BENNING

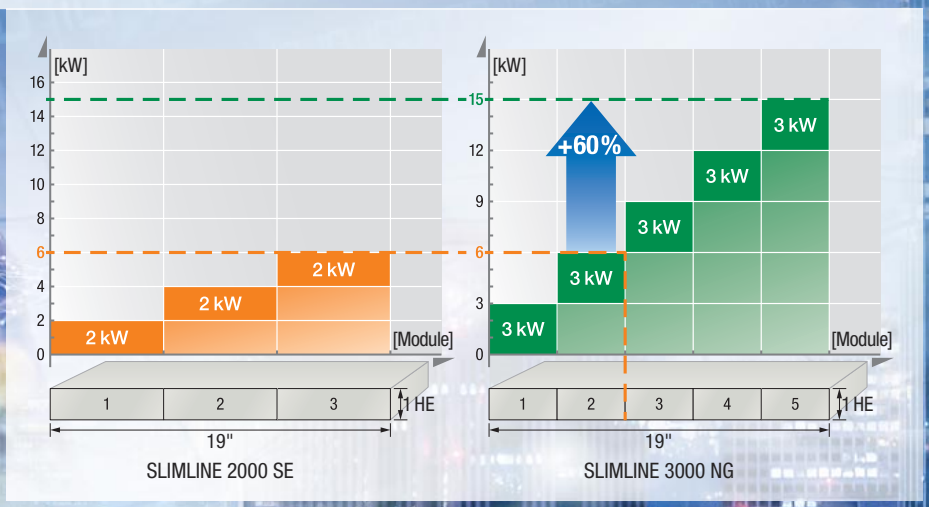
World Class Power Solutions

Excellent Technology, Efficiency and Quality

SLIMLINE 3000 NG

- smart, flexible and modular
- highly efficient and reliable
- cost-effective

SLIMLINE – cost-effective operation and maximum availability



- **maximum availability**
- **minimised operating costs (system, maintenance and environment)**
- **flexible component concept**

Fig. 1: In this series, the power density is 60% improved on the previous model

- **maximum availability**
  - **very high reliability**
  - **low mean time to repair (MTTR)**
  - **reliable hot swap modularity**
  - **decentralised parallel architecture**
  - **remote monitoring via TCP/IP**
- **low operating costs**
  - **high efficiency up to 98% even at partial load**
  - **extremely high power density and, thus, low space requirements at the installation site**
  - **sustainable investment reliability through pay-as-you-grow**
  - **automatic synchronisation of the rectifier modules during replacement and retrofitting**
  - **low expenditure for installation, commissioning and expansion**
- **superior supply quality**
  - **sinusoidal input current, no reactive-power absorption (power factor ≥ 0.99)**

Reliable cost-effective solutions – Made in Germany

It has become normal within our modern society to use a wide variety of electronic media for instantaneous contactability, communication, process control and transactions.

In order to always be in touch, permanently available network access is required whose backbone is formed by the nationwide roll-out of high-speed wireless data networks such as LTE and, in future, 5G. The requisite telecommunications technology requires there to be a reliable power supply which is operational at all times.

BENNING has delivered battery-powered AC and DC power supplies to many mobile phone and landline operators around the world for decades and has made particular investments in the development of high-efficiency power supplies for energy-saving, reliable operation. Nowadays, BENNING ranks as one of the leading suppliers of high-efficiency power supplies for the secure operation of information, telecommunications and industrial technology systems.

SLIMLINE telecommunications power supplies offer a cost-effective solution for every requirement

Fig. 4: SLIMLINE system 48 V / 12 kW with a controller module

Fig. 5: SLIMLINE system 48 V / 27 kW with a controller module

Fig. 6: SLIMLINE system 48 V / 12 kW with a controller, as well as battery and consumer distribution.
Power ratings of 3 – 27 kW can be achieved by scaling the rectifiers and adapting the distribution.

Modular component concept

The modular concept significantly lowers the cost and time expenditure in the installation and maintenance of the new SLIMLINE telecommunications power supplies at wireless sites which are being newly built or converted.

Flexible scalability up to 300 kW
The SLIMLINE system is simply scalable and can grow in line with customer requirements up to 100 modules with a total output of 300 kW. Due to the high degree of modularisation, it is possible to plan, configure and deliver customised systems at very short notice.

It is possible to combine rectifiers and inverters in one system (see Fig. 7). Both system components are monitored and configured by the MCU 3000 on a common interface.

Hot plug
All modules can be replaced during ongoing operation (hot plug). The SLIMLINE carrier with the appropriate quantity of rectifier modules and the assigned battery and consumer distribution create a complete, modular SLIMLINE power supply system (see Fig. 6).

Fig. 7: Combination of a rectifier (90 kW) and an inverter (7.5 kVA) in one system

The most cost-effective solution for every requirement

The new SLIMLINE series covers the entire array of mobile radio applications, from the mobile switching center (MSC for short) to the base station controller (BSC) to individual base transceiver stations (BTS). Consequently, the power supply systems safeguard the entire transmission technology (LTE, 5G, VOIP, TV, servers, etc.) against power failures.

Medium power ratings of up to 27 kW
System power ratings of 12 kW (with a controller module) or 15 kW in only one module height can be achieved with a carrier which is fully configured with rectifiers for the medium output range, which includes mobile radio stations for example (see Fig. 5).

The power rating can be increased to up to 27 kW by connecting a second SLIMLINE carrier in parallel (see Fig. 5).
Battery and consumer distribution units of different outputs are available for all power ranges, guaranteeing a compact, space-saving system. The distribution units are also structured in 19" plug-in units (see Figs. 4 and 6).

High power ratings of up to 300 kW
Larger power ratings, such as those required in nodes and distribution stations, can be achieved by connecting multiple SLIMLINE carriers in parallel. This enables power ratings of up to 300 kW to be achieved. The systems are integrated into 19" cabinet systems which can also house batteries and distribution units.

The SLIMLINE controller is available for more extensive control and monitoring functions (see Figs. 8 and 9).

Fig. 8: The front of the new SLIMLINE controller module has a 1.8" display, a USB 2.0 port (to accommodate a WLAN stick, for instance), as well as an Ethernet port

Fig. 9: In the case of systems with a larger power rating, the system controller (MCU 3000) can be inserted into the cabinet door of the power supply system. This design has a 10.4" touch display

SLIMLINE controller – remote monitoring and reliability in a very compact space

The SLIMLINE controller is available for extensive control and monitoring functions. This is generally inserted into the SLIMLINE carrier as a module (see Fig. 8) in the case of low power ratings. The 19" 1H carrier can accommodate either four 48 V / 3 000 W rectifier modules combined with a controller module or five rectifier modules. In the case of power supplies with a greater power rating, the monitoring and control unit can be integrated into the cabinet door of the power supply system (see Fig. 9).

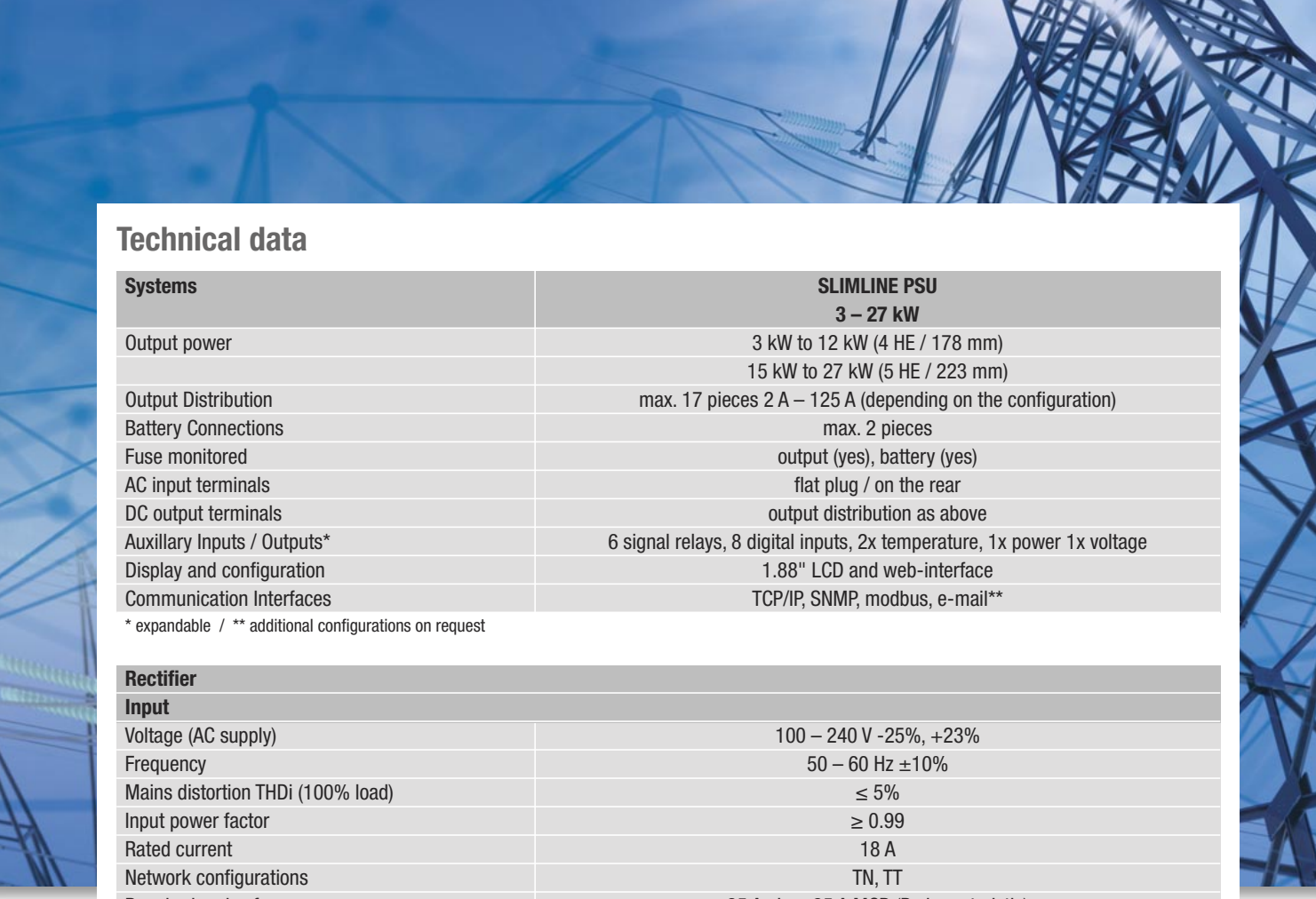
The controller monitors the entire power supply system and controls the power management for example. The system is structured to ensure that the power supply remains operational in the event of controller failure. The rectifiers continue to supply the system and the batteries, which is why the power remains at 100%. Therefore, failure is not critical to the process, and there is no need for controller redundancy. This lessens the space required and reduces investment and operating costs. Needless to say, a message appears in the event of a controller failure so that prompt steps can be taken to have the controller module replaced by a service technician at short notice.

It is easy to operate by computer, tablet or smartphone

In the case of the SLIMLINE controller modules which are inserted in the carrier, a large number of components are integrated on just a fifth of the 19" width, so the module offers interfaces for e.g. SNMP, modbus, modem, ethernet and USB for connecting a WLAN adapter.

The system can be configured via the integrated colour display on the front. If there is a mobile device or computer available, the configuration can take place conveniently via a network connection and Internet browser (see figure above). There is no further software required. By consistently matching operation to the requirements of the user delivers all the most beneficial measurements and settings with clarity, precision and simplicity.

The high contrast, bright display of the SLIMLINE controller also functions as a visual alert. If a fault occurs, it is fully illuminated in red and is clearly visible from a distance.



Technical data

Systems	SLIMLINE PSU 3 – 27 kW
Output power	3 kW to 12 kW (4 HE / 178 mm)
	15 kW to 27 kW (5 HE / 223 mm)
Output Distribution	max. 17 pieces 2 A – 125 A (depending on the configuration)
Battery Connections	max. 2 pieces
Fuse monitored	output (yes), battery (yes)
AC input terminals	flat plug / on the rear
DC output terminals	output distribution as above
Auxillary Inputs / Outputs*	6 signal relays, 8 digital inputs, 2x temperature, 1x power 1x voltage
Display and configuration	1.88" LCD and web-interface
Communication Interfaces	TCP/IP, SNMP, modbus, e-mail**

* expandable / ** additional configurations on request

Rectifier	
Input	
Voltage (AC supply)	100 – 240 V -25%, +23%
Frequency	50 – 60 Hz ±10%
Mains distortion THDi (100% load)	≤ 5%
Input power factor	≥ 0.99
Rated current	18 A
Network configurations	TN, TT
Required mains fuse	25 A gL or 25 A MCB (B characteristic)
Output	
Voltage	48 V
Current	62.5 A
Power	3 000 W
Adjustable voltage range	42 V – 58 V
Charging characteristic	IPU
Psophometric noise	< 2 mV
General data	
Module dimension (HxWxD)	40.8 x 84.5 x 290 mm / 1.61 x 3.33 x 11.4"
Cooling	forced-air ventilated
Operating temperature	-40 °C to 55 °C (reduction in power beyond this) max. 75 °C -40 °F to 131 °F (reduction in power beyond this) max. 165.2 °F
Relative humidity	≤ 95% (non-condensing)
Storage temperature	-40 °C to 85 °C / -40 °F to 185 °F
Installation height	3 000 m (without reduction in power) max. 5 000 m 9 842 ft (without reduction in power) max. 16 404 ft
Weight	1.8 kg / 3.97 lbs
Connection	hot swap modular
Protection class	I
Over voltage category	II
Protection class	IP 20
Parallel operation	up to 100 modules
Efficiency	98%
Acoustic noise	< 55 dB(A)
MTBF	> 500 000 h
Standards	
Electrical Safety	EN 60950-1, IEC 60950-1
EMC	IEC 61000, EN 55032
	ETSI EN 300386 (telecom) ETSI EN 300132-2 (telecom)

SLIMLINE – modular, smart, flexible and extremely efficient

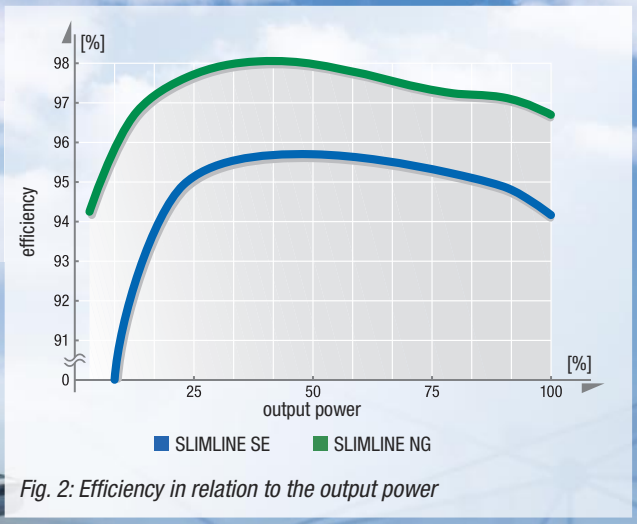


Fig. 2: Efficiency in relation to the output power

Fig. 3: The 19" 1H carrier can accommodate either four 48 V and 3000 W rectifier modules combined with a controller or five rectifier modules.

Maximum operational reliability, minimum operating costs

The newly developed SLIMLINE power supply solutions are precisely tailored to the requirements of the telecommunications network operator.

They include:

- **optimum operational reliability**
- **maximum energy efficiency**
- **optimum user space**
- **flexibility (pay as you grow)**
- **modularity**

They not only contribute significantly to the low total cost of ownership (TCO), they are also the basis for a clear reduction in installation and assembly times, as well as for simpler and more efficient maintenance possibilities in later operation.

Only one type of rectifier is required for systems within a power range of 3 kW to 300 kW.
This simplifies stock management and logistics for the benefit of the owner as it is only required to keep one type of module in stock for all systems.

Optimum energy efficiency in the minimum user space

Individual rectifier modules with an output of 3000 W are available for creating complete power supply systems.
The 19" 1H carrier can accommodate either four 48 V / 3000 W rectifier modules combined with a monitoring and control unit (SLIMLINE controller) or five rectifier modules. This gives a power rating of 12 kW or 15 kW per rack (see Fig. 3).

In this series of high-efficiency rectifiers, the power loss which occurs in the transformation of energy from alternating current to direct current has been reduced by up to 30% compared to the previous model. At the same time, the overall physical footprint of the rectifiers has been reduced by more than 33% (see Fig.1).

A particularly impressive fact is that the SLIMLINE series works at efficiency in excess of 98% across a load range of between 20% and 90% (see Fig. 2).
This creates substantial savings for telecommunications service providers which operate a number of systems in the field.
Optionally, active power management can be enabled which determines the load required and automatically connects or disconnects the rectifier modules accordingly.

www.benning.us

www.benning.de

ISO 9001 ISO 14001 ISO 50001 SCC[P]

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
OOO «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
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.
Korczunkowa 30
05-503 GLOSKÓW
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
OOO 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.
Šenkvická 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. Kürkçü 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 Sosninykh 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 13 55
E-mail: sales@benning.us

BENNING

10228072.00 USA 06/2021 paus Design & Medien, Bocholt Subject to alterations. Printed on chlorine free paper.