



Power Conversion

Description

Rotron has a variety of converters and inverters that enable operation of traditional Rotron fans and blowers, when alternate power sources are available.

The *converter* (identified by the Rotron trademark, Deltac®) is an electronics frequency-changer, which converts an AC input of one frequency to a different frequency required to drive a specific motor design. Since AC induction motor speed is directly proportional to the input frequency, the use of a Deltac ensures delivery of the specific frequency required to obtain a given motor speed, regardless of the input line frequency to the Deltac. For example, this can allow 400 Hz fan performance, when only 60 Hz source frequency is available. Deltacs can also operate multiple fan loads.

The *inverter* (identified by the Rotron trademark, Batac®, pronounced "Bay-Tack") is a power conversion device that changes DC voltage to AC voltage. This allows operation of an AC motor with a DC input. The use of such a device eliminates sensitive application-specific problems, such as EMI interference, and other reliability concerns.

Both Batacs and Deltacs are designed to accommodate the power load of specific fans. These devices are enclosed in solder-sealed, or resin-filled cases which generally range in a package size measuring one-inch cube, to 2.50" x 3.50" x 5.06". They can be further adapted, on special order, to provide multiple speeds, drive multiple fans, and conform to the user's needs and/or specifications.

Applications

Batacs have been designed to operate to specification through an ambient temperature range of -45 °C to +85 °C, and can withstand environmental conditions equal to the fan's capabilities, i.e., shock / vibration, altitude, humidity, salt spray, sand / dust, submergibility, lightning, explosive atmosphere, etc. These inverters can operate over a voltage range of at least ±10% of the listed nominal voltage and will tolerate a peak ripple of 5% riding on the DC input voltage.

Deltacs are mainly used to convert 60 Hz to 400 Hz in order to operate higher speed fans such the Propimax and Aximax units. They can also convert 400 Hz to 60 Hz where a 60 Hz fan must operate. Deltacs can also be used to generate nonstandard frequencies to obtain specific fan or blower speeds.

Life Expectancy

Power conversion products are designed to have a lifetime at least equal to the fan or blower with which they are used. In most instances, the life expectancy far exceeds that of the fan or blower. Specific information and data for a given system can be obtained from Rotron Sales Representative, or Application Engineering.

Mounting

When metal cases with mounting inserts or flanges are used on the Deltac and Batacs, it is expected that they will be mounted on a metal chassis for heat sinking.

Materials and Finish

The unit is housed in a cold-rolled steel box, which has been hot tin-dipped. Standard finish is flat black enamel, but other finishes are available per customer request.

Military Specifications

For information, contact Rotron's Application Engineering Department.

EMI and RFS Consideration

Electromagnetic Interference (EMI) and Radio Frequency Suppression (RFS) should be considered seriously in any application. As is well known, abrupt changes in voltage or current as employed in inverters and converters contain harmonic frequencies that can cause problems in some user equipment.

The interference can arise from radiation from the inverter, connecting wires, and fan or blower. It can also cause a problem when conducted by the input power lines from the inverter to the power source where the impedance is common to the inverter and other equipment operating from that source of power.

Generally, the user equipment is in an enclosure that contains or renders ineffective the radiated energy and a problem does not exist. Interference conducted by the input power leads is a much more prevalent problem. However, complete suppression of the offending frequency can be a costly addition to an inverter or converter. It should not be specified unless it is strongly suspected that an interference problem will arise, or the specification has been imposed upon the user equipment. In most cases, an inverter fan system with no suppression of EMI will cause no problem in the equipment in which it is used and, will not cause a problem external to that equipment. In those few cases where a problem with EMI does exist, an inverter listed with RFS can be specified. Those inverters contain a moderate amount of suppression elements that often is all that is required. In severe cases of interference, a much more elaborate, and more expensive, solution to the problem is required. Application Engineering should be contacted to facilitate the most economical solution or design alternatives for those specific problems.



Fan Voltage

To obtain reduction in size, weight, and cost, and to increase efficiency of the inverters and converters, the use of voltage step-up and step-down transformers has been avoided. All of the power conversion fans listed have been wound for a voltage which is slightly less than the DC input voltage to the inverter. Thus, fans specified for a 12 VDC inverter are wound for 10.5 volts, average value, square wave. Those for 115 volts AC input to the converters are usually wound for 150 volts square wave. Custom designs may be available to run standard off-the-shelf 115V fans or blowers.

On occasion, it is desirable or necessary to operate the fans from DC or AC inputs (at different times) in the same equipment. When considering that combination it is useful to know that the fans listed can be operated from a sine wave RMS voltage equivalent to the square wave voltage for which

they are designed provided the frequency of the fan voltage is also the same as the design frequency. Generally, the equivalent sine wave RMS voltage will be in the neighborhood of 90 percent of the DC input voltage of the Batac unit and 90 percent of the output voltage of the Deltac units. Because this is not strictly true for all fans listed, Rotron Application Engineering should be consulted when such use is being considered.

Running Capacitors for Inverter-Driven Rotron Fans and Blowers

The following suggestions are offered for consideration where motor running capacitors must be supplied by the customer on inverter or converter driven fans and blowers.

- Oil-filled AC motor capacitors as used universally throughout the industry are first choice.
- Reduction in size and weight is possible by the use of metalized film capacitors. The voltage across the auxiliary phase of the motor where the capacitor is connected should be assumed to have a peak value of at least twice the specified output voltage of the inverter.
- The DC rating of the capacitor should then be at least 1.5 times that value for reliable operation. As an example, a fan requiring 27 volt square wave input voltage can be assumed to exhibit 60 volts peak on its auxiliary phase and require 100 volt DC rating as a minimum for the capacitor. When a choice of voltage rating exists for nearly identical capacitor case sizes, chose the capacitor with the highest voltage rating.
- Do not use polarized capacitors in this application.
- Capacitors with tolerance up to $\pm 10\%$ may be used.

Ordering Information

To order a power conversion system, consult the selection chart below. For other DC voltages, for models capable of driving more than one fan, for DC to AC or AC to AC power supplies to drive other inductive loads, or for special connections or box configurations, please consult Rotron Application Engineering.

Fusing and external motor capacitor are the responsibility of the customer.



SELECTION CHART:

The combinations shown are a brief sampling of the available products. Many custom designs exist that incorporate one or more of the following: input voltages other than those listed, fans and blowers other than those listed, multiple fans of the same kind or mixed combinations of two or more fans or blowers. Therefore, if your specific needs are not met by those designs listed, consult a Custom Division application engineer. For fan performance, refer to the specific fan section in this catalog.

Table with columns: FAN MODEL OR MODEL SERIES, VOLTS VDC, MODEL & TYPE, RPP, RFS, BOTH, OUT LINE, MAX. AMB., FREQ. / PHASE, RUN AMPS, LOCKED ROTOR AMPS, FAN Part Number †, SPEED (RPM), MOTOR CAP., HOOK-UP DIAGRAM, NOTES, BATACTM Part Number, Typ. Weight oz.

Table with columns: FAN MODEL OR MODEL SERIES, VOLTS VAC, MODEL & TYPE, RPP, RFS, BOTH, OUT LINE, MAX. AMB., FREQ. / PHASE, RUN AMPS, LOCKED ROTOR AMPS, FAN Part Number †, SPEED (RPM), MOTOR CAP., HOOK-UP DIAGRAM, NOTES, DELTACTM Part Number, Typ. Weight oz.

† A number appearing in parentheses in front of the fan part number indicates how many fans will operate on one Batac® or Deltac®
* Reverse Polarity Protection.
** Radio Frequency Suppression

- NOTES
1. Fans must be connected to the inverter for proper operation.
2. EMI suppression included is, in most instances, adequate to prevent difficulty when the fan system is installed in customer equipment.
3. Inverter requires heat sinking to mounting surface or cooling air to dissipate approximately: (A) 0-5 watts, (B) 5-10 watts, (C) 10-15 watts, (D) 15-20 watts, (E) 20-50 watts.
4. Customer must supply external motor capacitor.
5. May be operated as low as: (A) -55C, (B) -65C.
6. See performance curve of equivalent fan elsewhere in fan catalog.
7. When ordering, specify whether Aximax 2 or Aximax 2H to obtain desired fan mounting configuration.



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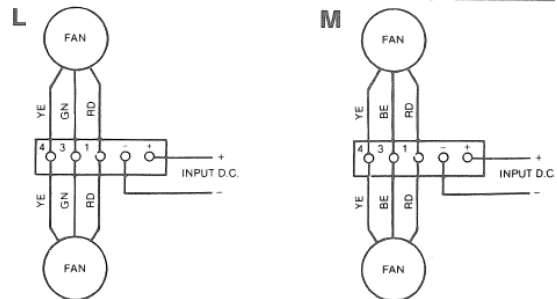
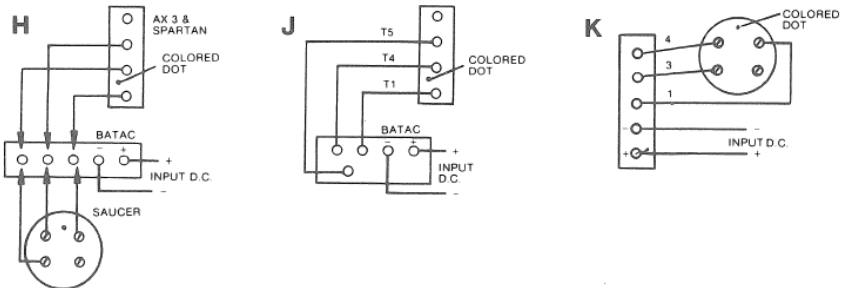
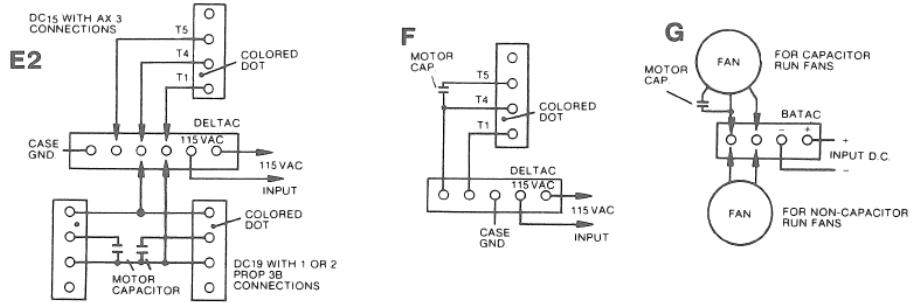
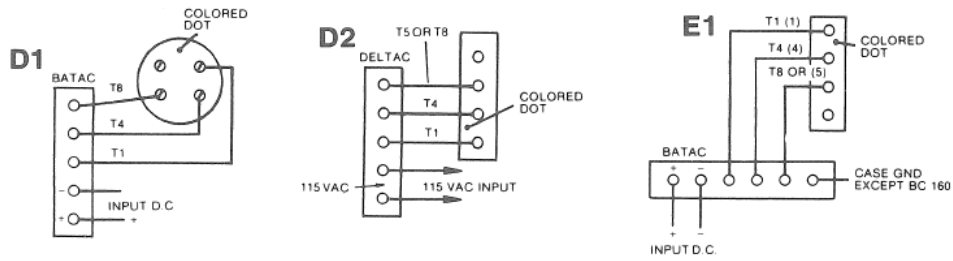
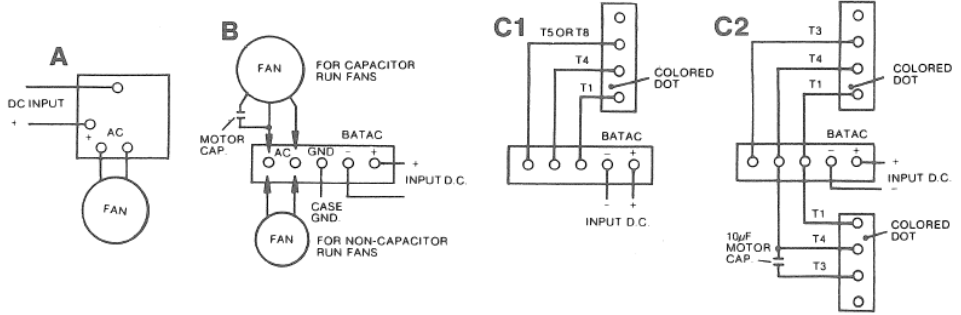
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HOOK-UP DIAGRAMS



Note: The inverter output is not isolated from the inverter input. To avoid possible damage to the inverter, be certain that test equipment connected to the inverter output does not complete a ground loop through the power supply. Use ungrounded test equipment with proper precautions for those tests.



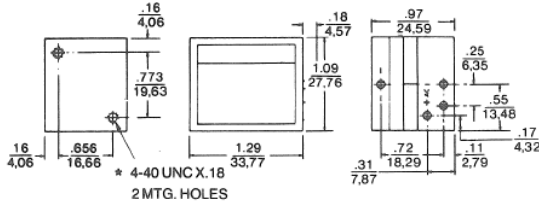
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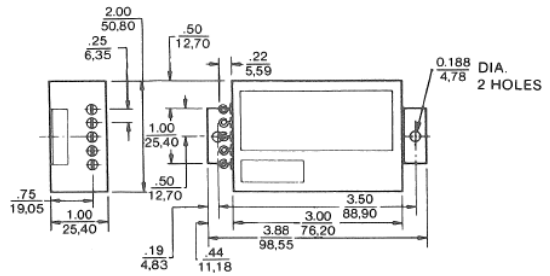
BATAC® / DELTAC®

OUTLINE: Standard BATAC® & DELTAC® Boxes

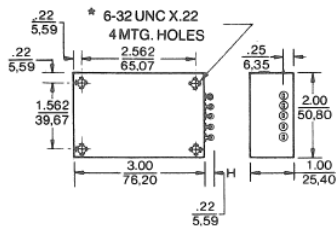
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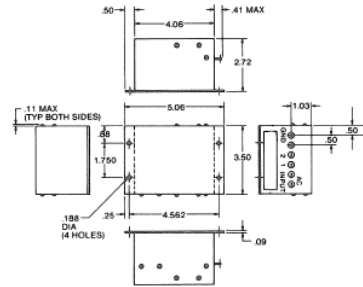
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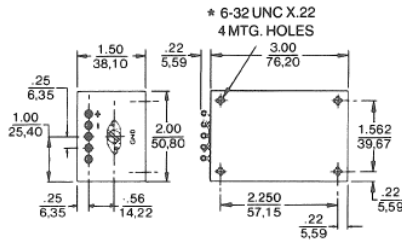
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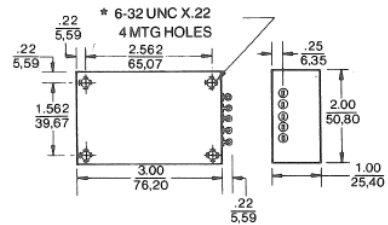
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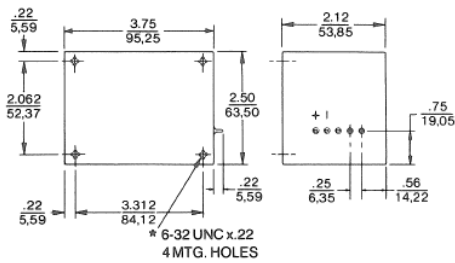
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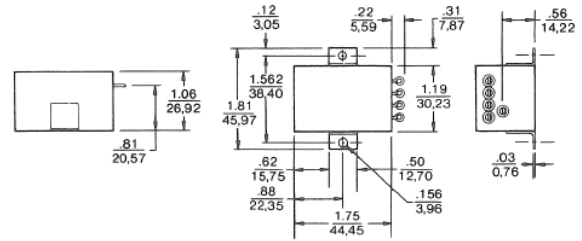
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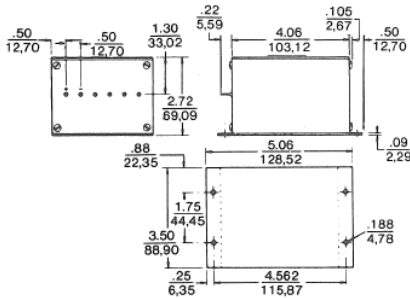
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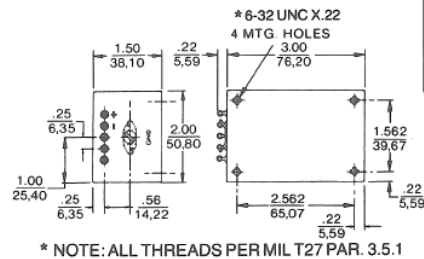
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TOLERANCES
.XX ± .03 (± 0.76)
.XXX ± .010 (± 0.25)

* NOTE: ALL THREADS PER MIL T27 PAR. 3.5.1



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