SIEMENS

5192

Variable speed drives SED2

Variable speed drives for speed control of three-phase ac motors actuating fans or pumps.
Range: 1.5 kW to 90 kW for IP20
Voltage range: 380 V to 480 V
Freely programmable I/Os
Integrated PID controller
Integrated HVAC functions

CM1N5192en
2018-02-28

Building Technology

Use

The SED2 is used for energy-optimized speed control of pump and fan motors in HVAC applications:

- Demand-controlled speed control for supply and exhaust air fans in air handling systems
- Demand-controlled speed control for circulating pumps in HVAC systems
- Variable Air Volume (VAV) plants
- Cooling tower fans
- Condensate pumps

Product documentation

Getting started guide CM1G5192X

The "Getting started" guide is a short guide in the form of a CD booklet; it contains all notes and parameters necessary to configure the SED2 based on the factory settings.

Commissioning Guide CM1G5192en

The Commissioning Guide contains all information required for mounting, installing and commissioning the SED2 variable speed drives. It is supplied with the product and also contains a number of typical SED2 application examples with the relevant information on the parameter settings.

Planning Manual CM1J5192en

The Planning Manual is intended for the support of system houses and HVAC planning engineers when planning and sizing drive systems for HVAC plants.

Application Guide "Fire Mode" CM1A5192en

Without additional control logics, the SED2 support two operating modes. In the comfort mode, the supply air and extract air fans are controlled exactly according to the actual demand. Thus, a high level of comfort is guaranteed at lowest energy consumption.
If a fire control panel signals a fire, the SED2 change their operating mode to the fire emergency mode. This operating mode ensures that rooms for example are specifically controlled by means of overpressure to make sure escape routes are kept free of smoke.

Handbook Detection, measurement and mini-mization of harmonics CM1P5199en

This document focuses on interplay between the SED2 and harmonics in the power supply system.
The document provides practical knowledge, aimed at identifying harmonics at an early stage and selecting the right approach to solve problems.

Type summary

Type codes

SED2-aaa/bcd				
SED2	**-aaa**	**b**	**c**	**d**
SBT variable speed drive of the 2nd generation	Power [kW]	Voltage range	Protection of housing	EMC Filter according to EN 55011
		-	2 = IP20	-
		3 = 380...480 V	-	B = Filter class B

Complete type summary

See the tables in section SED2 type summary on page 12.

Accessories

Accessories	Order number ASN	Suited for
AOP (Advanced Operator Panel) Multilanguage Clear Text Display	SED2-AOP1	All SED Types
LON integration module	SED2-LONI/F	All types of SED2
Profibus integration module	MLFB 6SE6400-1PB00-0AA0 [1]	All types of SED2

[1] To be ordered at Siemens I DT

Spare parts

Spare parts	Order number ASN	Suited for:
Basic Operator Panel (BOP)	SED2-BOP1	All SED2 types
EMC filter frame size A	SED2-BFLTR-A	All SED2 IP20 frame size A
EMC filter frame size B	SED2-BFLTR-B	All SED2 IP20 frame size B
EMC filter frame size C for 200V AC	SED2-BFLTR-C-L	SED2-3/22x – SED2-7.5/22x
EMC filter frame size C for 400V AC	SED2-BFLTR-C-H	SED2-5.5/32x – SED2-15/32x
I/O Board	SED2-IOBD1	All SED2 types
Cooling fan IP20 frame size A (with 3 wire connection)	SED2-FAN-20A	IP20 frame size A, produced before December 10th 2002 (see SED2 serial number)

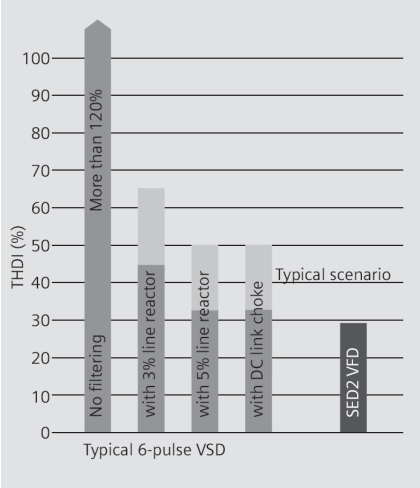
Spare parts	Order number ASN	Suited for:
Cooling fan IP20 frame size A (with 2 wire connection)	SED2-FAN2-20A	IP20 frame size A produced since December 10th 2002 (see SED2 serial number)
Cooling fan IP20 frame size B (with 3 wire connection)	SED2-FAN-20B	IP20 frame size B produced before April 22nd 2004 (see SED2 serial number)
Cooling fan IP20 frame size B (with 2 wire connection)	SED2-FAN2-20B	IP20 frame size B produced since April 22nd 2004 (see SED2 serial number)
Cooling fan IP20 frame size C (with 3 wire connection)	SED2-FAN-20C	IP20 frame size C produced before April 27th 2004 (see SED2 serial number)
Cooling fan IP20 frame size C (with 2 wire connection)	SED2-FAN2-20C	IP20 frame size C produced since April 27th 2004 (see SED2 serial number)
Cooling fan IP20 frame size D und E	SED2-FAN-20DE2	All IP20 frame size D und E
Cooling fan IP20 frame size F	SED2-FAN-20F	All IP20 frame size F
Cooling fan IP54 frame size B (internal with 3 wire connection)	SED2-FAN-20B	All IP54 frame size B produced before April 22nd 2004 (see SED2 serial number)
Cooling fan IP54 frame size B (internal with 2 wire connection)	SED2-FAN2-20B	All IP54 frame size B produced since April 22nd 2004 (see SED2 serial number)
Cooling fan IP54 frame size B (external)	SED2-FAN-54B	All IP54 frame size B
Cooling fan IP54 frame size C (internal with 3 wire connection)	SED2-FAN-20C	All IP54 frame size C produced before April 27th 2004 (see SED2 serial number)
Cooling fan IP54 frame size C (internal with 2 wire connection)	SED2-FAN2-20C	All IP54 frame size C produced since April 27th 2004 (see SED2 serial number)
Cooling fan IP54 frame size C (external)	SED2-FAN-54C	All IP54 frame size C
Cooling fan IP54 frame size D und E (Internal)	SED2-FAN-20DE2	All IP54 frame size D und E
Cooling fan IP54 frame size D und E (External)	SED2-FAN-54DE	All IP54 frame size D und E
Cooling fan IP54 frame size F (Internal)	SED2-FAN-20DE2	All IP54 frame size F
Cooling fan IP54 frame size F (External)	SED2-FAN-54F	All IP54 frame size F

Software	You obtain the following SED2 Software free from your local Siemens sales office:
EasyComm	Parameterization-Software including standard applications and Commissioning Wizard
EasySave	Calculates the payback time and energy savings in comparison to a conventional plant
HarmonEE	HarmonEE is a PC program developed by Siemens SBT to calculate the entire distortion of harmonic currents and voltages. It covers the harmonic spectrum up to the 49th order and conforms to international standards, such as IEEE 519.2, UK EA G5/4 and IEC 61000-3-6.

Equipment combinations

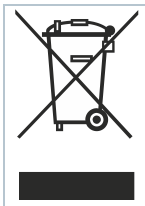
For the integration	Desigo TX OPEN, TX SED2, Engineering Instructions CM110573 LON Integration module, data sheet CE1N5193 Profibus Integration module, data sheet (from Siemens I DT): 6SE6400-5AK00-0BP0

Low Harmonic Technology



The SED2 incorporates **LHT** (Low Harmonic Technology) in all models (technology for reducing harmonic currents on the AC line). Without additional chokes, SED2 variable frequency drives reach a THDI ≤ 29%.

Disposal



The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

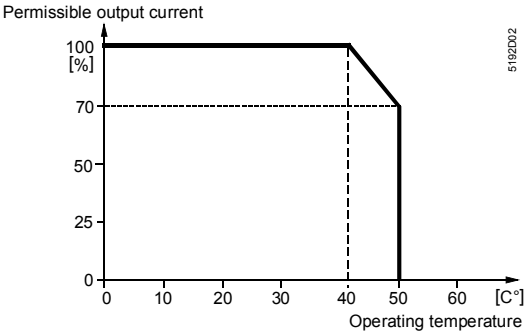
Technical data

Environmental conditions	Storage temperature	-40 °C to +70 °C
	Operating temperature for all types	-10 °C to +40 °C (+50 °C with derating)
	Humidity	95% relative humidity Non-condensing
	Altitude	Up to 1000 meters above sea level without performance reduction
Power	Rated voltage range	3 x 380 - 480 V ±10%
	Input frequency	47 – 63 Hz
	Switch-on current	≤ Nominal input current
	Power factor	≥ 0.95
	Efficiency	96 – 97%
	Output frequency	0 – 150 Hz
	Overload capacity	110 % periodic overload capacity for 60 s within 5 minutes relative to the nominal output current
	Power range	1.5kW - 90kW
	Switching frequency	4 kHz to 16 kHz (2 kHz steps)
Functions	Protection functions	Protection against: Undervoltage, overvoltage, ground fault, short circuit, rotor jam, motor and drive over temperature
	HVAC functions	PID controller for speed, pressure, and temperature control Belt failure detection with and without sensor Staging of pumps or fans Hibernation mode Variable speed drive bypass Fire mode
	Fixed frequencies	15, programmable
	Masking frequencies	4, programmable
Control unit	Setpoint resolution	0.01 Hz digital, 10 bit analog
Inputs	2 analog inputs: AIN1, AIN2	0/2 to 10 V or 0/4 to 20mA, changeover possible (programmable scaling), configurable for direct connection of an LG-Ni 1000 temperature sensor
	6 digital inputs: DIN1 to DIN6 20 configurable functions	Potential-free, expandable to 8 inputs by reconfiguring the 2 analog inputs Switchable polarity: active low/ active high Switching threshold: <3 V low, >3 V high Input current min. 6 mA at ≥ 15 V, aim: 8 mA Max. input voltage: 33 V
Outputs	2 analog outputs: AOUT1, AOUT2	0/2 to 10 V or 0/4 to 20 mA, changeover possible (programmable scaling) Output impedance: 1 kΩ
	2 relays	Programmable 1 potential-free changeover contact each Max. contact rating: DC 30 V, 5 A AC 250 V, 2 A
	Auxiliary supply AC 24 V or AC 24 V class 2 (US)	Galvanically separated, unregulated auxiliary supply (18 to 32 V), 50 mA.
	Max. motor cable length	Generally: 50 m screened 100 m unscreened EN 55011 Industrial scientific and medical (ISM) radio-frequency equipment: class B: 25 m screened with SED2 B filter option class A1: 50 m screened with SED2 B filter option EN61800-3 for conducted radio-frequency emission used in the first environment: C1 : 25 m screened with SED2 B filter option C2: 50 m screened with SED2 B filter option Up to 1000 m cable length with additional output filters

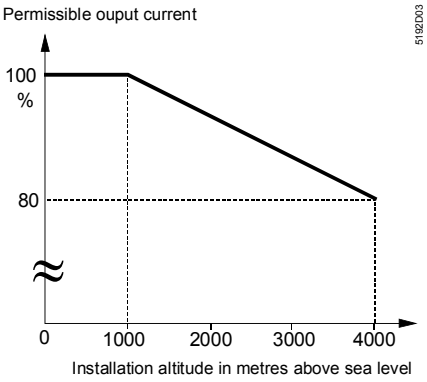
Interface	Serial interface	RS 485, (RS 232 optional with converter) Protocols: USS, P1, and N2 USS transmission rate: up to 38.4 kBaud (default 9.6 kBaud) LON – Module optional, Profibus DP optional
Degree of protection of housing	As per EN 60529	IP20
Standards	Product safety	
	Safety of machinery; electrical equipment of machines	EN 60204-1
	Semiconductor converters. General requirements and line commutated converters	EN 60146-1-1
	Electromagnetic compatibility	
	EMC emissions	EN 55011
	Electromagnetic compatibility part 3-12: Limits for harmonic currents	On the power side, the integrated LHT minimizes the network effects dramatically and thus maintains operation within the limits of EN 61000-3-12
	Adjustable speed electrical power drive systems Part 3: EMC product standard including specific test methods	EN 61800-3
	RoHS conformity	conform

Derating factors for SED2 1.5 kW… 90 kW

Derating as a function of the operating temperature



Derating as a function of the atmospheric pressure (altitude above sea level)



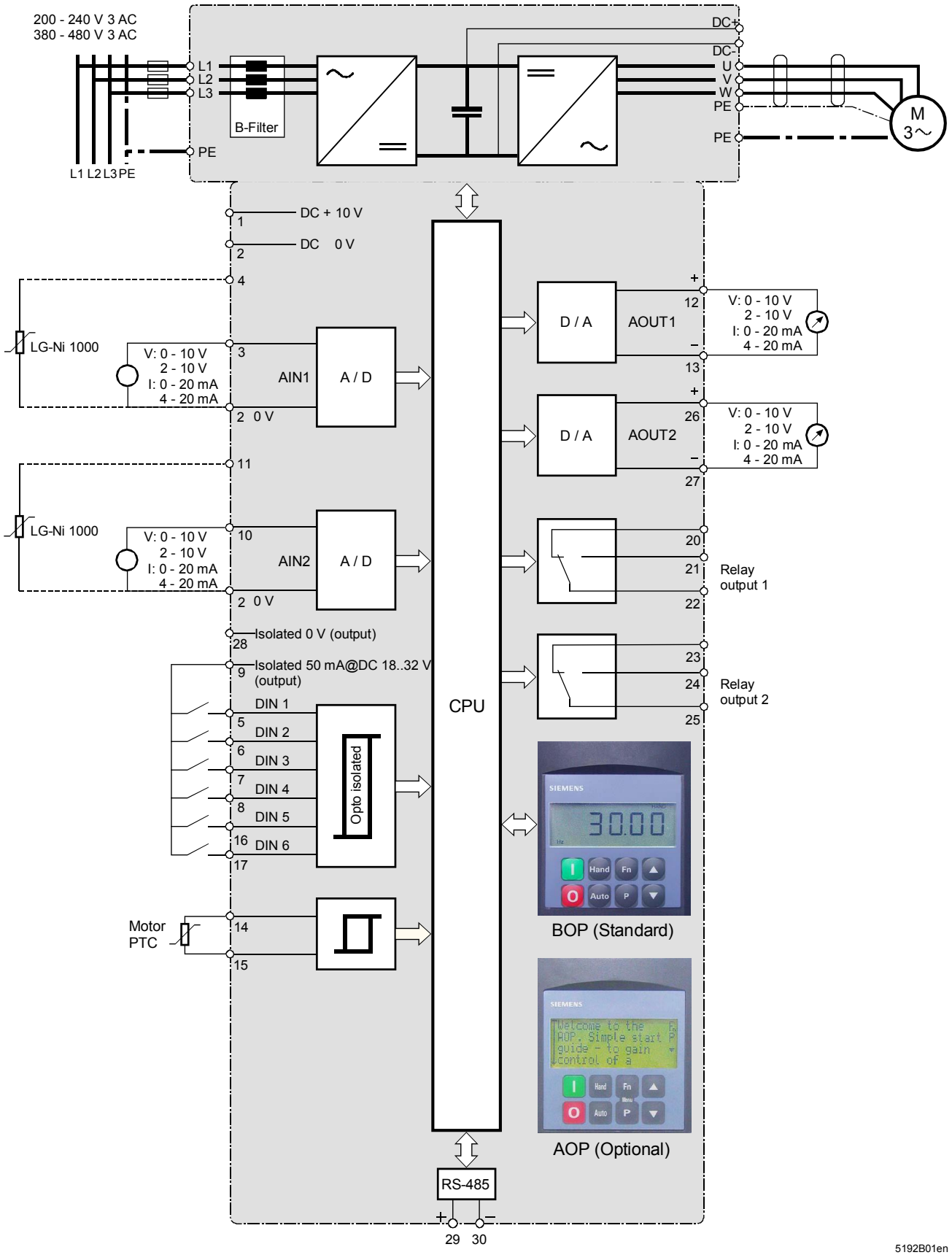
Derating as a function of increasing the Pulse Frequency (P1800)

Increasing the Pulse Frequency (Switching Frequency) has the benefit of reducing the acoustic noise of the driven motor. The downside of this is that the SED2 will generate more heat internally within the drive. It is therefore important to observe the derating table shown below. If full motor output shall also be ensured at higher pulse frequencies, the VSD must be selected according to the following table.

Note Increasing the pulse frequency will also potentially increase RFI (Radio Frequency Interference) and therefore extra precautions in bonding and screening may be necessary.

380 V – 480 V, ± 10%, 3 phases											
IP20/IP21 filtered	**IP20 unfiltered**	**IP54 filtered**	**IP54 unfiltered**	**Rating**	**Pulse frequency in kHz**						
				kW	**4**	**6**	**8**	**10**	**12**	**14**	**16**
					Max. output current in A						
SED2-1.5/32B				1.5	4	3.6	3.2	2.9	2.3	2	1.4
SED2-4/32B				4	10.2	9.2	8.2	7.1	6.1	5.1	4.1
SED2-15/32B				15	32	30.4	28.8	25.6	22.4	19.2	16
SED2-30/32B				30	62	58.9	55.8	49.6	43.4	37.2	31
SED2-45/32B				45	90	76.5	63	51.8	40.5	33.8	27
SED2-90/32B				90	178	137.9	97.9	84.5	71.1	62.3	53.3

Internal diagram



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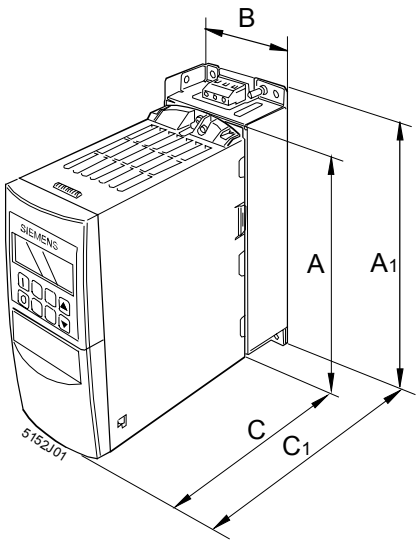
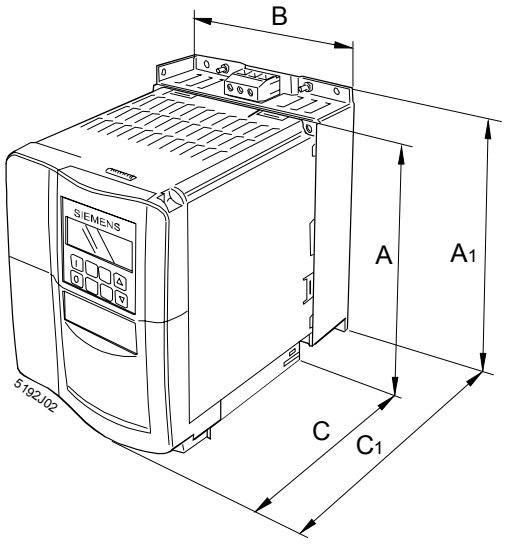
Dimensions of SED2 drives with IP20/NEMA 0 rating

Dimensions of SED2 frame sizes A to C

Frame size	Dimensions				
	A	A_1	B	C	C_1
A	173	200	73	149	192.5
B	202	213	149	172	222.5
C	245	261	185	195	250



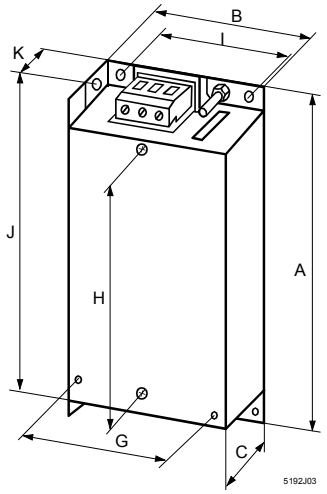
Frame size A



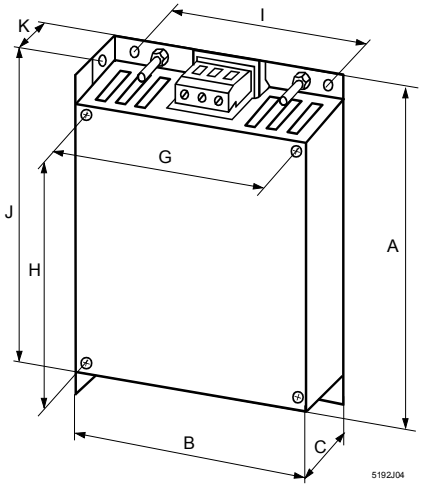
Frame sizes B and C

Dimensions of SED2 footprint filters for frame sizes A to C

Frame size	**Dimensions** in mm							
	A	B	C	G	H	I	J	K
A	200	73	43.5	60	160	56	187	22
B	213	149	50.5	138	174	120	200	24
C	245	185	55	174	204	156	232	35

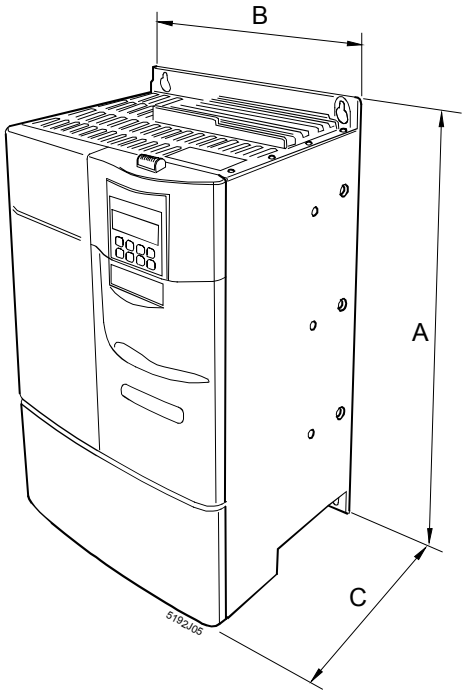


Filter for frame size A



Filter for frame sizes B and C

Dimensions of SED2 frame sizes D to F IP20 / NEMA 0



Frame size	Dimensions in mm		
	A	B	C
D	520	275	245
E	650	275	245
F	850 (with filter 1150)	350	320

380 V to 480 V, ± 10%, 3 phases / IP20								
Output power (variable torque)		**IP code**	**Filter class**	**Max. input current**	**Max. output current**	**Frame size**	**Weight**	**Type reference (ASN)**
kW	**hp**	**IP**		**A**	**A**		**kg**	
1.5	2	20	B	5.8	4	A	2	SED2-1.5/32B
4	5	20	B	12.8	10.2	B	4.2	SED2-4/32B
15	20	20	B	42	32	C	6.7	SED2-15/32B
30	40	20	B	68	62	D	17	SED2-30/32B
45	60	20	B	99	90	E	22	SED2-45/32B
90	125	20	B	196	178	F	75	SED2-90/32B

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Building Technologies Division
International Headquarters
Gubelstrasse 22
6301 Zug
Switzerland
Tel. +41 58-724 24 24
www.siemens.com/buildingtechnologies