



Smart
connections.

Data sheet

INVEOR M

INVEOR – "Smart connections." on five levels

1 The INVEOR

- IP65 protection class
- Integrated soft PLC
- Pre-fitted cable glands
- Fan-free design up to 7.5 kW
- Robust and vibration-resistant housing concept
- STO functional safety

3 Operation and observation

- Potentiometer
- M12 RS485 service interface
- Integrated foil keypad
- MMI handheld controller
- MMI cover option
- Touch operating terminal
- PC software: KOSTAL INVERTERpc
- App: KOSTAL INVERTERapp



2 Communication



4 Motor adaptations

- Robust and vibration-resistant adapter concept
- Motor adapter concept compatible with all commercially available motors

5 Control process

- IE1, IE2, IE3, IE4: for asynchronous motors and synchronous motors

Overview of INVEOR M sizes



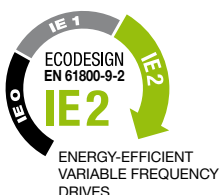
a

A




B

C

D



230 V devices, technical data for INVEOR M

Size	α				A				
Recommended motor rating ¹⁾ [kW]	0.25	0.37	0.55	0.75	0.37	0.55	0.75	1.1	1.5
Supply voltage	1 x 100 V AC -15 %...230 V AC +10 % 140 V DC -15 %...320 V DC +10 % ⁴⁾								
Grid frequency	50/60 Hz ± 6%								
Network configurations	TN / TT / IT (option)				TN / TT				
Line current [A]	4.5	4.5	5.8	7.3	4.5	5.6	6.9	9.2	13.2
Rated current output eff. [IN at 8 kHz]	1.4	2.2	2.7	3.3	2.3	3.2	3.9	5.2	7
Min. brake resistance [Ω]	-				50				
Overload for 60 sec.	150 %								125 %
Switching frequency	4 kHz, 8 kHz, 16 kHz, (factory setting 8 kHz)								
Output frequency	0 Hz – 400 Hz								
Mains cycles of operation / restart	Every 2 min.								
DIN EN 61800-5 touch current	< 10 mA ²⁾								
Protective function	Overvoltage and undervoltage, I ² t restriction, short-circuit, ground leak, motor and variable frequency drive temperature, stall prevention, blocking detection, PID dry run protection, functional safety (SIL 3/PLe)								
Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit								
Soft PLC	IEC61131-3, FBD, ST, AWL								
Housing	Plastic adapter plate / aluminium die-cast casing				Two-part aluminium die-cast casing				
Dimensions [L x W x H] mm	187 x 126 x 70		187 x 126 x 80		233 x 153 x 120				
Weight including adapter plate	1.5 kg				3.9 kg				
Protection class [IPxy]	IP 65								
Cooling	Passive cooling								Active "internal" cooling
Ambient temperature	-10 °C (non-condensing) to +40 °C (50 °C with derating)								up to 35 °C / 40 °C ⁵⁾
Storage temperature	-25 °C...+85 °C								
Altitude of the installation location	Up to 1000 m above sea level / over 1000 m with reduced performance (1 % per 100 m) / above 2000 m see operating manual								
Relative air humidity	≤ 96 %, condensation not permitted.								
Vibration resistance (DIN EN 60068-2-6)	50 m/s ² , 60...160 Hz ³⁾								10 m/s ² ; 5...200 Hz ³⁾
Shock resistance (DIN EN 60068-2-27)	300 m/s ² , 11ms, 3 layers								100 m/s ²
EMC (DIN-EN-61800-3)	C2				C1				
Certificates and conformity	  								

Size	α		A		
Application circuit board model	Standard		Basic 0.37-1.1 kW	Standard 0.37-1.1 kW	Basic 1.5 kW
I/O interfaces	2 DI / 1 DO / 1 AI / - AO / 1 relay		2 DI / 1 DO / 1 AI / - AO / - relay	4 DI / 2 DO / 2 AI / 1 AO / 2 relays	2 DI / 1 DO / 1 AI / - AO relay
Potentiometer on device	Accessories		Option	Option	Option
Foil keypad	Option		Option	Option	-
MMI option	-		Option	Option	-
Internal power supply	24 V DC, 100 mA / 10 V DC, 30 mA / short-circuit proof				24 V DC, 100 mA / short-circuit proof
External feed-in 24 V DC	-		-	24 V DC +/-15 %	-
Fieldbus integrated	Modbus RTU				
Fieldbus option	CANopen		-	CANopen / PROFIBUS / PROFINET / EtherCAT / Sercos III	-

Technical data for 230 V devices INVEOR M (subject to technical changes)

¹⁾ Recommended motor rating (4-pole asynch. motor) is given based on the 230 V AC supply voltage.




²⁾ With 1LA7 asynchronous motor, motor-mounted

³⁾ Installation- and application-related resonant frequencies can damage the devices.

⁴⁾ In compliance with the overvoltage category

⁵⁾ For 40 m³/h / 60 m³/h cooling air flow

400 V devices, technical data for INVEOR M

Sizes	A				B			C		D			
Recommended motor rating ¹⁾ [kW]	0.55	0.75	1.1	1.5	2.2	3.0	4.0	5.5	7.5	11.0	15.0	18.5	22.0
Supply voltage	3 x 200 V AC -10 %...480 V AC +10 % 280 V DC -10 %...680 V DC +10 % ⁴⁾												
Grid frequency	50/60 Hz ± 6 %												
Network configurations	TN / TT												
Line current [A]	1.4	1.9	2.6	3.3	4.6	6.2	7.9	10.8	14.8	23.2	28.2	33.2	39.8
Rated current output eff. [IN at 8 kHz]	1.7	2.3	3.1	4.0	5.6	7.5	9.5	13.0	17.8	28.0	34.0	40.0	48.0
Min. brake resistance [Ω]	100				50			50		30			
Overload for 60 sec. in %	150												130
Switching frequency	4 kHz, 8 kHz, 16 kHz, (factory setting 8 kHz)									4 kHz - 16 kHz (factory setting 4 kHz)			
Output frequency	0 Hz – 400 Hz												
Nominal output apparent power [kVA]	1.06	1.43	1.93	2.49	3.49	4.68	5.92	8.11	11.1	17.46	21.2	24.94	29.93
Mains cycles of operation / restart	Unlimited ⁵⁾									2 min.			
DIN EN 61800-5 touch current	< 3.5 mA ²⁾												
Protective function	Overvoltage and undervoltage, I ² t restriction, short-circuit, ground leak, motor and variable frequency drive temperature, stall prevention, blocking detection, PID dry run protection, functional safety (SIL 3/PLe)												
Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit												
Soft PLC	IEC61131-3, FBD, ST, AWL												
Housing	Two-part aluminium die-cast casing												
Dimensions [L x W x H] mm	233 x 153 x 120				270 x 189 x 140			307 x 223 x 181		414 x 294 x 232			
Weight including adapter plate	3.9 kg				5.0 kg			8.7 kg		21.0 kg			
Protection class	IP 65									IP 55			
Cooling	Passive cooling									Active cooling			
Ambient temperature	-40 °C (non condensing) to +50 °C (without derating)									-40 up to +50 °C (8kHz)		-40 up to +50 °C (4kHz)	
Storage temperature	-40 °C...+85 °C												
Altitude of the installation location	Up to 1000 m above sea level / over 1000 m with reduced performance (1 % per 100 m) / above 2000 m see operating manual												
Relative air humidity	≤ 96 %, condensation not permitted.												
Vibration resistance (DIN EN 60068-2-6) standard variant	50 m/s ² ; 60...160 Hz ³⁾									30 m/s ² 60...160 Hz ³⁾			
Vibration resistance HD variant	-				(DIN EN 60068-2-6) 50 m/s ² 60 ... 160 Hz ³⁾ ; (DIN EN 60068-2-64) Noise 10 -1000 Hz ³⁾								
Shock resistance (DIN EN 60068-2-27) standard variant & HD variant	300 m/s ² , 11ms, 3 layers												
EMC (DIN-EN-61800-3)	C2												
Energy efficiency class (EN 61800-9-2)	IE2												
Certificates and conformity													

Size	A, B, C		A, B, C, D	
Application circuit board model	Basic		Standard	Functional safety
I/O interfaces	2 DI / 1 DO / 1 AI / - AO / - relay		4 DI / 2 DO / 2 AI / 1 AO / 2 relays	4 DI / 2 DO / 2 AI / 1 AO / - relay / 2 STO channels
Potentiometer on device	Option		Option	Option
Foil keypad	Option		Option	Option
MMI option	Option		Option	Option
Internal power supply	24 V DC, 100 mA / 10 V DC, 30 mA / short-circuit proof			
External feed-in 24 V DC	-		24 V DC +/-15 %	24 V DC +/-15 %
Fieldbus integrated	Modbus RTU			
Fieldbus option	-		CANopen / PROFIBUS / PROFINET / EtherCAT / Sercos III	

Technical data for 400 V devices INVEOR M (subject to technical changes)

¹⁾ Recommended motor rating (4-pole asynch. motor) is given based on the 400 V AC supply voltage.

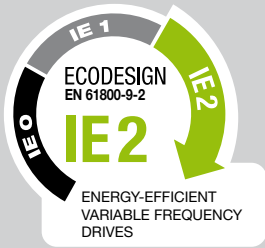
²⁾ With 1LA7 asynchronous motor, motor-mounted

³⁾ Installation- and application-related resonant frequencies can damage the devices.

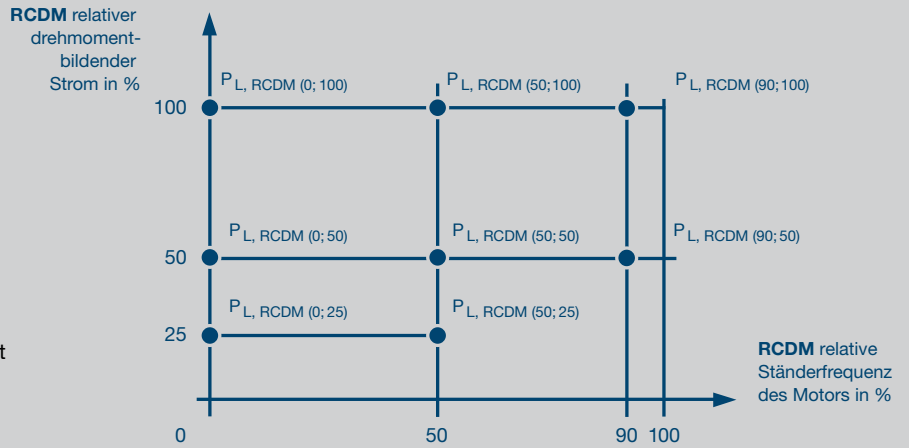
⁴⁾ In compliance with the overvoltage category

⁵⁾ < 3 s may result in power failure/intermediate circuit undervoltage faults

Variable frequency drive losses in accordance with EN 61800-9-2



INVEOR variable frequency drives meet the most stringent of energy efficiency requirements.



Device	Supply voltage [V]	Nominal current [A]	Measurement (90; 100)	Measurement (50; 100)	Measurement (10; 100)	Measurement (90; 50)	Measurement (50; 50)	Measurement (10; 50)	Measurement (50; 25)	Measurement (10; 25)	Standby Losses [W]	IE class
			Relative losses [%] ^{1) 2) 3)}									
Size A 0.55 kW	400	1.7	20	19	21	19	17	18	16	18	5	IE2
			1.9	1.8	2	1.8	1.6	1.7	1.5	1.7		
Size A 0.75 kW	400	2.3	26	25	26	19	19	21	19	20	5	IE2
			1.8	1.8	1.8	1.3	1.3	1.4	1.3	1.4		
Size A 1.1 kW	400	3.1	33	33	32	24	26	25	19	21	5	IE2
			1.7	1.7	1.6	1.3	1.4	1.3	1	1.1		
Size A 1.5 kW	400	4.0	45	38	41	29	31	30	32	26	5	IE2
			1.8	1.5	1.6	1.2	1.2	1.2	1.3	1		
Size B 2.2 kW	400	5.6	58	55	56	42	40	42	32	37	5	IE2
			1.7	1.6	1.6	1.2	1.1	1.2	0.9	1		
Size B 3.0 kW	400	7.5	81	87	71	54	53	52	43	46	5	IE2
			1.7	1.9	1.5	1.2	1.1	1.1	0.9	1		
Size B 4.0 kW	400	9.5	103	96	94	67	62	64	53	53	5	IE2
			1.7	1.6	1.6	1.1	1	1.1	0.9	0.9		
Size C 5.5 kW	400	13.0	153	125	123	77	73	73	53	58	5	IE2
			1.9	1.5	1.5	0.9	0.9	0.9	0.7	0.7		
Size C 7.5 kW	400	17.8	233	187	171	104	95	95	74	81	5	IE2
			2.1	1.7	1.5	0.9	0.9	0.9	0.7	0.7		
Size D 11.0 kW	400	28.0	268	234	242	152	140	150	107	116	13	IE2
			1.5	1.3	1.4	0.9	0.8	0.9	0.6	0.7		
Size D 15.0 kW	400	34.0	339	293	297	185	165	174	123	133	13	IE2
			1.6	1.4	1.4	0.9	0.8	0.8	0.6	0.6		
Size D 18.5 kW	400	40.0	407	347	347	212	189	200	135	147	13	IE2
			1.6	1.4	1.4	0.9	0.8	0.8	0.5	0.6		
Size D 22.0 kW	400	48.0	526	448	448	262	237	248	172	183	13	IE2
			1.8	1.5	1.5	0.9	0.8	0.8	0.6	0.6		

¹⁾ Loss values were determined at 4 kHz switching frequency
²⁾ Loss values include 10% supplement in accordance with EN 50598 standard
³⁾ Relative losses in relation to the device's rated apparent power

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