



Variable Frequency Drive, 3~ / 3~ 400 V, 9.5 A, 4 kW, Vector control, EMC-Filter, Brake-Chopper

Part no. DA1-349D5FB-A66N
Article no. 169201
Catalog No. DA1-349D5FB-A66N

Delivery programme

| | | | |
|----------------------------------|----------|----|---|
| Product range | | | Variable frequency drives |
| Rated operational voltage | U_e | | 400 V AC, 3-phase |
| Output voltage with V_e | U_2 | | 400 V AC, 3-phase |
| Mains voltage (50/60Hz) | U_{LN} | V | 380 (-10%) - 480 (+10%) |
| Rated operational current | | | |
| At 150% overload | I_e | A | 9.5 |
| Note | | | Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +40 °C |
| Note | | | Overload cycle for 60 s every 600 s |
| Assigned motor rating | | | |
| Note | | | for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz |
| Note | | | Overload cycle for 60 s every 600 s |
| Note | | | at 400 V, 50 Hz |
| 150 % Overload | P | kW | 4 |
| 150 % Overload | I_e | A | 8.5 |
| Note | | | at 440 - 480 V, 60 Hz |
| 150 % Overload | P | HP | 5 |
| 150 % Overload | I_e | A | 7.6 |
| Degree of Protection | | | IP66/NEMA 4X |
| Interface/field bus (built-in) | | | OP-Bus (RS485)/Modbus RTU, CANopen® |
| Fieldbus connection (optional) | | | Ethernet IP DeviceNet PROFIBUS PROFINET Modbus-TCP EtherCAT BACnet/IP SmartWire-DT |
| Fitted with | | | Radio interference suppression filter Brake chopper 7-digital display assembly |
| Frame size | | | FS2 |
| Connection to SmartWire-DT | | | with SmartWire-DT module DX-NET-SWD2 |

Technical data

General

| | | | |
|--------------------------------|----------|----|---|
| Standards | | | Specification for general requirements: IEC/EN 61800-2 EMC requirements: IEC/EN 61800-3 Safety requirements: IEC/EN 61800-5-1 |
| Certifications | | | CE, cUL, UL, c-Tick, Ukr Sepro, EAC |
| Production quality | | | RoHS, ISO 9001 |
| Climatic proofing | ρ_w | % | < 95%, average relative humidity (RH), non-condensing, non-corrosive (EN 50178) |
| Ambient temperature | | °C | |
| operation (150 % overload) | θ | °C | -10 - +40 |
| Storage | θ | °C | -40 - +60 |
| Radio interference level | | | |
| Radio interference class (EMC) | | | C1, C2, C3, depending on the motor cable length, the connected load, and ambient conditions. External radio interference suppression filters (optional) may be necessary. |
| Environment (EMC) | | | 1st and 2nd environments |
| maximum motor cable length | l | m | C1 ≤ 1 m C2 ≤ 5 m |

| | | | |
|--|------------|-----|---|
| Mounting position | | | C3 ≤ 25 m |
| Altitude | | m | Vertical |
| Degree of Protection | | | 0 - 1000 m above sea level above 1000 m with 1 % performance reduction per 100 m max. 4000 m |
| Protection against direct contact | | | IP66/NEMA 4X |
| | | | BGV A3 (VBG4, finger- and back-of-hand proof) |
| Main circuit | | | |
| Supply | | | |
| Rated operational voltage | U_e | | 400 V AC, 3-phase |
| Mains voltage (50/60Hz) | U_{LN} | V | 380 (-10%) - 480 (+10%) |
| Input current (150% overload) | I_{LN} | A | 9.8 |
| System configuration | | | AC supply systems with earthed center point |
| Supply frequency | f_{LN} | Hz | 50/60 |
| Frequency range | f_{LN} | Hz | 48 - 62 |
| Mains switch-on frequency | | | Maximum of one time every 30 seconds |
| Power section | | | |
| Function | | | Frequency inverter with internal DC link and IGBT inverter |
| Overload current (150% overload) | I_L | A | 14.25 |
| max. starting current (High Overload) | I_H | % | 200 |
| Note about max. starting current | | | for 4 seconds |
| Output voltage with V_e | U_2 | | 400 V AC, 3-phase |
| Output Frequency | f_2 | Hz | 0 - 50/60 (max. 500) |
| Switching frequency | f_{PWM} | kHz | 8 adjustable 4 - 32 (audible) |
| Operation Mode | | | U/f control Speed control with slip compensation sensorless vector control (SLV) optional: Vector control with feedback (CLV) |
| Frequency resolution (setpoint value) | Δf | Hz | 0.1 |
| Rated operational current | | | |
| At 150% overload | I_e | A | 9.5 |
| Note | | | Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +40 °C |
| Power loss | | | |
| Heat dissipation at rated operational current | P_V | W | 136 |
| Efficiency | η | % | 96.6 |
| Maximum leakage current to ground (PE) without motor | I_{PE} | mA | 4.65 |
| Fitted with | | | Radio interference suppression filter Brake chopper 7-digital display assembly |
| Safety function | | | STO (Safe Torque Off) |
| Frame size | | | FS2 |
| Motor feeder | | | |
| Note | | | for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz |
| Note | | | Overload cycle for 60 s every 600 s |
| Note | | | at 400 V, 50 Hz |
| 150 % Overload | P | kW | 4 |
| Note | | | at 440 - 480 V, 60 Hz |
| 150 % Overload | P | HP | 5 |
| maximum permissible cable length | l | m | screened: 100 screened, with motor choke: 200 unscreened: 150 unscreened, with motor choke: 300 |
| Apparent power | | | |
| Apparent power at rated operation 400 V | S | kVA | 6.58 |
| Apparent power at rated operation 480 V | S | kVA | 7.9 |
| Braking function | | | |
| Standard braking torque | | | max. 30 % M_N |

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|---|------------------|----------|---|
| DC braking torque | | | 100 %, adjustable |
| Braking torque with external braking resistance | | | max. 100% rated operational current I_{e} , with external braking resistance |
| minimum external braking resistance | R_{min} | Ω | 100 |
| Switch-on threshold for the braking transistor | U_{DC} | V | 780 V DC |

Control section

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| External control voltage | U_{c} | V | 24 V DC (max. 100 mA) |
| Reference voltage | U_{s} | V | 10 V DC (max. 10 mA) |
| Analog inputs | | | 2, parameterizable, 0 - 10 V DC, 0/4 - 20 mA |
| Analog outputs | | | 2, parameterizable, 0 - 10 V, 0/4 - 20 mA |
| Digital inputs | | | 3, parameterizable, max. 30 VDC, max. 5 for non-parameterized analog inputs |
| Digital outputs | | | 2, parameterizable, 24 V DC |
| Relay outputs | | | 2, parameterizable, 1 N/O and 1 changeover contact, 6 A (250 V, AC-1) / 5 A (30 V, DC-1) |
| Interface/field bus (built-in) | | | OP-Bus (RS485)/Modbus RTU, CANopen [®] |

Assigned switching and protective elements

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|--|--|---|--------------|
| Power Wiring | | | |
| IEC (Typ B, gG) | | | FAZ-B16/3 |
| UL (Class CC or J) | | A | 16 |
| 150 % overload (CT/ I_{H} , at 50 °C) | | | DX-LN3-010 |
| Motor feeder | | | |
| 150 % overload (CT/ I_{H} , at 50 °C) | | | DX-LM3-011 |
| 150 % overload (CT/ I_{H} , at 50 °C) | | | DX-SIN3-010 |
| 10 % duty factor (DF) | | | DX-BR100-0K8 |
| 20 % duty factor (DF) | | | DX-BR100-1K4 |

Design verification as per IEC/EN 61439

| | | | |
|--|------------------|---|--|
| Technical data for design verification | | | |
| Rated operational current for specified heat dissipation | I_{n} | A | 9.5 |
| Equipment heat dissipation, current-dependent | P_{vid} | W | 136 |
| IEC/EN 61439 design verification | | | |
| 10.2 Strength of materials and parts | | | |
| 10.2.2 Corrosion resistance | | | Meets the product standard's requirements. |
| 10.2.3.1 Verification of thermal stability of enclosures | | | Meets the product standard's requirements. |
| 10.2.3.2 Verification of resistance of insulating materials to normal heat | | | Meets the product standard's requirements. |
| 10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects | | | Meets the product standard's requirements. |
| 10.2.4 Resistance to ultra-violet (UV) radiation | | | Meets the product standard's requirements. |
| 10.2.5 Lifting | | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.2.6 Mechanical impact | | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.2.7 Inscriptions | | | Meets the product standard's requirements. |
| 10.3 Degree of protection of ASSEMBLIES | | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.4 Clearances and creepage distances | | | Meets the product standard's requirements. |
| 10.5 Protection against electric shock | | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.6 Incorporation of switching devices and components | | | Does not apply, since the entire switchgear needs to be evaluated. |
| 10.7 Internal electrical circuits and connections | | | Is the panel builder's responsibility. |
| 10.8 Connections for external conductors | | | Is the panel builder's responsibility. |
| 10.9 Insulation properties | | | |
| 10.9.2 Power-frequency electric strength | | | Is the panel builder's responsibility. |
| 10.9.3 Impulse withstand voltage | | | Is the panel builder's responsibility. |
| 10.9.4 Testing of enclosures made of insulating material | | | Is the panel builder's responsibility. |
| 10.10 Temperature rise | | | The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices. |
| 10.11 Short-circuit rating | | | Is the panel builder's responsibility. The specifications for the switchgear must be observed. |
| 10.12 Electromagnetic compatibility | | | Is the panel builder's responsibility. The specifications for the switchgear must be observed. |

Technical data ETIM 5.0

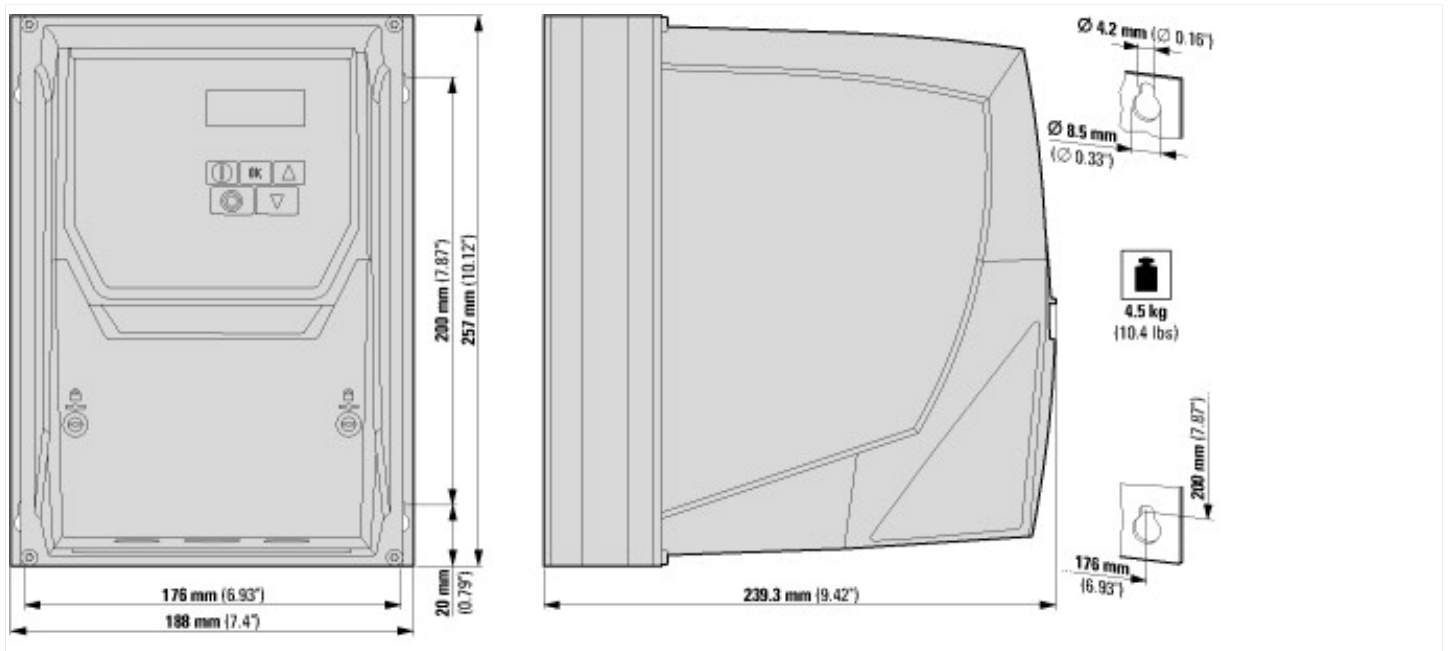
| | | |
|---|----|-------------|
| Low-voltage industrial components (EG000017) / Frequency controller =< 1 kV (EC001857) | | |
| Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kv (ecI@ss8-27-02-31-01 [AKE177010]) | | |
| Mains voltage | V | 380 - 480 |
| Mains frequency | | 50/60 Hz |
| Number of phases input | | 3 |
| Number of phases output | | 3 |
| Max. output frequency | Hz | 500 |
| Rated output voltage | V | 400 |
| Measuring output current | A | 9.5 |
| Output power at rated output voltage | kW | 4 |
| Max. output at quadratic load at rated output voltage | kW | 4 |
| Max. output at linear load at rated output voltage | kW | 4 |
| With control unit | | Yes |
| Application in industrial area permitted | | Yes |
| Application in domestic- and commercial area permitted | | Yes |
| Supporting protocol for TCP/IP | | No |
| Supporting protocol for PROFIBUS | | Yes |
| Supporting protocol for CAN | | Yes |
| Supporting protocol for INTERBUS | | No |
| Supporting protocol for ASI | | No |
| Supporting protocol for KNX | | No |
| Supporting protocol for MODBUS | | Yes |
| Supporting protocol for Data-Highway | | No |
| Supporting protocol for DeviceNet | | No |
| Supporting protocol for SUCONET | | No |
| Supporting protocol for LON | | No |
| Supporting protocol for PROFINET IO | | Yes |
| Supporting protocol for PROFINET CBA | | No |
| Supporting protocol for SERCOS | | No |
| Supporting protocol for Foundation Fieldbus | | No |
| Supporting protocol for EtherNet/IP | | Yes |
| Supporting protocol for AS-Interface Safety at Work | | No |
| Supporting protocol for DeviceNet Safety | | No |
| Supporting protocol for INTERBUS-Safety | | No |
| Supporting protocol for PROFIsafe | | No |
| Supporting protocol for SafetyBUS p | | No |
| Supporting protocol for other bus systems | | No |
| Number of HW-interfaces industrial Ethernet | | 0 |
| Number of HW-interfaces PROFINET | | 0 |
| Number of HW-interfaces RS-232 | | 0 |
| Number of HW-interfaces RS-422 | | 0 |
| Number of HW-interfaces RS-485 | | 1 |
| Number of HW-interfaces serial TTY | | 0 |
| Number of HW-interfaces USB | | 1 |
| Number of HW-interfaces parallel | | 0 |
| Number of HW-interfaces other | | 0 |
| With optical interface | | No |
| With PC connection | | Yes |
| Integrated braking resistance | | Yes |
| 4-quadrant operation possible | | No |
| Type of converter | | U converter |
| Degree of protection (IP) | | IP66 |

| | | |
|--|----|-----|
| Height | mm | 231 |
| Width | mm | 107 |
| Depth | mm | 186 |
| Relative symmetric net frequency tolerance | % | 5 |
| Relative symmetric net current tolerance | % | 10 |

Approvals

| | | |
|--------------------------------------|--|---|
| Product Standards | | UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking |
| UL File No. | | E172143 |
| UL Category Control No. | | NMMS, NMMS7 |
| CSA File No. | | UL report applies to both US and Canada |
| North America Certification | | UL listed, certified by UL for use in Canada |
| Specially designed for North America | | No |
| Suitable for | | Branch circuits |
| Max. Voltage Rating | | 3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey) |
| Degree of Protection | | IEC: IP66 |

Dimensions



Additional product information (links)

IL04020015Z DA1 variable frequency drives (FS2+3, IP66)

[IL04020015Z DA1 variable frequency drives \(FS2+3, IP66\)](#)

MN04020005Z DA1 variable frequency drive, manual

[MN04020005Z Frequenzumrichter DA1, Handbuch - Deutsch](#)

[MN04020005Z DA1 variable frequency drive, manual - English](#)

CA04020001Z_EN-INT Product range catalog:
Efficient Engineering for starting and
controlling motors.

http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1095238.pdf