



## Unidrive M600



**High performance drive for induction and  
sensorless permanent magnet motors**

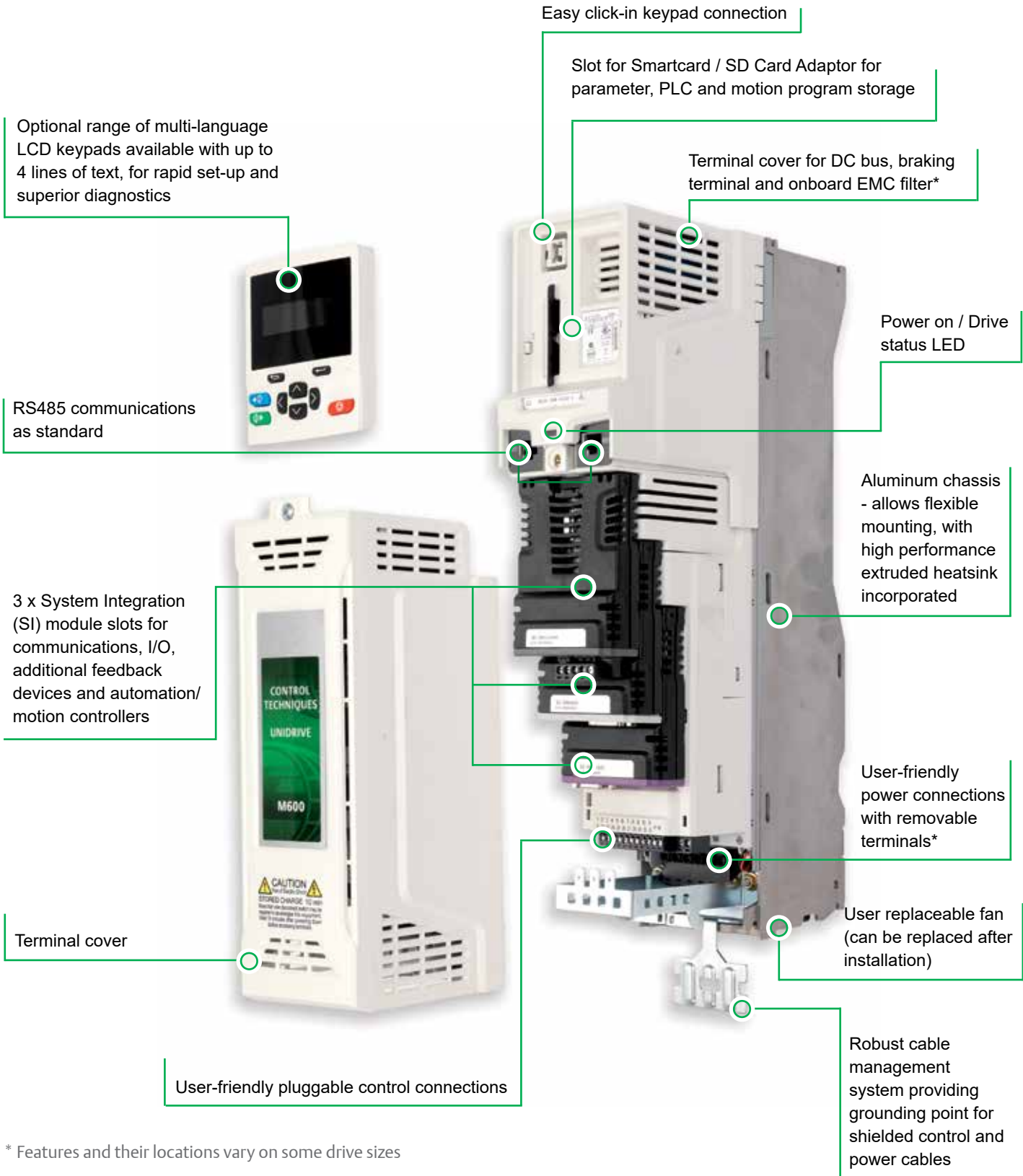
0.75 kW - 2.8 MW Heavy Duty (1.0 hp - 4,200 hp)  
200 V | 400 V | 575 V | 690 V



**CONTROL TECHNIQUES™**

**Nidec**  
All for dreams

# Unidrive M600 features



\* 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 Machine 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

## 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 Nidec 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 IEC 61131-3 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

## 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
	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](http://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	365 x 83 x 200	365 x 124 x 200	365 x 143 x 202	365 x 210 x 227	508 x 270 x 280	753 x 310 x 290		
	in	14.4 x 3.3 x 7.9	14.4 x 4.9 x 7.9	14.4 x 5.6 x 8	14.4 x 8.3 x 8.9	20 x 10.6 x 11.0	29.7 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

Sizes do not include removable mounting brackets



	9A	9E	10E	11E
	•	•	•	•
	1049 x 310 x 288	1010 x 310 x 288	1010 x 310 x 288	1190 x 310 x 312
	41.3 x 12.2 x 11.4	41.3 x 12.2 x 11.4	41.3 x 12.2 x 11.4	46.9 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)

**Unidrive M: High Power Modular AC Drives**

Highly reliable drive modules, flexible system design and rapid global support

Unidrive M600 | Unidrive M700/ M701/ M702  
90 kW to 2.8 MW / 125 to 4,200 hp  
200 V | 400 V | 575 V | 690 V

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