

**ITALIAN VACUUM MOTORS  
QUALITY AND RELIABILITY**



*OUR MOTORS OUT PERFORM  
AND HAVE A  
LONGER LIFE THAN OTHER MOTORS!*

### *WHY ARE OUR MOTORS DIFFERENT ?*

- We have more than 30 motor types in our range
- Our motors are used by ORIGINAL EQUIPMENT MANUFACTURERS
- Our motors conform to European Community Standards
  
- Our motors are wound to 240V and can handle power spikes of up to 280V
- Our motors have 1st class ball bearings, which increases the lifespan
- Our motors have radio/television interference suppression
- Carbon brushes are available for all our motors
  
- Technical drawings and specifications are available from our website.
  
- Our motors fit all makes of cleaning equipment available in SA:  
**WETROK, KARCHER, NILFISK, COLUMBUS, KINGFISHER, WAP,  
NUMATIC, VIPER, SORMA, TENNANT, GHIBLI, EUROSTEAM, FAST  
and any other No Name Brand machine.**

*WE HAVE BEEN SUPPLYING VACUUM MOTORS TO THE SOUTH AFRICAN  
COMMERCIAL CLEANING INDUSTRY FOR 25 YEARS.  
WE DO NOT COMPROMISE ON QUALITY.*



Sapii motors are imported from Italy where they are manufactured.

Excellent quality, manufactured to very strict European standards, they are all wound to 240v, have first class ball bearings and interference suppressors. Each motor comes with a set of connecting cables which usually run from the motor to the switch. The cables are supplied loosely with the 240V motors and must be fitted. The 24V & 36V motor cables come pre-fitted.

Name / Code	Specifications & Description	Picture
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### Dry Only Motors / Thru Flow Motors

Dry Only Motors, otherwise known as Thru flow motors are specifically designed for dry vacuum machines only. They are cooled directly by the air flowing through the vacuum machine over the motor itself. It is therefore critical for the vacuum machine to have a filter and for the filter not to be totally clogged to allow for airflow.

AB 75	850W capacity, two stage, thru flow motor, 240 Volt	
AB 85	1000W capacity, two stage, thru flow motor, 240 Volt	
AB 95	1300W capacity, three stage, thru flow motor, 240 Volt	
AM 50	800W capacity, single stage, thru flow motor, 240 Volt	
AM10	1050W capacity, single stage, thru flow motor, 240 Volt For use in: Wetrok Monovac 6	
CAB63	850W capacity, two stage, thru flow motor, 240 Volt, diameter 106mm For use in: backpack vacuums and upright vacuums	
AM05	950W capacity, two stage, thru flow, 240 Volt For use in: backpack vacuums and upright vacuums, Sebo BS36 & BS46	

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## Wet & Dry Motors / Bypass Motors

Wet & Dry motors, otherwise known as Bypass Motors are designed to be used in vacuum machines that suck up water. They are cooled by a separate fan.

The air intake into the motor is expelled via perifiral openings around the motor.

<b>IBM10</b>	<p><b>1050W capacity, single stage, bypass motor, 240 Volt, small size</b></p> <p><b>For use in: Nilfisk GWD range</b></p>	
<b>BB20</b>	<p><b>800W capacity, two stage, bypass motor, 240 Volt</b></p>	
<b>BB30</b>	<p><b>1000W capacity, two stage, bypass motor, 240 Volt</b></p>	
<b>BB40</b>	<p><b>1200W capacity, two stage, bypass motor, 240 Volt</b></p>	
<b>BM10</b>	<p><b>1000W capacity, single stage, bypass motor, 240 Volt</b></p>	
<b>BB24v 2 stage</b>	<p><b>500W capacity, two stage, bypass motor 24 Volt</b></p> <p><b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	
<b>BB24v 3 stage</b>	<p><b>500W capacity, three stage, bypass motor 24 Volt</b></p> <p><b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	
<b>BB36v</b>	<p><b>600W capacity, two stage, bypass motor 36 Volt</b></p> <p><b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	

## Tangential Discharge Motors

Tangential Discharge motors are designed to be used in vacuum machines that suck up water. They are cooled by a separate fan. The air intake into the motor is expelled via a tangential exhaust situated on the side of the motor. Any water or air entering the motor is directed through this exhaust. This motor can also be used to create a blowing action.

<p><b>BBT38</b></p>	<p><b>1200W capacity, two stage, Tangential Discharge Motor, 240 Volt</b></p>	
<p><b>BBT38i</b></p>	<p><b>1200W capacity, two stage, Tangential Discharge Motor, 240 Volt, includes inlet port flange.</b></p>	
<p><b>BBT40</b></p>	<p><b>1400W capacity, three stage, Tangential Discharge Motor, 240 Volt</b></p>	
<p><b>BBT24v 2 stage</b></p>	<p><b>500W, two stage, Tangential Discharge Motor, 24 Volt</b>  <b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	
<p><b>BBT24v 3 stage</b></p>	<p><b>500W, three stage, Tangential Discharge Motor, 24 Volt</b>  <b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	
<p><b>BBT36V 2 stage</b></p>	<p><b>600W, two stage, Tangential Discharge Motor, 36 Volt</b>  <b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	
<p><b>BBT36v 3 stage</b></p>	<p><b>600W, three stage, Tangential Discharge Motor, 36 Volt</b>  <b>For use in: Battery Operated Machines (e.g. Auto scrubbers)</b></p>	

### Aircraft Motors

Aircraft motors are specifically designed for use in aircraft or vacuum cleaners that are used on board aircraft.

<p><b>BM10</b> 115V 400C</p>	<p>1000W capacity, single stage, bypass motor, 115 Volt, 400 Cycles</p>	
<p><b>CAB63</b> 115V 400C</p>	<p>850W capacity, two stage, thru flow motor, 115 Volt, 400 Cycles, diameter 106mm  For use in: backpack vacuums and upright vacuums</p>	
<p><b>AB80</b> 115V 400C</p>	<p>1000W capacity, two stage, thru flow motor, 115 Volt, 400 Cycles</p>	
<p><b>BB30</b> 115V 400C</p>	<p>1000W capacity, two stage, bypass motor, 115 Volt, 400 Cycles</p>	

### Marine Motors

Marine motors are specifically designed for use on ships or vacuum cleaners that are used onboard ships.

<p><b>BB30</b> 115v 50C</p>	<p>1000W capacity, two stage, bypass motor, 115 Volt, 50 Cycles</p>	
<p><b>BM10</b> 115v 50c</p>	<p>1000W capacity, single stage, bypass motor, 115 Volt, 50 Cycles</p>	

### Spares

<p><b>CARBON BRUSHES</b></p>	<p>Carbon Brush in holder, size fits most 220 Volt SAPII motors. Please specify your motor version for price</p>	
<p><b>RECTIFIER</b> 620035600</p>	<p>Rectifier changing 50/60 Cycles to 400 Cycles</p>	
<p><b>Inlet Port Flange</b></p>	<p>Inlet port Flange, Fits all Standard Sapii Motors, Allows a 38 mm hose connection to the air inlet port.</p>	

# Vacuum Motors

## How They Work and What They Do?

Of course, on Earth, there is no such thing as a true vacuum. So what does a central vacuum actually do? Central vacuums "pull" with intense force by utilizing turbine energy. They create low pressure inside the vacuum unit which allows air outside it, which is at 400 inches of water pressure, to rush inward in a controlled flow. This is the vacuum effect we're all thankful for when it comes to cleaning our homes. Some central vacuum motors are good for extreme suction, while others are good for being able to move air across long distances, such as a 6000 m<sup>2</sup> building.

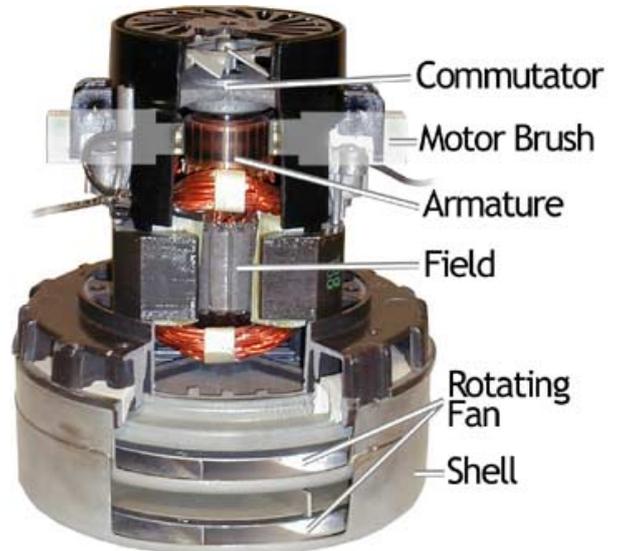
### Motor Anatomy

In a vacuum motor, the rotating fans force outside air in through a round 25-30mm opening on the bottom of the shell (you cannot see the opening in this photo). The pictured motor has two fan stages. Without opening a motor you can determine the number of fan stages by the number of seams separating metal plates on the motor shell. The diameter of this motor is referred to as 135 mm, or the width of the shell.

The components above the rotating fans perform the function of getting electricity to spin the armature which then spins the fans. The exhaust on this motor is peripheral - it comes out the holes above the shell. Other motors have tangential or what looks like a horned exhaust.

### Measuring Vacuum Suction

Vacuum "pressure", or waterlift, is measured without any air flowing through it. A completely sealed vacuum measures the power or force of the pull and is usually done by lifting water up a column and measuring how many millimetres the water is taken up. The other measurement is CFM or cubic feet per minute of air which measures how much air the vacuum moves without resistance - the opposite of a sealed vacuum. (CFM is usually an American measurement) These are the two key measurements and both must be present in a good relation to have a satisfactory vacuum. Central vacuum motors are usually larger than portable ones and offer greater vacuum power. The AirWatts measurement is a formula using waterlift and CFM.



### Most Common Terms:

#### CFM (Air Flow)

##### Cubic Feet (of air) per Minute.

Wonder why that pebble won't vacuum up but stays rattling in the end of your vacuum wand? Basically, without sufficient air moving around it, it's going nowhere. Even a feather won't budge without any air moving past it. Therefore, CFM (air flow) is crucial for deep carpet cleaning. Some vacuums may be able to lift bowling balls, but the cleanest homes have central vacuums with a lot of CFM. CFM becomes more important as the air opening size gets larger. For example, you can feel the air rushing in to a straw when you inhale, but you wouldn't feel a thing if you inhale through a 50 mm pipe. If you want to vacuum through a larger opening, you'd need more CFM.

The CFM (air flow) is measured by how much air is taken in through a round opening ranging from two inches to completely closed. Of course, there is zero CFM at no opening and maximum CFM at a two-inch opening.

#### Water-lift

Central vacuums don't vacuum the wet stuff, but this benchmark specification is calculated using water. The calculation is obtained by how many inches up a tube the vacuum motor's intake can pull up water. This is in contrast to CFM which measures how much air flows into the same intake. For the water-lift test there is no air moving through the motor. It is a "sealed suction" measurement to find the pure suction force of the motor. The water-lift of a vacuum is what is used when lifting a bowling ball, as seen in some commercials. It is amazing what you can do when all the power of the vacuum is focused on one surface.

The water-lift measurement is not the only key to effective vacuuming. A vacuum may have amazing water-lift, but without it spinning fast and pulling in a lot of air, it will hardly move anything toward the vacuum's filter. That is why CFM is so important as well. But they work together. Water-lift is important to keep the air moving, especially over long distances or when the tool being used to vacuum has a small air opening such as in a turbine brush. One such example is the TurboCat. The air opening is reduced to a 15 mm square and is located next to the turbine. The suction makes the turbine spin incredibly fast, which then engages the belt, which then engages the roller brush for grooming the carpet. When the opening is reduced, it is the water-lift that forces the air through that hole at a greater speed.

Water-lift measurements will fluctuate based on the actual amount of voltage the motor is receiving, the altitude, air temperature, and the barometric pressure.

#### Air Watts

Internationally vacuums are measured by CFM and waterlift. Each of these measurements are in themselves inadequate because a vacuum is working somewhere in between these opposite maximums. A vacuum is not operating with sealed suction or at a two inch vacuum opening but somewhere in between. When you read the CFM and waterlift specifications of a vacuum, remember you are reading their maximum values. These values are never at that measurement at the same time in an operating vacuum.

Air watts is a calculated measurement taking into account both CFM and waterlift in real time at the operating end of the vacuum hose, tool, or brush. You have to know the curve created by both CFM and waterlift as the opening changes from zero to two inches. Somewhere along this curve the calculation for air watts will maximize. Different motors have different curves and thus differing peak performance operating orifices (otherwise known as the maximum air watt).

## Other Terms:

### Air Pressure

The air around us constantly exerts a pressure of about 10 metres of water. That means that every exposed surface has the equivalent of 10 metres of water pushing on the surface. A vacuum cleaner doesn't actually create a vacuum, but it does lower air pressure inside the vacuum unit. Since the outside air is at normal pressure it rushes inward in a controlled airflow which creates the cleaning effect.

### AMPS

Amperage current draw of electricity required to operate the vacuum motor. A motor that uses more electrical current does not always mean the current is being used more efficiently.

### Armature

The centre part of the motor that rotates, making the transfer of electricity across the motor, enabling the motor shaft to spin. A quality armature is mounted on ball bearings, and protected from incoming vacuum air that has been heated and dirtied.

### Bypass Cooling

A separate stream of air that cools the motor, different from the air that draws in dirt from the home. In a bypass motor, air being vacuumed does not actually flow through the electrical components of the motor. Normally these motors have a separate fan to provide cooling air to the motor.

### Watts to Amps (Conversion)

The conversion of watts to amps is governed by the equation  $\text{Amps} = \text{Watts} / \text{Volts}$ . So if a motor draws 2000 watts at 120 volts it will pull 16.66 amp. If you know the amps and volts you can multiply them to get the watts.

### Cyclonic Action

Cyclonic action describes the natural action found in a tornado. In a vacuum with cyclonic filtration, the air carrying the dust and debris moves through a tornado action. The air swirls downward in a cone-shaped pattern. At the bottom of the cone, it starts swirling upward again, inside the downward cone. Thus this is sometimes called a "reverse" tornado action or "dual cyclonic action." The vast majority of the debris separates from the air stream as air reaches the bottom of the swirl, and is deposited in the dirt container. A fraction of the debris remains in the air, to be removed by the secondary filter, if there exists any secondary filters, otherwise it exits through the exhaust.

### Fan and Fan Stages

The fan is a combination of blades that spin to create airflow that produces the vacuum. Fans are flat impellers, and there are often two or three layers of fans on each motor, called fan stages. A motor with two fans is called "two-stage," if it has three fans it's "three-stage." Each fan layer increases the waterlift or sealed suction measurement and decreases CFM. Air driven power brushes work better with a motor with more fan stages.

### Motor Speed

Measured in revolutions per minute (RPM).

### Overall Efficiency

Otherwise known as the "Measure of Fan Efficiency" is  $\text{Air Watts} / \text{Input Watts}$ .

### PVC (Poly Vinyl Chloride)

A common plastic polymer that provides excellent appearance and longevity with good flame retardance at an attainable price. All of MD Manufacturing central vacuum fittings are made from virgin PVC.

### Sealed Bearings

Often used in high quality motors to prevent dust and debris from entering the motor bearing area. All MD motors have sealed bearings.

### Soft Start

An electronic means of slowly starting vacuum motors to reduce initial in-rush voltage spikes. It starts the motor at a slower voltage, slowly ramping up to operation voltage. No tests by the motor manufacturer Sapii or any other agency have produced quantifiable measurement of this extending a motor's life. It does, however, allow the manufacturer to utilize a smaller capacity of relay, which is less expensive.

### Stages

See Fan Stages.

### Thru-Flow Motor

In some less-expensive motors, the air drawn from the home flows right through the motor to cool it. Unfortunately this air is laden with the dust from the home which dirties and contaminates the motor. This air is also warmed by friction as it moves through hoses and piping, and is substantially warmer so it is less able to cool the motor. Thru-flow motors will overheat if they are run for long periods of time without adequate air flowing through the system.

### Voltage or Volts

A measure of the electrical potential employed by a vacuum motor. Typically, motors require common household current; 110 to 120 volts in North America; 240 volts in South Africa. Voltage is to electricity as pressure is to water, a measure of potential or driving force.

### Watts

Electrical power consumption of the motor.