

# BRAKING UNITS AND RESISTORS



## Perfect Match of SINUS PENTA, Drive, Braking Unit, Resistors

SINUS PENTA drives have integrated braking unit up to size S32  
 Specific external braking units are available from size S41 to S90  
 Santerno offers a complete set of resistors for each specific application

# BRAKING UNITS AND RESISTORS

## Configurations



### INTEGRATED Braking Unit in SINUS PENTA DRIVE S05-S32

All SINUS PENTA DRIVES up to S32 have an integrated Braking Unit.



### BU200 for S60 - S60P

BU200 is the specific external Braking Unit for size S60  
 (BU200 may be used instead of BU700 also for S41-S51)



### BU700 2T-4T for S41-S51 - BU600 5T-6T for S42-S52

BU700 is the specific external Braking Unit for 2T-4T size S41-S51  
 BU600 is the specific external Braking Unit for 5T-6T size S42-S52



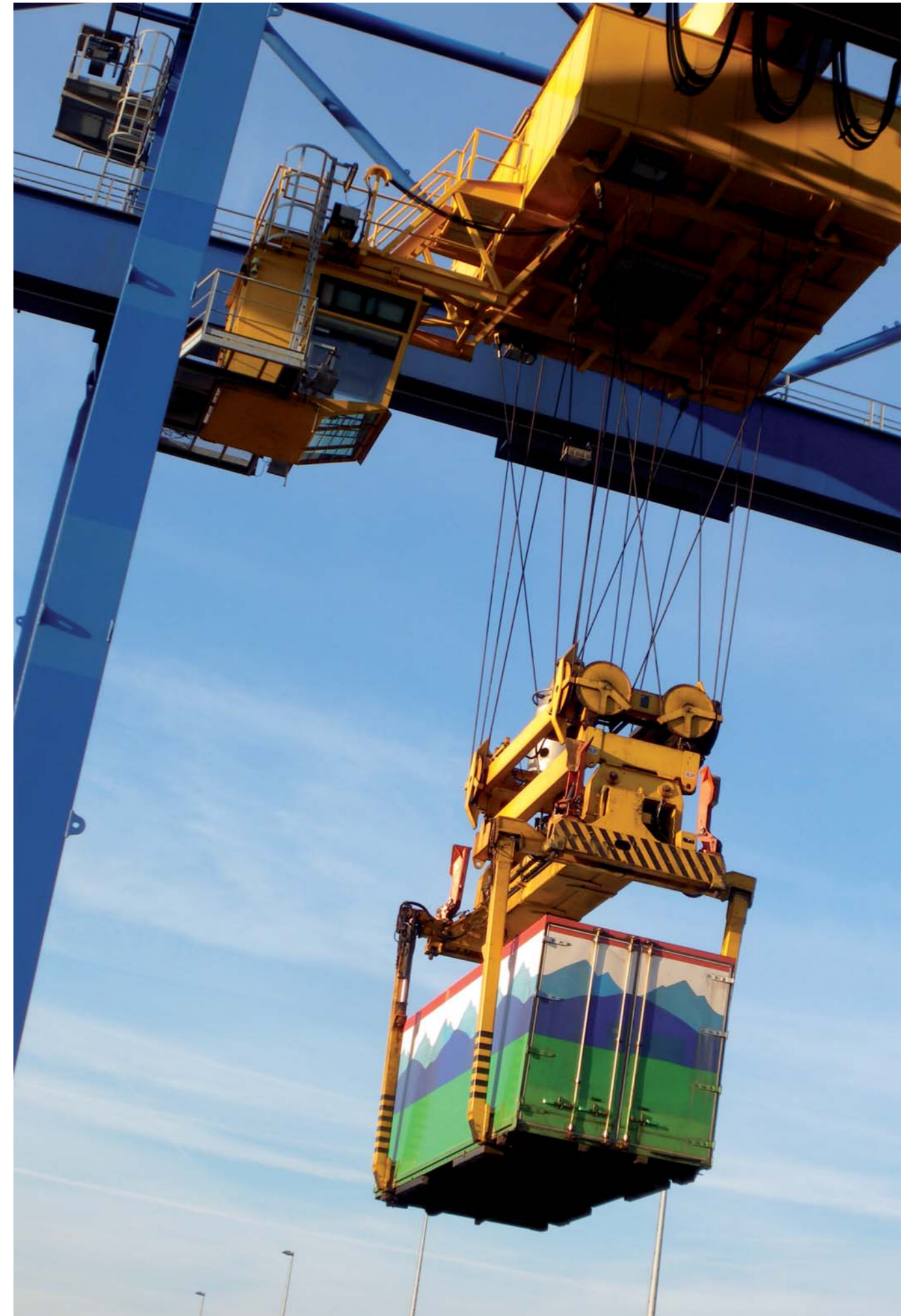
### BU1440 for Modular Inverter S65-S90

BU1440 is the modular Braking Unit for all modular inverters:  
 S65,S70,S75,S80,S90

## BRAKING UNITS AND RESISTORS

### Type of connection

- A-** One resistor
- B-** Two or more parallel-connected resistors
- D-** Four resistors (parallel connection of two series of two resistors)
- C-** Two series-connected resistors
- D-** Four resistors (parallel-connection of two series of two resistors)
- E-** Six resistors (parallel-connection of three series of two resistors)
- F-** Eight resistors (parallel-connection of four series of two resistors)
- M-** Two units, each of them including a braking module connected to its braking resistor
- MD-** Two units, each of them including a braking module connected to four braking resistors (parallel-connection of two series of two resistors)
- ME-** Two units, each of them including a braking module connected to six braking resistors (parallel-connection of three series of two resistors)
- MF-** Two units, each of them including a braking module connected to eight braking resistors (parallel-connection of four series of two resistors)
- MG-** Two units, each of them including a braking module connected to ten braking resistors (parallel-connection of five series of two resistors)
- MH-** Two units, each of them including a braking module connected to twelve braking resistors (parallel-connection of six series of two resistors)
- N-** Three units, each of them including a braking module connected to its braking resistor
- O-** Four units, each of them including a braking module connected to its braking resistor
- P-** Five units, each of them including a braking module connected to its braking resistor
- Q-** Six units, each of them including a braking module connected to its braking resistor
- R-** Seven units, each of them including a braking module connected to its braking resistor
- S-** Eight units, each of them including a braking module connected to its braking resistor
- V-** Two units, each of them including a braking module connected to two parallel-connected braking resistors
- X-** Three units, each of them including a braking module connected to two parallel-connected braking resistors
- Y-** Four units, each of them including a braking module connected to two parallel-connected braking resistors
- W-** Five units, each of them including a braking module connected to two parallel-connected braking resistors
- Z-** Six units, each of them including a braking module connected to two parallel-connected braking resistors



## BRAKING RESISTORS FOR S05-S30 - 2T

Applications with DUTY CYCLE 10% - Class 2T

Inverter			Braking resistors								
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section		
								(Ω)	mm <sup>2</sup> (AWG)		
S05	SINUS 0007	25.0	RE2643560	1	56Ω-350W	IP55	A	56	2.5(14)		
	SINUS 0008	25.0			2*56Ω-350W	IP55	B	28	2.5(14)		
	SINUS 0010	25.0		2	2*56Ω-350W	IP55	B	28	2.5(14)		
	SINUS 0013	18.0			2*56Ω-350W	IP55	B	28	2.5(14)		
	SINUS 0015	18.0			2*56Ω-350W	IP55	B	28	2.5(14)		
	SINUS 0016	18.0		3	3*56Ω-350W	IP55	B	18.7	2.5(14)		
	SINUS 0020	18.0			3*56Ω-350W	IP55	B	18.7	2.5(14)		
S12	SINUS 0023	15.0	RE3083150	1	15Ω-1100W	IP55	A	15	4(12)		
	SINUS 0033	10.0	RE3093100	1	10Ω-1500W	IP54	A	10	4(12)		
	SINUS 0037	10.0			10Ω-1500W	IP54	A	10	4(12)		
S15	SINUS 0040	7.5	RE3083150	1	2*15Ω-1100W	IP55	A	7.5	4(12)		
	SINUS 0049	5.0	RE3482500	1	5Ω-4000W	IP20	A	5.0	10(8)		
S20	SINUS 0060	5.0			5Ω-4000W	IP20	A	5.0	10(8)		
	SINUS 0067	5.0			5Ω-4000W	IP20	A	5.0	10(8)		
	SINUS 0074	4.2			5Ω-4000W	IP20	A	5.0	10(8)		
	SINUS 0086	4.2			5Ω-4000W	IP20	A	5.0	10(8)		
S30	SINUS 0113	3.0			RE3762330	1	3,3Ω-8000W	IP20	A	3.3	10(8)
	SINUS 0129	3.0					3,3Ω-8000W	IP20	A	3.3	10(8)
	SINUS 0150	2.5	3,3Ω-8000W	IP20			A	3.3	10(8)		
	SINUS 0162	2.5	3,3Ω-8000W	IP20			A	3.3	10(8)		

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors

Applications with DUTY CYCLE 20% - Class 2T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section
								(Ω)	mm <sup>2</sup> (AWG)
S05	SINUS 0007	25.0	RE2644100	2	2*100Ω-350W	IP55	B	50	2.5(14)
	SINUS 0008	25.0	RE2643560	2	2*56Ω-350W	IP55	B	28	2.5(14)
	SINUS 0010	25.0			2*56Ω-350W	IP55	B	28	2.5(14)
	SINUS 0013	18.0	RE2644100	4	4*100Ω-350W	IP55	B	25	2.5(14)
	SINUS 0015	18.0			4*100Ω-350W	IP55	B	25	2.5(14)
	SINUS 0016	18.0	RE3103250	1	25Ω-1800W	IP54	A	25	2.5(14)
SINUS 0020	18.0	25Ω-1800W			IP54	A	25	2.5(14)	
S12	SINUS 0023	15.0	RE3113150	1	15Ω-2200W	IP54	A	15	4(12)
	SINUS 0033	10.0	RE3103250	2	2*25Ω-1800W	IP54	B	12.5	2.5(14)
	SINUS 0037	10.0			2*25Ω-1800W	IP54	B	12.5	2.5(14)
S15	SINUS 0040	7.5	RE3113150	2	2*15Ω-2200W	IP54	B	7.5	2.5(14)
	SINUS 0049	5	RE3482500	1	5Ω-4000W	IP20	A	5	6(10)
S20	SINUS 0060	5.0	RE3762500	1	5Ω-8000W	IP20	A	5	10(8)
	SINUS 0067	5.0			5Ω-8000W	IP20	A	5	10(8)
	SINUS 0074	4.2			5Ω-8000W	IP20	A	5	10(8)
	SINUS 0086	4.2			5Ω-8000W	IP20	A	5	10(8)
S30	SINUS 0113	3.0	RE4022330	1	3.3Ω-12000W	IP20	A	3.3	16(6)
	SINUS 0129	3.0			3.3Ω-12000W	IP20	A	3.3	16(6)
	SINUS 0150	2.5			3.3Ω-12000W	IP20	A	3.3	16(6)
	SINUS 0162	2.5			3.3Ω-12000W	IP20	A	3.3	16(6)

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors

## BRAKING RESISTORS FOR S05-S30 - 2T

Applications with DUTY CYCLE 50% - Class 2T

Inverter			Braking resistors								
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section		
								(Ω)	mm <sup>2</sup> (AWG)		
S05	SINUS 0007	25.0	RE3083500	1	50Ω-1100W	IP55	A	50	2.5(14)		
	SINUS 0008	25.0	RE3103250	1	25Ω-1800W	IP54	A	25	2.5(14)		
	SINUS 0010	25.0			25Ω-1800W	IP54	A	25	2.5(14)		
	SINUS 0013	18.0	RE3483250	1	25Ω-4000W	IP20	A	25	2.5(14)		
	SINUS 0015	18.0			25Ω-4000W	IP20	A	25	2.5(14)		
	SINUS 0016	18.0			25Ω-4000W	IP20	A	25	2.5(14)		
	S12	SINUS 0020	18.0	RE3483200	1	20Ω-4000W	IP20	A	20	4(12)	
SINUS 0023		15.0	20Ω-4000W			IP20	A	20	6(10)		
SINUS 0033		10.0	RE3763100			1	10Ω-8000W	IP20	A	10	10(8)
SINUS 0037	10.0	10Ω-8000W		IP20	A		10	10(8)			
S15	SINUS 0040	6.6	RE4022660	1	6.6Ω-12000W	IP20	A	6.6	16(6)		
	SINUS 0049	6.6			6.6Ω-12000W	IP20	A	6.6	16(6)		
S20	SINUS 0060	5.0			RE3763100	2	6.6Ω-12000W	IP20	A	6.6	16(6)
	SINUS 0067	5.0					2*10Ω-8000W	IP20	B	5	10(8)
	SINUS 0074	4.2	2*10Ω-8000W	IP20	B	5	10(8)				
	SINUS 0086	4.2	2*10Ω-8000W	IP20	B	5	10(8)				
S30	SINUS 0113	3.0	RE4022660	2	2*6.6Ω-12000W	IP20	B	3.3	16(6)		
	SINUS 0129	3.0			2*6.6Ω-12000W	IP20	B	3.3	16(6)		
	SINUS 0150	2.5	RE4023100	3	3*10Ω-12000W	IP20	B	3.3	10(8)		
	SINUS 0162	2.5			3*10Ω-12000W	IP20	B	3.3	10(8)		

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors

## BRAKING RESISTORS FOR S05-S30 - 4T

Applications with DUTY CYCLE 10% - Class 4T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section mm <sup>2</sup> (AWG)
S05	SINUS 0005	50	RE3063750	1	75Ω-550W	IP33	A	75	2.5(14)
	SINUS 0007	50			75Ω-550W	IP33	A	75	2.5(14)
	SINUS 0009	50	RE3083500	1	50Ω-1100W	IP55	A	50	2.5(14)
	SINUS 0011	50			50Ω-1100W	IP55	A	50	2.5(14)
	SINUS 0014	50			50Ω-1100W	IP55	A	50	2.5(14)
S12	SINUS 0016	40	RE3093500	1	50Ω-1500W	IP54	A	50	2.5(14)
	SINUS 0017	40			50Ω-1500W	IP54	A	50	2.5(14)
	SINUS 0020	40			50Ω-1500W	IP54	A	50	2.5(14)
	SINUS 0025	20	RE3103250	1	25Ω-1800W	IP54	A	25	4(12)
	SINUS 0030	20			25Ω-1800W	IP54	A	25	4(12)
	SINUS 0034	20	RE3483200	1	20Ω-4000W	IP20	A	20	4(12)
SINUS 0036	20	20Ω-4000W			IP20	A	20	4(12)	
S15	SINUS 0040	15	RE3483150	1	15Ω-4000W	IP20	A	15	6(10)
	SINUS 0049	10			15Ω-4000W	IP20	A	15	6(10)
S20	SINUS 0060	10	RE3763100	1	10Ω-8000W	IP20	A	10	10(8)
	SINUS 0067	10			10Ω-8000W	IP20	A	10	10(8)
	SINUS 0074	7.5			10Ω-8000W	IP20	A	10	10(8)
	SINUS 0086	7.5			10Ω-8000W	IP20	A	10	10(8)
S30	SINUS 0113	6	RE4022660	1	6.6Ω-12000W	IP20	A	6.6	10(8)
	SINUS 0129	6			6.6Ω-12000W	IP20	A	6.6	10(8)
	SINUS 0150	5	RE4162500	1	5Ω-16000W	IP20	A	5	16(6)
	SINUS 0162	5			5Ω-16000W	IP20	A	5	16(6)

Type of connection:  
A-One resistor

Applications with DUTY CYCLE 20% - Class 4T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section mm <sup>2</sup> (AWG)
S05	SINUS 0005	50	RE3083500	1	50Ω-1100W	IP55	A	50	2.5(14)
	SINUS 0007	50			50Ω-1100W	IP55	A	50	2.5(14)
	SINUS 0009	50			50Ω-1100W	IP55	A	50	2.5(14)
	SINUS 0011	50			50Ω-1500W	IP54	A	50	2.5(14)
	SINUS 0014	50			50Ω-1500W	IP54	A	50	2.5(14)
S12	SINUS 0016	40	RE3113500	1	50Ω-2200W	IP54	A	50	2.5(14)
	SINUS 0017	40			50Ω-2200W	IP54	A	50	2.5(14)
	SINUS 0020	40			50Ω-4000W	IP20	A	50	2.5(14)
	SINUS 0025	20	RE3483250	1	25Ω-4000W	IP20	A	25	6(10)
	SINUS 0030	20			25Ω-4000W	IP20	A	25	6(10)
	SINUS 0034	20	RE3483200	1	20Ω-4000W	IP20	A	20	6(10)
SINUS 0036	20	20Ω-4000W			IP20	A	20	6(10)	
S15	SINUS 0040	15	RE3783150	1	15Ω-8000W	IP23	A	15	10(8)
	SINUS 0049	10			10Ω-12000W	IP20	A	10	10(8)
S20	SINUS 0060	10	RE4053100	1	10Ω-12000W	IP20	A	10	16(6)
	SINUS 0067	10			10Ω-12000W	IP20	A	10	16(6)
	SINUS 0074	7.5	RE4163100	1	10Ω-16000W	IP23	A	10	16(6)
	SINUS 0086	7.5			10Ω-16000W	IP23	A	10	16(6)
S30	SINUS 0113	6	RE3762330	2	2*3.3Ω-8000W	IP20	C	6.6	16(6)
	SINUS 0129	6			2*3.3Ω-8000W	IP20	C	6.6	16(6)
	SINUS 0150	5	RE4023100	2	2*10Ω-12000W	IP20	B	5	16(6)
	SINUS 0162	5			2*10Ω-12000W	IP20	B	5	16(6)

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors  
C-Two series-connected resistors

## BRAKING RESISTORS FOR S05-S30 - 4T

Applications with DUTY CYCLE 50% - Class 4T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section mm <sup>2</sup> (AWG)
S05	SINUS 0005	50	RE3483500	1	50Ω-4000W	IP23	A	50	4(12)
	SINUS 0007	50			50Ω-4000W	IP23	A	50	4(12)
	SINUS 0009	50			50Ω-4000W	IP23	A	50	4(12)
	SINUS 0011	50			50Ω-4000W	IP23	A	50	4(12)
	SINUS 0014	50			50Ω-4000W	IP23	A	50	4(12)
S12	SINUS 0016	40	RE3783500	1	50Ω-8000W	IP23	A	50	4(12)
	SINUS 0017	40			50Ω-8000W	IP23	A	50	4(12)
	SINUS 0020	40			50Ω-8000W	IP23	A	50	4(12)
	SINUS 0025	20	RE4053200	1	20Ω-12000W	IP23	A	20	10(8)
	SINUS 0030	20			20Ω-12000W	IP23	A	20	10(8)
	SINUS 0034	20	RE4163200	1	20Ω-16000W	IP23	A	20	10(8)
SINUS 0036	20	20Ω-16000W			IP23	A	20	10(8)	
S15	SINUS 0040	15	RE4293150	1	15Ω-24000W	IP23	A	15	16(6)
	SINUS 0049	10			15Ω-24000W	IP23	A	15	16(6)
S20	SINUS 0060	10	RE4293100	1	10Ω-24000W	IP23	A	10	16(6)
	SINUS 0067	10			10Ω-24000W	IP23	A	10	16(6)
	SINUS 0074	7.5	RE4293150	2	2*15Ω-24000W	IP23	B	7.5	16(6)
	SINUS 0086	7.5			2*15Ω-24000W	IP23	B	7.5	16(6)
S30	SINUS 0113	6	RE4552600	1	6Ω-64000W	IP23	A	6	35(2)
	SINUS 0129	6			6Ω-64000W	IP23	A	6	35(2)
	SINUS 0150	5	RE4552500	1	5Ω-64000W	IP23	A	5	50(1/0)
	SINUS 0162	5			5Ω-64000W	IP23	A	5	50(1/0)

A-One resistor  
B-Two or multiple parallel-connected resistors

## BRAKING RESISTORS FOR S14-S32 - 5T

Applications with DUTY CYCLE 10% - Class 5T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section (mm <sup>2</sup> (AWG))
S14	SINUS 0003	120	RE3084250	1	250Ω-1100W	IP55	A	250	10(8)
	SINUS 0004	120	RE3084180	1	180Ω-1100W	IP55	A	180	10(8)
	SINUS 0006	60	RE3104120	1	120Ω-1800W	IP55	A	120	10(8)
	SINUS 0012	60	RE3114100	1	100Ω-2200W	IP55	A	100	10(8)
	SINUS 0018	60	RE3483820	1	82Ω-4000W	IP20	A	82	10(8)
	SINUS 0019	40	RE3483600	1	60Ω-4000W	IP20	A	60	10(8)
	SINUS 0021	40	RE3483450	1	45Ω-4000W	IP23	A	45	10(8)
	SINUS 0022	25			45Ω-4000W	IP23	A	45	10(8)
	SINUS 0024	25	RE3483300	1	30Ω-4000W	IP23	A	30	10(8)
	SINUS 0032	20			22Ω-8000W	IP23	A	22	10(8)
S22	SINUS 0042	12	RE3783220	1	22Ω-8000W	IP23	A	22	10(8)
	SINUS 0051	12			18Ω-8000W	IP23	A	18	10(8)
	SINUS 0062	12	RE4053150	1	15Ω-12000W	IP23	A	15	10(8)
	SINUS 0069	12	RE4053120	1	12Ω-12000W	IP23	A	12	10(8)
S32	SINUS 0076	8	RE4053100	1	10Ω-12000W	IP23	A	10	16(6)
	SINUS 0088	8	RE4162820	1	8.2Ω-16000W	IP23	A	8.2	16(6)
	SINUS 0131	5	RE4292660	1	6.6Ω-24000W	IP23	A	6.6	16(6)
	SINUS 0164	5	RE4292500	1	5Ω-24000W	IP23	A	5	16(6)

Type of connection:  
A-One resistor

Applications with DUTY CYCLE 20% - Class 5T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section (mm <sup>2</sup> (AWG))
S14	SINUS 0003	120	RE3094250	1	250Ω-1500W	IP55	A	250	10(8)
	SINUS 0004	120	RE3094180	1	180Ω-1500W	IP55	A	180	10(8)
	SINUS 0006	60	RE3484120	1	120Ω-4000W	IP20	A	120	10(8)
	SINUS 0012	60	RE3484100	1	100Ω-4000W	IP20	A	100	10(8)
	SINUS 0018	60	RE3483820	1	82Ω-4000W	IP23	A	82	10(8)
	SINUS 0019	40	RE3483600	1	60Ω-4000W	IP23	A	60	10(8)
	SINUS 0021	40	RE3783450	1	45Ω-8000W	IP20	A	45	10(8)
	SINUS 0022	25			45Ω-8000W	IP23	A	45	10(8)
	SINUS 0024	25	RE3783300	1	30Ω-8000W	IP23	A	30	10(8)
	SINUS 0032	20	RE4053220	1	22Ω-12000W	IP23	A	22	10(8)
S22	SINUS 0042	12			22Ω-12000W	IP23	A	22	10(8)
	SINUS 0051	12	RE4053180	1	18Ω-12000W	IP23	A	18	10(8)
	SINUS 0062	12	RE4163150	1	15Ω-16000W	IP23	A	15	10(8)
S32	SINUS 0069	12	RE4163120	1	12Ω-16000W	IP23	A	12	10(8)
	SINUS 0076	8	RE4293100	1	10Ω-24000W	IP23	A	10	16(6)
	SINUS 0088	8	RE4292820	1	8.2Ω-24000W	IP23	A	8.2	16(6)
	SINUS 0131	5	RE4362660	1	6.6Ω-32000W	IP23	A	6.6	25(3)
SINUS 0164	5	RE4452500	1	5Ω-48000W	IP23	A	5	25(3)	

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors

## BRAKING RESISTORS FOR S14-S32 - 5T

Applications with DUTY CYCLE 50% - Class 5T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value (Ω)	Wire cross section (mm <sup>2</sup> (AWG))
S14	SINUS 0003	120	RE3114250	1	250Ω-2200W	IP55	A	250	16(6)
	SINUS 0004	120	RE3484180	1	180Ω-4000W	IP20	A	180	16(6)
	SINUS 0006	60	RE3484120	1	120Ω-4000W	IP23	A	120	16(6)
	SINUS 0012	60	RE3484100	1	100Ω-4000W	IP23	A	100	16(6)
	SINUS 0018	60	RE3783820	1	82Ω-8000W	IP20	A	82	16(6)
	SINUS 0019	40	RE3783600	1	60Ω-8000W	IP23	A	60	16(6)
	SINUS 0021	40	RE4053450	1	45Ω-12000W	IP20	A	45	16(6)
	SINUS 0022	25			45Ω-12000W	IP23	A	45	16(6)
	SINUS 0024	25	RE4163300	1	30Ω-16000W	IP23	A	30	16(6)
	SINUS 0032	20	RE4163220	1	22Ω-16000W	IP23	A	22	16(6)
S22	SINUS 0042	12	RE4293220	1	22Ω-24000W	IP23	A	22	16(6)
	SINUS 0051	12	RE4293180	1	18Ω-24000W	IP23	A	18	16(6)
	SINUS 0062	12	RE4363150	1	15Ω-32000W	IP23	A	15	16(6)
	SINUS 0069	12	RE4453120	1	12Ω-48000W	IP23	A	12	16(6)
S32	SINUS 0076	8	RE4453100	1	10Ω-48000W	IP23	A	10	25(3)
	SINUS 0088	8	RE4552820	1	8.2Ω-64000W	IP23	A	8.2	25(3)
	SINUS 0131	5	RE4552660	1	6.6Ω-64000W	IP23	A	6.6	50(1/0)
	SINUS 0164	5	RE4453100	2	2x10Ω-48000W	IP23	B	5	50(1/0)

Type of connection:  
A-One resistor  
B-Two or multiple parallel-connected resistors

## BRAKING RESISTORS FOR S14-S32 - 6T

Applications with DUTY CYCLE 10% - Class 6T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section
								(Ω)	mm <sup>2</sup> (AWG)
S14	SINUS 0003	150	RE3094250	1	250Ω-1500W	IP55	A	250	10(8)
	SINUS 0004	150	RE3114180	1	180Ω-2200W	IP55	A	180	10(8)
	SINUS 0006	80	RE3114150	1	150Ω-2200W	IP55	A	150	10(8)
	SINUS 0012	80	RE3484120	1	120Ω-4000W	IP20	A	120	10(8)
	SINUS 0018	80	RE3483820	1	82Ω-4000W	IP20	A	82	10(8)
	SINUS 0019	50	RE3483600	1	60Ω-4000W	IP23	A	60	10(8)
	SINUS 0021	50			60Ω-4000W	IP23	A	60	10(8)
	SINUS 0022	30	RE3483450	1	45Ω-4000W	IP23	A	45	10(8)
	SINUS 0024	30	RE3783300	1	30Ω-8000W	IP23	A	30	10(8)
	SINUS 0032	25			30Ω-8000W	IP23	A	30	10(8)
S22	SINUS 0042	15	RE3783220	1	22Ω-8000W	IP23	A	22	10(8)
	SINUS 0051	15	RE4053180	1	18Ω-12000W	IP23	A	18	10(8)
	SINUS 0062	15	RE4053150	1	15Ω-12000W	IP23	A	15	10(8)
	SINUS 0069	15			15Ω-12000W	IP23	A	15	10(8)
S32	SINUS 0076	10	RE4163100	1	10Ω-16000W	IP23	A	10	16(6)
	SINUS 0088	10	RE4293100	1	10Ω-24000W	IP23	A	10	16(6)
	SINUS 0131	6	RE4292660	1	6.6Ω-24000W	IP23	A	6.6	16(6)
	SINUS 0164	6	RE4362600	1	6Ω-32000W	IP23	A	6	16(6)

Type of connection:  
A-One resistor

Applications with DUTY CYCLE 20% - Class 6T

Inverter			Braking resistors						
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section
								(Ω)	mm <sup>2</sup> (AWG)
S14	SINUS 0003	150	RE3114250	1	250Ω-2200W	IP55	A	250	10(8)
	SINUS 0004	150	RE3484180	1	180Ω-4000W	IP20	A	180	10(8)
	SINUS 0006	80	RE3484150	1	150Ω-4000W	IP20	A	150	10(8)
	SINUS 0012	80	RE3484120	1	120Ω-4000W	IP23	A	120	10(8)
	SINUS 0018	80	RE3483820	1	82Ω-4000W	IP23	A	82	10(8)
	SINUS 0019	50	RE3483600	1	60Ω-4000W	IP23	A	60	10(8)
	SINUS 0021	50	RE3783600	1	60Ω-8000W	IP23	A	60	10(8)
	SINUS 0022	30	RE3783450	1	45Ω-8000W	IP23	A	45	10(8)
	SINUS 0024	30	RE3783300	1	30Ω-8000W	IP23	A	30	10(8)
	SINUS 0032	25	RE4053300	1	30Ω-12000W	IP23	A	30	10(8)
S22	SINUS 0042	15	RE4053220	1	22Ω-12000W	IP23	A	22	10(8)
	SINUS 0051	15	RE4163180	1	18Ω-16000W	IP23	A	18	10(8)
	SINUS 0062	15	RE4163150	1	15Ω-16000W	IP23	A	15	10(8)
SINUS 0069	15	15Ω-16000W			IP23	A	15	10(8)	
S32	SINUS 0076	10	RE4293100	1	10Ω-24000W	IP23	A	10	16(6)
	SINUS 0088	10	RE4363100	1	10Ω-32000W	IP23	A	10	16(6)
	SINUS 0131	6	RE4452660	1	6.6Ω-48000W	IP23	A	6.6	25(3)
	SINUS 0164	6	RE4452600	1	6Ω-48000W	IP23	A	6	25(3)

Type of connection:  
A-One resistor

## BRAKING RESISTORS FOR S14-S32 - 6T

Applications with DUTY CYCLE 50% - Class 6T

Inverter			Braking resistors							
Size	Sinus Penta model	Min. Applicable resistor (Ω)	Part number	Number of resistors	Type	Degree of protection	Type of connection	Value	Wire cross section	
								(Ω)	mm <sup>2</sup> (AWG)	
S14	SINUS 0003	150	RE3484250	1	250Ω-4000W	IP20	A	250	16(6)	
	SINUS 0004	150	RE3484180	1	180Ω-4000W	IP23	A	180	16(6)	
	SINUS 0006	80	RE3484150	1	150Ω-4000W	IP23	A	150	16(6)	
	SINUS 0012	80	RE3784120	1	120Ω-8000W	IP20	A	120	16(6)	
	SINUS 0018	80	RE3783820	1	82Ω-8000W	IP23	A	82	16(6)	
	SINUS 0019	50	RE3783600	1	60Ω-8000W	IP23	A	60	16(6)	
	SINUS 0021	50	RE4053600	1	60Ω-12000W	IP23	A	60	16(6)	
	SINUS 0022	30	RE4163450	1	45Ω-16000W	IP23	A	45	16(6)	
	SINUS 0024	30	RE4163430	1	30Ω-16000W	IP23	A	30	16(6)	
	SINUS 0032	25	RE4293300	1	30Ω-24000W	IP23	A	30	16(6)	
	S22	SINUS 0042	15	RE4293220	1	22Ω-24000W	IP23	A	22	16(6)
		SINUS 0051	15	RE4362660	1	18Ω-32000W	IP23	A	18	16(6)
SINUS 0062		15	RE4453150	1	15Ω-48000W	IP23	A	15	16(6)	
SINUS 0069		15			15Ω-48000W	IP23	A	15	16(6)	
S32	SINUS 0076	10	RE4553100	1	10Ω-64000W	IP23	A	10	25(3)	
	SINUS 0088	10			10Ω-64000W	IP23	A	10	25(3)	
	SINUS 0131	6	RE4452300	2	2x3Ω-48000W	IP23	C	6	50(1/0)	
	SINUS 0164	6			2x3Ω-48000W	IP23	C	6	50(1/0)	

Type of connection:  
A-One resistor  
C-Two series-connected resistors

## BRAKING UNIT AND RESISTORS FOR BU200

## BRAKING UNIT AND RESISTORS FOR BU200

### BU200 Ratings

Size	Max. Braking Current (A)	Average Braking Current (A)	Inverter Supply Voltage		
			200-240Vac (class 2T)	380-480Vac (class 4T)	481-500Vac (class 4T)
			Min. Braking Resistor ( $\Omega$ )		
BU200	130	80	3	6	6

### Braking resistors for BU200 - 2T

#### Applications with DUTY CYCLE 10% - Class 2T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	2	2	3.3	8	IP20	M	3.3/2	10(8)
	SINUS 0202	2	2	3.3	8	IP20	M	3.3/2	10(8)
	SINUS 0217	3	3	3.3	8	IP20	N	3.3/3	10(8)
	SINUS 0260	3	3	3.3	8	IP20	N	3.3/3	10(8)
S51	SINUS 0313	4	4	3.3	8	IP20	O	3.3/4	10(8)
	SINUS 0367	5	5	3.3	8	IP20	P	3.3/5	10(8)
	SINUS 0402	5	5	3.3	8	IP20	P	3.3/5	10(8)
S60	SINUS 0457	6	6	3.3	8	IP20	Q	3.3/6	10(8)
	SINUS 0524	6	6	3.3	8	IP20	Q	3.3/6	W(8)

#### Applications with DUTY CYCLE 20% - Class 2T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	2	2	3.3	8	IP20	M	3.3/2	16(6)
	SINUS 0202	2	2	3.3	8	IP20	M	3.3/2	16(6)
	SINUS 0217	3	3	3.3	12	IP20	N	3.3/3	16(6)
	SINUS 0260	3	3	3.3	12	IP20	N	3.3/3	16(6)
S51	SINUS 0313	4	4	3.3	12	IP20	O	3.3/4	16(6)
	SINUS 0367	5	5	3.3	12	IP20	P	3.3/5	16(6)
	SINUS 0402	5	5	3.3	12	IP20	P	3.3/5	16(6)
S60	SINUS 0457	6	6	3.3	12	IP20	Q	3.3/6	16(6)
	SINUS 0524	6	6	3.3	12	IP20	Q	3.3/6	16(6)

#### Applications with DUTY CYCLE 50% - Class 2T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	2	4	6.6	12	IP20	V	3.3/2	16(6)
	SINUS 0202	2	4	6.6	12	IP20	V	3.3/2	16(6)
	SINUS 0217	3	6	6.6	12	IP20	N	3.3/3	16(6)
	SINUS 0260	3	6	6.6	12	IP20	N	3.3/3	16(6)
S51	SINUS 0313	4	8	6.6	12	IP20	Y	3.3/4	16(6)
	SINUS 0367	5	10	6.6	12	IP20	Y	3.3/5	16(6)
	SINUS 0402	5	10	6.6	12	IP20	W	3.3/5	16(6)
S60	SINUS 0457	6	12	6.6	12	IP20	Z	3.3/6	16(6)
	SINUS 0524	6	12	6.6	12	IP20	Z	3.3/6	16(6)

### Braking resistors for BU200 - 4T

#### Applications with DUTY CYCLE 10% - Class 4T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	2	2	6.6	12	IP20	M	6.6/2	16(6)
	SINUS 0202	2	2	6.6	12	IP20	M	6.6/2	16(6)
	SINUS 0217	3	3	6.6	12	IP20	N	6.6/3	16(6)
	SINUS 0260	3	3	6.6	12	IP20	N	6.6/3	16(6)
S51	SINUS 0313	3	3	6.6	12	IP20	N	6.6/3	16(6)
	SINUS 0367	4	4	6.6	12	IP20	O	6.6/4	16(6)
	SINUS 0402	4	4	6.6	12	IP20	O	6.6/4	16(6)
S60	SINUS 0457	4	4	6.6	12	IP20	O	6.6/4	16(6)
	SINUS 0524	5	5	6.6	12	IP20	P	6.6/5	16(6)
S60P	SINUS 0598P	6	6	6.6	12	IP20	Q	6.6/6	16(6)

#### Applications with DUTY CYCLE 20% - Class 4T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	2	2	6.6	24	IP23	M	6.6/2	16(6)
	SINUS 0202	2	2	6.6	24	IP23	M	6.6/2	16(6)
	SINUS 0217	3	3	6.6	24	IP23	N	6.6/3	16(6)
	SINUS 0260	3	3	6.6	24	IP23	N	6.6/3	16(6)
S51	SINUS 0313	3	3	6.6	24	IP23	N	6.6/3	16(6)
	SINUS 0367	4	4	6.6	24	IP23	O	6.6/4	16(6)
	SINUS 0402	4	4	6.6	24	IP23	O	6.6/4	16(6)
S60	SINUS 0457	4	4	6.6	24	IP23	O	6.6/4	16(6)
	SINUS 0524	5	5	6.6	24	IP23	P	6.6/5	16(6)
S60P	SINUS 0598P	6	6	6.6	24	IP23	Q	6.6/6	16(6)

#### Applications with DUTY CYCLE 50% - Class 4T

Size	Sinus Penta Model	Braking Unit		Braking Resistors					
				Resistors to be used			Type of connection	Value ( $\Omega$ )	Wire Cross-section mm <sup>2</sup> (AWG or kcmils)
		Q.ty	Q.ty	Recommended Value ( $\Omega$ )	Power (kW)	Degree of Protection			
S41	SINUS 0180	3	3	10	24	IP23	N	10/3	16(6)
	SINUS 0202	3	3	10	24	IP23	N	10/3	16(6)
	SINUS 0217	4	4	10	24	IP23	O	10/4	16(6)
	SINUS 0260	5	4	10	24	IP23	O	10/4	16(6)
S51	SINUS 0313	5	5	10	24	IP23	P	10/5	16(6)
	SINUS 0367	6	6	10	24	IP23	Q	10/6	16(6)
	SINUS 0402	7	7	10	24	IP23	R	10/7	16(6)
S60	SINUS 0457	7	7	10	24	IP23	R	10/7	16(6)
	SINUS 0524	8	8	10	24	IP23	S	10/8	16(6)
S60P	SINUS 0598P	8	8	10	24	IP23	S	10/8	16(6)