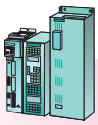


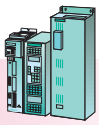
Converters, inverters, AFE inverters, rectifier units, rectifier/regenerative units and braking units

Cooling type	Forced ventilation with integral fan
Air-cooled Permissible ambient and cooling-medium temperature during operation	+32 °F (0 °C) to +104 °F (+40 °C) (reduction curves for +104 °F (+40 °C) < T < +122 °F (+50 °C), see page 6/3)
Water-cooled ● Cooling water inlet temperature ● Permissible ambient temperature during operation	 +41 °F (+5 °C) to 100.4 °F (+38 °C) +32 °F (0 °C) to +104 °F (+40 °C)
Permissible ambient temperature during storage and transport	–13 °F (–25 °C) to +158 °F (+70 °C)
Installation altitude	≤ 3282 ft (1000 m) above sea level (100 % load capability) > 3282 ft (1000 m) to 13126 ft (4000 m) above sea level (for reduction curves, see Section 6)
Humidity rating	Relative humidity ≤ 85 %, moisture condensation not permissible
Climatic category	Class 3K3 to EN 60 721-3-3
Environmental class	Class 3C2 to EN 60 721-3-3
Insulation	Pollution degree 2 to DIN VDE 0110-1 (HD 625. 1 S1: 1996), moisture condensation not permissible
Overvoltage category	Category III to DIN VDE 0110-1 (HD 625. 1 S1: 1996)
Degree of protection	To EN 60 529: Compact PLUS units: IP20; chassis units: IP00 (IP20 optional)
Protection class	Class I to EN 61 140
Shock protection	To DIN VDE 0106 Part 100 and BGV A2 (previously VBG 4)
Radio-interference suppression ● Standard ● Options	To EMC product standard EN 61 800-3 for variable-speed drives No radio-interference suppression Class B1 or Class A1 to EN 61 800-3
Additional information	The units are motor-side ground-fault protected, short-circuit-proof and may be operated under no-load conditions.
Paint finish	For indoor installation
Mechanical specifications ● during operation ● during transport	To EN 60 068-2-6 10 Hz to 58 Hz constant deflection 0.003 in (0.075 mm) 58 Hz to 500 Hz constant acceleration 32 ft/s² (9.8 m/s²) (1 g) 5 Hz to 9 Hz constant deflection 0.14 in (3.5 mm) 9 Hz to 500 Hz constant acceleration 32 ft/s² (9.8 m/s²) (1 g)

Approvals according to UL/CSA[1]	UL File No.	CSA File No.
● Converters and inverters	E 145 153	LR 21927
● Rectifier units and rectifier/regenerative units[2]	E 145 153	LR 21927
● Braking units and braking load resistors[2]	E 145 153	LR 21927
● Braking resistors for Compact PLUS units	E 233 422	210040 (Certificate 1185101)
● d*v*/d*t*- and sinusoidal filter[2]	E 145 153	LR 21927
● Radio-interference suppression filter type 6SE70 ...[2]	E 145 153	LR 21927
● Line commutating and output reactors (iron)	E 103 902	
● 3NE1 series fuses are cULus	E 167 357	

1) UL and CSA approval is not valid for units and system components 3 AC 660 V – 690 V and 890 V – 930 V DC.

2) UL and CSA approval only in combination with SIMOVERT MASTERDRIVES converters or inverters.



Technical characteristics

Pulse Resistor Braking

DC link braking units used in combination with braking resistors can decrease the deceleration time and increase the braking power. When a motor is occasionally generating power (i.e. when stopping) this energy is fed back to the DC link. On a non-regenerative drive the DC link voltage can become excessively high (DC link over-voltage fault) due to the inertia or ramp times. Through the use of pulse resistor braking this excess energy is dissipated through the braking unit and across the resistor in the form of heat.

Braking Units

The braking unit is connected to the converter or common DC bus in parallel to the DC link. The braking units consist of an IGBT that is switched (pulsed) on at predetermined DC link voltage levels to dissipate energy across the braking resistor. The appropriate resistor must always be connected to the braking unit. Braking energy can not be converted without one.

The braking unit operates autonomously of the converter or inverters. The braking unit electronics are supplied form the DC link voltage. Braking units can be connected in parallel to increase braking power, however each braking unit requires its own braking resistor.

Compact PLUS chopper

The Compact PLUS converters and rectifier units have an integrated braking chopper. Only an external braking resistor is required to dissipate the braking energy during generative operation.

Applications in which braking energy occurs only occasionally, e.g. emergency stop, can be implemented with compact braking resistors that are specially matched to Compact PLUS units. These compactly dimensioned braking resistors can absorb high levels of braking power for a short time.

More information

regarding dimensioning of the braking units and braking resistors can be found in Section 6, Engineering Information.

Fig. 3/12
Braking unit and braking resistor for compact and chassis units

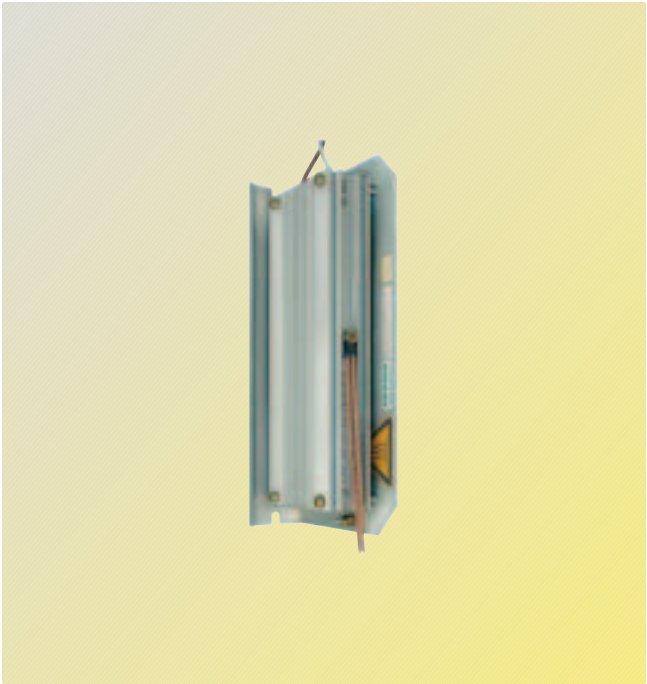


Fig. 3/13
Braking resistor for Compact PLUS units

Technical data

Rated voltage				
DC link voltage	280 V DC –15 % to 340 V DC +10 %	510 V DC –15 % to 650 V DC +10 %	675 V DC –15 % to 810 V DC +10 %	890 V DC –15 % to 930 V DC +15 %
Thresholds				
Upper threshold 1		774 V	967 V	1158 V
Lower threshold 2	NA	673 V	841 V	1070 V
Load class II to EN 60 146-1-1				
Rated power P_{20}	P_{20} power at the upper threshold: The duration is a function of the internal or external resistor			
Continuous power P_{DB}	Continuous power at the upper threshold: The value is dependent on the internal and external resistor			
Short-time power P_3	1.5 x P_{20} power at the upper threshold: The duration is a function of the internal and external resistor			
Cycle time	90 s			
Overload duration	20 s (22 % of the cycle time)			

Braking units cannot be ordered with options.

Note: At the time of this publication the size S and A braking units ending in order number ...–2DA0 were scheduled to be superseded. The newer type units have smaller envelope dimensions and do not contain an internal braking resistor. If a newer type unit is to replace a superseded braking unit which was only operating with the internal braking resistor, an appropriate Compact PLUS braking resistor can be used.

When a superseded unit is being replaced and signals are connected to control terminal X38, then the control terminal strip must be re-wired.
Ensure the ground X38/Pin 2 is connected to the ground on the receiver so the signal level of the electronic switch is detected.

Superseded units	Newer type S units
Order No.	Order No.
6SE7021–6CS87–2DA0	**6SE7021–6CS87–2DA1**
6SE7023–2CA87–2DA0	**6SE7023–2CS87–2DA1**
6SE7026–3CA87–2DA0	**6SE7026–3CS87–2DA1**
6SE7018–0ES87–2DA0	**6SE7018–0ES87–2DA1**
6SE7021–6ES87–2DA0	**6SE7021–6ES87–2DA1**
6SE7023–2EA87–2DA0	**6SE7023–2ES87–2DA1**
6SE7028–0EA87–2DA0	**6SE7028–0ES87–2DA1**
6SE7016–4FS87–2DA0	**6SE7016–4FS87–2DA1**
6SE7021–3FS87–2DA0	**6SE7021–3FS87–2DA1**
6SE7026–4FA87–2DA0	**6SE7026–4FS87–2DA1**

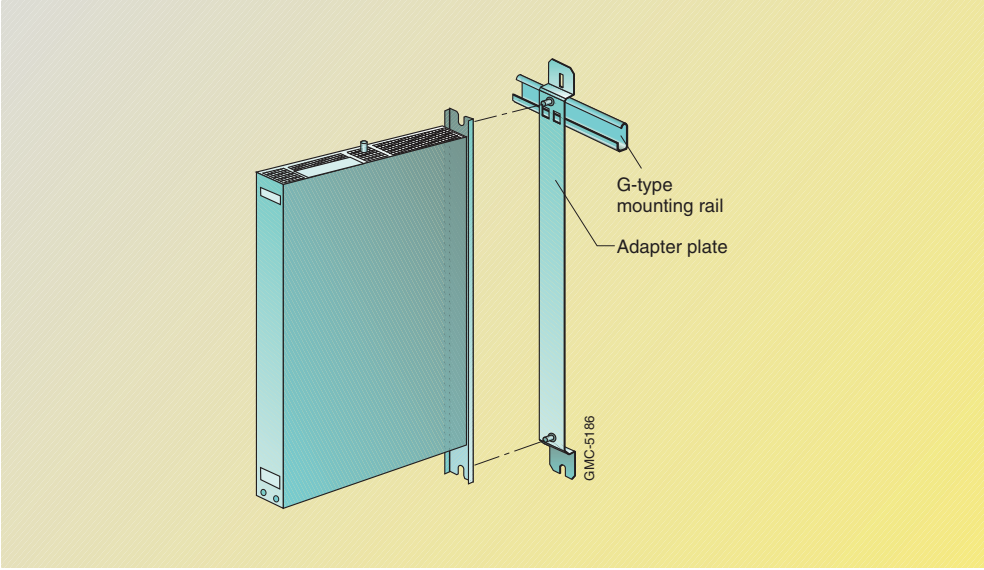
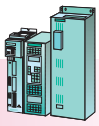


Fig. 3/14
Adapter plate 6SX7010–0KC01 is required for mounting on G-Type rail for size S newer type braking units



Selection and ordering data

Braking resistors for Compact PLUS units

Braking power[1] P_{20}	P_3	P_{DB}	Resistance	Cycle time T	Braking resistor
kW	kW	kW	Ω	s	Order No.
2[3]	3	0.15	200	3200	**6SE7013–2ES87–2DC0**
4[3]	6	0.3[4]	100	6400	**6SE7016–3ES87–2DC0**
5	7.5	1.25	80	90	**6SE7018–0ES87–2DC0**
10	15	2.5	40	90	**6SE7021–6ES87–2DC0**
12[3]	18	0.9[5]	33.3	6400	**6SE7022–0ES87–2DC0**
20	30	5	20	90	**6SE7023–2ES87–2DC0**
50	75	12.5	8	90	**6SE7028–0ES87–2DC0**
100	150	25	4	90	**6SE7031–6ES87–2DC0**

Braking units and braking resistors for compact and chassis units

Braking power[1] P_{20}	P_3	P_{DB}	Braking unit	Dimensions W x H x D		Weight		Braking resistor, external	Resistance[2]
kW	kW	kW	Order No.	in	(mm)	lb	(kg)	Order No.	Ω
DC link voltage 280 V to 310 V DC									
5	7.5	1.25	**6SE7021–6CS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	6.6	(3)	**6SE7021–6CS87–2DC0**	20
10	15	2.5	**6SE7023–2CS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	7.3	(3.3)	**6SE7023–2CS87–2DC0**	10
20	30	5	**6SE7026–3CS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	9.0	(4.1)	**6SE7026–3CS87–3DC0**	5
DC link voltage 510 V to 650 V DC[2]									
5	7.5	1.25	**6SE7018–0ES87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	6.6	(3)	**6SE7018–0ES87–2DC0**	80
10	15	2.5	**6SE7021–6ES87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	6.8	(3.1)	**6SE7021–6ES87–2DC0**	40
20	30	5	**6SE7023–2ES87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	7.3	(3.3)	**6SE7023–2ES87–2DC0**	20
50	75	12.5	**6SE7028–0ES87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	9.0	(4.1)	**6SE7028–0ES87–2DC0**	8
100	150	25	**6SE7031–6EB87–2DA0**	5.3 x 16.7 x 13.8	(135 x 425 x 350)	9.7	(18)	**6SE7031–6ES87–2DC0**	4
170	255	42.5	**6SE7032–7EB87–2DA0**	5.3 x 16.7 x 13.8	(135 x 425 x 350)	39.7	(18)	**6SE7032–7ES87–2DC0**	2.35
DC link voltage 675 V to 810 V DC[2]									
5	7.5	1.25	**6SE7016–4FS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	6.6	(3)	**6SE7016–4FS87–2DC0**	124
10	15	2.5	**6SE7021–3FS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	6.8	(3.1)	**6SE7021–3FS87–2DC0**	62
50	75	12.5	**6SE7026–4FS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	9.0	(4.1)	**6SE7026–4FS87–2DC0**	12.4
100	150	25	**6SE7031–3FB87–2DA0**	5.3 x 16.7 x 13.8	(135 x 425 x 350)	39.7	(18)	**6SE7031–3FS87–2DC0**	6.2
200	300	50	**6SE7032–5FB87–2DA0**	5.3 x 16.7 x 13.8	(135 x 425 x 350)	39.7	(18)	**6SE7032–5FS87–2DC0**	3.1
DC link voltage 890 V to 930 V DC[2]									
50	75	12.5	**6SE7025–3HS87–2DA1**	1.8 x 14.2 x 9.7	(45 x 360 x 247)	9.0	(4.1)	**6SE7025–3HS87–2DC0**	17.8
200	300	50	**6SE7032–1HB87–2DA0**	5.3 x 16.7 x 13.8	(135 x 425 x 350)	39.7	(18)	**6SE7032–1HS87–2DC0**	4.45

See Section 6 for information on paralleling braking units for additional braking capacity.

1) For power definition, see Section 6.

2) Permits the braking power for
switch-on application threshold = 774 V
(≙ supply voltage 3 AC 460 V)
switch-on application threshold = 967 V
(≙ supply voltage 3 AC 575 V)
switch-on application threshold = 1158 V
(≙ supply voltage 3 AC 690 V)

3) Braking resistor in type Compact PLUS for occasionally incurring braking energy, e. g. emergency stop.

4) CSA rating 240 W.

5) CSA rating 720 W.