OPERATION AND INSTRUCTION MANUAL

M020
Aerosol Generator

QVA Test Solutions
www.qvats.com
Email: info@qvats.com

1281 Colony Drive
New Bern, NC 28562 USA
PH: 919.567.3208

Revision E

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Address QVA Test Solutions / 1281 Colony Drive / New Bern, NC 28562 / USA
Phone No. (919) 567-3208
E-mail Address info@qvats.com

Limitation of Warranty and Liability

Each Aerosol Generator is warranted to be free from defects in material and workmanship when used in accordance with the M020 aerosol generator user manual. The warranty period is one year and begins on the date of shipment. The warranty provides, at no extra cost to you, all labor and parts necessary to ensure the aerosol generator is in proper operating condition during the warranty period. QVA Test Solutions will repair or replace any defective item or component provided that a claim is made within the warranty period of one year. This warranty is subject to the following terms:

What is not covered

QVA Test Solutions shall not be liable for costs incurred as a result of:

- Use of parts not in accordance with the user manual.
- Careless operation or handling, misuse, or damage that has occurred during transit.
- External sources such as weather.
- Repairs or alterations carried out by unauthorized parties or agents.
- Use of parts and accessories other than those produced or recommended by QVA Test Solutions.
- Cosmetic damage to outer surfaces and external parts to the product.

To obtain warranty service, contact QVA Test Solutions to obtain return authorization information.

To the fullest extent permitted by law, in no event shall QVA Test Solutions be liable for any special, direct, indirect, incidental, or consequential damages of any kind including, but not limited to, compensation, reimbursement or damages on account of the loss of present or prospective profits or for any other reason whatsoever arising from the use of the product.

Revision History

A	11 January 2016
B	09 September 2020
C	12 May 2021
D	02 September 2021
E	03 May 2022

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Purpose and Scope of Manual

This manual describes the features, precautions, and operation of the Model M020 aerosol generator. This manual contains important information for the safe operation of the M020 aerosol generator and failure to follow the procedures and warnings could result in serious injury or death. It is important that all intended users carefully read and understand this entire manual.

Please note that this manual gives a general overview of the units and that some features of custom aerosol generators may not be covered. All units are inspected prior to shipping. Please visually inspect each unit after receiving to ensure that the unit was not damaged during transport. Please immediately contact QVA Test Solutions if any defects are noted or if you have questions about the aerosol generator. The generator requires little maintenance and contains no serviceable parts. Any attempt to repair or make adjustments to components of the unit will likely result in compromising the generator's operational performance.

Introduction

The M020 aerosol generator is a compact low output unit that generates poly-dispersed oil based aerosols in the concentration ranges of 0.02 (µg/l)* in 10cfm and up to approximately 0.02 (µg/l) in 7,500 cfm of airflow. The poly-dispersed aerosol is produced by a nozzle that introduces a high velocity stream of air below an oil liquid level. The unit does not require an external compressed air source as an internal compressor provides the required nozzle air pressure to atomize the liquid. The aerosol generator is designed to be used in conjunction with particle counting systems for integrity testing of HEPA and ULPA filtration systems. The low concentration output levels significantly reduce the amount of oil exposure to the filtration system under test.

The M020 aerosol generator provides a means to introduce aerosol into a system (positive or negative pressure) and the output levels can be easily adjusted to the desired concentrations through a metering valve. The M020 generator rapidly responds to any adjustments made to the generator output and significantly reduces the delay required to reach stable output levels.

* 0.02 (µg/l) of aerosol is approximately equivalent to 6 million (0.3 µm-1.0 µm) particles/ft^3 of air.

Description of Caution and Warning Symbols

When working with the aerosol generator, cautionary measures must be taken. Caution, warning, and note statements are used throughout this manual. Their meanings are found below.

	CAUTION
	A caution statement identifies conditions or practices that could result in damage to the instrument.
	ATTENTION
	Un appel à l'ATTENTION indique des conditions ou des pratiques qui pourraient endommager l'appareil.

	WARNING
	A warning statement identifies conditions or practices that could result in injury or death in addition to damage to the instrument.
	MISE EN GARDE
	Un avertissement de MISE EN GARDE indique des conditions ou des pratiques qui pourraient causer des blessures ou même la mort, en plus d'endommager l'appareil.

	NOTE
	A note statement provides supplemental information that may be helpful.
	REMARQUE
	Le symbole de REMARQUE fournit un renseignement utile supplémentaire

Symbols

Symbol	Description
	Risk of danger. Consult user manual.
	DC (Direct Current)
	Fuse
	Indicates ON (Power)
	Indicates OFF (Power)

Symbole	Description
	Risque de danger. Consulter le manuel d'utilisation.
	CC (Courant continu)
	Fusible
	EN MARCHE (Power ON)
	ARRÊT (Power OFF)

Safety Precautions

The M020 aerosol generator produces an aerosol from a liquid source which can easily enter airways. It is the user's responsibility to assess and implement appropriate safety precautions for the handling and application of the substances used in the aerosol generator as well as the resulting aerosols produced by the generator.

	WARNING
	Review all material safety data sheets for substances that will be used in the aerosol generator. The use of proper protective equipment is required when handling aerosol agents and when generating aerosols. Proper protective equipment shall be used, maintained and inspected as per applicable local regulations.
	MISE EN GARDE
	Passer en revue les fiches techniques de tout le matériel afin d'identifier les substances utilisées dans le générateur d'aérosol. Le port d'équipement de protection adéquat est obligatoire lors de la manipulation et de la production d'agents aérosols. Cet équipement de protection doit toujours être utilisé, inspecté et entretenu selon les règlements en vigueur dans le lieu d'utilisation du générateur d'aérosol.

	WARNING
	Do not use flammable aerosol agents in the aerosol generator. The large surface area of the small droplets increases their reactivity and potential to form an explosive mixture. Be aware of potentially dangerous interactions between liquid droplets and other aspects of the area where the aerosol is being produced.
	MISE EN GARDE
	Ne jamais utiliser d'agents inflammables dans le générateur d'aérosol la surface élargie des gouttelettes multiplie leur réactivité chimique et augmente le risque potentiel de former un mélange explosif. Soyez attentif aux interactions potentiellement dangereuses entre les gouttelettes de liquide et les autres aspects environnants où sera produit l'aérosol

	CAUTION
	Read this instruction manual carefully before using the generator and handling any substances that will be used in the generator. QVA Test Solutions does not assume any liability for damages caused by improper operation, application, or use of unsuitable substances.
	ATTENTION
	Lire attentivement ce mode d'emploi avant d'utiliser le générateur ou de manipuler les produits chimiques qu'il utilise. La société QVA Test Solutions n'assume aucune

	responsabilité advenant un dommage causé par une manipulation inappropriée de l'appareil ou l'utilisation de produits inadéquats.

Technical Specifications

Power Adapter

- Input 100-240VAC, 50/60Hz, 1.4A
- Output ..... 24VDC, 2.5A, 60W MAX.

Electrical

- Input ..... 24VDC, 1A MAX.
- Fuse ..... 250V~, 1A (T) 5 X 20 mm

Dimensions

- Height ..... 197 mm (7.75 in)
- Width ..... 124 mm (4.85 in)
- Depth ..... 216 mm (8.5 in)
- Weight ..... 3.5 kg (7.7 lb)

Environment

- Temperature 10C-30C
- Relative Humidity ..... <95% non-condensing

Safety

Complies with IEC 61010-1:2010, 3rd Ed., UL 61010-1 3rd Ed. 2012, CAN/CSA-C22.2 No. 61010-1-12, 3rd Ed., and EN 61010-1:2010

EMC

Complies with IEC 61326-1 Edition 2.0 2012-07

Warranty

One year

Packing and Unpacking the Aerosol Generator

The M020 aerosol generator is provided in a carrying case and packaged for shipping with additional protective padding. Carefully remove the carrying case from any external packaging and visually inspect the unit and accessories for any damage that may have occurred during transport.

The following packaging list below identifies the components that are shipped with the M020 aerosol generator.

Table 1. Aerosol generator component and spare parts list.

Qty	Description	Part Number
1	Aerosol Generator Unit	M020
1	AC Power Cord North America Europe China Japan United Kingdom Australia	 020-C13 NA 020-C13 EU 020-C13 CN 020-C13 JP 020-C13 UK 020-C13 AU
1	24VDC Power Adapter Supply (115V/230V)	020-GS6-42219
2	Liquid Fill/Reserve Bottle (2oz)	020-002-42219
1	Operation Manual	020-001-42219
1	Carrying Case	020-520-42219
2	Drain Insert Plug	020-300-42219
2	Fill Port Plug ¼" BSPP	020-TUB-42219
2	Drain Insert	020-220-42219
2	1/4" BSPP Push to Connect Outlet for 3/8" OD Tubing	020-AMC-42219

Please contact QVA Test Solutions immediately if anything is missing or damage is noted.

Model variations:

M020 - ☐☐

NA=North America
EU=European Union
CN=China
JP=Japan
UK=United Kingdom
AU=Australia

Overview and Description

The M020 aerosol generator is a compact portable unit weighing approximately 7lbs. The features of the unit are outlined below.

1. FILL PORT (OIL BASED AEROSOLS ONLY)
2. 3/8" PUSH TO CONNECT OUTLET (1/4BSPP)
3. CARRYING HANDLE
4. OIL FILL LEVEL SIGHT GLASS
5. ON/OFF SWITCH
6. NOZZLE PRESSURE ADJUST VALVE
7. 24 VOLT DC INPUT
8. DRAIN PLUG (INSERT REQUIRED FOR DRAIN)
9. FUSE HOLDER-1A(T) 5X20mm FUSE

Theory of Operation

The M020 aerosol generator utilizes an internal compressor to produce a high velocity air jet that exits from a nozzle located below the surface of a liquid aerosol agent contained in a reservoir. The compressed air exiting the nozzle atomizes the oil based liquid to produce a poly-dispersed aerosol. The poly-dispersed aerosol and additional carrier air exit the aerosol generator's outlet. The aerosol output can be controlled by a precision needle valve that adjusts the nozzle pressure and carrier air flow to the unit.

Setup Procedure

	WARNING
	If the aerosol generator is used in a manner not specified by the manufacturer, the overall safety may be impaired.
	MISE EN GARDE
	Si les directives spécifiées par le manufacturier ne sont pas respectées lors de l'utilisation du générateur d'aérosol, la sécurité générale de son fonctionnement peut être sérieusement compromise.

	WARNING
	The aerosol generator is intended to be powered using a suitably rated certified limited power source. The power adapter is provided by the manufacturer of this product and the suitable plug is provided for the appropriate input voltage corresponding to the applicable country.
	MISE EN GARDE
	Le générateur d'aérosol est destiné à une utilisation avec une source d'alimentation certifiée de puissance limitée. L'adaptateur de courant fourni par le fabricant est programmé pour fournir le voltage adéquat selon le pays d'utilisation.

The following procedure should be followed prior to each use of the aerosol generator.

1. Verify the identity and quality of all liquid aerosol agents to be used in the aerosol generator. Contaminated sources should not be used in the unit.
2. Verify that the generator drain insert is removed and the backup drain plug is in place.
3. Place the generator on a flat surface and secure the unit if necessary to prevent any movement resulting from the vibration of the internal compressor. Allow a minimum of 4 inches clearance from the generators ventilation openings to prevent overheating.
4. Verify that the generator aerosol outlet is not blocked.
5. Inspect the power cords and power supply for any damage. If damage is noted, the power cords and/or supply should be replaced using the recommended parts listed in Table 1.

Operating Instructions

	WARNING
	Isopropyl alcohol or other similar flammable solvents should never be put or used in the aerosol generator. Operating or flushing the generator with solvents could damage the unit and pose serious risks resulting in injury or death.
	MISE EN GARDE
	L'alcool isopropylique (IPA, ou propan-2-ol), ou tout autre solvant inflammable, ne devrait jamais être utilisé ou versé dans le générateur aérosol. Utiliser le générateur, ou le rincer avec un solvant peut endommager l'appareil et causer des blessures graves ou même la mort.

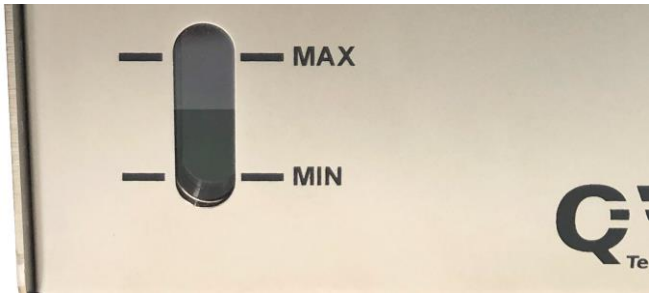
The following aerosol agents are approved to be used with the M020 aerosol generator. Alternative agents may be compatible with the M020 generators. Before using any aerosol agents, refer to the appropriate safety and usage guidelines as certain agents may pose health and safety risks.

DOS/DEHS - Di (2-Ethylhexyl) Sebacate
Mineral Oil – Arco Prime 200
Ondina Oil
PAO - Poly-Alpha Olefin/Emery 3004

	WARNING
	Never overfill the aerosol generator or fill the aerosol generator when it is under pressure or in operation as this could cause the aerosol agent to spray out of the unit and pose a hazard.
	MISE EN GARDE
	Ne jamais remplir au maximum le générateur d'aérosol (risque de débordement) ni le remplir sous pression ou en cours d'opération, cela pourrait causer un éclaboussement de l'agent aérosol hors de l'appareil et représenter un danger.

	CAUTION
	Ensure the generator is placed on a flat surface where it is secure from falling.
	ATTENTION
	S'assurer que le générateur est sur une surface plane, sans risque de chute.

1. Remove the fill port plug on the aerosol generator and fill the unit with the desired aerosol agent until the fill level is approximately half way between the MAX and MIN markings on the liquid level sight glass (~60ml). The volume of the supplied bottle (2oz) will be enough to fill a drained generator.



2. Replace the fill port plug. Only tighten the plug finger tight.

	CAUTION
	Verify that the generator aerosol output is not blocked or restricted.
	ATTENTION
	Vérifier que la sortie du générateur d'aérosol n'est pas obstruée ou restreinte.

3. Verify that the on/off switch is in the off position, plug in the power supply, and connect the power supply outlet to the 24V DC input on the back of the unit.

	CAUTION
	Only the provided power supply should be used to power the aerosol generator.
	ATTENTION
	Utiliser seulement la source de courant fournie pour alimenter le générateur d'aérosol.

4. Turn on the generator using the on/off switch on the back of the unit.
5. Adjust the valve knob until the desired output level for testing is reached. Clockwise rotation of the valve knob will increase the aerosol output and counter clockwise rotation will decrease the aerosol output.
6. When testing is complete, turn off the generator.

Draining

	CAUTION
	The unit should be fully drained whenever shipping the aerosol generator, whenever the unit may be tilted or rotated in a position other than upright during transport, or whenever the unit will be placed in long term storage.
	ATTENTION
	L'appareil doit être complètement vidé avant d'être transporté ou incliné, ou tourné dans une position autre que verticale lors d'un déplacement ou pour un entreposage à long terme.

1. To prepare the generator for draining, press down on the drain port's quick disconnect thumb latch.

2. Remove the drain port's safety plug.

3. Install the drain port insert body to open the drain valve. Tubing can be placed on the barbed fitting to assist in draining into a container.

	NOTE
	The oil will not drain from the unit until the insert body is installed.
	REMARQUE
	L'huile ne pourra pas être drainée à moins que le morceau accessoire ne soit installé.

4. The generator should be routinely drained to remove residue buildup and water that has accumulated in the unit. Tilting the unit forward, backward, and side to side after initial drain will help ensure the unit is fully drained.

	WARNING
	Never flush the generator with isopropyl alcohol or other solvents.
	MISE EN GARDE
	Ne jamais rincer le générateur avec de l'alcool isopropylique (IPA) ni aucun autre solvant.

Maintenance & Service

Preventative maintenance

Inspect the fittings on the unit for leaks. All threaded fittings should be installed finger tight without the use of tools. Wipe down the exterior of the unit with a non flammable cleaning agent to remove any residual oil or debris.

Changing the internal filter

	WARNING
	Risk of electric shock. Disconnect power supply before opening.
	MISE EN GARDE
	Risque d'électrocution. Débrancher l'appareil avant de l'ouvrir.

In order to change the internal filter, remove the six screws from the enclosure lid using a Phillips screwdriver. Remove the filter cartridge from the support clip and disconnect the ¼" OD tubing from the push to connect fitting on the filter by pressing down on the orange release button while simultaneously pulling out the ¼" tubing. Install the new filter in the same orientation and reassemble in reverse order.

Troubleshooting

Symptom	Possible Cause	Recommendation
Unit does not power on	Power supply is not plugged in	Ensure the power supply is plugged into the mains source and the AC power cord is connected to the power adapter
	Power supply is not connected to the unit	Ensure the power supply is fully seated into the aerosol generator 24VDC input jack.
	On/Off switch is in the off position	Turn the switch to the on position.
	Blown Fuse	Inspect/test fuse and replace with spare fuse of same rating if blown or damaged. Spare fuses included with new units.
	Defective power supply	Replace power supply with specified make/model.
	Internal component defective	Return unit for service
No Aerosol Output	The On/Off switch is in the off position.	Turn the On/Off switch to the on position.
	The internal filter is clogged	Replace the internal filter with the specified make/model
	The generation nozzle is clogged	Return the unit for service
	The liquid aerosol fill level is empty or too low	Fill the liquid reservoir to the appropriate fill level
Low Output Levels	The nozzle pressure adjust valve is set too low	Rotate the nozzle pressure adjust valve clockwise to increase output levels
	The liquid reservoir is over or under filled	Verify that the liquid reservoir is filled to the appropriate level
	Internal filter is partially clogged	Replace the internal filter with the specified make/model
	The generation nozzle is clogged	Return the unit for service