

Excellent Technology, Efficiency and Quality

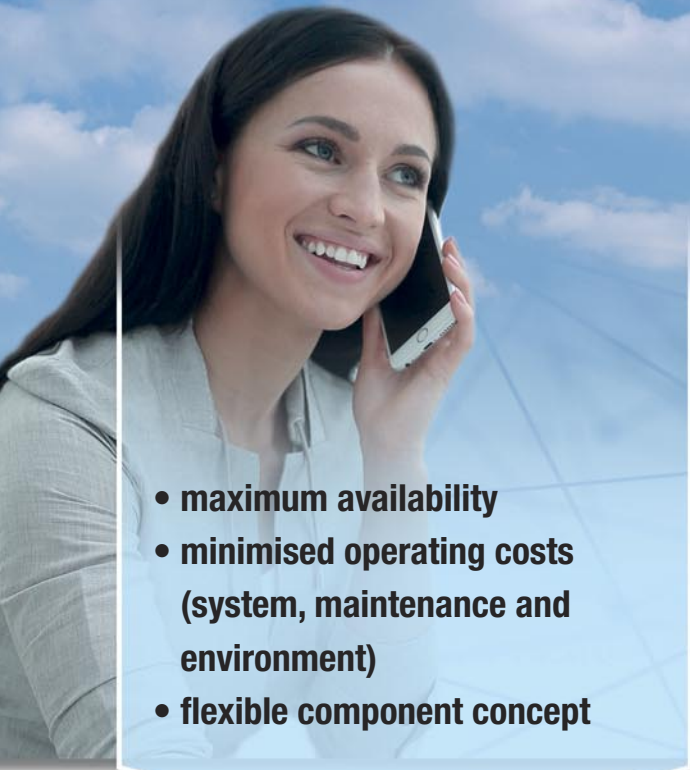


## SLIMLINE 2000 NG

- smart, flexible, 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

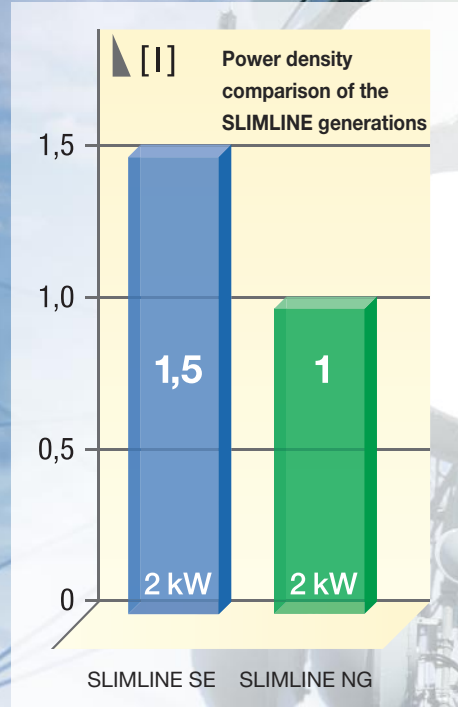


Fig. 1: In this series, the power density is more than 33% improved on the previous model

- 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 > 97% 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 scalability up to 400 kW
  - 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  $\geq 0.99$ )

## 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 / 4 kW with a controller module, as well as battery and consumer distribution



Fig. 7: Combination of a rectifier (72 kW) and an inverter (7.5 kVA) in one system



Fig. 5: SLIMLINE system 48 V / 22 kW with a controller module



Fig. 6: SLIMLINE system 48 V / 10 kW with a SLIMLINE controller, as well as battery and consumer distribution. Power ratings of 2 – 34 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 400 kW

The SLIMLINE system is simply scalable and can grow in line with customer requirements – from 2 to 400 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 Figs. 4, 5, 6).

## 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.

### Low power ratings of up to 4 000 W

The smallest rated low-power telecommunications power supply system, SLIMLINE PSU 4000, has a maximum of two rectifier modules 48 V / 2 000 W, a controller, as well as the battery and consumer distribution integrated into a 19" 1H SLIMLINE carrier (see Fig. 4).

### Medium power ratings of up to 34 kW

System power ratings of 10 kW (with a controller module) or 12 kW in only one module height can be achieved with a rack which is fully configured with rectifiers for the medium output range, which includes mobile radio stations for example (see Fig. 6).

The power rating can be increased to up to 22 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 400 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 400 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 five 48 V / 2 000 W rectifier modules combined with a controller module or six 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.

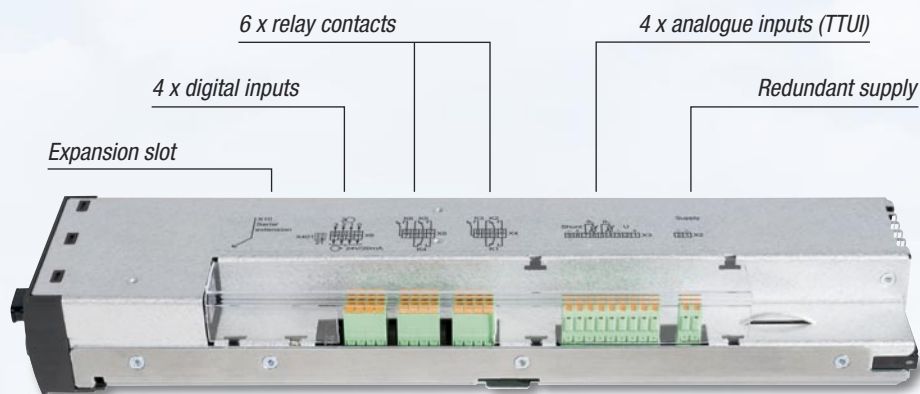
## It is easy to operate by computer, tablet or smartphone

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.

Fig. 10:  
The SLIMLINE controller module accommodates five methods of connectivity on only one sixth of its 19" width; they existed individually in the previous model and required additional space.



## Technical data

Systems	SLIMLINE PSU 4 kW	SLIMLINE PSU 2 – 34 kW
Battery outputs	1+1 (optional)	1+1 (optional)
LVD	•	○
N-PLD	–	○
Battery fuse monitored	1 x LSS 60 A	1+1 x LSS
Consumer fuse monitored (diodes)	6 x LSS 2 A – 30 A*	17 x LSS 2 A – 63 A
Shunt for battery current	•	•
Connection for an external distribution unit	•	–

(• = is included / ○ = optional / – = not included)

\* max. 84 A total

Additional configurations on request. Subject to technical changes.

### SLIMLINE rectifier module

Output power	[W]	2 000
max. quantity per 19" SLIMLINE carrier		6
max. quantity per system		200
Input voltage range	[V]	195 – 264
Input current	[A]	9.7 – 8.6
Frequency	[Hz]	47 – 63
Power factor		0.99
Output current	[A]	41.7

### Output voltages

Output voltage range	[V]	43.2 – 57.6
Floating charge (factory setting)	[V]	54
Main charge (factory setting)	[V]	57.6
Voltage stability (U <sub>A</sub> )		
static	[%]	± 1
dynamic (< 50 ms, 90-10-90%)	[%]	± 8
Recovery time	[ms]	50
Efficiency	[%]	> 97
Characteristic		IPU constant power
Interference voltage	[mV]	< 2
Radio interference level		EN 61000-6-2 / EN 61000-6-4
Safety		EN 60950 / IEC 950
Degree of protection		IP20
Ventilation		Fans
Ambient temperature	[°C]	-33 to 75*
Installation altitude	[m]	up to 2 000 m above sea level
Humidity class		EN 60721-3-3 class 3K3
Weight	[kg]	1.3

\* > 55 °C derating with 2.5% / K

Subject to technical changes.

# SLIMLINE – modular, smart, flexible and extremely efficient

# 5G

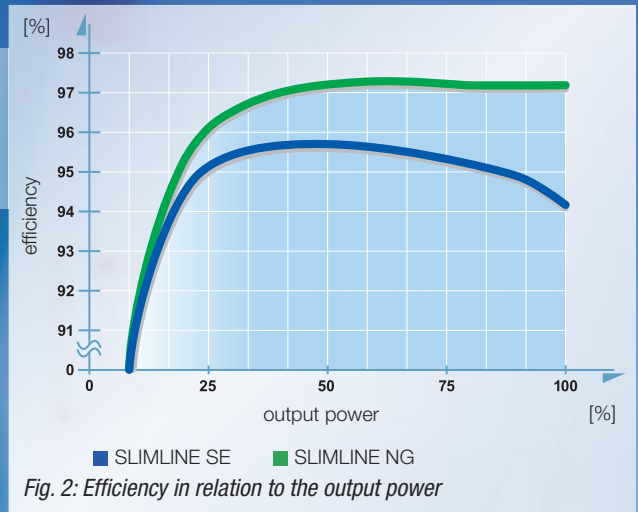


Fig. 2: Efficiency in relation to the output power



Fig. 3: The 19" 1H carrier can accommodate either five 48 V and 2 000 W rectifier modules combined with a controller or six 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 2 kW to 400 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 2 000 W are available for creating complete power supply systems.

The 19" 1H carrier can accommodate either five 48 V / 2 000 W rectifier modules combined with a monitoring and control unit (SLIMLINE controller) or six rectifier modules. This gives a power rating of 10 kW or 12 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 97% across a load range of between 50% 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.



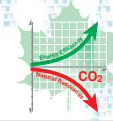
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ISO  
14001

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SCCP



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