

# Company Profile Ampegon Group



Transmission  
Systems



Antenna  
Systems



Scientific  
Applications



Green  
Technologies

## Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
1.1	About us	3
1.2	Quality Statement	3
1.3	Customer Services	3
1.4	Activities Ampegon AG	3
1.5	Activities Ampegon Antenna Systems GmbH	4
1.6	Activities Ampegon PPT GmbH	4
1.7	International Sales Offices & Service Center	4
<b>2</b>	<b>Competencies in Field of Transmission Systems</b>	<b>5</b>
2.1	Experience and Past Performance Transmission Systems	5
2.2	Shortwave Transmitters	5
2.3	Long- and Mediumwave Transmitters	6
2.4	DRM Equipment	6
2.5	Broadcast Control System	6
2.6	Transmission Auxiliaries	6
<b>3</b>	<b>Competencies in Field of Antenna Systems</b>	<b>7</b>
3.1	Experience and Past Performance Antenna Systems	7
3.2	SW Broadcast Antennas	7
3.3	LW/MW Broadcast Antennas	7
<b>4</b>	<b>Competencies in Field of Scientific Applications</b>	<b>8</b>
4.1	Experience and Past Performance Scientific Applications	8
4.2	High Voltage DC Power Supplies	8
4.3	High Power RF Amplifiers	9
4.4	Low Power RF (LLRF)	9
<b>5</b>	<b>Competencies in Field of Green Technologies</b>	<b>9</b>
5.1	Photovoltaic (PV) Plants for Broadcast Sites	9

## 1 Introduction

### 1.1 About us

Ampegon is a new brand established in November 2012 to merge the former Thomson Broadcast radio activities and newly acquired companies in one powerful and market leading group of companies. The group consists of Ampegon AG, Turgi (Switzerland), Ampegon Antenna Systems GmbH, Schifferstadt (Germany) and Ampegon PPT GmbH, Dortmund (Germany) with sales and service offices in China, Australia, UK and Nigeria. Ampegon is serving the global Radio Transmission markets including Antenna Systems as well as Scientific Applications and Green Technologies with an extensive product range tailored to all needs of the customers in these strategic fields.

The company began transmitter development in 1937. At that time it was the Transmitter Department of Brown Boveri, which evolved into Asea Brown Boveri (ABB) in 1988, moved to Thomson in 1993 and was finally transferred as Thomson Broadcast to a private investor Parter Capital Group (PCG). In October 2013 Puls-Plasmatechnik (PPT) GmbH joined Ampegon under same ownership. With a strong spirit of innovation from the beginning, the company made a reputation for itself as a true pioneer in the industry. The technological milestones laid have greatly shaped the industry and set high standards worldwide for state-of-the-art design.

### 1.2 Quality Statement

Providing premium quality products and services, Ampegon has been ISO 9001 certified since 1990. The standard supports efficient management processes and it demonstrates our commitment to quality and continuous improvement.

### 1.3 Customer Services

Ampegon is a reliable and experienced partner offering a wide range of service products: Spare parts management, troubleshooting support and customized service agreements. We aim to deliver complete solutions and pro-active support to maintain the availability and quality of the equipment over its life time.

### 1.4 Activities Ampegon AG

Situated near Zurich in Turgi (Switzerland), Ampegon AG is a highly specialized company in the field of high power RF engineering. As a leading manufacturer of high power AM/DRM broadcasting transmitters, high power RF amplifiers and regulated high voltage modulators and power supplies (HVPS) for more than 75 years, Ampegon gained an immeasurable amount of experience and know-how in the field of high power RF amplification, power electronics and fast signal processing. Our in-house R&D expertise covers a wide range of disciplines in electrical engineering, from the development phase throughout the complete design and validation phase. Customers include public and private broadcasters as well as renowned laboratories, research institutes and private institutions on all 5 continents and in more than 100 countries.

The company's product range includes

- Shortwave AM/DRM broadcast transmitters 50 - 500 kW
- Mediumwave AM/DRM broadcast transmitters 5 - 2000 kW
- Control systems for fully automated radio broadcast centers, including antenna- and network control systems
- Special auxiliary equipment for broadcast applications, such as test loads, RF feederlines, antenna selector switches, matrix switching systems, power combiners, filters, cooling systems

- Regulated high voltage modulators and power supplies (HVPS) with voltages up to 200 kV
- High power RF amplifiers
  - 3 - 30 MHz / up to 2 MW cw (continuous wave) and up to 6 MW pulse
  - 30 - 120 MHz / 0.05-2MW pulse
  - 100 - 300 MHz / up to 350 kW cw
  - up to 1300 MHz / up to 350 kW pulse

The company consists of a manufacturing facility, a comprehensive R&D section, a project management and an international sales & marketing team, with a permanent staff of 85 employees.

## **1.5 Activities Ampegon Antenna Systems GmbH**

Ampegon Antenna Systems GmbH is situated in Schifferstadt, Germany and is highly specialized in the field of high-performance antenna & mast systems for more than 60 years. The core business of the company is the design and development of high-power AM antennas with systems and components. Ampegon high profile engineers are specialized in designing, building, servicing and optimizing antenna systems. Customers are public and private broadcasters on all 5 continents.

The company's product range includes

- Shortwave AM/DRM broadcast antenna systems 50 - 500 kW
- Long- and Mediumwave AM/DRM broadcast antenna systems 10 - 2000 kW
- VLF (very low frequency) applications as well as towers and masts for specific communication needs (TV, FM, etc.)

The company consists of a comprehensive R&D section, a project management and an international sales & marketing team, with a permanent staff of 20 employees.

## **1.6 Activities Ampegon PPT GmbH**

Located in Dortmund (Germany), Ampegon PPT GmbH is a highly specialized company in the field of pulsed power systems for scientific, medical and industrial applications. The excellence of the company is its ability to prototype, produce and commission small series in close cooperation with the customer.

The company's product range includes

- Pulse modulators for the operation of high power microwave tubes
- Pulsed magnetic systems and plasma systems (vacuum arcs)
- High voltage capacitor charging power supplies for medical applications (kidney stone disintegrators)
- High voltage/high current solid state switches

The company consists of a comprehensive R&D section, a project management and an international sales & marketing team, with a permanent staff of 20 employees.

## **1.7 International Sales & Service Offices**

In China, Ampegon is supported by a sales & service office in Beijing, Ampegon Science & Technology (Beijing) Co., Ltd. The company is responsible for local services, sales and marketing. Two sales representative offices in Melbourne (Australia) and in London (UK) support the international sales team and serve the local market.

## 2 Competencies in Field of Transmission Systems

Ampegon is the leading designer, manufacturer and integrator of radio transmission systems worldwide. More than one out of every two high power radio broadcast transmitters comes from Ampegon. Our trademarks are innovation, advanced technology and premium quality systems combined with highest reliability and the best performance over the equipment lifetime. Seeking to exceed what the market asks for in performance and reliability, Ampegon is intent to supply environmentally sound broadcast solutions that support cost-efficient media implementation.

### 2.1 Experience and Past Performance Transmission Systems

Important inventions, innovations and technological steps include	
Development of 1st mediumwave transmitter	1937
Development of 1st shortwave transmitter	1952
First DCC dynamic carrier control for B-class-modulated AM transmitters	1976
Automatic tuning for shortwave transmitters	1976
Invention of Pulse Step Modulator (PSM) Technology	1982
500 kW shortwave PSM transmitter	1985
1 MW PEP on single side band operation (SSB)	1986
Invention of "Distortion Free" transmitter	1990
Design and market introduction of low power solid state mediumwave transmitter: M2W Line (5 – 125 kW)	1997
Introduction of the first digital AM Modulator Product Line: Skywave	1997
Founding member of the DRM (Digital Radio Mondiale) Consortium, founded to develop and promote a digital AM standard for the broadcasting bands below 30 MHz	1998
Upgrading of transmitters for the participation in DRM field tests and DRM pilot broadcasting	1999 -2002
Development of a M2W digital starter kit	2002
Automated DRM shortwave broadcasting	2003
Extension of power range of M2W Transmitter Line to 200 – 300 kW	2007 – 2008
Invention of E-PSM technology	2011
New Activity Green Technologies: Photovoltaic (PV) Plants for Broadcast Sites	2012
Introduction of the new transmitter control system UCS (Universal Control System)	2013
Introduction of new Shortwave Transmitter Line	2014

### 2.2 Shortwave Transmitters

Ampegon high power shortwave transmitter TSW product line extends from 50 kW to 500 kW. True to its tradition of combining innovative technology with reliable and well proven techniques, Ampegon offers an enhanced shortwave transmitter line with integrated DRM solutions. The Ampegon shortwave transmitters are designed and produced in our factory in Switzerland to meet the highest quality and industrial design standards. Satisfied customers around the world testify to the superior design, performance and maintainability of Ampegon shortwave transmitters.

## **2.3 Long- and Mediumwave Transmitters**

Ampegon cooperates with TRANSRADIO SenderSysteme Berlin AG for long- and mediumwave transmitters. TRANSRADIO's TRAM line is available in power ranges from 5 to 2000 kW and is ready for digital transmission with DRM. TRAM transmitters are optimised for high reliability and minimal maintenance costs. Modular design is combined with high redundancy. In countries with small technological infrastructure these transmitters have proven their outstanding performance.

## **2.4 DRM Equipment**

Providing end-to-end DRM solutions, the Ampegon DRM product line offers a one-stop-shop for integrated, proven DRM solutions. As a leading force for digital broadcasting since the beginning, our DRM-compatible equipment meets highest standards and customer requirements. Designed to provide end-to-end DRM solutions for broadcasters and network operators, the DRM product line allows facilitating data import, preparation, encoding and broadcast with DRM content server, to broadcast a DRM signal and to analyze a DRM signal with professional monitoring receiver.

With the introduction of the new transmitter control system UCS (universal control system) by the end of 2013, the DRM modulator/RF exciter/control system will be integrated in the UCS to feed any AM broadcasting transmitter or linear amplification transmitter.

## **2.5 Broadcast Control System**

From local monitoring to worldwide networking, the Master Series II line manages practically anything from a single transmitter site to a global network. Based on a modular, hierarchical design principle, Master Series II systems avoid a single point of failure and guarantee practically 100 % availability of your broadcast system. The systems incorporate a multi-layer redundancy approach including a hot standby main control computer system and can be configured to provide different levels of functionality for specific demands. In addition to controlling all kinds of station equipment and infrastructure, Master Series II can also take charge of frequency and programming supervision. A built-in GPS system provides for transmission synchronization. From simple monitoring of one or more transmitters to the complex job of coordinating and controlling entire broadcast networks, Master Series II can virtually control any number of tasks from anywhere in the world via its web-interface.

## **2.6 Transmission Auxiliaries**

The purchase of an Ampegon transmitter or antenna system opens the door to a whole world of highest-quality, hand-crafted, professional broadcast auxiliary systems and components. Our auxiliaries are a cornerstone of our A to Z professional solutions and are especially designed and engineered to enhance performance and lifetime of AM/DRM broadcast stations. All auxiliaries are the product of highest quality craftsmanship backed by more than half a generation of experience in the trade. The choice of Ampegon professional components for your radio broadcasting system is your guarantee for quality, long lifetime and best performance.

## 3 Competencies in Field of Antenna Systems

Ampegon is the leading designer, manufacturer and integrator of radio broadcast systems worldwide. Behind every great signal-on-air is a well-designed antenna. Ampegon offers the most advanced, flexible and efficient antenna systems on the market today and is the only supplier in the world for rotatable curtain antennas. Whether shortwave, mediumwave or longwave, Ampegon helps you to get the most out of your antenna system.

### 3.1 Experience and Past Performance Antenna Systems

#### Important inventions, innovations and technological steps include

Installation of the 264 m mediumwave mast at Mühlacker for the Süddeutscher Rundfunk, at that time the highest guyed mast in Germany	1950
Europe's biggest shortwave antenna system, Wertachtal, Germany	1972
Europe's biggest myriametricwave antenna system, Ramsloh, Germany	1978
First fully rotatable shortwave antenna worldwide in Kuwait	1978
Biggest transmitting station worldwide in Abu Dhabi with a mediumwave antenna system, 50 fixed and 2 rotatable shortwave antennas for 500 kW	1985
First longwave directional antenna with 2 MW transmitting power in Algeria	1986
First antenna combination worldwide with 1 MW transmitting power for shortwave in Jordan	1988
10 rotatable shortwave antennas with mode-switching, each capable to provide 500 kW RF for TDF, Issoudun, France	1995
First one-band shortwave antenna with rigid-dipole technology capable to provide 300 kW RF for Junglinster, Luxembourg	2006
First rotatable shortwave antenna, HR 2/2 for BBG, Kuwait	2010

### 3.2 SW Broadcast Antennas

The best signal on air depends on optimal interconnection of all broadcast system components. One of the key components is without doubt the broadcast antenna. Our shortwave broadcast transmitting antenna solutions include non-directional antennas and directional antennas in a fixed and a rotating performance.

### 3.3 LW/MW Broadcast Antennas

Ampegon longwave/mediumwave broadcast antennas are perfectly designed and matched to site-specific conditions, and are the most cost-efficient, high-performance systems available on the market today. With the introduction of DRM, mediumwave offers broadcasters a highly cost-efficient approach for local, regional and national program services in near FM quality. However, the technical and economic performance of a DRM broadcast system depends greatly on the choice and design of the antenna. Ampegon offers a full range of LW and MW antenna masts and towers including monopoles and dipole antennas.

## 4 Competencies in Field of Scientific Applications

Ampegon has the long term experience for RF amplifier, RF systems, high voltage power supplies (HVPS), high current power supplies (HCPS) and modulators for world-class medical, industrial and research facilities.

Our expertise includes stand-alone HVPS systems with voltages up to 200 kV and currents up to 2000 A, RF amplifier systems up to 2 MW at frequencies up to 1300 MHz, short pulse modulators with voltages over 500 kV and currents up to 400 A and stand-alone multi-channel digital low level RF control systems. Our technology base extends across the entire field of RF transmission.

### 4.1 Experience and Past Performance Scientific Applications

#### Important inventions, innovations and technological steps include

Invention of Pulse Step Modulator (PSM) Technology	1982
2 MW/30-120 MHz power amplifiers for fusion research	1983
55 kV/100A solid state power supplies in PSM technology	1985
Extension of technological limits towards 130 kV and 100 A for HVPS systems	1999
Development of special RF amplifier systems for medical applications like cancer treatment	2003- 2006
Development of a digital low level RF system for the most reliable and precise control of amplitude and phase of electromagnetic fields as well as cavity tuning in non-superconducting cavities for particle acceleration	2008 - 2009
Development of flexible, output voltage controlled long pulse modulators for klystrons used to drive for Free Electron Laser Accelerators (XFEL)	2010
Invention of E-PSM technology	2011
Development of long pulse HV modulators for klystrons based on a serial resonant converter topology	2012
Development of high power solid state RF amplifiers and combining systems for single frequency applications	2013
Introduction of new short pulse high power modulators	2014

### 4.2 High Voltage DC Power Supplies

Ampegon designs highly accurate regulated high voltage power supplies for high power vacuum tubes like klystrons, tetrodes, IOTs or gyrotrons. The HVPS systems are provided as stand-alone device or within the scope of a turnkey project. Ampegon HVPS solutions are esteemed for their highest flexibility, modularity and reliability. Thanks to the newest design of the E-PSM technology, systems are adaptable to meet practically any customer specifications and needs. HVPS units, including PSM modulator and transformer, are suited for installation either inside facilities or outside in separate shelters. Particle accelerators with very high energy levels are dependent on most stable and reliable high voltage power supplies and modulators for their high power RF sources. Ampegon has the perfect tailored product available for all requirements.



## **4.3 High Power RF Amplifiers**

Ampegon RF amplifier systems are based on gridded tubes, klystrons, inductive output tubes (IOT) or transistors. Our specialty is handling RF power ratings of up to 2 megawatts and frequencies up to 200 MHz with gridded tubes, several hundreds of kilowatts up to 1300 MHz with klystrons and IOT's, and up to 100 kW and 500 MHz with solid state based amplifier. Familiar with the challenges of high power applications as well as of frequencies of several hundred MHz, we undertake studies, plant engineering and project assignments. The application of special RF amplifiers for the acceleration of particles or plasma heating is a well known and established technology in our company.

## **4.4 Low Power RF (LLRF)**

Ampegon digital low level RF systems are designed for high accuracy, availability and long term reliable operation. Digital LLRF systems accomplish e-field regulation in RF cavities. The systems also serve as the primary man machine interface (MMI) between the operator and the RF system as a whole. Thus, in spite of their highly complex nature, they must secure easy, straight-forward and self-explanatory operation. In addition they must be robust in terms of EMC, stable, reliable and feature a high degree of automation. Digital LLRF systems are instrumental in accomplishing amplitude and phase controlling in the electromagnetic cavities of particle accelerators. They keep the RF tuned to the correct phase and amplitude, no matter how the cavities drift, thus insuring that the particles are accelerated and not slowed down.

## **4.5 Short Pulse High Power Modulators**

The short pulse modulators based on solid state technology or pulse forming network (PFN) topology complement Ampegon's product range in pulsed high voltage modulator applications as well as RF amplifier systems. The modulators are valued for their highest flexibility. Thanks to the modular design of the implemented technology, these systems are adaptable to meet practically any customer specification. The design is optimized for best performance and an ideal footprint with long term reliable operation.

## **5 Competencies in Field of Green Technologies**

Ampegon is offering complete photovoltaic power plants within its new Green Technologies business segment. Taking benefit from our large turnkey experience with radio transmission stations and acquired solar power know how, such business is a perfect fit for the expansion of existing broadcast sites but also for complete new PV power plants. The activity includes project development, dimensioning, customer relations, project monitoring, legal construction permits and financing. Considering ecological awareness, the necessity of environment and climate protection as well as continuously increasing energy costs motivated Ampegon to generate new and innovative concepts and inventions.

### **5.1 Photovoltaic (PV) Plants for Broadcast Sites**

Despite the introduction of new high efficient broadcast technologies, radio transmission stations still consume a huge amount of electrical energy. The large antenna field on the other hand is often an ideal place for a photovoltaic power plant to produce energy close to the consumer. Ampegon promotes an optimized utilization of fallow land area at broadcast stations and antenna fields as well as in plain countryside. That land area is environmental beneficial used to produce renewable energy with a PV power plant.