



## Variable Frequency Drive, 3-3-phase 400 V, 46 A, 22 kW, Vector control, EMC-Filter, Brake-Chopper

**Part no.** DA1-34046FB-B55C  
**Article no.** 169393  
**Catalog No.** DA1-34046FB-B55C

### Delivery program

|                                  |          |    |                                                                                                                                                                   |
|----------------------------------|----------|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product range                    |          |    | Variable frequency drives                                                                                                                                         |
| Part group reference (e.g. DIL)  |          |    | DA1                                                                                                                                                               |
| Rated operational voltage        | $U_e$    |    | 400 V AC, 3-phase<br>480 V AC, 3-phase                                                                                                                            |
| Output voltage with $V_e$        | $U_2$    |    | 400 V AC, 3-phase<br>480 V AC, 3-phase                                                                                                                            |
| Mains voltage (50/60Hz)          | $U_{LN}$ | V  | 380 (-10%) - 480 (+10%)                                                                                                                                           |
| <b>Rated operational current</b> |          |    |                                                                                                                                                                   |
| At 150% overload                 | $I_e$    | A  | 46                                                                                                                                                                |
| Note                             |          |    | Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C                                                              |
| Note                             |          |    | Overload cycle for 60 s every 600 s                                                                                                                               |
| <b>Assigned motor rating</b>     |          |    |                                                                                                                                                                   |
| Note                             |          |    | for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with $1500 \text{ rpm}^{-1}$ at 50 Hz or $1800 \text{ min}^{-1}$ at 60 Hz |
| Note                             |          |    | Overload cycle for 60 s every 600 s                                                                                                                               |
| Note                             |          |    | at 400 V, 50 Hz                                                                                                                                                   |
| 150 % Overload                   | P        | kW | 22                                                                                                                                                                |
| 150 % Overload                   | $I_M$    | A  | 41                                                                                                                                                                |
| Note                             |          |    | at 440 - 480 V, 60 Hz                                                                                                                                             |
| 150 % Overload                   | P        | HP | 30                                                                                                                                                                |
| 150 % Overload                   | $I_M$    | A  | 40                                                                                                                                                                |
| Degree of Protection             |          |    | IP55/NEMA 12                                                                                                                                                      |
| Interface/field bus (built-in)   |          |    | OP-Bus (RS485)/Modbus RTU, CANopen®                                                                                                                               |
| Fieldbus connection (optional)   |          |    | Ethernet IP<br>DeviceNet<br>PROFIBUS<br>PROFINET<br>Modbus-TCP<br>EtherCAT<br>SmartWire-DT                                                                        |
| Fitted with                      |          |    | Radio interference suppression filter<br>Brake chopper<br>Additional PCB protection<br>OLED display                                                               |
| Frame size                       |          |    | FS4                                                                                                                                                               |
| Connection to SmartWire-DT       |          |    | with SmartWire-DT module DX-NET-SWD2                                                                                                                              |

### Technical data

#### General

|                            |          |    |                                                                                                                                     |
|----------------------------|----------|----|-------------------------------------------------------------------------------------------------------------------------------------|
| Standards                  |          |    | Specification for general requirements: IEC/EN 61800-2<br>EMC requirements: IEC/EN 61800-3<br>Safety requirements: IEC/EN 61800-5-1 |
| Certifications             |          |    | CE, UL, cUL, c-Tick, UkrSep, EAC                                                                                                    |
| Approvals                  |          |    | DNV                                                                                                                                 |
| Production quality         |          |    | RoHS, ISO 9001                                                                                                                      |
| Climatic proofing          | $\rho_w$ | %  | < 95%, average relative humidity (RH), non-condensing, non-corrosive                                                                |
| Ambient temperature        |          |    |                                                                                                                                     |
| operation (150 % overload) | $\theta$ | °C | -10 - +40                                                                                                                           |

|                                   |   |    |                                                                                                                                                                       |
|-----------------------------------|---|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage                           | 9 | °C | -40 - +60                                                                                                                                                             |
| Radio interference level          |   |    |                                                                                                                                                                       |
| Radio interference class (EMC)    |   |    | 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 as per EN 61800-3                                                                                                                            |
| maximum motor cable length        | l | m  | C2 ≤ 5 m<br>C3 ≤ 25 m                                                                                                                                                 |
| Mounting position                 |   |    | Vertical                                                                                                                                                              |
| Altitude                          |   | m  | 0 - 1000 m above sea level<br>Above 1000 m: 1% derating for every 100 m<br>max. 4000 m                                                                                |
| Degree of Protection              |   |    | IP55/NEMA 12                                                                                                                                                          |
| Protection against direct contact |   |    | BGV A3 (VBG4, finger- and back-of-hand proof)                                                                                                                         |

## Main circuit

|                                                             |            |     |                                                                                                                                                                   |
|-------------------------------------------------------------|------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supply                                                      |            |     |                                                                                                                                                                   |
| Rated operational voltage                                   | $U_e$      |     | 400 V AC, 3-phase<br>480 V AC, 3-phase                                                                                                                            |
| Mains voltage (50/60Hz)                                     | $U_{LN}$   | V   | 380 (-10%) - 480 (+10%)                                                                                                                                           |
| Input current (150% overload)                               | $I_{LN}$   | A   | 51.9                                                                                                                                                              |
| 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   | 69                                                                                                                                                                |
| max. starting current (High Overload)                       | $I_H$      | %   | 200                                                                                                                                                               |
| Note about max. starting current                            |            |     | for 4 seconds every 40 seconds                                                                                                                                    |
| Output voltage with $V_e$                                   | $U_2$      |     | 400 V AC, 3-phase<br>480 V AC, 3-phase                                                                                                                            |
| Output Frequency                                            | $f_2$      | Hz  | 0 - 50/60 (max. 500)                                                                                                                                              |
| Switching frequency                                         | $f_{PWM}$  | kHz | 8<br>adjustable 4 - 24 (audible)                                                                                                                                  |
| Operation Mode                                              |            |     | U/f control<br>Speed control with slip compensation<br>sensorless vector control (SLV)<br>optional: Vector control with feedback (CLV)                            |
| Frequency resolution (setpoint value)                       | $\Delta f$ | Hz  | 0.1                                                                                                                                                               |
| Rated operational current                                   |            |     |                                                                                                                                                                   |
| At 150% overload                                            | $I_e$      | A   | 46                                                                                                                                                                |
| Note                                                        |            |     | Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C                                                              |
| Power loss                                                  |            |     |                                                                                                                                                                   |
| Heat dissipation at rated operational current $I_e = 150\%$ | $P_V$      | W   | 506                                                                                                                                                               |
| Efficiency                                                  | $\eta$     | %   | 97.7                                                                                                                                                              |
| Maximum leakage current to ground (PE) without motor        | $I_{PE}$   | mA  | 2.47                                                                                                                                                              |
| Fitted with                                                 |            |     | Radio interference suppression filter<br>Brake chopper<br>Additional PCB protection<br>OLED display                                                               |
| Safety function                                             |            |     | STO (Safe Torque Off, SIL1, PLc Cat 1)                                                                                                                            |
| Frame size                                                  |            |     | FS4                                                                                                                                                               |
| Motor feeder                                                |            |     |                                                                                                                                                                   |
| Note                                                        |            |     | for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with $1500 \text{ rpm}^{-1}$ at 50 Hz or $1800 \text{ min}^{-1}$ at 60 Hz |
| Note                                                        |            |     | Overload cycle for 60 s every 600 s                                                                                                                               |
| Note                                                        |            |     | at 400 V, 50 Hz                                                                                                                                                   |
| 150 % Overload                                              | P          | kW  | 22                                                                                                                                                                |
| Note                                                        |            |     | at 440 - 480 V, 60 Hz                                                                                                                                             |
| 150 % Overload                                              | P          | HP  | 30                                                                                                                                                                |

|                                                 |           |          |                                                                                                          |
|-------------------------------------------------|-----------|----------|----------------------------------------------------------------------------------------------------------|
| maximum permissible cable length                | I         | m        | screened: 100<br>screened, with motor choke: 200<br>unscreened: 150<br>unscreened, with motor choke: 300 |
| Apparent power                                  |           |          |                                                                                                          |
| Apparent power at rated operation 400 V         | S         | kVA      | 31.87                                                                                                    |
| Apparent power at rated operation 480 V         | S         | kVA      | 38.24                                                                                                    |
| Braking function                                |           |          |                                                                                                          |
| Standard braking torque                         |           |          | max. 30 % $M_N$                                                                                          |
| DC braking torque                               |           |          | adjustable to 100 %                                                                                      |
| Braking torque with external braking resistance |           |          | Max. 100% of rated operational current $I_g$ with external braking resistor                              |
| minimum external braking resistance             | $R_{min}$ | $\Omega$ | 22                                                                                                       |
| Switch-on threshold for the braking transistor  | $U_{DC}$  | V        | 780 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 %                                                       |  |   | NZMC1-S80                                                                                                                        |
| UL (Class CC or J)                                                            |  | A | 70                                                                                                                               |
| Mains contactor                                                               |  |   |                                                                                                                                  |
| 150 % overload (CT/ $I_H$ , at 50 °C)                                         |  |   | DILM40                                                                                                                           |
| Main choke                                                                    |  |   |                                                                                                                                  |
| 150 % overload (CT/ $I_H$ , at 50 °C)                                         |  |   | DX-LN3-050                                                                                                                       |
| Radio interference suppression filter (external, 150 %)                       |  |   | DX-EMC34-055                                                                                                                     |
| Radio interference suppression filter, low leakage currents (external, 150 %) |  |   | DX-EMC34-055-L                                                                                                                   |
| Note regarding radio interference suppression filter                          |  |   | Optional external radio interference suppression filter for longer motor cable lengths and for use in different EMC environments |
| DC link connection                                                            |  |   |                                                                                                                                  |
| Braking resistance                                                            |  |   |                                                                                                                                  |
| 10 % Einschaltdauer (ED)                                                      |  |   | DX-BR022-5K1                                                                                                                     |
| 20 % duty factor (DF)                                                         |  |   | DX-BR022-9K2                                                                                                                     |
| Motor feeder                                                                  |  |   |                                                                                                                                  |
| motor choke                                                                   |  |   |                                                                                                                                  |
| 150 % overload (CT/ $I_H$ , at 50 °C)                                         |  |   | DX-LM3-050                                                                                                                       |
| Sine filter                                                                   |  |   |                                                                                                                                  |
| 150 % overload (CT/ $I_H$ , at 50 °C)                                         |  |   | DX-SIN3-048                                                                                                                      |

## Design verification as per IEC/EN 61439

|                                                          |            |    |     |
|----------------------------------------------------------|------------|----|-----|
| Technical data for design verification                   |            |    |     |
| Rated operational current for specified heat dissipation | $I_n$      | A  | 46  |
| Heat dissipation per pole, current-dependent             | $P_{vid}$  | W  | 0   |
| Equipment heat dissipation, current-dependent            | $P_{vid}$  | W  | 506 |
| 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 | 40  |
| 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 6.0

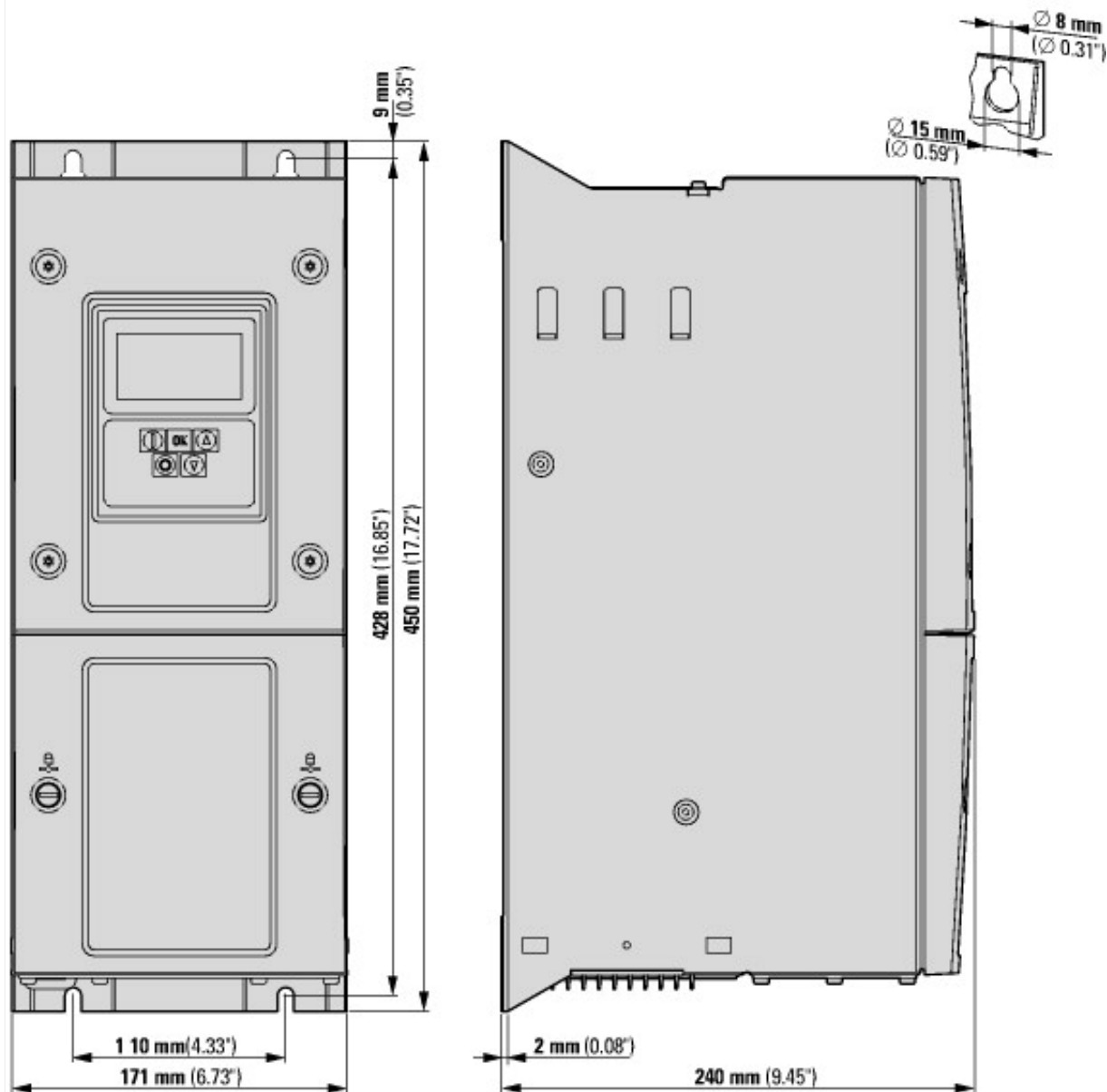
|                                                                                                                                                                                         |    |  |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|-----------|
| 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 (ecI@ss8.1-27-02-31-01 [AKE177011]) |    |  |           |
| 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       |
| Max. output voltage                                                                                                                                                                     | V  |  | 400       |
| Rated output current I <sub>2N</sub>                                                                                                                                                    | A  |  | 46        |
| Max. output at quadratic load at rated output voltage                                                                                                                                   | kW |  | 22        |
| Max. output at linear load at rated output voltage                                                                                                                                      | kW |  | 22        |
| 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 breaking resistance                      |  |    | Yes         |
| 4-quadrant operation possible                       |  |    | No          |
| Type of converter                                   |  |    | U converter |
| Degree of protection (IP)                           |  |    | IP55        |
| Height                                              |  | mm | 450         |
| Width                                               |  | mm | 171         |
| Depth                                               |  | mm | 240         |
| 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: IP55                                                           |

## Dimensions



## Additional product information (links)

### IL04020011Z DA1 variable frequency drives (FS4 - 7)

IL04020011Z DA1 variable frequency drives (FS4 [ftp://ftp.moeller.net/DOCUMENTATION/AWA\\_INSTRUCTIONS/IL04020011Z2013\\_10.pdf](ftp://ftp.moeller.net/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020011Z2013_10.pdf) - 7)

### MN04020005Z DA1 variable frequency drives, Installation manual

MN04020005Z Frequenzumrichter DA1, Handbuch - Deutsch [ftp://ftp.moeller.net/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_DE.pdf](ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN04020005Z_DE.pdf)

MN04020005Z DA1 variable frequency drive, manual - English [ftp://ftp.moeller.net/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_EN.pdf](ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN04020005Z_EN.pdf)

### MN04020006Z DA1 variable frequency drives, Parameters manual

MN04020006Z DA1 variable frequency drives, Parameters manual - Deutsch [ftp://ftp.moeller.net/DOCUMENTATION/AWB\\_MANUALS/MN04020006Z\\_DE.pdf](ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN04020006Z_DE.pdf)

MN04020006Z DA1 variable frequency drives, Parameters manual - English [ftp://ftp.moeller.net/DOCUMENTATION/AWB\\_MANUALS/MN04020006Z\\_EN.pdf](ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN04020006Z_EN.pdf)

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