

Excellent Technology, Efficiency and Quality

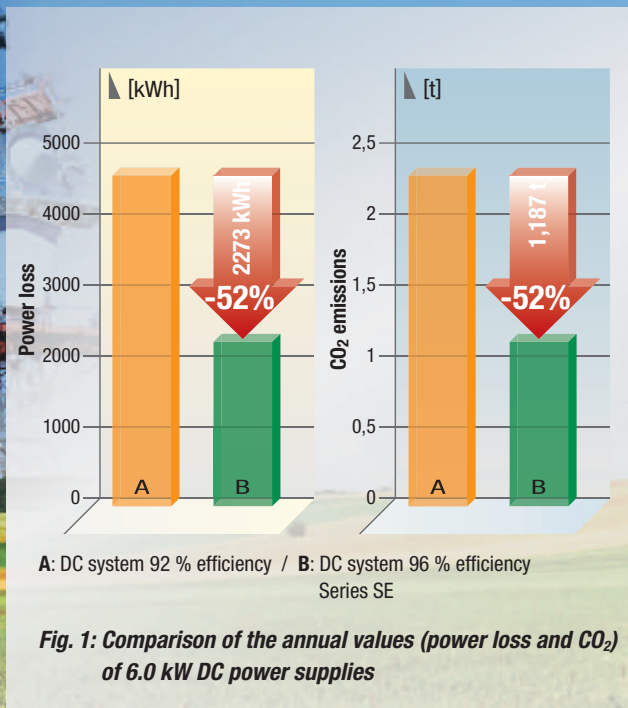


Telecom power supplies Rectifier series SE

- Highly efficient
- Reliable
- Flexible

Telecom power supplies

Rectifier series SE



Flexible, efficient and reliable

Established more than 70 years ago, today BENNING is a leading supplier of power supplies in support of the information, telecommunications and industrial technology sectors.

As the world has become more aware of how finite our energy resources are BENNING has invested significantly in the development of ever more efficient power supply systems.

Increased efficiency when converting AC to DC using rectifiers, DC to AC using inverters or AC to AC in UPS systems has the potential to create significant energy savings.

Advanced manufacturing techniques, improved circuit design and the use of state of the art semiconductor components all lead to greater equipment efficiencies.

As an example BENNING has achieved a 52% reduction in power losses when converting AC to DC using our new high-efficiency rectifier series SLIMLINE SE and TEBECHOP 13500SE.

Additionally the weight and volume of the rectifiers and distribution units was also reduced during development leading to further practical benefits and reduced resource use.

The highly efficient and innovative SE series contributes to a reduction in electrical energy consumption lessening your environmental impact. Using less energy means there is less heat to dissipate which in turn results in a reduced need for cooling providing another consequential saving.

As an example, using the new SE series rectifier reduces the environmental impact of a DC supply rated at 6kW by 2373kWh and 1.19t of CO₂ on an annual basis.

Telecom Power Supplies Rectifier Series SE

Special features

- **Extremely high power density reduces 'footprint' on site**
- **High efficiency >96% under partial load**
- **DC output with consistent power and temperature characteristics**
- **Reliable hot plug technology**
- **Automatic synchronization of the DC rectifier modules when replacing and upgrading**
- **Commissioning, expansion and replacement is a simple process**
- **Operating temperature range -33°C to +75°C (for outdoor use)**
- **Remote monitoring via TCP/IP or modem**



Fig. 2:
Power supply system
DC output:
48 V / 28 kW (n+1)

SLIMLINE modular DC power supply systems

SLIMLINE SE power supply systems are built from individual modules with capacities of 800W (SLIMLINE 800 SE) and 2000W (SLIMLINE 2000 SE). The SLIMLINE SE rectifier modules are installed in 19" 1U carriers. Each carrier can accommodate up to five 48V- 800 SE modules or three 48V-2000 SE modules.

Systems with different battery capacities and load configurations can be created. Distribution modules are designed to fit 19" racks and are 1U or 3U high depending upon the number of output feeds required. The rectifier carrier, rectifier modules, battery protection devices and output distribution equipment forms a complete modular SLIMLINE SE power supply system (SLIMLINE Modular System = SMS).

BENNING's smallest capacity power supply system (SMS 2400 SE) accommodates up to three rectifier modules (48V-800 SE) in a 1U 19" carrier together with a battery protection and load distribution unit (4000 SE) in a second 1U 19" enclosure.

The SMS 4000 SE increases the maximum power to 4000W. This system consists of a 1U carrier with up to five rectifier modules (48V-800 SE) plus the battery protection and load distribution unit 4000 SE .

Larger capacities up to 6000W (SMS 6000 SE) are possible using the 48V-2000 SE modules. A 1U 19" carrier can accommodate up to three of these rectifiers and can be combined with the battery protection and load distribution unit 6000 SE (fig. 4).

A capacity of up to 18000W (SMS 18000 SE) can be achieved by connecting in parallel three 6000 SE rectifier carriers. These can then be combined with the 3U 19" battery protection and load distribution unit 18000 SE. Even greater capacities can be realized by the parallel connection of further carriers (fig.2).

A SLIMLINE control board is provided for rectifier control and monitoring purposes. A SLIMLINE MCU is available as an option for additional monitoring functionality. In the case of the SMS 2400 SE the SLIMLINE MCU is mounted in the rectifier carrier. In power supplies with greater capacity the SLIMLINE MCU is mounted in the battery protection and load distribution enclosure.

For more comprehensive control and monitoring functions, the remote mounted monitoring system MCU 2500 is available. A description of this device can be found on page 7 (fig.9).

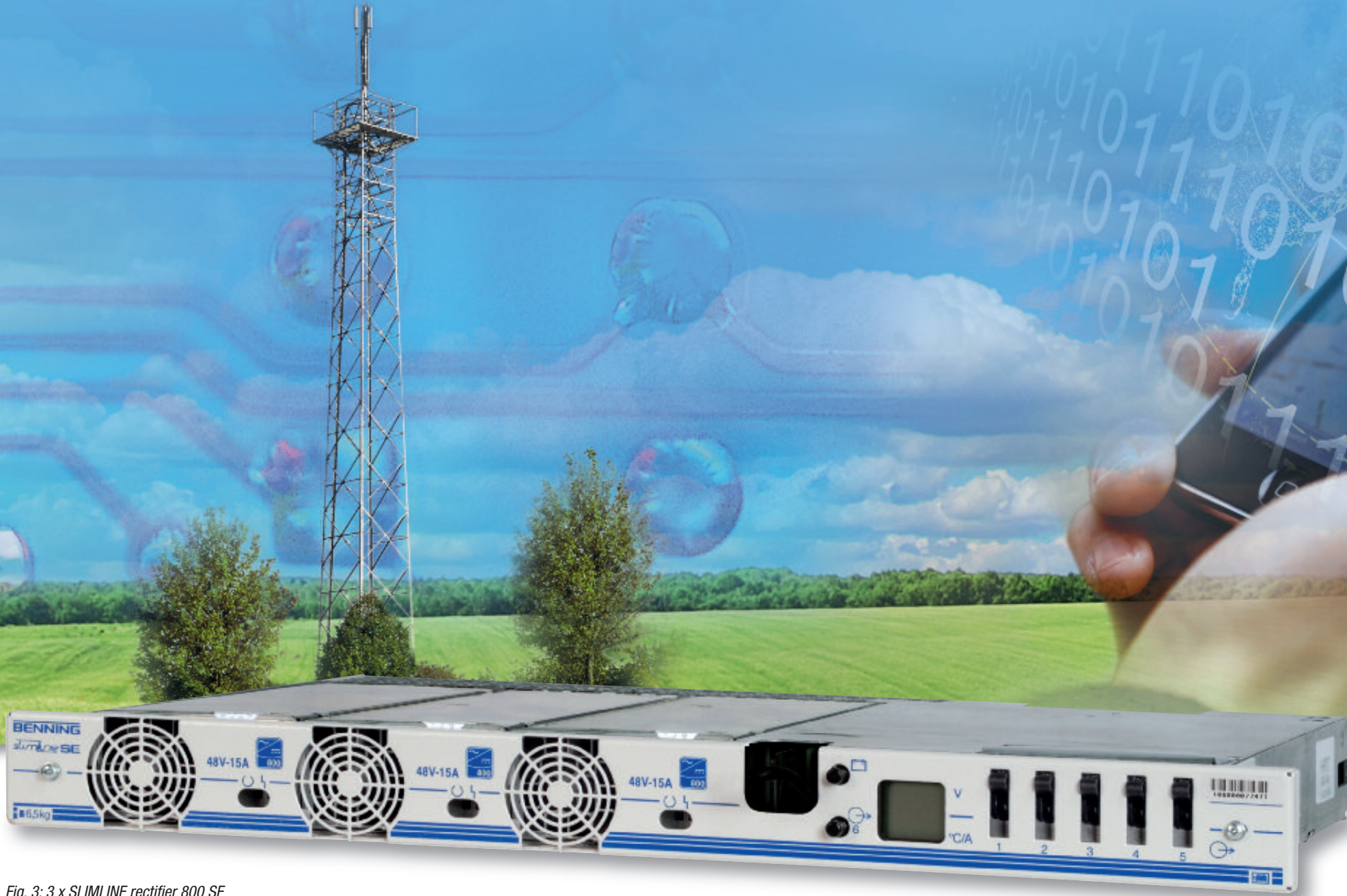


Fig. 3: 3 x SLIMLINE rectifier 800 SE
with distribution 2400 SE
DC output 48 V / 2400 W



Fig. 4: 3 x SLIMLINE rectifier 2000 SE
with distribution 6000 SE
DC output 48 V / 6000 W



Fig. 5: 9 x SLIMLINE rectifier 2000 SE
with distribution 18000 SE
DC output 48 V / 18000 W

	SMS 2400 SE	SMS 4000 SE	SMS 6000 SE	SMS 18000 SE	SMS 18000 SE
Battery connections	1	1	1	1	2
LVD	●	●	●	●	●
N-PLD	○	○	○	○	○
LC display (display of U, I, T)	●	●	●	●	●
Battery fuse monitored (1 battery)	1 x LSS 60 A	1 x LSS 150 A	1 x LSS 150 A	1 x LSS 350 A	–
Battery fuse monitored (2 batteries)	–	–	–	–	2 x LSS 350 A
Load fuse monitored (diodes)	5 x LSS 6 A – 15 A	6 x LSS 2 A – 60 A	6 x LSS 2 A – 60 A	15 x LSS 2 A – 125 A	15 x LSS 2 A – 125 A
Load fuse* monitored (auxiliary switch)	–	–	–	9 x LSS 6 A – 50 A	9 x LSS 6 A – 50 A
Battery current measurement	●	●	●	●	●
Connection for external distribution	1 x 60 A	1 x 150 A	1 x 150 A	–	–
SLIMLINE MCU	○	○	○	○	○

(● = is included / ○ = optionally available / – = not included), * alternatively

LVD ≙ battery deep discharge protection

N-PLD ≙ Non-essential load disconnect

Important components of the SLIMLINE SE battery and load distributions



Fig. 6: Power supply system
DC output: 48 V / 121.5 kW (n+1)

TEBECHOP 13500 SE Modular power supply systems

The new 48V rectifier TEBECHOP 13500 SE is ideally suited to power supply systems with a load requirement greater than 50kW.

The 3U high 19" mounting unit has a three-phase mains connection, active power factor correction (power factor 0.99) and supplies a constant output power of 13500W. The output current is 250A at 2.25V /c (float voltage) (fig. 7).

The TEBECHOP 13500 SE is very energy efficient particularly within the 25% to 90% load range (fig.8). For larger capacity systems proportionately more energy can be saved when using this rectifier series. Higher energy efficiency results in reduced heat output. In most cases this leads to a reduced demand for cooling or ventilation, saving even more energy.

The compact installation height (3U) of the TEBECHOP 13500 SE together with the low power loss and improved efficiency allows up to 10 rectifier modules to be installed in a single cabinet 2000mm high x 600mm wide x 600mm deep.

To complete the system, battery protection and load distribution cabinets are available. These cabinets can also accommodate assemblies such as the MCU 2500 (fig.6).

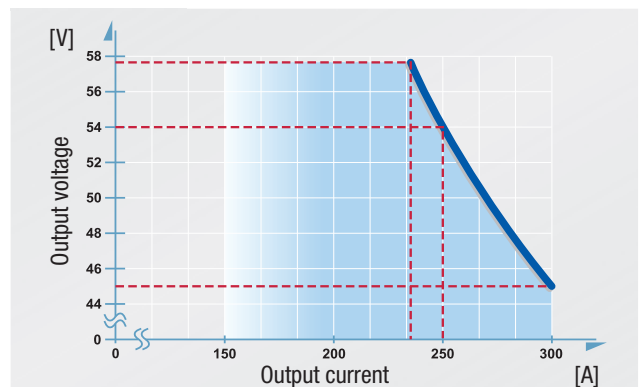


Fig. 7: Output currents vs. output voltages,
rectifier shelf TEBECHOP 13500 SE

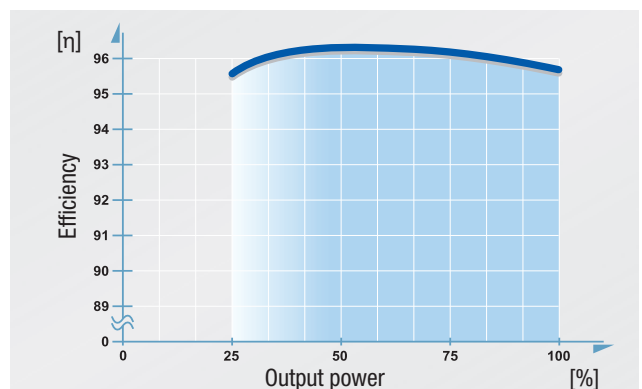


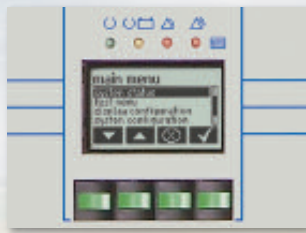
Fig. 8: Efficiency vs. output power,
rectifier shelf TEBECHOP 13500 SE

Telecom power supplies

Rectifier series SE

MCU 2500

The MCU 2500 is a door mounted, microprocessor controlled, monitoring and control device. The embedded software makes comprehensive monitoring and control of the power supply system possible both locally and remotely.



Connection to the MCU 2500 can be made via a PC, modem or TCP/IP adapter. The MCU 2500 encourages more efficient use of maintenance and service personnel.



Fig. 9: MCU 2500 remote monitoring system

Technical data

Rectifier		SLIMLINE SE		TEBECHOP SE
Output power	[W]	800	2000	13500
Max. number per 19" carrier		5	3	1
Input voltage range	[V]	200 - 264	85* - 264	3 x 340 - 440 (o. N)
Input current	[A]	3.7	9.3	21
Frequency	[Hz]		47 - 63	
Power factor			0.95	0.99
Output current				
48 V	[A]	15	40	250
60 V	[A]	-	30	-
Output voltage				
programmable				
Boost charge	[V/C]		2.4	2.4
Float charge	[V/C]		2.25	2.25
Direct feed	[V/C]		2.0	2.0
Battery test	[V/C]		1.95	1.95
Voltage stability (U _A)				
static			+/- 1	
dynamic load (10/100/10) (di/dt > 200 μs)	[%]		+/- 5	+/- 4
Settling time	[ms]		< 5	< 1
Efficiency			96	96
IPU power constant				
Interference voltage	[mV]		< 2	
Electromagnetic compatibility			EN 61000-6-2 / EN 61000-6-4	
Safety			EN 60950 / IEC 950 / UL 1950	
Protection degree			IP 20	
Cooling			temperature controlled fan	
Temperature range	[°C]		-33 to +75**	
Installation height	[m]		up to 2000 m above NN	
Humidity class			F DIN 40040	
Weight (without tool carrier)	[kg]	1.0	1.9	22

* with derating max 790 W

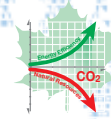
** > 55°C derating with 2.5 % / K

ISO
9001

ISO
14001

ISO
50001

SCCP



BENNING worldwide

Austria

Benning GmbH
Elektrotechnik und Elektronik
Eduard-Klinger-Str. 9
3423 ST. ANDRÄ-WÖRDERN
Tel.: +43 (0) 22 42 / 3 24 16-0
Fax: +43 (0) 22 42 / 3 24 23
E-mail: info@benning.at

Belarus

000 «BENNING Elektrotechnik
und Elektronik»
Masherova Ave., 6A, 1003
224030, BREST
Tel.: +375 162 / 51 25 12
Fax: +375 162 / 51 24 44
E-mail: info@benning.by

Belgium

Benning Belgium
branch of Benning Vertriebsges. mbH
Assesteenweg 65
1740 TERNAT
Tel.: +32 (0) 2 / 5 82 87 85
Fax: +32 (0) 2 / 5 82 87 69
E-mail: info@benning.be

Croatia

Benning Zagreb d.o.o.
Trnjanska 61
10000 ZAGREB
Tel.: +385 (0) 1 / 6 31 22 80
Fax: +385 (0) 1 / 6 31 22 89
E-mail: info@benning.hr

Czech Republic

Benning CR, s.r.o.
Zahradní ul. 894
293 06 KOSMONOSY
Tel.: +420 / 3 26 72 10 03
Fax: +420 / 3 26 74 12 99
E-mail: odbyt@benning.cz

France

Benning
conversion d'énergie
43, avenue Winston Churchill
B.P. 418
27404 LOUVIERS CEDEX
Tel.: +33 (0) / 2 32 25 23 94
Fax: +33 (0) / 2 32 25 13 95
E-mail: info@benning.fr

Germany

Benning Elektrotechnik und Elektronik
GmbH & Co. KG
Factory I: Münsterstr. 135-137
Factory II: Robert-Bosch-Str. 20
46397 BOCHOLT
Tel.: +49 (0) 28 71 / 93-0
Fax: +49 (0) 28 71 / 9 32 97
E-mail: info@benning.de

Great-Britain

Benning Power Electronics (UK) Ltd.
Oakley House, Hogwood Lane
Finchampstead
BERKSHIRE
RG 40 4QW
Tel.: +44 (0) 1 18 / 9 73 15 06
Fax: +44 (0) 1 18 / 9 73 15 08
E-mail: info@benninguk.com

Greece

Benning Hellas
Chanion 1, Lykovrisi 141 23
ATHENS
Tel.: +30 (0) 2 10 / 5 74 11 37
Fax: +30 (0) 2 10 / 5 78 25 54
E-mail: info@benning.gr

Hungary

Benning Kft.
Power Electronics
Rákóczi út 145
2541 LÁBATLAN
Tel.: +36 (0) 33 / 50 76 00
Fax: +36 (0) 33 / 50 76 01
E-mail: benning@benning.hu

Italy

Benning Conversione di Energia S.r.l.
Via Cimarosa, 81
40033 CASALECCHIO DI RENO (BO)
Tel.: +39 0 51 / 75 88 00
Fax: +39 0 51 / 6 16 76 55
E-mail: info@benningitalia.com

Netherlands

Benning NL
branch of Benning Vertriebsges. mbH
Peppelkade 42
3992 AK HOUTEN
Tel.: +31 (0) 30 / 6 34 60 10
Fax: +31 (0) 30 / 6 34 60 20
E-mail: info@benning.nl

Poland

Benning Power Electronics Sp. z o.o.
Korczyńska 30
05-503 GŁOSKÓW
Tel.: +48 (0) 22 / 7 57 84 53
Fax: +48 (0) 22 / 7 57 84 52
E-mail: biuro@benning.biz

P. R. China

Benning Power Electronics (Beijing) Co., Ltd.
No. 6 Guangyuan Dongjie
Tongzhou Industrial Development Zone
101113 BEIJING
Tel.: +86 (0) 10 / 61 56 85 88
Fax: +86 (0) 10 / 61 50 62 00
E-mail: info@benning.cn

Russian Federation

000 Benning Power Electronics
Domodedovo town,
microdistrict Severny,
"Benning" estate, bldg. 1
142000 MOSCOW REGION
Tel.: +7 4 95 / 9 67 68 50
Fax: +7 4 95 / 9 67 68 51
E-mail: benning@benning.ru

Slovakia

Benning Slovensko, s.r.o.
Senkvičká 3610/14W
902 01 PEZINOK
Tel.: +421 (0) 2 / 44 45 99 42
Fax: +421 (0) 2 / 44 45 50 05
E-mail: benning@benning.sk

South East Asia

Benning Power Electronics Pte Ltd
85, Defu Lane 10
#05-00
SINGAPORE 539218
Tel.: +65 / 68 44 31 33
Fax: +65 / 68 44 32 79
E-mail: sales@benning.com.sg

Spain

Benning Conversión de Energía S.A.
C/Pico de Santa Catalina 2
Pol. Ind. Los Linares
28970 HUMANES, MADRID
Tel.: +34 91 / 6 04 81 10
Fax: +34 91 / 6 04 84 02
E-mail: benning@benning.es

Sweden

Benning Sweden AB
Box 990, Hovslagarev. 3B
19129 SOLLENTUNA
Tel.: +46 (0) 8 / 6 23 95 00
Fax: +46 (0) 8 / 96 97 72
E-mail: power@benning.se

Switzerland

Benning Power Electronics GmbH
Industriestrasse 6
8305 DIETLIKON
Tel.: +41 (0) 44 / 8 05 75 75
Fax: +41 (0) 44 / 8 05 75 80
E-mail: info@benning.ch

Turkey

Benning GmbH Turkey Liaison Office
19 Mayıs Mah. Kırkkçi Sokak No:16/A
34736 KOZYATAGI
KADIKÖY / ISTANBUL
Tel.: +90 (0) 2 16 / 4 45 71 46
Fax: +90 (0) 2 16 / 4 45 71 47
E-mail: info@benning.com.tr

UAE

Benning Power Systems
Middle East / Office: 918,
9th Floor, AYA Business Center
ADNIC Building, Khalifa Street
ABU DHABI
Tel.: +971 (0) 2 / 4 18 91 50
E-mail: benningme@benning.fr

Ukraine

Benning Power Electronics
3 Sim'yi Sosnynykh str.
03148 KYIV
Tel.: 0038 044 501 40 45
Fax: 0038 044 273 57 49
E-mail: info@benning.ua

U.S.A.

Benning Power Electronics, Inc.
1220 Presidential Drive
RICHARDSON, TEXAS 75081
Tel.: +1 2 14 / 5 53 14 44
Fax: +1 2 14 / 5 53 15 55
E-mail: sales@benning.us