

Variable frequency drive, 400 V AC, 3-phase, 46 A, 22 kW, IP55/NEMA 12,  
Radio interference suppression filter, OLED display



Part no. DA1-34046FB-B55C  
Catalog No. 169393  
Alternate Catalog No. DA1-34046FB-B55C  
EL-Nummer 4137315  
(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%)
<b>Rated operational current</b>			
At 150% overload	$I_e$	A	46
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 400 V, 50 Hz
150 % Overload	P	kW	22
150 % Overload	$I_M$	A	41
Note			at 440 - 480 V, 60 Hz
150 % Overload	P	HP	30
150 % Overload	$I_M$	A	40
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
Parameterization			Keypad Fieldbus drivesConnect drivesConnect mobile (App)
Frame size			FS4
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	$\rho_w$	%	< 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	8	°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	51.9
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	69
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 - 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	46
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	506
Efficiency	$\eta$	%	97.7
Heat dissipation at current/speed [%]			
Current = 100%			
Speed = 0 %	$P_V$	W	447
Speed = 50 %	$P_V$	W	527
Speed = 90 %	$P_V$	W	614
Current = 50 %			
Speed = 0 %	$P_V$	W	261
Speed = 50 %	$P_V$	W	303

Speed = 90 %	P <sub>V</sub>	W	350
Current = 25 %			
Speed = 0 %	P <sub>V</sub>	W	192
Speed = 50 %	P <sub>V</sub>	W	231
Maximum leakage current to ground (PE) without motor	I <sub>PE</sub>	mA	2.47
Fitted with			Radio interference suppression filter Brake chopper Additional PCB protection OLED display
Safety function			STO (Safe Torque Off, SIL2, PLd Cat 3)
Frame size			FS4
Motor feeder			
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	22
Note			at 440 - 480 V, 60 Hz
150 % Overload	P	HP	30
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	31.87
Apparent power at rated operation 480 V	S	kVA	38.24
Braking function			
Standard braking torque			max. 30 % M <sub>N</sub>
DC braking torque			max. 100% of rated operational current I <sub>e</sub> , variable
Braking torque with external braking resistance			Max. 100% of rated operational current I <sub>e</sub> with external braking resistor
minimum external braking resistance	R <sub>min</sub>	Ω	22
Switch-on threshold for the braking transistor	U <sub>DC</sub>	V	780 V DC

## Control section

External control voltage	U <sub>c</sub>	V	24 V DC (max. 100 mA)
Reference voltage	U <sub>s</sub>	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 %			NZMC1-S80
UL (Class CC or J)		A	70
Mains contactor			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DILM40
Main choke			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-LN3-050
Radio interference suppression filter (external, 150 %)			DX-EMC34-055
Radio interference suppression filter, low leakage currents (external, 150 %)			DX-EMC34-055-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-BR022-5K1

20 % duty factor (DF)			DX-BR022-9K2
40 % duty factor (DF)			R:2 x DX-BR012-18K1
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			
motor choke			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-LM3-050
Sine filter			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-SIN3-048
All-pole sine filter			
150 % overload (CT/I <sub>H</sub> , at 50 °C)			DX-SIN3-046-A

## Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I <sub>n</sub>	A	46
Heat dissipation per pole, current-dependent	P <sub>vid</sub>	W	0
Equipment heat dissipation, current-dependent	P <sub>vid</sub>	W	506
Static heat dissipation, non-current-dependent	P <sub>vs</sub>	W	0
Heat dissipation capacity	P <sub>diss</sub>	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 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 (ecI@ss10.0.1-27-02-31-01 [AKE177014])		
Mains voltage	V	380 - 480
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	46
Max. output at quadratic load at rated output voltage	kW	22
Max. output at linear load at rated output voltage	kW	22
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 element		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		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)		IP55
Degree of protection (NEMA)		12

Height		mm	450
Width		mm	173
Depth		mm	240