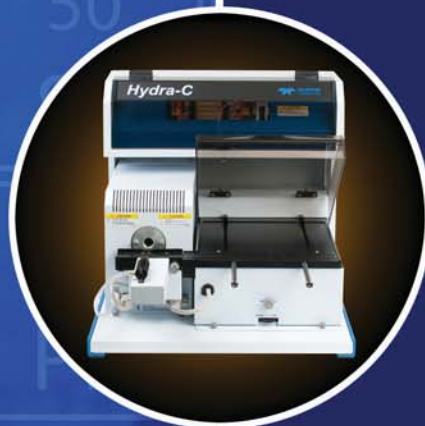


Hydra II_{AA} Mercury Analyzer



28 Ni	29 Cu	30 Zn	31 Ga	32 Ge
46 Pd	47 Ag	48 Cd	49 In	50 Sn
78 Pt	79 Au	80 Hg	81 Tl	82 Pb
110 Ds	111 Uuu	112 Uab	113 Uut	114 Uuq
64 Gd	65 Tb	66 Dy	67 Ho	68 Er
96 Cm	97 Bk	98 Cf	99 Es	100 Fm

Don't Settle for just any Mercury Analyzer...

...Go with the Experts in Mercury Analysis

...Go with Teledyne Leeman Labs

**Teledyne Leeman Labs
offers both the technical
expertise and products
needed to meet your most
demanding mercury
analysis challenges**

When the concentration of mercury needs to be accurately measured, laboratories all over the world turn to Teledyne Leeman Labs for high performance solutions to their Hg analysis challenges.

At Teledyne Leeman Labs, the development of instrumentation for the detection of mercury is one of our highest priorities. Since the 1980's, when we developed the first fully automated mercury analyzer, we have focused on advancing methodology as well as detection technology for mercury. As a result, we have both the technical expertise and the products needed to meet your most demanding mercury analysis needs.

Now in their fourth generation, our current mercury products cover a broad range of techniques including cold vapor atomic absorption (CVAA), cold vapor atomic fluorescence (CVAf), Direct Solids Analysis and Hg emissions monitoring. All of our Hg products have been designed to comply with EPA and European methods for the determination of mercury in a broad range of sample matrices.

Introducing the Hydra Series

The Hydra Series is a family of fully automated instruments that address the analysis of liquids, solids and gases.

The product line includes: **Hydra II_{AA}**, **Hydra AF**, **Hydra-C** and **Hydra-C_{Appendix K}**

- **Hydra II_{AA} – Where Performance and Productivity Meet**

Hydra II_{AA} is a fully automated mercury analyzer that operates on the principle of cold vapor atomic absorption. This instrument is capable of 1 ppt detection of mercury and includes methods for an extremely wide range of sample matrices.

- **Hydra AF – for sub ppt Hg Measurements**

Hydra AF is a fully automated mercury analyzer that operates on the principal of cold vapor atomic fluorescence. Atomic fluorescence provides superior detection limits and dynamic range when compared with CVAA. This system is available in two configurations. The first is the core Hydra AF system which provides a detection limit for mercury of approximately 0.2 ppt and a dynamic range that extends into the high ppb realm. This system is also available as the Hydra AF_{Gold Plus} for companies that require even lower limits of detection. The Hydra AF_{Gold Plus} includes a gold amalgamation system to preconcentrate mercury and yields a limit of detection well below 0.05 ppt.

- **Hydra-C – Hg Analysis Made Simple**

Hydra-C is a fully automated mercury analyzer that permits the direct analysis of solid or liquid samples without the need for acid digestion. Hydra-C is designed to address the needs of analysts who want to use EPA's method 7473 or that simply want to determine mercury without prior sample digestion.

- **Hydra-C_{Appendix K}** is designed to measure Hg emission from coal-fired power plants as well as cement kilns and incinerators. It is compliant with CFR40, Part 75, Appendix K (Sorbent Trap Analysis Method).

**Hydra II_{AA} is capable of running samples
in triplicate in about 1 minute delivering a
substantial improvement in productivity
and in cost per analysis.**



dental
environment
water
fish
soils

The *Hydra* Series at a Glance

				
Instrument	<i>Hydra II_{AA}</i>	<i>Hydra AF</i>	<i>Hydra AF_{Gold Plus}</i>	<i>Hydra-C</i>
Usage	- Primarily for liquid samples - Determine Hg from low ppt to ppm levels	- Primarily for liquid samples - Determine Hg from sub ppt to high ppb levels	- Primarily for liquid samples - Determine Hg from 0.05 ppt to high ppb levels	- Primarily for solid samples - Determine Hg in various matrices without sample preparation
Detection Limit	1 ppt	0.2 ppt	Less than 0.05 ppt	0.005 ng
Dynamic Range	1 ppt - 1 ppm	0.0002 - 250 ppb	0.00005 - 250 ppb	0.005 - 1000 ng (to 20,000 ng with high range option)
Scientific Method	Chemical Reduction followed by Atomic Absorption	Chemical Reduction followed by Atomic Fluorescence		Thermal decomposition followed by amalgamation and atomic absorption
Gas/Liquid Separation	Leeman-designed gas-liquid separator provides exceptional sensitivity and recoveries, even for samples that foam during the reduction step			N.A.
Software Interface	Hydra's software provides ease-of-use and compatibility with other MS-Windows® applications including Word, Excel, and Access. It also permits custom report generation and data manipulation, as well as connectivity to most LIMS systems			
Features	- Dual beam detection system 30cm optical cell provides exceptional sensitivity and stability, 1 cm optical cell provides access to high concentration Hg measurements - High sample throughput for improved productivity and low cost of analysis - Easy access sample introduction system - Continuous flow-through rinse minimizes sample carryover, even at ultra-low levels - High concentration protection system - High capacity autosampler - Upgradable to direct solid analysis (Hydra-C)	- Proprietary fluorescence optical cell - High sample throughput for improved productivity and low cost of analysis - Counter-flow Nafion® membrane dryer minimizes water vapor-based scatter in the fluorescence cell - Continuous flow-through rinse minimizes sample carryover, even at ultra-low levels - High concentration protection system	- Proprietary fluorescence optical cell - High sample throughput for improved productivity and low cost of analysis - Counter-flow Nafion® membrane dryer minimizes water vapor-based scatter in the fluorescence cell - Continuous flow-through rinse minimizes sample carryover, even at ultra-low levels - High concentration protection system - Dual fluorescence detectors provide unparalleled working range from sub ppt to high ppb - Ultra trace analysis mode with dual gold amalgamation traps for improved performance at sub-part-per-trillion levels	- Analysis in 5 minutes - Easy access maintenance - Green chemistry/ no chemicals needed & no hazardous waste produced - Applicable to both solid & liquid samples
EPA/ASTM Methods	245.1 245.5 245.6 7470A 7471B	245.7	245.7 1631	EPA 7473 ASTM D-6722-01
European Standards	EN-1483 EN-13806	EN-13506	EN-13506 EN-12338	
Maintenance	<i>On-line audio visual help</i> guides users through routine operation and maintenance. <i>Predictive Maintenance</i> ensures that Hydra series instruments consistently operate at peak performance.			
Service	A variety of post warranty service options are available to Hydra Series operators. Please inquire for additional details.			
Windows is a registered trademark of Microsoft Nafion is a registered trademark of E.I. DuPont				

Hydra II_{AA}

Where **PERFORMANCE** and **PRODUCTIVITY** Meet

ACHIEVE LOWER REPORTING LIMITS

- 1 ppt detection limit

PERFORM FEWER DILUTIONS

- Dynamic range from ppt to ppm

ANALYZE DIFFICULT/FOAMY SAMPLES

- 3rd generation gas/liquid separator

SATISFY QCs WITH EASE

- Excellent long-term stability

ELIMINATE SAMPLE PREPARATION

- Direct Analysis Option

HIGH CAPACITY AUTOSAMPLER

- Up to 270 samples
- Large CCV & CCB reservoirs
- Smart rinse to minimize sample cycle time

ADVANCED CONTAMINATION CONTROL

- Powerful over-range protection system
- Flow-through rinse
- Interchangeable sample introduction systems

UNPARALLELED SUPPORT

- Built-in maintenance schedules
- On-line audio/visual help
- Overnight parts availability
- Extensive field service network



Don't Settle for Just any Mercury Analyzer... ...Go with a *Hydra II_{AA}*

WHERE PERFORMANCE AND PRODUCTIVITY MEET

Hydra II_{AA} delivers both the performance needed to meet today's tightening regulatory demands and the productivity required for laboratories to operate efficiently. Its ppt detection limit, exceptional stability and powerful over-range protection easily satisfy the most stringent QC's, while its high capacity autosampler permits long periods of unattended operation. *And unlike any other mercury analyzer, Hydra II_{AA} can easily be converted to a direct solids analysis system should the need ever arise.*

COLD VAPOR AA DETECTION – FOR EXCEPTIONAL PERFORMANCE

The most widely used technique for mercury analysis remains cold vapor atomic absorption (CVAAS). This is due to its inherent sensitivity and selectivity as well as the widespread availability of robust analytical methods associated with the technique.

Innovative Dual Beam, Multi-Cell Optical Design

Hydra II_{AA} takes CVAAS to the next level with its innovative dual beam, Multi-Cell Optical design providing an unparalleled dynamic measurement range from 1ppt to more than 1ppm.



AUTOMATION - FOR ENHANCED PRODUCTIVITY

High Capacity Autosampler

Hydra II_{AA}'s high speed autosampler holds up to 270 samples for exceptional productivity and supports sample tubes ranging in size from 8 to 50 ml. The additional QC volumes required to support large sample runs are addressed with extra large reservoirs for your CCV and CCB solutions.



Sophisticated Over – Range Protection

Samples high in Hg can cripple some instruments but not the Hydra II_{AA}. At the first appearance of an over-range condition, Hydra II_{AA}'s sample probe automatically moves to rinse and increases gas flow to clean the system before unwanted contamination occurs.

Flow-Through Rinse

Contaminated solution is quickly removed from the sample tip minimizing carryover and providing exceptional baseline stability.

HIGH SAMPLE THROUGHPUT – FOR ENHANCED PRODUCTIVITY

Hydra II_{AA} is capable of running samples in triplicate in about 1 minute delivering a substantial improvement in productivity and in cost per analysis.

ADVANCED GAS/LIQUID SEPARATOR – FOR ANALYTICAL RELIABILITY

Difficult and/or foaming samples are no problem for Hydra II_{AA}; its integrated gas/liquid separator delivers exceptional recoveries, even in poorly digested samples. It is particularly effective at handling foaming samples and has been designed to prevent downstream contamination. This high performance gas/liquid separator is one of the core reasons that the Hydra Series consistently delivers superior results.



COMPLIANCE WITH U.S. EPA AND EUROPEAN METHODS

Hydra II_{AA} is compliant with EPA methods 245.1, 245.5, 245.6, 7470a, 7470b, EN-1483, and EN-13806

HYDRA II SOFTWARE

Designed for ease-of-use and productivity, Hydra II_{AA}'s software automates all aspects of instrument operation including gas and liquid flows, autosampler function and over-range protection. It also facilitates data storage and retrieval with powerful tools to recalculate data, download sample IDs and upload data to LIMS systems.

ELIMINATE SAMPLE PREP – TRANSITION TO DIRECT SOLIDS ANALYSIS ...WHEN THE TIME IS RIGHT FOR YOU !

Certain samples such as soils, sludge, foods, coal, tissues and heavy oils are amenable to direct analysis in their native form with no sample preparation. The combustion technique described in EPA Method 7473 and implemented in the Teledyne Leeman Labs Hydra-C, is now available as an option for the Hydra II_{AA}. This option allows you to purchase the liquids analysis version of the Hydra II_{AA} today so you can run your current solution samples and then purchase the Direct Solids Analysis Option as your needs evolve.

The conversion process is fast and easy – simply swap the liquids autosampler base for the solids autosampler base, launch Hydra II's solids analysis software and you're up and running. Not only does this approach eliminate sample prep for many of your samples, but it will save you thousands of dollars when compared to the cost of purchasing individual instruments.



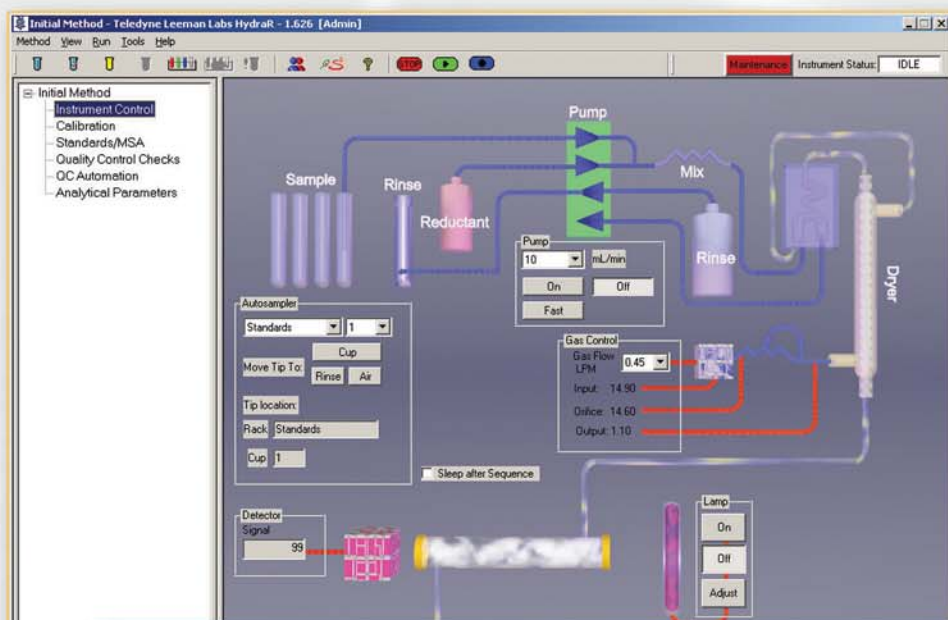
For additional information on our Mercury Analysis products visit:
www.leemanlabs.com/products/mercury/index.asp

Powerful and Intuitive Mercury Analysis Software

Incorporating user requested features, as well as time tested Leeman Labs functionality; Hydra II's software brings unprecedented performance and productivity to Hg analysis. Hydra II's software automates the analytical process from Method Development to Final Report Generation – all within a user-friendly graphical interface. Context sensitive help is provided in the software including scheduled maintenance with audio/visual tutorials. Advanced functionality such as automated importation of sample sequences, recalculation of data and exportation to LIMS is provided.

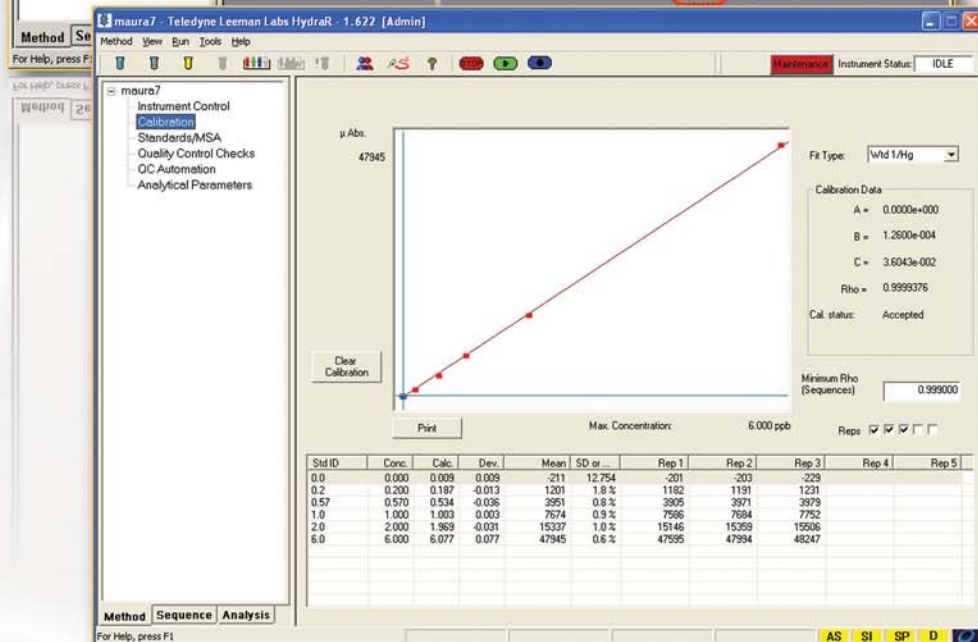
INSTRUMENT CONTROL

Hydra II's software provides complete computer control of all instrument parameters for unattended operation. All parameters are saved and recalled when the method is opened.



CALIBRATION

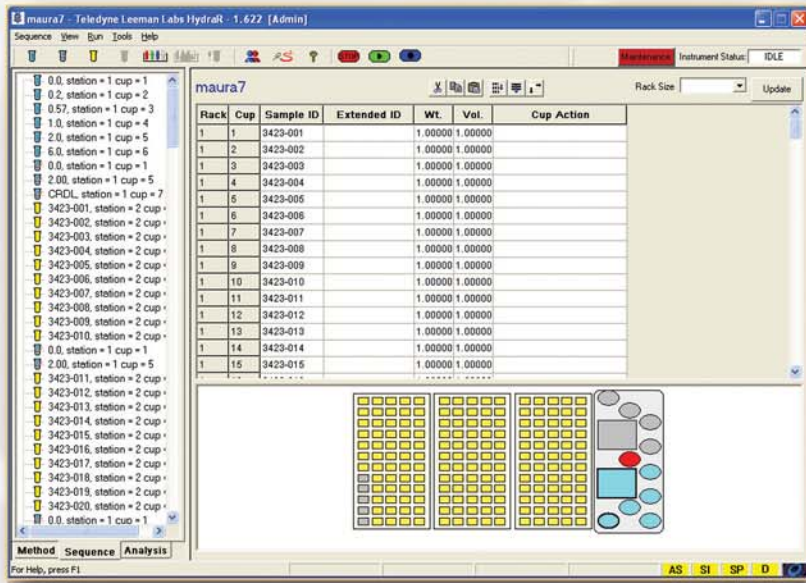
Calibration curves are displayed with calculated concentrations, deviations, and precision values for each standard. Mean intensity and relative standard deviations are calculated based on selected replicate readings. A variety of curve fits are provided including EPA's calibration factor algorithm.



QUALITY CONTROL AUTOMATION

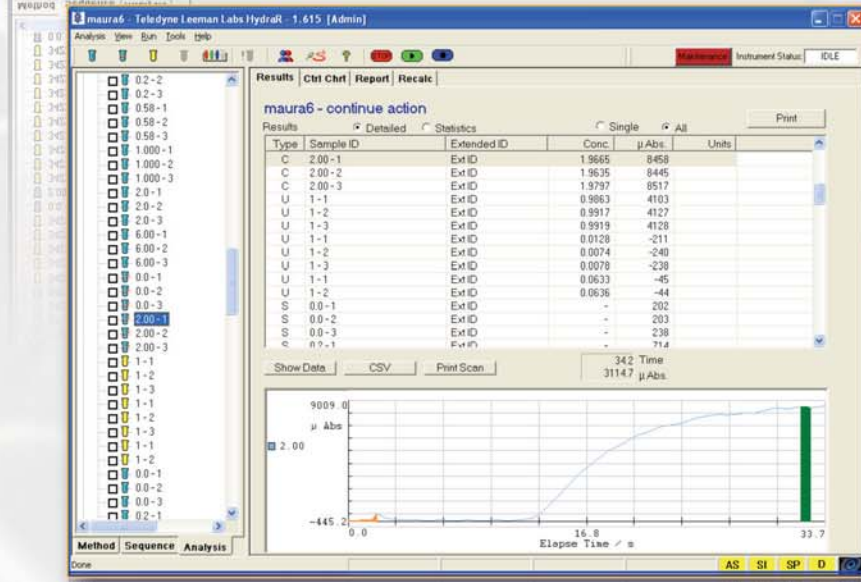
Quality control checks are programmed within the method and may be assigned unique actions upon failure.

Keeping your Instrument Running at Optimum Performance



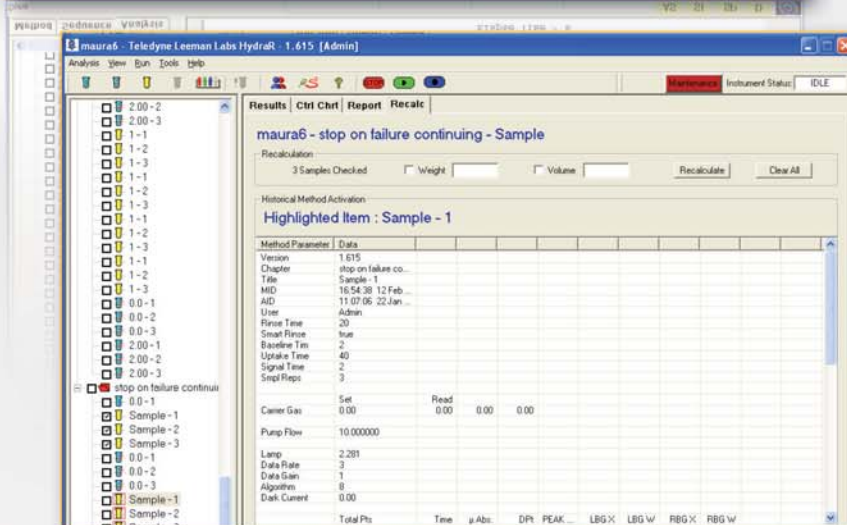
AUTOMATED SEQUENCES

Automated sequences can be generated quickly. By simply typing or downloading the sample info into the sample table, all calibration standards and quality control checks are stored with the method and inserted automatically.



RESULTS

Real-time signals are displayed for each sample or standard measured. Signals are integrated for the designated period and numerical values are displayed and then saved. The software collects multiple replicates for a single sampling and records raw signal for each time slice. Historical graphs may be redisplayed or overlaid.



RECALCULATION

For every analysis, Hydra II's Software keeps a detailed record of the analysis parameters and operator ID. Results are never deleted, but tools are provided to recalculate results. When results are recalculated, the old record remains and a new record is appended and identified as recalculated data.

REPORT GENERATION

Hydra II's Software provides tools to create concise reports. Select the records and the sample parameters you want to include. Choose to output the report to a printer or export to LIMS.

Become a Teledyne Leeman Labs Customer... ...you'll find yourself in good company.

WITH TELEDYNE LEEMAN LABS YOU GET MORE THAN JUST A SPECTROMETER

As you know, beyond the initial purchase of any instrument lies the true cost of ownership, and that's where the Hydra Series shines. Why? Because Teledyne Leeman Labs has built these instruments to last.

Performance Guarantee

Like you, we expect our instruments to perform reliably, that's why we offer a unique comprehensive performance guarantee. Teledyne Leeman Labs warrants the Hydra Mercury Analyzers to:

1. Meet or exceed all functional and QC requirements of the EPA methods for which they were designed.
2. Provide greater than 95% up-time.
3. Operate with fewer QC failures than competitive instruments.

After Sales Support

Telephone Support: Instrument malfunctions never occur at opportune times and your first line of defense is knowledgeable telephone technical assistance. A technical support specialist can provide you with information on instrument operation, trouble-shooting, applications, maintenance and help you with basic repair. Most problems can be resolved over the phone. Our toll free hot line is available to you from 8:30am until 6:30 P.M. EST. During normal business hours, telephone assistance is provided by technicians and support chemists with specialized training in Hg Analysis and emergency repair. Every call that comes into the Customer Support Center is entered into a computerized database. After basic information has been entered, your call is routed to the appropriate Customer Relationship Manager (CRM) team leader and tracked internally until resolved.

On Site Support

On the rare occasion of instrument failure, our field service group is ready to provide the on-site assistance you need.

Service Agreements

A variety of optional service agreements are available depending on your requirements, including:

Full Maintenance Agreement: A set rate comprehensive package that allows the user to budget for each instrument under the agreement.

Depot Maintenance Agreement: Includes all replacement parts and unlimited telephone technical support. It also includes our depot repair service that allows the user to return the unit to our factory repair center and ensures a guaranteed turnaround time of 5 days or less (from receipt of instrument).

Limited Maintenance Agreement: Allows the user to budget for costs associated with replacement parts and technical support. This agreement is designed for the user who performs their own maintenance, requires a fixed cost for replacement parts and may need extended access to our Technical Support Group to help diagnose a problem.



REAGENTS

Teledyne Leeman Labs prepares and validates standards and reagents for both sample digestion and analysis. For mercury analysis, reagent purity is critical to controlling contamination and obtaining accurate results.

With Teledyne Leeman Labs you have an analytical partner, ready to provide support for the chemistry, as well as the mechanics, of the methods.

YOU'RE IN GOOD COMPANY

Are you getting the impression that we stand solidly behind our Hydra Series? You're right. Our confidence comes from knowing that we haven't cut corners in the design, manufacture or testing of our products. We build our mercury analyzers to the most exacting specifications. We build them to do the job, and to do it right. Perhaps that's why we've become the industry leader in mercury analysis. It's a reputation that we've worked hard to earn, and that we work even harder to maintain.

So what kind of companies and organizations rely on analytical instruments from Teledyne Leeman Labs? Our customers come from both the public and private sector. They are leaders in industry, government, and academia. Add to the list hundreds of cities, municipalities, and institutions of higher learning and you start to get a sense of the family of Teledyne Leeman Labs customers, and the impact that they have on our society.

We continue to invest heavily in research and development and look forward to providing our customers with additional products and technology advances in the years ahead.



HYDRA'S SERVICE AND SUPPORT

Specifications

Principle of operation	Atomic Absorption 253.65 nm
Instrument control	External PC Controller with Hydra II _{AA} Software
Detection limit	1 ppt
Dynamic range	1 ppt – 1 ppm
Short-term precision	0.2 – 0.5% @ 0.5 ppb
Long-term precision	< 1% @ 0.5 ppb
Average analysis time	1 sample/minute

Gases required	Argon (nitrogen or air can be substituted) 15 psi
Power required	110/220 Vac, 50/60 Hz 100W

Dimensions	19.5"w x 19"d x 18.5"h (496w x 483d x 470h mm)
Weight	40.6 lbs

Operating conditions

Temperature	15 – 30°C (60-86°F)
Relative humidity	Maximum 80% non-condensing



TELEDYNE LEEMAN LABS

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