Capping Instrument for Threaded Vials

For Analytical and Research Laboratories

MM Lab Systems
EP-310 Series
Patents Pending

MMLS

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Threaded Vials #1 Worldwide Preferred Lab Container

- Preferred by the FDA/EPA/USDA/DOE
- Less risk of cross-contaminates
- Ease of use for end user
- Less impact during removal/assembly
- Certified shipping torque
- Lowest overall cost closure
- Largest selection of sizes and materials
- Multiple sources and suppliers, worldwide

Hand Capping

- ✖ Inconsistent Torque
- ✖ Risk of Hand/Wrist Injury
- ✖ Elevated Risk of Exposure
- ✖ Risk of Breakage Injury
- ✖ Risk of Diagnostic Errors
- ✖ Job Drudgery/Labor Costs
- ✖ Process Bottleneck

EP-310 Capping

- ✔ Simplified Process
- ✔ Vials Closed Sooner
- ✔ NO Hand/Wrist Injury Risk
- ✔ NO Breakage Exposure Risk
- ✔ Accurate Samples
- ✔ Minimal Contamination Risk
- ✔ Exact Six-Sigma Torque

BEST PRACTICE !!

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The EP-310 models are precision compact bench-top instruments designed to automate the opening and closing of screw-type threaded vials for the laboratory. The instrument can be used in clean-rooms, inside hoods, or under liquid handlers. Two sizes accommodate vials from 8 to 28 mm diameter, and three types dedicated to OPENING, CLOSING, or BOTH.

Each torque cycle sets an exact six-sigma quality level of torque. Optional monitoring processes are so exact, a septum/seal missing inside the cap can be detected during closing.

Instruments can be ordered with options to automate handling and to communicate to robots. The A-model (capable of both Opening and Closing) can be optionally configured with up to five Modes; Cap, Decap, Torque, De-Torque, or Decap/Recap.

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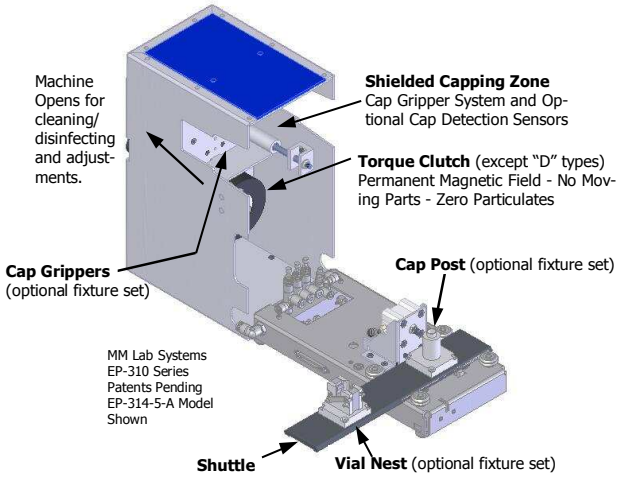


Basic Description and Operation

Designed exclusively for laboratory screw-cap vial processing.

The EP-312 can be used by technicians manually loading and unloading caps and vials, and the EP-314 can be interfaced to robots and cell controllers.

The Shuttle operates side to side. When the right side is out where loading and unloading is occurring, the left side is inside the instrument where automatic operations are being performed.

When the Shuttle reverses, loading and unloading occurs on the left side, while other automation is being performed inside the instrument on the right side.

Either end of the shuttle can accept a Vial Nest (in some cases on both ends) and the other end can accept a Cap Post (when caps are handled).

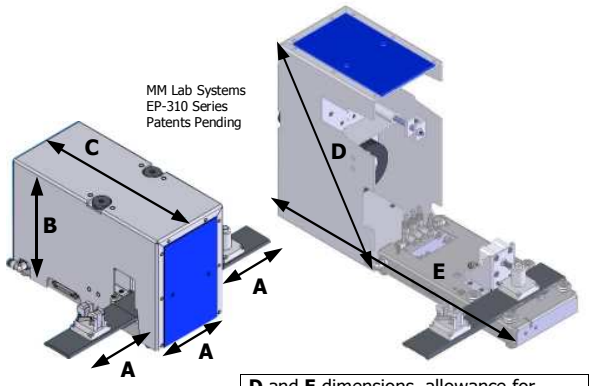
EP-314 automation steps inside the machine are automatically monitored:

- Cap present?
- Vial present?
- Seal inside cap missing?
- Torqued too soon (bound on threads)
- Torqued too late (slipping/ breakage)

Clean-Room and Analytical Laboratory Quality

- Extensive use of stainless steel and hard-coat anodized aluminum.
- Near-zero particulates.
- Moving parts above open vial are stainless steel pins operating in PTFE seals.
- Can be wiped down between batches. Easy to clean.
- Low energy motions and voltage.
- Pneumatic exhaust air can be ported outside of clean-rooms.
- 100% solid state; photo-electric sensors, brushless motors, capacitive touch pads.
- Shuttle is close to bench surface; easy to load vial nests and cap posts.
- Cycle rates up to 20 assemblies per minute.
- Compact size; portable, fits under liquid handlers/hoods.
- Easy to integrate for robot automation (EP-314).
- Self monitoring - detects errors during processing and communicates faults (EP-314).
- Uses six-sigma statistical quality analysis and sensors to detect faulty vials and caps; **can detect a missing gasket inside the cap**. (EP-314)
- Delivers exceptional quality and consistency for capping processes.
- Easy-to-read operating manual with extensive pictures and Good Practice training examples.

Specifications, Model Selection



A dimension, alternate cycles each side

D and **E** dimensions, allowance for opening machine for cleaning/adjusting.

Dimensions in Inches

Size	Torque Adjust In-lbs	A	B	C	D Arc	E	Machine Weight Lbs.	Max Cap Dia.	Max Vial Dia.
5	0.3 - 6	5.0	7.3	10.9	13.1	18.2	10.3	1.1	0.63
10	0.5 - 11	5.0	8.4	11.1	13.9	19.5	11.8	1.1	1.1

Max Processing Heights

F1 Cap/ Decap (Tight) F2 Torque/ Detorque (Loose)

H Cap Height I Vial Height

Model Size	Max F Load Height	Max Cap Engage (H+I-F1)	Max H+I
5	3.15	0.71	3.62
10	3.90	0.90	4.37

If your application exceeds any of the limits shown above, or requires a special process, we can quote you a special machine. Please contact our Engineering Department for assistance in selecting the right machine for your application.

How to Order - Part Numbers

EP-(Model)-(Size)-(Type)-(Options)-(Fixtures)

Model **-312** (Manual load/unload by technicians, single vial)
-313 (For multi-vial and adding flexible options)
-314 (For Automation; Robots, multi-vial)

Size **-5** (0.3 to 6.0 inch pounds of application torque)
-10 (0.5 to 11.0 inch pounds of application torque)

Type **-D** (Decapping or De-torque Only)
-T (Capping or Torque Only)
-A (Can process both D and T functions)

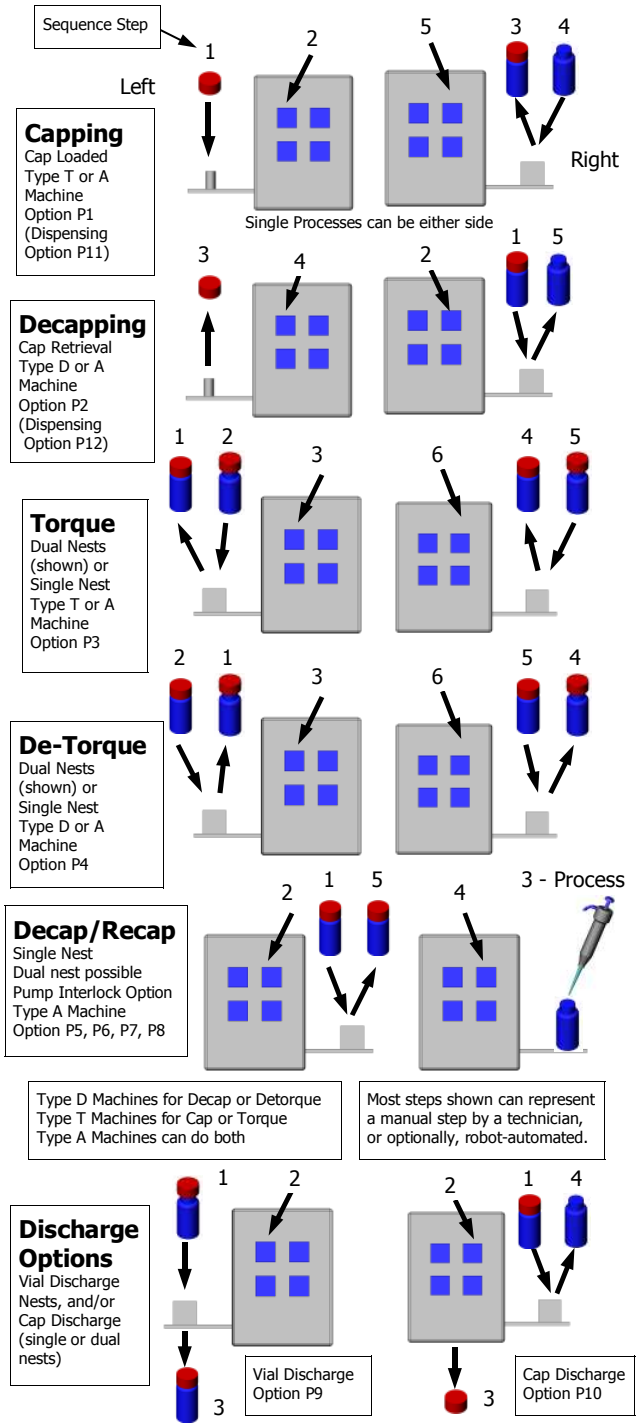
Options -**P(n)** (Processes - See List)
-**E(n)** (Control Options - See List)

Fixtures (Vials and Caps) (Identified in Quote) **-V(n)** Vial-Nests
-C(n) Cap-Grippers (or –CS serrated)
-O(n) Cap Post

Special Modifications **-S(n)**

Each model includes one process option. The EP-313 and EP-314 are capable of processing multiple vials (3 maximum) with the optional fixtures, by changing the fixtures and adjusting the torque. The physical specs of each vial/caps must fall within the capability of the machine, including the minimum torque. Factory setup, or requires the E7, E8, or E9 option for manual setup.

Process Modes, Machine Types



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Options to Improve Throughput/Quality Control

Processing Options: (Types D, T, A, Left, Right, Both as specified)

Pick one or more Process Options for EP-312, EP-313 or EP-314

P1: Capping, T/A; requires vial-nest, cap grippers, cap-post, L/R
P2: Decapping, D/A; requires vial-nest, cap grippers, cap-post, L/R
P3: Torque, T/A; requires vial-nest(s), cap grippers, L, R, Both
P4: De-Torque, D/A; requires vial-nest, cap grippers, L, R, Both
P5: Decap/Recap, A; requires vial-nest and cap grippers, L/R

Special Process Options (see notes)

P6: Decap/Recap, (same as P5 with Dual Nests)
P7: Decap/Recap, (same as P5 with Stop Position for Dispensing)
P8: Decap/Recap, (same as P6 with Dual Dispensing)
P9: Vial Discharge (same as P1 - P8 w/ "trap-door" nests)
P10: Cap Discharge (same as P2 allows L, R, Both no cap-post req'd)
P11: Capping (same as P1 with Stop Position for Dispensing)
P12: Decapping (same as P2 with Stop Position for Dispensing)

Control/Programming Options:

Not available in EP-312 - optional for EP-313 - included in EP-314

E1: Automatic Initialization of Shuttle. Required at startup, Shuttle needs to be set to "zero" location. Operator initiated in EP-312.
E2: Shuttle Feedback. Automatically creates a Fault signal if the Shuttle should not reach it's programmed position.
E3: Cap Lowered Sensor. Detects slightest variations in Cap and Vial Height, automatically creates Cap Missing, Vial Missing, and Gasket Missing Faults.
E4: Rotation Sensor. Detects rotation of the capping and decapping process; insures the cap was turned the nominal amount. Automatically creates Cap/Decap Fault.
E5: RS232 Serial Communications; full duplex, DB9 connector, ASCII command set, full documentation.

Special Control Options:

E6: Torque Signature; requires E3 and E4. Evaluates the nominal graph of Lift Height versus Rotation to insure that an elastic compression state was induced between the cap gasket and the vial, and the amount of compression was consistent with pre-selected values. Insures clutch is gradually slowing, grippers are holding, and a tight seal was created. May not be useful for some compound libraries with caps that have lost their elasticity, or caps that have a hard or unpredictable seal. Recommended for new vial/caps that must be certified to be tight.
E7: Query and off-set LCD/push-button panel set up to change vial/cap properties and process steps internal to the program. Recommended for Multi-Vial use. Full documentation.
E8: PC Software to query and change offsets to EP-313/EP-314. Requires E5 option, PC, and serial cable. Useful when processing Multi-Vials, or if vial/cap properties have changed creating nuisance faults. Full documentation.
E9: PC Software and hardware to set up Ethernet capability. Fixed IP address, configure Gateway and Subnet settings. Requires PC, Ethernet based LAN, and T10/100 RJ45 standard cable.

Notes: P6 requires closed vials (either new or exact same compound) to be decapped on one side, removed to process, brought back from process and recapped in other side. Eliminates contaminating intermediate steps with final step compounds. Traces flow exclusively outbound.

P7, P8, P11 and P12 stop the open vial under dispensing tips for filling or sampling. Ask for separate data-sheet.

P9 drops the vial downward automating the unload. Requires holes in bench/platform or elevated machine.

P10 disposes of caps downward. Requires holes in bench/platform or elevated machine.