



## Fully Automated 96-Well Format Sample Preparation with Hamilton's MICROLAB STAR

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**T**he MICROLAB STAR liquid handling workstation offers full automation for plasma protein precipitation, solid phase extraction (SPE), and liquid-liquid extraction on one workstation, while delivering maximal throughput, precision and simplicity.

### Hardware

The STAR workstation is available in multiple configurations, including 18 possible arm configurations. The STAR offers 4, 8, 12, or 16 independent pipetting channels for tube to plate reformatting, hit picking, or plate processing. For optimal throughput, the new 96 CO-RE head can be added to the arm for whole plate pipetting. The STAR also offers optional integrated barcode identification for tubes, plates, reagents, and carriers and the iSWAP internal microplate gripper. The Automated Vacuum System is fully integrated into the deck of the STAR for 96-format SPE and plasma protein precipitation. In addition, the STAR can be integrated with multiple other devices including readers, centrifuges or plate storage options, including Hamilton's MICROLAB Carousel plate hotel.

The timing results (Table I) for plasma protein precipitation and solid phase extraction reflect the use of an 8-channel STAR with the 96 CO-RE head. Liquid-liquid extraction timing is based on the 8-channel STAR. Detailed application notes for each sample preparation method is available from Hamilton Company.

### Plasma Protein Precipitation

The STAR performs both the methanol- and acetonitrile-based protein precipitation methods. The STAR automates a vacuum-based protein precipitation protocol for 96 samples in approximately 11 min, and can process a maximum of 384 samples or four 96-well plates without plate storage or user intervention. A maximum of approximately 40 plates can be automated per 8-h shift with plate storage and minimal user intervention. The STAR system can affect approximately 97% analyte recovery (diazepam) with a relative standard deviation of approximately 1.7%. The STAR can precisely pipette 100% solvent without dripping.

### Solid Phase Extraction

The STAR automates 96 extractions in approximately 17 min, depending on the protocol. The STAR can process approximately 288 samples or three 96-well plates without plate storage. A maximum of approximately 25 plates can be automated per 8-h shift with plate storage and minimal user intervention. The STAR system has achieved approximately 92.0% analyte recovery (diazepam) with a relative standard deviation of approximately 3.0%.

### Liquid-Liquid Extraction

The STAR allows full automation of variable volume liquid-liquid extraction with a unique pressure-based liquid level detection (LLD) system. The STAR first detects the top organic layer with the pressure-based LLD, then detects the aqueous interface with the standard capacitive-based LLD and calculates the relative volumes for each phase. The STAR uses this information to define pipetting volumes for the extraction. The pressure-based LLD is only available with the independent pipetting channels. The STAR's 96 CO-RE head can deliver much greater throughput, but only for known, fixed volumes.

The STAR automates liquid-liquid extraction with the automated volume calculation for 96 samples in 45 min. The STAR can automate a maximum of 12 microplates without additional plate storage or user intervention. A maximum of approximately 8 plates can be automated per 8-h shift with plate storage and minimal user intervention.

**Table I:** The MICROLAB STAR automates three major sample preparation methods with one workstation. The liquid-liquid extraction method automatically calculates the relative volumes of both phases for high-level automation

	96 Samples	Maximum Throughput
Plasma Protein Precipitation	11 min	40 plates per shift
Solid Phase Extraction	17 min	25 plates per shift
Liquid-Liquid Extraction with Volume Calculation	45 min	8 plates per shift
Liquid-Liquid Extraction without Volume Calculation	11 min	35 plates per shift

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