



**Variable frequency drive, 400 V AC, 3-phase, 90 A, 45 kW, IP55/NEMA 12,
Radio interference suppression filter, OLED display, DC link choke**

Part no. DA1-34090FB-B55C
Catalog No. 169397
Alternate Catalog No. DA1-34090FB-B55C
EL-Nummer 4137319
(Norway)

Delivery program

| | | | |
|------------------------------------|-----------------|----|---|
| Product range | | | Variable frequency drives |
| Part group reference (e.g. DIL) | | | DA1 |
| Rated operational voltage | U _e | | 400 V AC, 3-phase 480 V AC, 3-phase |
| Output voltage with V _e | U ₂ | | 400 V AC, 3-phase 480 V AC, 3-phase |
| Mains voltage (50/60Hz) | U _{LN} | V | 380 (-10%) - 480 (+10%) |
| Rated operational current | | | |
| At 150% overload | I _e | A | 90 |
| Note | | | Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +40 °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 400 V, 50 Hz |
| 150 % Overload | P | kW | 45 |
| 150 % Overload | I _M | A | 81 |
| Note | | | at 440 - 480 V, 60 Hz |
| 150 % Overload | P | HP | 60 |
| 150 % Overload | I _M | A | 77 |
| Degree of Protection | | | IP55/NEMA 12 |
| 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 | | | Radio interference suppression filter Brake chopper Additional PCB protection OLED display DC link choke |
| Parameterization | | | Keypad Fieldbus drivesConnect drivesConnect mobile (App) |
| Frame size | | | FS6 |
| 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 |
| Approvals | | | DNV |

| | | | |
|------------------------------------|----------|----|---|
| Production quality | | | RoHS, ISO 9001 |
| Climatic proofing | ρ_w | % | < 95%, average relative humidity (RH), non-condensing, non-corrosive |
| Air quality | | | 3C3, 3S3 |
| Ambient temperature | | | |
| Operating ambient temperature min. | | °C | -10 |
| Operating ambient temperature max. | | °C | +40 |
| | | | operation (with 150 % overload) |
| Storage | θ | °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 C3 ≤ 25 m |
| 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 | | | 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 480 V AC, 3-phase |
| Mains voltage (50/60Hz) | U_{LN} | V | 380 (-10%) - 480 (+10%) |
| Input current (150% overload) | I_{LN} | A | 102.7 |
| 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, DC link choke and IGBT inverter |
| Overload current (150% overload) | I_L | A | 135 |
| 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 480 V AC, 3-phase |
| Output Frequency | f_2 | Hz | 0 - 50/60 (max. 250) |
| Switching frequency | f_{PWM} | kHz | 4 adjustable 4 - 16 (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 | 90 |
| 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 $I_e = 150\%$ | P_V | W | 1080 |
| Efficiency | η | % | 97.6 |
| Maximum leakage current to ground (PE) without motor | I_{PE} | mA | 2.68 |
| Fitted with | | | Radio interference suppression filter Brake chopper Additional PCB protection OLED display DC link choke |
| Safety function | | | STO (Safe Torque Off, SIL2, PLd Cat 3) |
| Frame size | | | FS6 |

| | | | |
|---|------------------|-----|---|
| 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 | 45 |
| Note | | | at 440 - 480 V, 60 Hz |
| 150 % Overload | P | HP | 60 |
| 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 | 62.35 |
| Apparent power at rated operation 480 V | S | kVA | 74.82 |
| Braking function | | | |
| Standard braking torque | | | max. 30 % M _N |
| DC braking torque | | | max. 100% of rated operational current I _e , variable |
| Braking torque with external braking resistance | | | Max. 100% of rated operational current I _e with external braking resistor |
| minimum external braking resistance | R _{min} | Ω | 6 |
| 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 % | | | NZMC2-S125 |
| UL (Class CC or J) | | A | 125 |
| Mains contactor | | | |
| 150 % overload (CT/I _H , at 50 °C) | | | DILM80 |
| Main choke | | | |
| 150 % overload (CT/I _H , at 50 °C) | | | DX-LN3-100 |
| Note regarding mains choke | | | Mains choke recommended only if the power quality is poor. Current harmonics (THD) are attenuated by internal DC link chokes. |
| Radio interference suppression filter (external, 150 %) | | | DX-EMC34-100 |
| Radio interference suppression filter, low leakage currents (external, 150 %) | | | DX-EMC34-100-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 % duty factor (DF) | | | DX-BR006-9K2 |
| 20 % duty factor (DF) | | | DX-BR006-18K1 |
| 40 % duty factor (DF) | | | DX-BR006-33K3 |
| Notes concerning braking resistances: | | | 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-LM3-100 |
| Sine filter | | | |

| | | | |
|---|--|--|---------------|
| 150 % overload (CT/I _H , at 50 °C) | | | DX-SIN3-090 |
| All-pole sine filter | | | |
| 150 % overload (CT/I _H , at 50 °C) | | | DX-SIN3-110-A |

Design verification as per IEC/EN 61439

| | | | |
|--|-------------------|----|--|
| Technical data for design verification | | | |
| Rated operational current for specified heat dissipation | I _n | A | 90 |
| Heat dissipation per pole, current-dependent | P _{vid} | W | 0 |
| Equipment heat dissipation, current-dependent | P _{vid} | W | 1080 |
| 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 7.0

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|--|----|--|-----------|
| 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 | | 342 - 528 |
| Mains frequency | | | 50/60 Hz |
| Number of phases input | | | 3 |
| Number of phases output | | | 3 |
| Max. output frequency | Hz | | 500 |
| Max. output voltage | V | | 500 |
| Nominal output current I _{2N} | A | | 90 |
| Max. output at quadratic load at rated output voltage | kW | | 45 |
| Max. output at linear load at rated output voltage | kW | | 45 |
| Relative symmetric net frequency tolerance | % | | 10 |
| Relative symmetric net voltage tolerance | % | | 10 |

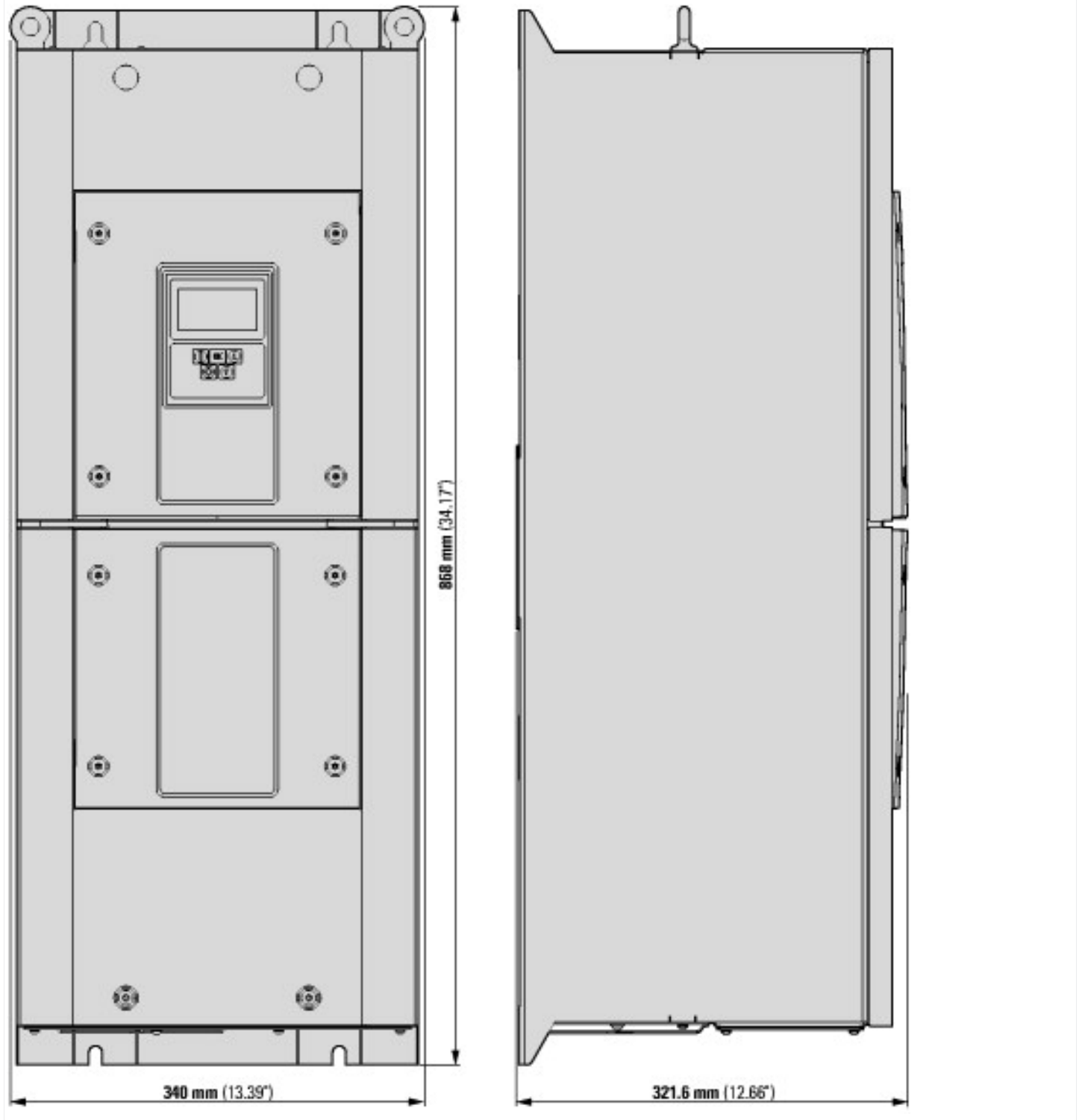
| | | | |
|--|--|----|-------------|
| Number of analogue outputs | | | 2 |
| Number of analogue inputs | | | 2 |
| Number of digital outputs | | | 2 |
| Number of digital inputs | | | 5 |
| With control unit | | | Yes |
| Application in industrial area permitted | | | Yes |
| Application in domestic- and commercial area permitted | | | Yes |
| 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 | | | No |
| Type of converter | | | U converter |
| Degree of protection (IP) | | | IP55 |
| Degree of protection (NEMA) | | | 12 |
| Height | | mm | 868 |
| Width | | mm | 340 |
| Depth | | mm | 321.6 |

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 https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020011Z2018_04.pdf - 7)

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

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|---|---|
| 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 |