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iCAP PRO Series ICP-OES

Perform like a PRO
Simplicity, robustness and speed

ThermoFisher
SCIENTIFIC

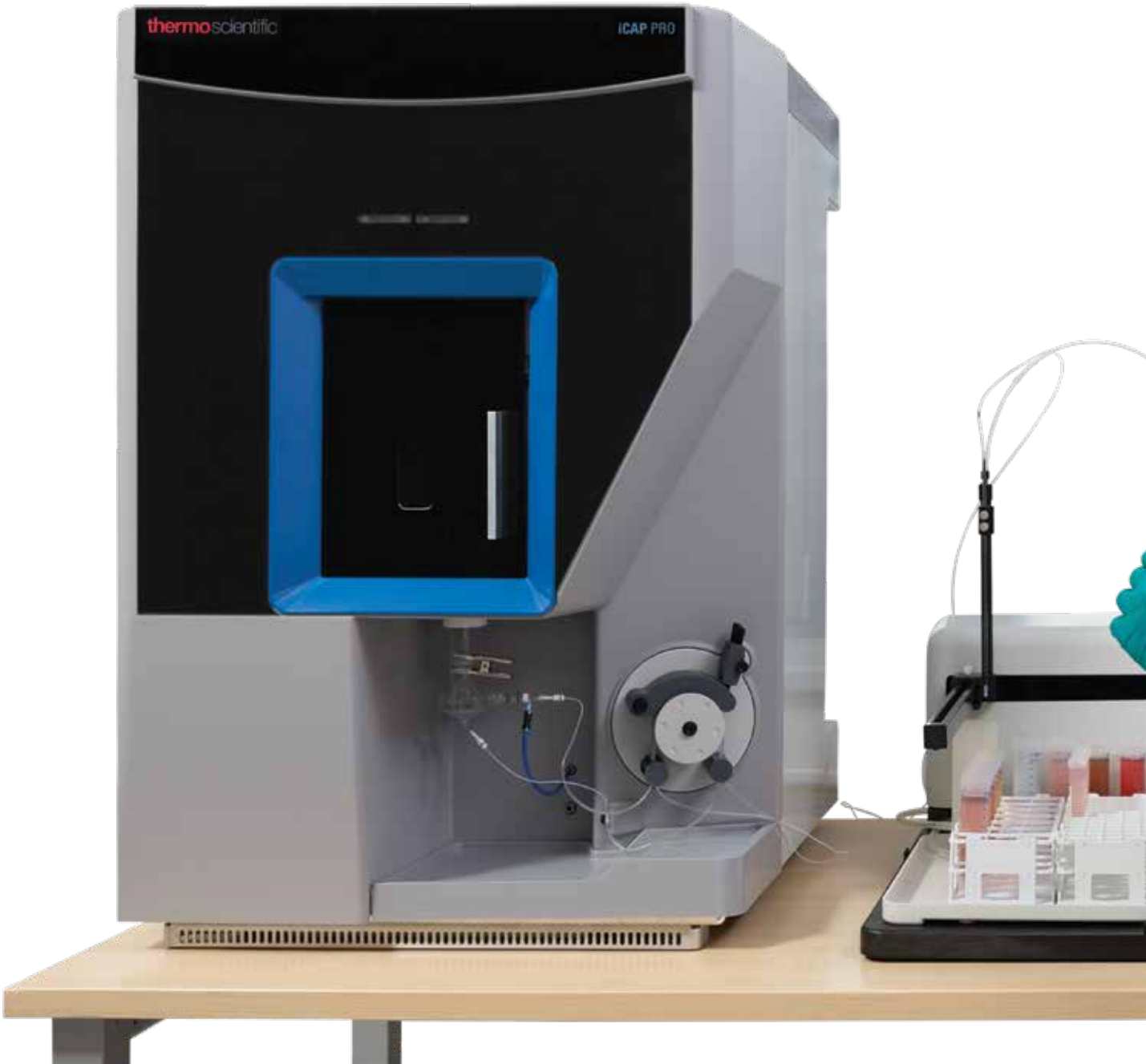
The iCAP PRO Series ICP-OES

Analyze even the most challenging sample matrices

The Thermo Scientific™ iCAP™ PRO Series ICP-OES combines powerful multi-element capability with flexibility so your lab is ready for any challenge.

Produce consistent, reliable data quickly and easily. Experience enhanced sample throughput, matrix tolerance and flexibility to produce results you can trust.

Achieve precise results first time, every time with the innovative Get Ready feature. This automated technology sets up the instrument for you and checks performance. Manage instrument processes using a logical dashboard interface. Trust in ICP-OES technology driven by Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution™ (ISDS) Software.



Obtain measurements fast

- Advanced, high-speed charge injection device detection technology produces results in the fastest possible time
- Consistent, predictable measurement times
- A small optical tank ensures fast start up time and reduced purge gas requirements. With start up times of just 30 minutes from power off and 5 minutes from standby (model dependent)
- Detect from % range to sub ppb detection limits with a high dynamic range detector
- Application-specific sample introduction systems reduce method development time

Experience more simplicity without compromising on detail

Easy to use Qtegra ISDS Software delivers both flexibility and simplicity.

- Easy to use for entry-level technicians
- Flexibility to fulfil demanding projects
- Long-term stability through gas MFCs and temperature control
- Full frame view immediately after measurement
- Intelligent monitoring of analytes with Qtegra ISDS Software
- Generate both predefined and custom reports on demand
- Plasma optimization tool with tune sets and auto-tune for automated method development

New features enhance user experience

- Plasma TV allows you to monitor the plasma during sample analysis
- Smaller design to fit easily in any laboratory
- Know at a glance whether the instrument is in use or on standby with status LEDs
- Beam blocker to maximize the lifetime of optical components

Fast, powerful performance. Easy-to-use technology and software

Advanced technology combines optimal performance with flexibility. Exceed the analysis requirements of any substance from drinking water to crude oil. A simple user interface empowers intuitive operation by analysts with any level of experience. An ideal instrument for new ICP-OES users, the iCAP PRO Series ICP-OES is equally suited to experienced operators conducting high performance analysis.

Achieve effective interference separation with high-resolution optics

Simple analysis of complex line-rich samples is achieved without elaborate deconvolution, thanks to a resolution of <7 pm at 200 nm. Use of fewer optical surfaces minimizes reflective losses and maximizes light transmission from plasma to detector for superior detection limits. Advanced automatic stabilization dramatically reduces the instrument's warm-up time without impacting analysis times.

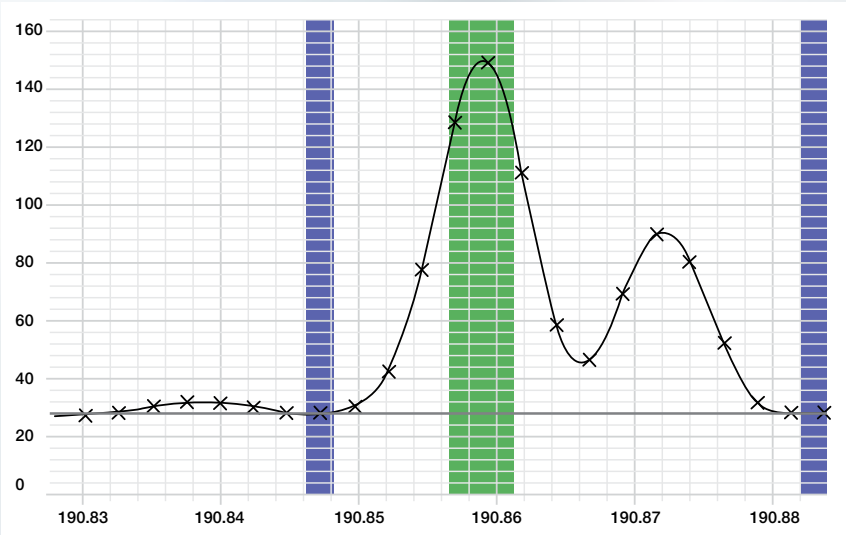
Achieve superior signal detection and a working dynamic range of 9 orders of magnitude. The iCAP PRO Series ICP-OES features a unique combination of double pass optics and an advanced CID detector.

Reduce the need for re-analysis of over-range samples

High speed random access CID allows complete simultaneous access to the spectrum between 167.021 to 852.145 nm, regardless of concentration.

Consistent results at any wavelength

- Large photo active area to cover the complete wavelength range
- High-speed electronics and readout to ensure consistent measurement times
- Random-access integration to negative blooming and pixel saturation



Thallium doublet at 190 nm

Optimized vertical torch for ultimate robustness

Both duo and radial view configurations of the instruments feature vertical torch orientation. When combined with the unique plasma interface, a new level of robustness is achieved.

Adjustable radial viewing height on both duo and radial view instruments, enabled by the vertical plasma interface.

Short warm-up time of just 30 minutes from switching the power on and just 5 minutes from standby (model dependent).

Increase robustness further with dedicated accessories and analyze the most challenging samples, such as saturated brine solutions.

Laboratory optimization

Rapid instrument start up and fast analysis times increase productivity

Routine analysis is simplified by automated method development features within the Qtegra ISDS Software. The capabilities of the iCAP PRO Series ICP-OES are further enhanced by dedicated accessories controlled directly by Qtegra ISDS Software plug-ins. These allow for method development and analysis to be carried out via one software package.

Discreet sampling and auto-dilution

Analysis time and cost are both reduced by auto-dilution which eliminates the need for additional post-run analysis. Samples exceeding the calibrated range or showing poor internal standard recoveries are automatically diluted.

Unique Qtegra ISDS Software monitors data and makes decisions on QCs and calibrations used to perform dilutions with the auto-dilution system. The Qtegra ISDS Software can also use the auto-dilution system to generate calibration standards from a single stock solution.

Hydride generation

Gain true confidence in detection of hydride forming elements at sub ppb concentration. The increased detection capability is achieved using:

- A basic hydride kit to simultaneously determine hydride forming and non-hydride forming elements
- An integrated hydride generation accessory enabling maximum detection of hydride forming elements

Easy to use

Trust in consistent performance and fast analysis with simple workflows that minimize the number of steps required to perform each task. Rely on the fully-automated Get Ready function to prepare the instrument from standby to ready.

Work flow driven software - Qtegra ISDS Software

Data streams are flexible, fully compatible with LIMS and can be exported in several formats.

Create a LabBook in five clicks and automatically start an intelligent workflow with fully integrated QA/QC protocol.

Integration of peripherals

Unique plugin architecture of the Qtegra ISDS Software enables users to connect to multiple industry standard sample preparation devices and autosamplers.

Common platform

The Qtegra ISDS Software supports various analytical devices. Adoption of new instrumentation and cross-training of analysts becomes quicker and easier. Enjoy increased flexibility in multi-technique laboratories.

Automated reports and calculations

Remove the need to proactively monitor data. Analytical determinations take place with minimal analyst interaction using the iCAP PRO Series ICP-OES and Qtegra ISDS Software.

Compliance

Full traceability of results and workflow to support compliance with CFR 21 Part 11. Dedicated validation solutions ensure fast instrument commissioning.

Advanced technology delivering the ultimate ICP-OES performance

Sample introduction

The iCAP PRO ICP-OES systems are fitted with either a three- or four-channel high precision peristaltic pump. Both allow for the addition of an online internal standard or the use of hydride generation accessories.

A concentric glass nebulizer and glass cyclonic spray chamber are supplied as standard with the iCAP PRO ICP-OES instruments. These are ideal for the analysis of aqueous samples with up to 3% total dissolved solids.

A range of optional nebulizers and spray chambers for more diverse applications are available. These enable analysis of samples such as those containing hydrofluoric acid, organic solvents or with a total dissolved solids content of more than 3%.

For samples with a high total dissolved solids content, the sheath gas adaptor can be used on both the radial and duo systems of the iCAP PRO Series ICP-OES. This accessory offers ultimate robustness for the analysis of samples containing very high dissolved solids, such as saturated brine solutions.

Torch

The iCAP PRO Series ICP-OES instruments are supplied with a semi-demountable Enhanced Matrix Tolerance quartz torch. The duo torch is optimized to reduce easily ionized element interferences.

A ceramic semi-demountable torch is available for all instruments and is supplied as standard with the dedicated radial Thermo Scientific™ iCAP™ PRO XP ICP-OES and iCAP™ PRO XPS ICP-OES systems. The durable ceramic torch body ensures maximum torch lifetime is achieved with the high-matrix samples that are typically analyzed with radial systems.

Both torch types are designed for simplicity with a quick release pre-aligned mounting block, which requires no tools for removal. The torch mount incorporates automatic gas connections.

A range of center tubes for different applications is available, including a ceramic center tube for use with samples containing hydrofluoric acid.

Gas control

All systems incorporate a series of computer-controlled mass flow controllers (MFC) to ensure precise and stable delivery of plasma gas to the torch and carrier gas to the nebulizer.

An additional MFC is fitted to the iCAP PRO XP ICP-OES and iCAP PRO XPS ICP-OES with the ability to deliver the following gases:

- Air and oxygen for the removal of interferences when analyzing organic samples
- Argon for use with the sheath gas accessory

Radio frequency generator and plasma

The solid state, free running 27.12 MHz RF generator, induces plasma formation via the load coil. The plasma system is contained in an EMC enclosure with viewing window, plasma TV (available on the iCAP PRO XP ICP-OES and iCAP PRO XPS ICP-OES) and fast access, fully interlocked door.

Optics

The new high-energy echelle polychromator with a “side-by-side” arrangement of the prism and grating minimize the optical surfaces, ensuring maximum light throughput to the detector to achieve maximum sensitivity. This compact design also reduces pure gas requirements keeping the operating cost of the instrument at a minimum. The unique optical design ensures high image quality with a resolution of 7 pm at 200 nm and very low stray light performance.

The lower wavelength limit of 167.021 nm allows the determination of aluminum at the most sensitive wavelength of 167.079 nm and extends to 852.145 nm for the option of determining potassium at 766.490 nm and sodium at 818.326 nm.

The intelligent Full Range (iFR) analysis mode can measure wavelengths between 167.021 to 852.145 nm in one simultaneous measurement, significantly reducing analysis times. The iFR mode achieves excellent sensitivity without the need for multiple measurements from different slits to cover the spectrum.

The enhanced Ultra Violet (eUV) analysis mode can be used to further enhance sensitivity for elements that fall in the wavelength range of 167.021 to 240.063 nm, such as mercury, sulfur, lead and cadmium. The eUV analysis mode is available on the iCAP PRO XP ICP-OES and the iCAP PRO XPS ICP-OES.

Charge Injection Device Detector

The iCAP PRO Series ICP-OES uses the latest high speed Charge Injection Device (CID) detector technology, the new CID821. This unique technology consists of an array of over 4 million individually addressable pixels to ensure continuous wavelength coverage. The high read-out speed of the CID821 ensures consistent read-out times regardless of the number of wavelengths being measured.

The unique nondestructive read-out (NDRO) capability only available with a CID detector, allows measurement of the signal level on any pixel at any point in the exposure. This has the advantage of achieving optimum signal to noise for any wavelength anywhere on the detector, while maintaining wide dynamic range for all signals.

Agricultural screening

Enjoy maximum sample throughput during screening for nutrients and toxic elements. The Thermo Scientific™ iCAP™ PRO XPS Radial ICP-OES provides robust sample introduction and plasma generation. Analysis of high matrix samples, like soil extracts, has never been easier.

Environmental analysis

Accurately quantify the elemental composition of a wide range of environmental samples. Sample introduction and plasma generation efficiently process the matrix of challenging, high-solid samples like sludge. Powerful detection capabilities of the Thermo Scientific™ iCAP™ PRO XP Duo ICP-OES enable quantification of ppb concentrations for analysis of drinking water.

Food production and safety

Monitor key toxic elements during food production with the dual view system. Analyze samples to the standards required by a range of food safety regulations thanks to low detection limits achieved using the axial view. The instrument's radial view extends its linear range, enabling easy analysis of higher concentrations such as those required for nutritional labelling. Electronic signatures and workflow ensure all analytical results are fully traceable.

Pharmaceutical and nutraceutical compliance

Qualified instrumentation complies with current and future legislation, including the new General Chapters and a Supplemental General Chapter of the United States Pharmacopeia:

<232> Elemental Impurities – Limits
<233> Elemental Impurities – Procedure
<2232> Elemental Contaminants in Dietary Supplements

Qtegra ISDS Software provides full traceability of results and workflow. It incorporates features to support compliance with CFR 21 Part 11, including electronic signatures and audit trails. Dedicated validation solutions ensure fast instrument commissioning in the laboratory.

Chemical QA and QC

Increase productivity in your laboratory thanks to superior stability of the iCAP PRO XPS ICP-OES. Have complete confidence in your results with dedicated sample introduction for different sample types. Such a function minimizes drift associated with sample introduction that is often caused by matrix deposition. Analyse trace contaminants in high purity chemicals and measure high-concentration matrix elements using the wide dynamic range of the CID detector. Qtegra ISDS software has intelligent QC functions to ensure highest quality data standards are met.

Petrochemical

Easily analyze samples ranging from crude oil to volatiles like petrol thanks to the robust sample introduction and dedicated radial systems. An automated plasma optimization routine within the Qtegra ISDS software provides optimum analysis conditions for each sample type. A dedicated oil auto-sampler homogenizes samples prior to analysis. Combine this with the iCAP PRO XP ICP-OES, and the demanding requirements of high-throughput applications like analysis of in-service oil are exceeded. Analyze elements at single figure ppb concentrations in volatile organic samples thanks to the addition of a Peltier cooled spray chamber.

Mining

Gain absolute confidence in your results wherever you are with the field-proven iCAP PRO XP ICP-OES. A five minute start up time and low gas consumption make it ideal for remote sites. A robust, reliable design maximizes uptime whilst minimizing user maintenance. Dedicated accessories such as a Ceramic D-Torch coupled with a high-solids sample introduction kit allow simple analysis of high-matrix samples. Easy-to-use Qtegra ISDS software enables you to create a LabBook in five clicks and automatically start a simple, intelligent workflow. Unattended analysis of samples is possible over extended periods of time with high volume autosamplers.

Metals and materials

High-resolution echelle optics and the CID detector are ideal for analysis of metals and materials where detection of trace amounts of an element in complex matrices is required. To minimize interference, the radial plasma instrument has robust matrix-handling abilities. Repeat analysis of expensive samples is virtually eliminated thanks to auto-dilution, monitored uptake and wash reduce carry-over.

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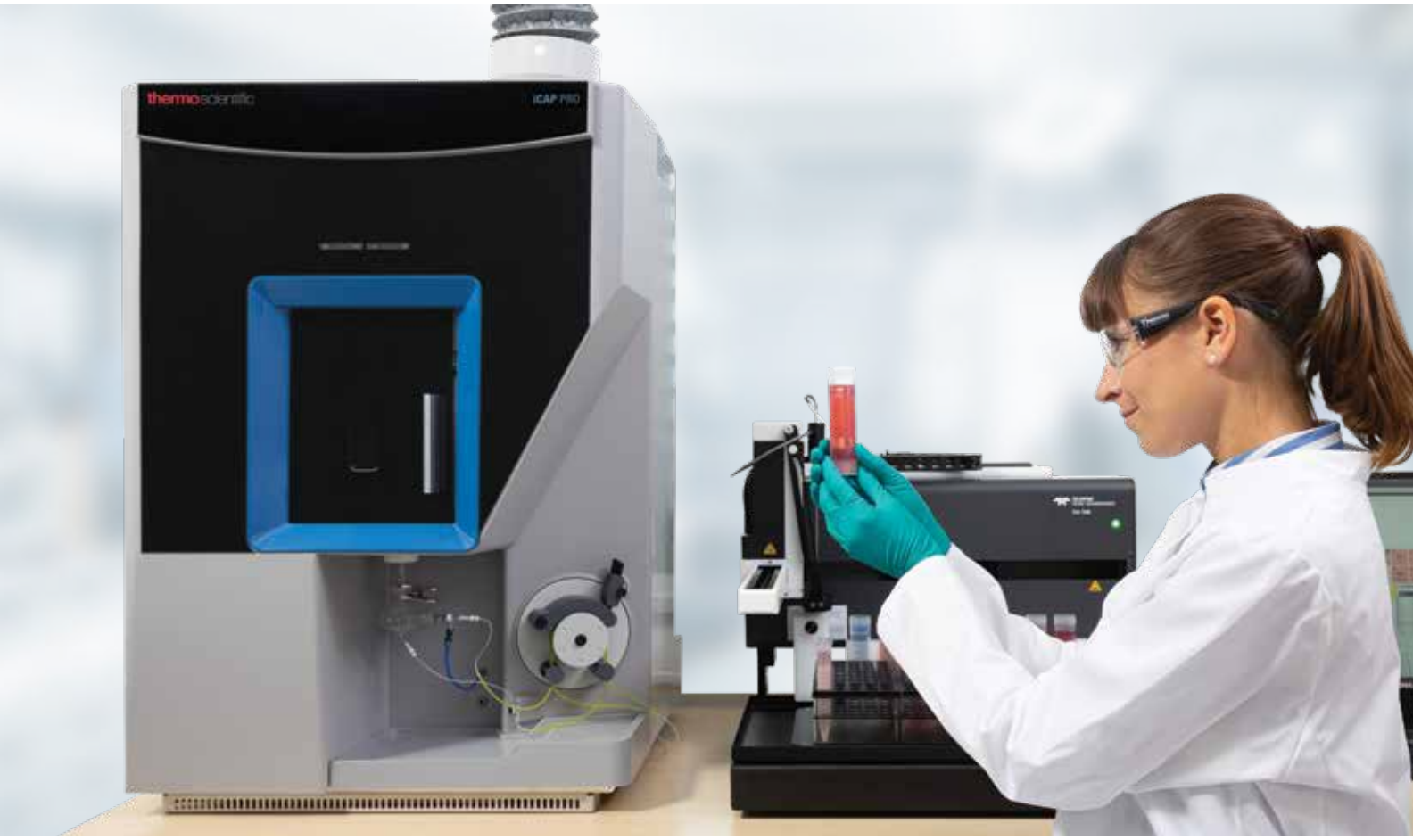

iCAP PRO ICP-OES and iCAP PRO X ICP-OES

Deliver robust, uncomplicated trace elemental analysis for your laboratory with the Thermo Scientific iCAP PRO ICP-OES and Thermo Scientific iCAP PRO X ICP-OES systems. These systems offer fast start-up, easy-to-use software and incredible speed, providing multi-element detection technology far superior to that of single-element AAS.

iCAP PRO XP ICP-OES

Analyze high-matrix trace elemental samples with sensitive multi-element detection and meet your data requirements with the optimal performance of the Thermo Scientific iCAP PRO XP ICP-OES. Rugged on all fronts, this system needs surprisingly little bench space or user maintenance.

iCAP PRO XPS ICP-OES

Experience high-speed analysis of your trace elemental samples with the Thermo Scientific iCAP PRO XPS ICP-OES. It meets your specific regulatory requirements with unmatched throughput and versatility.

Find out more at **thermofisher.com/icp-oes**

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