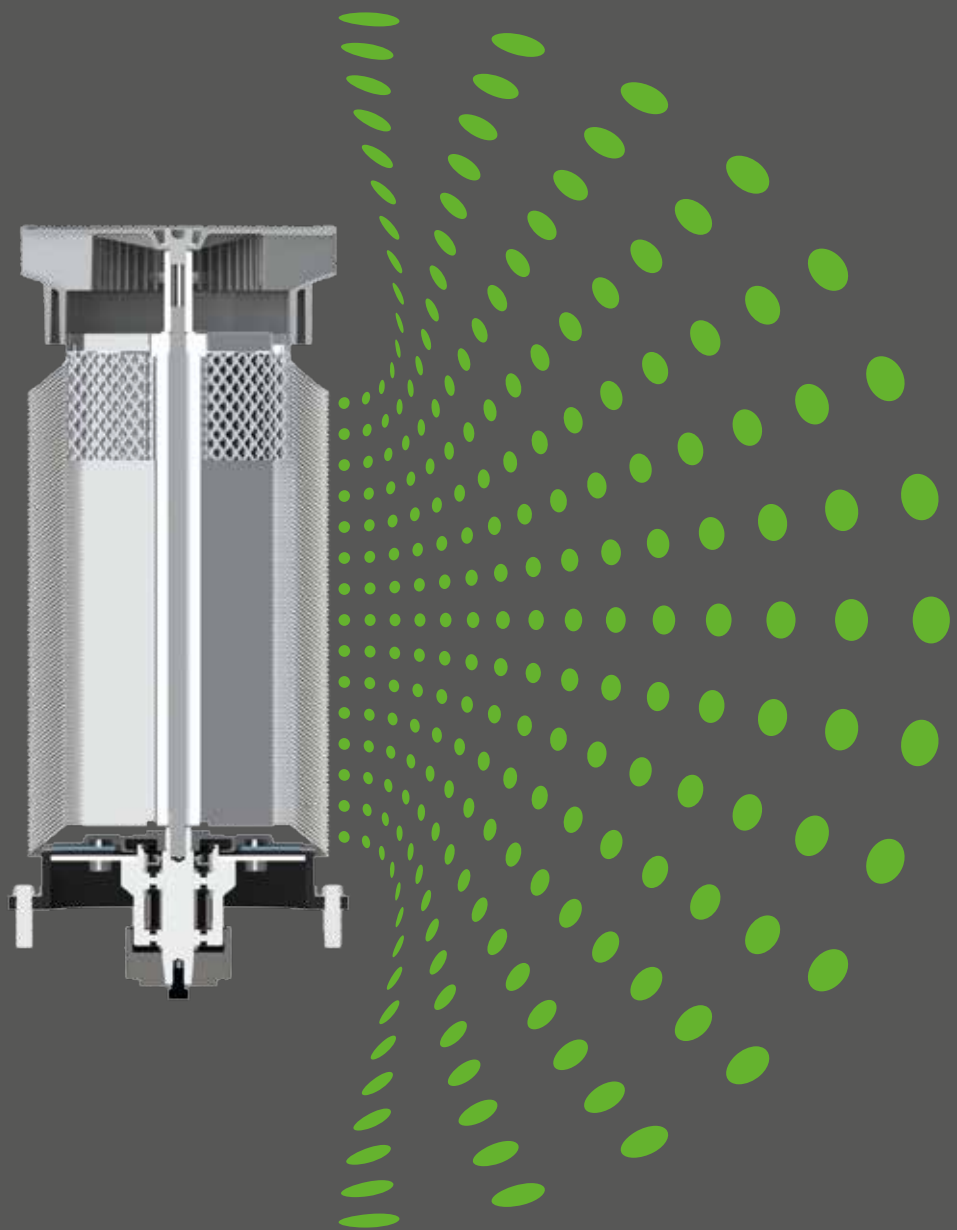
3nine

GREEN LINE

OIL MIST SEPARATORS

THE TECHNOLOGY

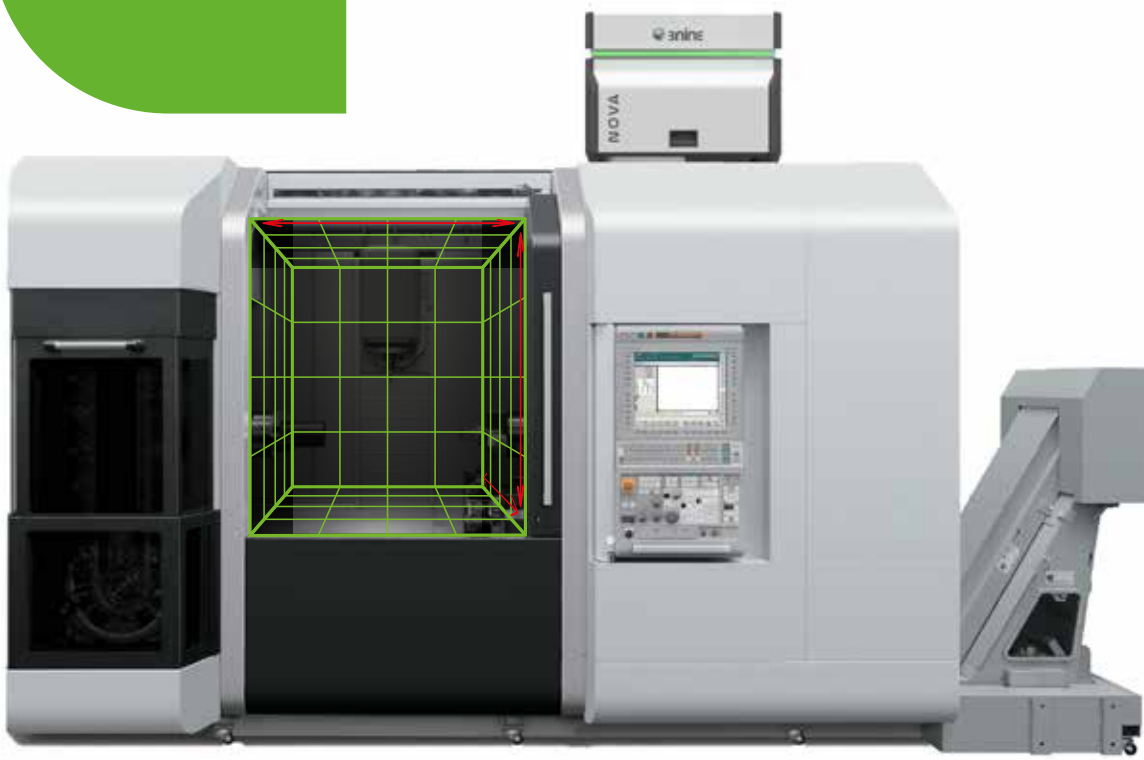


Liquid to gas separation technology was invented over 100 years ago. Based on that technology, 3nine has been developing oil mist separators since 2001. In 2009, 3nine started developing a totally new concept and technologies that would further change the way oil mist would be eliminated in the shop.

Our goal was to bring oil mist elimination to a new level, develop products that were well adapted for all applications using either oil or coolant and to simplify the monitoring of the products through visual and digital communication. The new series, called the GREEN LINE, is based on Multi-Rotor and Counter Current Technologies. Multi-Rotor technology facilitates scalability which allows for the many airflow requirements and Counter Current Technology allows each unit to work with all machining applications using either oil or coolant.

SELECTING THE RIGHT PRODUCT

(WxDxH)



Every competing filtered technology suggests a higher flow rate (CFM) than 3nine because they have to. As an example, Mechanical solutions require 3-4 times more CFM because of their filters and normally longer pipe runs, which eventually all create pressure drops. We don't have those issues at 3nine because we are not pulling any of the processed air through a filter. So, understanding what CFM you need for your machine tool is easy with 3nine. Simply measure the cubic footage (WxDxH) of the cabin then refer to the unit specifications below to find the max cabin size that each unit can handle.

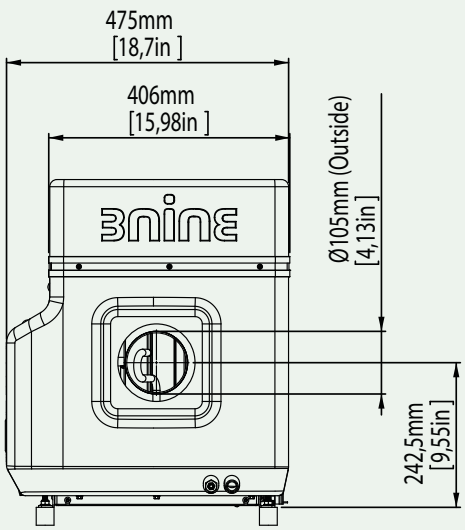
This is a very good place to start however it is not absolute because there are variables such as the size of the doors and how often they open, the pressure of the cutting fluid, speed of the spindle, the application being performed and more, all of which are vital in estimating the flow rate needed. We recommend making contact with 3nine so a Sales Representative can help you. In the meantime, you will have an educated look at the unit which will most likely fit your need.

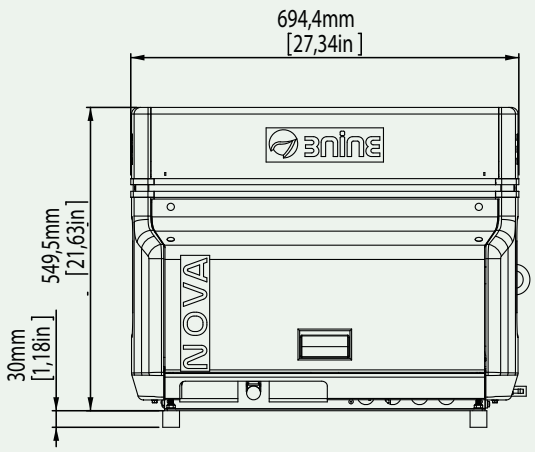
	Max cabin size
Nova	70 CF
Lina	176 CF (BLUE LINE)
Anna	210 CF
Lova	320 CF
Clara	353 CF (BLUE LINE)
Petra	353 CF (BLUE LINE)
Nina	425 CF
Emma	710 CF (BLUE LINE)

SPECIFICATIONS

NOVA 300

	EU-standard	NA-standard
Max cabin size	<2 m^3	70 CF
Air flow	300m^3/h	176 CFM
Operating conditions	5-50 °C	41-122 F
Power supply (basic)	3-phase 280-400V 50Hz 6A	3-phase 230/460V 60Hz 6A
(advanced)	3-phase 380-480V 50/60Hz 6A	3-phase 208-240V 50/60Hz 6A
Motor rating	0.37 kW	0.37 kW
Rated current	1 A	1.9A (230V) - 1.1A (460V)
Weight	35 kg	77.2 lbs
Height	550 mm	21.6"
Lenght	694 mm	27.3"
Depth	475 mm	18.7"
Inlet pipe	Ø 100 mm	Ø 4"
Sound level	< 65 db (A)	< 65 db (A)





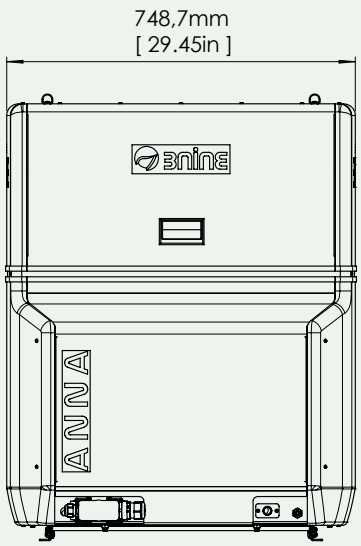
ADVANCED VS. BASIC

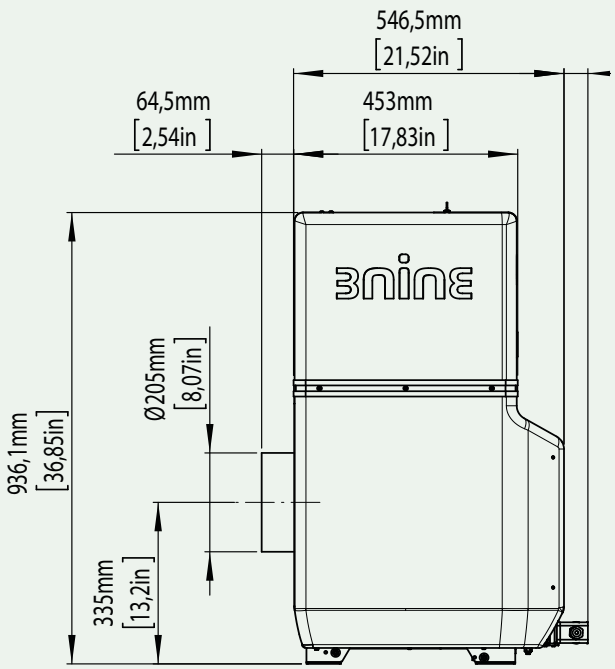
The Nova Advanced is controlled by a frequency converter which incorporates more advanced monitoring of the HEPA filter, pressure drops, the drive belt and controls the CIP system.

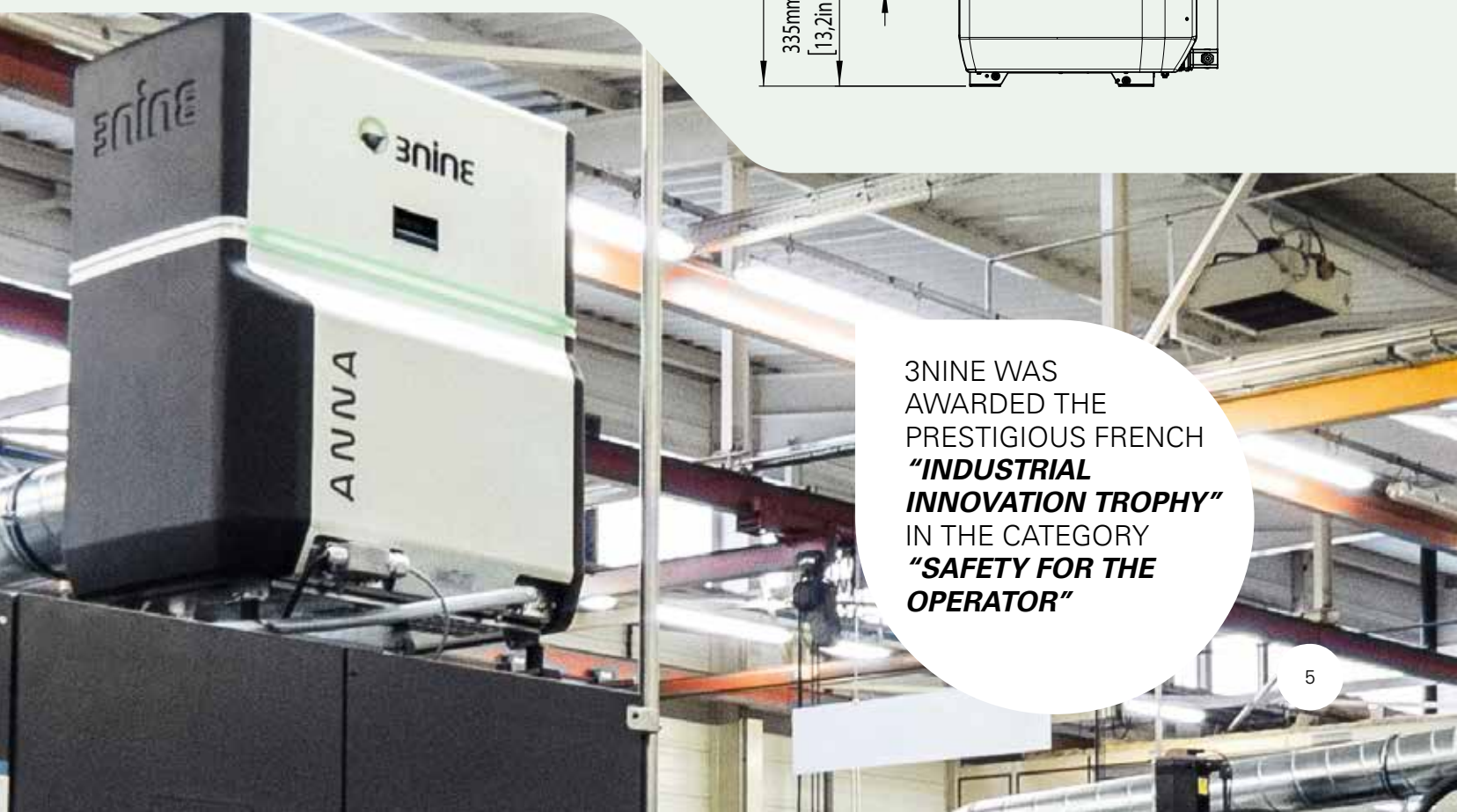
The Nova Basic is controlled by a built in circuit breaker and has a pressure switch which monitors the HEPA filter.

ANNA 600

	EU-standard	NA-standard
Max cabin size	<6 m^3	210 CF
Air flow	600 m^3/h	352 CFM
Operating conditions	5-50 °C	41-122 F
Power supply	3-phase 380-480V 50/60Hz 6A	3-phase 208-240V 50/60Hz 6A
Motor rating	0.75 kW	0.75 kW
Rated current	1.9 A	1.9A (230V) - 3.3A (460V)
Weight	77 kg	169.7 lbs
Height	936 mm	36.8"
Lenght	748 mm	21.5"
Depth	546 mm	29.7"
Inlet pipe	Ø 200 mm	Ø 8"
Sound level	<70 db (A)	<70 db (A)







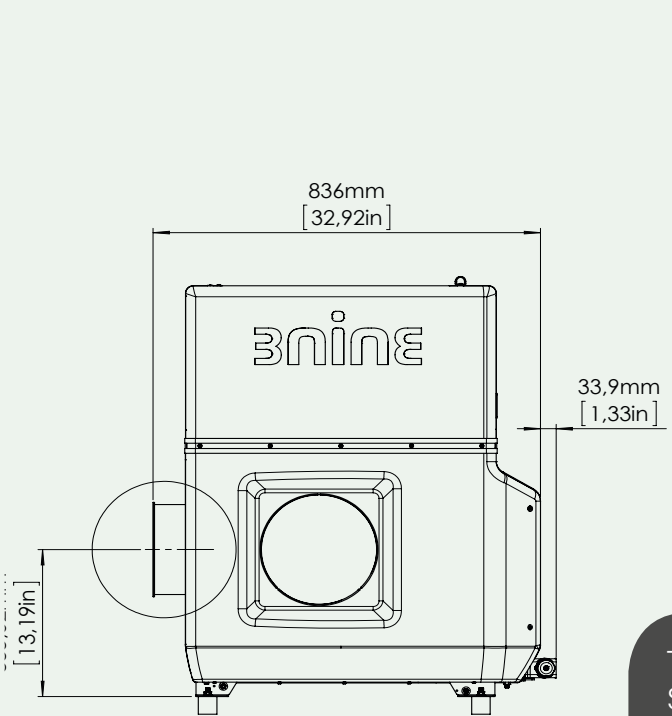
3NINE WAS AWARDED THE PRESTIGIOUS FRENCH ***"INDUSTRIAL INNOVATION TROPHY"*** IN THE CATEGORY ***"SAFETY FOR THE OPERATOR"***

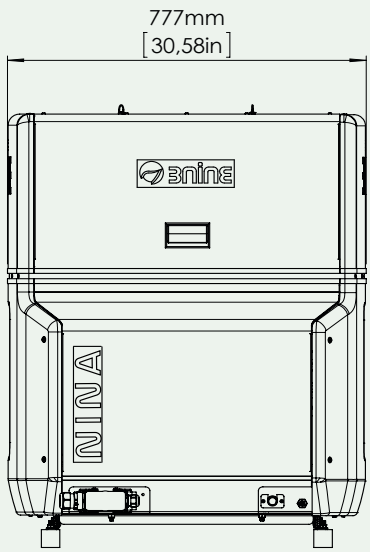
OVER THE PAST DECADE, 3NINE HAS BEEN AWARDED OVER 100 PATENTS. THAT REPRESENTS OVER 40% OF THE GLOBAL PATENTS AND POSITIONS US AS THE WORLDWIDE LEADER IN OUR SEPARATION TECHNOLOGIES.

SPECIFICATIONS

LOVA 900

	EU-standard	NA-standard
Max cabin size	<9 m^3	320 CF
Air flow	900 m^3/h	528 CFM
Operating conditions	5-50 °C	41-122 F
Power supply	3-phase 380-480V 50/60Hz 6A	3-phase 208-240V 50/60 Hz 6A
Motor rating	1.5 kW	1.5 kW
Rated current	3.3 A	2.8A (230V) - 5.7A (460V)
Weight	115 kg	253.5 lbs
Height	936 mm	36.8"
Lenght	777 mm	30.5"
Depth	833 mm	32.8"
Inlet pipe	Ø 200 mm	Ø 8"
Sound level	<70 db (A)	<70 db (A)





THE LOVA AND NINA SHARE THE SAME UNIT SIZE. HOWEVER THE LOVA HAS 3 ROTORS AND THE NINA HAS 4, ALLOWING FOR GREATER AIRFLOW.

NINA 1200

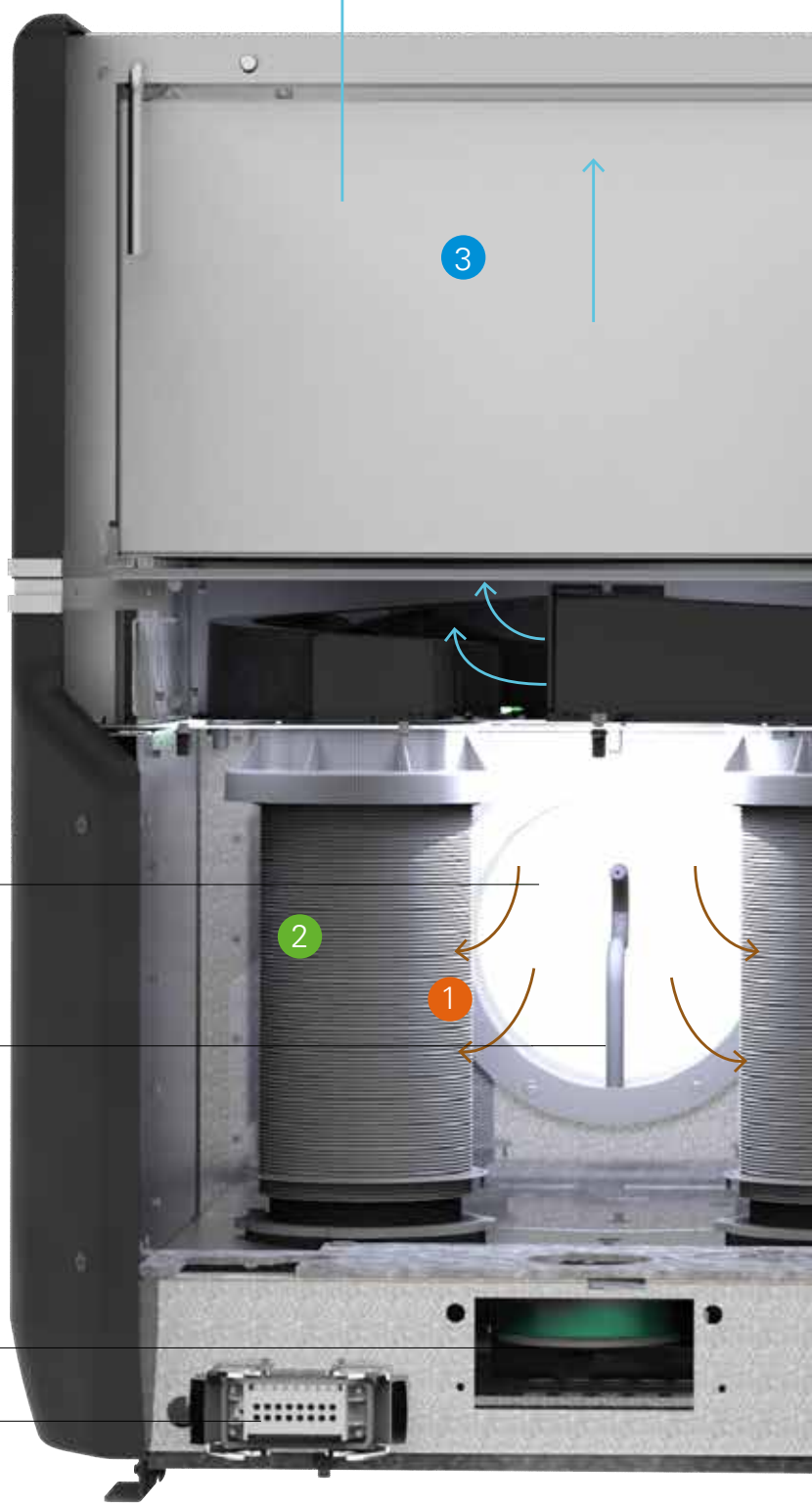
	EU-standard	NA-standard
Max cabin size	<12 m^3	425 CF
Air flow	1200 m^3/h	704 CFM
Operating conditions	5-50 °C	41-122 F
Power supply	3-phase 380-480V 50/60Hz 6A	3-phase 208-240V 50/60 Hz 6A
Motor rating	1.5 kW	1.5 kW
Rated current	3.3 A	2.8A (230V) - 5.7A (460V)
Weight	120 kg	264.5 lbs
Height	936 mm	36.8"
Lenght	777 mm	30.5"
Depth	833 mm	32.8"
Inlet pipe	Ø 200 mm	Ø 8"
Sound level	<70 db (A)	<70 db (A)

OPERATING PRINICIPLE

99.97% particle free air

3 STEP CLEANING

1. Counter flow separates the largest particles down to ~ 10 µm
2. Disc Stack separates smaller particles at 100% > 1 µm
3. HEPA filter further cleans particles to 99.97%



Inlet for polluted air

CIP: Automated cleaning system that keeps the rotors clean

Drive belt

Multipolar Connector

Separated cutting fluid is fed back out to the machine tool for reuse

MULTI ROTOR TECHNOLOGY

The GREEN LINE Series utilizes one rotor and disc stack size for all the units. One rotor develops 176CFM/300m³/h. When a higher flow rate is required we add another rotor to the separator. This facilitates scalability for different airflow requirements. The rotors are spun by a motor and drive belt.

1 COUNTER FLOW TECHNOLOGY

The GREEN LINE units are based on Counter Current Technology. Each rotor has a fan at its top, which along with the spinning disc stack, creates the suction and pulls the processed air in from the machine tools' cabin. This combination creates the pre-separation of the larger particles down to 10µm. This makes it extremely efficient for all applications, including difficult applications such as grinding or die casting with emulsions.

2 CENTRIFUGAL SEPARATION

Fluid particles smaller than 10 µm, will enter the disc stack to be further separated to 100% down to 1µm. On the discs, the small particles coalesce and form larger particles. The bigger the particle, the faster they move towards the edge of the spinning disc to be thrown off and onto the inner wall of the rotor chamber to be returned to the machine tool for reuse.

3 FINAL STAGE HEPA FILTER H13

The particulate smaller than 1µm, will be collected by the final stage HEPA filter. With most of the particles separated in the rotor, the HEPA filter has a life expectancy of 12-18 months.* The final stage HEPA filter is a grade H13 and produces 99.97% particle free air.

CIP "YOUR MAINTENANCE PARTNER"

With our CIP (Clean in Place) particle buildup on the rotor is avoided. The CIP system uses clean cutting fluid from the machine tool to automatically and continuously clean the rotors. With the GREEN LINE Series the rotor can go through a cleaning cycle automatically at every startup and shutdown of the unit.

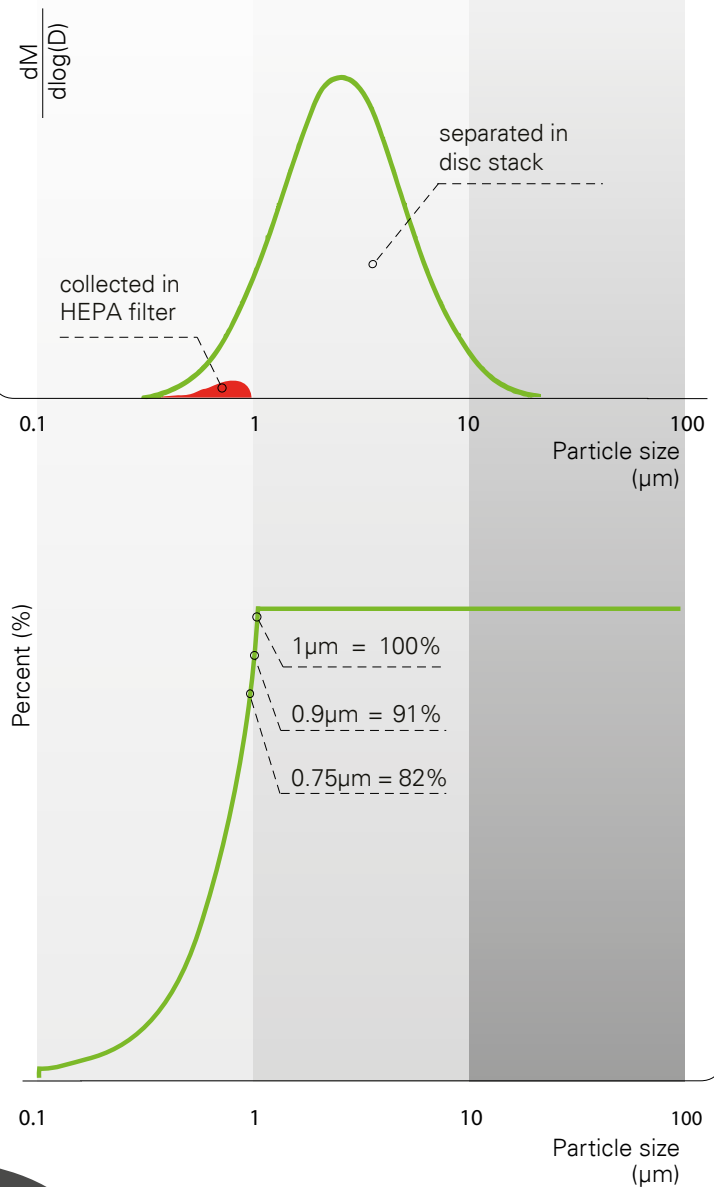
* 12-18 months filter life is based on 1 shift per day, 5 days a week and normal operating conditions.

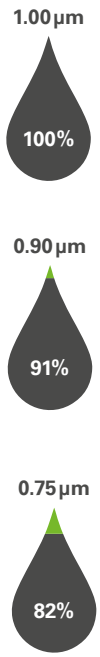
SEPARATION EFFICIENCY

The GREEN LINE series of units separate 100% of all fluid particles down to 1 µm, 91% down to 0.9 µm and 82% down to 0.75 µm. In order to capture the finer particles that are <1µm, 3nine uses a HEPA filter (H13) to ultimately clean the air to 99.97%. With most of the particles separated in the disc stack, only 1% of the particles are collected in the HEPA filter.

The diagram is based on the assumption of a log-normal distribution of D_{V50}=2.7 µm, σ=0.6.

This would be a normally distributed application.

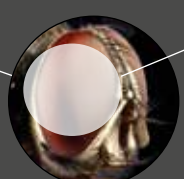




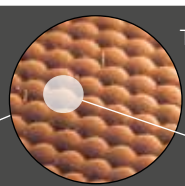
The diagram shows the performance as a function of the particle diameter.

10µM? 1µM? HOW SMALL IS THAT?

It is difficult to imagine how small 1 µm is, but looking into a fly's eye, one gets a pretty good understanding.



The eye of the fly consists of thousands of individual photoreceptors.



The size of one individual photoreceptor is around 10 µm. Hence, a particle of the size of a single photoreceptor would be separated in step 1 in the GREEN LINE unit.

10µm

COMMUNICATION

LED-COMMUNICATION

All GREEN LINE oil mist separators have a built in system control box. The control box monitors and reports on the HEPA filter status and the status of the airflow.
The status of the machine is then communicated through a LED RGB-strip on the front and back of the machine. To see some examples on how this looks, scan the QR codes below.

Alert filter

Alert flow

Alarm flow

Alarm filter

ECO SOLUTIONS

RECYCLE

Our customers have invested in over 10,500 3nine oil mist separators. The units together separate over 4.1 million liters of oil every year. That's the equivalent of 91 trucks of recycled oil for the Metal Working Industry.

REDUCE

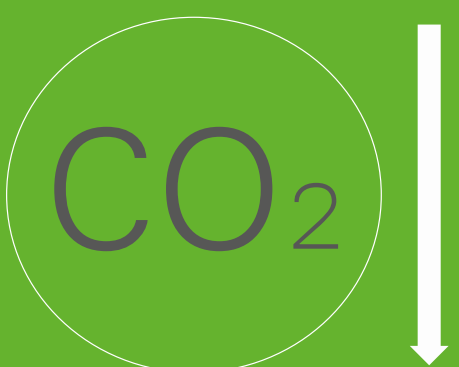
Compared to all traditional filtered technologies (I.e. Mechanical or Rotating) that collect oil mist through some type of filter media and require filter replacements often, 3nine solutions spare the environment from thousands of used filters that would otherwise need to be disposed of as bio-hazardous waste.

REUSE

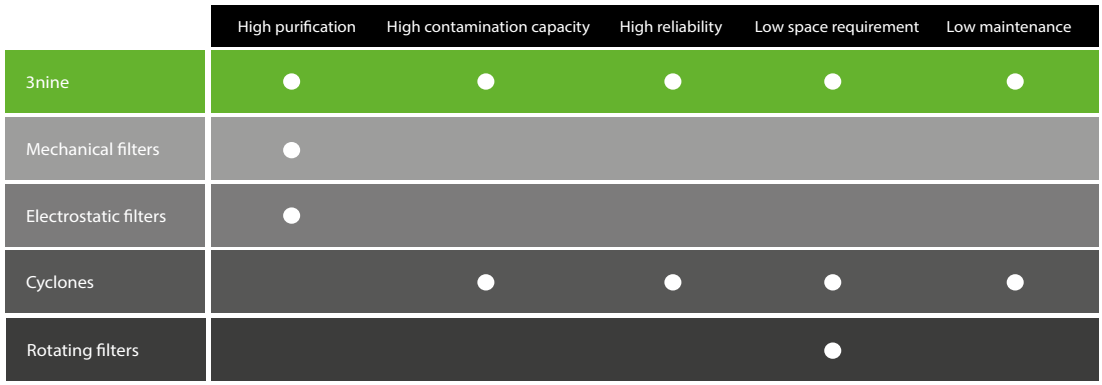
The processed air that is treated in our oil mist separators is slightly warmed in the cleaning process before it is recycled back into the workshop. This reduces energy consumption at many companies and the purified air helps reduce the maintenance on air handlers for the shop.

BE GREEN!

By separating your oil or coolant instead of collecting it you will lower your company's overall CO_2 emissions. The 91 trucks of recycled oil mentioned above, spares the environment of 12,800 tons of CO_2.



ADVANTAGES



WHY SPEND TIME ON MAINTENANCE?

3nine oil mist separators are known worldwide for requiring minimum maintenance and still providing the highest purification rate. Why? Because the basis of the technology is to separate not collect fluid particles and the units clean themselves automatically. Our final stage HEPA filter, which is a grade H13, has a life expectancy of 12-18 months.*

LESS PIPING REQUIRED

Installing a 3nine oil mist separator requires very little piping. Long pipe runs should be avoided because oil mist particulate will collect in long pipe runs and that can create a fire risk, bacteria buildup and leaky joints, unless properly maintained.

FLEXIBILITY FOR WHEN PRODUCTION NEEDS CHANGE

3nine units are easy to install. They can be mounted on top of the machine tool, the side or a pillar stand. By installing the oil mist separator on the machine tool you can move the machine tool freely depending on your future production requirements.

Recycling of cutting fluids

No Oily Surfaces in the Workshop

Compact and Direct Installation

Low energy use

Low Life Cycle Cost

99.97% Particle free Air!

Minimal Maintenance

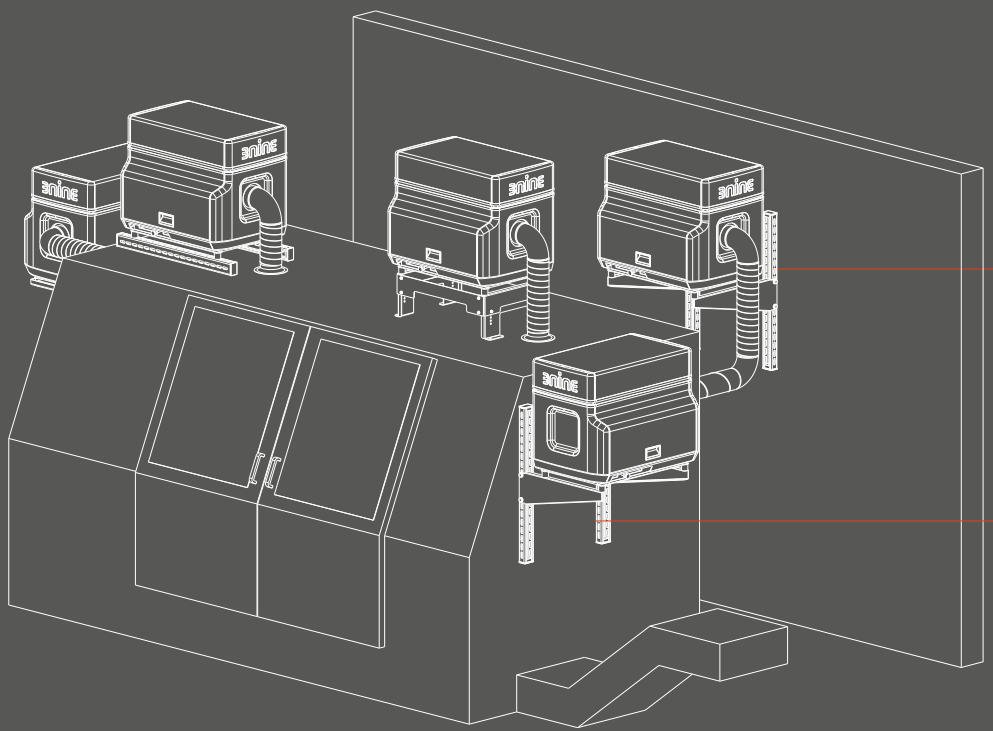
Minimal Filter Changes

Suitable for applications with high degree of solid particles

Minimal Duct Work

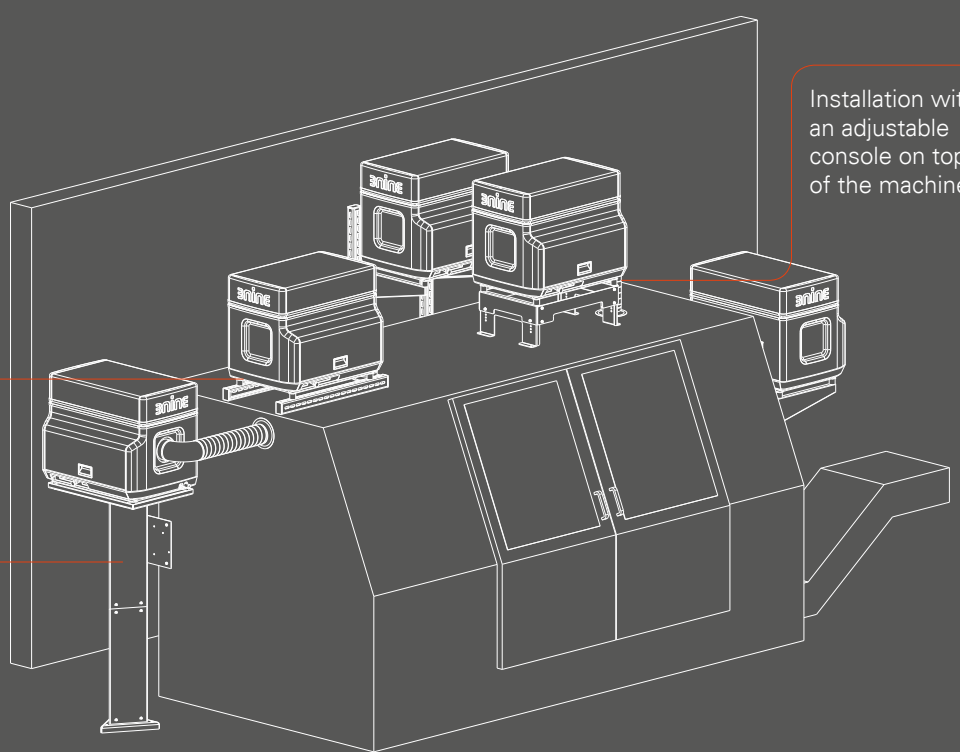
* 12-18 months filter life is based on 1 shift per day, 5 days a week and normal operating conditions.

INSTALLATION ALTERNATIVES



If there is no space on top of the machine tool, all GREEN LINE oil mist separators can be installed on a wall mount.

If there are cranes or other obstacles limiting the space above the machine tool, the oil mist separator can be mounted on the side of the machine tool.



Installation with an adjustable console on top of the machine.

Installation w/ C-profiles on top of the machine tool.

Installation on a pillar stand is an alternative when no other option works.


3nine
3nine
ANNA
RAVEMA

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3nine is a Swedish company that develops solutions for the purification of processed air for the Metal Working Industry. Our revolutionary technology is based on centrifugal separation, using a disc stack which produces an extremely high degree of purification in a very compact format and requires a minimum of maintenance.