Thermo Scientific iCAP PRO Series ICP-OES

Ease of installation

There are a number of requirements to consider when undertaking the installation of an ICP-OES instrument. Depending upon the supplier, a significant amount of preparation work may need to take place in order for the laboratory to be ready for the installation. Before an instrument can be installed, the site must be prepared. Each ICP-OES instrument needs a specific space where the instrument can be installed. Laboratory space is one of the most valuable considerations, therefore, a smaller instrument footprint is always preferred. An ICP-OES instrument has additional requirements which need to be fulfilled to run the spectrometer. Each instrument requires a power supply, an appropriate exhaust system, an argon (and possibly nitrogen) gas supply, a computer, a cooling water supply and, depending on the supplier, an air compressor or vacuum pump.

The new Thermo Scientific™ iCAP™ PRO Series ICP-OES is designed to ensure installation is as simple as possible. To achieve this goal, Thermo Fisher Scientific has made some specific developments to keep the installation requirements as efficient as possible.

Footprint

In most laboratories, space is one of the most valuable resources. A smaller instrument footprint saves space and allows laboratories to work efficiently and reduce costs. Compared to the Thermo Scientific™ iCAP™ 7000 Series ICP-OES, the footprint of the iCAP PRO Series ICP-OES instruments is more than 30% smaller. All iCAP PRO Series ICP-OES instruments have the same footprint regardless of the model.

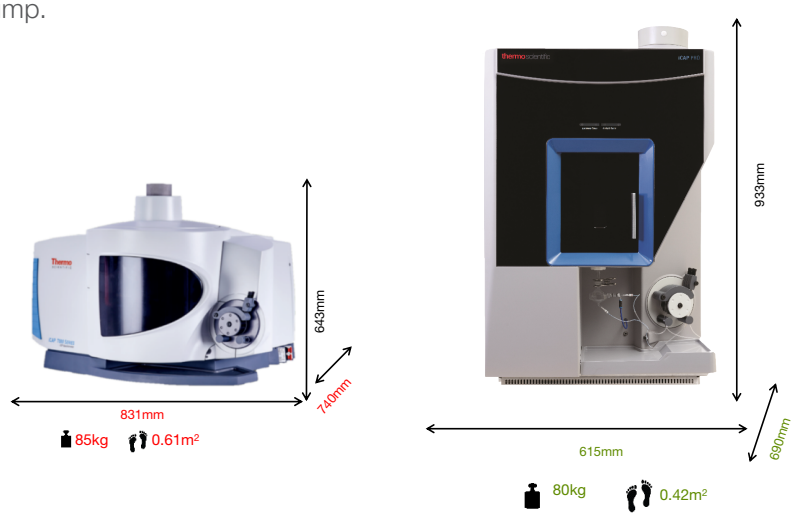

Figure 1. Thermo Scientific iCAP 7000 Series ICP-OES footprint vs. iCAP PRO Series ICP-OES footprint

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Electrical power requirements

The iCAP PRO Series ICP-OES instruments are designed to operate at a nominal voltage of 200–240 V, 50/60 Hz and supplied with a standard mains plug for power supply, making the laboratory preparation less complicated. Most laboratories are equipped with a standard 16 amp power network which makes the installation of the iCAP PRO Series ICP-OES possible without significant preparation work in your laboratory.

Table 1. Electrical power requirements

Specification value	Nominal voltage	200–240 V AC, 50–60 Hz AC, single phase
	Working voltage	180–264 V AC Exceeding or falling below the range of the working voltage will result in instrumental failure.
	Wire	2-pole, 3-wire grounding
	Fuse	Thermo Fisher Scientific recommends fusing the wall receptacle with 16 A (Europe) and 20 A (North America, Japan).

Exhaust system

The iCAP PRO Series ICP-OES is designed with very low extraction requirements. The exhaust hose supplied with the instrument is compatible with most laboratory exhaust systems. For additional ease of installation, all iCAP PRO Series ICP-OES instruments have the same exhaust requirements. The requirement is reduced by a factor of two when compared to the iCAP 7000 Series ICP-OES and the universal exhaust hose provides energy savings and straightforward installation.

Table 2. Extraction system

Plasma exhaust	Port dimensions	135 mm (recommended 120 mm ID ducting)
	Flow rate (120 mm ID ducting)	180-220 $m^3 \cdot h^{-1}$ for Radial and Duo instruments

Gas specifications

The iCAP PRO Series ICP-OES instrument requires argon as the **plasma gas** supply for the inductively coupled plasma. The purging of the optical path is maintained by the **purge gas**, which can be argon or nitrogen. Air is an optional gas when an additional gas is required, depending on the type of analysis.

It is essential that the gases are delivered with the necessary pressure and purity.

As a alternative purge gas, nitrogen gas can be used with the iCAP PRO Series ICP-OES to purge the optical path of the light.

Table 3. Gas specifications

Gas	Specification	Value
Argon gas	Purity	≥ 99.995%
	Maximum water content	< 10 ppm
	Maximum oxygen content	< 10 ppm
	Operating pressure	0.55–0.6 MPa (5.5–6bar)
Nitrogen	Purity	≥ 99.995%
	Maximum water content	< 10 ppm
	Maximum oxygen content	< 10 ppm
	Operating pressure	0.55–0.6 MPa (5.5–6bar)

Gas consumption

The gas consumption of the iCAP PRO Series ICP-OES varies with plasma conditions and purge operating parameters. Table 4 shows the approximate gas consumption for plasma gas and purge gas at different conditions.

Table 4. Gas consumption

Operating mode	Typical plasma gas [L/min]	Purge gas [L/min]
Standby	0	0.4 (standard)
	0	2.4 (extended UV performance)
Plasma	12	1.4 (standard)
		3.4 (extended UV performance)

Cooling water

For operating the iCAP PRO Series ICP-OES instruments, cooling water is required. An in-line filter is supplied with the instrument to maintain cooling water quality. More details on water cooling requirements can be found in Table 5.

Table 5. Cooling water

Cooling water requirements	Temperature	5 °C below ambient (10–30 °C)
	Recommended conductivity	< 1000 µS/cm
	pH	6–8
	Solid residual	< 50 mm particle size
	Pressure	0.2–0.6 MPa (2–6 bar)
	Cooling capacity	≥ 750 W

Power and communication connections

The iCAP PRO Series ICP-OES has been designed with an easy-to-access connection area. Importantly, no access is required to the back of the instrument, as all connectors are located on the side of the instrument. This means the instrument can be pushed as close as possible against the wall in the laboratory. Two wall spacers located on the back of instrument guarantee the optimal distance between the instrument and the wall, this ensure that the instrument is always in the correct position (Figure 2).

The connection area is on the right-hand side of the instrument and is easily accessible. If a user needs to connect or disconnect a new accessory, it can be performed without moving the instrument. The connection area also accommodates the power connection, the ethernet connection and the gas connections. The cooling water connection is located on the left-hand side of the instruments.

The iCAP PRO Series ICP-OES is connected via an ethernet connection to the PC to allow fast and stable connection and communication.

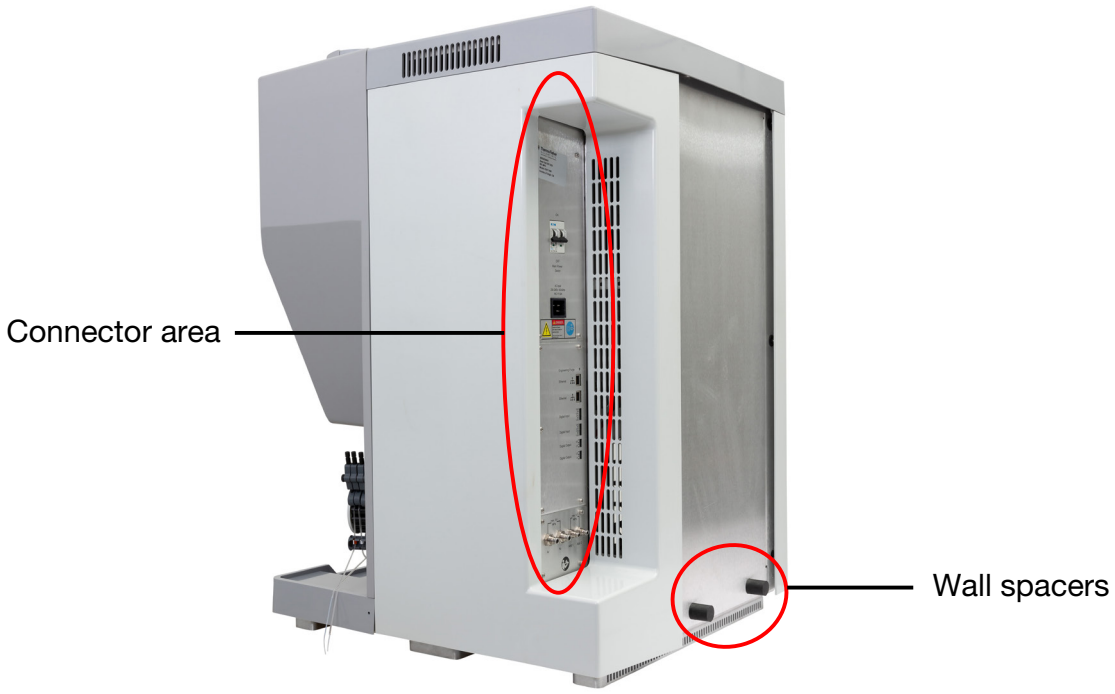

Figure 2. iCAP PRO Series ICP-OES connection area

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Automated installation procedure

In order to enable the installation of the iCAP PRO Series ICP-OES in the laboratory as quickly and as simply as possible, the instrument is supplied with a fully automated installation procedure, and due to its light weight and four integrated handles, may easily be relocated. The automated installation program can be restarted to assure flawless operation in the new location (support from a Thermo Scientific Filed Service Engineer is advised). After connection of the power, communications, cooling water supply/chiller and the purge gas, the instrument will run through the automated installation procedure.

The fast installation saves a significant amount of time and enables the laboratory to be be up and running samples as soon as possible.

Conclusion

These features make the new iCAP PRO Series ICP-OES very easy and simple to install. The laboratory requirements are reduced, saving time and investment associated with the upgrading of additional services, such as power and extraction.

The iCAP PRO Series ICP-OES instruments offer:

- Light weight design for easy positioning on a laboratory benchtop
- Reduced footprint and ability to locate against the wall to maximize valuable laboratory space
- Standard mains plug
- Improved design for easy accessory connection
- Less demanding exhaust system for energy savings and universal extraction hose for easier installation.

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

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