MGE MOTORS

0.25 - 22 kW

be
think
innovate

GRUNDFOS

# GRUNDFOS E-PUMPS
— IN A CLASS OF THEIR OWN

As a world leading manufacturer of pumps and pump equipment, we make electrical motors of exceptional quality.

For decades, we have been manufacturing our own motors with integrated frequency converters that match the very high standard of our electronic controlled pumps (E-pumps) in building services, industry and water supply applications.
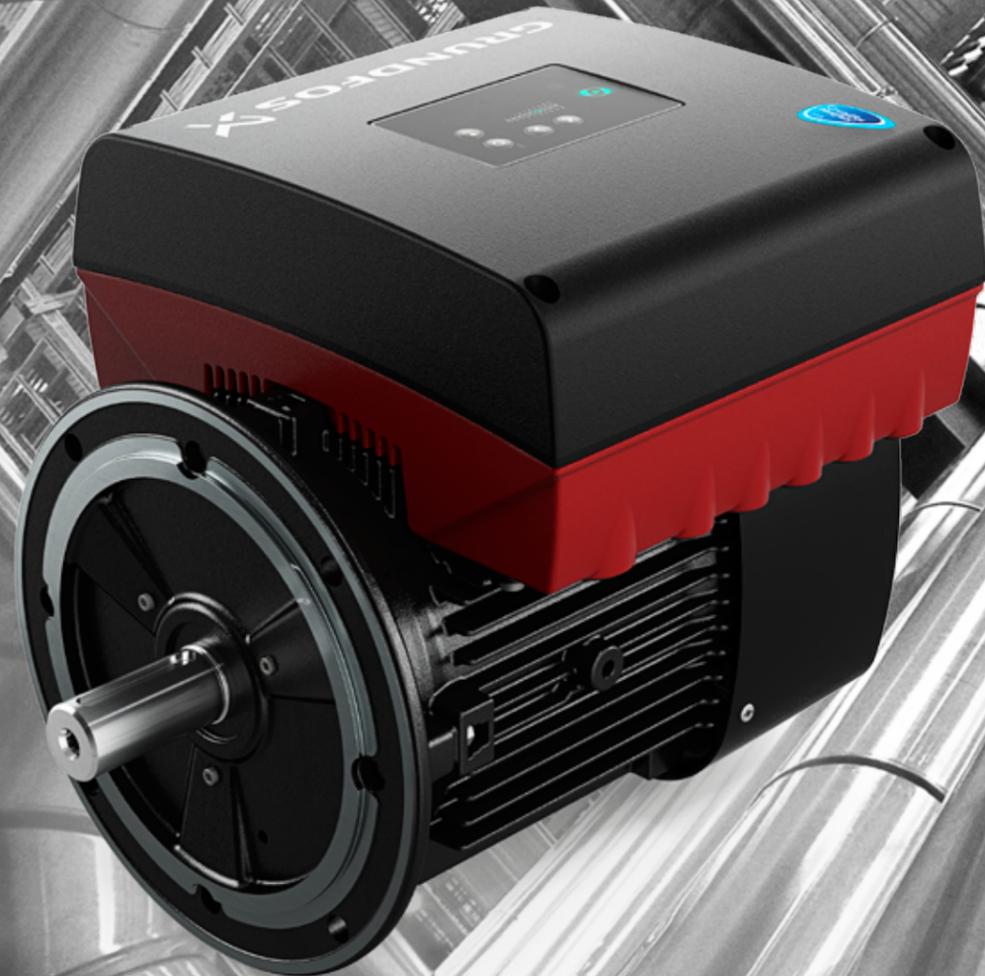
ENERGY AND COST SAVINGS WITH OPTIMISED EFFICIENCY

The Grundfos MGE motors model H/I/J are the most energy efficient yet. These permanent magnet synchronous motors (PMSM) are designed especially for frequency converter operations and optimised for pump applications and high part-load efficiency. This results in lower energy and lifecycle costs and exceeds the IE4 level in IEC60034-30-1, even with frequency converter losses at medium speed range (2950-4000-RPM).
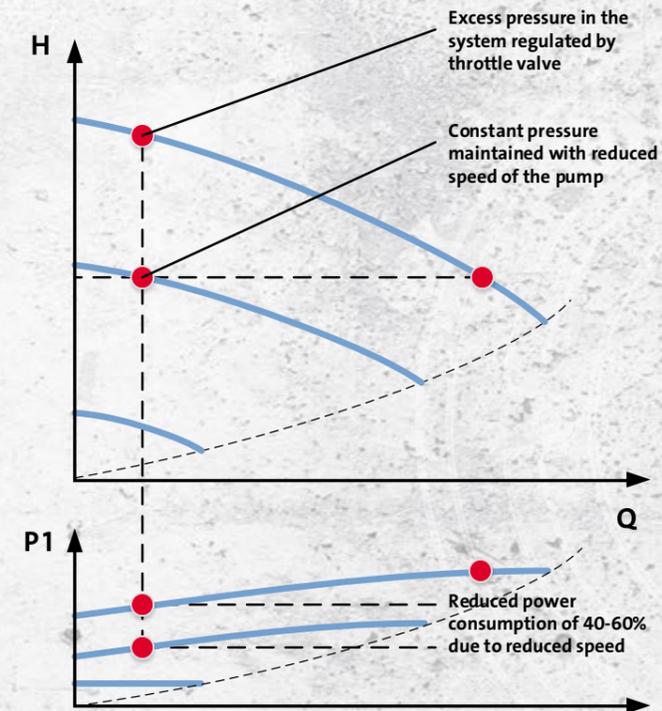
Adjusting the speed of the pump based on demand, rather than throttling the system flow with a valve, results in:

- No excess pressure causing stress in the system and noise in the valve due to cavitation
- Reduced power consumption due to lower pump speed.
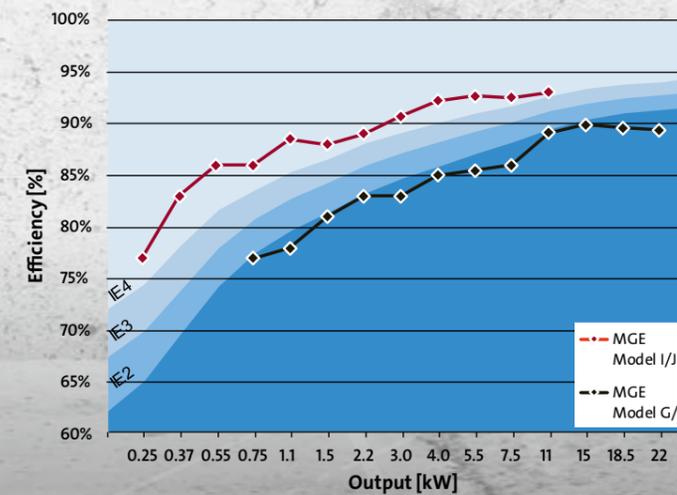
High efficiency components, variable speed control, lower energy consumption, compact design, and additional control features make integrated E-motors the right choice for your system.

PRESSURE BOOSTING WITH
HYDRO MULTI-E

The efficiency improvements in the latest generation of MGE motors also apply at part-load. In a typical pump system the operating time at full load is fractional. This makes it possible to establish a typical energy profile so you can more accurately estimate the annual energy consumption.

The new MGE motor can shorten the payback time of the E-pump by up to 1-year compared with previous MGE, IE3 or IE2 motors with frequency converters as mandated in EU.
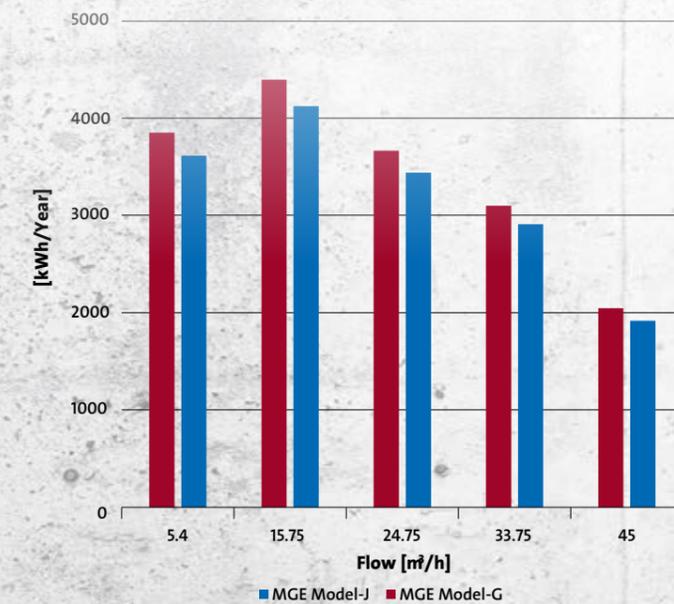
A system consisting of two CRE pumps with 7,5kW MGE motors operating a given profile shows that the annual energy consumption is reduced by more than 6% or 125€ per year – **compared with previous MGE motor** – (at 12 cents/kWh).

Annual energy consumption per duty point
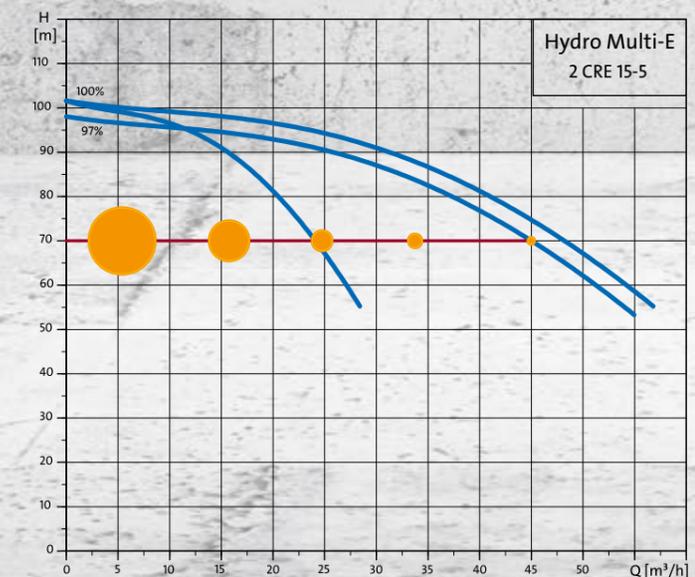

Y-axis: [kWh/Year]
X-axis: Flow [m³/h] — 5.4, 15.75, 24.75, 33.75, 45

■ MGE Model-J ■ MGE Model-G

Energy profile with time fraction at each part load operating point

Hydro Multi-E
2 CRE 15-5

Y-axis: H [m]
X-axis: Q [m³/h]

PLUG-AND-PUMP
INTEGRATION

The Grundfos E-motor with a built-in frequency converter that enables variable-speed operation with the following benefits in pump applications:

- energy savings
- process control
- extra functionalities
- built-in motor protection
- higher performance and more compact pumps
- reduced water hammer due to long ramp times
- low starting currents

WHY CHOOSE AN E-MOTOR ?

E-motors provide a range of benefits over standard motors such as:

- The motor and frequency converter are perfectly matched for trouble-free operation.
- Reduced CAPEX in installed components and wiring costs.
- Purchase the complete system through Grundfos for easy customer service.
- Dedicated functionality for specific pump applications – no further programming required.
- Predefined intelligent control modes such as constant pressure, proportional pressure, and constant level, make it easy to fit the pump into any application.
- Meets EMC standards making it suitable for residential purpose buildings – without an intermediate transformer.
- Wide variety of motor mounting with flanges / shafts / feet all according to IEC and NEMA standards – customised combinations can be delivered as required.
- High operating temperature with up to IP66 enclosure range up to 50 °C without any derating.
- Low acoustic noise levels make it suitable for use in building services compared to similar competitor products.
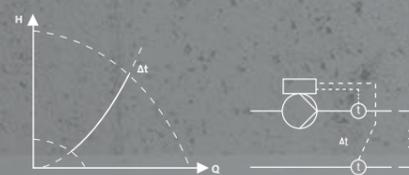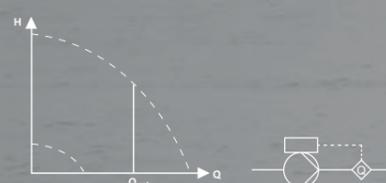
CONTROL MODE

CONSTANT CURVE
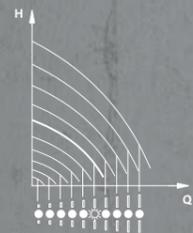
CONSTANT PRESSURE
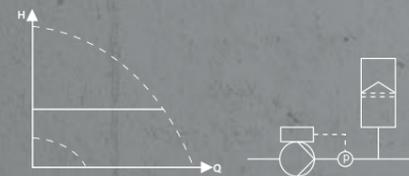
CONSTANT DIFFERENTIAL TEMPERATURE

CONSTANT FLOW

SUPERIOR PERFORMANCE
through unique functionality

E-motors offer increased functionality, making them easy to use in a wide-range of complex applications.

The features listed are pump type dependant.

Multi-pump function including alternating, back-up or cascade function
The Multi-pump function makes it possible to control up to four parallel-coupled pumps without the need for an external controller. Four different multi-pump functions are available: Alternating time, Alternating energy, Back-up, and Cascade control.

Differential pressure or temperature control using two sensors
Use two sensors instead of one differential sensor for running in differential pressure mode or differential temperature control.

Proportional pressure
Proportional pressure control on pumps with user adjustable control curve for pressure loss compensation.

Low flow stop function
Improved energy optimisation, easy configuration and high comfort.

Stop at minimum speed function
Ensures that the pump will stop after a selected time when the controller is in saturation, forcing the pump to run at minimum speed.

Standby mode
For pumps only in operation for a few hours each day, standby mode minimises power consumption.

Loss of prime and dry run
Protects the pump against failure due to loss of prime and dry run.

LiqTec interface
Built-in interface for LiqTec sensor for dry run detection with or without time delay in order to get a minimum run time.

Pipe filling
Function for filling pipes without the risk of water hammer.

Constant torque
Run constant torque in, for example, positive displacement pump applications.

Pump curve adjustment
Create non-labile pump curves for applications where it is necessary for system control.

Run at power limit
Utilise the extra available power in the motor for additional pressure, or choose an under sized motor.

Specific energy estimation as function of flow
Calculates specific energy as a function of flow in the range kWh/m³.

Limit Exceed function
Makes the pump react to a measured or an internal value exceeding a user-defined limit. The pump can either give an alarm/warning or change operating mode and reduce the need for external controllers.

Setpoint influence
The setpoint influence function makes it possible to influence the controller setpoint using measured or internal values such as estimated flow.

Standstill heating (anti-condensation heating)
Standstill heating ensures that even during standstill periods, the motor windings are kept at a minimum temperature-heating both motor and terminal box.

DEDICATED FOR BUILDING SERVICES

AUTOADAPT function
The AUTOADAPT function continuously adjusts the proportional pressure curve and automatically sets the most efficient curve. (only TPE3 pumps).

FLOWLIMIT function
The FLOWLIMIT function eliminates the need for a pump throttling valve, reducing pressure loss in the system. (only TPE3 pumps).

FLOWADAPT function
FLOWADAPT is a control mode that combines AUTOADAPT with the FLOWLIMIT function. (only TPE3)

Built-in Heat Energy Meter
Built-in heat energy meter that can monitor heat energy distribution and consumption. (only TPE3 pumps).

Advanced work log
TPE3 pumps with the new MGE/MLE motors have an advanced logging function that can record and display:

- Duty point over time: The 20 latest duty points with the highest power consumption are shown.
- 3D histograms (Flow, head, time), (Flow, temp., time), etc.

THE MGE MOTOR
MODEL H/I/J

The MGE PMSM contributes to efficiency levels ≥IE4

Communication Modules (CIM) come with all common protocols in industry and building services segments and save on installation and I/O components cost

Grundfos blueflux® is the best solution from Grundfos within energy efficient motors and variable speed drives (MG motors, MGE motors and CUE drives).

Grundfos blueflux® either meets or exceeds legislative requirements, such as the EUP IE3 grade.

The Functional Module is available to suit your application in basic, standard, and advanced options with different I/O and other interfaces that enable you to utilise the many integrated pump features

Fitted with either a deep-groove ball bearing or an angular-contact bearing, depending on the motor use. At the non-drive end bearings with axial clearance ensure trouble-free operation and a long life.

Grundfos selects high-quality bearings from the world's leading manufacturers who comply with international standards. This makes it easy to find replacement bearings wherever you are.

The Control Panel is designed to suit the needs of your operation in basic, standard, or advanced editions – all with wireless communication.

The foil is IP66 integrity to allow wash down of the motor.

Shafts ends are available with smooth, open or closed keys.

BEARINGS		
Frame size	DE1)	NDE
MGE71	6204.2Z.C3 (6304.2Z.C3)	6204.2Z.C3
MGE80	6204.2Z.C3	6204.2Z.C3
MGE90	6305.2Z.C3	6204.2Z.C3
MGE100	6306.2Z.C4	6205.2Z.C3
MGE112	6306.2Z.C4 (7306BE.2CS)	6206.2Z.C3
MGE132	6308.2Z.C4 (7308BE.2CS)	6206.2Z.C3
MGE160	6309.C4 (7309BE)	6309.C4
MGE180	6310.C4 (7310BE)	6309.C4

1) Alternative bearings are used in motors for CRE pumps
2) High speed multi-stage pumps (CRNE-HS) use alternated DE/NDE bearing sizes

Wide variety of motor mounting with flanges / shafts / feet all according to IEC and NEMA standards – customised combinations can be delivered as required.

All MGE are CE-marked and fulfil the EMC Directive 2004/108/EC and are tested according to the EN 61800-3 standard.

MGE-H/I/J motors are category C1, corresponding to CISPR11, group 1, class B, and can be installed in both residential areas (first environment) andindustrial areas (second environment) without any limitations.

The MGE-F is category C3 and can be installed in industrial areas (second environment). If equipped with an external Grundfos EMC filter, the motors are category C2 and may be installed in residential areas (first environment).

	FIRST ENVIRONMENT		SECOND ENVIRONMENT	
EN61800-3	Category 1	Category 2	Category 3	Category 4
CISPR11	Group 1, Class B	Group 1, Class A	Group 2, Class A	Not defined

APPROVALS

IMPROVED SERVICABILITY

Real time clock and date
This function time-stamps any alarms and errors so you can accurately track performance.

MGE pump recognition
Automatically transmits product data to remote connected tools, such as Grundfos GO, for easy identification.

Intelligent failure modes
Improved error codes ease troubleshooting and minimise down-time.

Advanced failure analysis
Datalog function includes information up to 20 seconds before the event happened.

WIRELESS COMMUNICATION

Wireless GENI communication automatically connects pumps to each other and to the remote control unit.

Grundfos R100 and Grundfos GO
The new MGE/MLE has IR interface to the well-known R100 remote controller. It can use the wireless GENI interface to communicate with the new remote controller Grundfos GO.
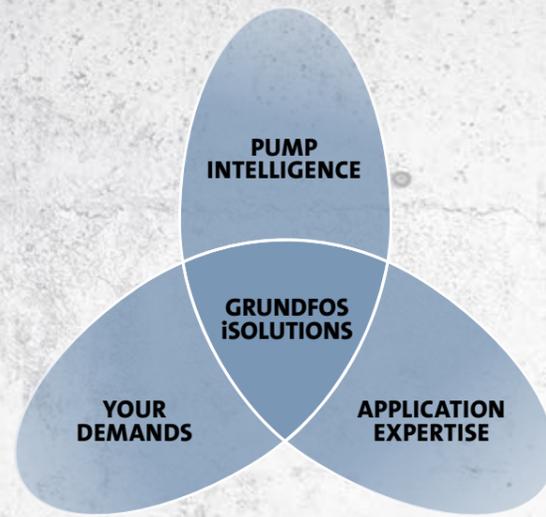
PUMP INTELLIGENCE

GRUNDFOS iSOLUTIONS

YOUR DEMANDS

APPLICATION EXPERTISE

GRUNDFOS iSOLUTIONS

Grundfos iSOLUTIONS delivers the optimal combination of pumps, drives and auxiliary components for the specific application, incorporating special features and functions and building on application knowledge and experience.

Grundfos iSOLUTIONS allows easy integration of pumps, drives, measurement, controls, protections, and communication, saving you valuable engineering, installation and commissioning time.

Learn more on grundfos.com/isolutions

CHOOSE YOUR OWN MOTOR OR SELECT A PRECONFIGURED PUMP

	Configuration of MGE motors			... or preconfigured E-pumps		
1st step: Select the motor size.	Select the line voltage and power (p2)			Motor size based on your pump dimensioning		
	Basic (FM100)	Standard (FM200)	Advanced (FM300)	Basic (FM100)	Standard (FM200)	Advanced (FM300)
2nd step: Select the Functional Module (FM) tailored to your application	• GENIbus • CIM module support • Suitable for constant curve / open loop • Simple process control with constant pressure/ flow/ level/ temperature	• GENIbus • CIM module support • Suitable for constant curve / open loop • Demanding process control with constant pressure/ flow/ level/ temperature • Proportional pressure • AUTOADAPT • FLOWADAPT • Signal relay output • Digital Sensor I/O	• GENIbus • CIM module support • Suitable for constant curve / open loop • Demanding process control with constant pressure/ flow/ level/ temperature • Proportional pressure • AUTOADAPT • FLOWADAPT • Signal relay output • Digital Sensor I/O • Pt100/1000 sensor • LiqTec dry-run protection • Real-Time Clock	• None	• CME • CMBE • TPE • NBE/NKE	• CRE • MTRE • Hydro MPC • Hydro Multi-E
	Basic (HMI100)	Standard (HMI200)	Advanced (HMI300)	Basic (HMI100)	Standard (HMI200)	Advanced (HMI300)
3rd step: Select the Control Panel that suits your operations	• Grundfos EYE • Wireless communication	• Grundfos EYE • Wireless communication • Start/Stop button for local operation with indicator light • Setpoint indicator and adjustment	• Grundfos EYE • Wireless communication • Start / Stop button for local operation • Full color display • Full graphical monitoring and configuration	• None	• CRE • Hydro Multi-E • Hydro MPC • CME • CMBE • MTRE • TPE series 1000 • NBE/NKE	• TPE series 2000 • TPE3

TECHNICAL INFORMATION

POWER - VOLTAGE/EFFICIENCY/LOAD/SPEED

Motor voltage	Speed [min⁻¹]	Shaft Power P₂ [kW]	Maximum torque Speed n [rpm]	Maximum torque Torque M_N [Nm]	Maximum speed Speed n_{max} [rpm]	Maximum speed Torque M [Nm]	Efficiency η [%]	Class	Power factor cos φ	Noise level dBA	Frame size	Model
1 x 200-240V	1450-2000	0.25	1450	1.7	2000	1.2	83.4	IES2	0.95	43	MGE71	H
		0.37	1450	2.45	2000	1.8	82.0	IES2	0.96			
		0.55	1450	3.6	2000	2.6	84.3	IES2	0.98		MGE80	
		0.75	1450	5.00	2000	3.6	85.7	IES2	0.99			
	2900-4000	0.25	2900	0.8	4000	0.6	81.1	IES2	0.95	60	MGE71	
		0.37	2900	1.2	4000	0.9	84.0	IES2	0.96			
		0.55	2900	1.8	4000	1.3	85.3	IES2	0.98			
		0.75	2900	2.5	4000	1.8	85.2	IES2	0.99		MGE80	
		1.1	2900	3.6	4000	2.6	86.9	IES2	0.99			
		1.5	2900	5.0	4000	3.6	87.4	IES2	0.99	64	MGE90	
	4000-5900	0.25	4000	0.6	5900	0.4	77.9	IES2	0.92	68	MGE71	
		0.37	4000	0.9	5900	0.6	82.3	IES2	0.94			
		0.55	4000	1.3	5900	0.9	84.9	IES2	0.96			
		0.75	4000	1.8	5900	1.2	85.7	IES2	0.98		MGE80	
		1.1	4000	2.6	5900	1.8	85.7	IES2	0.99			
		1.5	4000	3.6	5900	2.4	87.5	IES2	0.99			
3 x 380-500V	1450-2000	0.25	1450	1.7	2000	1.2	81.2	IES2	0.58-0.52	43	MGE71	I
		0.37	1450	2.45	2000	1.8	84.5	IES2	0.68-0.58			
		0.55	1450	3.6	2000	2.6	85.9	IES2	0.80-0.64		MGE80	
		0.75	1450	5.0	2000	3.6	85.9	IES2	0.83-0.71			
		1.1	1450	7.2	2000	5.2	89.1	IES2	0.90-0.74		MGE90	
	1450-2200	2,2	1450	14,5	2200	9,6	89,1	IES2	0.90-0.82	55	MGE100	
		3	1450	19,5	2200	12,9	90,1	IES2	0.91-0.86			
		4	1450	26,3	2200	17,4	90,3	IES2	0.92-0.87		MGE112	J
		5,5	1450	36,2	2200	23,9	91,9	IES2	0.92-0.88	61	MGE132L	
		7,5	1450	49,4	2200	32,6	92,2	IES2	0.93-0.89			
3 x 380-480V	4-pole	11	1460	72	-	-	87.5	IE3	0.91	68	MGE160M	F
		15	1460	98	-	-	88.5	IE3	0.90		MGE160L	
		18.5	1460	120	-	-	87.5	IE2	0.91		MGE180	
3 x 380-500V	2900-4000	0.25	2900	0.8	4000	0.6	81.2	IES2	0.58-0.50	60	MGE71	I
		0.37	2900	1.2	4000	0.9	84.5	IES2	0.68-0.54			
		0.55	2900	1.8	4000	1.3	85.9	IES2	0.77-0.61			
		0.75	2900	2.5	4000	1.8	85.9	IES2	0.83-0.67		MGE80	
		1.1	2900	3.6	4000	2.6	89.1	IES2	0.89-0.79			
		1.5	2900	5.0	4000	3.6	88.9	IES2	0.92-0.85	64	MGE90	
		2.2	2900	7.2	4000	5.2	90.1	IES2	0.93-0.87			
		3	2900	9,9	4000	7,2	90,7	IES2	0.91-0.86	68	MGE100	
		4	2900	13,2	4000	9,6	92,2	IES2	0.92-0.87		MGE112	
		5,5	2900	18,1	4000	13,1	92,7	IES2	0.92-0.88		MGE132S	J
		7,5	2900	24,7	4000	17,9	92,5	IES2	0.93-0.89	74	MGE132L	
		11	2900	36,2	4000	26,3	93,1	IES2	0.93-0.90		MGE160MH	
3 x 380-480V	2-pole	15	2930	49	-	-	89.9	IE3	0.92	66	MGE160M	F
		18.5	2930	60.5	-	-	89.6	IE3	0.88		MGE160L	
		22	2940	71.5	-	-	89.4	IE3	0.90		MGE180	
3 x 380-500V	4000-5900	0.25	4000	0.6	5900	0.4	79.9	IES2	0.58-0.50	68	MGE71	I
		0.37	4000	0.9	5900	0.6	84.0	IES2	0.67-0.53			
		0.55	4000	1.3	5900	0.9	86.8	IES2	0.76-0.61			
		0.75	4000	1.8	5900	1.2	88.1	IES2	0.82-0.66		MGE80	
		1.1	4000	2.6	5900	1.8	88.5	IES2	0.88-0.74			
		1.5	4000	3.6	5900	2.4	89.1	IES2	0.90-0.83			
		2.2	4000	5.2	5900	3.5	90.1	IES2	0.91-0.85			
		3	4000	7,2	5900	4,9	89,7	IES2	0.91-0.86	74	MGE100	
		4	4000	9,6	5900	6,5	91,3	IES2	0.92-0.87		MGE112	J
		5,5	4000	13,1	5900	8,9	90,5	IES2	0.92-0.88		MGE132	
		7,5	4000	17,9	5900	12,1	90,9	IES2	0.93-0.89	80		
		11	4000	26,3	5900	17,9	93,1	IES2	0.93-0.90		MGE160MH	

TECHNICAL SPECIFICATIONS

MAINS CONNECTION

Voltage and Power (P2) range	1 x 200-240V : 0,25 - 1,5kW 3 x 380-500V : 0,25 - 11kW 3 x 380-480V : 15 - 22kW
Voltage tolerances	+/-10%
Frequency	50-60Hz +/- 5%
Network	TN/TT (IT with optional motor) according to IEC 60364

ENVIRONMENTAL LIMITS

Degree of protection	IP55/IP66 according to EN60529
Operating temperature	-20 to +60°C, derating above +50°C
Storage/transport temperature	-30 to +60°C
Altitude	0-1000m without derating
Humidity	0-95%, non-condensing

COMPLIANCE

Conformity to standards	MGE: CE, EAC, RCM, CCC, and cURus
Harmonics	IEC/EN 61000-3-12
EMC	**Model H/I/J:** Category C1 according to EN 61800-3, corresponding to CISPR 11, class B, group 1 (residential areas) **Model F:** Category C3 according to EN 61800-3, corresponding to CISPR 11, class A, group 2

INPUTS / OUTPUTS*

	FM100	FM200	FM300
Digital inputs	1	1	2
Digital inputs or open-collector outputs	1	1	2
Relay outputs (Form C)	-	2	2
Analog inputs	1**	2	3
PT100/PT1000 inputs	-	-	2
+5V Supply	Y	Y	Y
+24 Supply	-	Y	Y
RS-485 (GENIbus profile)	Y	Y	Y
Grundfos digital sensor input	-	Y	Y
LiqTec sensor input	-	-	Y
Digital inputs (dedicated)	0-5V		
Digital inputs/open-collector outputs	0-24V, resistive or inductive		
Analog input	0-20mA / 4-20mA, 0,5-3,5V / 0-5V / 0-10V		
Relay output	250V AC/30V DC, max. continues current 2A rms		
Communication options	GENIbus (CIM 050) LonWorks (CIM 100) PROFIBUS DP (CIM 150) Modbus RTU (CIM 200) GSM/GPRS (CIM 250) BACnet MS/TP (CIM 300) PROFINET IO (CIM 500) Modbus TCP (CIM 500) BACnet IP (CIM 500) CIM 500 (CIM 500)		

*) Only applicable for MGE Models H/I/J
**) Only 0,5-3,5V / 0-5V / 0-10V

IE and IES

Electric motors are subject to EU ecodesign requirements. EN 50598 is a standard looking at Ecodesign for power drive systems and their driven applications. Part 2 defines energy efficiency indicators ("IE" and "IES") for the complete drive module (CDM) and the combination of the CDM and motor to form a power drive system (PDS).

The power drive system classification is based on determined losses at one operating point, 100% speed and 100% current. In addition, the standard defines a set of standardized operating points that can be used to determine energy efficiency values and system losses across the operating profile of the PDS using reference models.

Grundfos MGE are motors with integrated frequency converters (PDS) and can measure or calculate the IES values without having to use the reference models: Motor IE + CDM IE ≠ IES.

Grundfos MGE use IE4/IE3 motors and complies with the EISA2007 legislation for USA and are ahead of the EU IES2 class requirements legislated by the Energy-related Products (ErP) Directive (Directive 2009/125/EC of the European Parliament and of the Council).

Three points of related losses and shaded area of interest for pump manufacturers when calculating the EEI (Energy Efficiency Index) of a pump unit

DIMENSIONS

Voltage	Frame size[4]	Stator housing					Shaft end							Feet B3, B34, B35													Free-hole flange B35, B5/V1								Tapped-hole flange B34, B14/V18								Cable entry
		AC	AD	AE	AF	LL	D	DB	E	EB	F	G	GA	L	LB[1]	A	AB	B	B'	BB	C	H	HA	HC	HD	K	L	LB[1]	LA	M	N	P	SxZ	T	L	LB	LA[3]	M	N	P	SxZ	T	O
1 x 200-240V	MGE71	122	158	106	106	192	14	M5	30	22	5	11	16	244[2]	234	112	138	90	-	110	45	71	3	131	229	7	264	234	9	130	110	160	Ø10x4	3,5	244	214	12	85	70	105	M6x4	2,5	4xM20
	MGE80						19	M6	40	32	6	15,5	21,5	254[2]		125	158	100	-	125	50	80		140	238	10	274		10	165	130	200	Ø12x4		254			100	80	120	M6x4	3	
	MGE90S						24	M8	50	40	8	20	27	284		140	178	100	-	155	56	90		150	248	10,5	284		11						324		13	115	95	135			
	MGE90L																		125																								
3 x 380-500V	MGE71	122	158	134	134	232	14	M5	30	22	5	11	16	304	274	112	138	90	-	110	45	71		131	229	7	304	274	9	130	110	160	Ø10x4	4	244	254	12	85	70	105	M6x4	2,5	4xM20
	MGE80						19	M6	40	32	6	15,5	21,5	314		125	158	100	-	125	50	80		140	238	10	314		10	165	130	200	Ø12x4		254			100	80	120		3	
	MGE90S						24	M8	50	40	8	20	27	324		140	178	100	-	155	56	90		150	248	10,5	324		11						324		13	115	95	135			
	MGE90L																		125																								
	MGE100	191,3	201	145,5	145,5	280	28	M10	60	50	8	24	31	394	334	160	200	140	-	173	63	100	5	197	301	12	394	334	10	215	180	250	Ø14,5x4	4	394	334	14,5	130	110	160	M8x4	3,5	1 x M25 + 4 x M20
	MGE112															190	230	140	-	180	70	112		209	313																		
	MGE132S	255	237	173	173	317	38	M12	80	70	10	33	41	445	365	216	256		-	180	89	132		229	333	12	445	365	12	265	230	300	Ø15x4	4	445	365		165	130	200	M10x4	3,5	1 x M32 + 5 x M20
	MGE132L													469	389				178					263	369		469	389							469	389							
	MGE160 MH									110				516	317	254	290	210	-	250				291	397	14,5	516	406	12						-	-	-	-	-	-	-	-	1 x M40 +1x M20 +4x M16
3 x 380-480V	MGE160M	314	308	210	210	400	42	M16	110	82	12	37	45	581		254	287	210	-	239	108	160	8	317	467	15	581	471		300	250	350	Ø19x4	5	-	-	-	-	-	-	-	-	
	MGE160L													625	-				254	283							625	515							-	-	-	-	-	-	-	-	
	MGE180						48			100	14	43	51,5	651		279	312	241	279	308	121	180		337			651	541							-	-	-	-	-	-	-	-	

1) Only applicable for B34/B35 motors with feet and free-hole flanges.
2) Except B34/B35 are 264mm for MGE71 and 274mm for MGE80.
3) When fitting a component on the motor flange, check that the through-going screws do not penetrate deeper into the flange than the dimension LA.
If the screws are too long, they can be screwed into the stator windings.
4) See Technical Information to identify Frame Size.

B3, B34/B35, B6/B7/B8/V5/V6

Flange B5/V1, B35

Flange B14/V18, B34

be think innovate

GRUNDFOS