



Variable frequency drive, 400 V AC, 3-phase, 5.8 A, 2.2 kW, IP20/NEMA 0,  
Radio interference suppression filter, 7-digital display assembly



**Part no.** DA1-345D8FB-A20C  
**Catalog No.** 169051  
**Alternate Catalog No.** DA1-345D8FB-A20C  
**EL-Nummer (Norway)** 4137163

## 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%)
<b>Rated operational current</b>			
At 150% overload	$I_e$	A	5.8
Note			Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C
<b>Assigned motor rating</b>			
Note			for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm <sup>-1</sup> at 50 Hz or 1800 min <sup>-1</sup> at 60 Hz
Note			Overload cycle for 60 s every 600 s
Note			at 400 V, 50 Hz
150 % Overload	P	kW	2.2
150 % Overload	$I_M$	A	5
Note			at 440 - 480 V, 60 Hz
150 % Overload	P	HP	3
150 % Overload	$I_M$	A	4.8
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			Radio interference suppression filter Brake chopper Additional PCB protection 7-digital display assembly
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

<b>General</b>			
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	$\rho_w$	%	< 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
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			
Altitude		m	0 - 1000 m above sea level Above 1000 m: 1% derating for every 100 m max. 4000 m
Degree of Protection			
Protection against direct contact			IP20/NEMA0
			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	7.5
System configuration			
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	8.7
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. 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)	$\Delta f$	Hz	0.1
Rated operational current			
At 150% overload	$I_e$	A	5.8
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	101.2
Efficiency	$\eta$	%	95.4
Maximum leakage current to ground (PE) without motor	$I_{PE}$	mA	4.65
Fitted with			
			Radio interference suppression filter Brake chopper Additional PCB protection 7-digital display assembly
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 $1500 \text{ rpm}^{-1}$ 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	2.2
Note			at 440 - 480 V, 60 Hz
150 % Overload	P	HP	3
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	4.02
Apparent power at rated operation 480 V	S	kVA	4.82
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	$R_{min}$	$\Omega$	150
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 %			FAZ-B10/3
UL (Class CC or J)		A	10
Mains contactor			
150 % overload (CT/ $I_H$ , at 50 °C)			DILM7
Main choke			
150 % overload (CT/ $I_H$ , at 50 °C)			DX-LN3-010
Radio interference suppression filter (external, 150 %)			DX-EMC34-008
Radio interference suppression filter, low leakage currents (external, 150 %)			DX-EMC34-008-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-BR150-0K5
20 % duty factor (DF)			DX-BR150-0K5
40 % duty factor (DF)			DX-BR150-1K1
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-LM3-008
Sine filter			
150 % overload (CT/ $I_H$ , at 50 °C)			DX-SIN3-010
All-pole sine filter			
150 % overload (CT/ $I_H$ , at 50 °C)			DX-SIN3-006-A

## Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	$I_n$	A	5.8
Heat dissipation per pole, current-dependent	$P_{vid}$	W	0
Equipment heat dissipation, current-dependent	$P_{vid}$	W	101.2
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
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

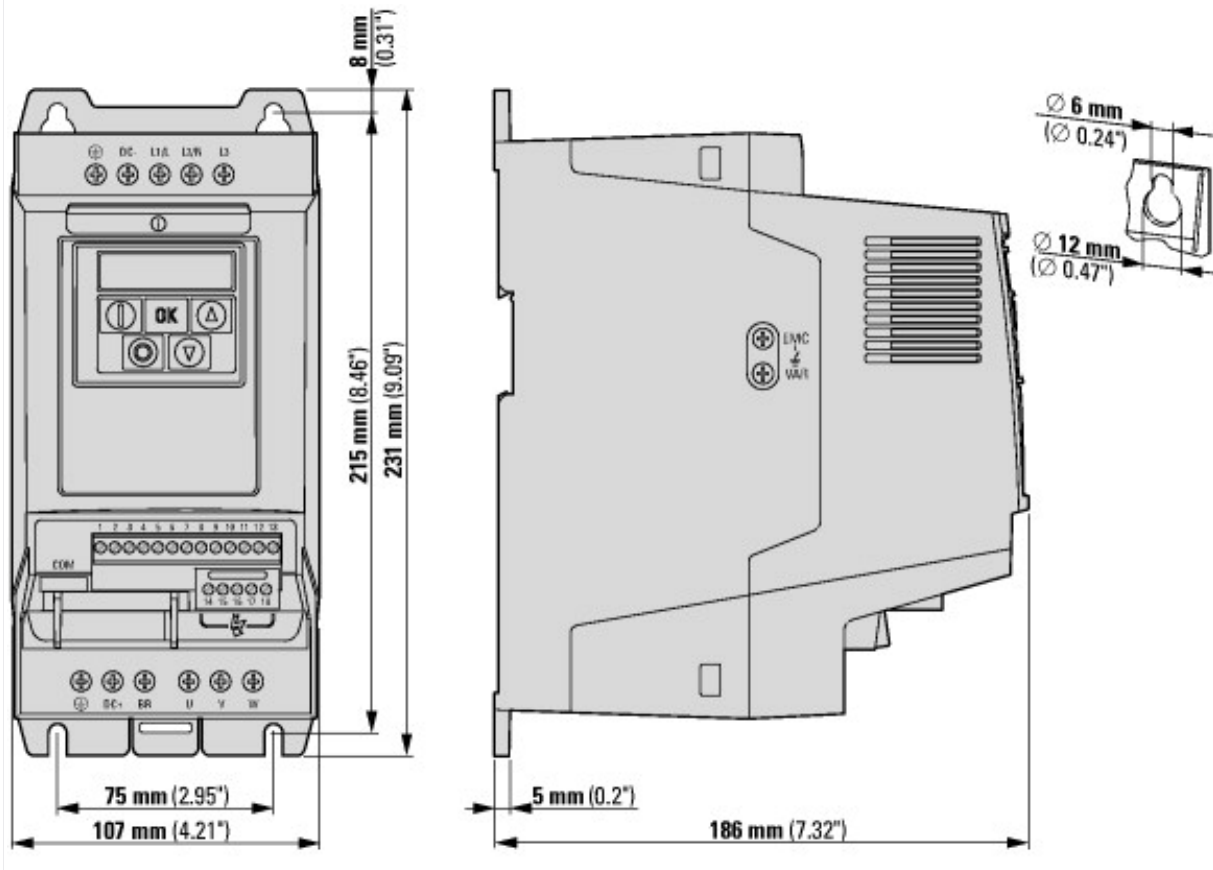
Low-voltage industrial components (EG000017) / Frequency converter =< 1 kV (EC001857)			
Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kV (ec@ss10.0.1-27-02-31-01 [AKE177014])			
Mains voltage		V	342 - 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 I2N		A	5.8
Max. output at quadratic load at rated output voltage		kW	2.2
Max. output at linear load at rated output voltage		kW	2.2
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)			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~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)

## 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](https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020010Z2018_04.pdf) - FS3, IP20)

### MN04020005Z DA1 variable frequency drives, Installation manual

MN04020005Z Frequenzumrichter DA1, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_DE.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_DE.pdf)  
Installationshandbuch - Deutsch

MN04020005Z DA1 variable frequency drives, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_EN.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_EN.pdf)  
Installation manual - English

MN04020005Z Convertitore di frequenza DA1, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_IT.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_IT.pdf)  
manuale Installazione - italiano

### MN04020006Z DA1 variable frequency drives, Parameters manual

MN04020006Z Frequenzumrichter DA1, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020006Z\\_DE.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_DE.pdf)  
Parameterhandbuch - Deutsch

MN04020006Z DA1 variable frequency drives, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020006Z\\_EN.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_EN.pdf)  
Parameters manual - English

MN04020006Z Convertitore di frequenza DA1, [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020006Z\\_IT.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020006Z_IT.pdf)  
manuale Parametri - italiano

CA04020001Z-EN Product Range Catalog: [http://www.eaton.eu/DE/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct\\_1095238.pdf](http://www.eaton.eu/DE/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1095238.pdf)  
Efficient Engineering for Starting and Controlling Motors