

The Golden Gate™

Single Reflection Diamond ATR Series Mk II



The Golden Gate is the world's most versatile Infrared sampling system. It analyzes all sample types from hard solids to corrosive liquids and is fast, sensitive and robust.

Product Highlights

- High sample throughput - no sample preparation
- Rugged type IIa diamond ATR metal-bonded into a tungsten carbide mount
- Hard, inert, sapphire self-levelling pressure anvil
- Pressure bridge for highest sensitivity
- A wide choice of available options
- Quick release bridge with safety interlock
- Built-in pressure control for reproducible results

Applications

- QA on pharmaceutical powders
- Analysis of hard and soft polymer pellets
- Forensic sampling, paint chips and single fibers
- Hard samples, eg rock and geochemicals
- Corrosive liquids
- Coated wires
- Air sensitive samples

Outstanding sensitivity is achieved using high pressure contact against a type IIa diamond, selected for its unparalleled sensitivity as a single reflection ATR element together with its unique physical and chemical stability. The accessory can be used to analyze a range of samples from single particles and fibers to corrosive liquids, and the large working area sample platform is ideal for macro sampling.

The diamond is high temperature bonded into its tungsten carbide mount, giving performance and strength to withstand the high pressures required for maximum optical contact with hard samples.

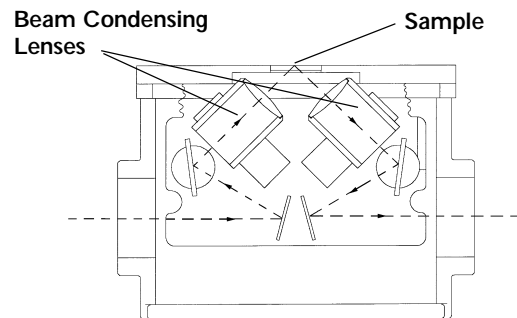
The quick lock and release bridge allows for fast sample change around. The built-in pressure control mechanism means reproducible results are obtainable without the need for a torque tool.



Schematic of the Golden Gate Single Reflection ATR System

The Top-plates of the Golden Gate Single Reflection ATR Series are supplied on an optical unit which contains mirrors and a choice of beam condensing optics (ZnSe or KRS-5). All Top-plates are interchangeable with the optical unit.

A schematic is shown opposite of the beam path through the Golden Gate optical system. The schematic is shown with a beam path from left-to-right. The symmetrical arrangement means that a Golden Gate ATR can also be used with a right-to-left beam system.



Reproducibility and Sensitivity of the Golden Gate Style Reflection ATR System

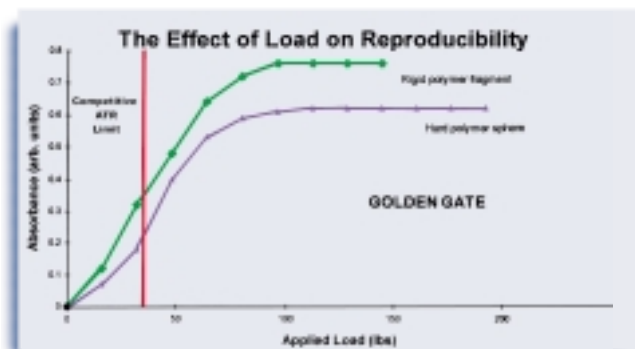
A key feature of the Golden Gate Single Reflection ATR System is the outstanding contact achievable with solid samples to the diamond crystal.

As the load is increased via the bridge clamping mechanism and optical contact between the diamond and the sample increases, there is a critical load at which the optimum optical contact is achieved. Thereafter, no increase in absorbance intensity is possible and maximum sensitivity of the measurement is achieved.

With accessories capable of applying only small loads there is

uncertainty as to whether the maximum optical contact has been achieved. Therefore, sensitivity for the technique is also compromised. In addition, until optimum contact is achieved, there is no control over experimental reproducibility.

Low load measuring devices on low load ATR units are not sensitive to changes in the sample properties under applied load. The unique high load capability of the Golden Gate Diamond ATR ensures that maximum sensitivity is achieved reproducibly.



Anvil Options

A variety of special anvils exist for use with the Golden Gate Top-plates. The use of an appropriate anvil improves the sample

handling capabilities of the Golden Gate Single Reflection ATR System.



1 Reactive Sample Anvil

Samples which are sensitive to air or moisture can be loaded and pressed in a dry box. The anvil has a seal which compresses as the sample is pressed, thus keeping it in an inert environment while the spectrum is being run.

2 & 5 Grooved Anvils (Narrow and Wide)

To study the coating on transformer wire the grooved anvils hold the wire exactly in the middle of the diamond.

3 Sapphire Anvil

This is the standard anvil and is used for most sample types. It has the advantage of being very hard, and easy to clean to prevent sample carry-over. It is also self-levelling to accommodate non-flat samples.

4 Stainless Steel Flat Anvil

This is used for fibers or fine wires. It is not self-levelling, which can be an advantage with this type of sample.

6 Pellet Anvil

Polymer pellets are held firmly in position with this concave anvil. With a flat anvil they could move when pressure is applied.

7 Volatiles Cover

If liquid samples are very volatile the cover is useful to minimize evaporation.

8 View-Thru Anvil

The View-Thru Anvil allows the sample to be viewed through a 4x lens system with a built-in reflective illuminator. The lower window of the anvil acts as a viewing window so the sample may be positioned accurately and observed as pressure is applied. The anvil does not rotate as it presses on the sample, thus preventing movement of the sample and also minimizing any heating effects due to friction.

9 Flow-Thru Anvil

This micro flow cell anvil seals under pressure around the diamond. Its volume is 28 microliters and it can operate at 1000 psi. The pipe flow fittings are 1/16" O.D. stainless steel. It may be used as a flow cell or as a micro reaction chamber in conjunction with the heated Golden Gate. It has also been used for the study of polymers in the presence of a supercritical fluid.

Germanium Top-plate



Traditionally difficult samples, such as those containing high concentrations of carbon black, require controlled penetration of the infrared beam. The high refractive index of germanium makes this ATR material an ideal choice for these samples. Optimum sensitivity is achieved using a 4mm x 4mm germanium crystal cemented into a rugged stainless steel disc for maximum strength and support.

The shallow depth of penetration with no band distortion overcomes difficult quantitative analysis of strongly infrared absorbing materials. Similarly, corrosive samples, thin films and surface coatings can also be analyzed.

Features

- 45° single reflection germanium crystal
- 4mm x 4mm cement bonded stainless steel mount
- Working range 5000-550cm⁻¹
- Pressures up to 2 kbar
- High throughput
- Good chemical resistance
- Suitable for use with DTGS detectors
- Full compatibility with Golden Gate ATR series

Applications

- Very strongly absorbing polymers and rubbers
- Thin films on semi-conductors and other substrates
- Surface coatings
- Corrosive liquids
- Macro and micro sample volumes
- Forensic Science

Heated Diamond Top-plate



Many reactions and processes occur at high temperatures. The Heated Diamond Top-plate allows all the normal benefits of the Golden Gate sampling technique.

Diamond has a uniquely high thermal conductivity. The Top-plate has a low thermal mass, and in combination with high power heaters in close proximity to the diamond, both rapid and efficient heating is achieved. This gives a high degree of temperature control. A rapid sample turn

around is also possible.

The Top-plate can be used with a computer controlled temperature controller with digital readout to 1°C.

With safety in mind, low voltage (30V) heaters are used, and for additional protection thermal fuses are fitted as standard. The controller complies with the 1996 European CE regulations.

Features

- Heatable to 200°C
- Stainless steel with tungsten carbide diamond mount
- Low voltage heaters
- Thermal safety fuses
- Programmable temperature control
- Complies with CE regulations
- Low thermal mass

Applications

- Polymerization reactions
- Thermochemical studies
- Curing reactions
- Cooking processes
- Degradation / decomposition
- Phase transitions

Micro Specular Reflectance Top-plate



A 45° angle Micro Specular Reflection Top-plate is available for flat samples of greater than 2mm x 2mm, or powders that can be pressed into a self-supporting wafer.

A scribed reference grid allows accurate repeat positioning of samples.

Applications

- Micro reflectance samples
- Very highly absorbing samples
- Carbon black containing polymers

Golden Gate Reaction Cell



The Reaction Cell allows in-compartment reaction monitoring over a broad range of extreme conditions.

This Top-plate has the diamond ATR crystal and tungsten carbide mounting contained within a high pressure reaction vessel.

The unique strength and durability of the diamond element makes it ideal for withstanding combinations of aggressive chemical contact at high temperatures and pressures.

Product Highlights

- Controlled temperatures to 200°C
- Low voltage (30V)
- Cell volume 28 μ l
- Pressures up to 3000psi
- Water jacket to prevent overheating
- Stainless steel construction with choice of other materials
- Stirring option
- Flow through configuration option

Applications

- Chemical reaction analysis at high temperatures and pressures
- Caustic solutions
- Slurries with abrasive particulates
- Acidic reactions
- Optimization of process parameters

Ordering Information

Golden Gate ATR Mk II series

A Complete Golden Gate ATR Mk II System consists of an Optics Unit with Lenses, Top-plate, Baseplate and Purge Bellows.

10500 Series Golden Gate ATR Mk II

When ordering specify 10500 Series Golden Gate ATR Mk II and choose from the following Top-plates. Also specify Spectrometer make and model for the appropriate Baseplate.

P/N 10563	Diamond ATR Top-plate Mk II
Includes:	Sapphire and Pellet anvils, volatiles cover
P/N 10566	Germanium ATR Top-plate Mk II
Includes:	Large stainless steel anvil and volatiles cover
P/N 10565	Wire Holder Diamond ATR Top-plate Mk II
Includes:	Narrow and wide gauge grooved anvils and stainless steel flat anvil
P/N 10514	Micro Specular Reflectance Top-plate
Includes:	Reference mirror

Choose from the following Lens Configurations:

- ZnSe Lenses 5000 - 650cm⁻¹
- KRS-5 Lenses 5000 - 300cm⁻¹

All of the Top-plates can be ordered separately as upgrades if desired.

10542 Series Heatable Golden Gate ATR Mk II

A Complete Heatable Golden Gate ATR Mk II System consists of an Optics Unit with Lenses, Heatable Diamond ATR Top-plate Mk II, Baseplate, Purge Bellows and an Automatic Temperature Controller with RS232 control.

The Heatable Diamond ATR Top-plate includes Sapphire and Pellet Anvils, and Volatiles Cover

When ordering specify 10542 Series Heatable Golden Gate ATR and Spectrometer make and model for the appropriate Baseplate. Also specify 220V or 110V and country for controller.

Choose from the following Lens Configurations:

- ZnSe Lenses 5000 - 650cm⁻¹
- KRS-5 Lenses 5000 - 300cm⁻¹

10540 Series Heated Diamond ATR Top-plate Mk II Upgrade

This is for ordering a Heated Diamond ATR Top-plate and controller with RS232 as an upgrade for an existing Golden Gate System.

The Heatable Diamond ATR Top-plate Mk II includes Sapphire and Pellet Anvils, and Volatiles Cover.

When ordering specify 10540 Series Heated Diamond ATR Top-plate Mk II and 220V or 110V and country for controller.

Golden Gate Reaction Cell

This version of the Golden Gate ATR Mk II System is available in a number of configurations - contact your Product Specialist to discuss your requirements.

Upgrade - Lenses

P/N 10552	ZnSe lens upgrade kit 5000 - 650cm ⁻¹
P/N 10508	KRS-5 lens upgrade kit 5000 - 300cm ⁻¹

Anvil Options for Mk II Golden Gate Top-plates

P/N 10503	Volatiles cover
P/N 10522	Forensic Sapphire anvil
P/N 10531	Sapphire anvil
P/N 10532	Pellet anvil
P/N 10536	Reactive sample anvil
P/N 10547	Grooved anvil - narrow gauge
P/N 10548	Grooved anvil - wide gauge
P/N 10549	Stainless steel flat anvil
P/N 10567	Stainless steel large anvil for Germanium Top-plate
P/N 10568	Micro Reaction / Flow Cell anvil
P/N 10569	View-Thru anvil/bridge assembly

Spares

P/N 10707	Purge tubes (bellows) 1 pair
-----------	------------------------------

Anvil Options for MK I Golden Gate Top-plates

(without Quick Lock Bridge)

P/N 10501	Sapphire anvil
P/N 10502	Pellet anvil
P/N 10506	Reactive sample anvil
P/N 10517	Grooved anvil - narrow gauge
P/N 10518	Grooved anvil - wide gauge
P/N 10519	Stainless steel flat anvil
P/N 10521	Forensic Sapphire anvil
P/N 10557	Stainless steel large anvil for Germanium Top-plate
P/N 10558	Micro Reaction/Flow Cell anvil

Mk I to Mk II Top-plate Upgrade

P/N 10564	Specac can upgrade an existing Mk I Golden Gate Top-plate to a Mk II version with the quick lock and release bridge and in-built pressure mechanism. The upgrade includes Sapphire anvil P/N 10531 and Pellet Anvil P/N 10532. Return your Mk I Top-plate to Specac for the upgrade.
-----------	--

SPECAC INC

500 TECHNOLOGY COURT, SMYRNA, GA 30082 5211
TEL: 770 803 1106 FAX: 770 319 2488 TOLL FREE: 1-800 447 2558
www.specac.com

SPECAC LIMITED

RIVER HOUSE, 97 CRAY AVENUE, ORPINGTON, KENT BR5 4HE, UK
TEL: 01689 873134 FAX: 01689 878527
www.specac.com

Illustrations, descriptions and specifications - This Data Sheet was correct at the time of going to print. However, Specac's policy is one of continuous product development. The right is reserved to change descriptions and specifications at any time. For the latest details please contact your local Specac Representative.

Golden Gate and Silver Gate are trademarks of Specac Ltd.

DS 38 03/2000