*Description Semi-Automatic Loading and Unloading Systems*

# PennTech Newsletter

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***Quote of the week:***

"*The best executive is the one who has sense enough to pick good people to do what he wants done, and self-restraint to keep from meddling with them while they do it*".....Theodore Roosevelt

***Next Week's Topic***

*- RW-500 brochure -*

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The Semi-Automatic Loading and Unloading System consists of the following components:

- Vial Loading Station, model VLS-45
- Portable Cart model PC-45/120

Above: The Vial Loading Station model VLS-45

Right: The Portable Cart model PC-45/120

**Vial Loading Station model VLS-45**

The Vial Loading Station is designed for low to medium output, aseptic applications. The station will handle containers with speeds of up to 100 containers per minute. This depends on the vial size and number of vials per row. It is designed to load vials onto the Portable Cart shelf in a configuration of 45x120cm.

**The VLS-45 consists of the following components:**

- Infeed conveyor
- Servomotor controlled loading actuator
- Servomotor controlled nesting actuator
- Allen Bradley Micrologix PLC.
- Allen Bradley PanelView HMI Human-Machine-Interface

VLS Chamber with HEPA-filtered recirculated Class-100 air (optional)

All stainless steel parts inside the chamber are constructed of AISI-316(L) stainless steel. This includes the HEPA filter housing. Lexan windows are equipped with glove ports for vial changeover purposes. The chamber can be pressurized (typically to 15Pa), using recirculated air from the chamber in combination with make-up air from the cleanroom.

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The HEPA filters (99.99% Gel seal) create a vertical unidirectional airflow in the chamber. A pre-filter before the return duct prevents contamination of the duct itself. The pre-filter is easily accessible when a replacement filter needs to be installed. A door with an inflatable gasket in front of the chamber is automatically activated when the PC-shelf docks up to the VLS, creating a seal between the VLS and the PC.

**Portable Cart model PC-45/120**

The PC-45/120 is constructed of AISI-304 stainless steel with height adjustable frame. Included are heavy-duty locking casters constructed of stainless steel. The PC-45/120 is self-contained, powered by an Uninterrupted Power Supply (UPS). The battery is capable of maintaining running condition for 30 minutes between recharges. An audible and low-level alarm is included.

The PC-45/120 switches seamlessly between single phase clean room voltage and battery operation. The operator plugs the power cord of the PC into the clean room electrical outlet for automatic recharging of the UPS.

The PC-45/120 is approx. 78cm wide and 175cm long and is designed to transport a vial pack of 45x120cm to and from the lyophilizer. Self-centering cones in the floor in front of the VLS, guide the positioning of the Portable Cart when placed in front of the VLS.

*Note:The VLS-45 can only be operated when the Portable Cart is in the correct position in front of the VLS-45 and when the shelf of the Portable Cart is extended and correctly positioned in relation to the VLS-conveyor.*

Mounted on linear bearings is a shelf (PC-shelf), constructed of AISI 316L stainless steel, with a low-friction surface. The PC-shelf is motorized (servomotor) and can move over a distance of approx. 50cm. This is required to dock the shelf to the infeed conveyor of the VLS, and to dock to the shelf in the Lyo. The dimensions of the shelf are approx. 45x120cm. On either side of the shelf are guiding rails to maintain the pack of vials.

An independent pusher blade, with its own servomotor, moves the vials from the PC-shelf onto the Lyo-shelf, inside a 3-sided ring.
Another function of the pusher is

during the retrieval of the vials after lyophilization. The extended pusher will latch onto the 3-sided ring and move the ring with vials onto the PC-shelf.

**Automatic Height Adjustment**

The base of the PC includes programmable, automatic height adjustment. This allows loading and unloading vials at different shelf heights of the lyophilizer.

**Sequence of Operation - Loading the Lyophilizer**

The operator moves the PC in front the VLS. Docking of the PC to the VLS is aided by cones in the floor.

The PC “recognizes” the VLS and adjusts itself automatically to the correct height.

Through an operator command on the HMI, the PC-shelf docks to the VLS conveyor. The VLS-PLC receives a signal that the PC-shelf is in place.

The operator starts the vial loading process (HMI-command)

Vials are pushed row by row onto the PC-shelf in a nested configuration.

The operator transports the PC to the lyophilizer. Also here, cones in the floor avoid lateral misalignment of the PC in relation to the Lyo-shelf.

The operator selects the shelf number to be loaded, and the PC automatically adjusts to the correct height.

The PC-shelf moves automatically to the shelf of the lyophilizer. The operator starts the lyo loading process through the PC-HMI

The PC-pusher moves the vials onto the Lyo-shelf, inside the 3-sided ring.

After the vials are loaded onto the lyo-shelf, the PC-shelf moves automatically to the home position in the PC.

The operator moves the PC back to the VLS for the next load of vials.

**Unloading the Lyophilizer**

The operator moves the PC in front of the lyo. Docking the PC to the Lyo is aided by cones in the floor.

The PC automatically adjusts to the correct (shelf) height.

The PC-shelf moves towards the lyo-shelf automatically.

The PC-PLC receives a signal that the shelf is in position.

The operator starts the Lyo unloading process through the PC-HMI.

The PC-pusher extends into the Lyo and latches onto the 3-sided ring. The pusher retracts, moving the ring with vials along onto the PC-shelf.

The ring is now inside the PC-chamber. The PC-pusher de-latches the ring automatically and the operator slides the ring back into the lyophilizer.

The operator transports the PC in front of the conveyor of the capping machine. The PC “recognizes” this position and adjusts itself automatically to the correct height.

The PC-PLC receives a signal that the PC-shelf is in place. The operator starts the vial unloading process (HMI command).

After all the vials are loaded onto the capper-conveyor, the PC-shelf moves automatically back to the home position in the chamber.The operator moves the PC back to the lyophilizer for the next load of vials.

**Chamber with HEPA-filtered recirculated Class-100 air (optional)**

All stainless steel parts inside the chamber are constructed of AISI-316(L) stainless steel. This includes the HEPA filter housing. Lexan windows are equipped with glove ports on either side to protect the operator when working with cytotoxic drugs.

The chamber can be pressurized (typically to 15Pa), using recirculated air from the chamber in combination with make-up air from the clean room.

The HEPA filters (99.99% Gel seal) create a vertical unidirectional airflow in the chamber. A pre-filter before the return duct prevents contamination of the duct itself. The pre-filter is easily accessible in case a replacement filter needs to be installed.

A door in front of the chamber is automatically activated to allow for the PC-shelf movement when docking up to the VLS or the Lyo-shelf.

The chamber can be pressurized (typically to 15Pa), using recirculated air from the chamber in combination with make-up air from the clean room.

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