



Variable frequency drive, 500 V AC, 3-phase, 6.5 A, 4 kW, IP66/NEMA 4X, OLED display



Part no. DA1-356D5NB-B66C  
 Catalog No. 176987  
 Alternate Catalog No. DA1-356D5NB-B66C

## Delivery program

Product range			Variable frequency drives
Part group reference (e.g. DIL)			DA1
Rated operational voltage	$U_e$		500 V AC, 3-phase 600 V AC, 3-phase
Output voltage with $V_e$	$U_2$		500 V AC, 3-phase 600 V AC, 3-phase
Mains voltage (50/60Hz)	$U_{LN}$	V	500 (-10%) - 600 (+10%)
<b>Rated operational current</b>			
At 150% overload	$I_e$	A	6.5
Note			Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °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 500 V, 50 Hz
150 % Overload	P	kW	4
150 % Overload	$I_M$	A	6.5
Note			at 525 V, 50 Hz
150 % Overload	P	kW	4
150 % Overload	$I_M$	A	6.5
Note			at 550 - 600 V, 60 Hz
150 % Overload	P	HP	5
150 % Overload	$I_M$	A	6.1
Degree of Protection			IP66/NEMA 4X
Interface/field bus (built-in)			OP-Bus (RS485)/Modbus RTU, CANopen®
Fieldbus connection (optional)			Ethernet IP DeviceNet PROFIBUS PROFINET Modbus-TCP EtherCAT
Fitted with			Brake chopper OLED display Additional PCB protection
Parameterization			Keypad Fieldbus drivesConnect drivesConnect mobile (App)
Frame size			FS2
Connection to SmartWire-DT			no

## 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			3C3, 3S3

<b>Ambient temperature</b>			
Operating ambient temperature min.		°C	-10
Operating ambient temperature max.		°C	+ 40
			operation (with 150 % overload)
Storage	$\theta$	°C	-40 - +60
<b>Mounting position</b>			
Altitude		m	0 - 1000 m above sea level Above 1000 m: 1% derating for every 100 m max. 4000 m
<b>Degree of Protection</b>			
Protection against direct contact			
IP66/NEMA 4X			
BGV A3 (VBG4, finger- and back-of-hand proof)			

## Main circuit

<b>Supply</b>			
Rated operational voltage	$U_e$		500 V AC, 3-phase 600 V AC, 3-phase
Mains voltage (50/60Hz)	$U_{LN}$	V	500 (-10%) - 600 (+10%)
Input current (150% overload)	$I_{LN}$	A	8.6
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	9.75
max. starting current (High Overload)	$I_H$	%	200
Note about max. starting current			
for 4 seconds every 40 seconds			
Output voltage with $V_e$	$U_2$		500 V AC, 3-phase 600 V AC, 3-phase
Output Frequency	$f_2$	Hz	0 - 50/60 (max. 500)
Switching frequency	$f_{PWM}$	kHz	8 adjustable 4 - 24 (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	6.5
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	120
Efficiency	$\eta$	%	97
Maximum leakage current to ground (PE) without motor	$I_{PE}$	mA	6.5
Fitted with			
Brake chopper OLED display Additional PCB protection			
Safety function			
STO (Safe Torque Off, SIL2, PLd Cat 3)			
Frame size			
FS2			
<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 500 V, 50 Hz			
150 % Overload	P	kW	4
Note			
at 525 V, 50 Hz			
150 % Overload	P	kW	4
Note			
at 550 - 600 V, 60 Hz			
150 % Overload	P	HP	5
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 600 V	S	kVA	6.75
Braking function			
Standard braking torque			max. 30 % $M_N$
DC braking torque			max. 100% of rated operational current $I_b$ , variable
Braking torque with external braking resistance			Max. 100% of rated operational current $I_b$ with external braking resistor
minimum external braking resistance	$R_{min}$	$\Omega$	150
Switch-on threshold for the braking transistor	$U_{DC}$	V	975 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 %			10NHG000B
Notes			NH fuse used together with TB00-D fuse base
UL (Class CC or J)		A	15
Notes			LPJ fuse used together with J60060-3 fuse base
UL (Class CC or J)		A	LPJ-10SP
Mains contactor			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DILM7
Main choke			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-LN3-010
DC link connection			
Braking resistance			
10 % duty factor (DF)			DX-BR150-0K5
20 % duty factor (DF)			DX-BR150-1K1
40 % duty factor (DF)			R:2 x DX-BR075-5K1
Notes concerning braking resistances:			R:m = "m" resistors connected in series 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			
Sine filter			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			SIN-0008-6-0-P

### Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	$I_n$	A	6.5
Heat dissipation per pole, current-dependent	$P_{vid}$	W	0
Equipment heat dissipation, current-dependent	$P_{vid}$	W	120
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
			Operation (with 150 % overload)
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

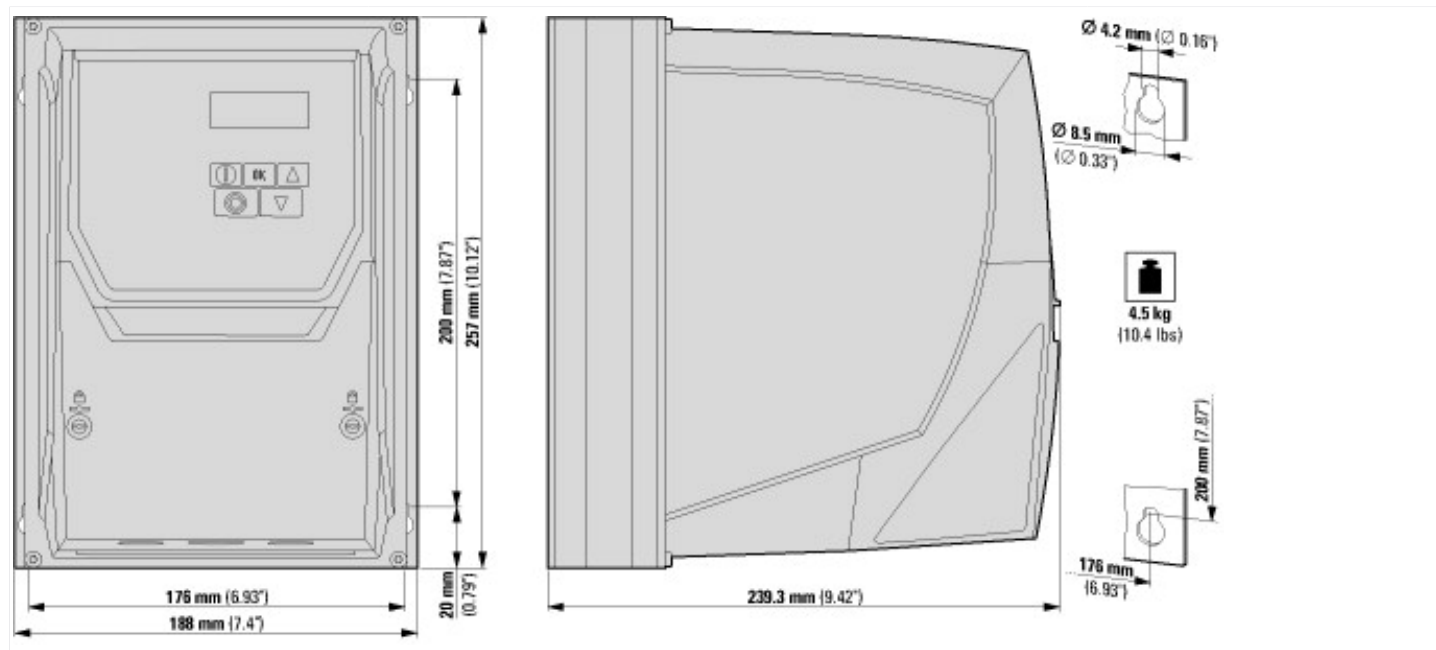
Low-voltage industrial components (EG000017) / Frequency converter =< 1 kV (EC001857)			
Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kV (ec!@ss10.0.1-27-02-31-01 [AKE177014])			
Mains voltage	V		540 - 660
Mains frequency			50/60 Hz
Number of phases input			3
Number of phases output			3
Max. output frequency	Hz		500
Max. output voltage	V		600
Nominal output current I2N	A		6.5
Max. output at quadratic load at rated output voltage	kW		4
Max. output at linear load at rated output voltage	kW		4
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			No
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		Yes
Type of converter		U converter
Degree of protection (IP)		IP66
Degree of protection (NEMA)		4X
Height	mm	257
Width	mm	188
Depth	mm	239.3

## 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- 600 V AC (+10 %) IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
Degree of Protection		IEC: IP66

## Dimensions



## Additional product information (links)

### IL04020015Z DA1 variable frequency drives (FS2+3, IP66)

IL04020015Z DA1 variable frequency drives (FS2+3, IP66) [https://es-assets.eaton.com/DOCUMENTATION/AWA\\_INSTRUCTIONS/IL04020015Z2018\\_04.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020015Z2018_04.pdf)

### MN04020005Z DA1 variable frequency drives, Installation manual

MN04020005Z Frequenzumrichter DA1, Installationshandbuch - Deutsch [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_DE.pdf](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](https://es-assets.eaton.com/DOCUMENTATION/AWB_MANUALS/MN04020005Z_EN.pdf)

MN04020005Z Convertitore di frequenza DA1, manuale Installazione - italiano [https://es-assets.eaton.com/DOCUMENTATION/AWB\\_MANUALS/MN04020005Z\\_IT.pdf](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](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](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](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](http://www.eaton.eu/DE/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1095238.pdf)