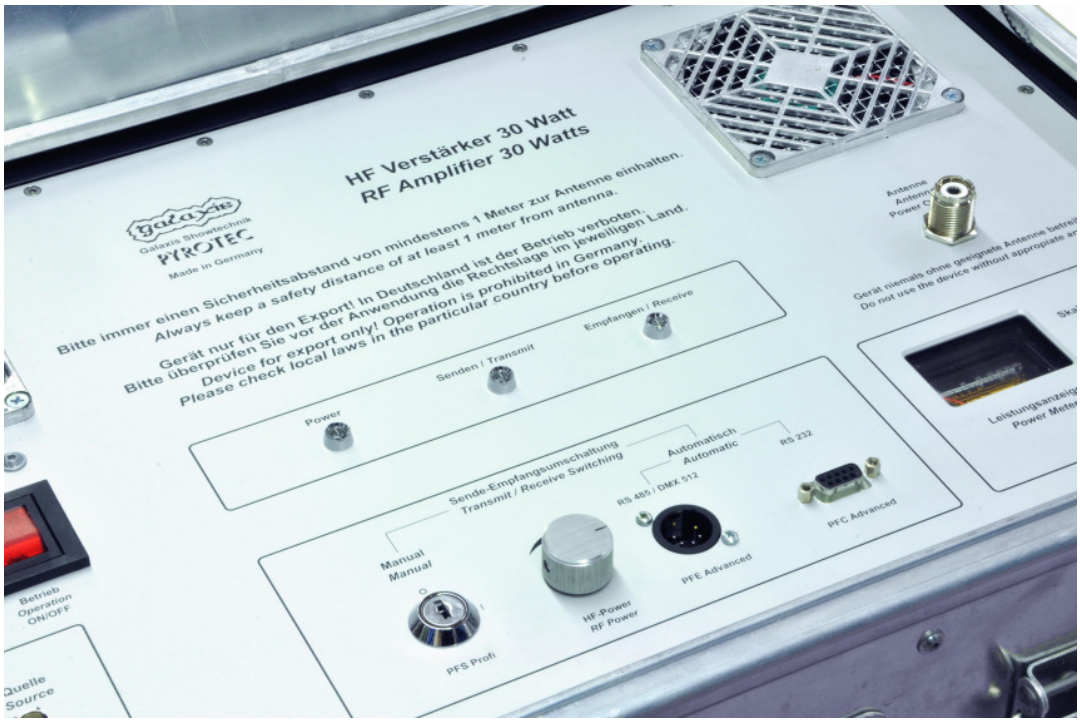
User Manual

Galaxis Showtechnik

PYROTEC

RF Amplifier 30 Watt



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Galaxis Showtechnik GmbH
Emmertinger Str. 2
84524 Neuötting / Germany

Tel.: +49 / 8671 / 73411
Fax: +49 / 8671 / 73513
www.galaxis-showtechnik.de
info@galaxis-showtechnik.de

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1. Safety regulations

Date: Sept. 19th 2007

Safety regulations for the firing of pyrotechnical effects and aerial shells by using e-matches:

The following instructions are for your understanding about important and basic safety principles.

Our general safety requirements are based on our own experience plus the contact and feedback from our customers. These rules allow the safe and successful usage of all components of our wireless firing systems. With proceeding development of our products, we will continuously revise and adapt the safety standards in conclusion with your notifications and support.

The following safety regulations are part of all our operation manuals within our product range. These regulations are also available in printed form and can be downloaded via our internet homepage at any time. Please forward these instructions to any relevant persons in your company dealing with this topic.

Any technical device can potentially cause a fault. This could be encouraged through: wrong usage, unit damage, unit aging as well as the wear and tear of the unit. This fundamental thesis was the basic principle when writing these instructions.

1. Smoking or open fire is strictly prohibited within the safety zone!

2. Depending on the type, size and quantity of the pyrotechnical effects that are being used and depending on the local conditions, allocate the necessary fire prevention and first aid measurements.

3. In all cases respect and follow any national and technical regulations as well as the operation manuals respective to the pyrotechnical effects in use.

4. Make sure that non authorized persons are not within the vicinity of the pyrotechnical effects and to the respective firing system.

5. The safety boundary distances required by the manufacturer and authorities are to be respected. Secure the area so that non authorized persons cannot gain access to the same.

6. The operation manuals and safety instructions of the pyrotechnical manufacturers must be observed at all times. If in doubt these must be discussed with the relevant safety organisations.

7. The usage of pyrotechnical effects as well as the respective firing systems are only allowed to be used according to it's defined function.

8. The components of our firing system are to be covered or encased against burn-off cinders or weather conditions where necessary. Electrical contacts should be protected against corrosion, soiling and damage plus they should be cleaned regularly.

9. The contacts of the pyrotechnical articles or their e-matches, which have not yet been connected, must always be short circuited.

10. We recommend to have our products inspected every one to two years. Along with the testing of the rechargeable battery, a visual test as well as a functional test will prove that the operational safety standards are still met.
11. Do not use damaged equipment. If a damage is found, immediately send the device back to the manufacturer for professional repair. Our warranty for the proper function for our equipment is only for components of our system, which have no damage.

12. Any changes in the devices or to the firing system as well as repair work on the units other than that through the manufacturer will invalidate any warranty claims and our product liability will be void. Should repair of the units be necessary, then we do require a detailed report of the problem.

13. Please make sure when lending or renting out the equipment, that no damage has occurred during the rental period of the units. Advise your staff, that it is very important to report any possible damage of the units immediately. Customers, which have borrowed or rented the equipment are hereby informed, that it is their duty to report any damage found or suspected on the unit when returning such.

14. Wire connections from the firing device to the e-matches are always to be insulated. At the same time avoid wire damage, for example through heat, cable twisting, cable pinching and burn-off cinders or through forced piercing. All cables must be checked before each use on it's faultless construction. When using used wires we do recommend a continuity and short circuit test between each insulated connection before using it again.

15. The firing of igniters in accordance with 'SprengG' (i.e. German explosives law) is not allowed with our products. For this purpose only firing units with a BAM certification in accordance with §5 'SprengG' or equivalent are allowed. The same applies to high explosives.

16. Avoid unintended firing through electrostatic charging. When using e-matches, make sure that you only use those types, which are protected against unintended firing through electrostatic discharges. The e-matches you use should also have a BAM certification or equivalent.

17. Avoid possible or even physical contact of the e-matches or their firing lines with other conductible materials if the possibility is given that either a static discharge or potential equalization can arise.

18. Make sure that no unintended firing possibilities are given. Commonly caused either through strong electrical, magnetic, electromagnetical fields as well as other voltage sources.

19. An often underestimated risk are unintended firings due to live contacts found as charging contacts on mobile phones, walkie talkies as well as rechargeable battery driven tools. Even when due care and attention is taken, a battery pack or similar can be a hazard when dropped especially when live contacts are revealed.

20. Unintended firing can be caused by thunderstorms or the electrostatic fields during the drawing up of a thunderstorm. We recommend clearing and securing the area in question.

21. Another possible danger for unintended firings are potential equalization currents. Be aware that these currents may occur in between conductive building segments themselves or between these conductive segments and earth potential. Neither e-matches nor wiring should come in contact with such segments.

22. Please be aware that through your pyrotechnical effects ionized gases are created. The thereby produced ions increase the conductivity within the air. This ionization process can cause an electrical arcing especially within the vicinity of high voltage overland cables. This may lead to lethal consequences for the pyrotechnicians and other persons. Please note that wind conditions can be totally different a few meters above the ground.

23. Please assure that the firing can only be initiated through the pyrotechnician. Keep firing system under lock and key! Within our safety concept, all firing systems are set with individual codes, which inhibit unintended and accidental firing through third parties. If requested we can also supply systems with the same coding. This may be necessary if in a company more than one transmitter is used or when companies exchange the units between each other.

24. With our using the key code numbers 901 and 311, we are using a standard key code, which can also be found in other products. On a customer's request we can also supply other key codes.

25. Please ensure that the relevant safety distances are met by everybody. The safety margins are to be kept as from the beginning of the project until the pyrotechnician releases the area after firing and containment of unfired effects and shells.

26. Connect at all times first the e-match to a 100% non-live firing line, which is also not connected to a firing unit. A pyrotechnical effect is given from the time onwards as 'armed' when the e-match wires are connected to the firing unit. This is independent if the units are on or off!

27. In the interest of your own safety and protection of the devices always use a sufficient length of firing wire.

28. Along with a sufficient length of firing wire you should ensure also the following:

In the field of display fireworks: The fireworks shells are only allowed to be loaded after the mortars have been stabilized and secured. Only after loading it is then allowed that the e-matches are connected to the respective firing units. At all times the most important rule is to never put your head or other part of the body into or over the mortar opening. This would also apply to other pyrotechnical effects.

In the field of special effects: Depending on the explosiveness of the pyrotechnical effects or materials that are being used it is advisable to proceed with higher care and attention (lies within the pyrotechnician's responsibility) and this could include for example a short circuit bridge over the contacts of the e-match to prevent unintended firing. Also it is possible to make a physical switch breakage in the firing line, which is only then closed when all safety regulations are met and kept! Should there be any unclarified situations, then discussions with the safety authorities are to be taken until all is clear for everyone. When it comes to the safety of your projects we are at all times at your disposal to develop a customized safety concept.

29. Make sure the devices are switched off before connecting the e-matches.

30. When checking the various system parameters as well as during firing, nobody is allowed within the danger zone.

31. After the effects have been fired, an ample amount of time should be given before disassembling the pyrotechnical setup. Before securing possible unfired effects first disconnect the corresponding wiring and then switch off the receivers. Especially in the field of special effects, during the installation special care should be taken of how to disassemble unfired effects or installations in a safe way.

The most current version of the safety regulations is always available in the download section of our website: www.galaxis-showtechnik.de

2. Application fields

This device is used to amplify the transmitter signal of the controller PFS Profi or PFC Advanced. Typical applications are:

- Firework displays on large venues

- Effects around a stadium or other buildings that cause difficult range conditions due to the metal framework of the construction

- The simultaneous firing of several fireworks displays on different firing sites, e.g. along a river or beach or on several rooftops

The amplifier supports also bi-directional communication. In receiving mode the signals are fed to the PFC Advanced.

When accessing receivers remotely with the functions remote data request and remote programming the device is able to switch fast between transmit and receive mode according to the requirements of the controller.

3. General definitions

a) RF

In this user manual the term 'RF' will be frequently used. RF stands for Radio Frequency.

A RF cable is a shielded cable intended to be used with radio equipment.
A RF connector is a shielded connector which can interface with RF cables.
RF power is the power that is e.g. provided by a radio device to be radiated at the antenna.

b) FOH

FOH is the abbreviation of 'Front of House'. It is the control room where sound and light technicians are taking control of a show or concert.

c) UPS

UPS is the abbreviation of 'Uninterruptible Power Supply'. These devices are used to prevent damages to PC systems due to power failures.

d) omni-directional antennas and directional antennas

An omni-directional antenna receives and emits radio waves in all directions of a horizontal layer.
All rod shaped antennas are typically omni-directional.

Directional antennas receive and emit radio waves mainly in only one direction. They need to be pointed towards the signal source or the receiver.

e) Yagi antenna

The Japanese engineer Mr. Yagi invented this antenna. It is a directional antenna with very high gain.

4. Illegal usage or usage without license

The manufacturer shall not be liable for any claims resulting of penalties resulting of illegal or unlicensed usage.

The manufacturer clearly states that the device is not allowed to be operated in many countries.

It is the duty of the user to apply for a licence. There may be countries which do not grant this.

5. Range improvement by increased transmitting power

With an input of 0,01 Watt the amplifier is able to generate an output signal of 30 Watt.
This is an amplification by the factor of 3,000!

Due to the laws of physics the gain in range is not 3,000 times the standard range.

To double the range of a radio transmission system the radiated power of the transmitter has to be quadrupled.

Taking this law of physics into account and assuming a standard range of 800 m the maximum range under good conditions for different RF power is:

RF Output	Theoretical range under ideal conditions approx.
0,04 Watt	1.6 km
0,16 Watt	3 km
0,64 Watt	6 km
2,50 Watt	12 km
10 Watt	25 km
40 Watt	50 km

The actual range that can be practically achieved is lower in most cases due to the following facts:

a) The longer the distance the more likely will hills, buildings or other obstacles which are within the line of sight cause a signal attenuation.

b) The decisive value is not the RF output power but the effective radiated power. Not all RF power of the amplifier is radiated. A certain amount is reflected by the antenna back to the output stage of the amplifier where it is simply transformed to heat.

c) Losses in cables and connectors occur.

6. Precautions to prevent harmful effects of the radiated power for human beings, animals and plants

Mainly these two effects can be harmful for human beings, animals and plants:

a) The radiated energy can cause a heating of tissue and other materials.

b) The high output power can cause voltage overshoots that may result in a spark over.

Attention: Make sure that a safety distance of at least 1 m for all human beings, animals, plants or any susceptible material or equipment is kept all the time to avoid damages.

Attention: Never touch the antenna while the device is in operation. The spark over can be extremely painful and dangerous e.g. for people with a cardiac disease.

Attention: People with a cardiac pacemaker or other medical implants should keep a safety distance of at least 10 m.

7. Precautions to prevent problems with electronic equipment operated close to the amplifier

Due to the fact that the output power is very high, disturbances or interference with electronic equipment of any kind can occur.

This can result e.g. in audible noise in audio systems or malfunction of devices.

Therefore we recommend to keep a safety distance of at least 10 m to this kind of equipment.

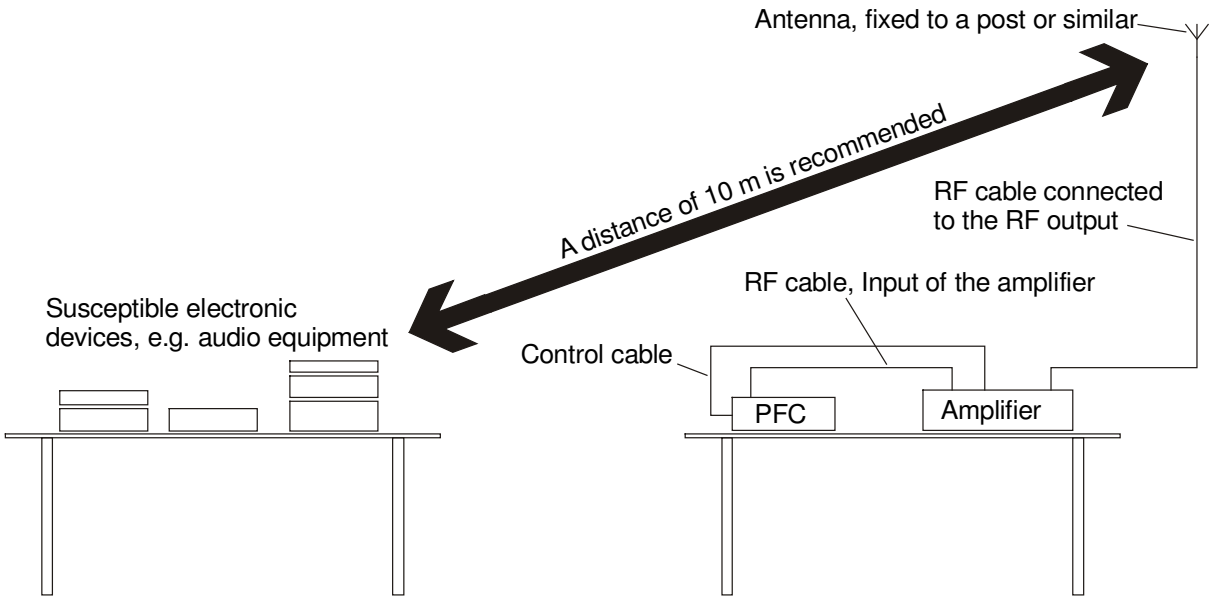
In general you should use only as much RF output power as required. You can determine this by performing range tests.

The output power of this amplifier can be varied. In the range of 1 to 30 Watt the device delivers a stable signal. Higher values lead to an overload condition and can cause spurious emissions. An output signal of less than 1 Watt may become instable.

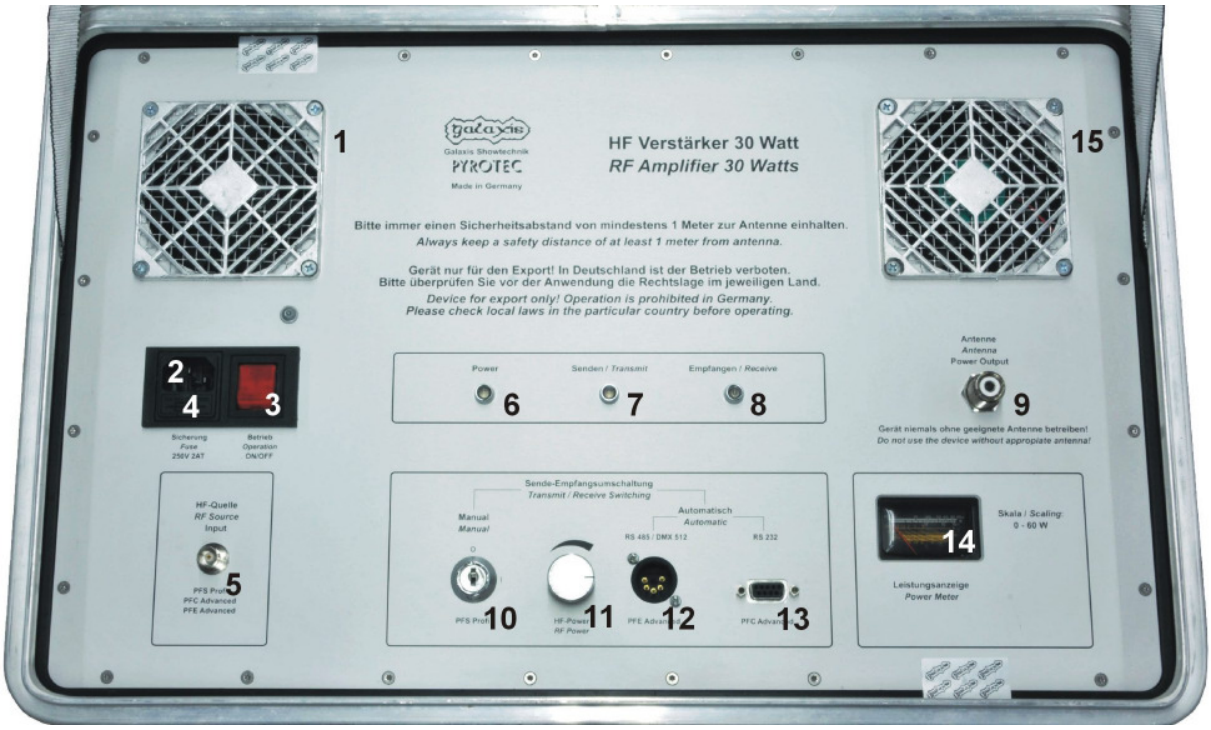
Especially at the FOH a lot of equipment is piled on one spot. In such an environment it is very likely that the operation of the amplifier will cause problems.

To avoid this operate the device at a lower output power which is also sufficient. In addition you should install the antenna at an elevated an remote position with maximum distance to the sensitive devices.

Example how to install the amplifier and the antenna related to other equipment:



8. Illustration



9. Description of indicators and control elements

1	Fan, air inlet	Two fans are used for the cooling of the output stage. Keep the lid always open when operating the device and do not cover the grids.
2	Input Mains Supply	Use the provided power cable to supply mains to the device.
3	Main Switch On / Off	First establish all cable connections and connect an antenna at the output, then switch on the device here.
4	Fuse	If fuse is blown open the small compartment which contains also a spare fuse with a screwdriver and replace it. Use only fuses of the same size and rating: 250 VAC 4AT delay-action fuse, dimensions 5 x 20 mm
5	RF Input	This BNC socket is the input of the amplifier. It need to be connected to the antenna socket of the controller, either PFS Profi or PFC Advanced. A suitable RF cable is supplied.
6	Indicator 'Power'	As soon as mains power is supplied and the main switch is in 'On' position this green LED indicator is lit.
7	Indicator 'Transmit'	Depending on the current operation mode either the indicator 'Transmit' or 'Receive' is on. The indicator for the transmit mode is red.
8	Indicator 'Receive'	Depending on the current operation mode either the indicator 'Transmit' or 'Receive' is on. The indicator for the receive mode is yellow.
9	RF Output	This connector (type PL-259, female) is the output of the amplifier. Install the provided adapter to connect the BNC RF cable and install the antenna. Only use the supplied antenna and cables. Other equipment needs to be approved by the manufacturer. Never operate the device without the antenna connected at the output. This could immediately damage the output stage.
10	Key Switch 'Manual Transmit / Receive Switching'	If you want to use the amplifier with the controller PFS Profi you will have to manually activate the transmit mode by using this key switch.
11	Control Knob 'RF Power'	With this knob you can adjust the output power of the amplifier.
12	Switching control input for PFE Advanced	To provide the possibility of using this device also with the receiver PFE Advanced 10 Outputs this input has been implemented. This is a feature that is not yet supported by the receiver's firmware.
13	Switching control input for PFC Advanced	If you want to use the amplifier with the PFC Advanced use the provided cable (RS232/V24) to connect the devices to enable automatic switching between receive and transmit mode.
14	Power Meter	The current output power of the amplifier is measured in Watt and being displayed on this power meter. The relevant scale is the upper one which is ranging from 0 to 60 Watt.
15	Fan, air outlet	Two fans are used for the cooling of the output stage. Keep the lid always open when operating the device and do not cover the grids.

10. Compatibility

The device can be used with the PFS Profi and the PFC Advanced.
If used with the PFS Profi the user has to manually activate and deactivate the transmit mode.

11. Power Supply

Mains supply is required to operate the device.

Due to the fact that a power failure can occur we strongly recommend to use an UPS (uninterruptible power supply) otherwise the show is in danger to be spoiled.

If power fails the unamplified signal of the transmitter is put directly through to the output and then reaches the antenna. This may be too less power for the application you have planned.

Note: Use an industry grade product otherwise the UPS may fail quite likely.

Note: The UPS needs to supply approx. 185 Watt for the duration of the show.

Attention: Make sure that the batteries of the UPS are in a good condition and test if the UPS functions properly also when the high RF signal is present. The UPS unit should be installed not to close to the antenna otherwise it may not function properly.

12. Installing the device

Put the amplifier next to the controller, e.g. on a table.

Attention: Never operate the device without the antenna connected at the output. This could damage the output stage immediately.

Attention: Always use the supplied antenna. If you want to use another antenna inquire at the manufacturer of the device if it can be used without damaging the output stage.

First establish the connection between the output of the amplifier and the antenna. Use the supplied RF cable with a length of 5 m and the two adaptors for this purpose.

a) Illustration how to connect the output to the antenna:

Use this adaptor to connect the 5m long RF cable to the output of the amplifier:

This picture shows the correctly connected adaptor:

Connect the output cable at the amplifier:

Use this adaptor to connect the antenna to the cable.

This picture shows the correctly connected antenna. Affix the antenna on a pole in upright direction e.g. by using adhesive tape.

Attention: Always make sure to use the original cables. Other cables may have insufficient shielding or the wrong impedance (50 Ohm is required).

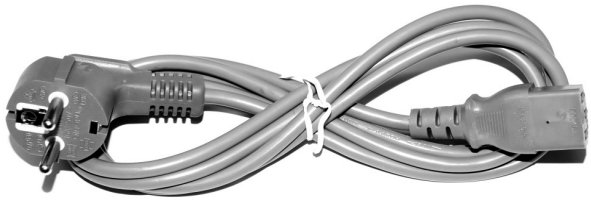
b) How to connect the signal input cable and mains cable

RF cable for the signal input.

Make sure that the controller is switched off. Then connect the antenna socket of the controller with the input of the amplifier by using the supplied RF cable with a length of 1 m. Never use the longer cable for the input because the output signal may couple in causing feedback.

Cable for mains supply.

Make sure that the main switch of the amplifier is in off position. Then insert the main supply cable and connect it to the power outlet or the UPS.



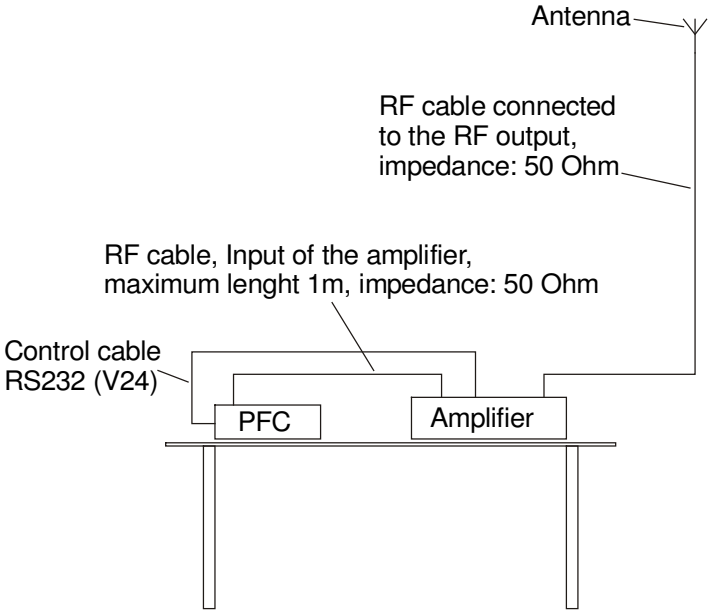
c) Control cable

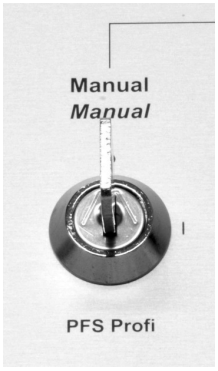
If you want to use the amplifier with the PFC Advanced, automatic switching between transmit and receive mode is possible if this control cable is being used:

Connect the cable at the socket 'RS232' (i.e. V24) of the controller. The other side is to be plugged in at the socket named 'PFC Advanced' at the amplifier.

Basically you can operate the amplifier and the PFC Advanced also without this cable connection. But in this case you will have to manually activate the transmit mode as described with the PFS Profi. Then remote data requests and remote programming are not possible because the user can not manually switch between transmit and receive mode as required.

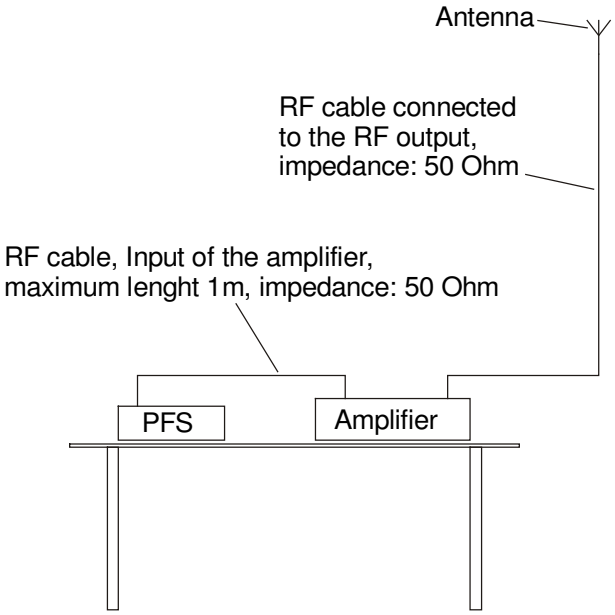
The complete installation for the PFC Advanced (mains supply has been disregarded):

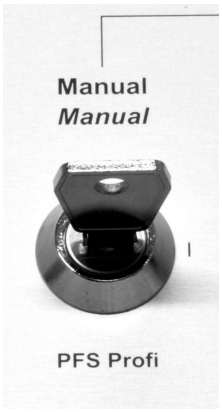




Keep this key switch in off position.
The PFC Advanced controls the operation mode automatically.

The complete installation for the PFS Profi (mains supply has been disregarded):





Switch on the transmit mode manually.

13. Operation of the device

a) Switch on sequence if the controller PFC Advanced is being used:

Establish all connections as described above and make sure that the controller is switched off.

Switch on the amplifier (main switch).

Make sure that the key switch 'Manual Transmit/Receive Switching' is in off position and the control knob 'RF Power' is almost at its maximum like this:

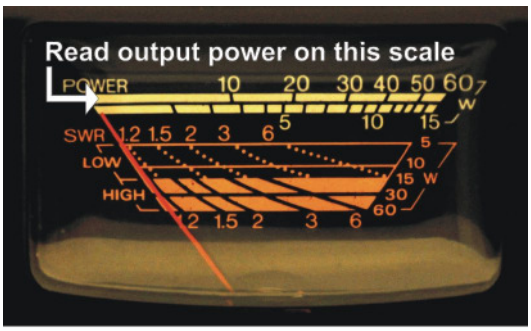
If receivers are operated in receiving mode they are constantly monitoring the radio channel.

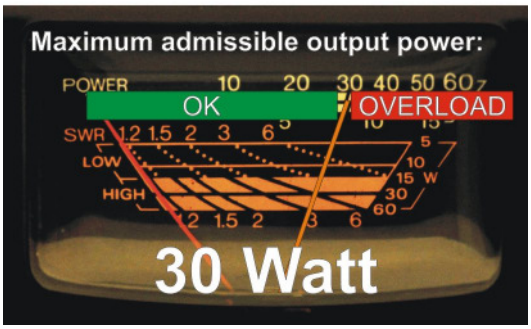
Every time the firing mode is armed at the controller the device sends a command that the following signals are not to be interpreted as foreign signals. When switching off the firing mode a command is being sent that all following signals are interfering ones.

Due to that it is important to make sure that these commands are amplified. Otherwise there may be a wrong radio interference warning.

Now you can switch on the PFC Advanced.

If you enter e.g. any of the different firing modes you will hear the switching of the transmit/receive relay.





As soon as you activate the firing mode you can read the actual RF power on the scale of the power meter.

The upper scale shows the power in the range of 0 to 60 Watt.

Turn the knob of the power setting until the desired value is reached.

The maximum admissible RF output is 30 Watt.

Reduce the power if necessary to avoid overheating of the output stage.

Check once and a while if the power level is still at the desired level.

Power may vary depending on e.g. temperature of the output stage, input signal and antenna alignment.

When transmitting the indicator 'Receive' goes off and the indicator 'Transmit' is active. The indicator 'Transmit' should be active in the following situations:

- Every time you enter a firing mode: Transmit mode for less than a second
- When any of the firing modes is armed: All the time in Transmit mode
- Every time you perform a range test: Transmit mode for approx. ten seconds
- Every time radio commands are being sent in the various menu items: Transmit mode for less than a second, several times one after another. E.g. in the remote data request or remote programming menus. Here the indicator is lit shortly several times one after another.

b) Switch on sequence if the controller PFS Profi is being used:

Establish all cable connections as described above and make sure that the controller is switched off.

Make sure that the key switch 'Manual Transmit/Receive Switching' is in off position and the control knob 'RF Power' is almost at its maximum, as you can see below.

Switch on the amplifier (main switch).

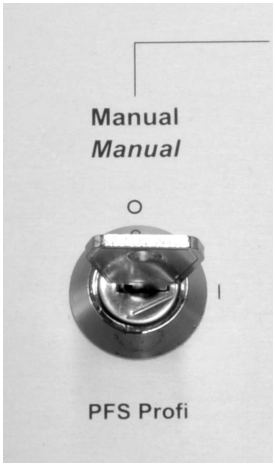
If receivers are operated in receiving mode they are constantly monitoring the radio channel.

Every time the firing mode is armed at the controller the device sends a command that the following signals are not to be interpreted as foreign signals. When switching off the firing mode a command is being sent that all following signals are interfering ones.

Due to that it is important to make sure that these commands are amplified. Otherwise there may be a wrong radio interference warning.

Switch on the PFS Profi.

Every time you want to send data (i.e. fire a display or send a range test command) first switch on the transmit mode at the amplifier, then activate the firing mode at the controller or press the range test button:

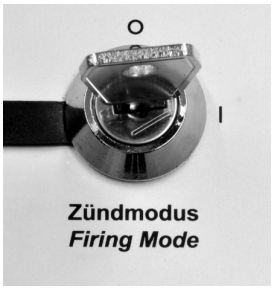


First switch on the transmit mode at the amplifier.

You should hear the switching of relays in the device.

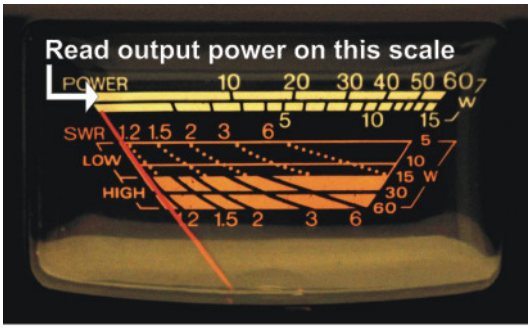
The LED receive mode goes off and the LED transmit mode is activated.

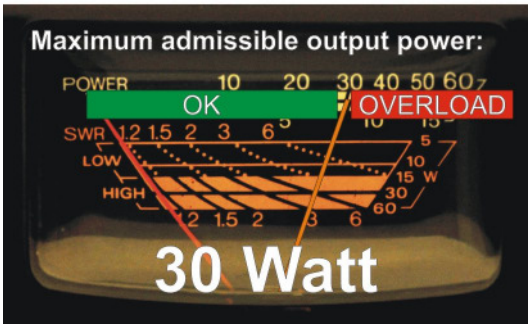
You will have no output power since the controller is not yet transmitting a RF signal.



Then activate the firing mode at the controller.

The controller is transmitting and now you should see some output power at the power meter.





As soon as you activate the firing mode you can read the actual RF power on the scale of the power meter.

The upper scale shows the power in the range of 0 to 60 Watt.

Turn the knob of the power setting until the desired value is reached.

The maximum admissible RF output is 30 Watt.

Reduce the power if necessary to avoid overheating of the output stage.

Check once and a while if the power level is still at the desired level.

Power may vary depending on e.g. temperature of the output stage, input signal and antenna alignment.

14. Switching off

a) If used with the PFC Advanced:

To switch off the system first power down the controller with the main menu being active.

Then switch off the amplifier and remove all cables. Make sure that the device is not operated again with no antenna connected to the output.

b) If used with the PFS Profi:

First switch off the firing mode, then switch off the transmit mode at the amplifier. After that you can power switch off the PFS Profi and the amplifier as well.

15. Radio Range Test

a) If used with PFC Advanced:

The PFC Advanced controls the switching between transmit and receive in all operation modes.

You can use the function 'Radio Range Test' in the main menu and the receivers will display the result. By varying the output power and performing several test you can easily determine which output power is sufficient for your application.

With every remote data request the range information is being displayed. You see two values (the signal of the controller and the returning signal of the receiver). When the amplifier is used it is quite normal that the returning signal is lower than the rather strong signal of the controller. In most cases this can be tolerated. If the signal of the receivers becomes too weak you can use a directional antenna with gain at the amplifier to compensate that. You will need to point that antenna in the direction of the receiver.

b) If used with PFS Profi:

You simply need to do the same as with the firing mode:

1. Establish all cable connections
2. Make sure that the key switch for the transmit mode at the amplifier is in 'off' position.
3. Switch on the main switch of the amplifier
4. Switch on the main switch of the PFS Profi
5. Switch on the transmit mode at the amplifier
6. Press the button 'Radio Range Test' at the PFS Profi
7. Read the results at the receiver's displays
8. Perform several tests one after anothe if required
9. Switch off the transmit mode at the amplifier
10. Switch off the main switches of the PFS Profi and the amplifier

By varying the output power and performing several tests you can easily determine which output power is sufficient for your application.

16. Receiving feedback information of Advanced receivers

This amplifier fully supports the bi-directional communication between the controller PFC Advanced and the receivers of the Advanced series.

As a matter of fact it can only amplify the transmitted signals.

Due to that the received signals may become too weak if the distance is very high.

A long as communication is still possible this can be tolerated. In this context we want to point out, that a signal strength close to 0% is sufficient for that purpose whereas the signal strength to fire a display should be at least 30%.

The following methods can be applied to improve the signal reception by the controller:

a) Try to set up the amplifier where no obstacles are causing signal attenuation.
E.g. the rooftop of a building would be an excellent location.

b) Install the antenna on an elevate position. A height of 2-3 meters could be meaningful. Mind the fact that long RF cable runs are causing losses. It makes no sense to use an extension cable of 10 m if you loose most of the gained signal on the cable.

c) Use a omni-directional high gain antenna like our Superscan 71, but pay attention that not every antenna can stand the maximum output power. The Superscan 71 allows 20 Watt max. By this practice the range for the feedback can be doubled or tripled.

d) Use a directional 'Yagi' antenna with high gain. The range improvement of these antennas is very good, so that up to 20 km of range can be achieved rather easily. The antenna needs to be pointed towards the receiver. The more elements these antennas have the higher the gain and the lower the opening angle will be. Yagi antennas with very high gain have an opening angle of approx. 30°.

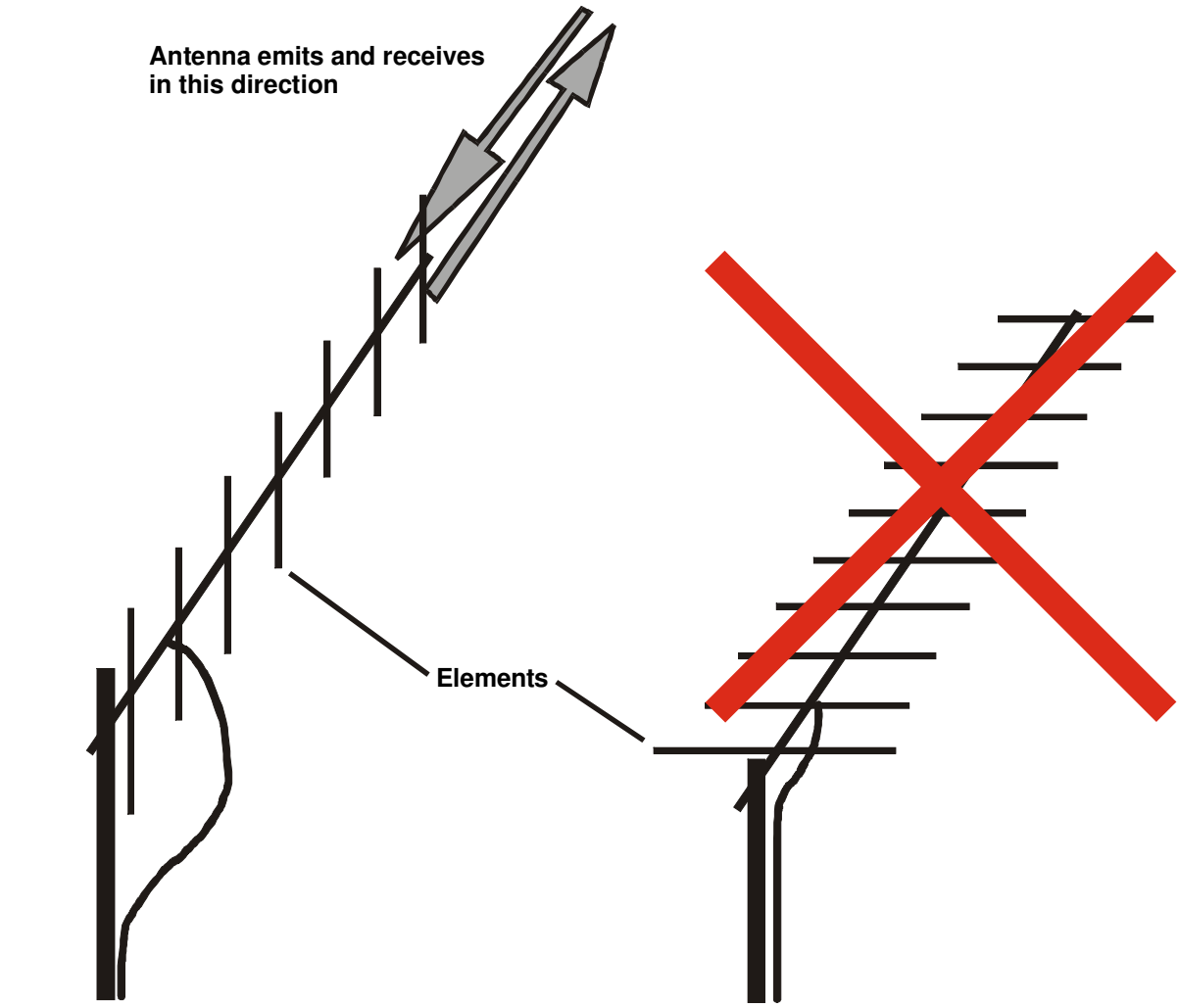
   If your receivers are installed in different directions from the point of view of the controller you will use the directional Yagi antenna for the programming and testing of receivers with the antenna pointing towards the currently addressed receiver and another omni-directional antenna to fire the display. Please inquire if you need any special antenna, we can provide excellent products for numerous applications.

   How a Yagi antenna looks like is shown in the section 'Antenna alignment' of this manual.

17. Antenna alignment

Due to the fact that the antennas on the receivers are vertically aligned the antenna of the controller should be used also vertically. Otherwise noticeable losses will occur.

The same applies to the elements of the Yagi antennas mentioned above.
The elements of the Yagi should be always vertical.



Correct:
Elements are vertical
(i.e. V-Polarization)

Wrong:
Elements are horizontal
(i.e. H-Polarization);
A 30% loss is the consequence.

Ground level

18. Notes regarding the housing of the devices

The housing is not water tight. Protect the device form moisture and water ingress.

Do not open the device. No user serviceable parts are inside.

19. Handling and cleaning

The device is very robust. Please take care that no burning or hot cinders of the firework effects fall onto the device, which may cause damage to the surface.

Use a piece of cloth, which was moistened with water and at most with ethyl alcohol, for cleaning the device. Strong detergents and abrasives could damage the surfaces.

Keep all electrical contacts always clean.

20. Maintenance

In general the amplifier needs no special maintenance if used properly. Depending how often the device is in use it can be meaningful to send it to the manufacturer to test all functions every one or two years.

21. Warranty

The warranty period is 24 months.
If there is any defect during in this period please pack the device properly and send it to the manufacturer with carriage paid to have it repaired free of charge. Please do not forget to attach a description of the symptoms, which have occurred. Warranty is excluded if the device was damaged due to wrong usage or excessive stress.

22. Damages caused by misusage, maloperation, malfunction

The device has been designed for firing of pyrotechnical effects only (Stage / Aerial Displays / SFX). Discuss all other applications with the manufacturer before usage. In the case that one of the events stated above has happened we are only liable if the defect was within our range of influence. The devices have been developed, manufactured and tested to the best of our knowledge and belief.

Especially the user's work must comply with the safety regulations at all times.

A long test period and our practical experience proved that the system is absolutely reliable even if used in difficult conditions.

23. Technical data

General data:

Input power	0.01 Watt (10 Milliwatt)
Input Impedance	50 Ohms
Maximum continuous output power	30 Watt
Output Impedance	50 Ohms
Frequency range	433.000 - 435.000 MHz
Allowed modulation	FM
Temperature range	-20 to +70°C
Humidity	10-90% rH, non-condensing
Power Supply / Fuse	Mains Supply 230V AC 50 Hz, 250V AC 4AT delay-action fuse, dimensions 5 x 20 mm
Power Consumption	30 Watt with no output 185 Watt with an output of 30 Watt
Cooling method	Forced air cooling
Communication	bi-directional, semi-duplex: Transmitted signal is amplified, in receiving mode the antenna is connected directly to the input to enable reception, attenuation is less than 1 dB

Dimension and weight:
580 x 390 x 180 mm; 16 kg

Radio range:
Typical range in urban environment: approx. 800 to 2,000 m,
Typical range on open land: approx. 2,000 to 5,000 m,
Maximum range with good conditions (free line of sight, transmitting antenna elevated at a height of at least 3 meters, receivers with antennas mounted on a pole at a height of at least 2 meters): approx. 5 to 20 km

Supplied accessories, included in delivery:
1 Cable for mains supply, 'Schuko' to IEC-60320 C14
1 Control cable type Sub-D 9way to connect to the PFC Advanced for automatic switching between transmit and receive mode (two male connectors, all signals wired 1:1)
1 RF cable (type RG-58, Z=50 Ohms) for the input signal, length: 1 m
1 RF cable (type RG-58, Z=50 Ohms) to connect the output of the amplifier with the antenna, length: 5 m
1 Adaptor connector: male PL-259 to female BNC
1 Adaptor connector: female BNC to female BNC
1 Standard antenna
2 Keys
1 Operation manual