FMS
Fluid Management Systems

Low Cost, Compact, High Throughput, Automated Sample Concentration and Evaporation

SuperVap®

Agenda

- Company Overview
- SuperVap Overview
- Questions

FMS, Inc.

- Fluid Management Systems
  - Founded in 1986
  - Focus
    - Automating the Sample Prep Process
  - Markets
    - Agricultural
    - Environmental
    - Clinical
    - Food and Beverage
    - Pharmaceutical
    - Petrochemical

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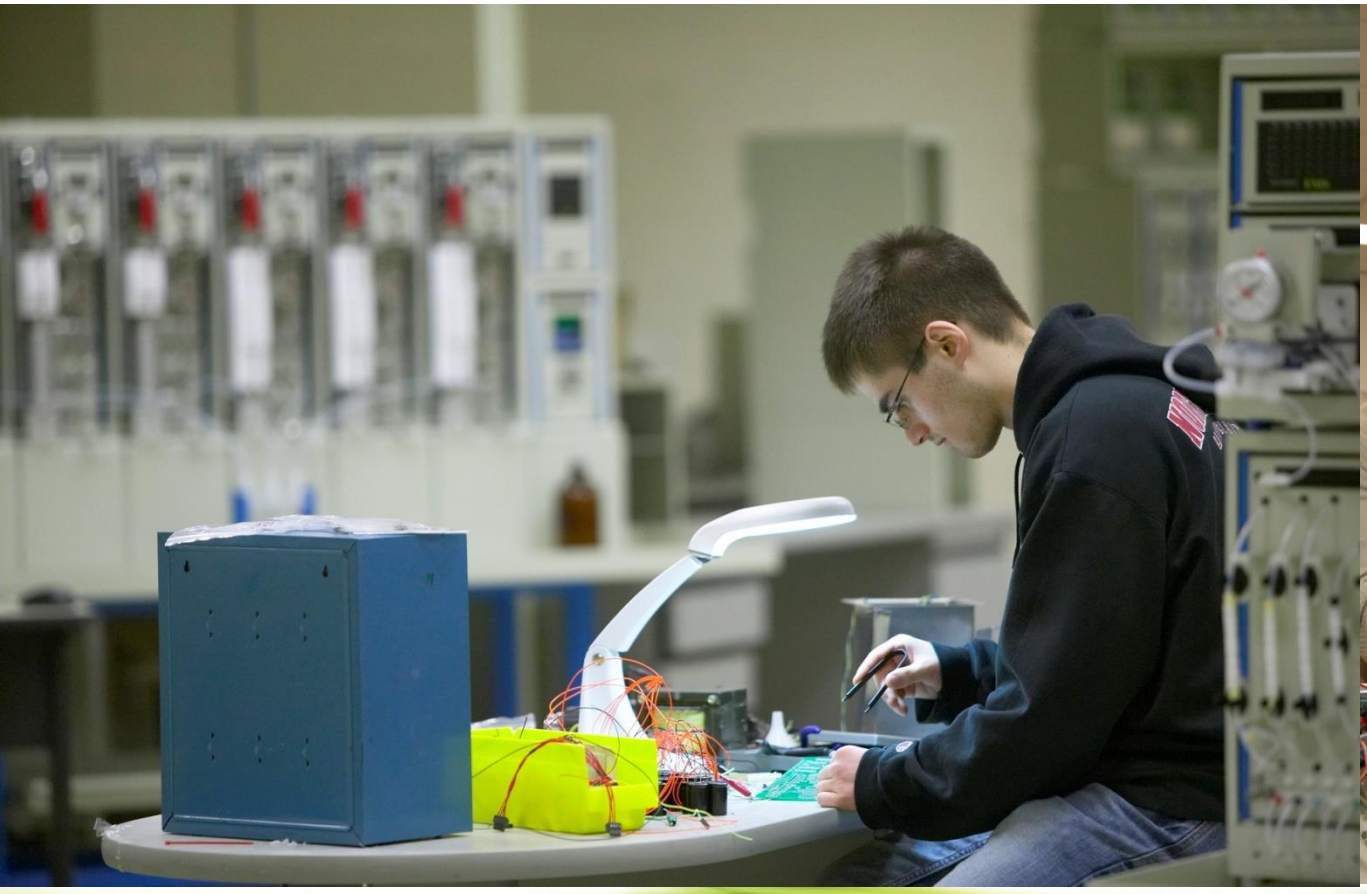
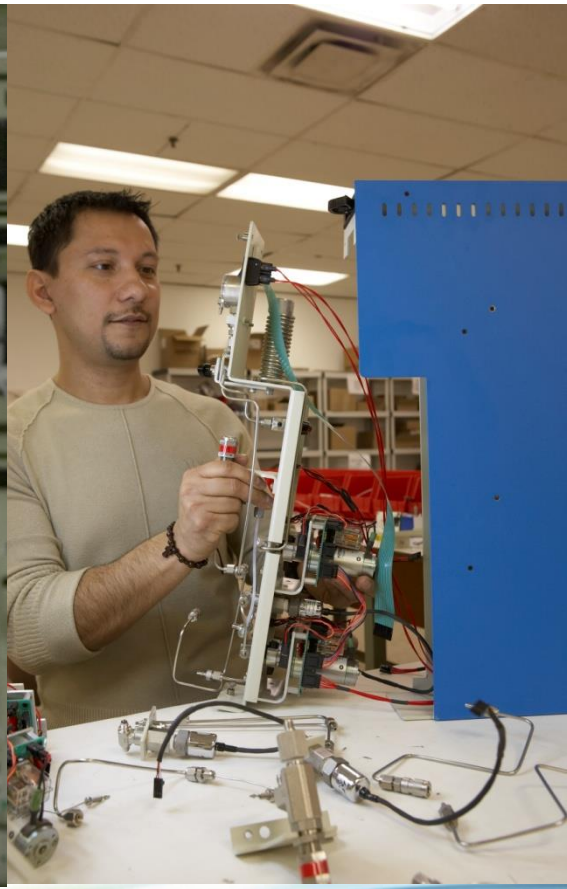
Made in the USA





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Solid Phase Extraction

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Pressurized Liquid Extraction

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Automated Sample Cleanup

Direct to Vial Concentration

Sample Handling

- Large Volume Concentration
- Concentrate/Evaporate up to 6 Samples
- Sample Sizes up to 220ml
- Automatic Endpoint Detection and Nitrogen Shutoff for each Vessel
- Compact Size

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Concentration Vessels

Direct to GC vial Vessel

Sample Handling

- Small Volume Concentration
- Concentrate/Evaporate up to 12 Samples
- Sample Sizes up to 50ml
- Automatic Endpoint Detection and Nitrogen Shutoff for each Vessel
- Compact Size

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Concentration Vessels

Sample Handling

- Small Volume Evaporation
- Evaporate up to 24 Samples
  - Sample Size Format
    - 2ml vial
    - 4ml vial
- Evaporate up to 12 Samples
  - Sample Size Format
    - 20ml Vial
    - ASE 40ml Vial
    - ASE 60ml Vial
- Timed or Manual Nitrogen Shutoff for each Vessel
- Compact Size

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Evaporation Vessels

Automated Concentration for PFAs

Automated Concentration for PFAs

- SuperVap PFC
  - 24 positions
  - 15ml Conical vials

Automated Concentration for PFAs

- SuperVap PFC
  - 12 positions
  - 50 ml Conical vials

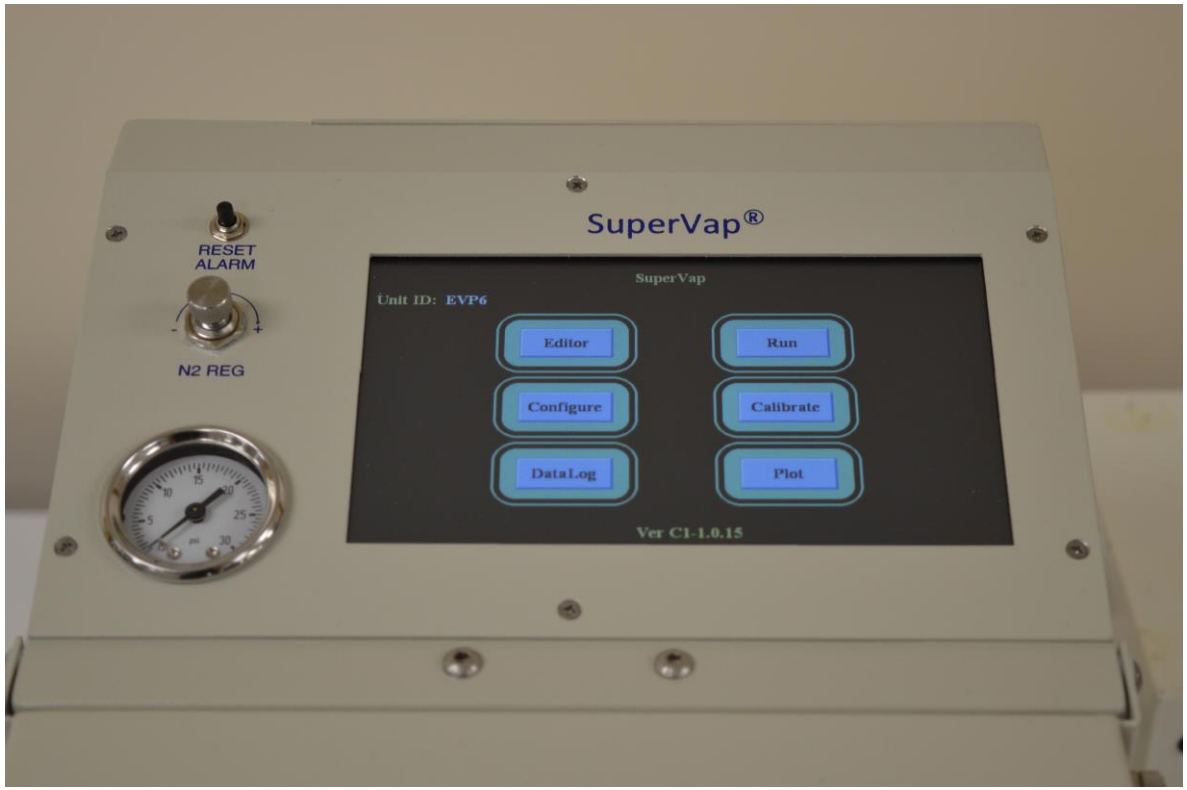
No Waterbath

- Dry Heating Assembly
  - Robust Endpoint Sensors
  - No Water dripping into the vessel as in a water bath

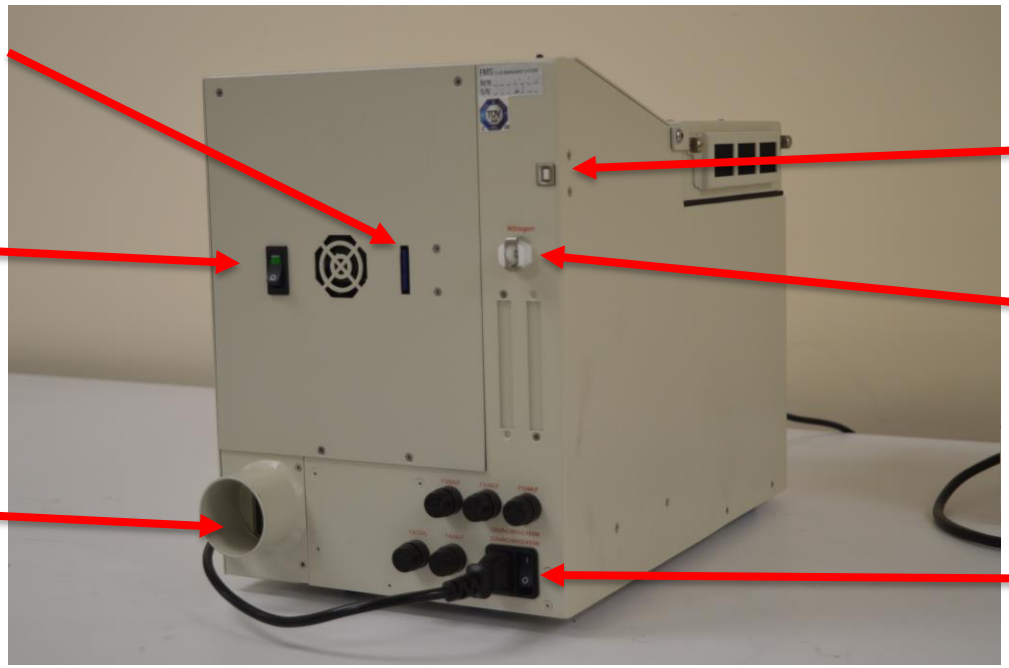
Easy to Use

- Touch Screen Programming
  - Programmable Temperature
    - 0° to 100° C depending upon model
  - End point liquid level sensor
    - Sensor sees the liquid has reached desired volume turns off Nitrogen
  - Timed End point
    - Set the time for the Nitrogen and Heat to turn off

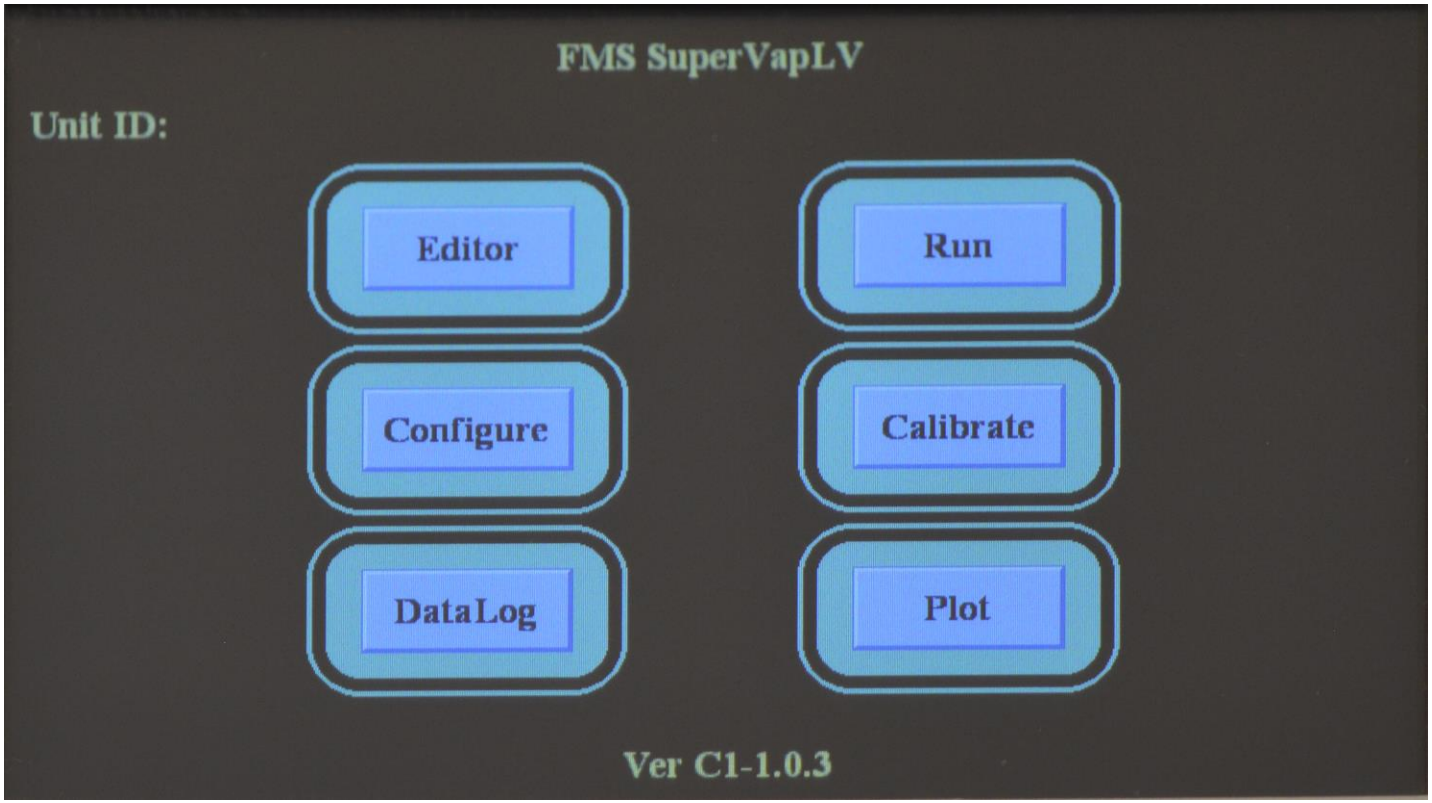
Front View


SuperVap®
RESET
ALARM
N2 REG
SuperVap
Unit ID: EVP6
Editor
Run
Configure
Calibrate
DataLog
Plot
Ver C1-1.0.15

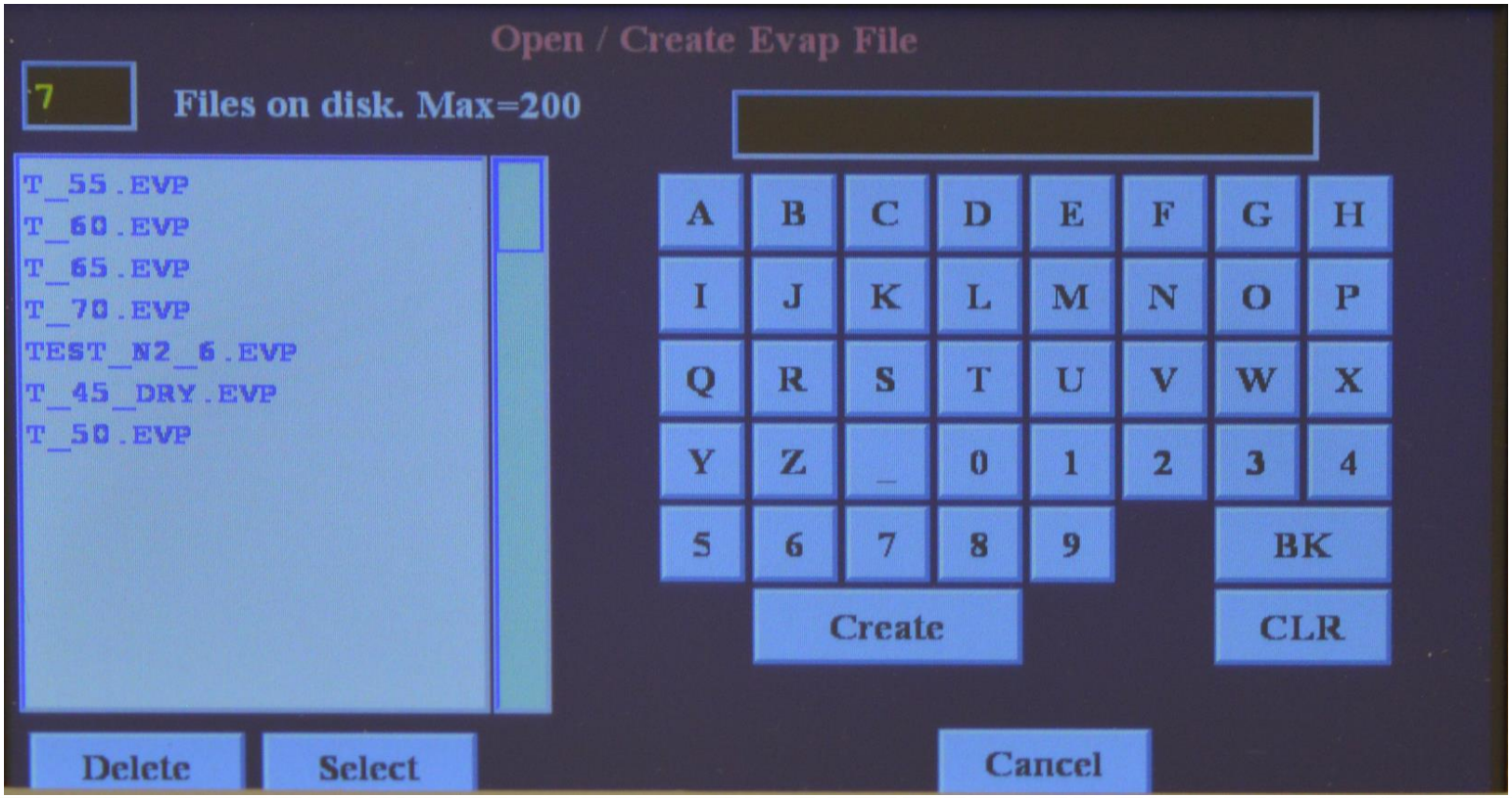
Rear View


SD Card
Lower Heater
Exhaust
USB
Nitrogen Quick connection
Power and Main Heater

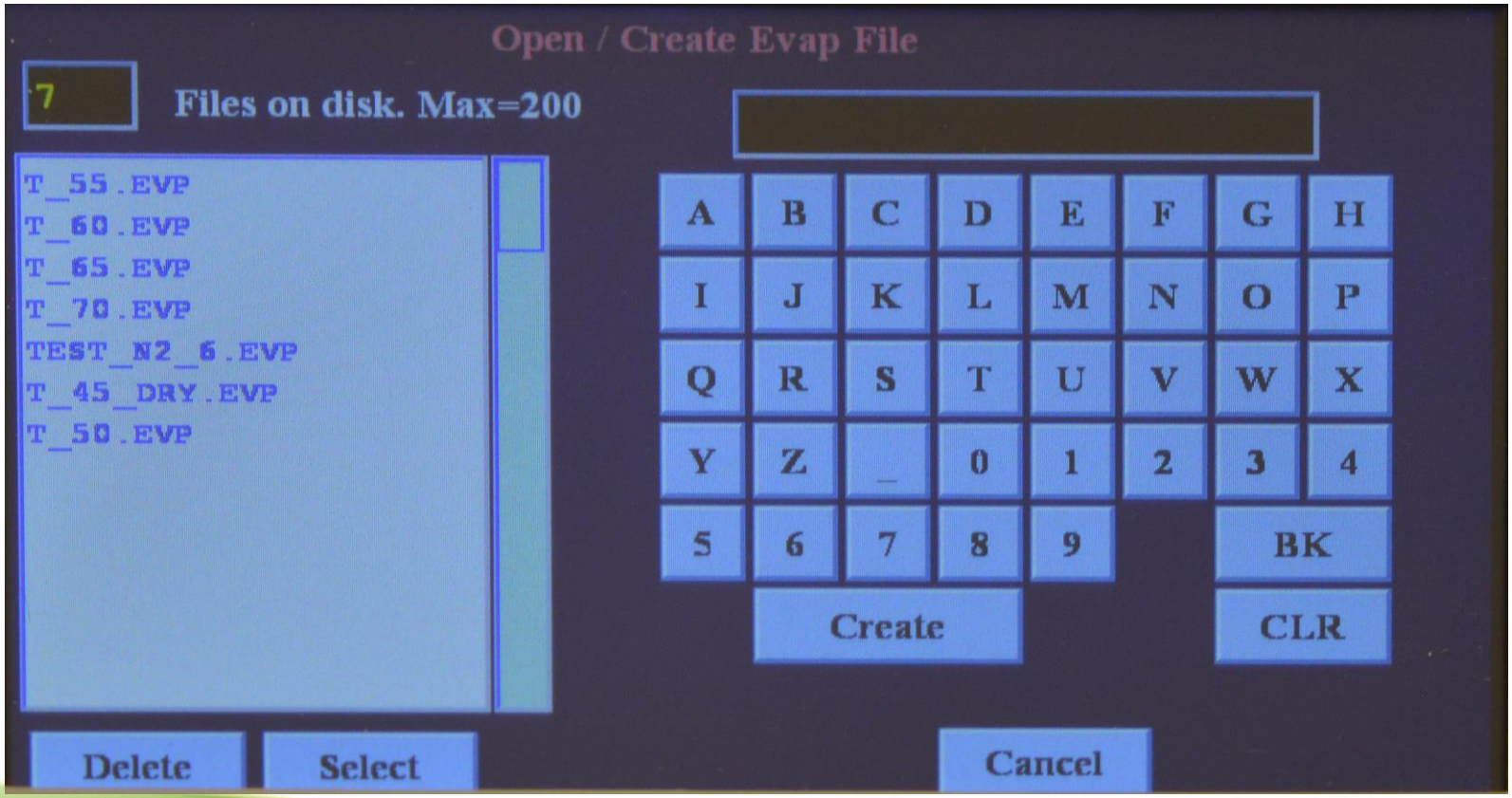
New Home Screen



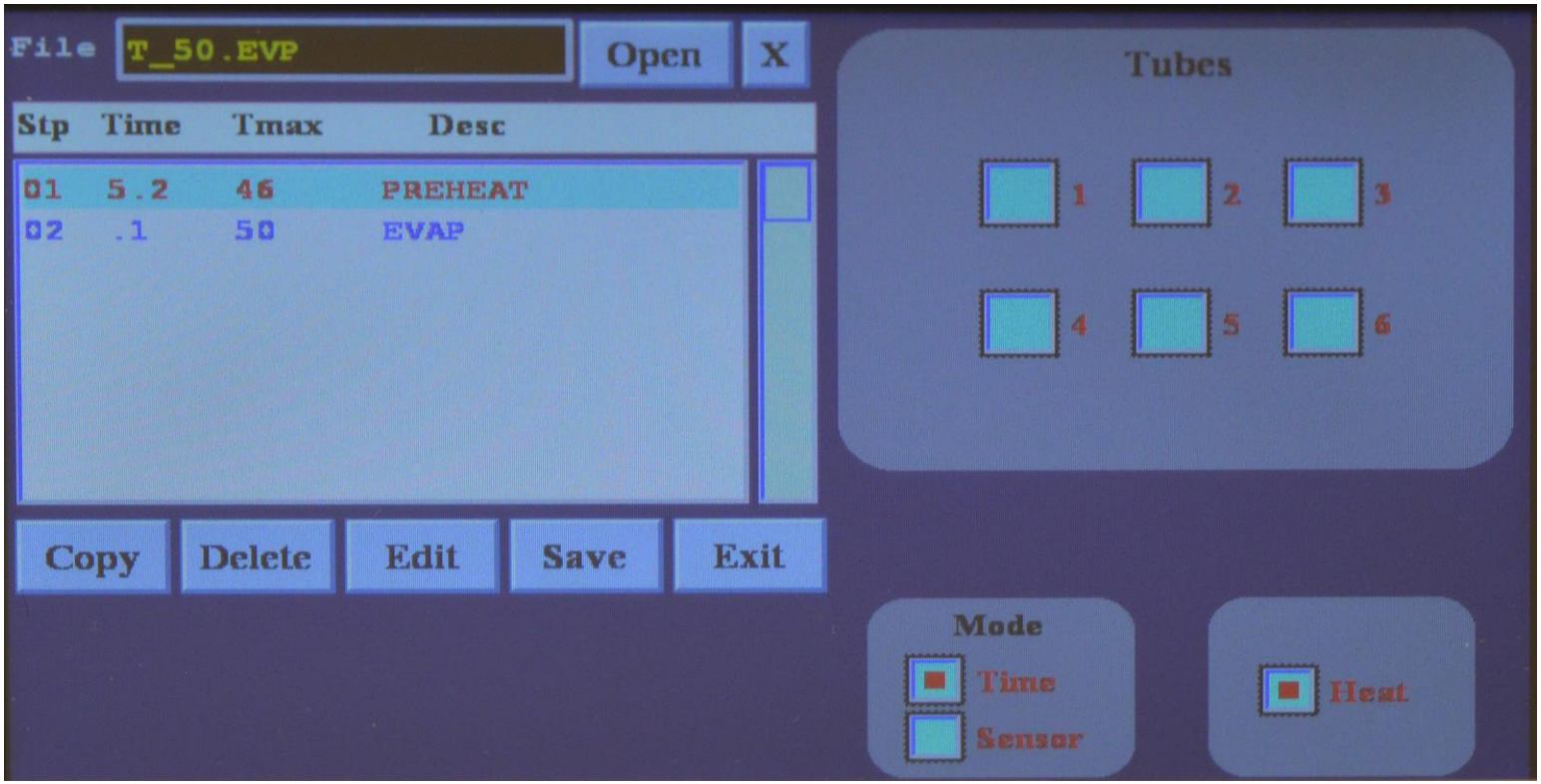
File Storage



Selecting a File



Running a Method



Running a Method

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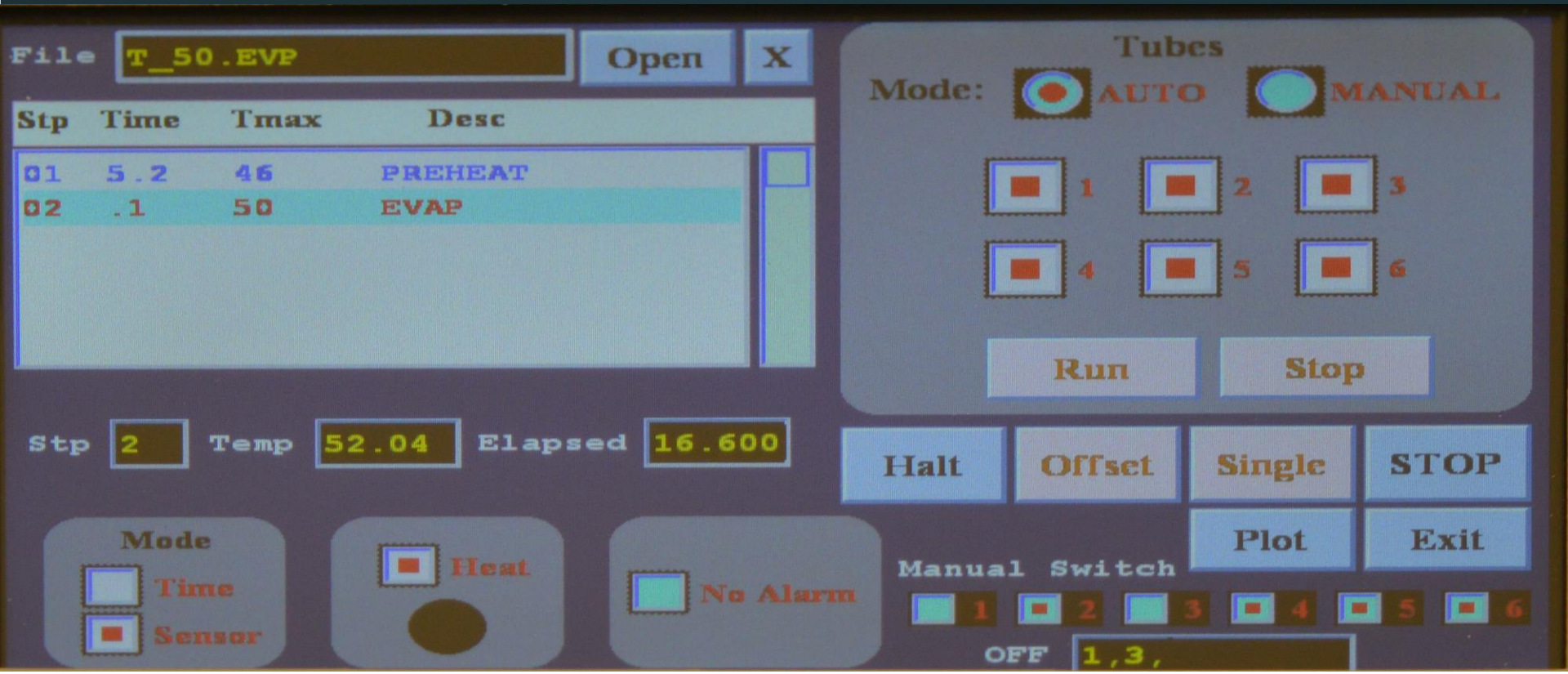
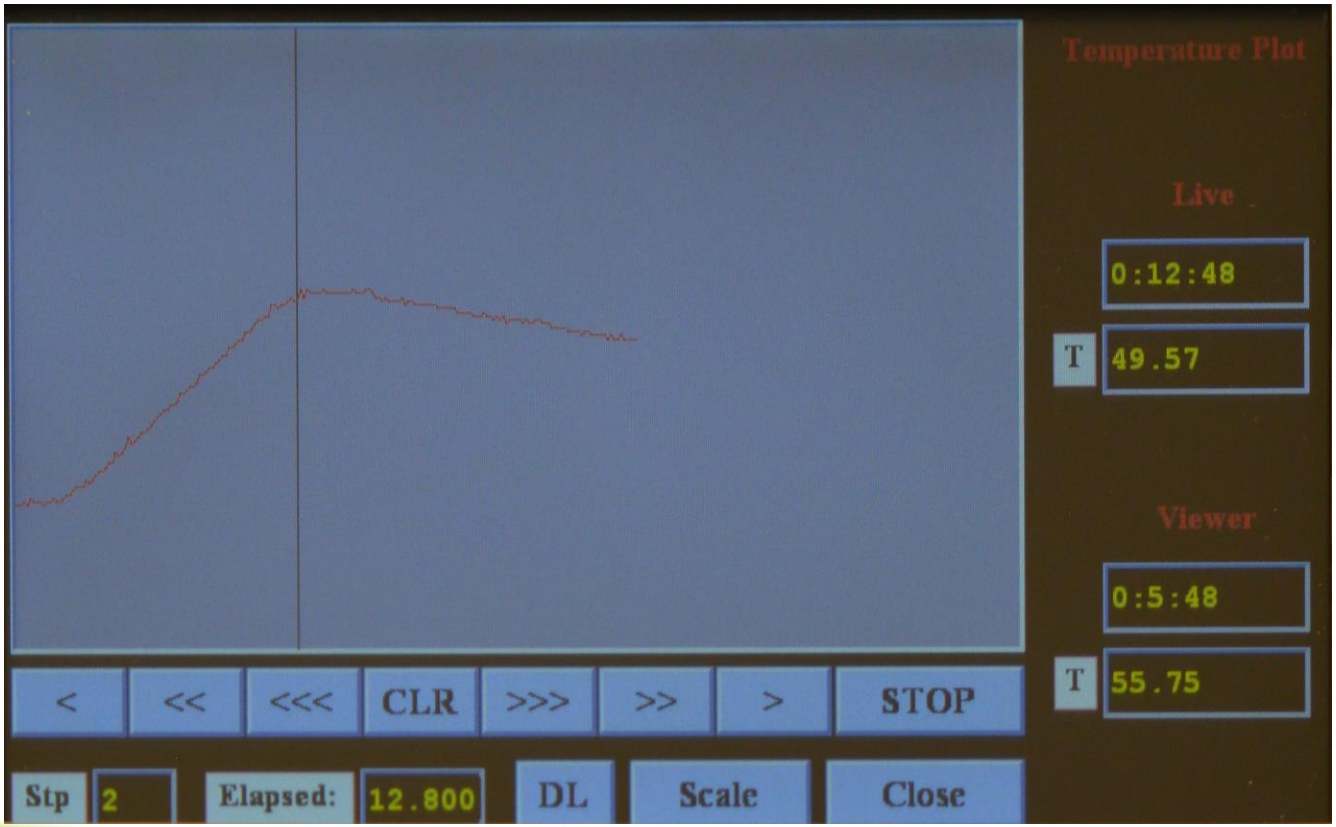
Vessels to Completion

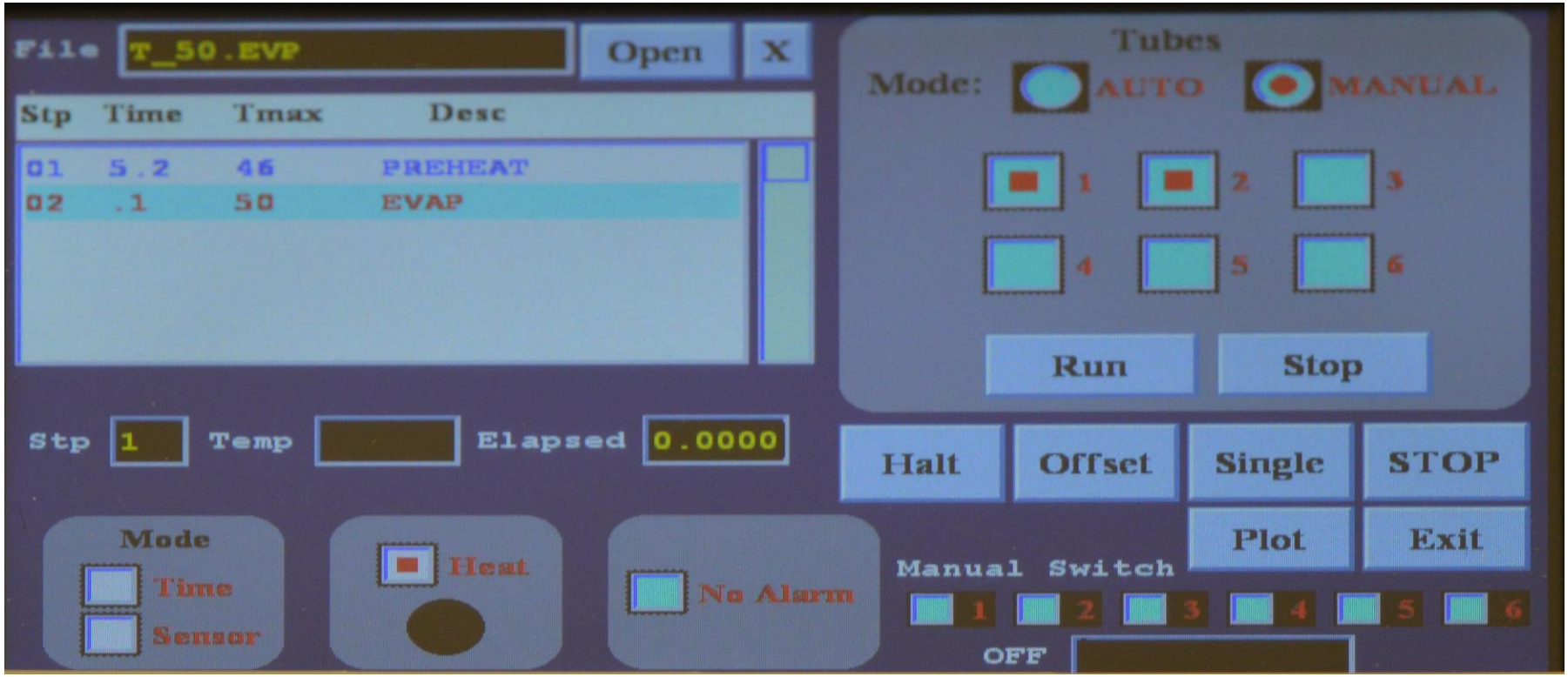


Temperature Plot

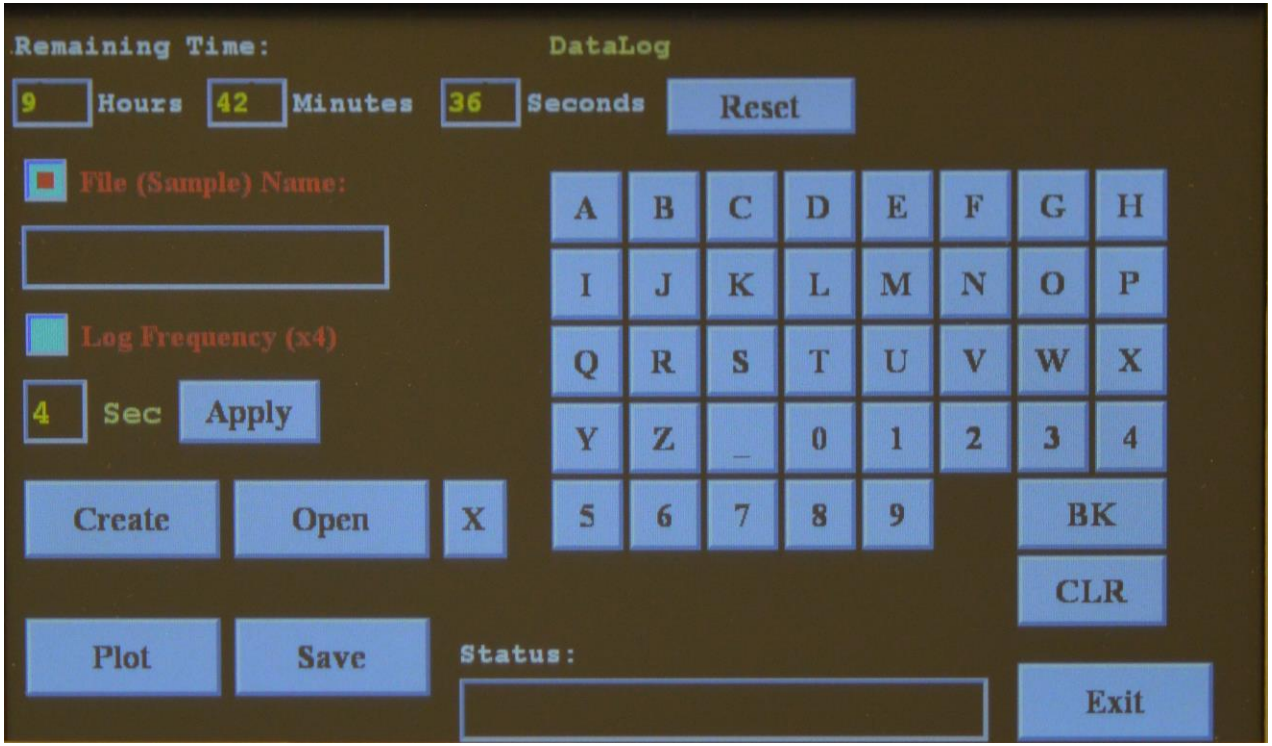
Temperature at any point



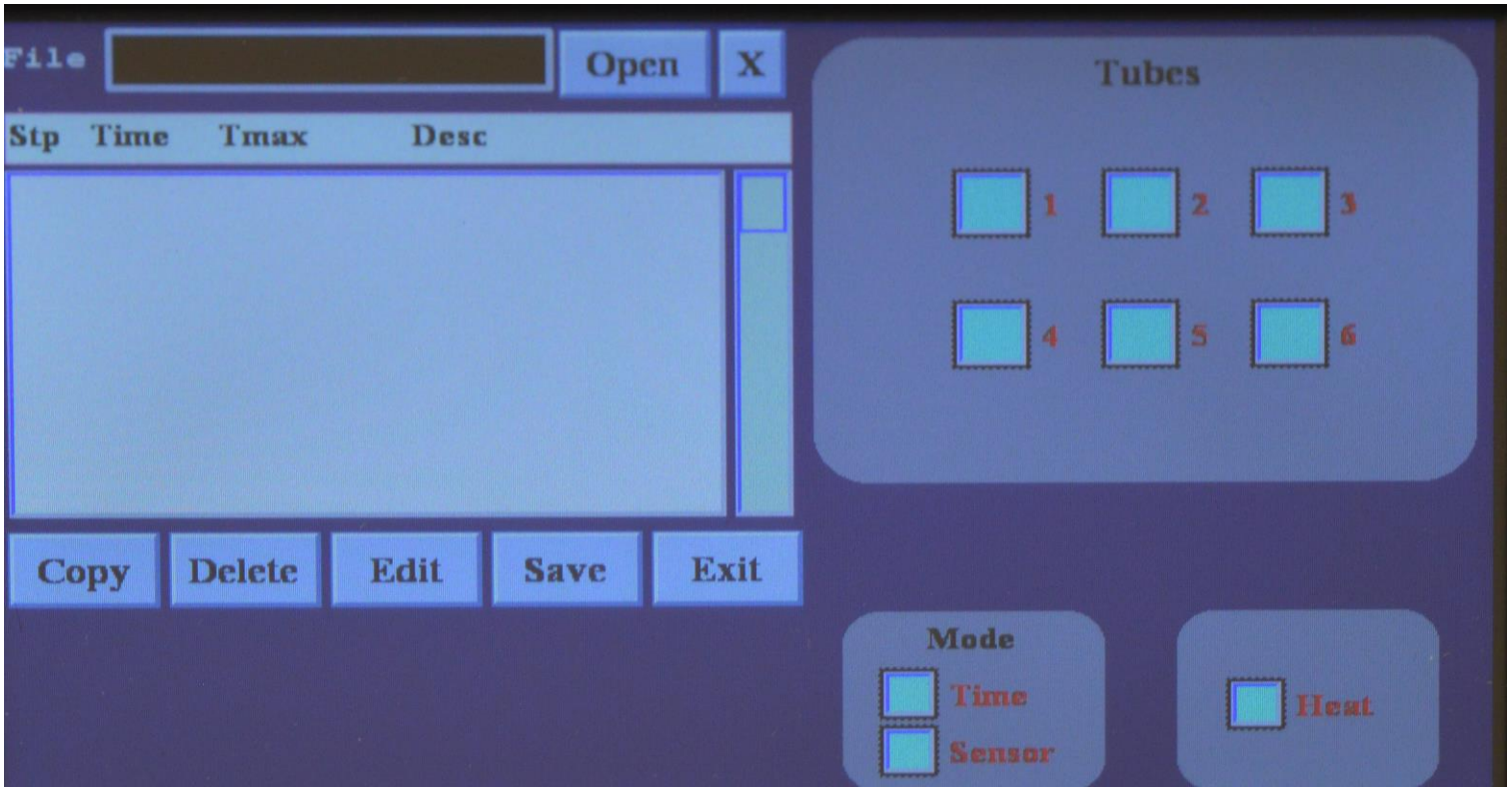
Manual Operation



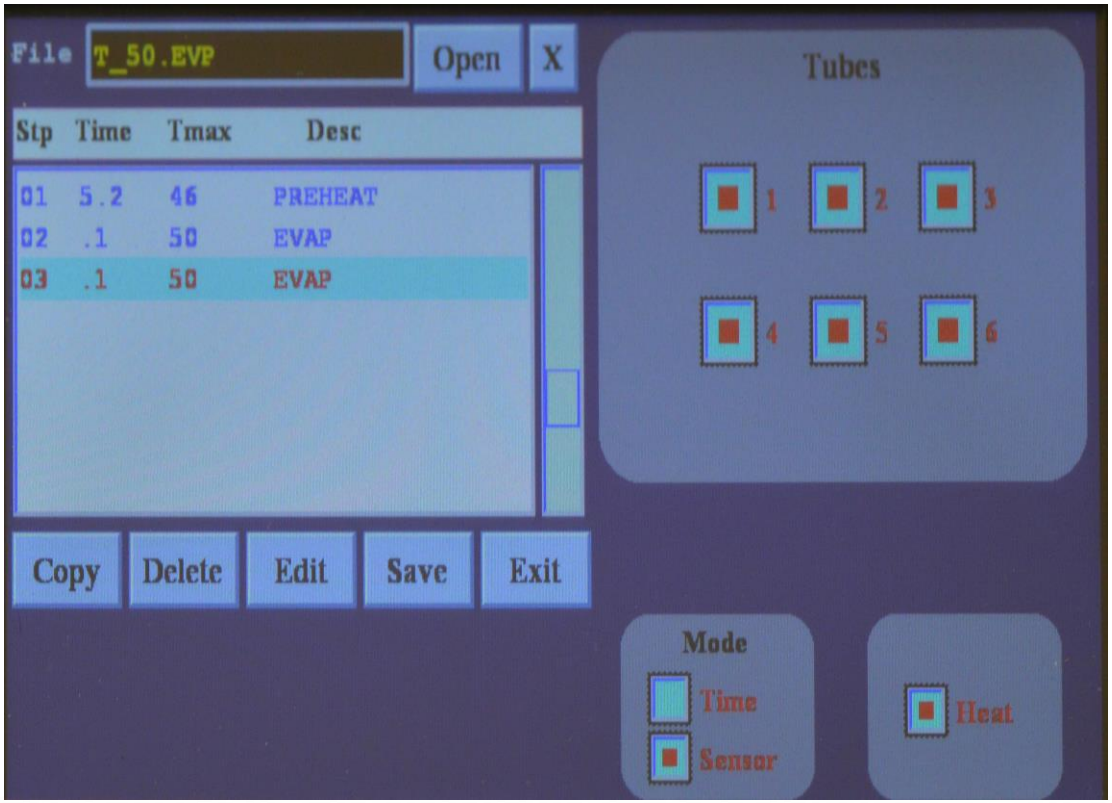
Create a DataLog to Save a Plot



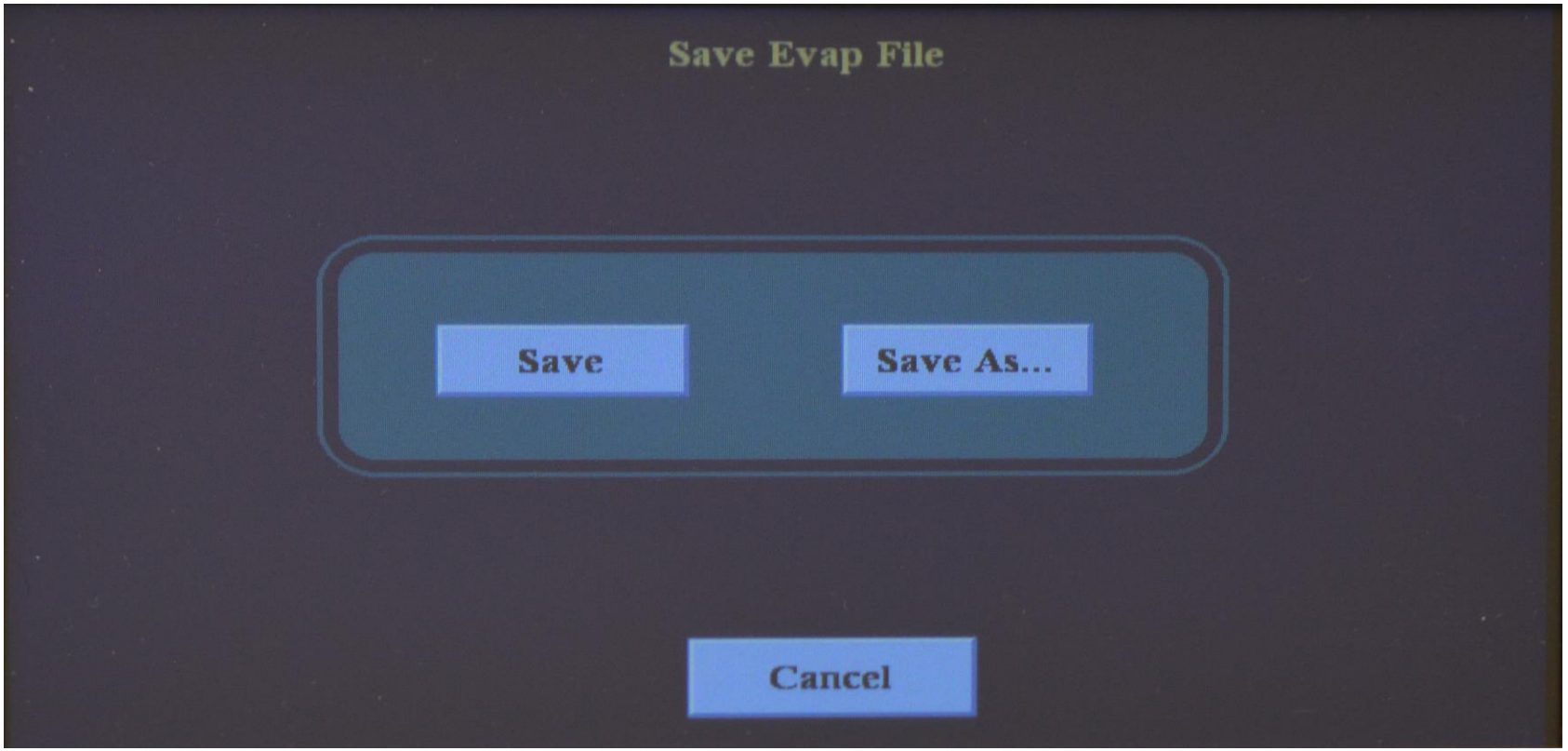
Create or Open a File



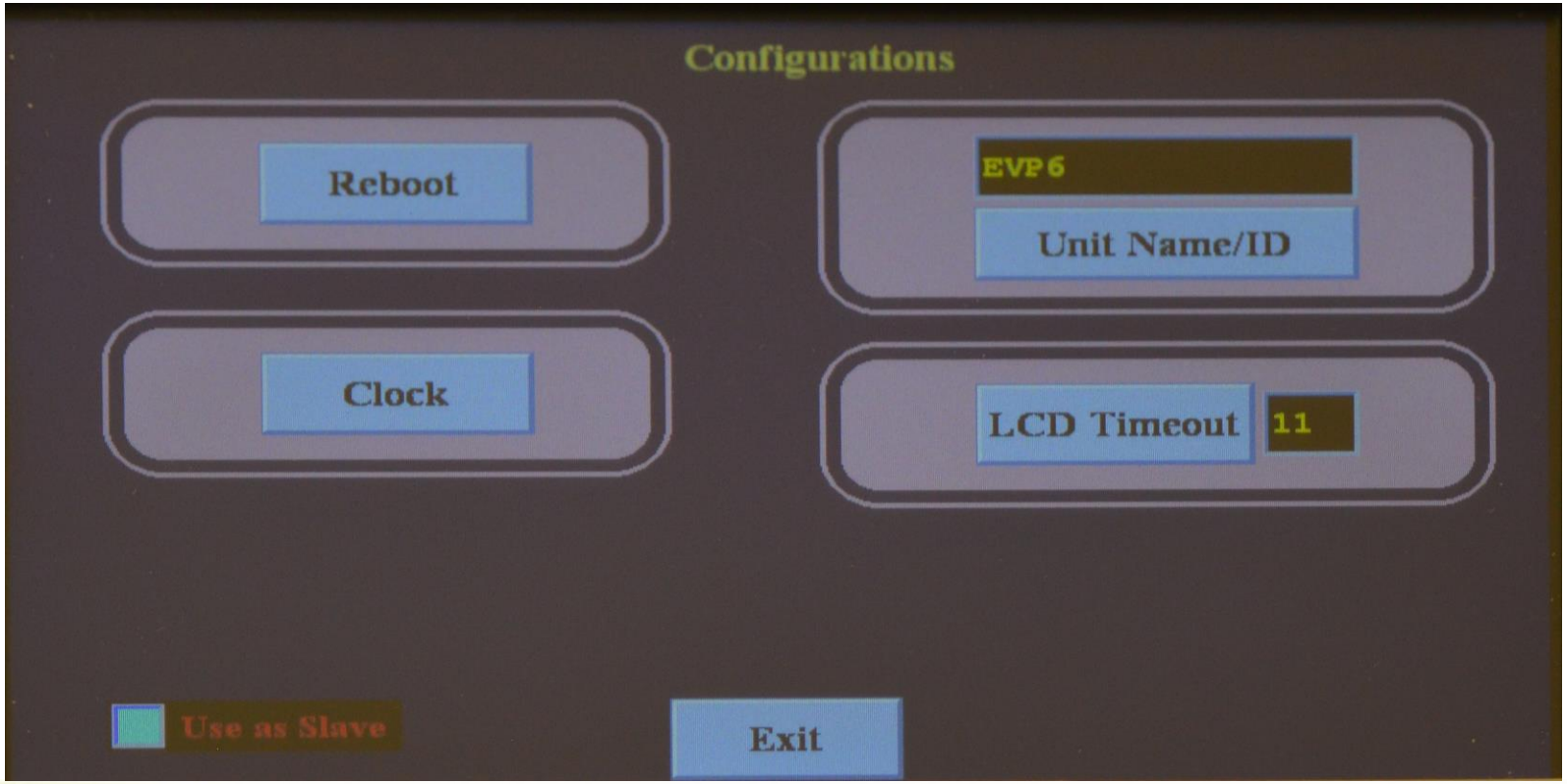
Programming a Method



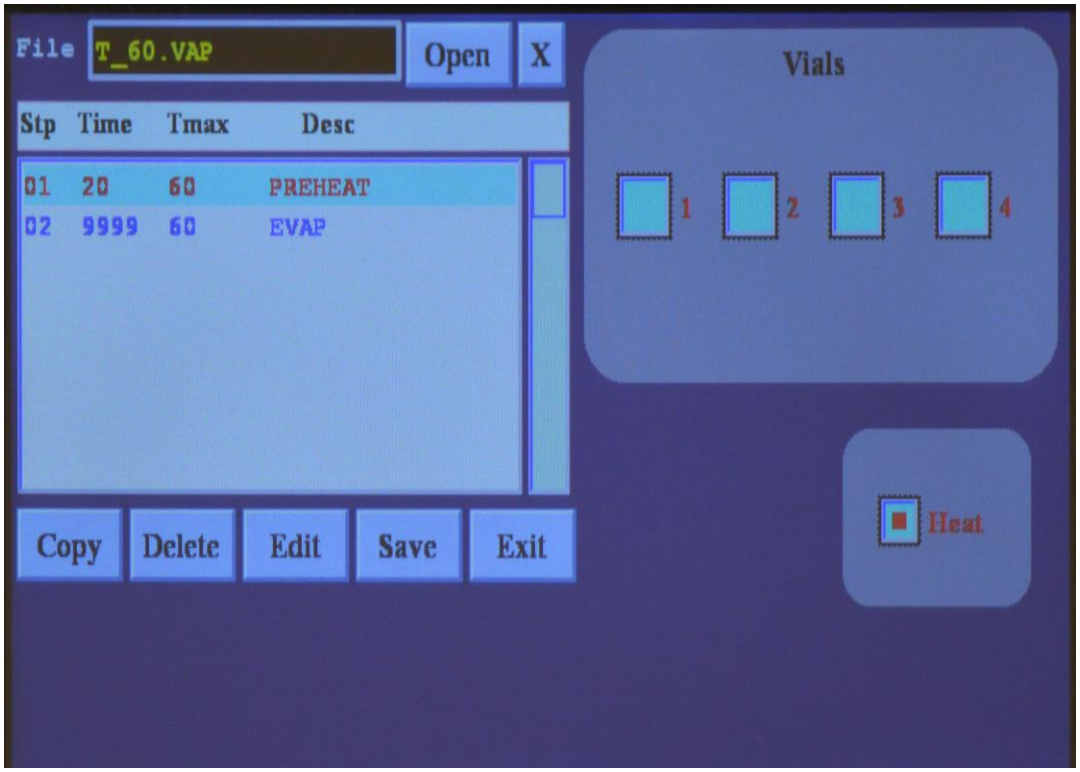
Saving a Method



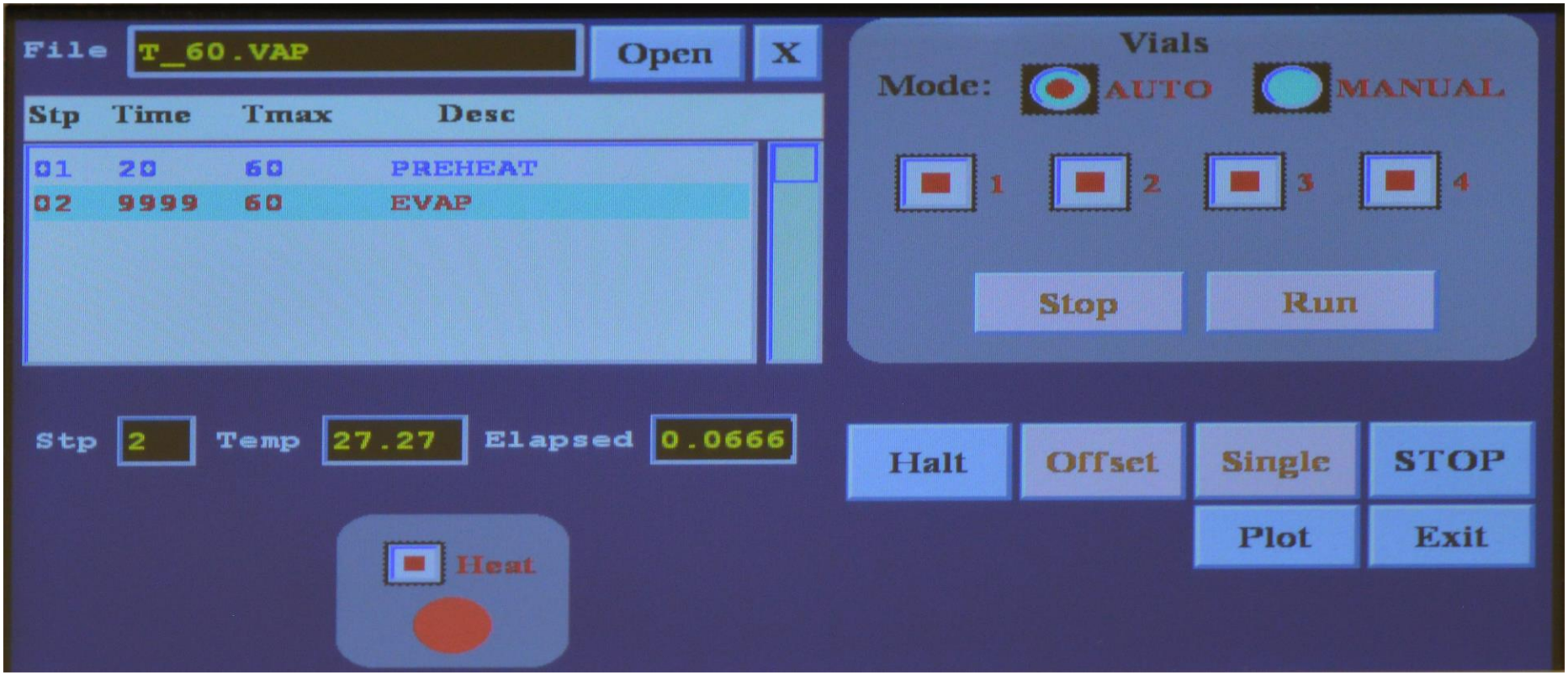
System Configuration



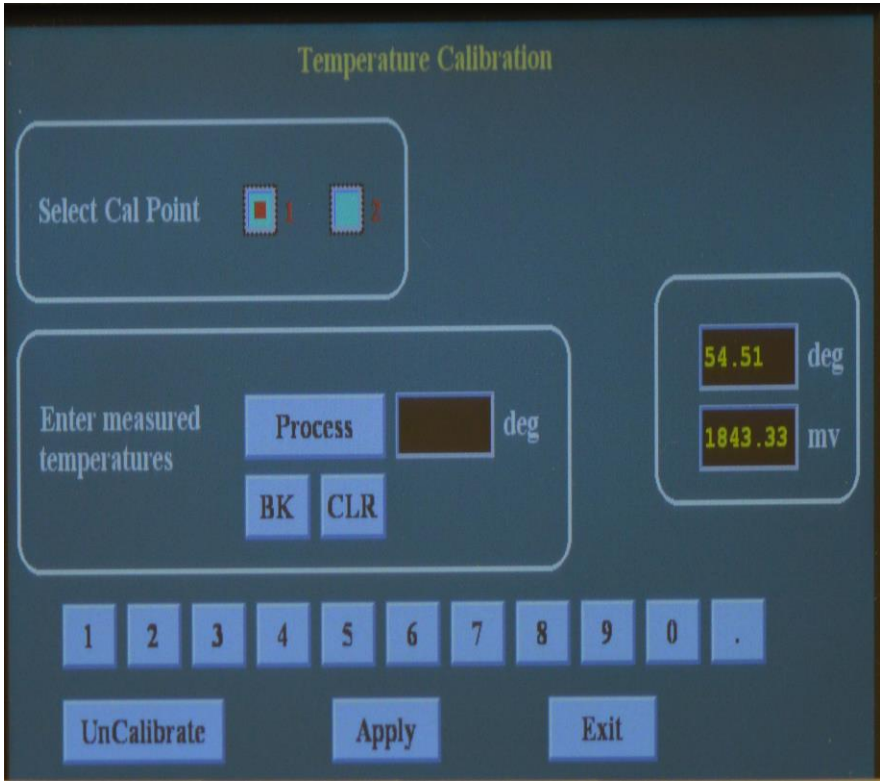
Vial Concentrator Interface



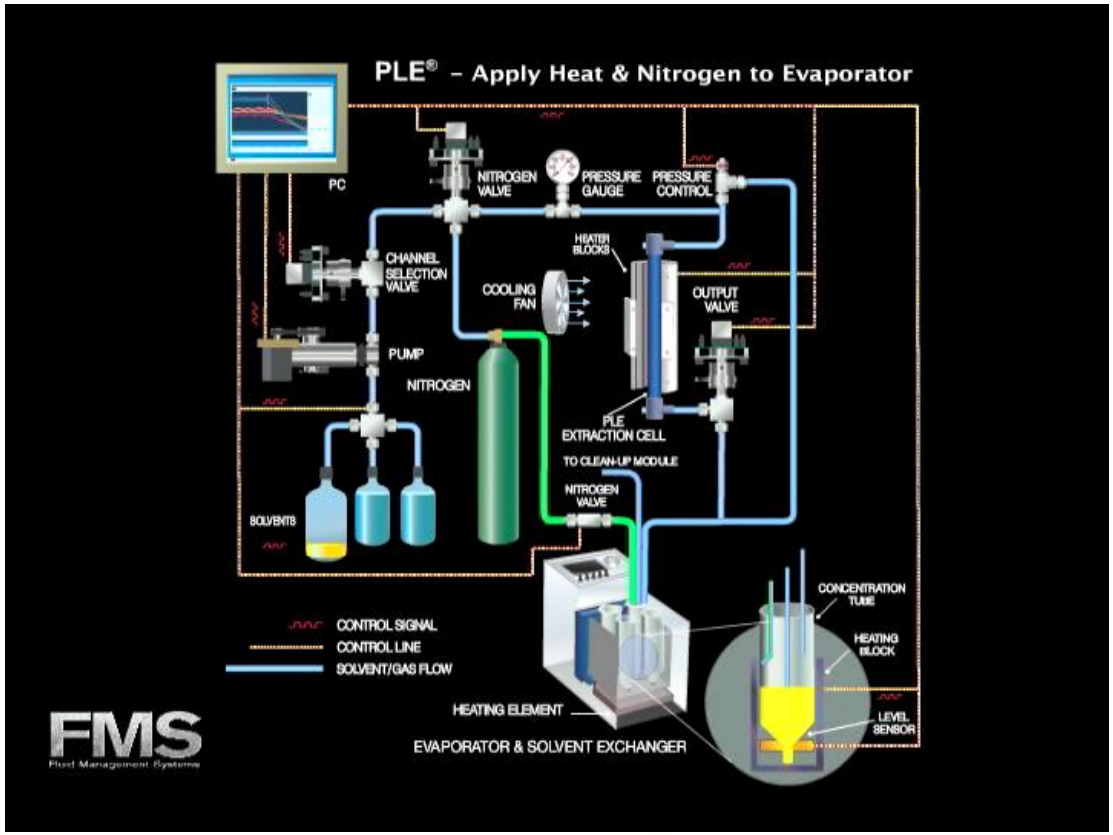
Vial/Centrifuge Interface



System Calibration



Automated Extraction and Concentration



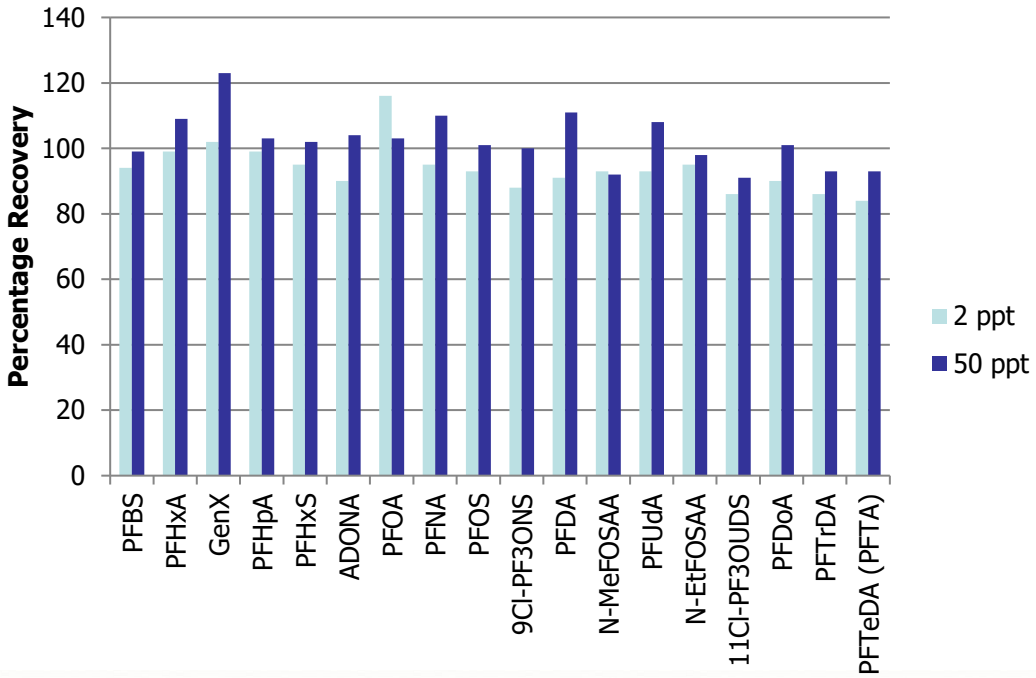
Alkane Recovery Data

Compound	Percent Recovery
Nonane (C9)	75%
Decane (C10)	77%
Dodecane (C12)	88%
Tetradecane (C14)	92%
Hexadecane (C16)	95%
Octadecane (C18)	97%
Nonadecane (C19)	97%
Eicosane (C20)	98%
Docosane (C22)	98%
Tetracosane (C24)	99%
Hexacosane (C26)	98%
Octacosane (C28)	97%
Triacontane (C30)	96%
Hexatriacontane (C36)	97%

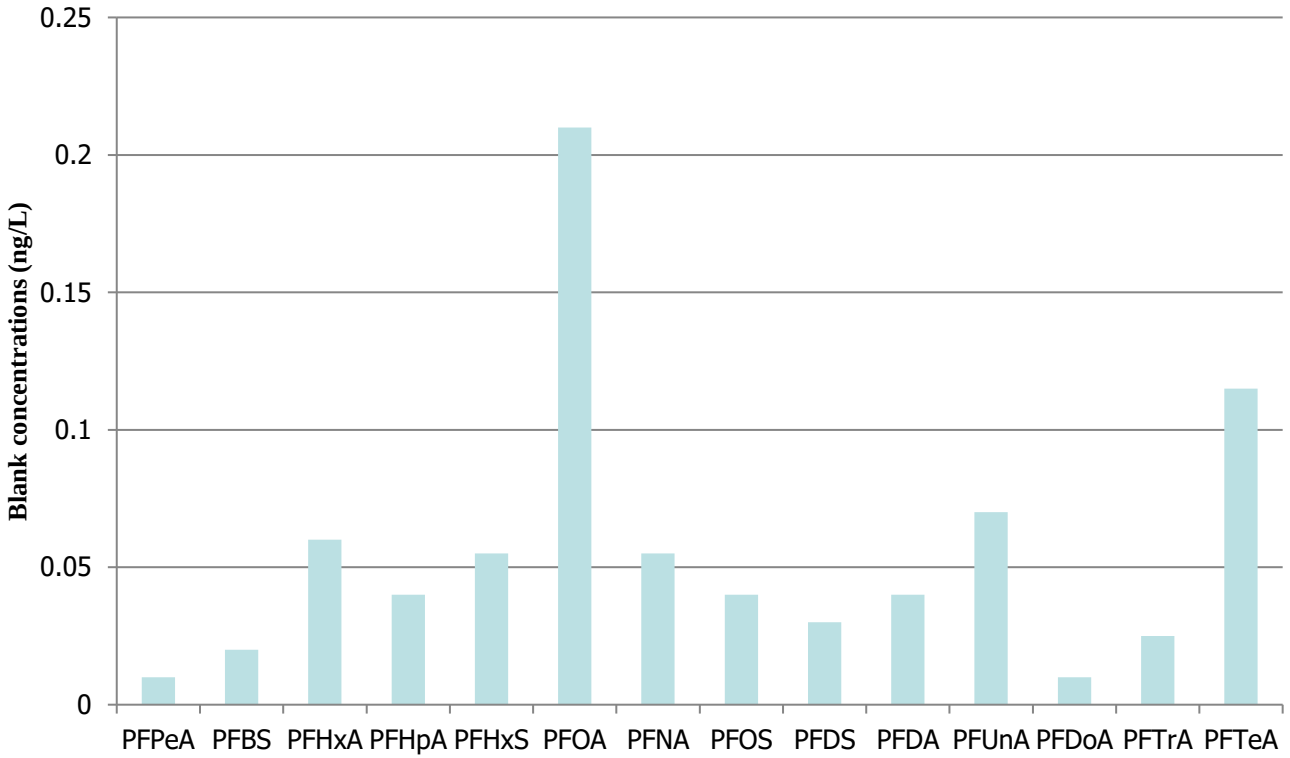
Typical PAH Recovery Data

Compound	Percent Recovery
Naphthalene	78%
2-Methylnaphthalene	102%
Acenaphthylene	83%
Acenaphthene	83%
Fluorene	87%
Phenanthrene	89%
Anthracene	89%
Fluoranthene	93%
Pyrene	90%
Benzo[a]anthracene	86%
Chrysene	95%
Benzo[b]fluoranthene	90%
Benzo[k]fluoranthene	93%
Benzo[a]pyrene	89%
Indeno[1,2,3-cd]pyrene	90%
Dibenzo[a,h]anthracene	89%
Benzo[g,h,i]perylene	91%

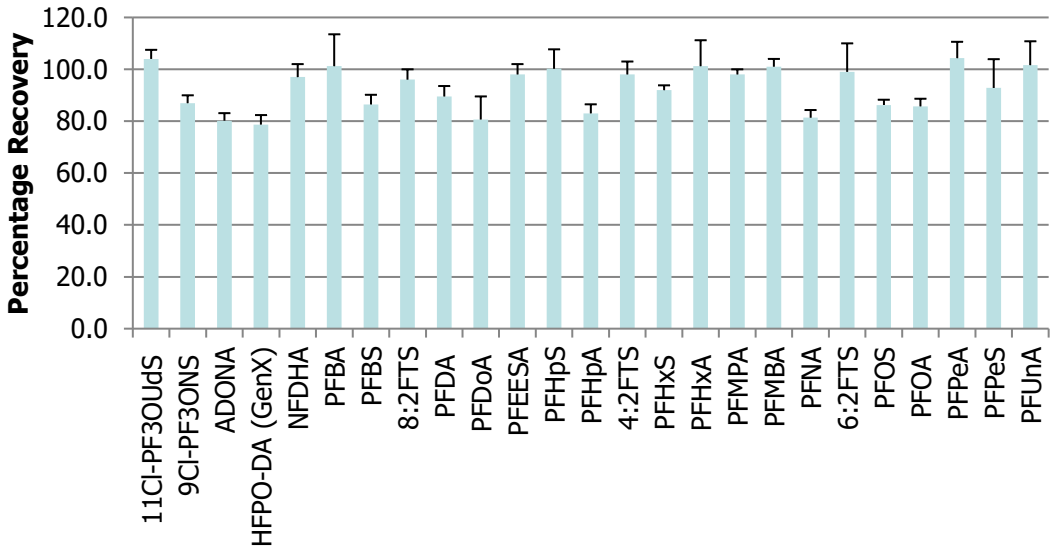
EPA 537.1


Percentage Recovery
140
120
100
80
60
40
20
0
PFBS
PFHxA
GenX
PFHpA
PFHxS
ADONA
PFOA
PFNA
PFOS
9Cl-PF3ONS
PFDA
N-MeFOSAA
PFUdA
N-EtFOSAA
11Cl-PF3OUDS
PFDoA
PFTrDA
PFTeDA (PFTA)
2 ppt
50 ppt

PFAS Background



EPA 533


Percentage Recovery
120.0
100.0
80.0
60.0
40.0
20.0
0.0
11Cl-PF3OUdS
9Cl-PF3ONS
ADONA
HFPO-DA (GenX)
NFDHA
PFBA
PFBS
8:2FTS
PFDA
PFDoA
PFEESA
PFHpS
PFHpA
4:2FTS
PFHxS
PFHxA
PFMPA
PFMBA
PFNA
6:2FTS
PFOS
PFOA
PFPeA
PFPeS
PFUnA

EPA 1633 SuperVap 12 PFC

Name	Average (%)	RSD (%)	EPA PASSING Window
13C2-4-2 FTSA	94.7	6.5	40-200
13C2-6-2 FTS	95.6	7.3	40-200
13C2-8-2 FTSA	85.0	7.0	40-300
13C2-PFDoDA	104.0	7.0	10-130
13C2-PFTDA	100.1	3.5	10-130
13C3-HFPO-DA	101.4	4.0	40-130
13C3-PFBS	84.7	5.9	40-135
13C3-PFHxS	93.5	7.1	40-130
13C4-PFBA	90.5	7.7	5-130
13C4-PFHpA	89.6	8.7	40-130
13C5-PFHxA	94.4	7.4	40-130
13C5-PFPeA	108.2	3.4	40-130
13C6-PFDA	82.4	8.3	40-130
13C7-PFUnA	92.2	6.8	30-130
13C8-PFOA	99.4	8.3	50-200
13C8-PFOS	93.3	7.1	50-200
13C8-PFOSA	97.3	7.2	40-130
13C9-PFNA	83.9	9.2	40-130
2H3-N-MeFOSA	99.2	3.7	10-130
2H3-N-MeFOSAA	99.1	4.9	40-170
2H5-N-EtFOSA	97.6	9.1	10-130
2H5-N-EtFOSAA	91.4	6.3	25-135
2H7-MeFOSE	95.1	4.1	10-130
2H9-EtFOSE	97.2	6.3	10-130

The SuperVap in Summary

- **Waterless Bath**
  - Dry Heater Assembly
  - Reduce Errors with Robust Sensors
  - No Water dripping into the vessel from condensation
  - Eliminates bacteria, biofilms, and cross-contamination from water
- **Fully Automated**
- **Compatible with all FMS automated systems**
  - Standalone or Integrated
  - Fully automated Sample Prep WorkFlow

The SuperVap in Summary

- Sample Handling
  - Direct to Vial
    - Reduces error associated with transfer steps
  - Concentrate/Evaporate up to 6 Samples
    - Sample Sizes up to 220ml
  - Concentrate/Evaporate up to 12 Samples
    - Sample sizes up to 50ml
  - Automatic Endpoint Detection and Nitrogen Shutoff for each Vessel
  - Timed Endpoint

The SuperVap in Summary

- Variety of Models and Vessels
  - Direct to GC/LC vial
  - 500ul
  - 1ml low volume GC/LC vial
  - 2ml GC/LC vial
  - 4ml GC/LC vial
  - 20ml VOA vial
  - ASE 40ml and 60ml VOA vials
  - 15ml Centrifuge Tube
  - 50ml Centrifuge Tube

The SuperVap in Summary

- Easy to Use Touch Screen
- Smallest Footprint
- Inexpensive Glassware
- Consistent Reproducible Results
- Reduces Errors

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Questions