TELEDYNE LEEMAN LABS
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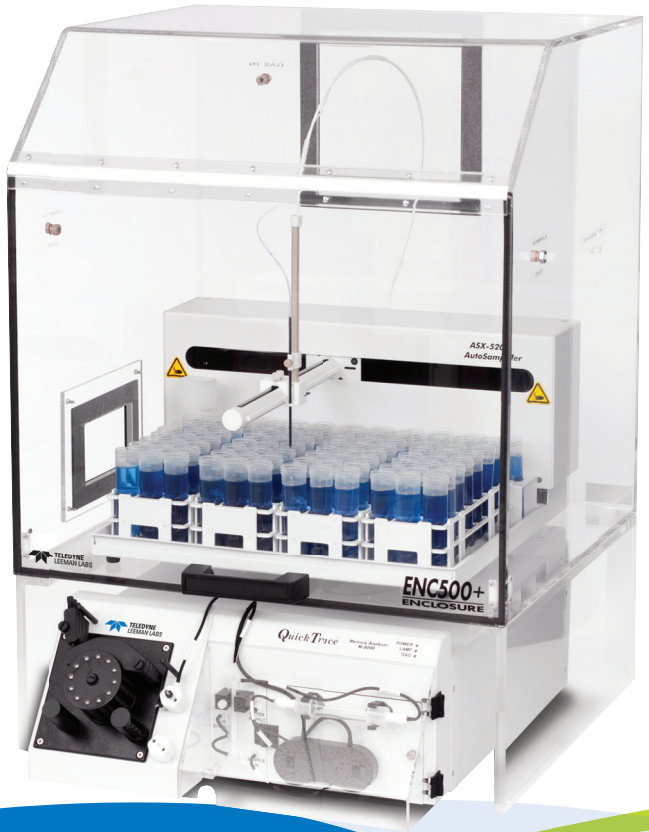
QuickTrace® M-8000 Mercury Analyzer Pre-Installation Guide (Service Installation)

Part Number: 15-2353-074

Rev: 1, May - 2015



Updated Information

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QuickTrace® M-8000 Mercury Analyzer Pre-Installation Guide (Service Installation)

1.1 Introduction

Thank you for purchasing a Teledyne Leeman Lab's QuickTrace® M-8000 CVAF mercury analyzer. The purpose of this guide is to assist new users in the preparation of their laboratory prior to the installation of the Teledyne Leeman Lab's QuickTrace® M-8000 CVAF mercury analyzer by the Teledyne Leeman Lab's Service Engineer.

In preparation for the installation of your analyzer, please review this pre-installation guide to ensure that your laboratory is prepared. After the installation, please retain a copy of this guide for your records.

If there is any doubt about the information provided, please contact your local Service Representative or Teledyne Leeman Labs using information in Section 1.15 "Contact Information".

1.2 Receiving the Instrument

Your analyzer will be installed by a Teledyne Leeman Lab's Service Engineer. Please do not unpack any boxes without consulting the Teledyne Leeman Lab's Customer Support Department (see Section 1.15 "Contact Information" if necessary).

The Service Engineer will be responsible for reviewing the shipment against the packing list. The Service Engineer cannot be responsible for this task, nor can Leeman Labs be responsible for any missing items, if boxes have been opened or removed before the arrival of the installation engineer.

The Service Engineer is a skilled professional who will install your equipment, verify that it is operating to specifications, and train your personnel in its basic operation. Your preparation enables you to use his/her visit to the best advantage.

NOTE

The connection of the QuickTrace® M-8000 CVAF mercury analyzer to your company's internal communication network/server is not part of the normal installation process and is best left to a trained Information Technology (IT) professional.

1.3 Pre-Installation Requirements

This section summarizes the site requirements necessary for proper installation of the QuickTrace® M-8000 mercury analyzer. Specific details of these requirements are included in the sections which follow.

Table 1-1 QuickTrace® M-8000 Site Requirements

Dimensions	
Width (Base)	48 cm (19 in
Depth (Base)	60 cm (24 in)[a]
Height	20 cm (8 in)[b]
Weight	16.8 Kg (37 lbs)
Electrical Requirements	
Four Grounded Electrical Outlets	100 - 240 VAC ±10%, 50/60 Hz
Gas Supply	
Type	Argon
Purity	Ultra-High Purity (99.999%) Argon
Inert Gas Regulator	Two-Stage
Recommended Regulator Pressure Range	69 - 689 kPa (10 - 100 psi)
Connection Size	3.175 mm (1/8 in) OD

Ventilation (for ENC-500 Enclosure, if installed)	
Recommended Rate	283 LPM (10 CFM)
Trunk Diameter	11 cm (4 in)

a. The optional ENC-500 enclosure will require 81 cm (32 in) in base depth to allow for the exhaust chimney. Ideally, an unobstructed open island type of bench either 24 or 36 inches deep will suffice.

b. The optional ENC-500 enclosure w/elevating legs for the autosampler requires 86 cm (33.75 in) in height.

1.4 Customer Supplied PC Requirements

A customer supplied PC must meet the requirements in Table 1-2 "Minimum PC Hardware/Software Requirements"..

Table 1-2 Minimum PC Hardware/Software Requirements

Operating System	Microsoft® Windows® 7 (32 and 64-bit) and Windows® 8.1 (64-bit only)
Random Access Memory (RAM)	2 GB Minimum
Video Processing	1024 x 768 with 24-bit color
Processor	Pentium Dual Core 2.3 GHz
Networking Communication Ports	Two free USB communication ports, either serial and/or USB
Additional Hardware	CD-ROM drive
	Printer with Windows® compatible print driver
	PS/2 or Bus Mouse
Internet Browser	Microsoft® Internet Explorer® 4 or higher must be installed for the online Help to function

NOTE

Also refer to the Teledyne Leeman Labs *Supplied Computer Specifications* document for PC specifications best suited to the M-8000 mercury analyzer.

1.5 Choosing a Location

NOTE

Always position the equipment so that it is easy to disconnect the power cord.

1.5.1 Spacial Requirements According to Configuration

The QuickTrace® M-8000 Mercury Analyzer System includes the analyzer, PC (standard desk top mini tower) with monitor, reagent and rinse bottles, 10 L waste bottle (supplied), and an optional autosampler and autosampler enclosure.

NOTE

30 cm x 30 cm (1 ft^2) of floor space is required for the liquid waste receptacle. The waste receptacle can be located directly below the analyzer or directly in front of the lab bench (in line with the analyzer's peristaltic pump).

Approximate spacial requirements are shown in Table 1-3 "M-8000 Spacial Requirements".

NOTE

Allow an additional 5 cm (2 in) behind the system for cable egress, ventilation, and access to power switches. If installing the optional ENC-500 enclosure, allow ~ 21 cm (8 in) behind the enclosure for ventilation (total minimum bench depth ≈ 32). If the bench does not provide enough depth for this additional clearance, a chase behind the bench can be used.

- The ASX-520 autosampler is made to be placed on top of the M-8000 analyzer and the width and depth required is the same.

- If the M-8000 is being used with an ENC-500 enclosure with elevating legs the autosampler sits inside the enclosure (instead of on top of the M-8000 analyzer) and the enclosure sits over the M-8000 analyzer. In this configuration, enclosure height, width and depth requirements include the M-8000 analyzer and ASX-520 autosampler.

Table 1-3 M-8000 Spacial Requirements[a]

Configuration	M-8000 w/ENC-500 (with elevating legs) and ASX-520 Rugged Autosampler	PC
Width	56 cm (22 in)	92 cm (36 in)[b]
Depth	60 cm (24 in)[c]	44 cm (17 in)
Height (Unobstructed Space Above)	86 cm (33.75 in)	41 cm(16 in)

a. 30 cm x 30 cm (1 ft^2) of floor space is required for the liquid waste receptacle. The waste receptacle can be located directly below the analyzer or directly in front of the lab bench (in line with the analyzer's peristaltic pump).

b. PC width requirement can be reduced to 51 cm (20 in) by placing the mini tower of the pc behind the monitor.

c. The optional ENC-500 enclosure will require 81 cm (32 in) in base depth to allow for the exhaust chimney. Ideally, an unobstructed open island type of bench either 24 or 36 inches deep will suffice.

NOTE

Teledyne Leeman Labs highly recommends the ENC-500 for protection against sample contamination and removal of acid gases from the laboratory environment during analysis of sample batches. We also recommend the ENC-500 for EPA 1631 and EPA 245.7 analysis in conjunction with a clean room, or at a minimum, a clean area dedicated for the preparation and analysis procedures.

Figure 1-1 Example Footprint of QuickTrace® M-8000 with ENC-500 enclosure (with elevating legs)

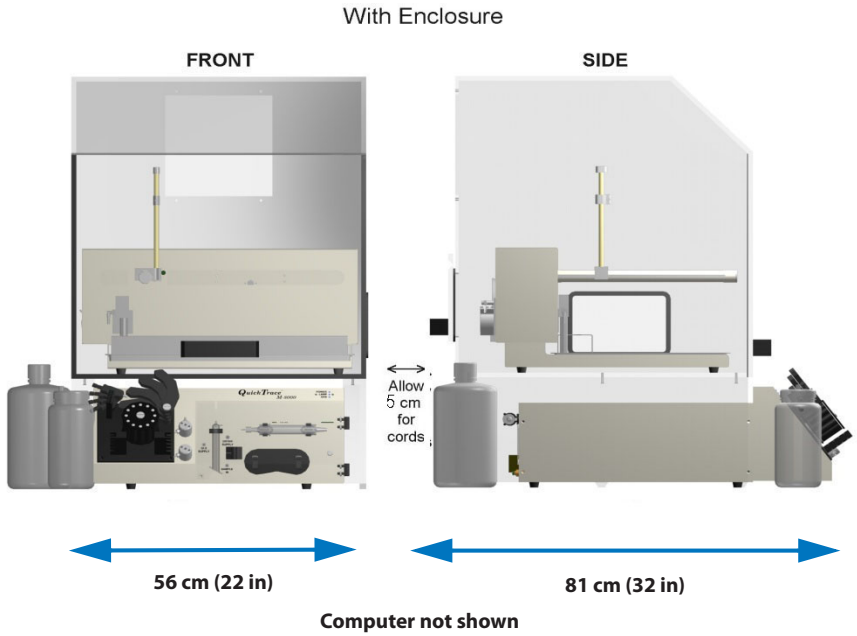
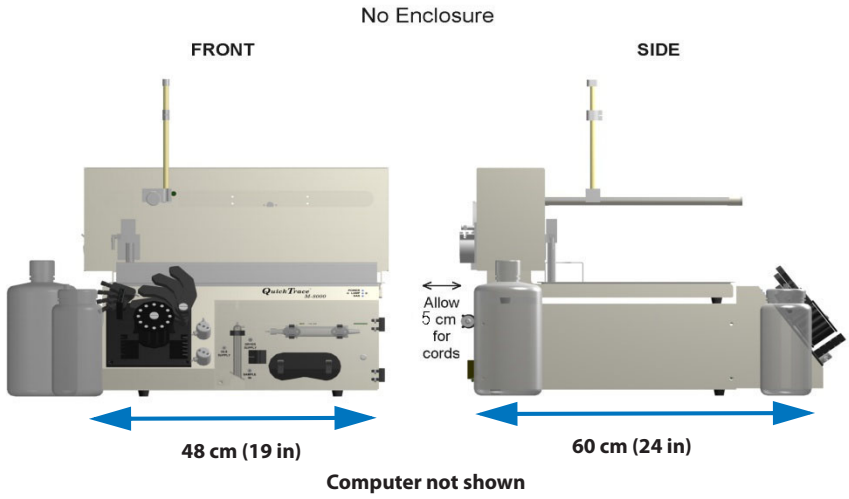


Figure 1-2 Example Footprint of QuickTrace® M-8000 without enclosure



1.5.2 Work Surface Requirements

The analyzer must be placed on a sturdy countertop or table.

NOTE

Do not place the analyzer on a wheeled cart or folding table.

The work surface should be at least 61 cm (24 in) deep.

1.6 General Requirements

- A clean and dedicated hood for standard and sample preparations.

NOTE

Due to the likelihood of accelerated damage from corrosion and dust, locating the analyzer or autosampler in a fume hood with stagnant air will automatically void the warranty.

1.7 Electrical Requirements

NOTE

Do not apply power to the power supply until ready to operate the analyzer.

Place the QuickTrace® M-8000 within 1.2 meters (4 feet) of a standard power outlet. The standard configuration requires four power outlets, one each for the QuickTrace® M-8000 Mercury Analyzer, autosampler, computer, and monitor.

NOTE

An AC surge protected power strip with six outlets is strongly recommended.

The power cord set supplied with the QuickTrace® M-8000 and autosampler meets the requirements of the country where the instrument was purchased.

NOTE

If the instrument is to be used in a country other than the one specified at the time of ordering, obtain a new power cord set that meets the requirements of that country.

The QuickTrace® M-8000 mercury analyzer and autosampler use an auto-switching power supply that accepts AC input from 100-240 VAC ±10%, 50/60Hz. The specifications are shown in Table 1-4 "Voltage and Power Requirements".

Table 1-4 Voltage and Power Requirements

	M-8000 Mercury Analyzer	ASX-520 Rugged Autosampler	Total
AC Input	8A @ 120 VAC ±10%	100 - 240 ±10% VAC	9.9A @ 120 VAC ±10%
	4A @ 240 VAC ±10%	1.9A	5.9A @ 240 VAC ±10%
	50/60 Hz	50/60 Hz	50/60 Hz

WARNING

This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature. For continued protection against electrical shock or damage to the instrument, do not disable this feature.

The power requirements for the computer can be found on the label affixed to the bottom of the computer, or in the computer user's manual.

1.8 Gas Supply Requirements

A source of Ultra-High Purity (99.999%) Argon is required. The gas regulator must be an inert 2-stage design and provide 69 - 689 kPa (10 - 100 psi), with a coupling for either a cylinder or Dewar capable of delivering 241 kPa (35 psi). The M-8000 is supplied with 1.82 meters (6 feet) of 1/8 inch (3.175 mm) OD gas supply tubing. If the regulator is located more than 1.82 meters (6 feet) from the analyzer, additional tubing will be required.

1.9 Ventilation Requirements

1.9.1 Without ENC-500 Enclosure

During operation, the QuickTrace® M-8000 internally contains trace amounts of mercury vapor. To prevent inhalation of the vapor, the QuickTrace® M-8000 uses a solid $KMnO_4$ absorbent trap located on the back of the instrument. This trap absorbs the mercury vapor prior to final exhaust, therefore no extra ventilation is required beyond that of a standard laboratory environment.

WARNING

Gases exhausting from the QuickTrace® M-8000 cabinet, prior to the external Hg vapor trap (affixed to the rear cabinet panel) contain traces of mercury vapor and must be treated as such. Do not run the QuickTrace® M-8000 unless exhausted gas is properly "scrubbed" or removed. Fill, maintain, and use the provided $KMnO_4$ absorbent trap or run a transfer line to a fume hood. It is the responsibility of the laboratory to supply the fill chemical and maintain the integrity of the mercury vapor trap.

1.9.2 With ENC-500 Enclosure

NOTE

The ENC-500 enclosure is optional, but is highly recommended for use with the M-8000.

If an optional ENC-500 enclosure is being used, the lab must be equipped with the following:

- A ventilation trunk 11 cm (4 in) in diameter for connecting to the enclosure exhaust chimney.
- The ENC-500 is rated for an exhaust flow with a maximum draw of 453 LPM (16 CFM) (recommended draw 283 LPM [10 CFM]).

NOTE

The ENC-500 enclosure includes a HEPA filter. The HEPA filter stops particulates from entering the enclosure as it draws room air to remove acid gas during the analysis of digested samples. Particulates can result in sample contamination and the biasing of results during ultra-trace analysis.

1.10 Environmental Conditions

The ambient temperature should be kept as stable as possible. Locating the QuickTrace® M-8000 directly in the path of an air conditioner or heater vent may cause baseline drift, and is not recommended.

1.11 Necessary Supplies

- UHP Argon (Cylinder or Dewar)
  99.999% purity Argon
- Inert Gas Regulator
  Inert 2-stage, 69 - 689 kPa (10 - 100 psi) secondary pressure gauge, with a coupling for either a cylinder or Dewar capable of delivering 241 kPa (35 psi).

NOTE

The M-8000 is supplied with 1.82 meters (6 feet) of 1/8 inch (3.175 mm) OD gas supply tubing. If the regulator is located more than 1.82 meters (6 feet) from the analyzer, additional tubing will be required.

- AC Power Strip (surge protected) with six outlets (if sufficient wall outlets are not available).
- Certified Mercury Standard Solution
  100 or 1000 ppm
- Hydrochloric acid (Minimum grade: Trace Metal specification @ 37%)
  Recommended: Mallinckrodt/Macron, 6 each - 2.5 L, AR Select, Item # 5587-46
- Nitric acid, trace metal grade (68-70%)
  Recommended: Mallinckrodt/Macron, 2.5 L, AR (ACS), Item # 2704-46
- Stannous chloride (crystals, Di-hydrate)
  Recommended: Mallinckrodt/Macron, ACS 500 g, Item # 8176-04
- Potassium permanganate; solid, crystalline for the hg exhaust vapor trap or suitable for mercury analysis i.e., EPA 245.1
  Recommended: j.t baker 500 g bottle item number 3227-1
- Precision adjustable air displacement pipettes, 10 to 100 µl (TD), 200 to 1000 µl (TD), 400 to 2000 µl (TD), 1000 to 5000 µl (TD), 2000 to 10000 µl (TD)
- Replacement tips for pipettes
- Disposable plastic pipette droppers
- Polypropylene Graduated Cylinders: 10, 25, 50, and 100 mL
- Polypropylene or polyethylene small mouth bottle with cap (three each -500 mL)
- Additional Chemical Compounds

NOTE

The sample preparation procedures of the intended analytical method may require additional chemical compounds. Refer to published method specifications.

1.11.1 Sources for Premixed 1631 and 245.7 Chemicals

Table 1-5 Premixed 1631 and 245.7 Chemical Sources

Supplier	Website
Environmental Express®	http://www.envexp.com/
o2si Smart Solutions®	https://www.o2si.com/

1.11.2 USEPA Method 1631 Users

Teledyne Leeman Labs recommends the following when using the QuickTrace® M-8000 mercury analyzer to perform USEPA Method 1631:

- A purged water source.
- Purged $SnCl_2$ for the reduction of Hg.
- For optimal performance an in-line gold trap (PN SP8042) for trace Hg removal from the gas supply used to purge the reagents and reagent water should be used. The M-8000 is supplied with a gold trap for Hg removal from the carrier gas.
- Hg pre-filter (PN 15-2145-003) for the gas supply when using gold trap modes of operation. This pre-filter should be used in conjunction with in-line gold trap SP8042.

NOTE

Teledyne Leeman Labs recommends using the Hg pre-filter to remove trace amounts of mercury from the instrument carrier gas and the gas used to purge reagents. The filter may also be used for the preparation of ultra-trace purged DI water.

- A clean room, or at a minimum a clean area, dedicated for the preparation and analysis procedures.

1.12 Recommended Supplies

- Volumetric Flasks 100 mL class A (TC) 6 each
- Volumetric Flasks 1000 mL class A (TC) 1 each
- Volumetric Flasks 2000 mL class A (TC) 1 each
- Kimwipes®
- Weighing Balance, top loading (0.1 g readability or better, capacity > 200 g)
- Stopwatch (for measuring liquid uptake rates)
- Powder Funnel, wide-bore stem, small overall size
- Wrenches, adjustable 12 in, 6 in and 4 in
- Screw Drivers:
  - 1 Small Phillips-Head
  - 1 Medium Phillips-Head
  - 1 Long-Shank Medium Flat-Head
  - 1 Small Thin Flat-Head
- Flow Meter 0-500 mL/min calibrated for argon gas with 1 mL readability
- Deionized Water
- Soda Lime 4-8 mesh

NOTE

Soda lime is used to preserve the integrity of the gold traps during USEPA Method 1631 analysis. Because EPA 1631 is a performance-based methodology, soda lime is not a necessary supply and may be eliminated.

1.13 Installation Solution Preparations

NOTE

The reagent, rinse and standard solutions should be prepared during the unpacking and initial installation period. Teledyne Leeman Labs and customer owned polypropylene bottles and standard tubes should be used.

Table 1-6 Installation Standards, Reagents and Rinse Solutions[a]

Solution	Preparation
Stannous Chloride	1 L of 10% w/v stannous chloride in 7% v/v HCl
Calibration Blank	3% v/v HCl
Autosampler Rinse Solution	2 L of 3% v/v HCl
Reagent Capillary Rinse Solution	500 mL of 10% v/v HNO_3
Reagent Capillary Rinse Solution	500 mL of 10% v/v HCl
Reagent Capillary Rinse Solution	500 mL of DI water
LC (ng/L) Secondary Mercury Standard	100 mL of 10,000 ng/L
LC (ng/L) Working Mercury Standard	100 mL of 200 ng/L
Calibration Standards	Shown in Table 1-7 "Standard Concentrations"

a. All bottles and vessels need to be cleaned prior to use.

Table 1-7 Standard Concentrations

EPA Method 1631		
Standard Concentration	**200 ng/L**	**Blank 3% HCl**
0.5 ng/L	0.1 mL	39.9 mL
1.0 ng/L	0.2 mL	39.8 mL
5.0 ng/L	1.0 mL	39.0 mL
25.0 ng/L	5.0 mL	35.0 mL
50.0 ng/L	10.0 mL	30.0 mL
100.0 ng/L	20.0 mL	20.0 mL
EPA Method 245.7		
Standard Concentration	**200 ng/L**	**Blank 3% HCl**
5.0 ng/L	1.0 mL	39.0 mL
10.0 ng/L	2.0 mL	38.0 mL
25.0 ng/L	5.0 mL	35.0 mL
50.0 ng/L	10.0 mL	30.0 mL
100.0 ng/L	20.0 mL	20.0 mL

1.14 Preparedness Statement

Failure to meet one or more of the pre-installation requirements may prevent your instrument from operating properly. During installation, if an installation engineer determines that one or more of the pre-installation requirements have not be met, the company reserves the right to delay installation until all requirements are satisfactorily met. Any time lost during installation, caused by failure to meet the pre-installation requirements, will be billed to your account. If you have any questions regarding these requirements, please contact Teledyne Leeman Labs using Section 1.15 "Contact Information".

1.15 Contact Information

Teledyne Leeman Labs encourages you to contact us for any questions or concerns regarding your installation, or to order accessories and consumables. Please use the appropriate means of contact listed below for the most efficient service.

1.15.1 Teledyne Leeman Labs

110 Lowell Road

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Visit our website at www.teledyneleemanlabs.com for a complete list of US and International Sales Representatives.

1.15.3 Technical Support

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1.15.4 Replacement Parts and Consumables

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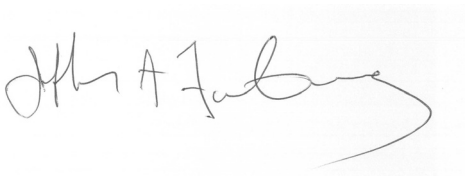
E-mail: service@teledyne.com

1.16 Your Installation is Our Highest Priority

Streamlining the installation of your new QuickTrace® M-8000 CVAF mercury analyzer system is our highest priority! Teledyne Leeman Labs would like to thank you in advance for the preparation of your laboratory. Your attention to detail will assist in the installation of your instrument. If you have any questions or concerns we encourage you to contact us directly:



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