



Variable frequency drive, 230 V AC, 3-phase, 2.3 A, 0.37 kW, IP20/NEMA 0, FS1



Part no. DC1-322D3NN-A20CE1  
 Catalog No. 185818  
 Alternate Catalog No. DC1-322D3NN-A20CE1  
 EL-Nummer 4137011  
 (Norway)

### Delivery program

Product range			Variable frequency drives
Part group reference (e.g. DIL)			DC1
Rated operational voltage	U <sub>e</sub>		230 V AC, 3-phase 240 V AC, 3-phase
Output voltage with V <sub>e</sub>	U <sub>2</sub>		230 V AC, 3-phase 240 V AC, 3-phase
Mains voltage (50/60Hz)	U <sub>LN</sub>	V	200 (-10%) - 240 (+10%)
<b>Rated operational current</b>			
At 150% overload	I <sub>e</sub>	A	2.3
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 230 V, 50 Hz
150 % Overload	P	kW	0.37
150 % Overload	I <sub>M</sub>	A	2
Note			at 220 - 240 V, 60 Hz
150 % Overload	P	HP	0.5
150 % Overload	I <sub>M</sub>	A	2.2
Degree of Protection			IP20/NEMA0
Interface/field bus (built-in)			OP-Bus (RS485)/Modbus RTU, CANopen®
Fieldbus connection (optional)			SmartWire-DT
Fitted with			7-digital display assembly Additional PCB protection
Parameterization			Keypad Fieldbus drivesConnect drivesConnect mobile (App)
Frame size			FS1
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 SEPRO, EAC
Production quality			RoHS, ISO 9001
Climatic proofing	ρ <sub>w</sub>	%	< 95%, average relative humidity (RH), non-condensing, non-corrosive
Air quality			3C2, 3S2
<b>Ambient temperature</b>			
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)
<b>Main circuit</b>			
<b>Supply</b>			
Rated operational voltage	$U_e$		230 V AC, 3-phase 240 V AC, 3-phase
Mains voltage (50/60Hz)	$U_{LN}$	V	200 (-10%) - 240 (+10%)
Input current (150% overload)	$I_{LN}$	A	3.4
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
<b>Power section</b>			
Function			Variable frequency drive with internal DC link and IGBT inverter
Overload current (150% overload)	$I_L$	A	3.45
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)	$\Delta f$	Hz	0.1
Rated operational current			
At 150% overload	$I_e$	A	2.3
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	14.8
Efficiency	$\eta$	%	96
Maximum leakage current to ground (PE) without motor	$I_{PE}$	mA	7.5
Fitted with			7-digital display assembly Additional PCB protection
Frame size			FS1
<b>Motor feeder</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 230 V, 50 Hz
150 % Overload	P	kW	0.37
Note			at 220 - 240 V, 60 Hz
150 % Overload	P	HP	0.5
maximum permissible cable length	l	m	screened: 50 screened, with motor choke: 100 unscreened: 75 unscreened, with motor choke: 150
Apparent power			
Apparent power at rated operation 230 V	S	kVA	0.92
Apparent power at rated operation 240 V	S	kVA	0.96
Braking function			
Standard braking torque			max. 30 % MN

DC braking torque			max. 100% of rated operational current $I_e$ , variable
<b>Control section</b>			
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

<b>Power Wiring</b>			
Safety device (fuse or miniature circuit-breaker)			
IEC (Type B, gG), 150 %			FAZ-B6/3
UL (Class CC or J)		A	6
Mains contactor			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DILM7 DILEM-...
Main choke			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-LN3-004
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
<b>Motor feeder</b>			
motor choke			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-LM3-008
Sine filter			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-SIN3-004

### Design verification as per IEC/EN 61439

<b>Technical data for design verification</b>			
Rated operational current for specified heat dissipation	$I_n$	A	2.3
Heat dissipation per pole, current-dependent	$P_{vid}$	W	0
Equipment heat dissipation, current-dependent	$P_{vid}$	W	14.8
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
<b>IEC/EN 61439 design verification</b>			
<b>10.2 Strength of materials and parts</b>			
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

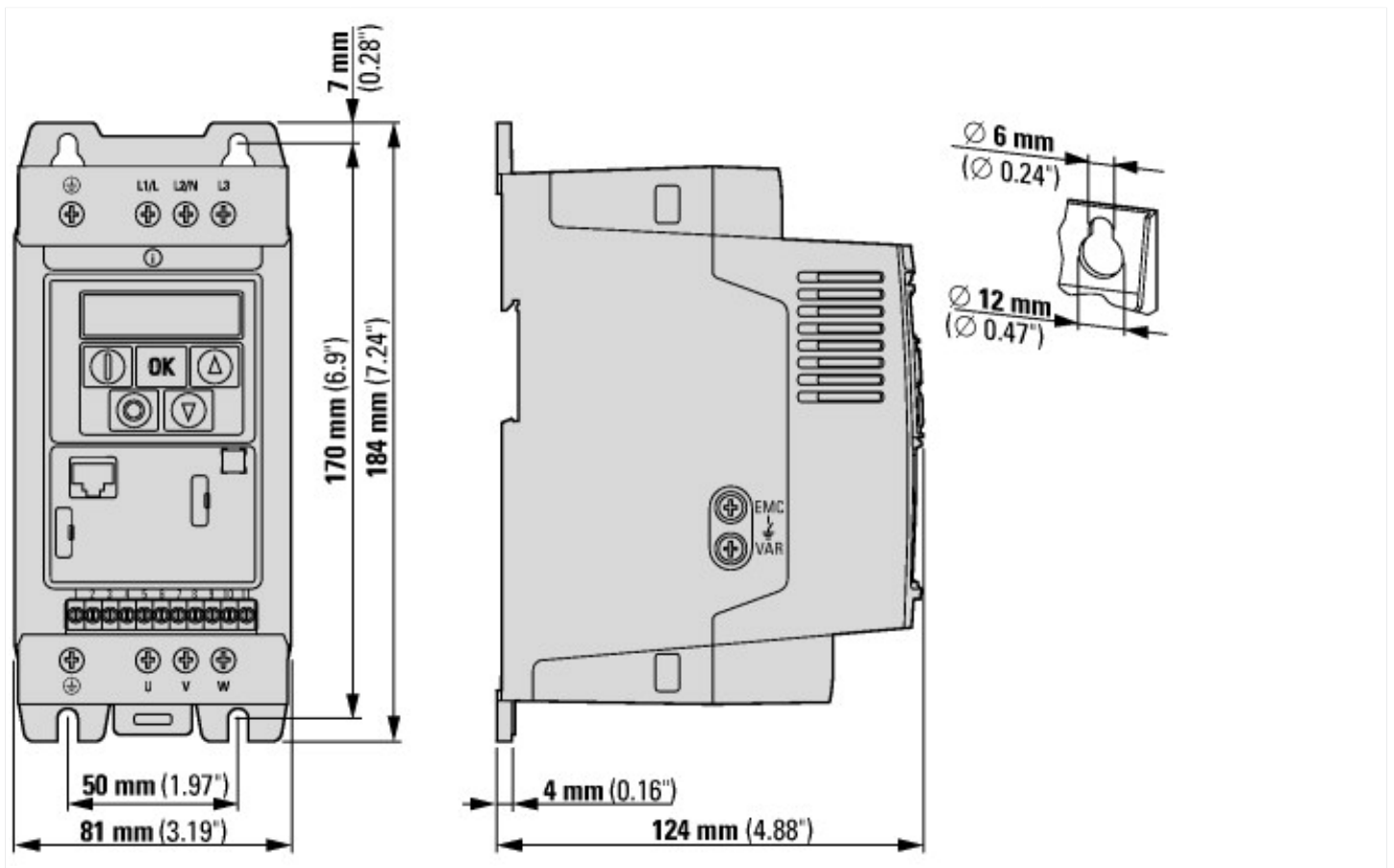
Low-voltage industrial components (EG000017) / Frequency converter =< 1 kV (EC001857)			
Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kV (ecl@ss10.0.1-27-02-31-01 [AKE177014])			
Mains voltage	V		180 - 264
Mains frequency			50/60 Hz
Number of phases input			3
Number of phases output			3
Max. output frequency	Hz		500
Max. output voltage	V		250
Nominal output current I2N	A		2.3
Max. output at quadratic load at rated output voltage	kW		0.37
Max. output at linear load at rated output voltage	kW		0.37
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 unit			Yes
Application in industrial area permitted			Yes
Application in domestic- and commercial area permitted			No
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		No
4-quadrant operation possible		No
Type of converter		U converter
Degree of protection (IP)		IP20
Degree of protection (NEMA)		Other
Height	mm	184
Width	mm	81
Depth	mm	124

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

## Dimensions



## Additional product information (links)

<b>IL04020009Z DC1 variable frequency drive (FS1 - FS3, IP20)</b>	
IL04020009Z DC1 variable frequency drive (FS1 - FS3, IP20)	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020009Z2018_05.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020009Z2018_05.pdf</a>
<b>MN040023 DC1...E1 Installation manual</b>	
MN040023 DC1...E1 Installationshandbuch - Deutsch	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_DE.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_DE.pdf</a>
MN040023 DC1...E1 Installation manual - English	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_EN.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_EN.pdf</a>
MN040023 DC1...E1 manuale Installazione - italiano	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_IT.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_IT.pdf</a>
MN040023 DC1...E1 podręcznik instalacji - polski	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_PL.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040023_PL.pdf</a>
<b>MN040022 DC1...E1, Parameters manual</b>	
MN040022 DC1...E1, Parameterhandbuch - Deutsch	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_DE.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_DE.pdf</a>
MN040022 DC1...E1, Parameters manual - English	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_EN.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_EN.pdf</a>
MN040022 DC1...E1, manuale Parametri - italiano	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_IT.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_IT.pdf</a>
MN040022 DC1...E1, podręcznik parametrów - polski	<a href="https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_PL.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN040022_PL.pdf</a>
CA04020001Z-EN Product Range Catalog: Efficient Engineering for Starting and Controlling Motors	<a href="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</a>