Static Clean International
MCS Installation, Operation & Maintenance Instructions

V2025.1

Table of Content:

MCS System Setup

MCS System Setup

- Locate and position system to be as comfortably and ergonomically accessible to the operator and process as possible

- If possible, leave access to the back of the system

- Lock the casters to prevent the system from rolling around once you've optimally located it

- Connect your CDA (clean, dry, compressed air) line to the input fitting of the red valve at the back of the MCS, as shown
- VERY IMPORTANT: YOUR SUPPLY LINE MUST BE AT LEAST 3/8" ID PIPE OR HOSE AND PROVIDE 80 PSI (MIN) @ 40 SCFM (MIN)

MCS System Setup

- A 3/8” Industrial Quick-Disconnect Plug is provided for easy connection. The MCS can be plumbed directly into the brass 3/8”NPT female elbow if preferred.

IMPORTANT: DO NOT USE ANYTHING SMALLER THAN 3/8”ID PIPE/TUBE/HOSE/FITTINGS!!

MCS Medical Cleaning Station Air-Flow Chart

Airline Supply Pressure	MCS-xxxx-15 with (1) hood & (2) 15" air tubes	MCS-xxxx-15-2 with (2) hoods & (4) 15" air tubes
5	7.0	14.0
10	10.0	20.0
15	13.0	26.0
20	16.0	32.0
25	17.1	34.2
30	19.3	38.6
	SCFM	

- SCFM values in chart above only apply when compressed air is ‘on’ via footswitch or sensors; see pages 7 & 8 for more info.

- Turn the red air valve counter-clockwise to the on/’Sup.’ (supply) position, which allows pressure through to the system

IMPORTANT: The valve must be turned off, then locked-out/tagged-out before performing any service or repairs!! When turned off (exhaust), it will dump air pressure downstream of the valve

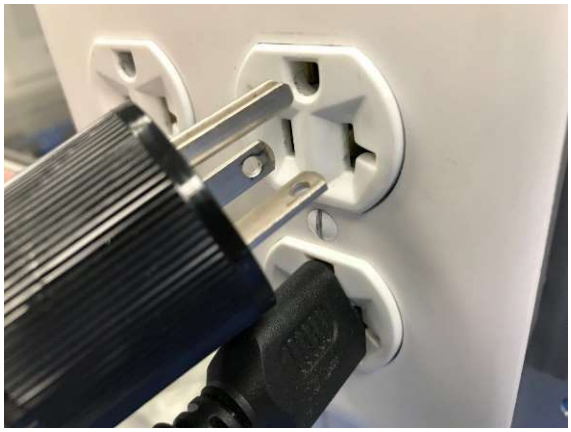
- Then adjust the MCS regulator to 80~90psi using the gray knob. Pull the gray knob down (out) to make adjustments, then press up (in) to lock your setting.

MCS System Setup

- CONNECT THE POWER CORD TO 120V, **60HZ**, 1-PHASE MAINS POWER ONLY, PER THE LABEL ON THE SYSTEM (AS SHOWN).

IMPORTANT: CONNECTING TO ANY OTHER MAINS VOLTAGE AND/OR **FREQUENCY** WILL DAMAGE THE SYSTEM AND VOID THE WARRANTY!!!

- NOTE: Picture for reference only, may not match plug on your machine



- TURN THE MCS ROCKER-SWITCH 'ON' (UP) TO POWER UP THE DUST COLLECTOR, STATIC BARS AND SOLENOID VALVE THAT ALLOW AIR-FLOW TO THE AIR TUBES TO VERIFY ALL SYSTEMS ARE WORKING OK

- The VQM5003 Dust Collector will turn on; the magnehelic gauge on the right side of the dust collector, depending on the system configuration, will usually read ~1.0 (+/- 0.5) IN. W.C. (inches of water column) when new. Normal operating range is < 2.0 IN. W.C. See pages 25 & 29 if => 2.0 IN. W.C. For troubleshooting

- The small 'status' LEDs on each of the (4) static bars will turn **RED** momentarily, then a steady **GREEN**
- NOTE: the Model 4103 Static Bar LED shows the current status of the bar; i.e.
- **GREEN** = healthy
- Blinking **GREEN*RED*** = needs attention, which is usually resolved by cleaning the bar; see 4103 Manual for details
- **RED** or **OFF** = Fault; bar needs to be replaced

MCS System Setup

- For systems built from ~November 2018 through ~September 2019 that include a footswitch for the compressed air, locate the footswitch on the floor in front of the system

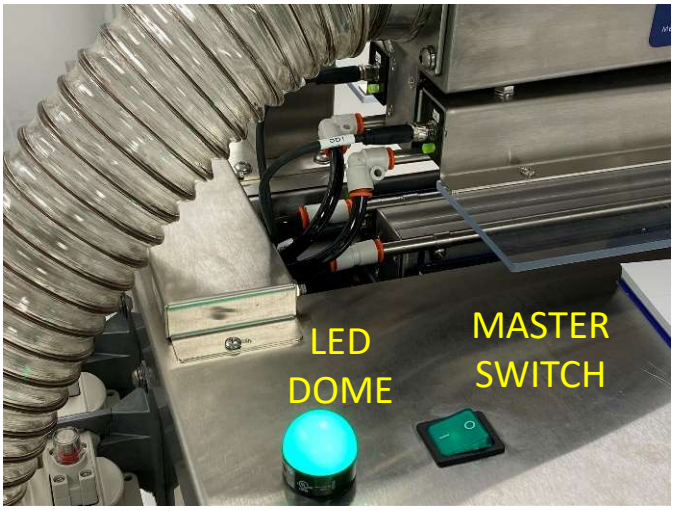
- so it can be easily stepped on during the entire cleaning process

- NOTE: For systems built prior to Nov, 2018 that did not come with a foot switch but that do include an electric 110VAC solenoid valve to control the compressed air, a foot switch and jumper cable can be very easily installed to save energy by only consuming air when the switch is depressed (stepped on). Please call Static Clean at 781-229-7799 for more info.

MCS System Setup

- For newer systems built ~October 2019 and later, we upgraded to our SAC (Status & Air Control) System, usually mounted to the back of the VQM Dust Collector which features:

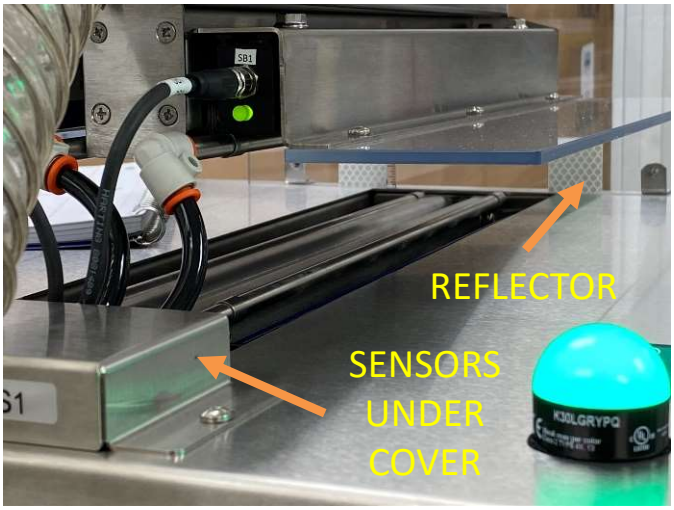
- A 3-color LED Dome Light to reflect the current status of the 4103 Static Bars
  - GREEN = normal
  - AMBER = 1 or more static bar requires attention; no need to stop production; usually a good cleaning of the bar(s) resolves this
  - RED = 1 or more static bar failed; stop production and replace bar ASAP
  - NOTE: each 4103 static bar has it's own LED which makes it easy to tell which bar(s) to clean/replace

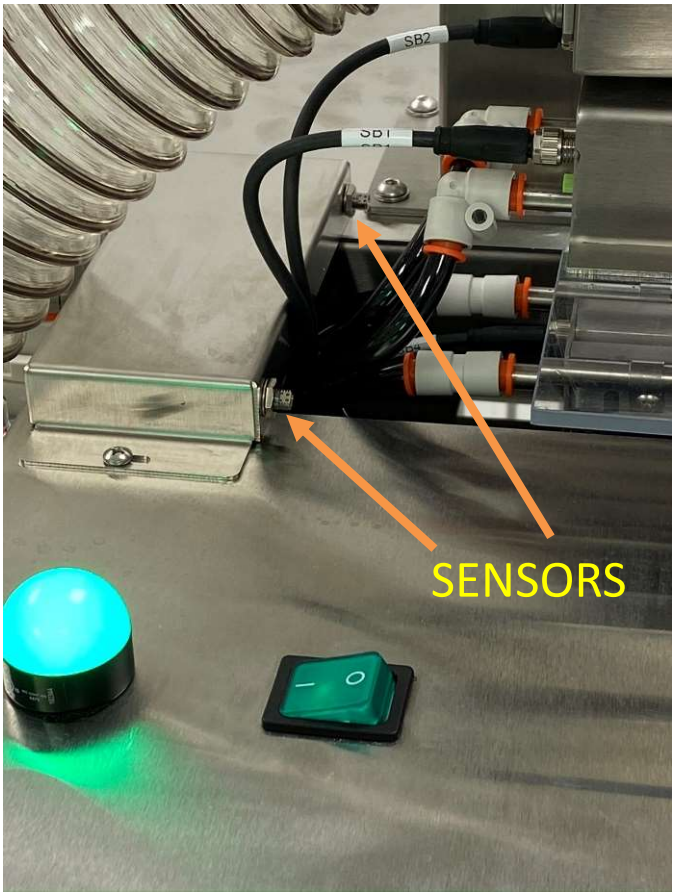


- If the system faults and the LED Dome light turns RED, an audible 'Horn' also sounds to reinforce the 'alarm' condition of the system. This audible alarm can be silenced by turning the switch next to the horn to the 'OFF' position
- <u>NOTE</u>: when shutting the system off, the alarm will usually sound a very short, low-volume chirp. <u>THIS IS NORMAL</u>!

MCS System Setup

- A Fiber Optic Sensor and reflector on located on both sides of the cleaning zone to turn compressed airflow on when one or both sensors see a part inside the cleaning zone, shutting air off at all other times for considerable energy savings
- Parts can be fed right-to-left OR left-to-right
- NOTE: the (2) SAC sensor amplifiers that control the solenoid valve are programmed for a 1~2 second ‘off-delay’ to avoid blow-off hiccups if a sensor sees beneath a part or through a clear packaging tray in the cleaning zone





MCS System Setup

- The SAC control box is fully connectorized for quick, easy connectivity between the static bars, solenoid valve, LED Dome Light and Sensors

- It also features externally accessible fuses for the static bars

MCS System Setup

- With the compressed air on (while stepping on the foot switch or holding your hand in front of a sensor), adjust the air pressure to the TOP AIR TUBES to ~6psi as a starting point. You will likely need to optimize this setting specific to your part(s) once you run production parts. Pull the knob out to unlock and make adjustments, then push in to lock the setting.

- With the compressed air on, adjust the air pressure to the BOTTOM AIR TUBES to ~6psi as a starting point. Push the cap in to lock the setting.

- TURN THE MCS ROCKER-SWITCH 'OFF' (DOWN)

IMPORTANT: UNPLUG FROM MAINS BEFORE PERFORMING ANY SERVICE OR REPAIRS!!

- The top MCS cleaning hood can easily be adjusted to accommodate parts up to 6" tall.

TO ADJUST THE HOOD:

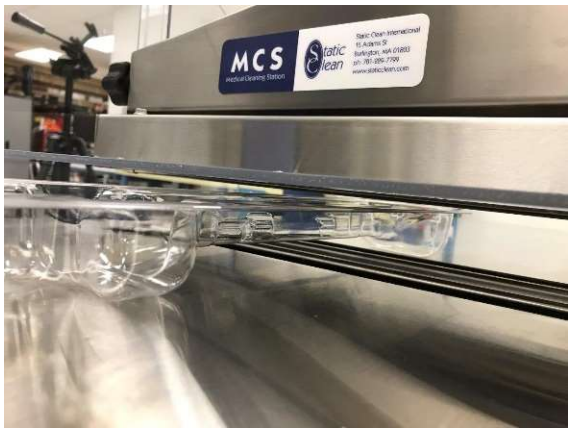
- Loosen the black knob at the front air baffle 1 full turn (counter-clockwise)

MCS System Setup

- Loosen the gray lever at the rear column 1 full turn (counter-clockwise)

- Turn the black handwheel at the top of the column clock-wise to raise the hood or counter-clockwise to lower the hood

- until the gap between the bottom of the vacuum hood assembly and the top of your part is 1/8” to 3/8” (max)



- Tighten the gray lever at the column
- NOTE: The gray lever can easily be reoriented by pulling it toward you to disengage it from the grooves on the bolt. Ideally, the lever will be at 5:00 o’clock when tight. The internal spring will draw the lever into the grooves on the bolt to re-engage it when you let go.

MCS System Setup

- Tighten the black knob at the front air baffle by turning clock-wise

THE BASIC SYSTEM SETUP IS NOW COMPLETE

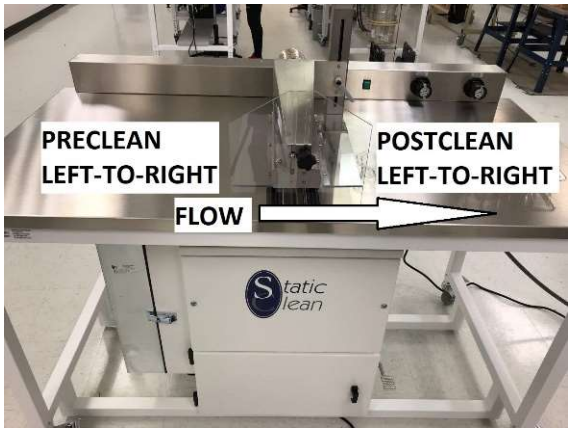
- SEE THE TROUBLESHOOTING SECTION OF THIS MANUAL IF YOU ARE UNABLE TO COMPLETE THIS BASIC SYSTEM SETUP

SECTION BREAK

MCS Normal Operation

MCS Normal Operation

- BEFORE RUNNING PARTS, A FEW HELPFUL TIPS!
- It is strongly recommended that one end of the station is established as the “pre-clean” end and the other as the “post-clean” end so that particulates are kept to one end of the system to minimize recontamination of parts after cleaning them.



- To get a ‘feel’ for the recommended 6”(ideal) to 12”(max)/second speed for feeding your trays/parts/devices through the MCS; on a standard 60” long bench using the stop-watch function on your smart phone, it should take 5 (minimum) to 10 seconds (ideal) to move your hand the entire length of the bench at a steady speed.
- NOTE: this speed is commonly referred to as IPS or ‘inches per second’
- TIP: the recommended speed for feeding parts through the cleaning zone is 6 IPS (ideal) to 12 IPS (max)
- IMPORTANT: DO NOT FEED PARTS TOO FAST AS IT WILL LIKELY RESULT IN POOR PERFORMANCE!!

- Note: We highly recommend cleaning the stainless steel work surface frequently to prevent particles that fall on the surface from transferring into/onto your tray, package, device or product
- HINT: Using a Static Clean HHCCR Hand-Held Contact Cleaning Roller is an excellent way of cleaning the surface fast and efficiently, so particles can then be transferred onto an adhesive pad, permanently removing them from your clean room, process and products.

MCS Normal Operation

- Turn the green rocker-switch on

- The VQM5003 Dust Collector will turn on; the magnehelic gauge on the right side of the dust collector, depending on the system configuration, will usually read ~1.0 (+/- 0.5) IN. W.C. (inches of water column) when new. Normal operating range is < 2.0 IN. W.C. See pages 25 & 29 if => 2.0 IN. W.C. For troubleshooting

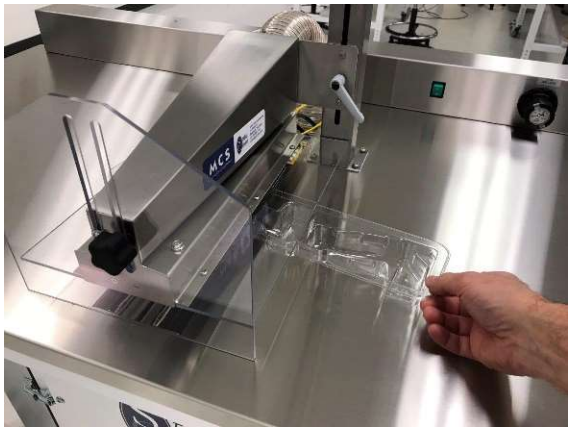
- The small 'status' LEDs on each of the (4) static bars will turn **RED** momentarily, then a steady **GREEN**
- NOTE: the Model 4103 Static Bar LED shows the current status of the bar; i.e.
- **GREEN** = healthy
- Blinking **GREEN*RED*** = needs attention, which is usually resolved by cleaning the bar; see 4103 Manual for details
- **RED** or **OFF** = Fault; bar needs to be replaced

- If your MCS does NOT include the SAC System, be sure to Step on the footswitch
- VERY IMPORTANT: YOU MUST STEP ON THE FOOT SWITCH BEFORE SLIDING YOUR PART INTO THE CLEANING ZONE AND CONTINUE TO STEP ON IT DURING THE ENTIRE CLEANING CYCLE IN ORDER FOR THE SYSTEM TO WORK AS INTENDED.

MCS Normal Operation

- Slide your thermoformed tray, device, part, etc… through the system left-to-right OR right-to-left, depending on your production line flow, at an even, slow speed of 6”~ 12” per second (IPS)
- NOTE: if your MCS does include the SAC System, the blow-off air will turn on automatically as soon as the leading end of your tray/part is ‘seen’ by the 1st upstream sensor, and will remain on until 1~2 seconds after the trailing end of your part passes by the 2nd downstream sensor to assure optimal results

- Pull the part out the other side at that same controlled speed



- If you have a foot switch to control blow-off air, Only after the part is fully removed from the cleaning zone…
- Stop stepping on the foot switch to turn off the compressed air and conserve energy

MCS Normal Operation

- Visually inspect your part to see if all FM (foreign matter) / PM (particulate matter) have been cleaned from inside and outside the part.
- NOTE: the MCS does an excellent job of cleaning and source capturing 'loose, dry, surface contaminants', permanently removing them from your parts, process and environment

- If there is still FM/PM in/on your part, turn UP the air pressure incrementally, 2~3 psi at-a-time and continue testing until you have the best possible result using the lowest possible pressure
- IMPORTANT NOTE: Using too much pressure unnecessarily can result in a) blowing particles out of the envelope of suction and b) wasted energy costs. Identify and document the optimal settings for each tray/package/device using only enough pressure to give the best possible result.
- NOTE: For MCS systems with a top and bottom hood, oftentimes the top hood requires a bit more pressure to purge stubborn particles hiding in nooks & crannies of complex-shaped parts and/or to get particles up into the air where the high-velocity vacuum air flow can gather them and pull them into the dust collector.

SECTION BREAK

MCS Adjustments & Optimizations

There are a number of adjustments that can be made to optimize performance of the MCS. Before proceeding, however, verify that the system has been setup properly, especially the compressed air plumbing per pages 4 & 5 AND for the specific trays or parts you plan to run per pages 8, 9 & 10. Next, make sure you are not feeding parts too fast, refer to page 13 for details on recommended and maximum speed. Only after verifying the above, try the following adjustments in order:

- Visually inspect your part to see if all FM (foreign matter) / PM (particulate matter) have been cleaned from inside and outside the part.

1st adjustment

- If there is still FM/PM in/on your part, turn UP the air pressure incrementally, 2~3 psi at-a-time and continue testing until you have the best possible result using the lowest possible pressure.
- IMPORTANT NOTE: Using too much pressure unnecessarily can result in a) blowing particles out of the envelope of suction and b) wasted energy costs. Identify and document the optimal settings for each tray/package/device using only enough pressure to give the best possible result.
- NOTE: For MCS systems with a top and bottom hood, oftentimes the top hood requires a bit more pressure to purge stubborn particles hiding in nooks & crannies of complex-shaped parts and/or to get particles up into the air where the high-velocity vacuum air flow can gather them and pull them into the dust collector.

MCS Adjustments & Optimizations

2nd Adjustment

- Raise or lower the top hood 1/16~1/8” per pages 8, 9 & 10 in this document to see if that improves cleaning and/or source capturing of particles
- NOTE: if the hood touches or scrapes your tray, part or device at any time, it is too low. You must raise it at least 1/8”

3rd Adjustment

- If cleaning trays with devices inside or parts with deep geometries, in some cases you may benefit from diverting some of the vacuum airflow from the bottom hood to the top hood, which is easily done by installing a slide-gate valve (sold separately), then incrementally closing-down the gate, shown in the full-open position here

- Loosen the thumb-screw that locks the gate in place

- Close/Slide the gate ~1/8” at-a-time until the desired airflow is achieved at the top and bottom hood, then retighten the thumb-screw
- NOTE: the more you close the valve, the more flow you divert from the bottom hood to the top hood
- IMPORTANT: if you do make this adjustment, be sure to remember to change as needed when running other parts that require a different setting

If you are not able to run the system per the instructions in this ‘MCS Normal Operation’ section, please refer to the ‘Troubleshooting’ section of this document

SECTION BREAK

MCS Troubleshooting

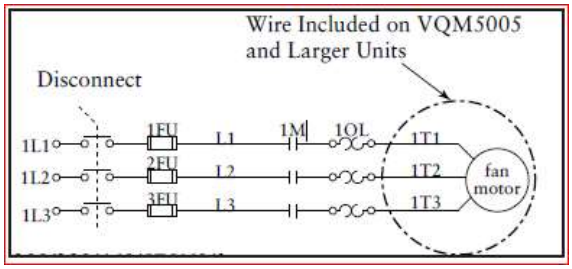
- Problem = not cleaning and/or source capturing FM/PM (loose, dry surface contaminants) satisfactorily
- Solution #1 = verify setup is correct for compressed air per pages 4 & 5 AND for your trays/parts per pages 8, 9 & 10 and/or
- Solution #2 = Optimize System per the MCS Adjustments & Optimizations section of this manual on pages 21 & 22

- Problem = no/Low air pressure at air tubes
- Solution = verify that you are connected to CDA (clean, dry, compressed air) from your 'house' system; make sure the valve at the compressed air filtration system(s) at the back of the MCS is in the On/'Sup.' position and make sure the pressure is regulated to 85~90 psi per setup instructions on pages 4 & 5

- Problem = too much suction at the hood vacuum slot(s)
- Solution = install a slide-gate valve (sold separately) so you can damper (close-down) the flow to that hood as needed
- NOTE: see '3rd Adjustment' in the MCS Adjustments & Optimizations section on page 22

MCS Troubleshooting

- Problem = not enough suction at the vacuum hoods
- Solution #1 = verify setup is correct for your trays/parts per pages 8, 9 & 10 and/or
- Solution #2 = optimize System per pages 18 & 19 and/or
- Solution #3 = check the magnehelic gauge on the right side of the dust collector; if the gauge reads 2.0 IN. W.C. (inches of water column) or more the filters inside the dust collector are getting overloaded with debris. To remedy a) turn off power to the system; b) wait 60 seconds for the dust collector to stop; c) stomp hard on the foot-pedal on the right side of the dust collector 6~10 times; d) wait 60 seconds for the dust inside to settle into the dust drawer; e) turn the system back on; f) verify that the mag gauge reads less than 2.0 IN. W.C. If the value remains at 2.0 IN. W.C. or more, contact Static Clean for info on replacement filters.
- Solution #3 = for MCS systems with larger 500cfm or 1200cfm dust collectors, HEPA filter at the top and 3-phase motor, the rotation of the motor **MUST** be verified **AFTER** the unit is wired **'in situ'!!** The unit, even when running backwards, will still generate low-level suction, about 40% of its rated air volume. To check rotation: a) be sure the unit it off, b) remove the HEPA Filter from the top of the unit, c) turn the unit on, then quickly off, d) when the motor slows enough that you can see what direction the motor hub is rotating, verify if it is rotating clockwise (correct) or counter-clockwise (incorrect). If rotating counter-clockwise, have your electrician interchange any 2 (of 3) wire leads to reverse rotation of the motor.
- IMPORTANT: if the mag gage reads 0 IN. W.C. the motor is likely running backwards



MCS Troubleshooting

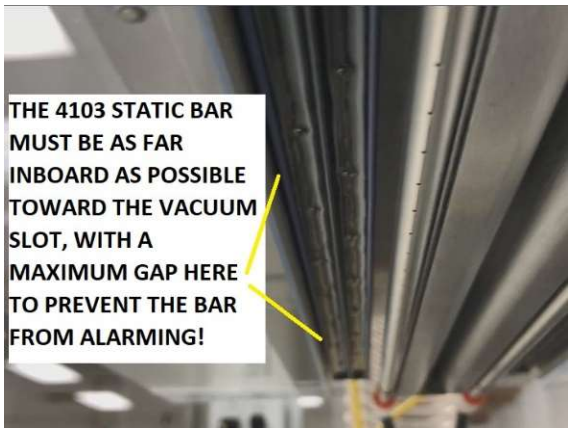
- NOTE: on a rare occasion, you may need to empty the dust drawer which can be accessed by opening the lower front door

- IMPORTANT: While the door is open to access the dust drawer, you will likely expose your clean room to excessive particles so we strongly recommend you schedule this as part of your annual PM while doing other 'dirty work' in the clean room, when you are not running production. As an alternative, you can roll the MCS out of the clean room so the dust collector is not open at anytime in the clean room, to do service work.

MCS Troubleshooting

- Problem = Status LED on 1 or more 4103 Static Bars is not a constant **GREEN** (normal)
- Solution #1a = Blinking **GREEN*RED*** = needs attention, which is usually resolved by cleaning the bar; see 4103 Manual for details

- Solution #1b = a 4103 Static Bar mounted too close to the metal bracket may cause the bar to go into 'attention' mode. This can be easily resolved by loosening the (2) flange-nuts that secure the bar into the bracket, then slide the bar as far inboard, toward the vacuum slot as possible, away from the bracket; also maintaining 1/8"(min) space between the end of the bar and bracket, then tighten the (2) flange-nuts

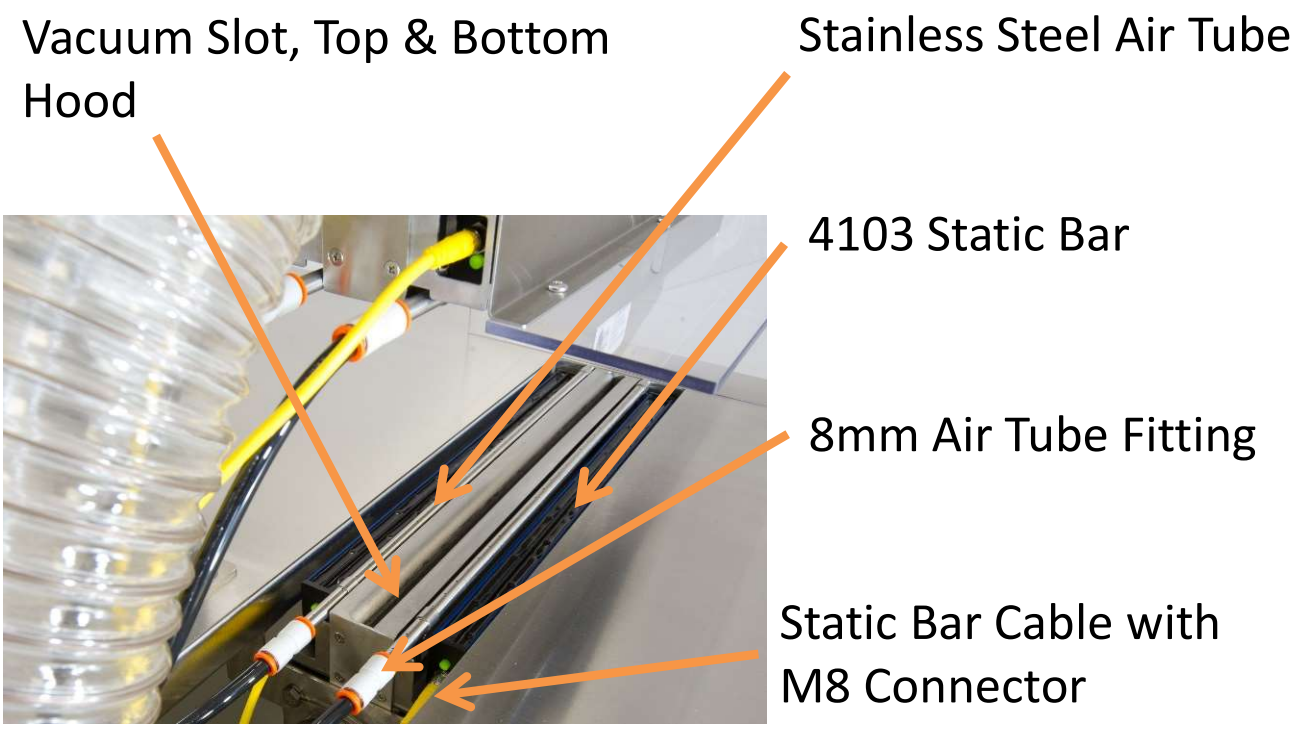


- Solution #2 = constant **RED** = Fault; the 4103 static bar needs to be replaced
- Solution #3 = constant **OFF** = verify that the system is connected to power and turned on then verify that all cables are properly connected from the AC adapter to the bars; if the LED remains **OFF** the 4103 static bar needs to be replaced
- NOTE: The small 'status' LEDs on each of the (4) static bars will turn **RED** momentarily, then a steady **GREEN** when operating normally.

MCS System Maintenance:

- IMPORTANT: TURN OFF POWER AND AIR TO THE SYSTEM, UNLESS NOTED OTHERWISE, BEFORE PERFORMING ANY SERVICE OR MAINTENANCE TO AVOID INJURY AND/OR DAMAGE TO THE SYSTEM.
- 4103 Static Bars
  - Clean the static bar emitter pins frequently, while the dust collector is on so as to capture any loose particles generated during the cleaning process, using a soft nylon tooth brush. Gently brush dirt & debris off of the emitter pin tips and surrounding black and blue bar surfaces.
  - See separate 4103 Static Bar Manual Included with documentation
  - The 4103 Static Bars do not require calibration
  - NOTE: each 4103 bar has a small LED on the end near the connector so you can easily determine the status for that bar: i.e.
    - Steady **GREEN** = operating normally
    - blinking **GREEN*RED*** = needs attention. Cleaning the bar as recommended usually returns the bar to normal operation.
    - Steady **RED** or **OFF** = Fault; bar must be cleaned and/or replaced

MCS Vacuum Hood Components



MCS System Maintenance:

- IMPORTANT: TURN OFF POWER AND AIR TO THE SYSTEM, UNLESS NOTED OTHERWISE, AND LOCK-OUT/TAG-OUT BOTH BEFORE PERFORMING ANY SERVICE OR MAINTENANCE TO AVOID INJURY AND/OR DAMAGE TO THE SYSTEM.
- Dust Collector
  - Shake down the internal filter bag if the magnehelic gauge, located on the right side of the unit, reads => 2.0 IN. W.C. (inches of water column). See the Problem = not enough suction at the vacuum hoods section; Solution #3 on page 25 of this document for detailed info.
  - The magnehelic gauge on the right side of the VQM5003(H) Dust Collector does not require calibration
- Clean all surfaces as needed using 70~90%IPA and a lint-free wiper
- Drain water from both bowls of the compressed air filtration system before either gets to half-full
- Replace both filter elements in the compressed air filtration system annually

MCS System Maintenance:

- The HEPA Filter should be replaced every 3~5 years. To remove the filter, open the clasp at the right & left side of the filter, remove the old filter and discard.
- IMPORTANT: the back-side of the filter does not have a protective screen, use caution when handling so you don't perforate or tear the filter pleats

- Sit the HEPA Filter on top of the metal rib at the left side of the VQM5003 Dust Collector with the gasket against the plenum as shown, centering the filter left-to-right on the dust collector plenum

- Engage the (2) latch hooks onto the strike plates on the HEPA Filter

- Close the latches firmly into place, squeezing the gasket on the HEPA Filter to seal all around the exhaust air plenum

BOM & Spare Parts

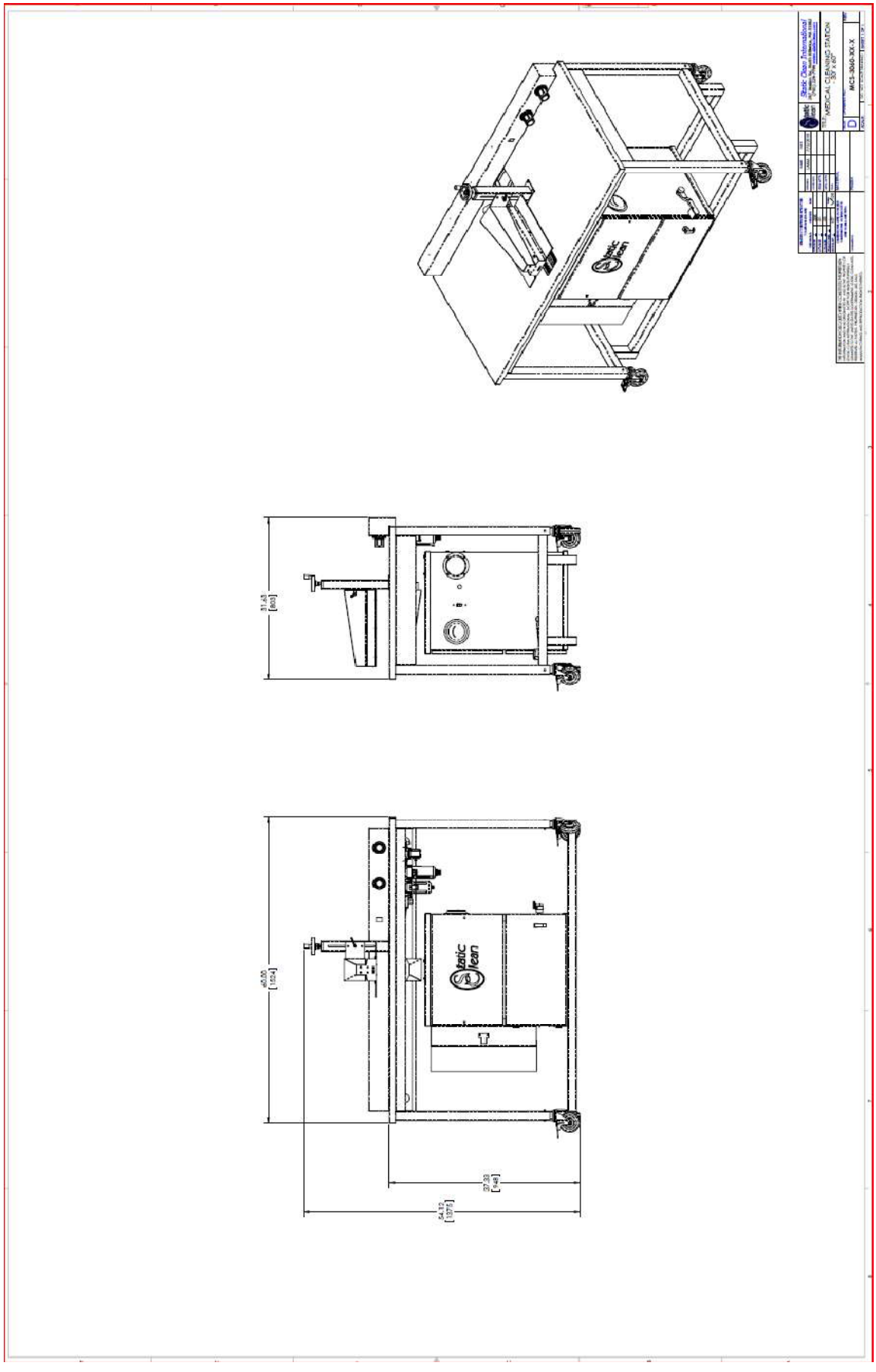
MCS Medical Cleaning Station with 15" Vacuum Hoods, Spare Parts List

NOTE: this list of spare parts is for the manual, non-automated version MCS only with 4103 static bars, regulators & gauges in a rail mounted over the work surface

Item	Part No	Description	Qty	U.O.M	Unit Price	Lead-Time	Notes
1	ASF38C	Compressed Air Filter System w/coalescing filter	1	Each	$ 247.00	stock	.3 micron coalescing filter
2	ASRG38	Regulator w/0-45psi gauge in knob	2	Each	$ 90.00	stock	1 per vacuum hood; 2 per system
3	AF40P-060S	FILTER ELEMENT ONLY; 5-MICRON FOR ASF38C, ASFRG38, & ASFRG38C(L)	1	Each	$ 12.00	stock	spare part; replace annually
4	AFM40P-060AS	FILTER ELEMENT ONLY; 0.3-MICRON COALESCING FOR ASF38C & ASFRG38CL	1	Each	$ 20.00	stock	spare part; replace annually
5	4103-0370-M	4103 High Speed Static Neutralizing Bar; 370mm (14.57"), w/ M8 4-pin male connector	4	Each	$ 551.00	2 - 3 weeks	replacement static bar
6	4203-31101	A/C Power Adapter for HS4203 Static Bars	1	Each	$ 56.00	2 - 3 weeks	replacement static bar adapter
7	4203-SC01	A/C Power Adapter Splitter Cable for (2) HS4203 Static Bars	3	Each	$ 72.00	2 - 3 weeks	to connect (4) 4103 static bars to (1) 4203-31101 a/c adapter
8	ATSS15K	.312" OD x 15" effective Air Tube Assembly with 5/16" elbow fitting for 5/16" hose	4	Each	$ 190.00	stock	2 per vacuum hood; 4 per system
9	WVCH3	3" flexible vacuum hose, clear, spiral reinforced	n/a	FOOT	$ 9.00	stock	price per foot
10	WVCHBC3	3" hose band clamp	4	Each	$ 5.00	stock	4 per system
11	HWATURTHN38-BK	3/8" OD poly tubing, black	n/a	FOOT	$ 1.29	stock	connects air filters to tubes
12	HWATURTHN516-BK	5/16" OD poly tubing, black	n/a	FOOT	$ 1.00	stock	connects air filters to tubes
13	VQMFLT5003	VQM5003 Replacement Filter Bag cotton satteen	1	Each	$ 718.00	stock	3~5 year life average
14	VQMFLTH5003/5	VQM5003 Replacement HEPA Filter	1	Each	$ 514.00	stock	2 - 3 year life average
15	MBCBAFSD15-2	Side Air Baffles for 15" SS Hoods	2	Each	$ 40.00	stock	2 at top vacuum hood only

PRICES AS OF 1/1/19; SUBJECT TO CHANGE WITHOUT NOTICE

Drawings



Drawings