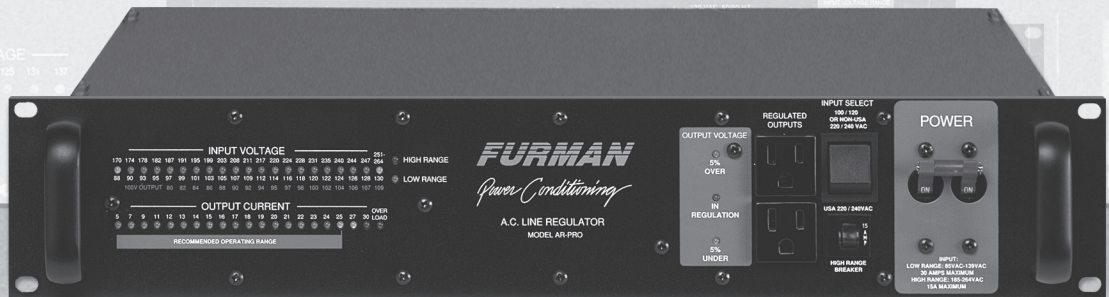


# AR-PRO

## AC LINE VOLTAGE REGULATOR



**FURMAN**  
**AR SERIES**

# AR-PRO – AC LINE VOLTAGE REGULATOR

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*Congratulations on your purchase of a Furman AR-PRO AC Line Voltage Regulator. The AR-PRO is the perfect accessory to any audio, video, or computer rack-mount system requiring clean, filtered, and regulated AC power for optimum operation. It is the ultimate high current regulating product for audio, video, computer, and broadcast professionals.*

## READ THIS FIRST!

1. Carefully inspect your AR-PRO for signs of damage that may have occurred in shipping. Any such damage is the responsibility of the carrier. If necessary, file a claim directly with them.
2. The AR-PRO is a complex electronic instrument with various wiring options. You cannot simply “plug in and go.” The supply cable must be adequate for your installation needs. Take the time to read this manual, especially the sections on Installation and Operation. If in doubt, obtain the assistance of a licensed electrician.
3. To insure full protection under the terms of the Limited Warranty in case your ownership documents are lost, please fill out and return the Warranty Registration Card immediately. Verify that the serial number shown on the Warranty Card matches the serial number on your unit.

## GENERAL INFORMATION

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### FEATURES OF THE AR-PRO

- Delivers 120 VAC  $\pm 4\%$  anywhere within capture ranges of 88 to 134 and 170 to 264 volts AC, 50/60 Hz, single phase
- Extends the usable voltage range for most equipment to 80 to 267 VAC
- Input voltmeter bar-graph with 21 LEDs
- Output ammeter bar-graph with 21 LEDs indicates low, normal, or high output voltage/current
- Fourteen regulated, conditioned outlets (2 front, 12 rear)
- Input capacity 30 amps; output capacity 22.5 to 30 amps
- Provision for remote turn-on/turn-off; multiple units may be turned on simultaneously or in a delayed sequence
- Multiple-stage transient (spike) suppression
- Multiple-stage RFI filtering
- Low stray magnetic field leakage
- Compact 3.5” rack-mount unit weighs only 50 lbs (23 kg)

### AR-PRO DESCRIPTION



# AR-PRO – AC LINE VOLTAGE REGULATOR

The AR-PRO is intended to protect computer, audio, video and other electronic equipment from problems caused by AC line voltage irregularities - sags, brown-outs or over voltages that can cause sensitive digital equipment to malfunction, or, in extreme cases, to sustain damage. It accepts single phase input AC voltages anywhere within two capture ranges, 88 to 134V (low range) or 170 to 264V (high range) and converts them to the North American standard 120 volts (or, on model AR-PRO-J, to 100V). Voltages outside the ranges may be converted to usable levels, depending on how far out of range they are and what is considered usable. For example, *any* voltage from 80 to 267 will be converted to 120V  $\pm$ 4%. See Figure 1 below.

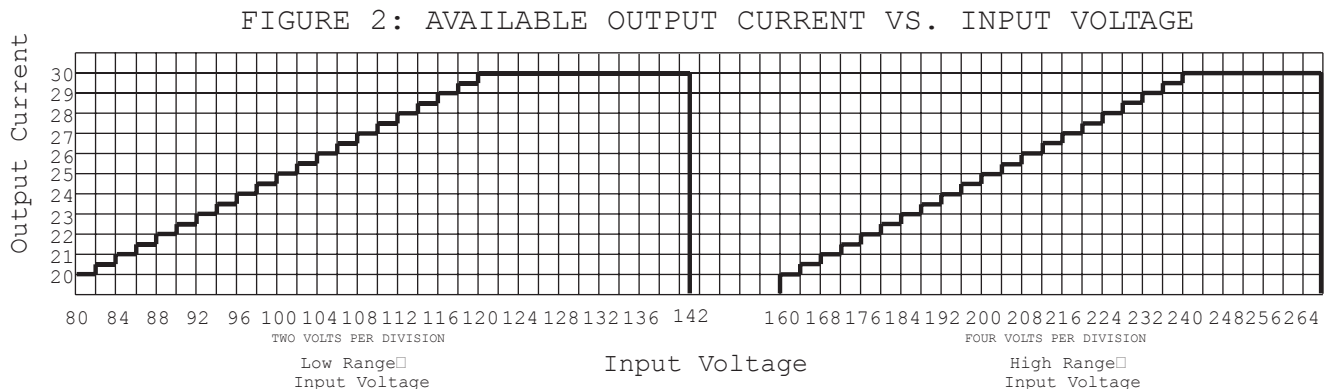
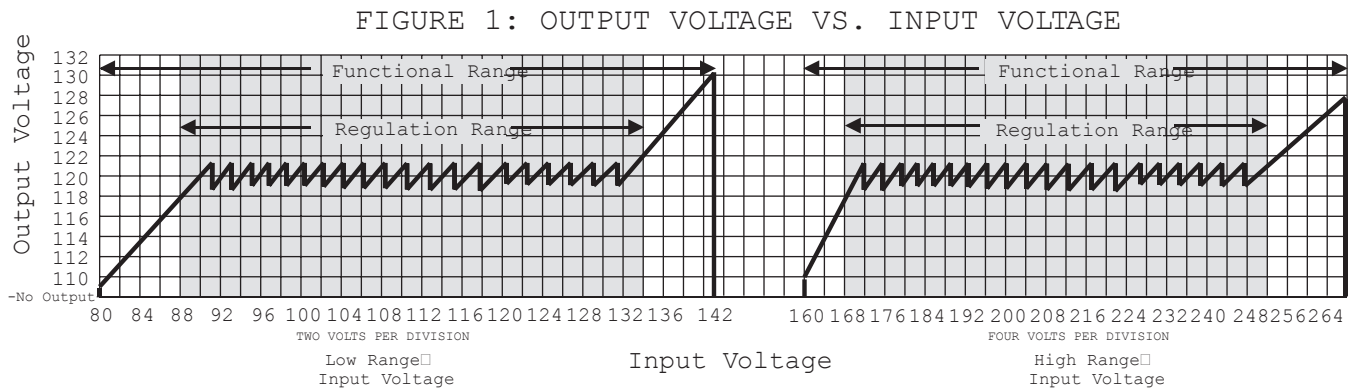
The AR-PRO can handle loads totaling up to 30 amperes as long as the input voltage is equal to or above 120 volts (low range) or 240 volts (high range). For voltages below those levels, its capacity must be derated at approximately one-quarter ampere per volt. See Figure 2 below.

In live performance situations, where each act requires a special AC configuration, accidental connection to

incorrect AC voltages occurs surprisingly often with disastrous consequences.

Because of its dual range capability, the AR-PRO can protect against a catastrophic error in AC mains wiring. This feature also makes the AR-PRO ideal as a component of a power distribution scheme suitable for worldwide use, accommodating national voltages of 100, 120, 220, 240, or others, with equal ease and without the need for readjustment.

The AR-PRO uses a design based on a 25-tap toroidal autotransformer. The toroidal design assures minimal leakage of stray magnetic fields in a highly efficient, compact package. The AR-PRO's circuitry monitors the incoming line voltage with each cycle. If a voltage change requires that a different tap be selected, the new tap is electronically switched in precisely at the zero-crossing, to avoid distorting the AC waveform. If necessary, the AR-PRO can switch taps as often as once each cycle. Most commercial voltage regulators using multiple-tapped transformers switch taps with relays at uncontrolled times, thereby *creating* voltage spikes! And unlike voltage regulators that employ Ferro



# AR-PRO – AC LINE VOLTAGE REGULATOR

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resonant transformers, the AR-PRO is not sensitive to small errors in line frequency, making it ideal for use with generators.

The AR-PRO has twelve convenience outlets on its rear panel, and two on the front panel. All outlets are regulated, spike-suppressed, and filtered against RFI with a 3-pole filter. There are no controls except a master circuit breaker, which serves as an on-off switch. Two bar-graph meters, each comprised of 21 LEDs indicate input voltage and output current. Three other LEDs indicate proper function (i.e., the output voltage is either within  $\pm 5\%$  of desired output, or above or below that range). One or more units may be turned on remotely, either simultaneously or in sequence, by switching an internally-derived DC control line.

The AR-PRO is housed in a double space (3.5" high and 17" deep) rack-mount chassis, and weighs only 50 lbs (23 kg). It is made of extremely rugged heavy-gauge black powder coat steel. Adjustable rear rack ears (RPM-2, sold separately) allow it to be secured in both front and rear. It comes equipped with a 125/250V-30A twist-lock input connector and a mating female cable-mount connector, ready to terminate your own custom supply cable.

To precisely monitor the AR-PRO's output voltage, you may want to use one or more Furman **PL-Series Power Conditioner and Light Modules**. Furman's PL-Series is the perfect complement to the AR-PRO for rack power distribution. Voltage meters monitor the incoming line (the AR-PRO's output), twin slide-out lights with a dimmer control illuminate your equipment, and eight additional outlets provide spike/surge protection and RFI filtering.

## AR-PRO LIMITATIONS

AC power is, to some extent, unpredictable. The available voltage may vary from place to place and from moment to moment. The waveform may not be a perfect sine wave, and high or low frequency noise may be present. AC power also varies from country to country in terms of voltage and frequency.

The AR-PRO is intended to reduce to the greatest extent possible, the impact of these irregularities. However, you should be aware that there are certain things

it cannot do. These include, but are not limited to:

1. Protecting against direct lightning strikes.
2. Protecting from complete loss of power (blackouts).
3. Performing frequency conversion to 60 Hz.
4. Isolating ungrounded equipment.
5. Handling multiple-phase power.

## INSTALLATION

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### SUPPLY CABLE WIRING

Because of the myriad differences in electrical code requirements around the world, plus the varying cable length needs in individual installations, it is not possible to include a complete supply cable with your AR-PRO. A cable-mount connector that mates with the AR-PRO's twist-lock connector is supplied, but it is up to the user to connect it to a cable with the appropriate gauge, number of conductors, length, and source-end connector. This section is intended to assist in determining the kind of cable to use, and in attaching it to the twist-lock connector.

### SELECTING THE CABLE

For nominal 120 VAC operation, 3 conductor cable of **at least 10 AWG\*** (.101"/2.56mm diameter) should be used, depending on distance from the power source.

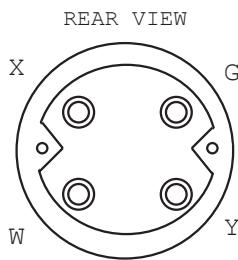
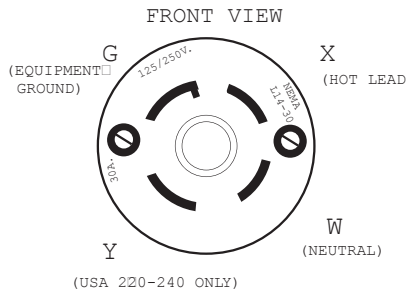
For nominal 220-240 VAC operation, 3 conductor cable of **at least 14 AWG** (.064"/1.62mm diameter) should be used, depending on distance from the power source.

Rubber-jacketed cable is highly recommended for best flexibility and abrasion resistance. It is permissible to use 4 conductor cable, but it is not necessary to do so and is not recommended.

\* American Wire Gauge

# AR-PRO – AC LINE VOLTAGE REGULATOR

Refer to the following diagrams for wiring the twist-lock connector:



All wiring configurations except North America 220-240V:

Wire hot lead to X (black in North America; black, brown, or black with white stripes in Europe). Wire the neutral to W (white in North America; blue in Europe). Wire the equipment ground to G (green in North America; green with yellow stripes in Europe).

**North America 220-240V:** Wire the two hot leads to X and Y (black, and white or red), and the equipment ground to G (green). Since the USA 220-240 doesn't use a neutral, you don't need to wire it. **However, because of the lack of a neutral, it is essential that all equipment powered by an AR-PRO be properly grounded! Never cut off the power cord ground pin or use a "cheater" adaptor on any of your equipment. Output neutral will have voltage.**

## EFFECTS OF CABLE LENGTH

When dealing with high currents such as those handled by the AR-PRO, the supply cable itself must be considered part of the load. As such, the length, gauge, and temperature rating of the insulation must be taken into account. The minimum wire gauges we suggest may not be large enough when the cable run is longer than about 20 feet (7 meters). The smaller the cable conductors are, the more fluctuation of input voltage

there will be. This is due to the greater voltage drop. For example, the recommended minimums will result in a drop of approximately 1.0 volt for each 30 feet (10 meters) of cable.

Increasing the cable by one AWG size will reduce the drop to 1 volt per 45 feet (15 meters). Bigger is definitely better in this case.

## SOURCE-END CONNECTOR

The connector used at the source end should be rated at least 250V-15A for high range operation, or 120V-30A for low range operation. If in doubt, consult a licensed electrician when installing your AR-PRO.

## RACK MOUNTING

Because its toroidal transformer design has minimal magnetic leakage, the AR-PRO may be successfully installed in the same rack as other equipment. Though small for a device capable of handling 30 amps, this leakage is not zero. It is wise to avoid positioning the AR-PRO immediately adjacent to equipment which handles low-level signals, such as preamps, mike mixers, etc. Power amps or other high level devices would make better "rack neighbors." If excessive hum or buzz is present in the audio signal, you may be able to reduce or eliminate it by leaving more empty spaces next to the AR-PRO.

Suggested rack locations would be near the top or bottom, with the bottom preferred due to the AR-PRO's weight. Because the AR-PRO generates considerable heat, leaving at least one empty space above and one below is recommended to aid in convective cooling. As with any rack-mount equipment, be sure to use 10-32 machine screws for mounting in the rack's tapped holes. In particular, beware of 10-24 screws, which may fit, if forced, but will strip the threads. To avoid marring the front panel finish, use plastic washers under the screw heads.

Adjustable rear rack ears (RPM-2, sold separately) permit the most secure rack installation. It is essential to use them when mounting the AR-PRO in any rack position other than the bottom. If your rack has no rear rack rails, you may wish to install them or at least substitute securely mounted blocks of wood.

The rear rack ears can be attached to the wood blocks with wood screws. They can be adjusted to any rail-to-rail spacing from 17 to 18.5 inches by loosening the three adjusting screws on each side, sliding the ears to a new position, and retightening them.

# AR-PRO – AC LINE VOLTAGE REGULATOR

## OPERATION

### FRONT PANEL FEATURES

**INPUT VOLTMETER:** Measures input voltage in either of two ranges. The appropriate range is selected automatically and is indicated by an LED at the end of the scale. All LEDs are green except those at the extreme high and low ends, which are yellow. (Model AR-PRO-J has a 120V/100V switch on the rear panel. When it is set to 100V, use the blue scale for the low range.)

**OUTPUT AMMETER:** Measures output current when it is between 5 and 30 amps. An additional "Overload" LED indicates current of 30A or more (if an overload continues for more than a few seconds, the circuit breaker will trip). The grey bar indicates a recommended operating range. The LEDs are green within this range, and become first yellow and then red when it is exceeded.

**OUTPUT VOLTAGE INDICATORS:** This display indicates whether the output voltage is within 5% of nominal 120V (or for model AR-PRO-J, either 120V or 100V depending on the rear panel switch setting). It will light green when IN REGULATION, & yellow if 5% OVER or 5% UNDER.

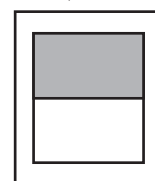
The yellow lights come on only when the input voltage is extremely far from normal. However, that doesn't necessarily mean your equipment won't work (even 10% below 120V is 108V, which is still adequate for most 120V equipment.)

**INPUT SELECT:** The Input Select Switch is the only front panel control. Its function is to select the correct hot and neutral wires in the supply cable, consistent with cable wiring in conformance with USA electrical codes. This switch is necessary because the United States (and other North American countries) use a different AC wiring scheme.

The upper position is for any situation in which the AR-PRO is fed either 120V or 100V, or 220V to 240V in a non-North American country. This corresponds to a two-wire scheme (hot-neutral).

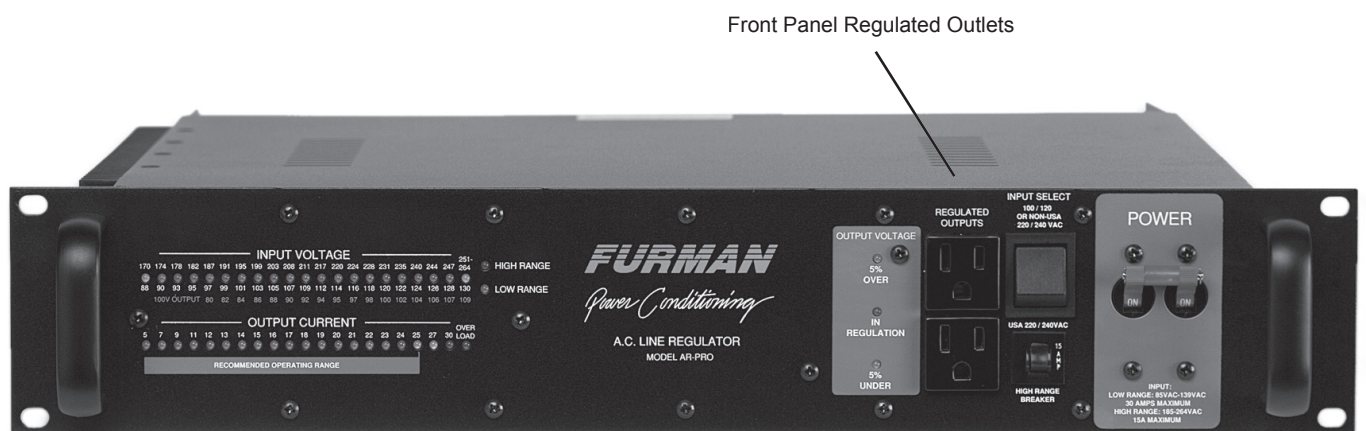
The lower position should be selected only when running the AR-PRO off 220V/240V *within the USA (or North America)*. This corresponds to a three-wire scheme (hot-neutral-hot), even if the neutral wire is omitted from the supply cable.

INPUT SELECT  
100/200  
OR NON-USA  
220/240 VAC



USA 220/240 VAC

Note that this switch only selects the active pins on the four-pin twist-lock supply connector. It does not select the voltage range (that is done automatically). Therefore, if the switch is inadvertently set to the wrong position, the AR-PRO will simply not receive power and will not operate. No damage will be done. (*Operation will be restored when the switch is reset correctly.*)



Front Panel Regulated Outlets

Voltage and Current

Over/Under Voltage  
and "In Regulation"  
Indicators

Current Breaker for off-shore  
220-240 V operation

AC Power Switch and  
30 Amp Magnetic Circuit  
Breaker



# AR-PRO – AC LINE VOLTAGE REGULATOR

**HIGH RANGE BREAKER:** The AR-PRO's basic current rating is 30 amps output at 120 VAC. The current at the input (where the circuit breakers are located) will be the same as the output only if the input voltage is also 120V (low range). If the AR-PRO is powered from a 220/240 volt source (high range), the input current will be approximately half, or 15 amps, to produce the rated 120V, 30A at the output. Therefore, safety considerations require a separate 15A breaker which is active only when a high range (170 volts or higher) supply voltage is used. This breaker trips by popping out. If it trips, decrease the load on the AR-PRO and push it in to reset.

**POWER SWITCH:** This is the AR-PRO's main on-off switch. It is actually a 30 ampere magnetic-trip circuit breaker rated for use as a switch. If the current drawn through the AR-PRO exceeds 30 amps at any time, the breaker will trip by snapping into the off position. If this happens, decrease the load on the AR-PRO and turn it back on.

After turning the Power switch on, there is a delay of approximately 3 seconds before power is available at the AR-PRO's output.

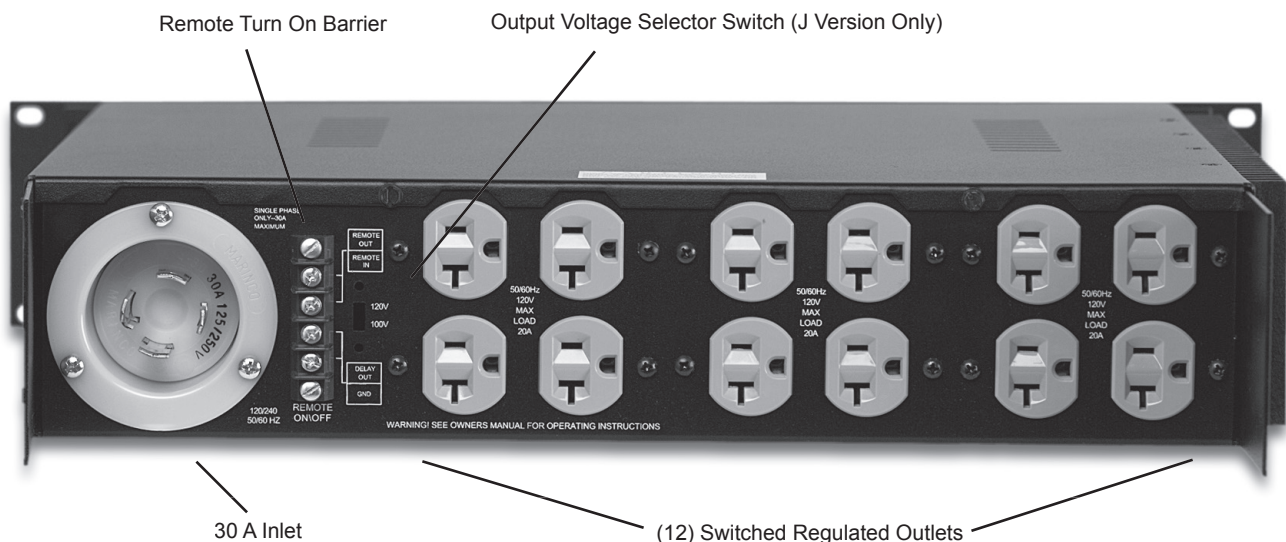
## REAR PANEL FEATURES

**INPUT CONNECTOR:** This 4-pin twist-lock connector is rated at 30 amperes for 120/240 volt service. See the Installation section for information on wiring a supply cable. **120V/100V SWITCH (Model AR-PRO-J**

**only):** The AR-PRO-J can supply 120 VAC for use with equipment intended for North America, or 100 VAC for equipment intended for use in Japan and other countries. Choose the setting that matches the type of equipment you plan to power with the AR-PRO-J.

**TERMINAL STRIP FOR REMOTE OPERATION:** Connection to this screw-terminal strip allows for a single AR-PRO to be turned on remotely, or for multiple AR-PROs to be turned on remotely, either simultaneously or in a delayed sequence. A built-in delay of approximately half a second is available to stagger the potentially large inrush currents that occur when certain types of equipment are powered up simultaneously. Using such a delayed sequence can avoid blowing a house breaker when all the AR-PROs are powered from the same circuit. See the section on Remote/Delayed Operation later in this manual for details. Note: No connections or jumpers are needed for normal AR-PRO operation.

**REGULATED OUTLETS:** There are 14 regulated outlets on the AR-PRO, two in front and the balance in the rear. While the combined load formed by all equipment plugged into all 14 outlets may not exceed 30 amps, the load on any one individual outlet may not exceed 15 amps, which is the maximum permissible for the type of connector used.



# AR-PRO QUESTIONS AND ANSWERS

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*Q. What happens if the Input Select switch is set to the wrong position and power is applied to the AR-PRO?*

A. In most cases, power will not reach the AR-PRO's input and it will appear to be dead. Normal operation will resume as soon as the switch is restored to the correct position. The only exception to this rule would be in the event that a 4-wire power cable is used and is **connected to** a USA source of 240V. In that case, the wrong setting will result in the AR-PRO running off half the line (120V-i. e., **the low range**). The AR-PRO will function normally, but there is a minor disadvantage to running this way. See the next question.

In no case will an incorrect setting of the Input Select switch result in damage.

*Q. If both 120V and 240V are available, which is better to use?*

A. 240V. Since an output of 120V at 30 amps requires only 15 amps in the supply cable at 240V, you can use a lighter gauge of wire in the supply cable (see section on Installation for details). Also, the smaller current necessary for high range (240V) operation allows all the internal components of the AR-PRO to run cooler and therefore may prolong its service life.

*Q. Will the AR-PRO protect my equipment from lightning strikes?*

A. Maybe. If lightning strikes a distant power line and causes a relatively small disturbance to reach your location, the spike suppressors in the AR-PRO will absorb the excess voltage invisibly and harmlessly. However, if lightning strikes the actual building where the AR-PRO is installed (or somewhere very nearby), equipment damage may be unavoidable due to the extremely high voltage and current present. If this does occur, most likely damage to the AR-PRO itself will be limited to the spike suppression components (called varistors or MOVs), which should be a relatively minor repair.

Any **AR-PRO known to have taken** a direct lightning hit should be checked by a qualified technician or the Furman factory to determine whether the MOVs need

replacement. If they are damaged, the AR-PRO may appear to be working normally, but its vital spike-suppression capability will be eliminated.

You should not rely on the AR-PRO to protect against a direct lightning hit. That is not its purpose, and damage caused by lightning is specifically excluded from its warranty. Your first line of defense against lightning should be a lightning arrestor installed on your building's electrical service entrance. If your building does not have one, contact your local power company or an electrical contractor to have one installed.

*Q. I am running a rack of power amps through the AR-PRO. Can I turn them all on at once with the AR-PRO's Power switch?*

A. We recommend against this because of the high inrush currents which power amps consume to charge their large power supply capacitors when first turned on. This could cause the AR-PRO's circuit breaker to trip even though the steady-state load is well within its rating. To avoid this, turn the power amps on one at a time with their own on-off switches, waiting a few seconds between each. (Furman's **PS-8R / PS-PRO Power Sequencers** will do this for you automatically). It is not necessary to do this with most other types of equipment. However, the general rule is that the function of the AR-PRO's circuit breaker is no different from any other circuit breaker. If turning on any combination of equipment simultaneously without the AR-PRO causes a house breaker to trip, adding the AR-PRO will not decrease the likelihood of this.

*Q. My steady-state current is well below the AR-PRO's 30 amp limit. But when I begin playing music, the current jumps up and the breaker trips. Why?*

A. The current used by many kinds of audio equipment (especially power amps) increases with musical peaks. The AR-PRO's ammeter may actually bounce up and down with the music like a VU meter. There is an important difference, however. When a VU meter goes to the top of its scale, an overload light may go on and you may hear some distortion. But when you try to draw too much current through the AR-PRO, its circuit breaker will trip and shut all your equipment off - a much more serious and inconvenient occurrence. In fact, this may happen below the top of the ammeter scale if the input voltage is lower than 120. Therefore, be conservative. Do not allow the ammeter reading to exceed more than two-thirds of maximum on the highest peaks. If it does, unplug some equipment and



power it through a different circuit.

*Q. Why is there a 3 second delay before power goes on?*

A. This built-in delay allows the internal sensing circuitry to stabilize and provides a means of turning on a group of AR-PROs in a delayed sequence.

*Q. I connected the AR-PRO through a Ground Fault Interrupt (GFI), and it keeps tripping. What can I do?*

A. Some European countries are using GFI circuits that will disconnect the load on sensing approximately 3 mA of ground current. This relatively small current can be created by the filters whose purpose is to clean up the power by shunting noise and interference to ground. In doing so, these filters can create the very leakage currents that cause the GFIs to trip! If use of the GFI is unavoidable, the only way to alleviate this problem is to reduce the amount of filtering by removing some of the capacitors that shunt the noise to ground. If this becomes necessary, consult the factory for assistance.

In North America, the GFIs we have tested trip at closer to 5 mA and are therefore generally not a problem. Also, running on the lower voltage range cuts the leakage current in half.

*Q. Are there any special considerations for using the AR-PRO with equipment containing switching power supplies?*

A. Switching power supplies are frequently used in video gear, lighting controllers, computers, and a variety of programmable logic controllers for controlling industrial equipment. Such supplies generate harmonics in the AC current waveform because they work by switching on and off at high speed. The amount of current being drawn by equipment using switching supplies may appear well under the AR-PRO's 30 amp limit when measured by a conventional average or RMS reading meter, but the heating effects in the wiring (both hot and neutral) can cause the wiring to be severely overloaded for its rating. If your load appears well within limits yet things are running hot, breakers are tripping, and/or transformers are buzzing, you may be experiencing high harmonic content in your power line. In such a situation, reduce your load by unplugging some equipment and power it through a different circuit.

Even if you are not running this type of equipment, you may experience the same effects if someone else on your line is doing so. Your utility company may be able

to help you determine the cause.

## REMOTE/DELAYED OPERATION

It is possible to control one or a group of remotely located AR-PROs using wiring carrying only a low control voltage. This can be very convenient in certain situations; for example, turning on amplifiers on a stage from a sound booth in the rear of a hall. The control signal can be safely routed through wiring no heavier than an unused microphone line. The control signal is DC, so it will not cause noise in adjacent audio lines. The necessary voltages are generated internally in the AR-PRO; all that is needed is wiring and a SPST switch.

All connections for remote operation are made through the screw terminal strip on the rear panel.

There are three recommended configurations:

**Single AR-PRO, local turn-on only:** Turn-on/off is with the Power switch on the front panel. No wires or jumpers should be connected to the terminal strip.

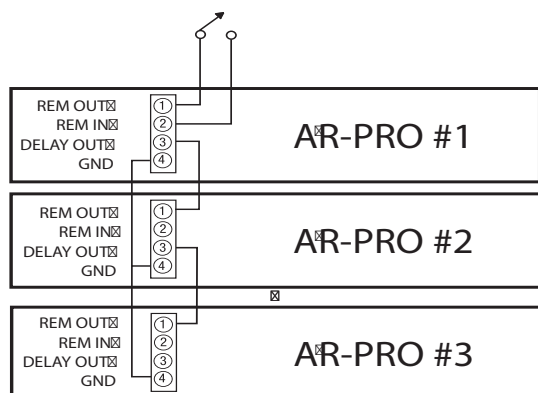
**Single AR-PRO, remote turn-on:** Connect a switch between the Remote Out and Remote In terminals. Leave the front panel Power switch in the ON position. When the switch is open, the AR-PRO is on; when closed, the AR-PRO, is off.

**Multiple AR-PROs, remote turn-on in delayed sequence:** A built-in delay of approximately a quarter second is automatically provided to stagger the potentially large inrush currents that occur when certain types of equipment are powered up simultaneously. Using such a delayed sequence can avoid blowing a house breaker when all the AR-PROs are powered from the same circuit.

To create a remote delayed sequence, all front panel Power switches must be left in the ON position. All Ground terminals must be connected together. The Delay Out of the first AR-PRO (the one that will turn on first) is connected to the Remote Out of the second unit. The Delay Out of the second AR-PRO is connected to the Remote Out of the third unit, and so forth for additional units.

The master on-off switch must be connected to the

# AR-PRO – AC LINE VOLTAGE REGULATOR



Remote In and Remote Out terminals of the first unit. See the following illustration.

The diagram above illustrates a set of three AR-PROs connected for remote turn-on in delayed sequence. When the switch is opened, unit 1 turns on after 3 seconds. Unit 2 turns on a quarter second later, and unit 3 turns on a quarter second after unit 2.

## 100 VOLT OPERATION

If you have a Model AR-PRO J, it may be switched for use in powering equipment made for the Japanese domestic market or for use in other countries with nominal 100 volt AC lines. A slide switch located on the rear panel allows the selection of either 100V or 120V output. Note that there is a blue scale on the INPUT VOLTAGE meter on the front panel for 100V use.

The capture range of the AR-PRO in 100V mode (the range of voltages that will produce 100  $\pm$ 5V at the output) is from 80 to 112V and from 160 to 220V  $\pm$ 5%.

## LIMITED WARRANTY

Furman Sound, Inc., having its principal place of business at 1997 South McDowell Blvd., Petaluma, CA 94954 ("Manufacturer") warrants its AR-PRO (the "Product") as follows:

Manufacturer warrants to the original Purchaser of the Product that the Product sold hereunder will be free from defects in material and workmanship for a period of one year from the date of purchase. The Purchaser of the product is allowed fifteen days from the date of purchase to complete warranty registration by mail or on-line at the Furman website. If the Product does not conform to this Limited Warranty during the warranty period (as herein above specified), Purchaser

shall notify Manufacturer in writing of the claimed defects. If the defects are of such type and nature as to be covered by this warranty, Manufacturer shall authorize Purchaser to return the Product to the Furman factory or to an authorized Furman repair location. Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date; this is not necessary if the Warranty Registration was completed either via the mailed in warranty card or on-line website registration. Shipping charges to the Furman factory or to an authorized repair location must be prepaid by the Purchaser of the product. Manufacturer shall, at its own expense, furnish a replacement Product or, at Manufacturer's option, repair the defective Product. Return shipping charges back to Purchaser will be paid by Manufacturer.

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Manufacturer does not warrant against damages or defects arising out of improper or abnormal use of handling of the Product; against defects or damages arising from improper installation, against defects in products or components not manufactured by Manufacturer, or against damages resulting from such non-Manufacturer made products or components. This warranty shall be cancelable by Manufacturer at its sole discretion if the product is modified in any way without written authorization from Furman Sound. This warranty also does not apply to Products upon which repairs have been affected or attempted by persons other than pursuant to written authorization by Manufacturer.

THIS WARRANTY IS EXCLUSIVE. The sole and exclusive obligation of Manufacturer shall be to repair or replace the defective Product in the manner and for the period provided above. Manufacturer shall not have any other obligation with respect to the Products or any part thereof, whether based on contract, tort, strict liability or otherwise. Under no circumstances, whether based on this Limited Warranty or otherwise, shall Manufacturer be liable for incidental, special, or consequential damages. Manufacturer's employees or representatives' ORAL OR OTHER WRITTEN STATEMENTS DO NOT CONSTITUTE WARRANTIES, shall not be relied upon by Purchaser, and are not a part of the contract for sale or this limited warranty. This Limited Warranty states the entire obligation of Manufacturer with respect to the Product. If any part of this Limited Warranty is determined to be void or illegal, the remainder shall remain in full force and effect.

## SERVICE

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number and a description of the problem.

NOTE: All equipment being returned for repair must have a Return Authorization (R/A) Number which can be obtained by calling the Furman Service Department, (707) 763 – 1010 ext. 120 or 121, between 8 a.m. and 5 p.m., U.S. Pacific Time. Please display your R/A Number prominently on the front of all packages.

## DEFINITIONS

**VOLTAGE REGULATION** – The A.C. line voltage is a number indicating the nominal electrical potential that has been adopted by a region for powering electrical equipment of all kinds. In the United States and Canada it is 120 volts; in Japan, 100 volts; and in many other countries 220 to 240 volts. The actual voltage can fall below or rise above this nominal level due to brownouts, power cutbacks, use of substandard wiring, and other causes. These deviations can cause poor performance or malfunction. A regulator is a device which, through use of a transformer, corrects the voltage deviation by stepping it up or down so that it is as close as possible to the nominal level.

**SPIKE** – A pulse of energy on the power line. Spikes can have voltages as high as 6000 volts.

Though they are usually of very short duration, the energy they contain can be considerable, enough to damage sensitive solid-state components in audio and computer equipment. Spikes can also foul switch contacts and degrade wiring insulation. They are an unavoidable component of electric power. They are caused unpredictably by electric motors switching on or off (on the premises or outside), utility company maintenance operations, lightning strikes, and other factors. Spikes (also called surges or transients) are absorbed by special components in the AR-PRO to provide safe voltage levels to protect your equipment.

**RFI / EMI INTERFERENCE** – Noise from RFI (Radio Frequency Interference) or EMI (Electro Magnetic Interference) involves lower voltages and less energy than is found in spikes, but it is continuous rather than transient in nature. It is not likely to cause damage, but it can certainly be annoying, producing static in audio circuits, “snow” on video screens, or garbled data in computers. Noise can be introduced into AC lines by nearby radio transmitters, certain kinds of lighting, electric motors, and others. Because noise occurs at higher frequencies than the 50 or 60 Hz AC line, it can be effectively reduced through use of low-pass filtering.



## AR-PRO SPECIFICATIONS

### Current rating:

30 amperes for input voltages of 120 (low range) or 240 (high range) or higher; derate at .25A per volt to a minimum of 22.5A

### Input Voltage Ranges:

Functional range 80 to 267VAC; provides regulation  $\pm 4\%$  in ranges 88-134 and 170-264 VAC

### Meter Accuracy:

Voltmeter  $\pm 2$  VAC; Ammeter,  $\pm 10\%$ ; factory calibrated

### Spike Protection Modes:

Line to neutral, neutral to ground, line to ground

### Clamping Voltage, line to neutral, neutral to ground:

250 Volts peak (130V rms=184V peak)

### Clamping Voltage, line to ground:

500 Volts peak

### Response time:

1 nanosecond

### Maximum surge current:

5,000 amps (8 x 20 ps pulse)

### Maximum spike energy:

455 joules total

### Noise attenuation: Transverse:

>50 dB, 1 to 120 MHz

### Common mode:

20 dB at 150 kHz, rising to >40 dB, 1 to 120 MHz

### Dimensions:

3.5" H x 19" W x 18.5" D

### Weight:

50 lbs.

### Construction:

All steel chassis, powder coated; supplied with front handles and rear rack ears; FR-4 glass epoxy circuit boards

Adjustable rack ears, RPM-2, are sold separately.

# **FURMAN**

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