Unidrive M600

High performance drive for induction and sensorless permanent magnet motors

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

Control Techniques™

EMERSON™
Industrial Automation

Unidrive M
Optimized throughput, open automation systems, maximum ease of use

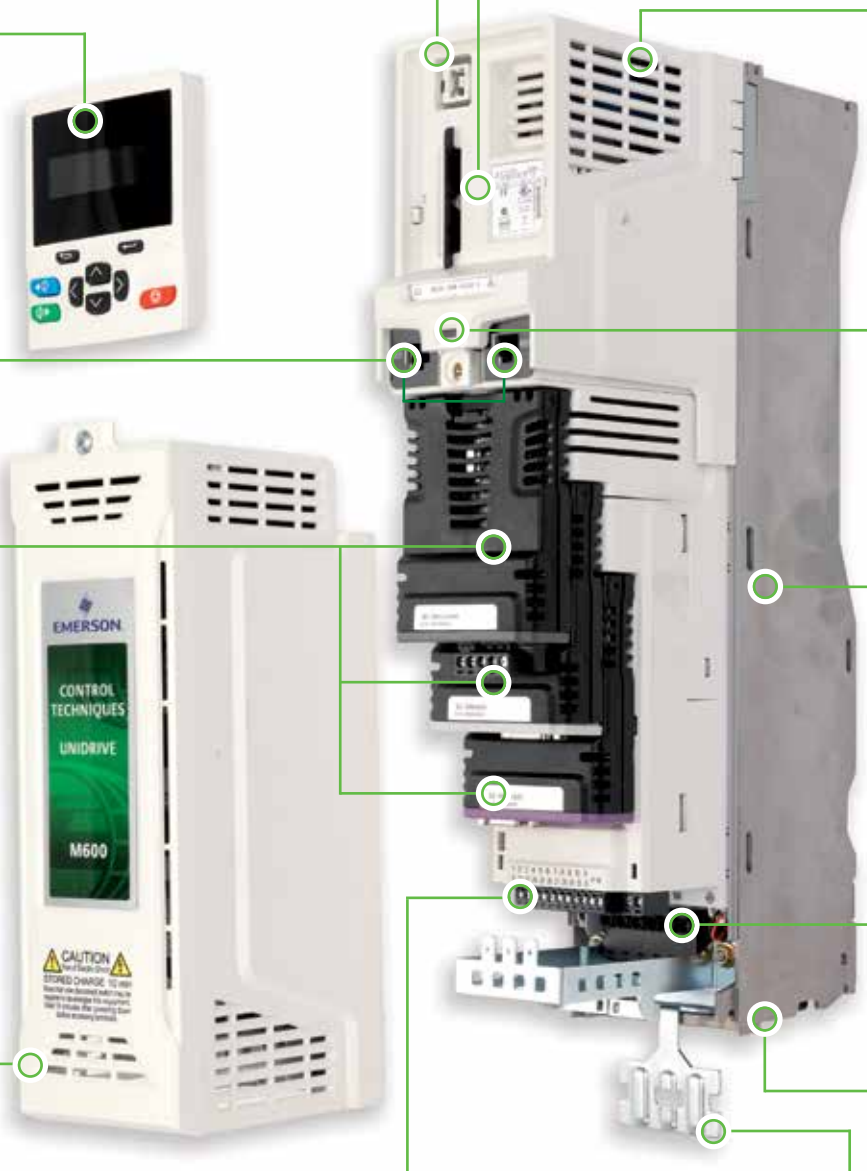
Led by the results of extensive customer-driven market research, we have tailored six Unidrive M feature-sets to specific application needs identified within industrial automation.The Unidrive M600 adds useful networking capability, additional I/O and improved motor control performance for open loop applications to the family. It also provides an easy upgrade for existing Commander SK users.

For more information on the full Unidrive M family, please download the Unidrive M Drives for Industry brochure or the 'Discover Unidrive M' App (available on the App Store, Android and online) via www.UnidriveM.com.

N1652

E171230

Unidrive M600 features



Easy click-in keypad connection

Slot for Smartcard / SD Card Adaptor for parameter, PLC and motion program storage

Optional range of multi-language LCD keypads available with up to 4 lines of text, for rapid set-up and superior diagnostics

Terminal cover for DC bus, braking terminal and onboard EMC filter*

Power on / Drive status LED

RS485 communications as standard

Aluminum chassis - allows flexible mounting, with high performance extruded heatsink incorporated

3 x System Integration (SI) module slots for communications, I/O, additional feedback devices and automation/ motion controllers

User-friendly power connections with removable terminals*

Terminal cover

User replaceable fan (can be replaced after installation)

User-friendly pluggable control connections

Robust cable management system providing grounding point for shielded control and power cables

* Features and their locations vary on some drive sizes

High performance drive for induction and sensorless permanent magnet motors

The M600 is the perfect choice for applications that require high performance open-loop control of induction or permanent magnet motors. SI-Encoder / SI-Universal Encoder option modules are available for applications that require more precise closed loop velocity and digital lock / frequency following of induction motors.

Highly efficient permanent magnet motors from Leroy Somer

Enhance throughput with high performance open-loop control of induction and permanent magnet motors

- Advanced Rotor Flux Control (RFC) algorithm gives maximum stability and control of induction and permanent magnet motors
- Up to 200% motor overload suitable for heavy industrial machinery applications

Reduce system costs by directly integrating with applications

- M600 incorporates an onboard PLC which can execute Engineering Control Studio (IEC61131-3) programs for logic control, sequencing, speed following and digital lock - removing the need for additional PLCs
- Fit up to three SI modules to add safe motion, speed feedback, additional I/O and fieldbus communications

Energy efficiency

Unidrive M is designed to enhance the energy efficiency of all applications:

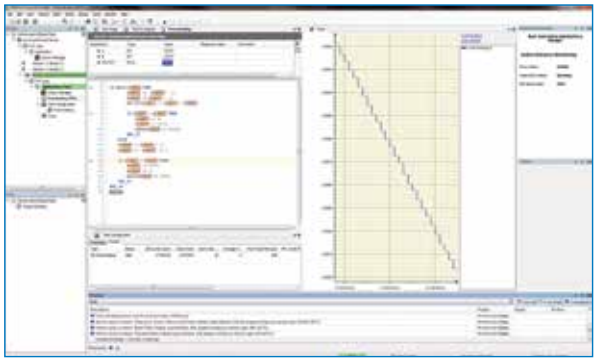
- Low power standby mode. In some applications, drives can sit idle for significant periods; Unidrive M's reduced standby power saves energy
- Easy common DC bus configuration enables braking energy to be recycled within the drive system, reducing energy usage and eliminating external supply components
- Unidrive M supports sensorless (open loop) control of compact high efficiency permanent magnet motors
- Active Front End for regenerative AC drive systems
- Dyneo®: perfectly synergized Permanent Magnet motor and Unidrive M solutions - optimized for performance and energy saving
- Dyneo® Unidrive M and Permanent Magnet motor solutions offer exceptional efficiency levels across all operating speeds, especially at lower speeds where the efficiency is much higher than induction motors
- Low losses, up to 98 % efficient

Engineering Control Studio software

Unidrive M600's onboard PLC is programmed using Engineering Control Studio which provides a flexible and intuitive environment for programming.

IEC 61131-3 automation programming

The programming environment is fully IEC 61131-3 compliant and therefore familiar, fast and easy to use for control engineers around the world.



Typical Engineering Control Studio Screen Shot

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 programs, speeding up software development.

Programmers have access to a vibrant open-source community for function blocks. Engineering Control Studio also supports customers' own function block libraries, with on-line monitoring of program variables with user defined watch windows and help for on-line change of programs, in line with latest PLC practices.

Power System Flexibility

Unidrive M's unique motor control algorithms combined with the latest microprocessor technology ensure it offers the highest stability and bandwidth for all industrial motor types.

This enables users 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.

Motor control options available include:

Control Mode	Features
Open loop vector or V/Hz induction motor control	Open loop motor control for induction motors. Easiest configuration. V/Hz can be used for multiple motor control.
Open loop Rotor Flux Control for induction motors (RFC-A)	Vector algorithm utilizing closed loop current control to greatly enhance performance for all induction motor sizes.
Open loop permanent magnet motor control (RFC-S)	Open loop control of compact, high efficiency, permanent magnet motors (including the Leroy-Somer Dyneo® LSRPM).
Closed loop Rotor Flux Control for induction motors (RFC-A)*	Speed and position control for induction motors, supporting a wide range of feedback devices (including quadrature, SinCos, EnDat 2.2, SSI encoders and resolvers).
Active Front End (AFE) for power quality and regeneration	Active Front End allows regeneration of energy back onto the power line. The Active Front End also provides power factor control for power quality management and greatly reduces unwanted power harmonics.

*With SI-Encoder or SI-Universal Encoder option module

Fast and Easy access for Commissioning, Monitoring and Diagnostics

User interface options

Unidrive M600 benefits from a number of keypad choices to meet your application needs. Unidrive M600 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.

Type		Benefit
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.
KI-Keypad RTC		All the features of the KI-Keypad, but with battery operated real-time clock, allowing accurate time stamping of events and aiding quick resolution.
Remote Keypad		Remote mountable keypad. This allows flexible mounting on the outside of a panel and meets IP66 (NEMA 4).
Remote keypad RTC		The keypad is remote mountable, allowing flexible mounting on the outside of a panel (meets IP54/ NEMA 12). Three line plain text, multi-language LCD keypad for rapid set-up and helpful diagnostics. Battery operated real-time clock allows accurate time stamping of events, aiding diagnostics.

Unidrive M drive and motor set-up tool screen

Unidrive M Connect commissioning tool

The Unidrive M Connect PC tool is 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:

- Task-based drive operations are simplified with intuitive graphical tools in a familiar Windows environment
- Dynamic drive logic diagrams and enhanced searchable listings
- 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 programs)
- Matching Unidrive M to Emerson motors (such as Dyneo®) can be achieved quickly and easily using Unidrive M Connect's motor database
- Multiple 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

Unidrive M's portable memory devices

Smartcard

Smartcards 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:

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

SD card

Standard SD cards can be used for quick and easy parameter and program storage using an adaptor. SD cards provide a huge memory capability allowing a system reload if required, and can be easily preprogrammed on a common PC.

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)*

*With Encoder option

Active Front End (AFE) power quality converter

Optional Drive Programming and Operator Interface

Unidrive M Connect

KI-Keypad

KI-Keypad RTC

Remote Keypad

Remote keypad RTC

Smartcard

SD Card using SD Card Adaptor

KI-485 Adaptor

Input/Output

SI-I/O

4 x Digital I/O
3 x Analog input (default) / Digital input
1 x Analog output (default) / Digital input
2 x Relay

Onboard

5 x Analog I/O
8 x Digital I/O (including 2 x high speed I/O [250 µs])
1 x Relay output
1 x STO

Applications with PLC Functionality

Standard

Easy to use onboard PLC using industry standard CODESYS programming environment

Communications

Onboard

RS485

SI-EtherCAT

SI-PROFIBUS

SI-Ethernet

SI-DeviceNet

SI-CANopen

SI-PROFINET

Feedback

SI-Encoder

SI-Universal Encoder

Safety

SI-Safety

DC back-up power supply

24 - 1067 Vdc power

24 Vdc control

Unidrive M600 ratings and specifications

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)
M600-03200050A	5	0.75	1	6.6	1.1	1.5
M600-03200066A	6.6	1.1	1.5	8	1.5	2
M600-03200080A	8	1.5	2	11	2.2	3
M600-03200106A	10.6	2.2	3	12.7	3	3
M600-04200137A	13.7	3	3	18	4	5
M600-04200185A	18.5	4	5	25	5.5	7.5
M600-05200250A	25	5.5	7.5	30	7.5	10
M600-06200330A	33	7.5	10	50	11	15
M600-06200440A	44	11	15	58	15	20
M600-07200610A	61	15	20	75	18.5	25
M600-07200750A	75	18.5	25	94	22	30
M600-07200830A	83	22	30	117	30	40
M600-08201160A	116	30	40	149	37	50
M600-08201320A	132	37	50	180	45	60
M600-09201760A	176	45	60	216	55	75
M600-09202190A	219	55	75	266	75	100
M600-09201760E	176	45	60	216	55	75
M600-09202190E	219	55	75	266	75	100
M600-10202830E	283	75	100	325	90	125
M600-10203000E	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)
M600-03400025A	2.5	0.75	1	3.4	1.1	1.5
M600-03400031A	3.1	1.1	1.5	4.5	1.5	2
M600-03400045A	4.5	1.5	2	6.2	2.2	3
M600-03400062A	6.2	2.2	3	7.7	3	5
M600-03400078A	7.8	3	5	10.4	4	5
M600-03400100A	10	4	5	12.3	5.5	7.5
M600-04400150A	15	5.5	10	18.5	7.5	10
M600-04400172A	17.2	7.5	10	24	11	15
M600-05400270A	27	11	20	30	15	20
M600-05400300A	30	15	20	31	15	20
M600-06400350A	35	15	25	38	18.5	25
M600-06400420A	42	18.5	30	48	22	30
M600-06400470A	47	22	30	63	30	40
M600-07400660A	66	30	50	79	37	50
M600-07400770A	77	37	60	94	45	60
M600-07401000A	100	45	75	112	55	75
M600-08401340A	134	55	100	155	75	100
M600-08401570A	157	75	125	184	90	125
M600-09402000A	200	90	150	221	110	150
M600-09402240A	224	110	150	266	132	200
M600-09402000E	200	90	150	221	110	150
M600-09402240E	224	110	150	266	132	200
M600-10402700E	270	132	200	320	160	250
M600-10403200E	320*	160	250	361	200	300
M600-11403770E	377	185	300	437	225	350
M600-11404170E	417*	200	350	487*	250	400
M600-11404640E	464*	250	400	507*	280	450

* At 2 kHz switching frequency

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)
M600-05500030A	3	1.5	2	3.9	2.2	3
M600-05500040A	4	2.2	3	6.1	4	5
M600-05500069A	6.9	4	5	10	5.5	7.5
M600-06500100A	10	5.5	7.5	12	7.5	10
M600-06500150A	15	7.5	10	17	11	15
M600-06500190A	19	11	15	22	15	20
M600-06500230A	23	15	20	27	18.5	25
M600-06500290A	29	18.5	25	34	22	30
M600-06500350A	35	22	30	43	30	40
M600-07500440A	44	30	40	53	37	50
M600-07500550A	55	37	50	73	45	60
M600-08500630A	63	45	60	86	55	75
M600-08500860A	86	55	75	108	75	100
M600-09501040A	104	75	100	125	90	125
M600-09501310A	131	90	125	150	110	150
M600-09501040E	104	75	100	125	90	125
M600-09501310E	131	90	125	150	110	150
M600-10501520E	152	110	150	200	130	200
M600-10501900E	190	132	200	200	150	200
M600-11502000E	200	150	200	248	185	250
M600-11502540E	254*	185	250	288*	225	300
M600-11502850E	285*	225	300	315*	250	350

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)
M600-07600190A	19	15	20	23	18.5	25
M600-07600240A	24	18.5	25	30	22	30
M600-07600290A	29	22	30	36	30	40
M600-07600380A	38	30	40	46	37	50
M600-07600440A	44	37	50	52	45	60
M600-07600540A	54	45	60	73	55	75
M600-08600630A	63	55	75	86	75	100
M600-08600860A	86	75	100	108	90	125
M600-09601040A	104	90	125	125	110	150
M600-09601310A	131	110	150	155	132	175
M600-09601040E	104	90	125	125	110	150
M600-09601310E	131	110	150	155	132	175
M600-10601500E	150	132	175	172	160	200
M600-10601780E	178	160	200	197	185	250
M600-11602100E	210	185	250	225	200	250
M600-11602380E	238*	200	250	275*	250	300
M600-11602630E	263*	250	300	305*	280	400

*At 2 kHz switching frequency

Unidrive M600 ratings and specifications

Environmental safety and electrical conformance

- 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
- Frames 9, 10 & 11 achieve IP55 / NEMA4 / UL TYPE 12 rating on the rear of the drive when through panel mounted
- Ambient temperature -20 °C to 40 °C as standard. Up to 55 °C with derating
- Humidity 95 % maximum (non-condensing) at 40 °C
- Altitude: 0 to 3000m, derate 1 % per 100 m between 1000 m and 3000 m
- Random Vibration: Tested in accordance with IEC 60068-2-64
- Mechanical Shock Tested in accordance with IEC 60068-2-29
- Storage temperature: -40 °C to 70 °C short term, -40 °C to 50 °C long term
- Electromagnetic Immunity complies with EN 61800-3 and EN 61000-6-2
- With onboard EMC filter, complies with EN 61800-3 (2nd environment)
- EN 61000-6-3 and EN 61000-6-4 with optional footprint EMC filter
- IEC 61800-5-1 (Electrical Safety)
- IEC 61131-2 I/O
- Safe Torque Off, independently assessed by TÜV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PL
- UL 508C (Electrical Safety)

Unidrive M600 feature and specification table

Performance	Current loop update: 62 µs
	Heavy Duty peak rating: 200 % (3s)
	Maximum output frequency: 550 Hz
	Switching frequency range: 2, 3, 4, 6, 8, 12, 16 kHz (3 kHz default)
Onboard intelligence	Programmable Logic Control (PLC)
	Real-time tasks
	Digital lock control
Onboard comms	RS485
Mechanical attributes	Tile mounting on sizes 3, 4, 5
	Common DC bus connections on sizes 3, 4, 5, 6
Parameter back-up	Serial port cloning
	SD card (using SD Card Adaptor)
	Smartcard reader support
Feedback	Optional SI-Encoder/SI-Universal Encoder
Onboard I/O	3 x Analog input, 2 x Analog output
	4 x Digital input, 1 x Digital output, 3 x Bidirectional digital input or output
	1 x Relay output
Machine safety	1 x Safe Torque Off (STO) terminal
Power and motor control	Stationary autotune for permanent magnet motors
	Wide operating range back-up DC supply
	24 V control back-up
Other	Temperature controlled fan operation with user adjustable speed limit
	User replaceable fan(s)
	Conformal coating
	Standby mode (energy saving)

Optional media and accessories

Description	Order code
SD Card Adaptor	3130-1212-03
Smartcard (64 kB)	2214-1006-03

Internal brake resistor

Frame size	Order code
3	1220-2752
4 & 5	1299-0003

DC bus paralleling kit

Frame size	Order code
3	3470-0048
4	3470-0061
5	3470-0068
6	3470-0063
6 (connect to frame 3,4 & 5)	3470-0111

Unidrive M operating modes

Operating mode	RFC from cold	RFC from 100 %	Open loop from cold	Open loop from 100 %
Normal duty overload with motor rated current = drive rated current	110 % for 165 s	110 % for 9 s	110 % for 165 s	110 % for 9 s
Heavy duty overload with motor rated current = drive rated current (size 8 and below)	200 % for 28 s	200 % for 3 s	150 % for 60 s	150 % for 7 s
Heavy duty overload with motor rated current = drive rated current (size 9E and 10)	175 % for 42 s	175 % for 5 s	150 % for 60 s	150 % for 7 s

Tile mount kit

Frame size	Order code
3	3470-0049
4	3470-0060
5	3470-0073

Through hole IP65 kit

Frame size	Order code
3	3470-0053
4	3470-0056
5	3470-0067
6	3470-0055
7	3470-0079
8	3470-0083
9E & 10	3470-0105
10 Inverter	3470-0108
10 Rectifier	3470-0106
11	3470-0123

UL Type 1 Conduit kit

Frame size	Order code
3 & 4	6521-0071
5	3470-0069
6	3470-0059
7	3470-0080
8	3470-0088
9E & 10	3470-0115
11	3470-0136

Retrofit brackets

To allow Unidrive M drives to be fitted in existing Unidrive SP surface mount installations.

Frame size	Order code
4	3470-0062
5	3470-0066
6	3470-0074
7	3470-0078
8	3470-0087
9E & 10	3470-0118

Cable grommet kit

Frame size	Order code
7	3470-0086
8 - Single cable	3470-0089
8 - Dual cable	3470-0090
9E & 10	3470-0107

General kit items

Item	Order code
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

** To allow multiple drives to be through hole mounted with no space between them.

Optional external EMC filters

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

Frame size	Voltage	Order code
3	200 V	4200-3230
	400 V	4200-3480
4	200 V	4200-0272
	400 V	4200-0252
5	200 V	4200-0312
	400 V	4200-0402
	575 V	4200-0122
6	200 V	4200-2300
	400 V	4200-4800
	575 V	4200-3690
7	200 V & 400 V	4200-1132
	575 V & 690 V	4200-0672
8	200 V & 400 V	4200-1972
	575 V & 690 V	4200-1662
9	200 V & 400 V	4200-3021
	575 V & 690 V	4200-1660
9E & 10	200 V & 400 V	4200-4460
	575 V & 690 V	4200-2210
11	400 V	4200-0400
	575 V & 690 V	4200-0690

For a full list of patents and patent applications, visit www.controltechniques.com/patents.

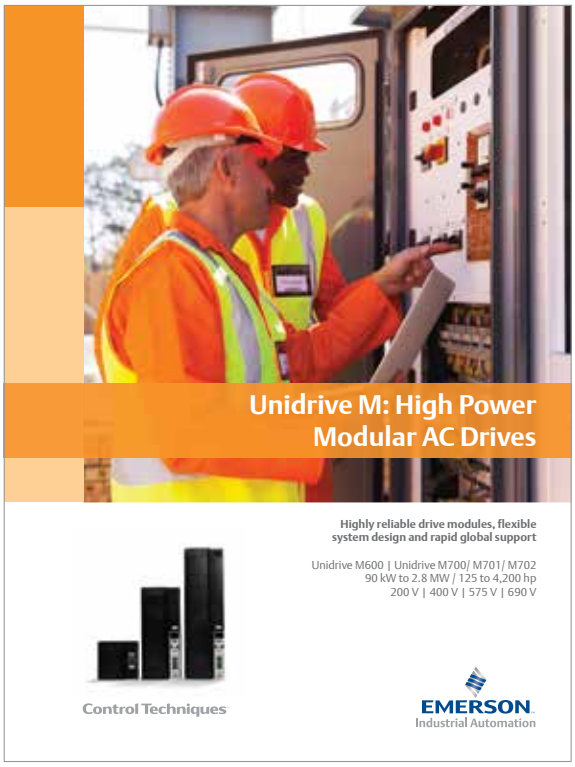
Unidrive M frame sizes and ratings

SINGLE DRIVES

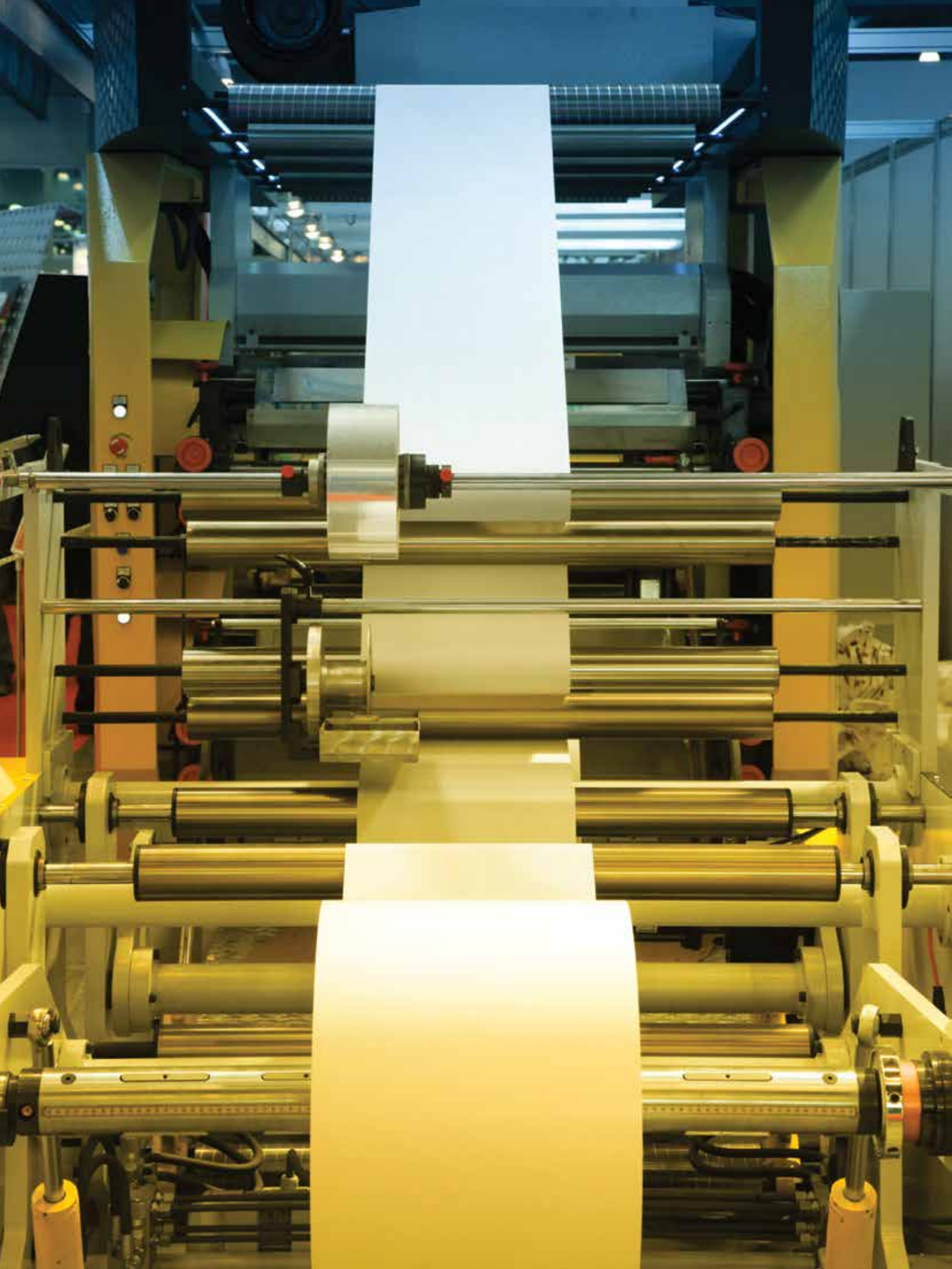
Frame size		3	4	5	6	7	8	
Frame sizes available	M600	•	•	•	•	•	•	
Dimensions (H x W x D)	mm	382 x 83 x 200	391 x 124 x 200	391 x 143 x 202	389 x 210 x 227	557 x 270 x 280	803 x 310 x 290	
	in	15.0 x 3.3 x 7.9	15.4 x 4.9 x 7.9	15.4 x 5.6 x 8	15.4 x 8.3 x 8.9	21.9 x 10.6 x 11.0	31.6 x 12.2 x 11.4	
Weight	kg (lb)	4.5 (9.9) Max	6.5 (14.3)	7.4 (16.3)	14 (30.9)	28 (61.7)	52 (114.6)	
DC Bus Choke/ AC Line Choke	Internal	• *	•	•	•	•	•	
	External							
Max Continuous Heavy Duty kW Rating	@ 100 V						N/A	
	@ 200 V	0.75 kW - 2.2 kW (1 hp - 3 hp)	3 kW - 4 kW (3 hp - 5 hp)	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)	
	@ 400 V	0.75 kW - 4 kW (1 hp - 5 hp)	5.5 kW - 7.5 kW (10 hp)	11 kW - 15 kW (20 hp)	15 kW - 22 kW (25 hp - 30 hp)	30 kW - 45 kW (50 hp - 75 hp)	55 kW - 75 kW (100 hp - 125 hp)	
	@ 575 V	N/A		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)	
	@ 690 V	N/A				15 kW - 45 kW (20 hp - 60 hp)	55 kW - 75 kW (75 hp - 100 hp)	

*except 03200050 and 03400062 ratings

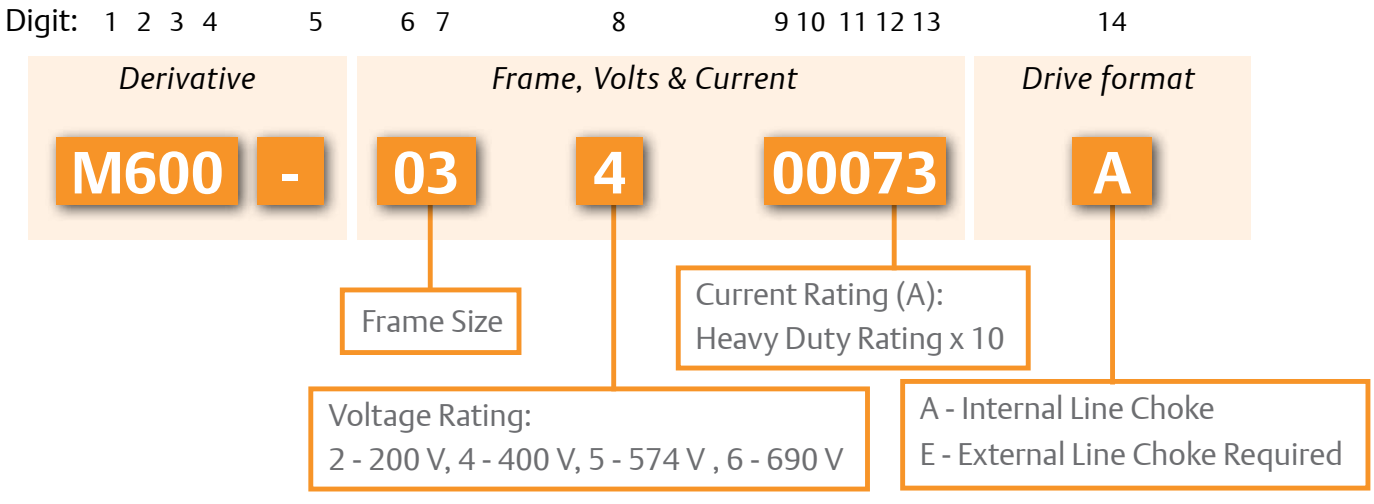
	9A	9E	10E	11E
	•	•	•	•
	1108 x 310 x 288	1069 x 310 x 288	1069 x 310 x 288	1242 x 310 x 312
	43.6 x 12.2 x 11.4	42.1 x 12.2 x 11.4	42.1 x 12.2 x 11.4	48.9 x 12.2 x 12.3
	66.5 (146.6)	46 (101.4)	46 (101.4)	63 (138.9)
	•			
		•	•	•
	45 kW - 55 kW (60 hp - 75 hp)	45 kW - 55 kW (60 hp - 75 hp)	75 kW - 90 kW (100 hp - 125 hp)	N/A
	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)
	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)
	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)



For information on our high power Unidrive M modules (90 kW - 2.8 MW) refer to the Unidrive M high power brochure - available online.



Unidrive M range - Identification



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