



# Glossary

## AIRBORNE NOISE (or Noise, Airborne)

Disturbances generated by operation of air movers. Emanations come from various frequencies, some audible, and frequency and amplitude are a function of several design characteristics and mounting attitudes. See "General Information" section.

## AIRFLOW SWITCH

A device which senses movement of air in an area. The Rotron Airflow Switch is a device incorporating a microswitch attached to vanes which are activated by different levels of air movement. It is often used in order to determine whether an air mover is operating in a cabinet or duct, and is most usually used with Centrifugal Blowers. See "Airflow Switch" section.

## AXIMAX®

Rotron trademark for a line of high performance, compact vaneaxial fans. See "Small Vaneaxial Fans" section.

## BALANCE: DYNAMIC

A state of near equilibrium of the rotating mass system in which all forces are cancelled while the motor or air mover is in operation. Degrees of unbalance are expressed in micro ounce-inches.

## BATAC®

Rotron trademark for a line of DC to AC solid state power conversion devices or inverters. The acronym stands for "Battery-to-AC". See "Power Conversion" section.

## BEARINGS: GRADES (ABEC Classes)

Precision miniature ball bearings are classified according to ABEC (American Bearing Engineers Classification) into at least 7 principal grades, with degree of finish and theoretical life and price increasing at each grade level. Rotron uses the class it feels best suited to the application.

## BLOWER: DEFINITION OF vs. FAN

Generally, blowers have discharge directions of 90° to inlet, and incorporate impellers while fans incorporate propellers, having discharge in the same direction as inlet. See "How to Use this Catalog" section.

## BURN-IN

A life test performed at elevated temperature designed to precipitate latent product defects which might cause early failure.

## CAPACITORS

Electrical devices associated with Rotron Permanent Split Capacitor Motors having the function of changing the time phase relationship of alternating current to accomplish the proper condition in the second motor phase to produce the rotating magnetic field required. See "Motor Wiring Hookup Diagrams" section.

## CENTRAXIAL BLOWER

An air moving device having an impeller that achieves a substantial portion of conversion of velocity energy to pressure energy within the impeller itself. See "Centraxial Blowers" section.

## CENTRIFUGAL BLOWER

An air moving device having a "squirrel cage" type of impeller, which is either tight or loose scroll forward curved blades, the latter sometimes referred to as Radial Wheel Blowers. Air enters axially and exits radially. See "Centrifugal Blowers" section.

## CFM: CUBIC FEET PER MINUTE

A volumetric measurement of airflow from a device. In fans and blowers it is normally given at standard density.

## CONDUCTION

Transmission (of heat) by means of a conductor. For instance, heat is conducted from a warm to a cooler part of a heat sink, a conductor usually made from extruded aluminum. See "General Information" section.

## CONE, INLET

A device commonly used on the inlet of a Centrifugal Blower to increase its aerodynamic efficiency. May be of either mounting type or furnished with clamp for larger blowers.

## CONNECTORS: MS

Military specified devices which are generally used to join electrical power from the power source to the motor or air mover. See "Motor Wiring Hookup Diagram" section

## CONVECTION

Transfer of (heat) energy by partial motion, a function of temperature differentials, surface finishes and orientations, density of the transferring medium, ect... See "General Information" section.

## CONVERTER

An electronic device which changes one AC frequency to another. See "Power Conversion" section.

## Decibel (DbA)

Measure of sound. This weighted sound level is filtered and is said to represent the human ear's response to sound. See "General Information" section.

## DELTAC®

Rotron trademark for a line of AC to AC solid state frequency converters. The acronym stands for "Delta AC", where delta is a frequently used symbol for change. See "Power Conversion" section.

## DUCT CLAMPS

A device commonly used for attaching a blower outlet to duct.

## DUPLEX BLOWER

A blower arrangement incorporating two blower wheels and housings mounted on the same motor. See "Centrifugal Blowers" section.

## E.C.D.C.™

An acronym for Electronically Commutated Direct Circuit. Rotron's DC motors are brushless. The commutation is accomplished by Hall Effect transistors which perform electrically the commutation function mechanically performed in brush type DC motors. This usually means greater life, lower operating temperatures, less power consumption, and less RFI than "conventional brush type DC motors".

Specifications subject to change without notice



**EFFICIENCY: MOTOR**

The ratio of shaft energy into aerodynamic energy out as the result of air moving over the working and stationary surfaces of the air mover. See "General Information" section.

**EMI/RFI: CONDUCTED**

Disturbances of an electromagnetic nature in the radio frequency spectrum which are conducted along the wires leading back to the power source and sometimes from there into other parts of an electronic system also drawing from the power source.

**EMI/RFI: EMITTED**

Disturbances of an electromagnetic nature in the radio frequency spectrum which are given off from the air mover or motor and it's related inverter or converter into the surrounding area.

**EMP: ELECTRO MAGNETIC PULSE**

Normally used in reference to Nuclear EMP.

**FAILURE MODES**

Reasons for our products to cease operating. For motors and air movers, reasons are primarily bearing related. For inverters and converters, mortality of electronic components. See "General Information" section – Operating Life.

**FAILURE SENSORS (See also Performance Sensor)**

As applied to motors and air movers, devices which determine whether a rotating device is maintaining proper operation. Many techniques are used, including optical outputs, magnetic field sensors, and temperature differential networks.

**FAN LAWS**

Equations which describe the physical properties at work that govern the operation of air movers. See "General Information" section – Fan Laws.

**FILTERS (for motors, air movers)**

A device commonly used on the inlet side of an air mover to remove particulate matter from the ambient air. See product detail drawings.

**FLANGE**

A plate attached to the outlet of a blower housing which serves as a land area through which holes may be drilled for mounting, etc.

**FLOW: LAMINAR**

A term from fluid mechanics describing a streaming motion in which the bulk of the molecules are moving most distinctly along the same parallel path within the confines of certain ducts or passages. See "General Information" section – Cooling and Airflow

**FLOW: TURBULENT**

A term from fluid mechanics describing a swirling motion in which the bulk of the molecules are moving most distinctly along the same path, but as the same time, a large portion are being diverted by obstacles or high or low pressure centers within the confines of certain boundaries. See "General Information" section – Cooling and Airflow

**FAN PERFORMANCE SENSOR (FPS)**

A device incorporated in an AC or ECDC motored air mover that senses whether the air mover is performing the desired function. In the case of the AC air mover, a 12 VDC power source is required. When connected to the

input lead, the 12 VDC causes a signal to be produced on the 2 output leads. This signal may be described as a pulse train at a speed proportional to air mover rotational speed. With the proper pulse counting technique, which may be performed by electronics provided by Rotron, one is capable of determining if the air mover is rotating at the desired rotational speed and therefore performing the desired function.

For an ECDC air mover, the DC power sources for the air mover and for the sensor are the same. A lead (or connection) exiting from the motor with the excitation connections carries the signal from the motor to the periphery of the air mover, where the signal can be put to use. The signal, a tachometer-type signal, can be discriminated with electronics provided by Rotron, and can tell one whether the air mover is rotating at the desired number of R.P.M. Reference Pages, 33, 58, 93, 120, 238, 246.

**FREQUENCY**

The rate at which an electrical or mechanical parameter changes with respect to time (i.e., to a motor or an air mover).

**GROUP A TESTS TO MIL-B-23071**

Visual and mechanical, input current, speed, generated vibration, dielectric withstanding voltage, insulation resistance, and burn-in tests performed on a 100% basis. See "General Information" section – Environment.

**GROUP B TESTS TO MIL-B-23071**

Warm up, airflow, line voltage and frequency extremes, temperature rise, wire lead stress, cold start tests performed on a sample basis on products which passed Group A. See "General Information" section – Environment.

**GROUP C TESTS TO MIL-B23071**

Requalification tests to remain on QPL, required every 6 months (extended life, speed, input current, generated vibration) or every 2 years (vibration, shock, humidity, and salt spray). See "General Information" section – Environment.

**HIGH ALTITUDE AIR MOVER OPERATION**

Rotron offers a line of fan products called ALTIVAR® which provides variable speed which is sensitive to the air density the fan experiences. This design helps compensate for varying mass flow by increasing speed with decreasing air density and is limited in its speed range due to the characteristics of the high slip motor used. Improved variable speed systems using electronic power supplies are available from Rotron on a custom design basis. See "General Information" section – Altitude Operation.

**HOOKUP INFORMATION**

Schematic diagrams and explanations regarding how to apply power to Rotron motors and air movers.

**INSULATION: MOTOR WINDING CLASS**

Material system which electrically isolates the windings (energized circuit) from the motor structure and provides intercoil and interturn insulation to avoid internal short circuiting. It consists of the following basic components: wire insulation enamel, ground coating material, insulating tapes and insulating varnish. Rotron products employ Class F (155°C) and Class H (180°C) systems of insulation which are rated for a minimum of 20,000 hours at the respective ratings. Temperatures are total (ambient + unit temperature rise).

*Specifications subject to change without notice*



**INVERTAFAN®**

Rotron trademark for a line of fans incorporating integral inverters. See "Power Conversion" section.

**INVERTABLOWER™**

Rotron trademark for a line of blowers incorporating integral inverter. See "Power Conversion" section.

**INVERTED CENTRIFUGAL BLOWER CONTRUCTION**

A type of blower where the motor is suspended partially in the inlet; these are more compact than others. See "Centrifugal Blowers" section.

**INVERTER MOTOR CONSTRUCTION**

Stator is wound on an inner cylinder and motor integral while fan blade rotates outside the stator. This technique in Rotron axial fan products leads to excellent rotor heat dissipation, improved bearing mounting, and alignment die to bore through outer race mounting technique and improved vibration resistance due to higher rotor inertia vis-a-vis the conventional motor construction.

**INVERTER**

An electronic device which takes direct current (DC) input and "chops" it to quasi-square wave alternating current (AC) output. Rotron inverters typically employ a modified "bridge" type circuitry. See "Power Conversion" section.

**L10**

The time after which 90% of a sample of motors or air movers will still be in operation, 10% having failed due to "normal" failure characteristics; also the pattern of such failures plotted as a function of time. See "General Information" section – Operating Life.

**LOW SPEED WARNING DEVICE (LSWD)**

A device to monitor the RPM of a fan or blower. See "Low Speed Warning Device" section.

**LUBRICANTS**

The greasy substance used in the bearings and their surrounding area which reduces friction and heat and aids life. Rotron uses many greases in its bearings, and has life and reliability data on several types, each suited best for certain applications. See "General Information" section – Operating Life.

**MASS FLOW**

A term from fluid mechanics relating to the volume of a fluid (in our case usually air) moving past a point in a surrounding; the term considering different air densities under different environmental conditions. See "General Information" section – Cooling and Airflow.

**MIL-B-23071**

A U.S. Department of Defense (military) specification entitled "Blowers, miniature, for cooling electronic equipment; general specifications for" which describes different particular blowers in "slash" sheets and the tests they must pass in order to qualify for listing on the MIL-B-23071 Qualified Products List (QPL). The specification also gives manufacturers a guideline to use when designing fans or blowers for military applications.

**MIL-B-28873**

A U.S. Dept. of Defense (military) specification entitled "Blowers, Electronically Commutated Brushless, Direct Current, (ECDC) Motor Driven, for Cooling Electronic Equipment, General Specification for" which describes different particular blowers in "slash" sheets and the tests they must pass in order to qualify for listing on the MIL-B-

28873 Qualified Products List (QPL). The specification also gives manufacturers a guideline to use when designing fans or blowers for military applications.

**MIL STANDARD (STD)**

A U.S. Dept. of Defense definition can apply to all specifications of criteria including procedural criteria or methodology covering various characteristics which products must meet if they are subject to those criteria; for example test criteria (methodology) covering Environment Test Methods are covered in MIL STD 81.

**MINIMAX®**

Rotron trademark for a family of ultra miniature high performance Small Vaneaxial Fans. See "Small Vaneaxial Fans" section.

**MULTISTAGE BLOWER**

An air moving device consisting of several impeller stages each of which increases pressure, much like stages in a turbine. See "Multistage Blowers" section.

**MODEL A, B, D, R, L, M (all separate)**

Rotron premium grade Centrifugal Blower (R has radial blade impellers; L and M are Multistage Blowers). See "Multistage Blowers" section.

**MODEL HF, HFV, HFG, NF, NFV, MF, MFV, JFG, FJGV**

Rotron high output propeller fans. See "Propeller Fans" section.

**MOTOR RELIABILITY MODEL**

A study on motors published December 1977 for Rome Air Development Center by Shaker Research Corp., and available through the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161

**NOMINAL**

Dimensions or performance characteristics representative of a product, around which tolerances are developed to give total, expected actual range of characteristics.

**OPERATION POINT (motor and air mover)**

For an air mover, the point at which the system impedance curve crosses the air performance curve of the air mover. For a motor, the point at which motor torque-speed curve intersects the fan load line. See "General Information" section – Air Mover section

**PSIL**

Preferred Speech Interference Level. This is a measurement of sound which refers to preferred octaves where speech is carried out; the average of the SPL (Sound Pressure Level) measured at 500, 1000, and 2000 Hz. See "General Information" section.

**PARALLEL OPEATION: AIRMOVERS IN**

An arrangement whereby air movers are used side-to-side, which approximately doubles flow, but does not appreciable change pressure. See "General Information" section.

**PERFORMANCE CURVE (motor and air mover)**

Air (gas) and electrical performance characterize air movers. Motor performance is characterized by speed vs. torque curves.

*Specifications subject to change without notice*



**PHON**

Measurement of the loudness level of noise. For a 100 Hz. Tone the sound-pressure level in dB can be interpreted as the loudness level in phons.

**PROPELLER FAN**

An air moving device of the axial fan type which has a propeller and a motor, neither of which is necessarily contained within the axial boundaries of the venturi of housing (if any). Air enters and exits axially. See "Propeller Fans" section.

**PROPIMAX®**

Rotron trademark for a line of high performance, compact Tubeaxial Fans. See "Tubeaxial Fans" section.

**QPL**

An acronym for Qualified Products List. A QPL may arise from a U.S. Dept. of Defense Military Specification, such as MIL-B-23071. When a QPL exists, the U.S. Government prefers that government agencies and their contractors and subcontractors buy from that QPL.

**RFS**

Acronym for Radio Frequency Suppression. Design feature of reduced level of unwanted electromagnetic energy radiated or conducted from the power conversion unit in the radio frequency spectrum. See "Power Conversion" section.

**RPP**

Acronym for Reverse Polarity Protection. Prevents damage to unit if accidentally wired up with "plus" electrical input on "minus", and vice versa. See "Power Conversion" section.

**RADIAL BLADE BLOWER**

A Centrifugal Blower having an impeller with backward or forward curved impeller vanes. See "Radial Blade Blowers" section.

**RADIATION**

Energy (such as heat) emitted in wave patterns to the surrounding atmosphere, dependent on the temperature differentials, surface conditions, and orientations emitting source and surrounding environment. See "General Information" section – Cooling and Airflow.

**RELIABILITY MODEL (per MIL-B-23071B) NTIS Publication AD-A013735**

A study on blowers published July, 1975 for Rome Air Development Center by Shaker Research Corp., and available through the National Technical Information Service, U.S. Department. of Defense, Springfield, VA 22161

**SAUCER®**

Rotron trademark for a family of small high performance Tubeaxial Fans, which are basically a rugged version of the Rotron Feather Fan. See "Tubeaxial Fans" section.

**SERIES OPERATION: AIR MOVERS IN**

An arrangement whereby one air mover's inlet is mounted on the other's outlet; this tends to cause outlet pressure of the second air mover to roughly double, but does not appreciably change flow. See "General Information" section.

**SIMPLEX BLOWER**

A blower arrangement whereby there is one blower wheel and housing. See "Centrifugal Blowers" section.

**SINGLE PHASE (1Ø) MOTOR**

A motor designed to run from two wire alternating current source. This type of motor usually derives starting torque by means of a shading pole or a capacitor.

**SONE**

A measurement that rates the unit of loudness in terms of soft to loud levels of noise. A level of 40 phons is equal to 1 sone. If noise is 5 times as loud as the sound of one sone, then the loudness would be 5 sones.

**SOUND POWER LEVEL (PWL)**

Omnidirectional measurement of sound energy. See "General Information" section – Noise.

**SOUND PRESSURE LEVEL (SPL)**

Sound POWER LEVEL considering a directivity factor, i.e., measured at a point. Units are Newtons/square meter. See "General Information" section – Noise.

**SPARTAN**

Rotron trademark for a family of small, high performance Tubeaxial Fans, which are, in their square configuration, basically a ruggedized version of the Rotron Muffin Fan. See "Tubeaxial Fans" section.

**SPECIFIC SPEED**

A dimensionless defining number which will, when calculated, define the best type of air mover for a particular application.

**SQUARE WAVE**

The shape of the wave form when viewed on an oscilloscope. It will have the same plus and minus form about the center line associated with sinusoidal or AC power, but the wave will have distinct squared corners. Early inverters delivered very definite square wave power with a single plus and a single minus step. Current inverters deliver quasi-square wave with multiple steps thus more closely simulating AC Power.

**SQUIRREL CAGE BLOWER**

See "Centrifugal Blowers" section.

**STANDARD DENSITY**

The density of air when measured at 70°F at a barometric pressure of 29.92 inches of mercury, and at zero percent relative humidity.

**STATIC PRESSURE**

The outlet or inlet pressure (it can be either positive or negative, although outlet positive static pressure is commonly referred to as pressure whereas negative inlet static pressure, as in a draw through system, is commonly referred to as suction) of a fan or blower measured in such a manner that only the energy of compression is measured. This is most easily done by means of a pressure tap at the wall of the vessel close to the pressure source. The tap is then connected to a pressure gauge or manometer.

**STRUCTURE NOISE (or Noise, Structureborne)**

With respect to air movers installed in equipment, disturbances generated by rotational imbalance, electromagnetic characteristics, etc. which cause equipment enclosures to vibrate at certain frequencies.

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**SURGE TESTS**

A high voltage stress test performed on motor windings which is designed to detect such faults as grounded windings, shorted coil turns, incorrect number of wire turns-per-coil or connections.

**SYSTEM RESISTANCE CURVE**

The equipment air movers are installed in has some resistance or impedance to the airflow of the air mover. When plotted on pressure vs. flow graph, this results in an upward sloping (parabolic) curve. See "General Information" section – Air Mover section.

**TERMINAL(S)**

Rotron products' motors, air movers, and power conversion devices are energized through various means; one of these is a screwdown type terminal attached to the air mover, another might be solder terminals – in each case they connect the power source to the inner workings of the motor or inverter or converter.

**THREE PHASE (3Ø) MOTOR**

A motor designed to run from alternation current which can be depicted by 3 periodic waves whose phase displacements are 120 degrees apart in time.

**TOLERANCES**

Dimensions or performance characteristics around a nominal which, taken in the whole range, represent characteristics of a product likely to be exhibited by a production unit.

**TUBEAXIAL FAN**

An air moving device of the axial fan type which generally has the motor and the propeller mounted in the confines of a tube or venturi which itself has no stationary directional vanes significance. See "Tubeaxial Fans" section.

**VANEAXIAL FAN**

An air moving device of the axial fan type which generally has the motor and propeller mounted in the confines of a venturi, and which also incorporates some working stationary vanes to improve static pressure building ability. See Small/Large "Vaneaxial Fans" sections.

**VIBRATION: GENERATED**

Movements caused by periodic mechanical and electrical forces in motors and air movers which are measured usually with a device-mounted accelerometer.

**VIBRATION: VELOCITY METHOD OF MEASUREMENT**

Movements caused by mechanical and electrical rotation in motors and air movers which are measured with an instrument called a vibrometer, which is hand held.

**WEIBULL DISTRIBUTION**

A statistical distribution often used in life studies and in defining failure characteristics. See "General Information" section – Operating Life.

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