

The Thermo Scientific range of iCE 3000 Series Atomic Absorption Spectrometers offer a refreshingly different approach to elemental analysis – cool looks, hot performance and stunningly simple operation.

## Thermo Scientific iCE 3000 Series Atomic Absorption Spectrometers

Technical Specification and Ordering Guide



### The Refreshingly different Thermo Scientific iCE 3000 Series:

- Ergonomically designed**  
 Easily accessible lamp carousel, quick fit lamps and flame compartment tray, all speed up simple instrument tasks.
- Enhanced software**  
 Renowned world-wide for its usability, extensive help functions and comprehensive cookbook, the Thermo Scientific iCE SOLAAR software is now better than ever.
- Unique integrated furnace vision system**  
 Perfect for effective and easy furnace method development.
- New and extended wizards**  
 Enables effective system utilization for quick, high productivity.
- New improved burner design**  
 Prolonged and trouble free operation even with the most difficult samples.
- Extensive auto optimization procedures**  
 Enables the instrument to optimize critical parameters, saving valuable time.

## AA iCE 3000 Series Atomic Absorption Spectrometer Specification

All iCE 3000 Series spectrometers are completely automatic with full element capability. Control is via a data station running Thermo Scientific iCE SOLAAR software under a Windows® operating system. Flame absorption/emission systems can be extended to graphite furnace and vapour modes by the use of the appropriate accessory.

### Spectrometer Models



#### Thermo Scientific iCE 3500

- Dual atomizer AA spectrometer
- Flame atomization in left hand sample compartment
- Furnace atomization in the right hand sample compartment
- Vapour atomization in either sample compartment
- Zeeman or non-Zeeman furnace options
- Wide range photomultiplier
- Furnace vision system as standard



#### Thermo Scientific iCE 3400

- Zeeman furnace
- Wide range photomultiplier
- 6 lamp auto-aligning carousel
- Furnace or vapour atomization
- Furnace vision system as standard



#### Thermo Scientific iCE 3300

- Standard or wide range photomultiplier
- 6 lamp auto-aligning carousel
- Fully automatic gas system

### Detailed Specifications

#### Power

100 to 240 V (+/-10 %) at 50 or 60 Hz  
Consumption 300 VA

#### Physical Characteristics

##### iCE 3500:

788 W x 527 H x 595 D (mm)

##### iCE 3400:

788 W x 527 H x 595 D (mm)

##### iCE 3300:

575 W x 527 H x 595 D (mm)



## OPTICAL SYSTEM

The iCE 3300 and iCE 3500 instruments have the advanced Stockdale double beam optic arrangement which provides maximum signal to noise ratio. Sealed optics prevents dust and dirt from entering the optical channels whilst all mirrors are silica coated.

Monochromators are self-calibrating and provide automatic wavelength and band pass setup.

All instruments have high energy Quadline background correction which is guaranteed to correct for up to 2A of background with less than 2 % error.

Lamp carousels have 6 data coded positions each with its own independent power supply which is modulated at 200/240 Hz. Auto-alignment of the lamp carousel ensures maximum light throughput.

## Optics specifications

### iCE 3500

- Double beam, Stockdale optics
- Self referencing Zeeman system
- Echelle monochromator and prism
- Nominal 0.1 (available below 400 nm), 0.2, 0.5, and 1.0 nm spectral bandwidths
- Reciprocal linear dispersion 0.5 nm/mm at 200 nm

### iCE 3400

- Self referencing Zeeman System
- Echelle monochromator and prism
- Nominal 0.1 (available below 400 nm), 0.2, 0.5, and 1.0 nm spectral bandwidths
- Reciprocal linear dispersion 0.5 nm/mm at 200 nm

### iCE 3300

- Double beam, Stockdale optics
- Ebert monochromator
- Nominal 0.2, 0.5 and 1.0 nm spectral bandwidths
- Reciprocal linear dispersion 1.5 to 2 nm/mm
- Focal length 270 nm
- Grating 1800 l/mm

## Wavelength range

Wide range photomultiplier 180 - 900 nm  
Standard photomultiplier 185 - 760 nm

## Absorbance range

-0.150A to 3.000A (including background signal)

## Background correction

Quadline (continuum source) is standard on all spectrometers. Background signals below 2A are corrected for with less than 2 % error. Total signal up to 3A.

## Light source

Single or multi-element hollow cathode lamps  
Uncoded or data coded hollow cathode lamps  
6 independent power supplies  
Each power supply provides 0 to 20 mA

## Flame systems

- All flame systems are supported by the enhanced Universal Finned 50 mm Titanium Burner to accommodate all flame types. This burner can provide exceptionally low carbon build up, high solids handling, and flame stability. For extra sensitivity with air/acetylene elements there is a 100 mm titanium burner available. The burner height is automatically optimized and there are controls for the rotational and transverse positions of the burner. A high tension electric spark provides automatic flame ignition.
- The automatic gas control system uses programmable array state logic and binary flow switching technology for reliability. Changeover of oxidant gas, and fuel and oxidant flow rates are software controlled and interlocked to prevent operation with incorrect burners and gas flows.
- Gas lines are fitted with flame arrestors and pressure sensors which will provide automatic safe shut down if the pressure in the line falls below safe limits. If the power fails the system will shut down safely.
- The 'kitchen' area is totally enclosed, draught proof and has a safety door containing a heat and UV absorbing window.
- An inert fluoroplastic spray chamber contains an inert adjustable impact bead, flow spoiler, low memory hydrophilic disc and built in over pressure relief. All flame types can be used with the standard spray chamber configuration and burner supplied. The inert nebulizer has a Pt/Ir capillary and PTFE venturi as standard and this is optimized in the factory.

## Gas Control

Automatic binary switching fuel flow control

## Safety

- Automatic flame ignition
- Software controlled, automatic oxidant changeover
- Software controlled, automatic fuel gas boost on oxidant changeover
- Automatic flame shut down
- Fuel line flashback arrestor
- Fuel line pressure regulator
- Fuel and oxidant line pressure sensors
- Flame present sensor
- Burner type sensor
- Power failure protection
- Empty drain protection
- Spray chamber over pressure protection

## Furnace Systems

### GFS33 – for use with the iCE 3300

Integrated furnace and auto-sampler. Fitted into the left hand flame compartment of the iCE 3300 without removing the spray chamber or disconnecting the gas lines.

#### **Included items:**

- Furnace head
- Furnace power supply
- Furnace auto-sampler
- Fixed mount
- Normal Electrographite cuvettes (10)

#### **Necessary additional items:**

- Water recirculator as required
- Cuvettes as required

### GFS35 – for use with the iCE 3500

Standard integrated furnace and auto-sampler. Fitted with a pre-aligned fixed mount as standard but can be upgraded to use a tilt mount.

#### **Included items:**

- Furnace head
- Furnace power supply
- Furnace auto-sampler
- Fixed mount
- Normal electrographite cuvettes (10)

#### **Necessary additional items:**

- Cuvettes as required
- Water recirculator

### GFS35(Z) - for use with the iCE 3400 or iCE 3500

Integrated Zeeman furnace and auto-sampler with pre-aligned tilt mount. Is used in the right hand compartment of the instrument

#### **Included items:**

- Zeeman Furnace head
- Furnace power supply
- Furnace auto-sampler
- Tilt mount
- Normal electrographite cuvettes (10)

#### **Necessary additional items:**

- Cuvettes as required
- Water recirculator

### Furnace Head

All cuvettes mount directly in an all graphite containment with end loaded contacts. Cuvettes are self-aligning, and can be rapidly exchanged with a single lever movement. The binary flow controlled internal gas system, with gas stop, offers a choice of inert gas or an alternate gas, and the fixed external inert gas flow protects the cuvette and purges the optical temperature sensor.

### Temperature control system

Voltage feedback control system.

Optical temperature feedback control system with a stabilized sensor and fibre optic transmission system.

### Gas System

Adjustable internal flow with choice of inert or alternate gas.

### Furnace Control

Control of the furnace is from the SOLAAR Data Station via the spectrometer.

Furnace cycles are set up within a rapid fill table allowing up to 20 phases to be programmed for temperature, time, ramp rate, gas type and flow and special functions such as optical temperature control, read phase and non linear ramp. Individual temperature look-up tables for all cuvette types ensure accurate temperature calibration. A lifetime display enables the cuvette to be changed before failure becomes likely. A pre-programmed cuvette clean cycle is available, culminating in maximum temperature for 5 seconds to ensure complete contamination removal. Comprehensive storage of the furnace program, together with spectrometer and auto-sampler parameters, is provided. Complete monitoring of all furnace interlocks is provided.

### Furnace Auto-sampler

- All furnace modules are supplied complete with an auto-sampler
- The attractively styled auto-sampler will accommodate up to 60 samples in the large carousel. Carousel changeover allows up to 500 samples per run. 6 large reagent cups enable up to 6 matrix modifiers to be employed.
- The sample is collected and dispensed via an inert PTFE capillary with easily interchangeable tips. Viscous and normal modes of injection ensure that samples are handled appropriately and an enhanced wash program eliminates contamination.
- Fast furnace operation provides concurrent operation of the furnace, spectrometer, and auto-sampler sample uptake procedures, minimising overall furnace cycle time.
- The syringe is visible and easily accessible for routine maintenance.
- A large 1 litre capacity wash vessel for long unattended analysis is complemented by an on-board waste vessel, removing the need for inconvenient waste collection on the laboratory floor.

- All facilities are programmed from the SOLAAR software and sampling facilities such as matrix modification (wet or dry mixing), standards addition, dilution, reconcentration and automatic standards preparations can be rapidly setup.
- Automatic rescaling and re-calibration functions are provided. If a sample falls outside the calibration range the system automatically and intelligently calculates the most appropriate dilution factor required to bring the sample back within range.
- Auto-sampler loading guides are fully configurable to suit your individual needs.

#### **Included Items:**

- Polypropylene Sample Cups (120)
- Polypropylene Reagent Cups (12)
- Spare Capillary tips (10)

### Carousel Capacity

60 sample cups, 6 reagent cups

### Cup Types

Polypropylene sample cups  
Fluoroplastic sample cups  
Reduced volume sample cups  
Polypropylene reagent cups

### Cup Volume

- Sample cups 0.5 - 2.0 ml
- Reduced volume cups 0.1 - 1.5 ml
- Reagent cups 5 - 25 ml

### Inert Gas Pressure

- Nominal - 0.34 bar (5 psi)
- Minimum - 0.20 bar (3 psi)
- Maximum - 0.68 bar (10 psi)

### Injection

Sample Volume 1-70  $\mu$ L

Reproducibility - better than 1 % (by mass) at volumes equal to and greater than 10  $\mu$ L

### Furnace Vision System

- The furnace vision system (GFTV) accessory provides high definition images of events inside the graphite furnace cuvette, allowing monitoring of the sample injection and behaviour during the dry and ash phases of the furnace program.
- A camera mounted in the instrument produces live video for display within the software on the data station's screen.
- This feature is standard on the iCE 3400 and iCE 3500 but can be fitted as an option to the iCE 3300



# ICE SOLAAR Software

## Data Station Software:

- Runs on the AA Series Data Station, and will control all iCE 3000 Series spectrometers.
- Is aware of the type of spectrometer that it is controlling, and will only provide relevant parameters and options for each instrument type and configuration.
- Features a range of Wizard based procedures and a tabbed methods dialogue to make setting up even complex analyses fast and easy.
- Stores all raw data, results and parameters in a single database for easy retrieval.
- True Windows® multi-tasking is available, so that SOLAAR can be iconized while running an analysis, allowing concurrent use of other applications.
- Enables full 16 element methods to be performed automatically. The flexible and comprehensive tabbed methods dialogue box guides the user through setting up complex, multi-element analyses.
- Fully supports data coded HCLs, and facilities are provided to record lamp usage.
- Up to 10 calibration standards and a blank can be used, with segmented curve, linear or quadratic least squares fit calibration algorithms.
- Normal, standard addition and standard curve calibration methods are supported, with full graphical display and print out of the calibration curve.
- Full alphanumeric sample details including sample mass and dilution correction can be entered for each sample, or imported via text files.
- Wizard driven automated ash/atomize plots produce graphical data for furnace program optimization, and will even suggest optimum values.
- For flame systems, fully automatic fuel gas flow and burner height optimization with graphical presentation are provided.
- Extensive on line, fully context sensitive, Help facilities are available. Troubleshooting and diagnostics sections describe simple experiments to first locate the problem then to rectify it.
- A full 'CookBook' with default parameters for all elements, common interferences, and the means of overcoming them is included.
- Flexible and comprehensive results database filters select and display the required data, which can be exported to other applications for further processing.
- Integrated auto QC software provides comprehensive Quality Control protocols, automation with checking, testing and re-analysis options, report generation and data filing.

- QC Blanks, QC Checks, QC Duplicates and two forms of QC Spikes are all included, each with user definable test criteria and failure actions. Full QC reporting, including pass/fail results and time and date stamps is provided on the Results display, and hard copy reporting of all QC protocols, parameters, results and actions is available. QC data is linked to the results to which it applies, and can be exported with the results.
- SOLAAR software is available in English, USA English, French, German, Russian, Spanish, Japanese, Chinese and Polish languages.

## SOLAARsecurity Software

The SOLAAR*security* software package adds additional facilities to the SOLAAR Data Station software. This provides the tools, facilities and functions required to allow an organisation to comply with the requirements of the US Food and Drugs Administration set out in Part 11 "Electronic Records; Electronic Signatures" of Title 21 of the Code of Federal Regulations (the 21 CFR part 11 Rule). Network compatible, this package provides User Authentication, Access Controls, Audit Trails, Event Logs and Digital Signatures for the Data Station client software, with central administration and storage of the user security settings. SOLAAR*security* is compatible with Windows, 2000, XP Professional and VISTA Ultimate operating systems.

## Data Station

The spectrometer system and accessories are controlled via a data station running the iCE SOLAAR AA software package. The data station is a personal computer, with a typical configuration of:

- 800 MHz Pentium processor or equivalent
- 512 MB RAM
- CD ROM Drive
- Fixed Disk Drive with at least 1 GB free space
- 19" SVGA Colour Monitor
- USB port
- Appropriate printer port
- Windows® 2000 SP4, XP Professional SP2 or VISTA Ultimate



## Accessory Specification

### Intelligent Spectrometer Qualification (iSQ) Enhancement

When an iSQ accessory is added to an iCE 3000 Series Spectrometer a truly unique instrument is created. The iSQ module and dedicated software automatically tests the hardware performance and gives a clear pass or fail result. Pre-programming is possible so your instrument can be working through its tests before you get to work, this ensuring maximum productivity.

**Included items:**

- iSQ module
- Coded Ca/Mg hollow cathode lamp
- Appropriate accessory mount

### Flame Auto-sampler – CETAC ASX-260 and ASX-520

Random access intelligent auto-sampler provides a fully automated sample introduction system for flame or vapour analysis. Large (ASX-520) or compact (ASX-260) sample capacity depending on rack configuration.

**Sample capacity**

- ASX-260: 42 to 180 samples
- ASX-520: 84 to 360 samples
- Smaller sample capacity implies larger available volume per sample

**Included items:**

- Random access x-y auto-sampler mechanism
- Standards rack (10 position)
- ASX-520: 4 sample racks (60 position each)
- AXS-260: 2 sample racks (60 position each)
- 10 standard polypropylene tubes
- 240 sample polypropylene tubes
- 0.5 mm ID and 0.8 mm ID PTFE samples probes
- Pumped wash facility
- RS232C adaptor

### ID100 Auto-dilutor

The ID100 Auto-dilutor provides rapid, in-line preparation of calibration standards and intelligent or fixed ratio dilution of samples for flame measurements. It is based on a high precision multi-piston pump that is calibrated for life, and does not require any consumable items. It can be used with manual sampling or with any of the flame auto-samplers.

### VP100 Continuous Flow Vapour Generator

The VP100 Continuous Flow Vapour System performs hydride and mercury vapour measurements with significant sensitivity improvement over normal flame techniques. An air/acetylene flame or an electrically heated cell is used for atomization. The VP100 unit incorporates the reagent reservoirs, a variable speed 4 channel peristaltic pump, control electronics and gas liquid separator. An integrated mass flow controller allows the carrier gas flow to be controlled and monitored through the system software, and the continuous flow principle eliminates the need to clean the reaction vessel after each sample. The VP100 operates automatically under Data Station control and can provide full auto-sampling operation with a suitable auto-sampler. When used with the EC90 Electrically Heated Atomization Cell, unattended operation is possible.

**Carrier gas**

Argon or nitrogen

**Reducing agents**

- Sodium borohydride
- Tin (II) chloride may be used for mercury analysis

**Solution transport**

Variable speed, 4 channel peristaltic pump using continuous flow principle

**Included items:**

- 2 T-cells (open ended, silica, 120 mm long)
- Mercury cell (long path 150mm long)
- Mount for T-cell
- Pump tubing
- Reagent bottles
- Glass beads
- Semi-permeable membrane

**Necessary additional items:**

- Appropriate accessory mount to fit the long path length cell if used.

**Additional items for cell heating:**

- Air/acetylene flame on 50 mm universal burner
- Electrical heating using EC90

### EC90 Electrically Heated Atomization Cell

The EC90 is an electrically heated atomization cell for flameless vapour generation AAS. It provides improved analytical performance, unattended operation and reduced operational costs in comparison with a flame heated system. The EC90 must be used with a VP100 and is suitable for all hydride forming elements.

**Included items:**

- EC90 Furnace head
- EC90 Furnace power supply

**Necessary additional items:**

- VP100 Continuous Flow Vapour system
- Appropriate accessory mount

### AA Validator

Available in three separate kits designed for Flame (FAAS), Furnace (GFAAS) or Flame and Furnace (FAAS/GFAAS) installations, the unique AA Validator provides full system validation for iCE 3000 Series AA systems, including comprehensive qualification plans. Full SOP's and check sheets, together with complete supplier assessment questionnaires, are supplied in the Validator Logbook for recording and demonstrating compliance. All necessary consumables are provided and even method validation guidelines are included. The integrated PQ Test software contains a complete set of SOP's and a Wizard to lead the user through the tests needed to validate the instrument analytical performance against the manufacturer's specification.

**Included items (depends on kit type):**

- Validator Logbook
- Ca/Mg Hollow
- Cathode Lamp
- Ni/Cr/Mn Hollow
- Cathode Lamp
- Pyrolytically Coated Cuvettes
- Manganese Validation Standard
- Nickel Validation Standard
- Chromium Validation Standard
- Water Blank Validation Standard

## AA Validatorplus

The Validatorplus accessory contains a set of traceable and certified filters. It is fitted in the spectrometer and controlled by the OQ Test software.

### **Included items:**

- Calibrated Validation Unit (CVU)
- Power Supply
- RS232 Data Lead

### **Necessary Additional Items:**

- Either the Validator Logbook or the appropriate Validator Kit.
- RH Universal Accessory Mount for iCE 3400/3500
- LH Universal Accessory Mount for iCE 3300

## Slotted Tube Atom Trap

The STAT accessory provides a useful and increase in flame analytical sensitivity for certain more volatile elements, such as Cd, Zn, Pb and Cu.

### **Included items:**

- STAT holder
- 5 Quartz STAT tubes

### **Necessary additional items:**

- 50 mm universal Titanium burner (as supplied with instrument)

## Variable Flow Auxiliary Oxidant Kit

The Variable Flow Auxiliary Oxidant Kit allows the flow rate of the auxiliary oxidant gas supplied to an air/acetylene flame to be varied over a wide range, in order to allow the flame chemistry to be optimized when using less common organic solvents. If you want to use your instrument to analyse this type of sample on a regular basis, it is recommended that the instrument should also be fitted with the Solvent Resistant Flame Kit.

All iCE 3000 Series flame instruments are fitted with automatic gas control modules which include a fixed flow rate auxiliary oxidant facility for air/acetylene flames that is suitable for the organic solvents most commonly used.

## Solvent Resistant Flame Kit

This kit contains the necessary replacement flame system parts recommended when the spectrometer is to be used extensively for the analysis of organic solvents. It includes solvent resistant 'O' rings, a modified spray chamber, and solvent resistant drain tubing.

## Universal Accessory Mounts

### **Left Hand**

For use in the left hand sample compartments of iCE 3300 and iCE 3500. This is necessary for mounting the EC90 Furnace Head, Mercury Absorption Cell and Validatorplus Calibration Validation Unit (iCE 3300 only).

### **Right Hand**

For use in the right hand sample compartment of iCE 3400 and iCE 3500. This is necessary for mounting the EC90 Furnace Head, Validatorplus Calibration Validation Unit, and Mercury Absorption Cell.

## Graphite Furnace Cuvettes

### **Normal Cuvettes (Electrographite)**

The normal cuvette is made from a form of graphite called electrographite. This cuvette is suitable for the determination of volatile elements such as Pb, and Cd in simple matrices, such as clean waters.

### **Coated Electrographite Cuvettes (Pyrolytically coated)**

This coated cuvette is a modified electrographite cuvette, coated with a thin layer of pyrolytic graphite. Coated cuvettes are required for the carbide forming, medium volatile and refractory elements and for samples with complex high salt matrices.

### **Extended Lifetime Cuvettes (ELC's)**

ELC's are unique to Thermo Scientific and have a pyrolytic coating that is up to 10 times thicker than the standard coating. This gives them more stable performance and much longer useful lifetimes than either of the electrographite based cuvettes. These cuvettes are especially recommended for high throughout analyses with complex samples and when measuring the most refractory elements.

### **Omega Platform Extended Lifetime Cuvettes**

Omega platform cuvettes have an integrated L'Vov platform built into the cuvettes, which makes them particularly suitable for determining the more volatile elements in heavy matrices where vapour phase interferences cause severe problems. The integral platform is designed to accommodate up to 50 µL volumes and so can provide excellent concentration limits. The omega cuvettes use the ELC coating technology and have similar long, stable lifetime characteristics.

## Hollow Cathode Lamps

High quality hollow cathode lamps optimized for use with the iCE 3000 Series spectrometers.

### **Data Coded Multi-Element and Single Element Lamps**

The spectrometers read the list of elements contained in the lamp and the maximum permissible lamp current from the data coding, providing maximum convenience and removing the possibility of damaging the lamp with excessive currents.

Multi-element lamps provide analytical performance comparable with single element lamps, while reducing your lamp inventory and increasing the ease of use.

Single element lamps provide the best possible analytical performance.

### **Uncoded Multi-Element and Single Element Lamps**

Multi-element lamps provide analytical performance comparable with single element lamps, while reducing your lamp inventory and increasing the ease of use. Single element lamps provide the best possible analytical performance.

### **Value Range Lamps**

A limited range of cost effective hollow cathode lamps for use with the iCE 3000 Series spectrometers. Value range single element lamps provide analytical performance comparable with normal lamps, at a significantly reduced cost.

All Thermo Scientific hollow cathode lamps carry a 5000 mA/hr lifetime guarantee.

# Part Numbers

## Instrument & Accessories

Description	Part Number
<b>Spectrometers</b>	
iCE 3300 AA Spectrometer (std PMT)	9423 500 33300
iCE 3300 AA Spectrometer (wide range PMT)	9423 500 33301
iCE 3400 AA Spectrometer	9423 500 23400
iCE 3500 AA Spectrometer	9423 500 23500
<b>Graphite Furnaces</b>	
<b>For use with iCE 3000</b>	
GFS33 Graphite Furnace and Auto-sampler	9423 590 30001
GFS33 Graphite Furnace and Auto-sampler (N. America)	9423 590 30002
<b>For use with iCE 3500</b>	
GFS35 Graphite Furnace and Auto-sampler	9423 590 20001
GFS35 Graphite Furnace and Auto-sampler (N. America)	9423 590 20002
<b>For use with iCE 3400 or iCE 3500</b>	
GFS35(Z) Graphite Furnace and Auto-sampler	9423 590 20051
GFS35(Z) Graphite Furnace and Auto-sampler (N. America)	9423 590 20052
GFS35(Z) Graphite Furnace and Auto-sampler with Rhodium Plated Centre Block	9423 590 20061
GFS35(Z) Graphite Furnace and Auto-sampler with Rhodium Plated Centre Block (N. America)	9423 590 20062
Rhodium Plated Centre Block for GFS35(Z) - retrospective fitting	9423 590 20069
<b>Graphite Furnace Items</b>	
Standard Furnace User Spares kit	9423 450 20002
Zeeman Furnace User Spares Kit	9423 450 20003
Water Recirculator (50Hz)	9423 393 97005
Water Recirculator (60Hz)	9423 393 97003
Tilt Mount for Standard Furnace (iCE 3500 only)	9423 490 20005
Contact Cones for Standard Furnace	9423 393 95011
Contact Cones for Zeeman Furnace	9423 393 95161
Contact Cone Replacement Tool for Standard Furnace	9423 393 95101
Contact Cone Replacement Tool for Zeeman Furnace	9423 393 95181
<b>Graphite Furnace Cuvettes</b>	
Normal Graphite Cuvettes - (10)	9423 393 95031
Coated Graphite Cuvettes (10)	9423 393 95071
Extended Lifetime Cuvettes (ELC) (10)	9423 393 95041
Extended Lifetime Cuvettes (ELC) (20)	9423 393 95051
Omega Platform Extended Lifetime Cuvettes (10)	9423 490 20101
<b>Furnace Auto-sampler Items</b>	
Furnace Auto-sampler User Spares Kit	9423 450 20004
Polypropylene Sample Cups (1000)	9423 393 80031
Polypropylene Reagent Cups (50)	9423 393 80021
PTFE Sample Cups (20)	9423 393 80051
Reduced Volume Sample Cups (20)	9423 393 80061
Cup Reducing Ring	9423 393 80071
Spare Sampling Capillary Tips	9423 393 81261
PTFE Sampling Capillary	9423 393 82261
Carousel and Tray	9423 393 83261
<b>Furnace Vision System - GFTV</b>	
<b>For use with iCE 3000 Series</b>	
GFTV factory fitted	9423 510 30001
<b>For use with iCE 3400</b>	
GFTV factory fitted	As Standard
<b>For use with iCE 3500</b>	
GFTV factory fitted	As Standard



# Part Numbers

## Instrument & Accessories

Description	Part Number
<b>Control Options</b>	
Data Station	9423 393 10005
Colour inkjet printer	9423 440 20001
SOLAAR Software upgrade (for iCE 3000 series, M series and S series only)	9423 430 20001
SOLAAR <i>security</i> Software – ordered with iCE 3000 Series spectrometer	9423 430 30011
SOLAAR <i>security</i> Software – upgrade for iCE 3000 series, M series and S series only	9423 430 30001
<b>Flame Compartment Items</b>	
Flame Compartment User Spares	9423 450 30001
Universal Finned (50 mm) Titanium Burner	9423 520 31011
Air/Acetylene (100 mm) Titanium Burner	9423 420 31021
Spare inert nebuliser	9423 390 05481
Nebuliser uptake tube 0.4 mm ID (For reduced uptake rate)	9423 390 05411
Nebuliser uptake tube 0.5 mm ID	9423 390 05421
Nebuliser Cleaning Probe	9423 390 05441
Spray Chamber Renovation Kit	9423 390 05461
Micro Adjustable Impact Bead Kit	9423 390 05401
Drain Vessel – 5litres	9423 390 05471
Solvent Resistant Drain Tubing	9423 390 05491
<b>Flame and Vapour CETAC Auto-samplers</b>	
CETAC ASX-260 Auto-sampler	9423 470 04002
CETAC ASX-520 Auto-sampler	9423 470 04001
21 Position Sample Rack	9423 470 03901
24 Position Sample Rack	9423 470 03911
40 Position Sample Rack	9423 470 03921
60 Position Sample Rack	9423 470 03931
90 Position Sample Rack	9423 470 03941
Polypropylene Tubes for 21 position rack and Standards rack, 50 ml, 500 per pack	9423 470 04151
Polypropylene Tubes for 24 position rack, 30 ml, 500 per pack	9423 470 04111
Polypropylene Tubes for 40 position rack, 20 ml, 500 per pack	9423 470 04161
Polypropylene Tubes for 60 position rack, 14 ml, 1000 per pack	9423 470 04131
Polypropylene Tubes for 90 position rack, 8 ml, 1000 per pack	9423 470 04141
Sample Probe Assembly	9423 470 03981
Sample Probe, 0.5 mm ID	9423 470 03991
Sample Probe, 0.8 mm ID	9423 470 04171
Tray Sub-assembly with a Standards Rack	9423 470 03951
Rinse Station	9423 470 03961
Drain Pump Tubing and Connector Kit	9423 470 03971
<b>Auto-Dilutor</b>	
ID100 Auto-Dilutor	9423 470 03201
ID100 Auto-Dilutor Consumables Kit	9423 450 03201
<b>Continuous Flow Vapour Generation System</b>	
VP100 Continuous Flow Vapour System	9423 460 10001
<b>Electrically Heated Atomization Cell</b>	
EC90 Electrically Heated Atomization Cell (Must be used with a VP100 vapour system and universal accessory mount to provide a working system)	9423 393 60061

## Part Numbers

### Instrument & Accessories

Description	Part Number
<b>Validator and Validation</b>	
Validator Log Book	9499 VAL 90006
FAAS Validator Package	9423 VAL 00001
GFAAS Validator Package	9423 VAL 00002
FAAS / GFAAS Package	9423 VAL 00003
Validator <i>plus</i> Accessory	9423 VAL 00004
Nickel Validation Solution	9423 VAL 00011
Chromium Validation Solution	9423 VAL 00012
Manganese Validation Solution	9423 VAL 00013
Water Blank Validation Solution	9423 VAL 00014
Re-Calibration of Validator <i>plus</i> and /or iSQ Module Accessory	9423 VAL R0004
<b>Slotted Tube Atom Trap (STAT)</b>	
STAT Accessory (Requires use of a 50 mm universal burner as supplied with instrument)	9423 390 35011
<b>Variable Flow Auxiliary Oxidant Kit</b>	
Variable Flow Auxiliary Oxidant Kit (factory fitted if ordered with spectrometer or field upgrade to be installed by a qualified service engineer)	9423 393 46111
<b>Solvent Resistant Flame Kit</b>	
Solvent Resistant Flame Kit	9423 420 31051
<b>Universal Accessory Mounts</b>	
Left Hand Accessory Mount (for use with iCE 3300/3500)	9423 420 21005
Right Hand Accessory Mount (for use with iCE 3400/3500)	9423 420 20005
<b>Air Supply</b>	
Air Compressor (220/240 V, 50 Hz) (includes filter/regulator)	9423 393 34225
Air Compressor (220/240 V, 60 Hz) (includes filter/regulator)	9423 393 34226
Air Compressor (110/120 V, 50 Hz) (includes filter/regulator)	9423 393 34115
Air Compressor (110/120 V, 60 Hz) (includes filter)	9423 393 34116
<b>Gas Handling</b>	
<b>These items are suitable for British Oxygen Company equipment only</b>	
Acetylene Gas Pressure Regulator	9423 352 43881
Acetylene Flashback Arrestor	9423 393 46061
Nitrogen/Air/Argon Gas Pressure Regulator	9435 179 21201
Nitrous Oxide Gas Pressure Regulator	9423 354 03111

# Part Numbers

## Hollow Cathode Lamps

### Multi-Element Lamps

Description	Uncoded P/N	Coded P/N	Description	Uncoded P/N	Coded P/N
Ag/Cr/Cu	9423 393 21501	9423 393 31501	Co/Ni	9423 393 21211	9423 393 31211
Ag/Cu	9423 393 21491	9423 393 31491	Cr/Cu	9423 393 21131	9423 393 31131
Al/Mg	9423 393 21051	9423 393 31051	Cr/Mn	9423 393 21141	9423 393 31141
Al/Si	9423 393 21041	9423 393 31041	Cr/Ni	9423 393 21121	9423 393 31121
Ba/Sr	9423 393 21591	9423 393 31591	Cr/Ni/Cu/Mn	9423 393 21171	9423 393 31171
Cu/Fe/Zn	9423 393 21531	9423 393 31531	Cr/Ni/Mn	9423 393 21161	9423 393 31161
Ca/Ba	9423 393 21571	9423 393 31571	Cu/Fe	9423 393 21221	9423 393 31221
Ca/Ba/S	9423 393 21601	9423 393 31601	Cu/Fe/Mn/Zn	9423 393 21561	9423 393 31561
Ca/Mg	9423 393 21011	9423 393 31011	Cr/Ni/Cu	9423 393 21151	9423 393 31151
Ca/Mg/Si	9423 393 21061	9423 393 31061	Cu/Mn	9423 393 21231	9423 393 31231
Ca/Si	9423 393 21081	9423 393 31081	Cu/Mn/Zn	9423 393 21541	9423 393 31541
Ca/Sr	9423 393 21581	9423 393 31581	Cu/Ni	9423 393 21241	9423 393 31241
Cd/Zn	9423 393 21611	9423 393 31611	Fe/Mn	9423 393 21251	9423 393 31251
Co/Cu	9423 393 21181	9423 393 31181	Fe/Ni	9423 393 21261	9423 393 31261
Co/Cu/Fe	9423 393 21281	9423 393 31281	Fe/Zn	9423 393 21511	9423 393 31511
Co/Fe	9423 393 21191	9423 393 31191	Mg/Si	9423 393 21091	9423 393 31091
Co/Mn	9423 393 21201	9423 393 31201	Mn/Zn	9423 393 21521	9423 393 31521
Co/Mn/Ni	9423 393 21291	9423 393 31291	Na/K	9423 393 21021	9423 393 31021
Co/Mo	9423 393 21111	9423 393 31111	Si/Ti	9423 393 21101	9423 393 31101

### Single Element Lamps

#### 9423 390....

Description	Uncoded	Data Coded	Value Lamp	Description	Uncoded	Data Coded	Value Lamp
Ag	20471	30471	2047 V	Nb	20411	30411	
Al	20131	30131	2013 V	Nd	20601	30601	
As	20331	30331	2033 V	Ni	20281	30281	2028 V
Au	20791	30791	2079 V	Os	20761	30761	
B	20051	30051		P	20151	30151	
Ba	20561	30561		Pb	20821	30821	2082 V
Be	20041	30041		Pd	20461	30461	
Bi	20831	30831	2083 V	Pr	20591	30591	
Ca	20201	30201	2020 V	Pt	20781	30781	
Cd	20481	30481	2048 V	Rb	20371	30371	
Co	20271	30271	2027 V	Re	20751	30751	
Cr	20241	30241	2024 V	Rh	20451	30451	
Cs	20551	30551		Ru	20441	30441	
Cu	20291	30291	2029 V	Sb	20511	30511	2051 V
Dy	20661	30661		Sc	20211	30211	
Er	20681	30681		Se	20341	30341	2034 V
Eu	20631	30631		Si	20141	30141	
Fe	20261	30261	2026 V	Sm	20621	30621	
Ga	20311	30311		Sn	20501	30501	2050 V
Gd	20641	30641		Sr	20381	30381	
Ge	20321	30321		Ta	20731	30731	
Hf	20721	30721		Tb	20651	30651	
Hg	20801	30801	2080 V	Te	20521	30521	
Ho	20671	30671		Th	20901	30901	
In	20491	30491		Ti	20221	30221	
Ir	20771	30771		Tl	20811	30811	
K	20191	30191	2019 V	Tm	20691	30691	
La	20571	30571		U	20921	30921	
Li	20031	30031		V	20231	30231	
Lu	20711	30711		W	20741	30741	
Mg	20121	30121	2012 V	Y	20391	30391	
Mn	20251	30251	2025 V	Yb	20701	30701	
Mo	20421	30421	2042 V	Zn	20301	30301	2030 V
Na	20111	30111	2011 V	Zr	20401	30401	

## Compatibility Table

Instrument	iCE 3300	iCE 3400	iCE 3500
<b>Flame Mode</b>	<b>Single</b>	<b>Single</b>	<b>Dual</b>
New design 50 mm burner	●	-	●
100 mm titanium burner	○	-	○
D2 Quadline background correction	●	●	●
ID100 in line dilution	○	-	○
STAT Aton Trap	○	-	○
CETAC Auto-sampler	○	-	○
<b>Furnace Mode</b>	○	◆	○
GFS33 Furnace & Auto-sampler module	○	-	-
GFS35 Furnace & Auto-sampler module	-	-	○
GFS35Z Zeeman Furnace & Auto-sampler module	-	●	○
D2 Quadline background correction	●	●	●
Zeeman background correction	-	●	○
GFTV Furnace vision system	○	●	●
<b>Vapour Mode</b>	○	○	○
VP100 Vapour system	○	○	○
EC90 Electrically heated cell	○	○	○
<b>Validation</b>	○	○	○
FAAS Kit	○	-	○
GFAAS Kit	○	○	○
FAAS/GFAAS Kit	○	-	○
CVU	○	○	○
iSQ package	○	○	○
<b>Enhanced SOLAAR Software</b>	●	●	●
SOLAARsecurity	○	○	○
Extensive Wizards	●	●	●

### Key:

Standard feature	●
Not available	-
Option	○
Requires additional items below	◆



Thermo Scientific iCE 3500



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