



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
- INVEOR PC software

2 Communication

- CANopen
- PROFINET
- EtherCAT
- PROFINET
- MODBUS RTU
- SERCOS the automation bus

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



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 |
| Grid voltage | 1 x 100 VAC -15 %...230 VAC +10 % 140 VDC -15 %...320 VDC +10 % ⁴⁾ | | | | | | | |
| Grid frequency | 50/60 Hz \pm 6% | | | | | | | |
| Mains 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 |
| Rated current output eff. [IN at 8 kHz] | 1.4 | 2.2 | 2.7 | 3.3 | 2.3 | 3.2 | 3.9 | 5.2 |
| Min. brake resistance [Ω] | - | | | | 50 | | | |
| Overload for 60 sec. | 150 % | | | | | | | |
| 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 drive controller 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 | | | | | | | |
| 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 | | | | | | | |
| Ambient temperature | -10 °C (non-condensing) to +40 °C (50 °C with derating) | | | | | | | |
| 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 | \leq 96 %, condensation not permitted. | | | | | | | |
| Vibration resistance (DIN EN 60068-2-6) | 50 m/s ² ; 5...200 Hz ³⁾ | | | | | | | |
| Shock resistance (DIN EN 60068-2-27) | 300 m/s ² | | | | | | | |
| EMC (DIN-EN-61800-3) | C2 | | | | C1 | | | |
| Certificates and conformity |    | | | | | | | |

| Size | α | | A | |
|---------------------------------|--|--|-------------------------------------|---|
| Application circuit board model | Standard | | Basic | Standard |
| 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 |
| Potentiometer on device | Accessories | | Option | Option |
| Foil keypad | Option | | Option | Option |
| MMI option | - | | Option | Option |
| Internal power supply | 24 VDC, 100 mA / 10 VDC, 30 mA / short-circuit proof | | | |
| External feed-in 24 VDC | - | | - | 24 VDC +/-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 VAC supply voltage.

²⁾ With 1LA7 asynchronous motor, motor-mounted

³⁾ Combined vibration test, part 4, severity 2 in accordance with FN942017

⁴⁾ In compliance with the overvoltage category

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 |
| Grid voltage | 3 x 200 VAC -10 %...480 VAC +10 % 280 VDC -10 %...680 VDC +10 % ⁴⁾ | | | | | | | | | | | | |
| Grid frequency | 50/60 Hz ± 6 % | | | | | | | | | | | | |
| Mains 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) | | | | | | | | | | | | |
| Output frequency | 0 Hz – 400 Hz | | | | | | | | | | | | |
| Mains cycles of operation / restart | Unlimited | | | | | | | | | 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 drive controller 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 | | | | | | | | | | | | |
| 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 | -25 °C (non-condensing) to +50 °C (without derating) | | | | | | | | | | | | |
| 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 ; 5...200 Hz ³⁾ | | | | | | | | | | | | |
| Shock resistance (DIN EN 60068-2-27) | 300 m/s ² | | | | | | | | | | | | |
| EMC (DIN-EN-61800-3) | C2 | | | | | | | | | | | | |
| 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 VDC, 100 mA / 10 VDC, 30 mA / short-circuit proof | | | |
| External feed-in 24 VDC | - | | 24 VDC +/-15 % | 24 VDC +/-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 VAC supply voltage.

²⁾ With 1LA7 asynchronous motor, motor-mounted

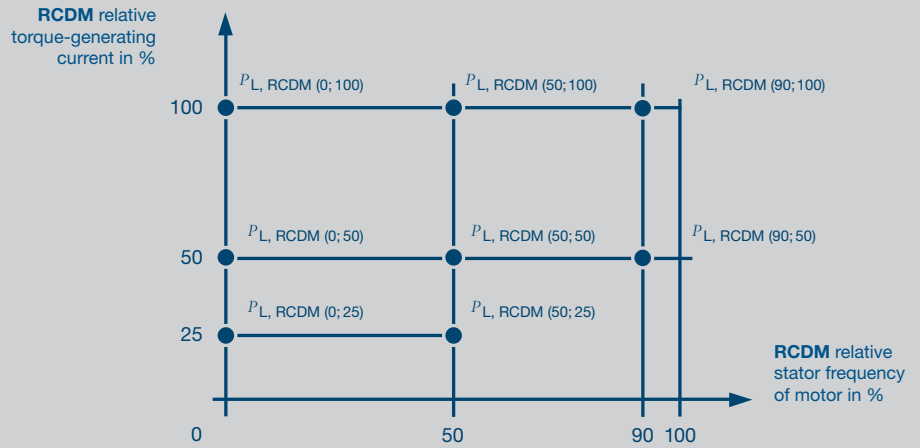
³⁾ Combined vibration test, part 4, severity 2 in accordance with FN942017

⁴⁾ In compliance with the overvoltage category

Drive controller losses in accordance with EN50598-2



INVEOR drive controllers 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) | IE class |
|---|--------------------|---------------------|--|-----------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------|
| | | | Absolute power loss [W] ^{1) 2)} | | | | | | | | |
| Relative losses [%] ^{1) 2) 3)} | | | | | | | | | | | |
| Size A 0.55 kW | 400 | 1.7 | 24 | 25 | 28 | 22 | 22 | 25 | 21 | 24 | IE2 |
| | | | 2.07 | 2.10 | 2.35 | 1.87 | 1.84 | 2.13 | 1.77 | 2.06 | |
| Size A 0.75 kW | 400 | 2.3 | 32 | 30 | 35 | 24 | 24 | 28 | 24 | 27 | IE2 |
| | | | 1.98 | 1.89 | 2.22 | 1.5 | 1.5 | 1.76 | 1.48 | 1.71 | |
| Size A 1.1 kW | 400 | 3.1 | 40 | 38 | 43 | 30 | 29 | 33 | 25 | 29 | IE2 |
| | | | 1.88 | 1.75 | 1.98 | 1.38 | 1.33 | 1.53 | 1.14 | 1.36 | |
| Size A 1.5 kW | 400 | 4.0 | 52 | 48 | 53 | 35 | 35 | 38 | 30 | 34 | IE2 |
| | | | 1.88 | 1.72 | 1.91 | 1.27 | 1.26 | 1.38 | 1.07 | 1.22 | |
| Size B 2.2 kW | 400 | 5.6 | 71 | 60 | 82 | 53 | 44 | 62 | 36 | 52 | IE2 |
| | | | 1.82 | 1.54 | 2.11 | 1.37 | 1.14 | 1.6 | 0.93 | 1.34 | |
| Size B 3.0 kW | 400 | 7.5 | 95 | 88 | 100 | 66 | 63 | 76 | 55 | 67 | IE2 |
| | | | 1.83 | 1.68 | 1.92 | 1.27 | 1.21 | 1.45 | 1.05 | 1.28 | |
| Size B 4.0 kW | 400 | 9.5 | 129 | 118 | 140 | 85 | 82 | 100 | 68 | 86 | IE2 |
| | | | 1.96 | 1.79 | 2.12 | 1.3 | 1.25 | 1.52 | 1.03 | 1.30 | |
| Size C 5.5 kW | 400 | 13.0 | 178 | 158 | 178 | 105 | 96 | 112 | 68 | 89 | IE2 |
| | | | 1.98 | 1.75 | 1.97 | 1.17 | 1.06 | 1.25 | 0.75 | 0.98 | |
| Size C 7.5 kW | 400 | 17.8 | 270 | 214 | 241 | 132 | 114 | 140 | 91 | 119 | IE2 |
| | | | 2.19 | 1.74 | 1.95 | 1.07 | 0.93 | 1.13 | 0.74 | 0.96 | |
| Size D 11.0 kW | 400 | 28.0 | 336 | 303 | 355 | 200 | 185 | 219 | 144 | 171 | IE2 |
| | | | 1.73 | 1.56 | 1.83 | 1.03 | 0.95 | 1.13 | 0.74 | 0.88 | |
| Size D 15.0 kW | 400 | 34.0 | 419 | 372 | 432 | 236 | 215 | 253 | 165 | 194 | IE2 |
| | | | 1.78 | 1.58 | 1.83 | 1.00 | 0.91 | 1.07 | 0.70 | 0.83 | |
| Size D 18.5 kW | 400 | 40.0 | 512 | 448 | 536 | 280 | 255 | 302 | 190 | 228 | IE2 |
| | | | 1.85 | 1.62 | 1.93 | 1.01 | 0.92 | 1.09 | 0.69 | 0.82 | |
| Size D 22.0 kW | 400 | 48.0 | 653 | 556 | 677 | 340 | 296 | 368 | 212 | 274 | IE2 |
| | | | 1.96 | 1.67 | 2.04 | 1.02 | 0.89 | 1.11 | 0.64 | 0.82 | |

¹⁾ Loss values were determined at 8 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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