INDUSTRIE ELEKTRIK

KOSTAL

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

2 Communication

CANopen

PROFIBUS

EtherCAT

PROFINET

MODBUS RTU

sercos the automation bus

Bluetooth

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
www.kostal-industrie-elektrik.com/KOSTAL INVERTERpc

App: KOSTAL INVERTERapp

Download on the App Store

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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

α	A	B	C	D

SIL3 PLe FUNCTIONAL SAFETY

ECODESIGN EN 61800-9-2 IE2 ENERGY-EFFICIENT VARIABLE FREQUENCY DRIVES

IEC/EN 60034-30-1 IE4 SUPPORT SYNCHRONOUS MOTORS

RoHS 2011/65/EU

CE

c UL us LISTED

230 V devices, technical data for INVEOR M

	Size	α				A				
Electrical data	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]								
Functions	Protective function	Overvoltage and undervoltage, I^2t restriction, short-circuit, ground leak, motor and variable frequency drive temperature, stall prevention, blocking detection, PID dry run protection								
	Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit								
	Soft PLC	IEC61131-3, FBD, ST, AWL								
Mechanical data	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
Environmental conditions	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/s², 60…160 Hz [3]								10 m/s²; 5…200 Hz[3]
	Shock resistance (DIN EN 60068-2-27)	300 m/s², 11ms, 3 layers								100 m/s²
	EMC (DIN-EN-61800-3)	C2				C1				
	Certificates and conformity	RoHS 2011/65/EU	CE	cULus LISTED						

	Size	α	A		
Interfaces	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 asynchr. 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 m^3/h / 60 m^3/h cooling air flow

400 V devices, technical data for INVEOR M

	Sizes	A				B			C		D			
Electrical data	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]												
Functions	Protective function	Overvoltage and undervoltage, I^2t restriction, short-circuit, ground leak, motor and variable frequency drive temperature, stall prevention, blocking detection, PID dry run protection												
	Software functions	Process control (PID controller), fixed frequencies, data record changeover, flying restart, motor current limit												
	Soft PLC	IEC61131-3, FBD, ST, AWL												
Mechanical data	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			
Environmental conditions	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/s²; 60…160 Hz[3]									30 m/s² | 60…160 Hz [3]			
	Vibration resistance (DIN EN 60068-2-6) HD variant	-				50 m/s² | 60…160Hz [3]; Noise: 10-1000 Hz [3]								
	Shock resistance (DIN EN 60068-2-27) standard variant & HD variant	300 m/s², 11ms, 3 layers												
	EMC (DIN-EN-61800-3)	C2												
	Energy efficiency class (EN 61800-9-2)	IE2												
	Certificates and conformity	RoHS 2011/65/EU, CE, cULus LISTED												

	Size	A, B, C	A, B, C, D	
Interfaces	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 asynchr. motor) is given based on the 400 V AC supply voltage.

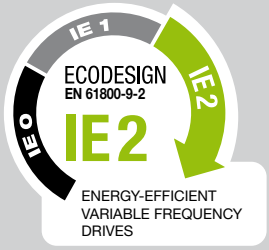
[2] With 1LA7 asynchronous motor, motor-mounted

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

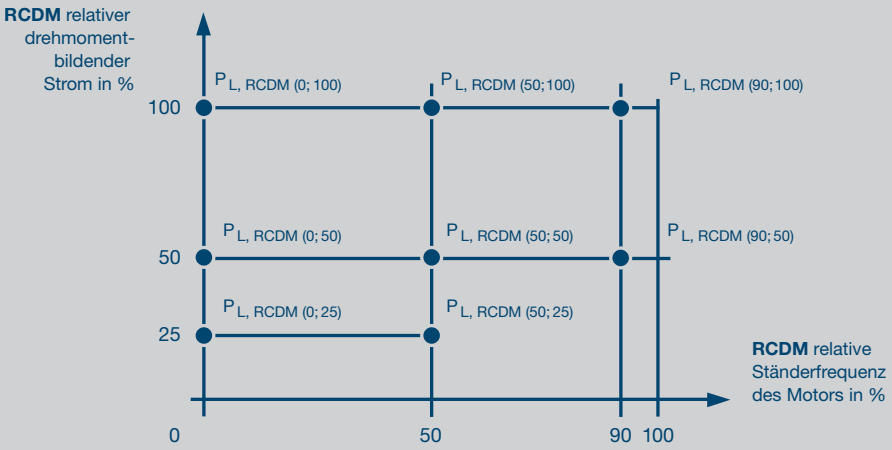
[4] In compliance with the overvoltage category

[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
			Absolute power loss [W] [1) 2)]									
			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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