




Variable frequency drive, 230 V AC, 1-phase, 10.5 A, 2.2 kW, IP20/NEMA 0, Brake chopper, FS2

Part no. DC1-12011NB-A20CE1
Catalog No. 185797
Alternate Catalog No. DC1-12011NB-A20CE1
EL-Nummer 4137004
(Norway)

Delivery program

Product range			Variable frequency drives
Part group reference (e.g. DIL)			DC1
			
Rated operational voltage	U_e		230 V AC, 1-phase 240 V AC, single-phase
Output voltage with V_e	U_2		230 V AC, 3-phase 240 V AC, 3-phase
Mains voltage (50/60Hz)	U_{LN}	V	200 (-10%) - 240 (+10%)
Rated operational current			
At 150% overload	I_e	A	10.5
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 230 V, 50 Hz
150 % Overload	P	kW	2.2
150 % Overload	I_M	A	8.7
Note			at 220 - 240 V, 60 Hz
150 % Overload	P	HP	3
150 % Overload	I_M	A	9.6
Degree of Protection			IP20/NEMA0
Interface/field bus (built-in)			OP-Bus (RS485)/Modbus RTU, CANopen®
Fieldbus connection (optional)			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-SWD3 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, Ukr SEPPO, EAC
Production quality			RoHS, ISO 9001
Climatic proofing	ρ_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
			-10 - +45 °C for UL compliance over a period of 24 hours. 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		230 V AC, 1-phase 240 V AC, single-phase
Mains voltage (50/60Hz)	U_{LN}	V	200 (-10%) - 240 (+10%)
Input current (150% overload)	I_{LN}	A	19.2
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	15.75
max. starting current (High Overload)	I_H	%	175
Note about max. starting current			for 2,5 seconds every 600 seconds
Output voltage with V_e	U_2		230 V AC, 3-phase 240 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) PM motors Synchronous reluctance motors BLDC motors
Frequency resolution (setpoint value)	Δf	Hz	0.1
Rated operational current			
At 150% overload	I_e	A	10.5
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	103.4
Efficiency	η	%	95.3
Heat dissipation at current/speed [%]			
Current = 100%			
Speed = 0 %	P_V	W	70
Speed = 50 %	P_V	W	90
Speed = 90 %	P_V	W	110
Current = 50 %			
Speed = 0 %	P_V	W	50
Speed = 50 %	P_V	W	60
Speed = 90 %	P_V	W	80
Current = 50 %			
Speed = 0 %	P_V	W	40
Speed = 50 %	P_V	W	40
Maximum leakage current to ground (PE) without motor	I_{PE}	mA	4.8
Fitted with			Brake chopper 7-digital display assembly

			Additional PCB protection
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 230 V, 50 Hz
150 % Overload	P	kW	2.2
Note			at 220 - 240 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 230 V	S	kVA	4.18
Apparent power at rated operation 240 V	S	kVA	4.36
Braking function			
Standard braking torque			max. 30 % MN
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	50
Switch-on threshold for the braking transistor	U _{DC}	V	390 V DC

Control section

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			1, parameterizable, 0 - 10 V
Digital inputs			4, parameterizable, max. 30 V DC
Digital outputs			1, parameterizable, 24 V DC
Relay outputs			1, parameterizable, N/O, 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-B25/1N
UL (Class CC or J)		A	25
Mains contactor			
150 % overload (CT/I _H , at 50 °C)			DILM7 DILEM-...+P1DILEM
Main choke			
150 % overload (CT/I _H , at 50 °C)			DX-LN1-024
Radio interference suppression filter (external, 150 %)			DX-EMC12-025-FS2
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-BR050-0K4
20 % duty factor (DF)			DX-BR050-0K8
40 % duty factor (DF)			DX-BR075-1K1
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-LM3-016
Sine filter			
150 % overload (CT/I _H , at 50 °C)			DX-SIN3-016
All-pole sine filter			

Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I _n	A	10.5
Heat dissipation per pole, current-dependent	P _{vid}	W	0
Equipment heat dissipation, current-dependent	P _{vid}	W	103.4
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			
10.2.3 Verification of thermal stability of enclosures			
10.2.3.1 Verification of resistance of insulating materials to normal heat			
10.2.3.2 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
10.2.4 Resistance to ultra-violet (UV) radiation			
10.2.5 Lifting			
10.2.6 Mechanical impact			
10.2.7 Inscriptions			
10.3 Degree of protection of ASSEMBLIES			
10.4 Clearances and creepage distances			
10.5 Protection against electric shock			
10.6 Incorporation of switching devices and components			
10.7 Internal electrical circuits and connections			
10.8 Connections for external conductors			
10.9 Insulation properties			
10.9.2 Power-frequency electric strength			
10.9.3 Impulse withstand voltage			
10.9.4 Testing of enclosures made of insulating material			
10.10 Temperature rise			
10.11 Short-circuit rating			
10.12 Electromagnetic compatibility			
10.13 Mechanical function			

Technical data ETIM 8.0

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	200 - 240
Mains frequency			50/60 Hz
Number of phases input			1
Number of phases output			3
Max. output frequency		Hz	500
Max. output voltage		V	250
Nominal output current I _{2N}		A	11
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			1
Number of analogue inputs			2

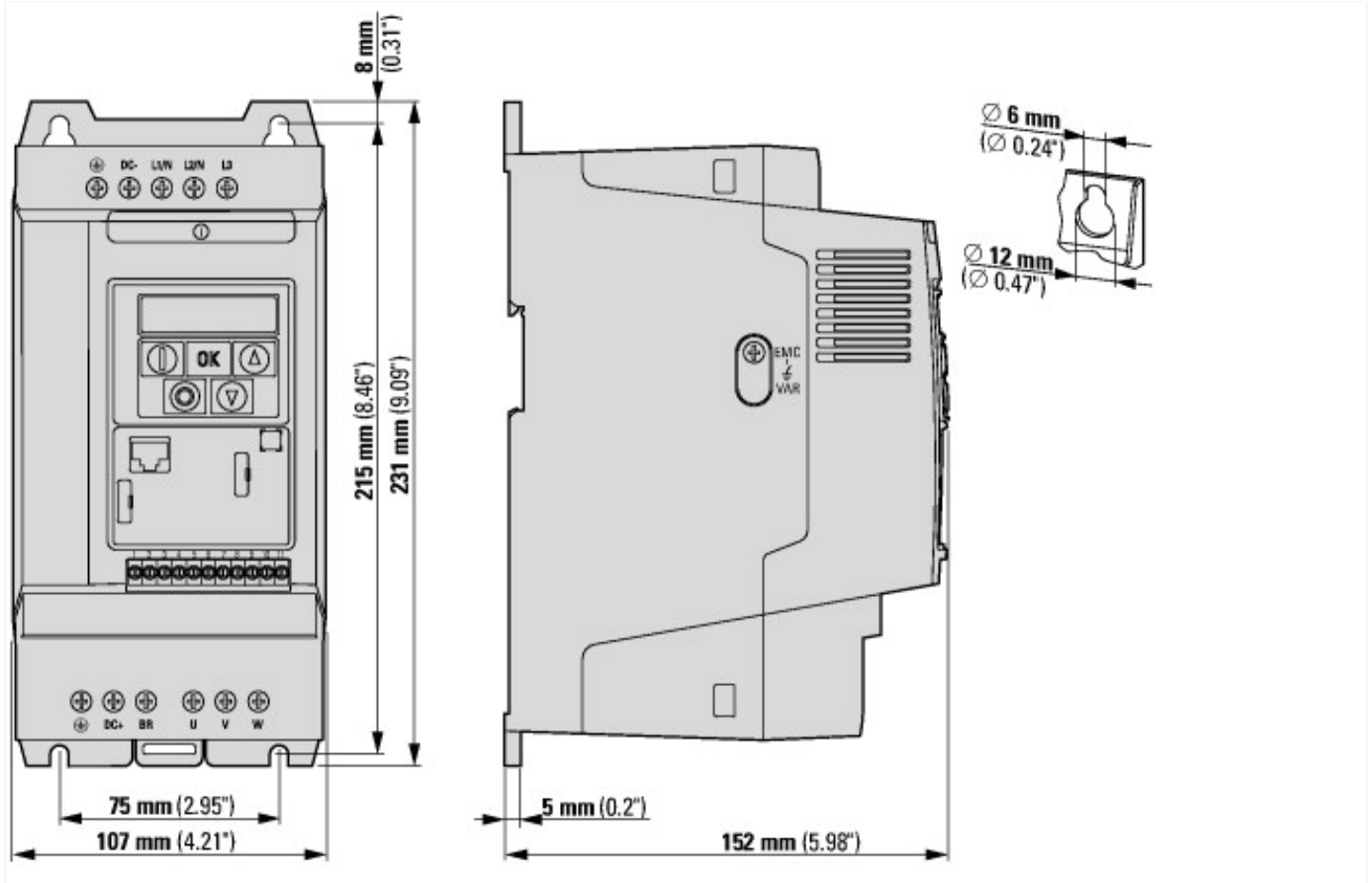
Number of digital outputs			1
Number of digital inputs			4
With control element			Yes
Application in industrial area permitted			Yes
Application in domestic- and commercial area permitted			Yes
Supporting protocol for TCP/IP			No
Supporting protocol for PROFIBUS			No
Supporting protocol for CAN			Yes
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			No
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			No
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	152

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	1~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
Degree of Protection	IEC: IP20

Dimensions



Additional product information (links)

IL04020009Z DC1 variable frequency drive (FS1 - FS3, IP20)	
IL04020009Z DC1 variable frequency drive (FS1 - FS3, IP20)	https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020009Z2021_04.pdf
MN040023 DC1...E1 Installation manual	
MN040023 DC1...E1 Installationshandbuch - Deutsch	https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_DE.pdf
MN040023 DC1...E1 Installation manual - English	https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_EN.pdf
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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