



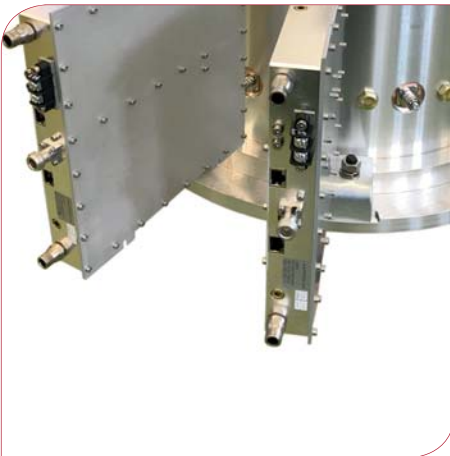
- Next-Generation Tubeless RF Amplifier
- Modular LDMOS Solid State Technology
- 80 kW Single-Step Combining
- High Efficiency Redundant Design Philosophy
- Low Maintenance and Mean Time To Repair (MTTR)



500 MHz Solid-State RF Amplifier



Modular and Scalable



DC Power Supply:

The DC power supply for the RF power modules works with a wide range of AC inputs. The rectifier units are arranged in a dedicated cabinet and controlled by Ampegon's proven Unified Control System UCS-PSM. Output voltage can be adjusted to vary the LDMOS compression point, allowing users to choose between highly linear response and additional efficiency.

RF Power Module:

Each RF power module provides up to 1.7 kW output from $2 \times$ LDMOS transistor amplifiers. A module features a circulator and load, allowing to handle full reflected power. DC-to-RF efficiency of up to 70 % is achieved by optimized module design with a layout minimizing thermal resistance between heat sources and the water cooling circuit. The UCS-PSM unit disables modules depending on required output power for enhanced energy saving. A restart is achieved within 10 μ s.

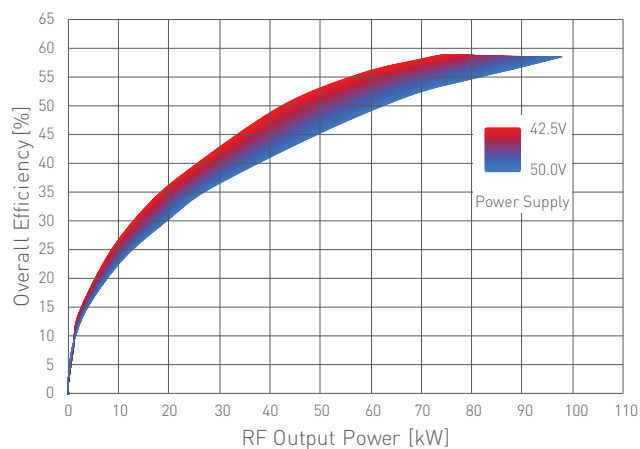
RF Cavity Combiner:

Ampegon's RF cavity combiner offers input ports for 128 RF power modules to be combined in a single step. Snap-N connectors allow to swap modules within minutes. Any vacant input ports can be fitted with extra modules at a later date. Such an upgrade provides either increased power or additional redundancy.

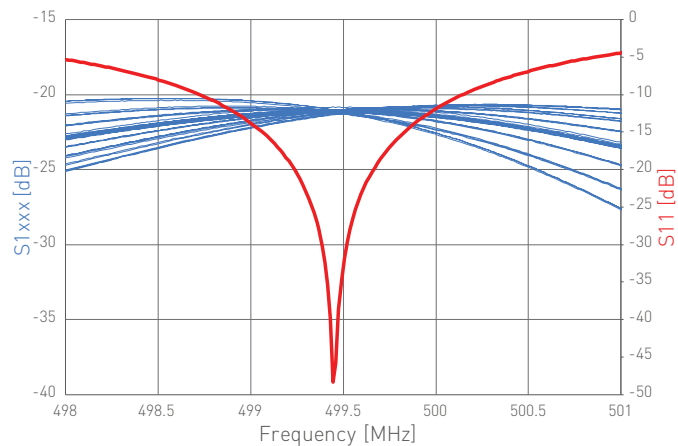
Redundancy and Maintainability:

The Solid-State RF Amplifier provides significant opportunities for redundancy, allowing dependable uninterrupted operation even in the event of faults. Should an RF amplifier module become unserviceable, replacement takes approximately 10 minutes, and requires only simple tools and an understanding of low voltage. DC power supplies are hot-swappable, and may be changed without shutting down the amplifier.

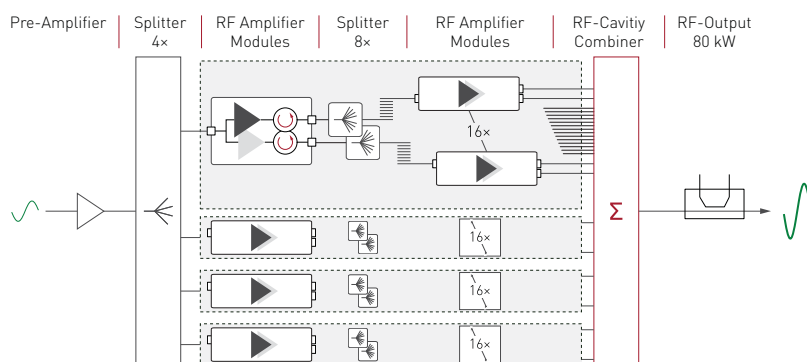
Performance and Efficiency



Overall efficiency versus RF output power of a system with 80 kW nominal output power and varying power supply voltage.



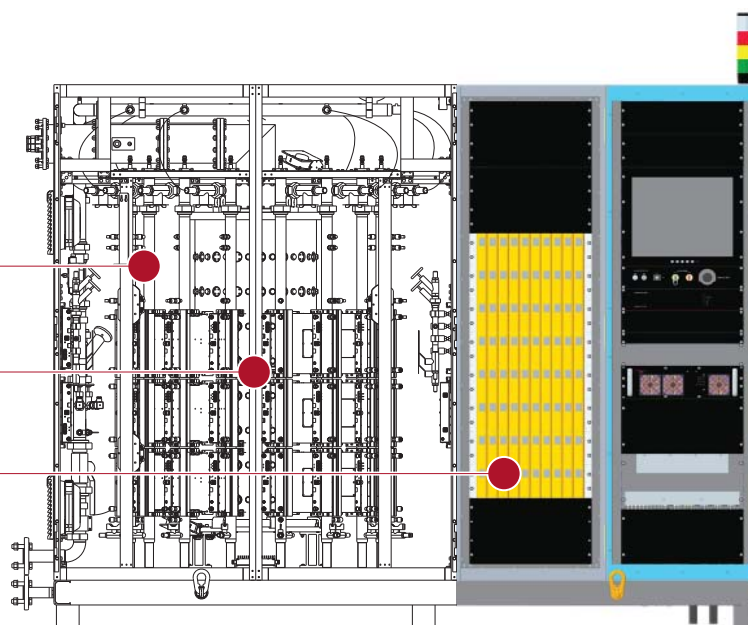
Parameters of the RF cavity combiner. Red line shows the output port matching. Blue lines show the transmission from input ports to the output port.



RF Cavity Combiner

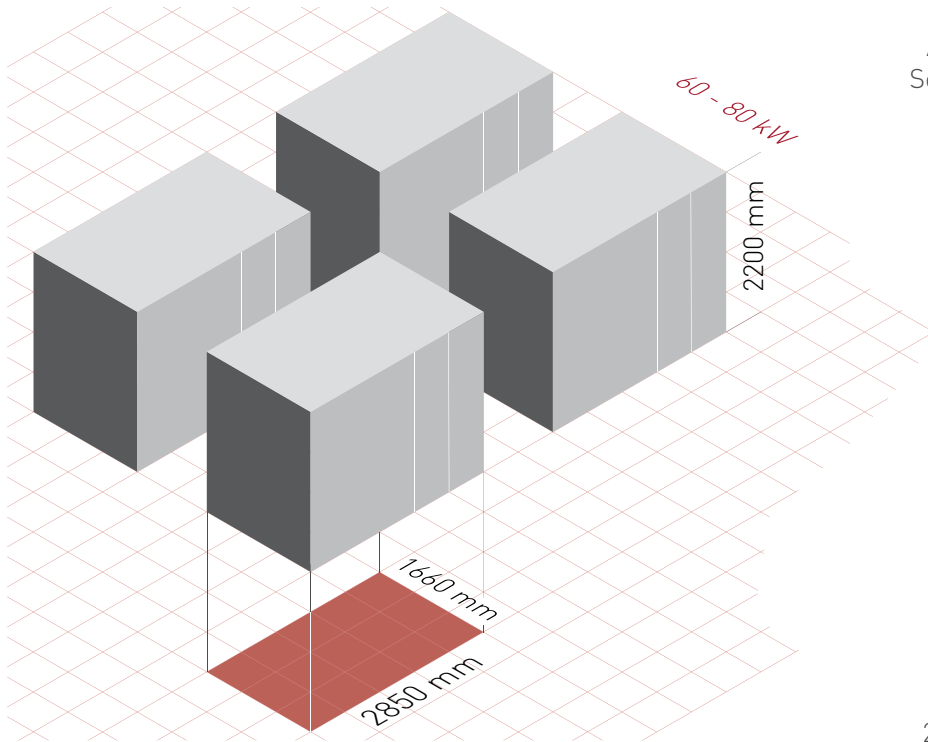
RF Power Module

DC Power Supply





The Power of Modularity



Flexible power scaling:

Ampegon has developed the 500 MHz Solid-State RF Amplifier specially for a wide range of scientific applications.

60 – 80 kW: single system
 120 – 160 kW: two systems combined
 280 – 320 kW: four systems combined

Technical Specifications

Typical Technical Data 500 MHz Solid-State Amplifier

Nominal output power at 500 MHz:	60 kW – 320 kW
Plug – RF efficiency:	>58 %
Bandwidth [1 dB]:	>2 MHz
Spurious emissions:	<70 dBc
Harmonics:	<30 dBc
Output RF power per module:	2 × 750 W
Group delay:	<200 ns
DC level:	43 – 50 V
Fast shutdown:	<2 us
Dimension 80 kW system (h × w × d):	2200 × 2850 × 1660 mm

Interfacing with 500 MHz Solid-State Amplifier

Mains voltage:	185 V – 275 V
AC input power (per 80 kW system):	145 kW
Power factor:	>0.98
RF input power:	10 dBm
Output impedance	50 Ohm
Water cooling (per 80 kW system):	160 l/min
Inlet water temperature:	15-25 °C
Input water pressure:	<6 bar
Pressure drop:	<1 bar
Control interface:	Ethernet, EPICS

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