



Variable frequency drive, 500 V AC, 3-phase, 3.1 A, 1.5 kW, IP20/NEMA 0, 7-digital display assembly



Part no. DA1-353D1NB-A20C
Catalog No. 177035
Alternate Catalog No. DA1-353D1NB-A20C
EL-Nummer (Norway) 4110151

Delivery program

| | | | |
|----------------------------------|----------|----|---|
| Product range | | | Variable frequency drives |
| Part group reference (e.g. DIL) | | | DA1 |
| Rated operational voltage | U_e | | 500 V AC, 3-phase 600 V AC, 3-phase |
| Output voltage with V_e | U_2 | | 500 V AC, 3-phase 600 V AC, 3-phase |
| Mains voltage (50/60Hz) | U_{LN} | V | 500 (-10%) - 600 (+10%) |
| Rated operational current | | | |
| At 150% overload | I_e | A | 3.1 |
| Note | | | Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C |
| 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 500 V, 50 Hz |
| 150 % Overload | P | kW | 1.5 |
| 150 % Overload | I_M | A | 2.9 |
| Note | | | at 525 V, 50 Hz |
| 150 % Overload | P | kW | 1.5 |
| 150 % Overload | I_M | A | 2.8 |
| Note | | | at 550 - 600 V, 60 Hz |
| 150 % Overload | P | HP | 2 |
| 150 % Overload | I_M | A | 2.7 |
| Degree of Protection | | | IP20/NEMA0 |
| Interface/field bus (built-in) | | | OP-Bus (RS485)/Modbus RTU, CANopen® |
| Fieldbus connection (optional) | | | Ethernet IP DeviceNet PROFIBUS PROFINET Modbus-TCP EtherCAT SmartWire-DT |
| Fitted with | | | Brake chopper 7-digital display assembly Additional PCB protection |
| Parameterization | | | Keypad Fieldbus drivesConnect drivesConnect mobile (App) |
| Frame size | | | FS2 |
| Connection to SmartWire-DT | | | yes in conjunction with DX-NET-SWD1 SmartWire DT module |

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, UL, cUL, RCM, UkrSEPRO, EAC |
| Production quality | | | RoHS, ISO 9001 |

| | | | |
|------------------------------------|----------|----|--|
| Climatic proofing | P_w | % | < 95%, average relative humidity (RH), non-condensing, non-corrosive |
| Air quality | | | 3C2, 3S2 |
| Ambient temperature | | | |
| Operating ambient temperature min. | | °C | -10 |
| Operating ambient temperature max. | | °C | + 50 |
| | | | operation (with 150 % overload) |
| Storage | θ | °C | -40 - +60 |
| Mounting position | | | Vertical |
| Altitude | | m | 0 - 1000 m above sea level Above 1000 m: 1% derating for every 100 m max. 4000 m |
| Degree of Protection | | | IP20/NEMA0 |
| Protection against direct contact | | | BGV A3 (VBG4, finger- and back-of-hand proof) |

Main circuit

| | | | |
|---|------------|-----|---|
| Supply | | | |
| Rated operational voltage | U_e | | 500 V AC, 3-phase 600 V AC, 3-phase |
| Mains voltage (50/60Hz) | U_{LN} | V | 500 (-10%) - 600 (+10%) |
| Input current (150% overload) | I_{LN} | A | 4.2 |
| 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 | | | Variable frequency drive with internal DC link and IGBT inverter |
| Overload current (150% overload) | I_L | A | 4.65 |
| max. starting current (High Overload) | I_H | % | 200 |
| Note about max. starting current | | | for 4 seconds every 40 seconds |
| Output voltage with V_e | U_2 | | 500 V AC, 3-phase 600 V AC, 3-phase |
| Output Frequency | f_2 | Hz | 0 - 50/60 (max. 500) |
| Switching frequency | f_{PWM} | kHz | 8 adjustable 4 - 24 (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 | 3.1 |
| Note | | | Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C |
| Power loss | | | |
| Heat dissipation at rated operational current $I_e = 150\%$ | P_V | W | 45 |
| Efficiency | η | % | 97 |
| Maximum leakage current to ground (PE) without motor | I_{PE} | mA | 3.1 |
| Fitted with | | | Brake chopper 7-digital display assembly Additional PCB protection |
| Safety function | | | STO (Safe Torque Off, SIL2, PLd Cat 3) |
| 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 500 V, 50 Hz |
| 150 % Overload | P | kW | 1.5 |
| Note | | | at 525 V, 50 Hz |
| 150 % Overload | P | kW | 1.5 |

| | | | |
|---|-----------|----------|--|
| Note | | | at 550 - 600 V, 60 Hz |
| 150 % Overload | P | HP | 2 |
| 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 600 V | S | kVA | 3.22 |
| Braking function | | | |
| Standard braking torque | | | max. 30 % M_N |
| DC braking torque | | | max. 100% of rated operational current I_b , variable |
| Braking torque with external braking resistance | | | Max. 100% of rated operational current I_b with external braking resistor |
| minimum external braking resistance | R_{min} | Ω | 300 |
| Switch-on threshold for the braking transistor | U_{DC} | V | 975 V DC |

Control section

| | | | |
|--------------------------------|-------|---|--|
| 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

| | | | |
|---|--|---|---|
| Power Wiring | | | |
| Safety device (fuse or miniature circuit-breaker) | | | |
| IEC (Type B, gG), 150 % | | | 6NHG000B |
| Notes | | | NH fuse used together with TB00-D fuse base |
| UL (Class CC or J) | | A | 6 |
| Notes | | | LPJ fuse used together with J60060-3 fuse base |
| UL (Class CC or J) | | A | LPJ-6SP |
| Mains contactor | | | |
| 150 % overload (CT/ I_H , at 50 °C) | | | DILM7 |
| Main choke | | | |
| 150 % overload (CT/ I_H , at 50 °C) | | | DX-LN3-004 |
| DC link connection | | | |
| Braking resistance | | | |
| 10 % duty factor (DF) | | | DX-BR400-0K4 |
| 20 % duty factor (DF) | | | DX-BR400-0K4 |
| 40 % duty factor (DF) | | | R:2 x DX-BR150-0K5 |
| Notes concerning braking resistances: | | | R:m = "m" resistors connected in series The brake resistors are assigned based on the maximum rated power of the variable frequency drive. Additional brake resistors and designs (e.g. different duty cycles) are available upon request. |
| Motor feeder | | | |
| motor choke | | | |
| 150 % overload (CT/ I_H , at 50 °C) | | | DX-LM3-008 |
| Sine filter | | | |
| 150 % overload (CT/ I_H , at 50 °C) | | | SIN-0005-6-0-P |

Design verification as per IEC/EN 61439

| | | | |
|--|-----------|---|-----|
| Technical data for design verification | | | |
| Rated operational current for specified heat dissipation | I_n | A | 3.1 |
| Heat dissipation per pole, current-dependent | P_{vid} | W | 0 |
| Equipment heat dissipation, current-dependent | P_{vid} | W | 45 |
| Static heat dissipation, non-current-dependent | P_{vs} | W | 0 |

| | | | |
|--|-------------------|----|--|
| Heat dissipation capacity | P _{diss} | W | 0 |
| Operating ambient temperature min. | | °C | -10 |
| Operating ambient temperature max. | | °C | 50 |
| | | | Operation (with 150 % overload) |
| 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. |
| 10.13 Mechanical function | | | The device meets the requirements, provided the information in the instruction leaflet (IL) is observed. |

Technical data ETIM 7.0

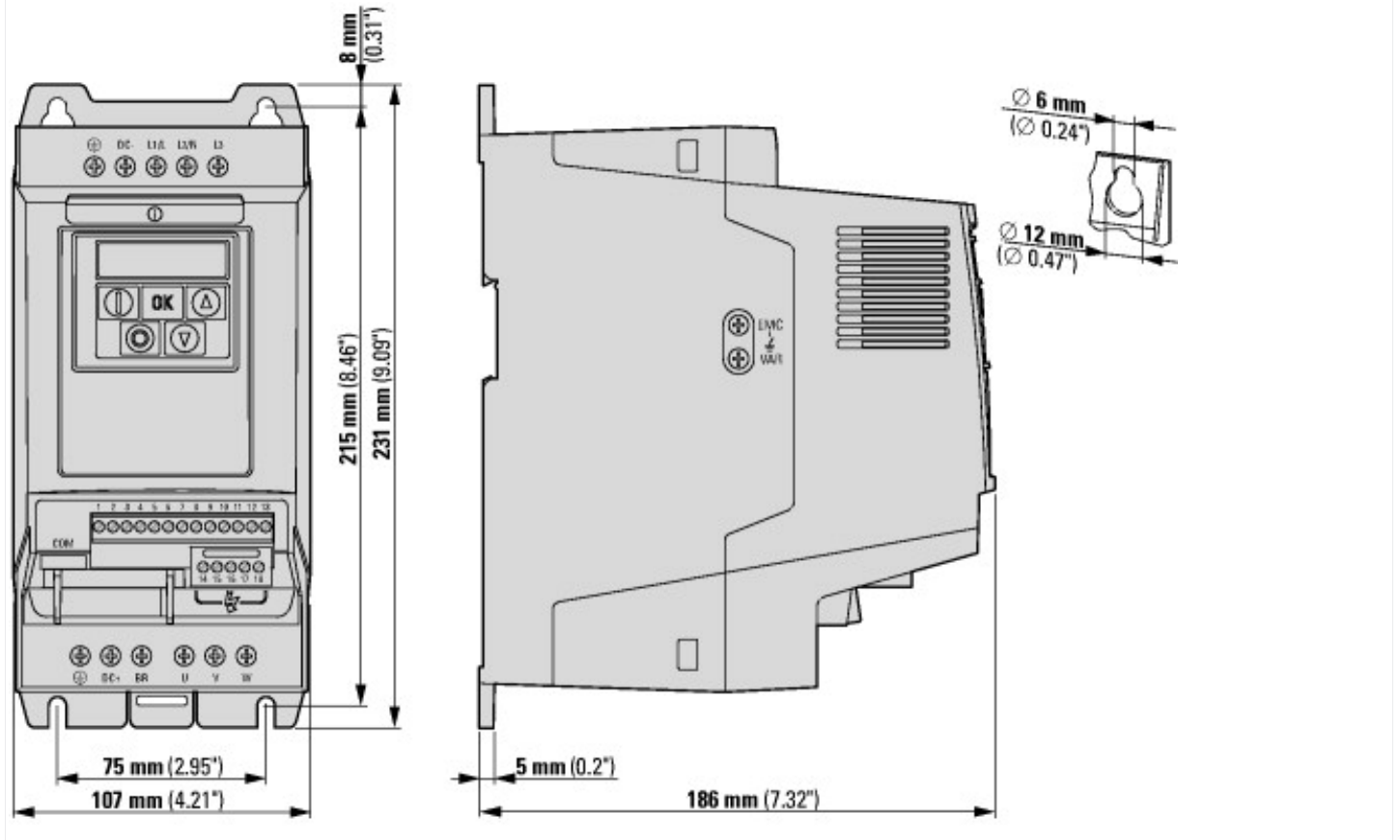
| | | | |
|--|--|----|-----------|
| Low-voltage industrial components (EG000017) / Frequency converter =< 1 kV (EC001857) | | | |
| Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kV (ecl@ss10.0.1-27-02-31-01 [AKE177014]) | | | |
| Mains voltage | | V | 540 - 660 |
| Mains frequency | | | 50/60 Hz |
| Number of phases input | | | 3 |
| Number of phases output | | | 3 |
| Max. output frequency | | Hz | 500 |
| Max. output voltage | | V | 600 |
| Nominal output current I _{2N} | | A | 3.1 |
| Max. output at quadratic load at rated output voltage | | kW | 1.5 |
| Max. output at linear load at rated output voltage | | kW | 1.5 |
| Relative symmetric net frequency tolerance | | % | 10 |
| Relative symmetric net voltage tolerance | | % | 10 |
| Number of analogue outputs | | | 2 |
| Number of analogue inputs | | | 2 |
| Number of digital outputs | | | 2 |
| Number of digital inputs | | | 5 |
| With control unit | | | Yes |
| Application in industrial area permitted | | | Yes |
| Application in domestic- and commercial area permitted | | | No |
| Supporting protocol for TCP/IP | | | Yes |
| 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 | | Yes |
| 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 BACnet | | Yes |
| Supporting protocol for other bus systems | | Yes |
| Number of HW-interfaces industrial Ethernet | | 0 |
| Number of 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 | | 0 |
| Number of HW-interfaces parallel | | 0 |
| Number of HW-interfaces other | | 0 |
| With optical interface | | No |
| With PC connection | | Yes |
| Integrated breaking resistance | | Yes |
| 4-quadrant operation possible | | Yes |
| Type of converter | | U converter |
| Degree of protection (IP) | | IP20 |
| Degree of protection (NEMA) | | Other |
| Height | mm | 231 |
| Width | mm | 107 |
| Depth | mm | 186 |

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- 600 V AC (+10 %) IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey) |
| Degree of Protection | | IEC: IP20 |

Dimensions



Additional product information (links)

IL04020010Z DA1 variable frequency drives (FS2 - FS3, IP20)

IL04020010Z DA1 variable frequency drives (FS2 https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020010Z2018_04.pdf - FS3, IP20)

MN04020005Z DA1 variable frequency drives, Installation manual

MN04020005Z Frequenzumrichter DA1, Installationshandbuch - Deutsch https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_DE.pdf

MN04020005Z DA1 variable frequency drives, Installation manual - English https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_EN.pdf

MN04020005Z Convertitore di frequenza DA1, manuale Installazione - italiano https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_IT.pdf

MN04020006Z DA1 variable frequency drives, Parameters manual

MN04020006Z Frequenzumrichter DA1, Parameterhandbuch - Deutsch https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_DE.pdf

MN04020006Z DA1 variable frequency drives, Parameters manual - English https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_EN.pdf

MN04020006Z Convertitore di frequenza DA1, manuale Parametri - italiano https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_IT.pdf

CA04020001Z-EN Product Range Catalog: Efficient Engineering for Starting and Controlling Motors http://www.eaton.eu/DE/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1095238.pdf