



# Pharmaceutical Liquid Filling Monobloc with Dual-Weight Verification

**BellatRx's Constellation Monobloc is a new servo-driven fill-weigh-cap system for unstable pharmaceutical microtubes, vials, and cartridges.**

BY KEREN SOOKNE, DIRECTOR OF EDITORIAL CONTENT

**T**he size and shape of certain vials and microtubes can make them difficult to stand on their own, adding difficulty in automated filling because they cannot be placed on a standard conveyor and moved from one machine to another.

Life sciences manufacturers producing high value liquid drugs may also be challenged inaccurate fill volume or weight control, or product loss at the end of a batch,

To combat these issues, **BellatRx Inc.** has launched its Constellation Monobloc to pre-weigh, fill, post-weigh, cap, torque, and inspect vials to insure adherence to specifications. The system is suited to small and large batches of high-value liquid products where accuracy is key for pharma, biotech, diagnostic, and healthcare customers. Constellation is able to index unstable vials in a safe way that

prevents tilting or leaking. It features a standard speed of 60 vials/min, with higher speeds available with dual-robotic stations.

What really sets the system apart is its dual-weight control of vials and microtubes before filling and after filling. "The system measures a tare weight and gross weight, subtracting the tare to obtain an accurate net weight as a verification of the fill volume," says Alan Shuhaibar, president at BellatRx. This eliminates the risk of underfilled vials.

## Operation

Robotic pick and place stations unload vials from trays into pucks that index the tubes gently throughout the process of filling, capping, and inspection. Grippers match the diameter of the vials

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for delicate handling. At the filling station, servo-controlled pumps deliver precise volumes into vials, and nozzles are lifted to reduce contact and reduce aeration.

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“The robotic modules that we’ve added to the system allow us to handle product that usually is very difficult to handle in an automatic format,” explains Shuhaibar. “The controls are Allen-Bradley (Rockwell Automation), with a large 10-in touchscreen. The robot itself is a Fanuc robot, while the software and the robotic stations are developed in-house.”

Capping stations are also servo-controlled—rotation and down-speed are synchronized to match the pitch of the threads. The capping system is equipped with torque feedback sensors.

A vision inspection system verifies the presence and placement of caps on vials. If a fill weight or cap issue is detected, rejected vials are tracked to a reject lane without disrupting the system’s operation (tagged in the HMI with the appropriate reason).

Robotic arms then reload finished product back into trays at the end of the line. Subsequent labeling and laser etching of vials or cartoning can be incorporated with the modular design of the Constellation system. If there is an interim operation, vials can also remain in trays to be stored in refrigeration.

The system on show at PACK EXPO Connects fills less than 1mL but the system can accommodate larger fill volumes. In its smallest configuration, the monobloc is 48” x 53”, however when fully configured with three robotic stations it is 156” x 53” approximately.

### Ease of use for operators

Modules feature surround status lighting that changes color depending on machine status. When operator intervention is necessary, Constellation illuminates the work area in white lighting for enhanced visibility.

Constellation can be changed over with minimal product loss. The filling trolley can be unlocked from the system and pulled away for further dismantling without tools. A CIP cycle can be activated to flush wetted surfaces without dismantling.

When level is low, a signal is triggered to alert the operator, while the machine continues running.

### In the field

The system is already at work at multiple facilities filling vials for COVID-19 test kits with swabs and rapid (oral) tests.

“The trend we’re seeing across the board is a drive towards automation. This includes tasks that were performed manually in the past—because operators could handle the unstable vials,” says

Shuhaibar. The shift to automate and increase uptime is driven both by the skilled worker shortage, as well as the desire to reduce contamination (and exposure) from operators breathing near or coming in close contact with the product. “This way they are able to load a tray and step away from the area, versus having to place one microtube at a time.” ➦



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