flexible three channel encoder port, for feedback encoder, reference encoder and a simulated encoder output. Encoder inputs are able to accept a wide range of feedback devices, from robust resolvers to high resolution SinCos encoders.

Maximize throughput while protecting people and machinery, meeting modern machine safety requirements

- Dual STO for integration with safety systems and elimination of external components.
- Advanced safety* to meet the IEC 61800-5-2 functional safety standard, covering numerous functions including STO, Safe Stop 1 and 2, Safe Limited Speed, Safe Limited Position etc.

*Future availability

Typical applications:

- Speed and position control with onboard application software for gearing and ratio control, winding (coilers), web handling, metal cutting, flying shear, rotary knife, test stands, printing, packaging machines, textiles, woodworking, tire manufacturing.

Scalable machine control

M800 - Integrated MCi200 machine controller and Ethernet networking

The M800 offers powerful CODESYS programming and Ethernet communications capability through the drive's integrated network interface. M800 is ideal for standalone motion applications and control of small machines requiring integration with I/O and HMIs, or PLC based systems where separation of PLC and motion functions is desirable.

M810 - Integrated MCi210 machine controller offering dual Ethernet networking

M810 offers high performance CODESYS programming capability as in the M800, but with the addition of increased program memory and an extra dual port switched Ethernet interface directly on the CODESYS microprocessor board. The additional Ethernet interface increases the data throughput capability and enables the simultaneous connection to two segregated Ethernet networks.

Size 4 M810 and size 3 M800 drives

Key data

Heavy Duty rating:	0.75 kW – 2.8 MW (1.0 hp - 4,200 hp)
Supply phases:	3 phase
Standard features	
Intelligence:	M800 - Onboard MCi200 Machine Controller M810 - Onboard MCi210 Machine Controller
Onboard comms:	Ethernet
Feedback:	2 x Encoder inputs 1 x Simulated encoder output
Machine safety:	2 x Safe Torque Off (STO) terminals SIL3/PLe compliant
Keypad:	No keypad as standard
Option slots:	2
Parameter cloning via:	PC tools, Smartcard, SD card
Options	
Keypad:	Advanced plain text multi-language LCD with or without real-time clock Remote mountable plain text multi-language LCD
SI Modules:	Communications, additional I/O, position feedback, additional machine control processing (with or without Ethernet) and additional safety*
Adaptor:	SD Card Adaptor

*Future availability

Voltage ratings	
100 V (100 V - 120 V ± 10%)	
200 V (200 V - 240 V ± 10%)	✓
400 V (380 V - 480 V ± 10%)	✓
575 V (500 V - 575 V ± 10%)	✓
690 V (500 V - 690 V ± 10%)	✓

Control mode	
Open loop vector or V/Hz induction motor control	✓
Open loop Rotor Flux Control for induction motors (RFC-A)	✓
Open loop permanent magnet motor control (RFC-S)	✓
Closed loop Rotor Flux Control for induction motors (RFC-A)	✓
Closed loop permanent magnet motor control (RFC-S)	✓
Active Front End (AFE) power quality convertor	✓

Integrate, automate, communicate with Unidrive M options

Unidrive M drives support a wide range of optional click-in System Integration (SI) 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

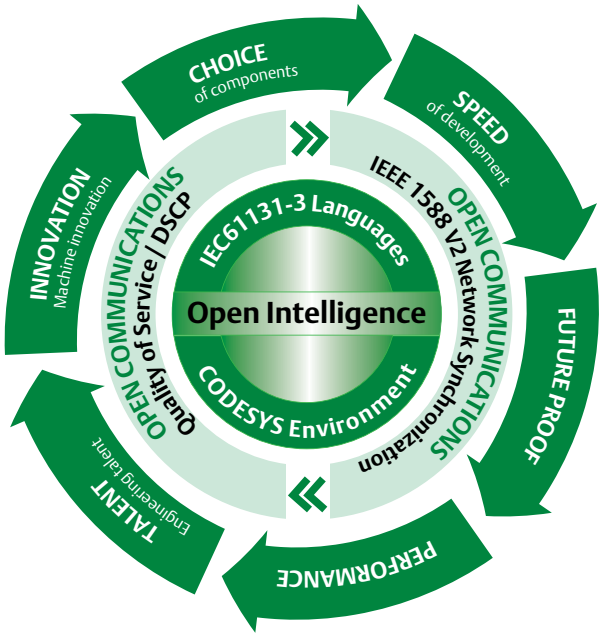
Option	Description
System Integration Modules	
SI-Encoder 	Incremental encoder input interface module. Provides Closed loop Rotor Flux Control for induction motors (RFC-A) on M600.
SI-Universal Encoder 	Additional combined encoder input and output interface supporting Incremental, SinCos, HIPERFACE, EnDAT and SSI encoders.
SI-PROFIBUS 	PROFIBUS interface module.
SI-DeviceNet 	DeviceNet interface module.
SI-CANopen 	CANopen interface module supporting various profiles, including several drive profiles.
SI-Ethernet 	External Ethernet module that supports EtherNet/IP, Modbus TCP/IP and PROFINET RT* and has an integrated web server that can generate emails. The module can be used to provide high speed drive access, global connectivity and integration with IT network technologies, such as wireless networking.
SI-PROFINET RT 	PROFINET RT interface module.
SI-EtherCAT 	EtherCAT interface module.
SI-Applications Plus 	A Unidrive SP SM-Applications compatible module, which allows existing SyPTPro application programs to be re-compiled for Unidrive M700.
MCi200 	System integration module that provides a second processor, allowing advanced machine control using industry standard CODESYS programming environment.
MCi210 	System integration module that provides a second processor, allowing advanced machine control using industry standard CODESYS programming environment. Also it has additional memory and a dual port switched Ethernet interface directly on the CODESYS processor, extending machinery control performance and enables the M700 and M800 to have simultaneous connectivity to 2 separate Ethernet networks.
SI-I/O 	Extended I/O interface module to increase the number of I/O points on a drive. Provides additional: 4 x Digital I/O, 3 x Analog inputs (default)/Digital inputs, 1 x Analog output (default)/Digital input, 2 x Relays.
SI-Safety 	Safety module that provides an intelligent, programmable solution to meet the IEC 61800-5-2/ISO 13849-1 functional safety standard up to SIL3/PLe.
Drive interface units	
AI-Back-up Adaptor 	Port adaptor that allows the drive to use an SD card for parameter cloning, and an input for 24 V back-up.
SD Card Adaptor 	Conversion device that allows an SD card to be inserted into the Smartcard slot, for parameter cloning and application programs.
AI-485 Adaptor 	Port adaptor that allows the drive to communicate via RS485.
KI-485 Adaptor 	This allows the drive to communicate via RS485. This is commonly used for programming if the drive has no keypad.
CI-485 Adaptor 	Port adaptor that allows the drive to communicate via RS485. This is commonly used to connect to the remote keypad, or for RS485 communications if there is no AI-485 adaptor fitted or it is already in use.
Other hardware	
Remote I/O 	Flexible I/O system for remote connectivity.

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.

	Type	Applicable to						
		M100	M200	M300	M400	M600	M700	M800
	Feedback					•	•	•
						•	•	•
	Communications		•	•	•	•	•	•
			•	•	•	•	•	•
			•	•	•	•	•	•
			•	•	•	•	•	•
						•	•	•
			•	•	•	•	•	•
	Applications						•	
							•	•
							•	•
	Additional I/O		•	•	•	•	•	•
	Safety			• *	• *	•	•	• *
	Back-up	•	•	•	•			
						•	•	•
	Communications		•	•	•			
						•	•	•
					•			
	External additional I/O						•	•

*Future availability

Intelligent Machine Architecture – Open technology, exceptional performance



Control Techniques Intelligent Machine Architecture is an open approach to automation, designed to maximize machine throughput. This is achieved through a synchronized high performance network of intelligent control devices, sensors and actuators, linked together through open and globally available, industry standard Ethernet. Open standards provide significant benefits to machine builders and OEMs:

- Choice to select the 'best-in-class' for every machine component.
- Familiarity with standards accelerates machine development and innovation.
- Broad acceptance of open standards makes it easier to recruit skilled engineering staff with the required expertise.

How is Intelligent Machine Architecture different?

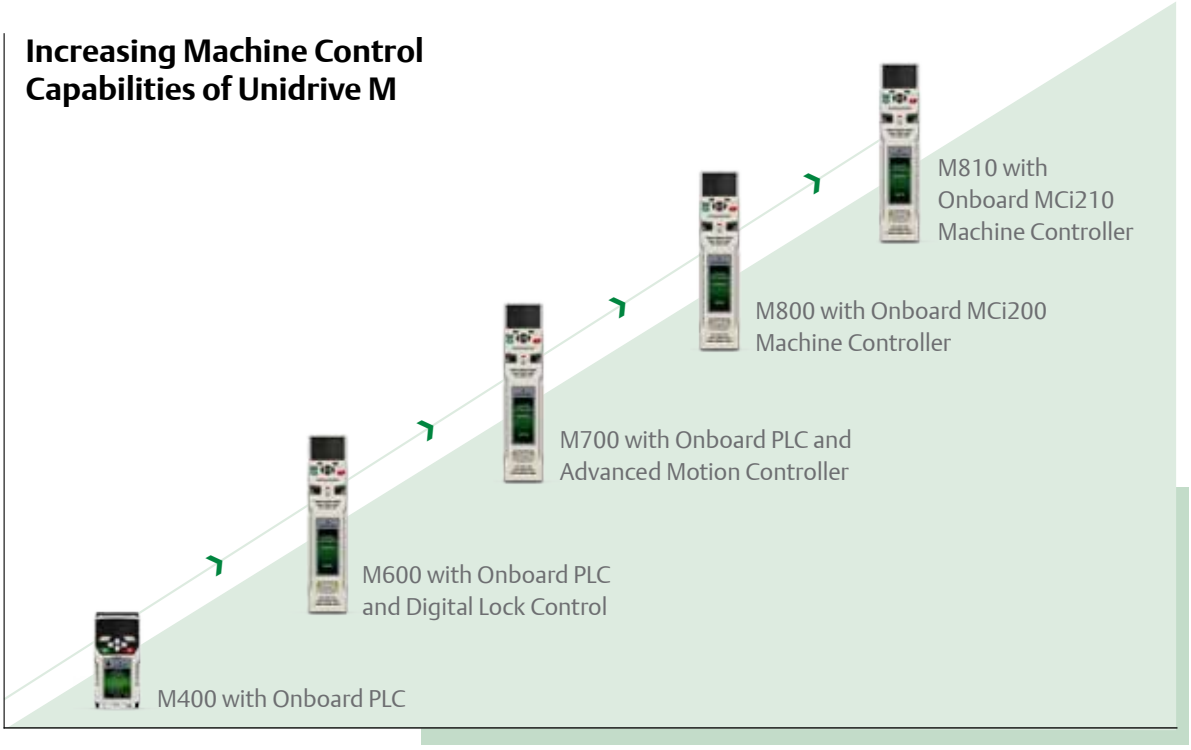
- Standard networking hardware - no limits on integration possibilities.
- Performance without effort - ease of use is prioritized with high level software tools that are proven to speed up the machine development and maximize machine performance.
- Increased network efficiency - intelligence is networked and not centralized, removing traffic bottlenecks.
- Inclusive networking - support for EtherNet/IP, Modbus TCP/IP and PROFINET RT* allows interaction with the widest range of automation equipment from a global pool of automation providers.
- Only leading technologies - Intelligent Machine Architecture is based on feedback from customers and adopts only the leading open standards throughout.

IEC 61131-3 motion and automation programming

Unidrive M offers the choice to integrate machine control functionality within the drive:

- Simple onboard CODESYS based PLC.
- Advanced 1.5 axis Motion Controller, key features include:
  - 250 µs cycle time
  - Motion profile generator
  - Electronic gearbox
  - Interpolated CAM
  - Homing function
  - High speed position freeze
- High performance MCi200 and MCi210 Machine Control modules for extra control performance.

* Future availability



Machine Control Studio software - powered by CODESYS

Control Techniques Machine Control Studio provides a flexible and intuitive environment for programming Unidrive M's new automation and motion control features. The new software offers programming for:

- Unidrive M400, M600 and M700's onboard PLC.
- Unidrive M800 and M810 with integrated machine control.
- High performance MCi200 and MCi210 Machine Control modules.
- Ethernet network data configurations.

Machine Control Studio is powered by CODESYS, the leading open software for programmable machine control. The programming environment is fully IEC 61131-3 compliant, meaning that it is familiar and therefore fast and easy to use for control engineers around the world.

The following IEC 61131-3 programming languages are supported:

- Structured Text (ST)
- Function Block Diagram (FBD)
- Structured Function Chart (SFC)
- Ladder Diagram (LD)
- Instruction List (IL)

Also supported:

- Continuous Function Chart (CFC)

Intuitive IntelliSense functionality helps to write consistent and robust programming, speeding up software development. Programmers have access to a vibrant open-source community for function blocks. Control Techniques also provides support for customers' own function block libraries, with on-line monitoring of program variables with user defined watch windows and help for on-line change of program, in line with current PLC practice.

Transformer core cutting line

Open, efficient, synchronized Ethernet

Control Techniques Intelligent Machine Architecture uses standard Ethernet to connect the machine controller parts and other devices such as PCs, I/O and HMIs together. Ethernet provides machine builders and manufacturers with real benefits:

- Maximize machine productivity through high performance deterministic Ethernet, suitable for complete Machine Automation and demanding synchronized motion functions.
- Access future developments in IT based industries where billions of nodes are installed, future proofing your investments .
- Access to a massive choice of network monitoring and diagnostics tools.

Through advances in Ethernet technology, standard Ethernet hardware now delivers the highest levels of machine performance in industrial networking. For communication between drives, PCs, I/O and other devices, Unidrive M uses open protocols such as TCP/IP and UDP, delivering exceptional performance:

- Network synchronization of less than 1 µs (typically <200 ns)
- 250 µs cycle time for the most demanding motion applications
- Virtually unlimited node count
- Bandwidth protection through a network gateway that manages non-real-time Ethernet messages
- Master/follower and peer-to-peer communications capabilities

Network synchronization

Network synchronization is a common requirement across many industries including industrial automation, entertainment, telecommunications and power generation. This requirement led to the development of the Precision Time Protocol (PTP) standard which provides a mechanism for precisely synchronizing clocks across all PTP capable nodes in an Ethernet network. PTP is defined by the international standard IEEE 1588 V2.

The wide range of applications for PTP has driven demand for chip manufacturers to provide network controllers that economically support this protocol. This has led to a massive and increasing choice of networking products that cost-effectively integrate PTP, including industrial Ethernet switches and I/O. Unidrive M integrates PTP onboard the drive within a dual port Ethernet switch enabling high precision synchronization across the Ethernet network.

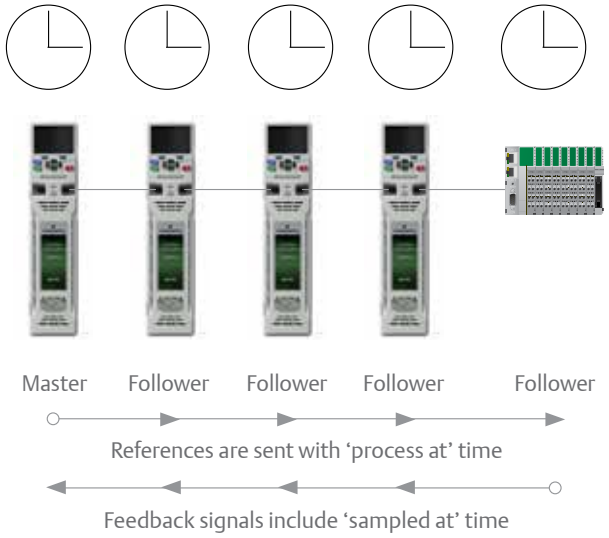
Traffic management

Manage non-critical network traffic through a network gateway

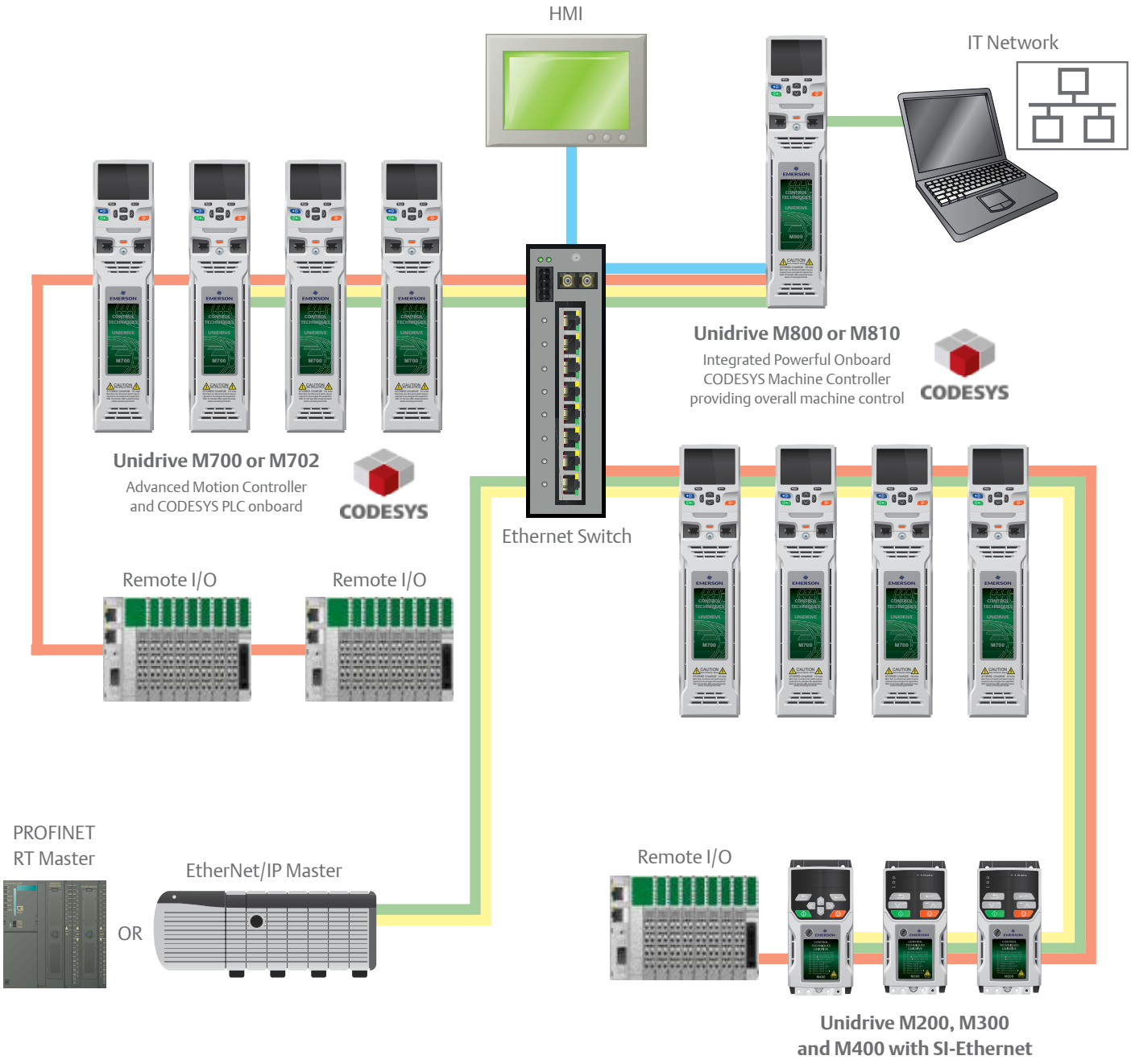
Unidrive M integrates a network gateway feature within the drive's dual port switch. This uses standards called Differentiated Services Code Point (DSCP) and Quality of Service (QoS) to protect network bandwidth by eliminating or delaying non-critical messages from outside the control network.

IEEE 1588 V2 clock explanation

IEEE 1588 V2 distributed clocks are used to automatically synchronize the position, speed and current loops across all drives.



Unidrive M Flexible Ethernet Communications



Synchronized communications using IEEE 1588 V2 PTP

PROFINET RT* or EtherNet/IP communications

Modbus TCP/IP communications

IT communications - Managed using QoS to ensure network reliability

System Integration (SI) option modules allow additional connectivity with EtherCAT, PROFIBUS, DeviceNet, CANopen and I/O. Plus connectivity to legacy CTNet system

* Future availability

Unidrive M's onboard real-time Ethernet (using IEEE 1588 V2) provides improved machine control with fast and flexible communications. Synchronization can be achieved across the network below 1 µs, with update rates as low as 250 µs with a virtually unlimited node count.

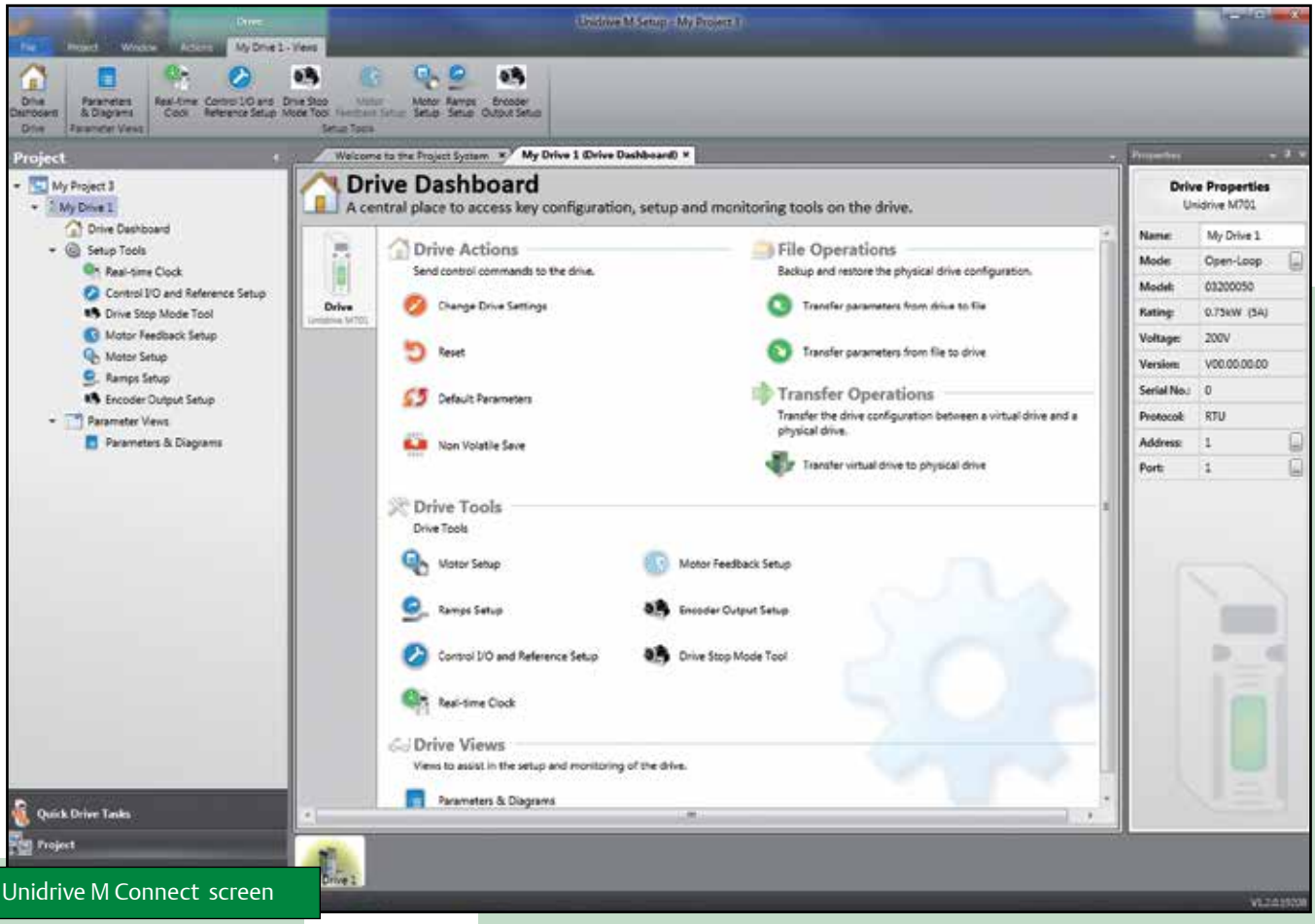
Unidrive M set-up, configuration and monitoring

Unidrive M is quick and easy to set-up. The drives may be configured using a selection of keypads, SD or Smartcard or the supplied commissioning software that guides the user through the configuration process.

User interface options

Unidrive M benefits from a number of keypad choices to meet your application needs:

Type		Benefit	M100	M200	M300	M400	M600	M700	M800
Fixed LED keypad		LED keypad fitted as standard for quick and easy commissioning and use.	•	•	•				
Fixed LED keypad with speed reference potentiometer		LED keypad with user friendly speed reference potentiometer for quick and easy commissioning and use.	M101	M201					
CI-Keypad		Intuitive plain text, multi-language LCD keypad for rapid set-up and superior diagnostics maximizes machine up-time. Novel clipless fit provides easy removal.				Opt			
Remote keypad		All the features of the CI-Keypad LCD, but remote mountable. This allows flexible mounting on the outside of a panel and meets IP66 (NEMA 4).		Opt	Opt	Opt	Opt	Opt	Opt
KI-Keypad		Plain text, multi-language LCD keypad with up to 4 lines of text for in depth parameter and data descriptions, for an enhanced user experience.					Opt	Opt	Opt
KI-Keypad RTC		All the features of the KI-Keypad, but with battery operated real-time clock. This allows accurate time stamping of events, aiding diagnostics.					Opt	Opt	Opt



Unidrive M Connect screen

Unidrive M Connect commissioning tool

Based on Control Techniques' 25 years of experience, Unidrive M Connect is our latest drive configuration tool for commissioning, optimizing and monitoring drive/system performance. Its development draws from extensive user research, using human centered design principles to give the ultimate user experience:

- Fast task based commissioning and easy maintenance of the Unidrive M family is simplified via familiar Windows interface.
- Intuitive graphical tools enhance and simplify user experience.
- For experienced users, dynamic drive logic diagrams and enhanced searchable listings are present.
- Drive and motor performance can be optimized with minimal specialized drive knowledge.
- Tool is scalable to match application requirements.
- Supports the import of Unidrive SP parameter files and allows full drive cloning (i.e. parameter sets and application program).
- Multiple simultaneous communications channels for a more complete overview of the system.
- Drive discovery gives the ability to find drives on a network automatically without the user having to specify their addresses.
- Automatic Modbus RTU baud rate scanning on the Unidrive M drives which have a RS485 connection.

Unidrive M's portable memory devices

Smartcard

The optional Smartcard memory device can be used to back-up parameter sets and basic PLC programs, as well as copying them from one drive to another, including from a Unidrive SP. It also allows:

- Simplified drive maintenance and commissioning
- Quick set-up for sequential build of machines
- Machine upgrades to be stored on a Smartcard and sent to the customer for installation

SD card

Unidrive M uses popular SD cards for quick and easy parameter and program storage using an adaptor, allowing them to fit in the drive Smartcard slot. SD cards provide a huge memory capability allowing a complete system reload if required, and can be easily pre-programmed on a common PC.

Unidrive M frame sizes and ratings

SINGLE DRIVES

Frame size		1	2	3 (M100 to M400)	4 (M100 to M400)	3 (M600 to M800)	4 (M600 to M800)	
Frame sizes available	M100	•	•	•	•			
	M200 & M300	•	•	•	•			
	M400	•	•	•	•			
	M600 → M810					•	•	
Dimensions (H x W x D)	mm	160 x 75 x 130 DIN rail mounting: 137 x 75 x 130	205 x 75 x 150 DIN rail mounting: 180 x 75 x 150	226 x 90 x 160	277 x 115 x 175	382 x 83 x 200	391 x 124 x 200	
	in	6.3 x 3.0 x 5.1 DIN rail mounting: 5.4 x 3.0 x 5.1	8.1 x 3.0 x 5.9 DIN rail mounting: 7.1 x 3.0 x 5.9	8.9 x 3.5 x 6.3	10.9 x 4.5 x 6.9	15.0 x 3.3 x 7.9	15.4 x 4.9 x 7.9	
Weight	kg (lb)	0.75 (1.65)	1.0 (2.2)	1.5 (3.3)	3.13 (6.9)	4.5 (9.9) Max	6.5 (14.3)	
Line Choke	Internal	•	•	•	•	•	•	
	External							
Max Continuous Heavy Duty kW Rating	@ 100 V	0.25 kW - 0.37 kW (0.33 hp - 0.5 hp)	0.75 kW - 1.1 kW (1.0 hp - 1.5 hp)					
	@ 200 V	0.25 kW - 0.75 kW (0.33 hp - 1 hp)	0.37 kW - 1.5 kW (0.5 hp - 2 hp)	2.2 kW (3 hp)	3 kW - 4 kW (4 - 5 hp)	0.75 kW - 2.2 kW (1 hp - 3 hp)	3 kW - 4 kW (3 hp - 5 hp)	
	@ 400 V	N/A	0.37 kW - 1.5 kW (0.5 hp - 2 hp)	2.2 kW - 4 kW (3 hp - 5 hp)	5.5 kW - 7.5 kW (7.5 hp - 10 hp)	0.75 kW - 4 kW (1 hp - 5 hp)	5.5 kW - 7.5 kW (10 hp)	
	@ 575 V	N/A						
	@ 690 V	N/A						

All dimensions include mounting brackets except for the DIN rail alternative for frames 1 and 2.

	5	6	7	8	9A*	9E	10	11*
	•	•						
	•	•	•	•	•	•*		
	•	•	•	•	•	•	•	•
	M200 to M400 391 x 143 x 192 M600 to M800 391 x 143 x 200	M200 to M400 391 x 210 x 221 M600 to M800 391 x 210 x 227	557 x 270 x 280	803 x 310 x 290	1108 x 310 x 290	1069 x 310 x 288	1069 x 310 x 288	1410 x 310 x 310
	M200 to M400 15.4 x 5.6 x 7.6 M600 to M800 15.4 x 5.6 x 7.6	M200 to M400 15.4 x 8.3 x 8.7 M600 to M800 15.4 x 8.3 x 8.9	21.9 x 10.6 x 11.0	31.6 x 12.2 x 11.4	43.6 x 12.2 x 11.4	42.1 x 12.2 x 11.3	42.1 x 12.2 x 11.3	55.5 x 12.2 x 12.2
	7.4 (16.3)	14 (30.9)	28 (61.7)	52 (114.6)		46 (101.4)	46 (101.4)	
	•	•	•	•	•			
						•	•	•
			N/A					
	5.5 kW (7.5 hp)	7.5 kW - 11 kW (10 hp - 15 hp)	15 kW - 22 kW (20 hp - 30 hp)	30 kW - 37 kW (40 hp - 50 hp)	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
	11 kW - 15 kW (20 hp - 25 hp)	18.5 kW - 22 kW (30 hp)	30 kW - 45 kW (50 hp - 75 hp)	55 kW - 75 kW (100 hp - 125 hp)	90 kW - 110 kW (150 hp)	90 kW - 110 kW (150 hp)	132 kW - 160 kW (200 hp - 250 hp)	185 kW - 250 kW (300 hp - 400 hp)
	1.5 kW - 4 kW (2 hp - 5 hp)	5.5 kW - 22 kW (7.5 hp - 30 hp)	30 kW - 37 kW (40 hp - 50 hp)	45 kW - 55 kW (60 hp - 75 hp)	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)
			15 kW - 45 kW (20 hp - 60 hp)	55 kW - 75 kW (75 hp - 100 hp)	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)

*Future availability

Unidrive M frame sizes and ratings

MODULAR DRIVES

INVERTER & RECTIFIER

INVERTER

Frame size		9	10	11*	9	10	11*
Frame sizes available	M600 → M810	•	•	•	•	•	•
Dimensions (H x W x D)	mm	1069 x 310 x 289	1069 x 310 x 289	1410 x 310 x 310	773 x 310 x 290	773 x 310 x 290	880 x 310 x 310
	in	42.1 x 12.2 x 11.4	42.1 x 12.2 x 11.4	55.5 x 12.2 x 12.2	30.4 x 12.2 x 11.4	30.4 x 12.2 x 11.4	34.7 x 12.2 x 12.2
Weight	kg (lb)						
Line Choke	Internal						
	External	•	•	•			
Max Continuous Heavy Duty kW Rating / A Rating	@ 200 V	45 kW - 55 kW (60 hp - 75 hp)	75 kW - 90 kW (100 hp - 125 hp)	N/A	45 kW - 55 kW (60 hp - 75 hp)	75 kW - 90 kW (100 hp - 125 hp)	N/A
	@ 400 V	90 kW - 110 kW (150hp)	132 kW - 160 kW (200 hp - 250 hp)	185 kW - 250 kW (300 hp - 400 hp)	90 kW - 110 kW (150hp)	132 kW - 160 kW (200 hp - 250 hp)	185 kW - 250 kW (300 hp - 400 hp)
	@ 575 V	75 kW - 90 kW (100 hp - 125 hp)	110 kW - 132 kW (150 hp - 200 hp)	150 kW - 225 kW (200 hp - 300 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)
	@ 690 V	90 kW - 110 kW (125 hp - 150 hp)	132 kW - 160 kW (175 hp - 200 hp)	185 kW - 250 kW (250 hp - 300 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)

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

Dimensions include mounting brackets.

RECTIFIER

6 pulse

12 pulse

10	11*	11*
355 x 310 x 290	570 x 310 x 310	570 x 310 x 310
15.8 x 12.2 x 11.4	22.4 x 12.2 x 12.2	22.4 x 12.2 x 12.2
•	•	•
410 A	N/A	410 A
452 A	681 A	2 x 415 A
248 A	485 A	2 x 398 A

*Future availability

Automotive assembly plant

Unidrive M100 to M400 ratings

100/120 Vac ±10 %							
Order Code	Supply Phases	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)
M100 to M400-01100017A	1	1.7	0.25	0.33	For Normal Duty applications, use Heavy Duty ratings.		
M100 to M400-01100024A	1	2.4	0.37	0.5			
M100 to M400-02100042A	1	4.2	0.75	1			
M100 to M400-02100056A	1	5.6	1.1	1.5			

200/240 Vac ±10 %							
Order Code	Supply Phases	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)
M100 to M400-01200017A	1	1.7	0.25	0.33	For Normal Duty applications, use Heavy Duty ratings.		
M100 to M400-01200024A	1	2.4	0.37	0.5			
M100 to M400-01200033A	1	3.3	0.55	0.75			
M100 to M400-01200042A	1	4.2	0.75	1			
M100 to M400-02200024A	1/3	2.4	0.37	0.5			
M100 to M400-02200033A	1/3	3.3	0.55	0.75			
M100 to M400-02200042A	1/3	4.2	0.75	1			
M100 to M400-02200056A	1/3	5.6	1.1	1.5			
M100 to M400-02200075A	1/3	7.5	1.5	2			
M100 to M400-03200100A	1/3	10	2.2	3			
M100 to M400-04200133A	1/3	13.3	3	3			
M100 to M400-04200176A	3	17.6	4	5			
M200 to M400-05200250A	3	25	5.5	7.5	30	7.5	10
M200 to M400-06200330A	3	33	7.5	10	50	11	15
M200 to M400-06200440A	3	44	11	15	58	15	20
M400-07200610A	3	61	15	20	75	18.5	25
M400-07200750A	3	75	18.5	25	94	22	30
M400-07200830A	3	83	22	30	117	30	40
M400-08201160A	3	116	30	40	149	37	50
M400-08201320A	3	132	37	50	180	45	60
M400-09201760A*	3	176	45	60	216	55	75
M400-09202190A*	3	219	55	75	266	75	100
M400-09201760E*	3	176	45	60	216	55	75
M400-09202190E*	3	219	55	75	266	75	100

380/480 Vac ±10 %							
Order Code	Supply Phases	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)
M100 to M400-02400013A	3	1.3	0.37	0.5	For Normal Duty applications, use Heavy Duty ratings.		
M100 to M400-02400018A	3	1.8	0.55	0.75			
M100 to M400-02400023A	3	2.3	0.75	1			
M100 to M400-02400032A	3	3.2	1.1	1.5			
M100 to M400-02400041A	3	4.1	1.5	2			
M100 to M400-03400056A	3	5.6	2.2	3			
M100 to M400-03400073A	3	7.3	3	3			
M100 to M400-03400094A	3	9.4	4	5			
M100 to M400-04400135A	3	13.5	5.5	7.5			
M100 to M400-04400170A	3	17	7.5	10			
M200 to M400-05400270A	3	27	11	20	30	15	20
M200 to M400-05400300A	3	30	15	20	30	15	20
M200 to M400-06400350A	3	35	15	25	38	18.5	25

* Future availability

M200 to M400-06400420A	3	42	18.5	30	48	22	30
M200 to M400-06400470A	3	47	22	30	63	30	40
M400-07400660A	3	66	30	50	79	37	50
M400-07400770A	3	77	37	60	94	45	60
M400-07401000A	3	100	45	75	112	55	75
M400-08401340A	3	134	55	100	155	75	100
M400-08401570A	3	157	75	125	184	90	125
M400-09402000A*	3	200	90	150	221	110	150
M400-09402240A*	3	224	110	150	266	132	200
M400-09402000E*	3	200	90	150	221	110	150
M400-09402240E*	3	224	110	150	266	132	200

500/575 Vac ±10 %							
Drive	Supply Phases	Heavy Duty			Normal Duty		
		Max Continuous Current (A)	Typical Output (kW)	Motor Power (HP)	Max Continuous Current (A)	Typical Output (kW)	Motor Power (HP)
M200 to M400-05500030A	3	3	1.5	2	3.9	2.2	3
M200 to M400-05500040A	3	4	2.2	3	6.1	4	5
M200 to M400-05500069A	3	6.9	4	5	10	5.5	7.5
M200 to M400-06500100A	3	10	5.5	7.5	12	7.5	10
M200 to M400-06500150A	3	15	7.5	10	17	11	15
M200 to M400-06500190A	3	19	11	15	22	15	20
M200 to M400-06500230A	3	23	15	20	27	18.5	25
M200 to M400-06500290A	3	29	18.5	25	34	22	30
M200 to M400-06500350A	3	35	22	30	43	30	40
M400-07500440A	3	44	30	40	53	37	50
M400-07500550A	3	55	37	50	73	45	60
M400-08500630A	3	63	45	60	86	55	75
M400-08500860A	3	86	55	75	108	75	100
M400-09501040A*	3	104	75	100	125	90	125
M400-09501310A*	3	131	90	125	150	110	150
M400-09501040E*	3	104	75	100	125	90	125
M400-09501310E*	3	131	90	125	150	110	150

500/690 Vac ±10 %							
Drive	Supply Phases	Heavy Duty			Normal Duty		
		Max Continuous Current (A)	Typical Output (kW)	Motor Power (HP)	Max Continuous Current (A)	Typical Output (kW)	Motor Power (HP)
M400-07600190A	3	19	15	20	23	18.5	25
M400-07600240A	3	24	18.5	25	30	22	30
M400-07600290A	3	29	22	30	36	30	40
M400-07600380A	3	38	30	40	46	37	50
M400-07600440A	3	44	37	50	52	45	60
M400-07600540A	3	54	45	60	73	55	75
M400-08600630A	3	63	55	75	86	75	100
M400-08600860A	3	86	75	100	108	90	125
M400-09601040A*	3	104	90	125	125	110	150
M400-09601310A*	3	131	110	150	150	132	175
M400-09601040E*	3	104	90	125	125	110	150
M400-09601310E*	3	131	110	150	150	132	175

Heavy Duty

M100: Suitable for demanding applications, current overload of 150 % (60 s) is available for dynamic loads.

M200 to M400: Suitable for demanding applications, current overload of 180 % (3 s) is available for dynamic loads.

Normal Duty

Suitable for most applications, with a current overload capacity of 110 %.

For a full explanation of the drive order code, refer to page 43.

* Future availability

Unidrive M600 to M810 ratings

200/240 Vac ±10%						
Drive	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)
M600 to M810-03200050A	5	0.75	1	6.6	1.1	1.5
M600 to M810-03200066A	6.6	1.1	1.5	8	1.5	2
M600 to M810-03200080A	8	1.5	2	11	2.2	3
M600 to M810-03200106A	10.6	2.2	3	12.7	3	3
M600 to M810-04200137A	13.7	3	3	18	4	5
M600 to M810-04200185A	18.5	4	5	24	5.5	7.5
M600 to M810-05200250A	25	5.5	7.5	30	7.5	10
M600 to M810-06200330A	33	7.5	10	50	11	15
M600 to M810-06200440A	44	11	15	58	15	20
M600 to M810-07200610A	61	15	20	75	18.5	25
M600 to M810-07200750A	75	18.5	25	94	22	30
M600 to M810-07200830A	83	22	30	117	30	40
M600 to M810-08201160A	116	30	40	149	37	50
M600 to M810-08201320A	132	37	50	180	45	60
M600 to M810-09201760A*	176	45	60	216	55	75
M600 to M810-09202190A*	219	55	75	266	75	100
M600 to M810-09201760E	176	45	60	216	55	75
M600 to M810-09202190E	219	55	75	266	75	100
M600 to M810-10202830E	283	75	100	325	90	125
M600 to M810-10203000E	300	90	125	360	110	150

380/480 Vac ±10%						
Drive	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)
M600 to M810-03400025A	2.5	0.75	1	3.4	1.1	1.5
M600 to M810-03400031A	3.1	1.1	1.5	4.5	1.5	2
M600 to M810-03400045A	4.5	1.5	2	6.2	2.2	3
M600 to M810-03400062A	6.2	2.2	3	7.7	3	5
M600 to M810-03400078A	7.8	3	5	10.4	4	5
M600 to M810-03400100A	10	4	5	12.3	5.5	7.5
M600 to M810-04400150A	15	5.5	10	18.5	7.5	10
M600 to M810-04400172A	17.2	7.5	10	24	11	15
M600 to M810-05400270A	27	11	20	30	15	20
M600 to M810-05400300A	30	15	20	30	15	20
M600 to M810-06400350A	35	15	25	38	18.5	25
M600 to M810-06400420A	42	18.5	30	48	22	30
M600 to M810-06400470A	47	22	30	63	30	40
M600 to M810-07400660A	66	30	50	79	37	50
M600 to M810-07400770A	77	37	60	94	45	60
M600 to M810-07401000A	100	45	75	112	55	75
M600 to M810-08401340A	134	55	100	155	75	100
M600 to M810-08401570A	157	75	125	184	90	125
M600 to M810-09402000A*	200	90	150	221	110	150
M600 to M810-09402240A*	224	110	150	266	132	200
M600 to M810-09402000E	200	90	150	221	110	150
M600 to M810-09402240E	224	110	150	266	132	200
M600 to M810-10402700E	270	132	200	320	160	250
M600 to M810-10403200E	320	160	250	361	200	300

* Future availability

500/575 Vac ±10%						
Drive	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)
M600 to M810-05500030A	3	1.5	2	3.9	2.2	3
M600 to M810-05500040A	4	2.2	3	6.1	4	5
M600 to M810-05500069A	6.9	4	5	10	5.5	7.5
M600 to M810-06500100A	10	5.5	7.5	12	7.5	10
M600 to M810-06500150A	15	7.5	10	17	11	15
M600 to M810-06500190A	19	11	15	22	15	20
M600 to M810-06500230A	23	15	20	27	18.5	25
M600 to M810-06500290A	29	18.5	25	34	22	30
M600 to M810-06500350A	35	22	30	43	30	40
M600 to M810-07500440A	44	30	40	53	37	50
M600 to M810-07500550A	55	37	50	73	45	60
M600 to M810-08500630A	63	45	60	86	55	75
M600 to M810-08500860A	86	55	75	108	75	100
M600 to M810-09501040A*	104	75	100	125	90	125
M600 to M810-09501310A*	131	90	125	150	110	150
M600 to M810-09501040E	104	75	100	125	90	125
M600 to M810-09501310E	131	90	125	150	110	150
M600 to M810-10501520E	152	110	150	200	130	200
M600 to M810-10501900E	190	132	200	200	150	200

500/690 Vac ±10%						
Drive	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)
M600 to M810-07600190A	19	15	20	23	18.5	25
M600 to M810-07600240A	24	18.5	25	30	22	30
M600 to M810-07600290A	29	22	30	36	30	40
M600 to M810-07600380A	38	30	40	46	37	50
M600 to M810-07600440A	44	37	50	52	45	60
M600 to M810-07600540A	54	45	60	73	55	75
M600 to M810-08600630A	63	55	75	86	75	100
M600 to M810-08600860A	86	75	100	108	90	125
M600 to M810-09601040A*	104	90	125	125	110	150
M600 to M810-09601310A*	131	110	150	150	132	175
M600 to M810-09601040E	104	90	125	125	110	150
M600 to M810-09601310E	131	110	150	155	132	175
M600 to M810-10601500E	150	132	175	172	160	200
M600 to M810-10601780E	178	160	200	197	185	250

Heavy Duty

M100: Suitable for demanding applications, current overload of 150 % (60 s) is available for dynamic loads.

M200 to M400: Suitable for demanding applications, current overload of 180 % (3 s) is available for dynamic loads.

Normal Duty

Suitable for most applications, with a current overload capacity of 110 %.

For a full explanation of the drive order code, refer to page 43.

* Future availability

Unidrive M feature and specification table

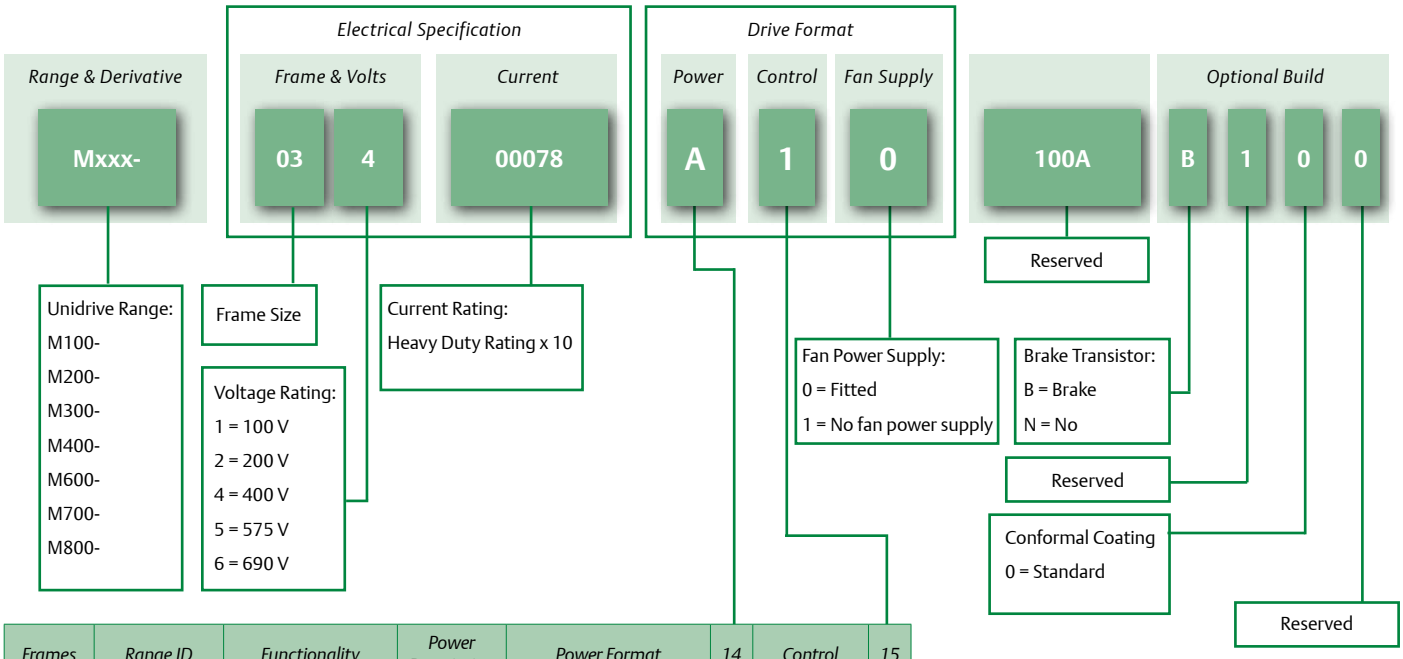
Feature		Unidrive						
		M100	M200	M300	M400	M600	M700	M800
Maximum Heavy Duty Ratings	Motor shaft power (kW)	7.5	22	22	110	2,800	2,800	2,800
	Motor shaft power (hp)	10	30	30	150	4,200	4,200	4,200
	Continuous current (A)	17	47	47	224	TBA	TBA	TBA
Maximum Normal Duty Ratings	Motor shaft power (kW)	N/A	30	30	132	3,500	3,500	3,500
	Motor shaft power (hp)	N/A	40	40	200	5,250	5,250	5,250
	Continuous current (A)	N/A	63	63	266	2,786	2,786	2,786
Voltage rating	100 V (100 V - 120 V ± 10%)	•	•	•	•			
	200 V (200 V - 240 V ± 10%)	•	•	•	•	•	•	•
	400 V (380 V - 480 V ± 10%)	•	•	•	•	•	•	•
	575 V (500 V - 575 V ± 10%)		•	•	•	•	•	•
	690 V (500 V - 690 V ± 10%)				•	•	•	•
Performance	Current loop update	166 µs				62 µs		
	Heavy Duty peak rating	150 % (60 s)	180 % (3 s)			200 % (3 s)		
	Maximum output frequency	550 Hz						
	Switching frequency range	0.67, 1, 2, 3, 4, 6 , 8, 12, 16 kHz - 3 kHz default				2, 3, 4, 6, 8, 12, 16 kHz - 3 kHz default		
	High performance current controllers						•	•
Control modes	Open loop vector or V/Hz induction motor control	•	•	•	•	•	•	•
	Open loop Rotor Flux Control for induction motors (RFC-A)		•	•	•	•	•	•
	Open loop permanent magnet motor control (RFC-S)					•	•	•
	Closed loop Rotor Flux Control for induction motors (RFC-A)					Opt	•	•
	Closed loop permanent magnet motor control (RFC-S)						•	•
	Active Front End (AFE) power quality convertor					•	•	•
Onboard intelligence	Programmable Logic Control (PLC)				•	•	•	•
	Real-time tasks				•	•	•	•
	Digital Lock Control					•	•	•
	Advanced Motion Controller						•	•
	Machine Controller							•
	Enhanced Machine Controller							M810

Feature		Unidrive						
		M100	M200	M300	M400	M600	M700	M800
Onboard comms	RS485					•	M701	
	Ethernet (2 switched ports)						•	•
	Ethernet (2 x 2 switched ports)							M810
Drive status	Status LED				•	•	•	•
Keypad	Fixed LED	•	•	•				
	Fixed speed reference potentiometer	M101	M201					
	Remote mountable LCD (RS485 port adaptor required)		Opt	Opt	Opt	Opt	Opt	Opt
	Removable plain text LCD				Opt	Opt	Opt	Opt
	Removable plain text LCD with real-time clock					Opt	Opt	Opt
SI module slots	0	•						
	1		•	•	•			
	2							•
	3					•	•	
Options	AI-Back-up Adaptor	•	•	•	•			
	AI-485 Adaptor		•	•	•			
	KI-485 Adaptor					•	•	•
	CI-485 Adaptor				•			
	Communications (SI-PROFIBUS, SI-DeviceNet, SI-CANopen, SI-Ethernet, SI-PROFINET RT**, SI-EtherCAT*)		•	•	•	•	•	•
	Additional I/O (SI-I/O)		•	•	•	•	•	•
	Position feedback SI-Encoder, SI-Universal Encoder					•	•	•
	SI-Applications Plus						•	
	Machine controller (MCi200 and MCi210)						•	•
	Safe Motion (SI-Safety)			• *	• *	•	•	• *
Mechanical attributes	Tile mounting					Frame sizes 3,4,5		
	DIN rail mounting on frame sizes 1 and 2	•	•	•	•			
	Mechanical retrofit capabilities	Commander SK compatible mechanical footprint either as standard or with conversion plates				Unidrive SP compatible mechanical footprint either as standard or with conversion plates		
	Common DC bus connections					Frame sizes 3,4,5,6		

*Future availability ** Only available on M600, M700 & M800

Feature		Unidrive						
		M100	M200	M300	M400	M600	M700	M800
Parameter back-up	Serial/Ethernet port cloning (using AI-485 Adaptor on M200, M300 & M400)		Opt	Opt	Opt	•	•	•
	SD card and adaptor	Opt	Opt	Opt	Opt	Opt	Opt	Opt
	Smartcard reader support					•	•	•
	Electronic motor nameplate parameter storage (EnDat, HIPERFACE, BiSS encoders)						•	•
Feedback	Encoder Input 1				•	Opt	•	•
	Encoder Input 2						•	•
	Simulated encoder output						•	•
Onboard I/O	Analog Inputs/Outputs	1/0	2/1	2/1	2/2	3/2	3/2 M702: 0/0	0/0
	Digital Inputs/Outputs/Bidirectional Inputs or Outputs	3/0/1	4/0/1	4/0/1	5/0/2	4/1/3	4/1/3 M702: 3/3/0	3/3/0
	Relay Output	1	1	1	1	1	1	1
Onboard safety	1 x STO terminal					•	•	
	2 x STO terminals			•	•		M702	•
	Advanced safety							Future option
Power and motor control	Stationary autotune for permanent magnet motors					•	•	•
	Mechanical load resonance compensation						•	•
	Wide operating range back-up DC supply					•	•	•
	24 V control back-up	Opt	Opt	Opt	Opt	•	•	•
Other	Fan operation	Temperature controlled with standby (off)				Temperature controlled with user adjustable speed limit		
	User replaceable fan(s)	•	•	•	•	•	•	•
	Ingress rating	IP20 / NEMA1 / UL open class				IP20 / NEMA1 / UL TYPE 1* *UL open class as standard, additional kit needed to achieve Type 1 IP65 / NEMA4 / UL TYPE 12 rating is achieved on the rear of the drive when through panel mounted		
	Conformal coating	•	•	•	•	•	•	•
	Heatsink mounted braking resistor support (up to frame size 5)					•	•	•
	Standby mode (energy saving)	•	•	•	•	•	•	•

Unidrive M Range - Identification



Frames	*Range ID*	*Functionality*	*Power Description*	*Power Format*	*14*	*Control*	*15*
03 to 09	Single drives Mxxx-	No paralleling. Control & fan power supply always fitted	AC to AC	**Internal Choke** 6P Rectifier + Inverter	A	Standard	1
09 to 11	Single drives Mxxx-	No paralleling. Control & fan power supply always fitted	AC to AC	**External Choke** (order separately) 6P Rectifier + Inverter	E	Standard	1
	Modular drives M000- (Unassigned power stage with no control fitted)	Can be paralleled. With or without fan power supply	DC to AC	12P Rectifier + Inverter	T	Unassigned	U
				18P Rectifier + Inverter	N	Master	M
				Inverter	D	Follower	F

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

Unidrive M Rectifier Range - Part Number

Supply Voltage	*Power Supply*	*Frame*	*DC Output Current*	*Item Number*
200 V	6 Pulse	10	410 A	RECT-10204100A10100A0100
400 V	6 Pulse	10	452 A	RECT-10404520A10100A0100
575 V	6 Pulse	10	243 A	RECT-10502430A10100A0100
690 V	6 Pulse	10	248 A	RECT-10602480A10100A0100

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