

Balanced AC Power Isolation Transformer, 30A

MODEL IT-1230

Owner's Manual



Introduction

Thank you for your purchase of a Furman IT-1230 30 Amp Balanced AC Power Isolation Transformer, and congratulations on your choice. This specially wound and shielded toroidal isolation transformer is designed specifically to reduce hum pickup by sensitive equipment when ultra-low-noise is a must.

Features

- Provides precisely balanced AC power for ultra-low-noise installations
- Typically gives a 16 dB improvement in background noise floor in systemwide installations
- Toroidal transformer with center-tapped secondary is the most efficient, compact design, with least magnetic field leakage
- Soft Start circuit prevents turn-on transients and high inrush currents
- Faraday shield reduces electrostatic coupling between primary and secondary
- Extreme Voltage Shutdown circuit protects against dangerously high or low input voltages
- Microprocessor-controlled "smart" AC voltmeter monitors line voltage, flashes alerts for marginal and extreme conditions
- Provides basic power conditioning functions (spike suppression, RFI filtering)
- Ground fault interrupter (GFCI) protection

Description

Designed for the most critical, ultra-low-noise installations, the IT-1230 can supply 30 amps of balanced AC power to a recording studio, video or film production facility, broadcast station, etc. Its purpose is to drastically reduce hum and buzz caused both by ground currents from power supply filtering and by radiation from supply cables into sensitive signal sources like guitar pickups, tape heads and microphones. Its effect is startling! It not only dramatically reduces the noise floor but also noticeably improves dynamic range and sonic clarity.

The IT-1230's heart is a specially wound and shielded toroidal isolation transformer with a center-tapped secondary. It is housed in a 3-unit (5.25" high) rack mount chassis. The back panel provides a 30-amp twistlock inlet and outlet, plus ten 20A balanced Edison outlets, widely spaced with plenty of clearance for "wall warts"; the front panel provides two more outlets. An IT-1230 can be installed in minutes, though you may require some help in choosing and wiring an appropriate supply cable. The IT-1230 provides clean and completely safe power—there is no need to "lift grounds" or compromise the integrity of safety ground wires to achieve hum reduction.

Special features include an accurate, self-checking AC voltmeter that not only measures normal voltages, but also flashes eye-catching special pattern alerts for off-scale but not extreme conditions (80-90 or 130-140 volts); an Extreme Voltage Shutdown circuit to cause a protective shutdown if the unit is exposed to dangerous voltages (like accidental connection to 220V); and a special "Soft Start" circuit to prevent the large in-rush surge currents and spikes that would otherwise occur at turn-on and turn-off with such a large transformer.

Background

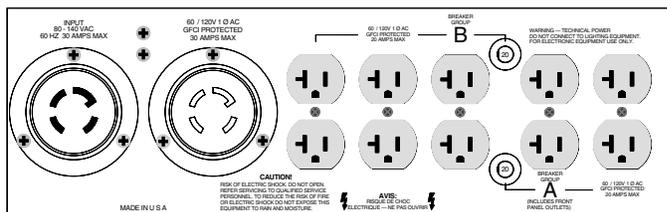
In much the same way that balanced audio lines can reduce the pickup of hum and other types of electromagnetic interference (EMI), the use of balanced AC power lines in sensitive audio, video, or computer installations can make an enormous difference in system noise. But power distribution in North America, unfortunately, is not balanced. The distribution standards currently in use were derived from practices established over a century ago, when electric power use was limited to lighting and motors—long before any EMI-sensitive applications existed. The emphasis then was on convenience (from the power utilities' standpoint) and safety, but not noise cancellation. The result was a three-wire distribution scheme in which 120V branch circuits have a hot wire and a neutral wire, with the neutral tied to a third wire connected for safety to an earth ground. The third wire does not carry any current unless there is a short circuit. This unbalanced scheme causes hum in audio circuits for two main reasons: First, the current flowing in the hot wire induces hum in any other nearby wires, which may carry vulnerable low-level audio signals. Second, because the impedance of chassis and cable shielding to ground is not zero, ground current flowing from power supply capacitors and from EMI pickup causes a voltage drop at 60 Hz and its harmonics which is added to the audio signals.

With a center-tapped isolation transformer, the AC power feeding a studio can be balanced at its source. The current-carrying wires then are no longer “hot” (120V) and “neutral” (0V), but two equal and opposite lines of 60V each (referenced to the safety ground connected to the center tap), which add to 120V. This type of power, when run around a room, does not induce hum into nearby audio wiring, because the two power conductors induce equal and opposite voltages that cancel each other out. Similarly, ground currents are all but eliminated by the same common-mode cancellation effect. No longer is it necessary to adopt cumbersome and expensive star-ground systems or use massive bus bars or heavy ground rods. All such systems are doomed to yield only mediocre results because of the impossibility of reducing the ground impedance to zero. The common-mode rejection of a truly balanced AC supply is far simpler, cheaper, and more effective.

Balanced, or “technical” power, is recognized by the US National Electrical Code (Article 530) for critical, low noise applications.

Installation

The power source to which the IT-1230 is connected must be adequate for use at 30 amps. We recommend a 30 amp circuit,



IT-1230 Rear View

wired with 10 gauge wiring, if continuous operation near 30 amps is anticipated. A dedicated (nothing else connected) 30 amp circuit is the minimum acceptable to comply with NEC requirements. Consult a qualified electrician if in doubt.

The IT-1230 is designed for mounting in a standard 19-inch rack. Because of its weight, the best position for it is at the bottom of the rack. Its toroidal transformer minimizes magnetic leakage, but nevertheless, due to its high capacity, it will radiate an appreciable magnetic field. Therefore, we recommend that it not be positioned adjacent to sensitive, low level signal processors, especially mic preamps, mixers, tape recorders, etc. Power amps may be more suitable “rack neighbors.”

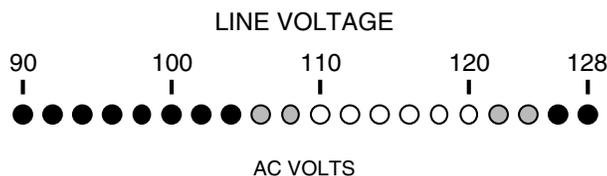
The maximum benefit is derived from balanced power when ALL equipment in an installation is powered with it. Therefore, try to position the IT-1230 in a central location so its power can be easily distributed everywhere it's needed. If the total power consumption of all equipment exceeds 30 amps at 120 volts, delete high level or mechanical devices first (such as power amps, etc.). If possible, physically isolate any such equipment that has to be powered with conventional power through a different circuit, and route their AC cords away from all other cabling.

The balanced power produced by the IT-1230 is restricted to use with electronic equipment only. Balanced power may not be used for lighting equipment, and access must be limited to use by qualified personnel only.

If you are installing the IT-1230 in a rack that has rear as well as front mounting rails, you may wish to order adjustable rear rack ears from Furman. They allow the IT-1230 to be securely attached both in front and in back. Order model RRM-2.

Operation

Circuit Breaker/Switch: The IT-1230 has just one control: the large blue switch on the front panel that is both a precision magnetic circuit breaker and an on-off switch. This breaker will trip (snap to the “off” position) if the total current drawn through the IT-1230 exceeds 30 amps. If this occurs, reduce the load by unplugging some equipment, then flip the switch back to “on.”



Mains	Voltage Status	Voltmeter Reading	Outlets
Below 80V	Extreme (Shutdown)	Meter off—Extreme Voltage LED flashes	OFF
80-90	Low Marginal	The LED beneath the 90V mark flashes	ON
90-104	Low	Meter Reads in Low Red	ON
106-108	Medium Low	Meter Reads in Low Yellow	ON
110-120	Normal	Meter Reads in Green	ON
122-124	Medium High	Meter Reads in High Yellow	ON
126-128	High	Meter Reads in High Red	ON
130-140	High Marginal	All Meter LEDs Flashing	ON
Above 140V	Extreme (Shutdown)	Meter off—Extreme Voltage LED Flashes	OFF

Since safety agencies dictate that the 20 amp Edison outlets be overcurrent limited to 20 amps maximum, they are broken into two groups: Group A includes the two front panel outlets and two duplex receptacles on the rear. Group B is comprised of the remaining three duplex Edison outlets. Each group is protected by its own 20A breaker. The twistlock is capable of a full 30 amps, however.

Soft Start/Outlets On/Off Indicator: When power is first applied to the IT-1230, the Soft Start feature is activated, indicated by a steady yellow color. Soft Start limits the inrush current to the IT-1230's transformer, which would otherwise be excessive. The result is that the IT-1230's output voltage does not reach its full level until several seconds have elapsed. When it has reached its maximum level, the LED color turns to green, indicating that all outlets are fully powered.

Should the power at the IT-1230's outlets go off for any reason—either because the power switch is in the “off” position or because an Extreme Voltage Shutdown has occurred, the LED will light up red.

Extreme Voltage Shutdown: This LED status indicator is normally off. It monitors a hazard particularly common in the entertainment industry: wiring faults—for example, accidental connection to 220V. The IT-1230 senses voltages that are so high or low that operation would be impossible (under 80V or over 140V) and shuts the power down before damage can occur. Upon initially applying power to the IT-1230, this indicator will be lit if the input is receiving below 80 volts or more than 140 volts, and power will not be applied to the IT-1230's outlets. If the unit has been operating with an acceptable input voltage and then that voltage goes out of the acceptable range, the IT-1230 will shut off power to the outlet and this LED will begin flashing.

NOTE: If the mains power is below 80 volts and has caused the IT-1230 to remove power from its outlets, the IT-1230 will not restore power to the outlets until the mains voltage is more than 90 volts. If the mains power is above 140 volts and has caused the IT-1230 to remove power from its outlets, the IT-1230 will not restore power to the outlets until the mains voltage is less than 130 volts. The reason for this is to prevent the power oscillating on and off in marginal conditions.

LED Voltmeter: This three-color, 20-LED bargraph is an accurate, self-checking AC voltmeter that continually measures the IT-1230's input voltage. The meter reads from 90 to 128 volts in two-volt steps. The normal range voltages are indicated in green, with moderate and extremely high or low voltages in yellow and red respectively (see chart on the previous page). The voltmeter provides three special flashing patterns to indicate abnormal power conditions:

1. If only the single LED located beneath the number 90 on the voltmeter flashes, voltage at the IT-1230 input is below 90 volts. Power to the IT-1230 outlets will remain on unless the incoming voltage falls below 80.
2. If all of the LEDs on the voltmeter flash, voltage at the input is between 130 and 140 volts. Power to the IT-1230's outlets will remain on unless the incoming voltage exceeds 140.
3. If none of the LEDs on the voltmeter are lit, and the Extreme Voltage LED indicator is flashing continuously, then the IT-1230 has shut down power to its switched outlets due to input voltage below 80 volts or above 140 volts.

The IT-1230's voltmeter has a basic accuracy of plus or minus two volts, and extreme cold or heat may cause an additional one volt of error. Please note that the voltage reading is advisory only. The IT-1230 does not compensate for high or low line volt-

age. If you frequently move your rack to different locations, derive power from generators, use long extension cords, travel internationally, or are in an area prone to brownouts, you may benefit from the use of one of Furman's AC Line Voltage Regulators.

NOTE: Because the voltmeter reads the input voltage BEFORE the circuit breaker/on-off switch, its LEDs stay on whenever the IT-1230 is plugged in, even when the power switch is off. This feature allows you to check voltage before powering up your equipment. The LEDs are designed for continuous use. They consume little power, just a few cents worth a month, like a clock.

Ground Fault Current Interrupter (GFCI): The GFCI built into the IT-1230 is a special kind of circuit breaker that detects an imbalance in the current flowing in the two hot legs. The “missing” current is presumed to be flowing through the ground conductor (the round pin on an AC outlet). Ground current often indicates a dangerous partial or full short circuit. If an imbalance is detected, the GFCI will trip the main breaker. To restore operation, correct the fault and turn the unit on again. 4-6 mA of current is enough to cause the GFCI to trip; to troubleshoot this type of problem, start with nothing connected to the IT-1230. Then add each piece of gear until the GFCI trips. Contact the manufacturer of the suspect unit for possible solutions.

You should test for proper operation of the GFCI once a month by pushing the button marked GFCI TEST. If the GFCI is working properly, this will cause the GFCI TEST main breaker to trip and to cut off power. You can restore operation after a test by once again turning the unit ON.

IT-1230 SPECIFICATIONS

Output current:	30 amps (3600 watts at 60/120 V 1 ϕ AC, 60 Hz)— Technical power, for electronic equipment (not lighting) only, per NEC Article 530.
Voltage Ranges:	Normal, 90-130; Marginal (flashes alert), 80-90 or 130-140; Extreme (causes shutdown), below 80 or above 140
Inlet:	30A NEMA L14-30P twistlock inlet connector, rear
Outlets:	Rear: 30A NEMA L14-30R twistlock plus 10 NEMA 5-20 (20A Edison) outlets Front: 2 NEMA 5-15 outlets suitable for 20A use
Isolation, Input to Output:	Breakdown Voltage: 1500V minimum Leakage current: 40 mA maximum Capacitance: 300 pf maximum
Turns Ratio:	1:1; windings separated with Faraday shield
Transformer Regulation:	(Full load/no load) 3% at full load
Spike Protection Modes:	Line to neutral, neutral to ground, line to ground Spike Clamping Voltage: TVSS rating of 400 volts peak, L-N, N-G, L-G (tested to UL-1449)
Spike Response time:	1 nanosecond
Maximum surge current:	6,500 amps (8 x 20 mS pulse)
Maximum spike energy:	80 joules per mode, 240 joules total
Noise attenuation:	Differential mode: Greater than 40 dB Transverse mode: Greater than 60 dB Common mode: Greater than 80 dB, 1 to 200 MHz
Mechanical:	Dimensions: 5.25" H x 19" W x 17" D. Weight: 66 lbs. (30 kg). Construction: Steel chassis, powder coated; glass epoxy printed circuit boards
Power Consumption:	8.5 watts for display and control circuits, independent of actual load

The IT-1230 is manufactured in the United States of America

Three Year Limited Warranty

The Furman IT-1230 is warranted against failures due to defective parts or faulty workmanship for a period of three years after delivery to the original owner. During this period, Furman will make any necessary repairs without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner; return shipping charges (via UPS Ground) will be paid by Furman.

This warranty applies only to the original owner and is not transferable. Also, it does not apply to repairs done other than by the Furman factory or Authorized Repair Stations.

This warranty may be cancelled by Furman at its sole discretion if the IT-1230 unit has been subjected to physical abuse or has been modified in any way without written authorization from Furman. Furman's liability under this warranty is limited to repair or replacement of the defective unit.

Furman will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date (if a Warranty Registration Card was mailed in at the time of purchase, this is not necessary). Before returning any equipment for repair, please read the important information on service, which follow.

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. To get an R/A Number, please call the Furman Service Department, (707) 763-1010 ext. 40, between 8 am and 5 pm U.S. Pacific Time. Please display your R/A Number prominently on the front of all packages.

Also Available: Furman IT-1220 and IT-1210 Balanced AC Power Isolation Transformers

For other installations and applications requiring ultra-low-noise performance, consider the Furman IT-1220 and IT-1210.

The IT-1220 (shown below) provides 20 amps of balanced AC power; the IT-1210 is rated at 10 amps. Both models include all of the features and performance of the IT-1230. For more information, please contact us for free data sheets.



Other Furman Products

Power Conditioning & Distribution

PL-8, PL-PLUS	Power Conditioner & Light Module, 15A
PL-PRO	Power Conditioner & Light Module, 20A
PL-TUNER	Power Conditioner/Instrument Tuner, 15A
PLH-15	Power and Light Center, 15A
PM-8	Power Conditioner/Monitor, 15A
PM-PRO	Power Conditioner/Monitor, 20A
PS-8, PS-8R	Power Conditioner/Sequencer, 15A
PS-PRO	Power Conditioner/Sequencer, 20A
PowerLink	Remote AC Power Sequence Controller
PowerPort	Remote AC Power Controller
MiniPort-15	Power Relay, 15A
MiniPort-20	Power Relay, 20A
MiniPort-15Q	Power Relay for Quad Box Mount, 15A
MiniPort-20Q	Power Relay for Quad Box Mount, 20A
RS-1	System Control Panel, Maintained Switching
RS-2	System Control Panel, Momentary Switching
AR-1215	AC Line Voltage Regulator, 15A, 120V
AR-2306	AC Line Voltage Regulator, 6A, 230V
AR-1220	AC Line Voltage Regulator, 20A, 120/100V
AR-1230	AC Line Voltage Regulator, 30A, 120/100V
AR-2330	AC Line Voltage Regulator, 30A, 220/230/240V
AR-2330D	AC Line Volt. Reg., 30A, 240/230/220V, N. America Use
AR-PRO	AC Line Voltage Regulator, 30A, 120V, Worldwide Use
BP-1000	On-Line Uninterruptible Power Supply, 1 KVA
ACD-100	Power Distro, 100A
ASD-120	Sequenced Power Distro, 120A
IT-1210	Isolation Transformer, Balanced AC Power, 10A
IT-1220	Isolation Transformer, Balanced AC Power, 20A
PlugLock™	Locking Outlet Strip
PlugLock-PRO	Locking Outlet Strips, Vertical Mount
WartStrap™	PlugLock WartStrap "Wall Wart" Retention Kit

Audio Signal Processing

PQ-3 Reissue	Parametric Equalizer, Instrument Preamp
PQ-4	Parametric Equalizer, 4 band
Q-151, Q-152	Dual 15-Band Graphic Equalizer
Q-301, Q-302	30-Band Graphic Equalizer
Q-602	Dual 30-Band Graphic Equalizer
Q-541	Quad 5-Band Stereo Graphic EQ
PUNCH-10	Bass Enhancement System
X-312	12 dB Crossover
X-324	2-Way/3-Way 24 dB Crossover
X-424	3-Way/4, 5-Way 24 dB Crossover
X-524	4-Way 24 dB Crossover
C-132	Compressor/Limiter
LC-6	Stereo Compressor/Gate
QN-44	Quad Noise Gate
SP-20A	Stereo Half Rack Power Amp, 20W per channel
HA-6A	Headphone/Monitor Amp
HR-2	Headphone Passive Remote Box
HDS-6	Headphone Distribution System
HR-6	Personal Headphone Mixer for use with HDS-6
PB-48	48-Point Patch Bay with TRS Connectors
PB-48D	48-Point Patch Bay with TRS and D-Sub Connectors (Full range of patch cords also available)
MM-3	Three Input Mic Mixer
MM-4A	4 x 1 Rack-Mount Mixer
MM-8A	4 x 2 Rack-Mount Mixer
DJM-6	DJ Production Mixer
DJM-8	DJ Production Mixer
SM-3	Stereo Mixer with Ducking
IP-8	Iso-Patch, Isolated Patch Bay, 8 channel
IP-2, IP-2B	Iso-Patch, Dual Isolator, 2 channel
VU-40	System Monitor (Power/VU Meter)
SC-1, 2	Security Covers

Please contact us by phone, fax or e-mail for a free copy of our color catalog