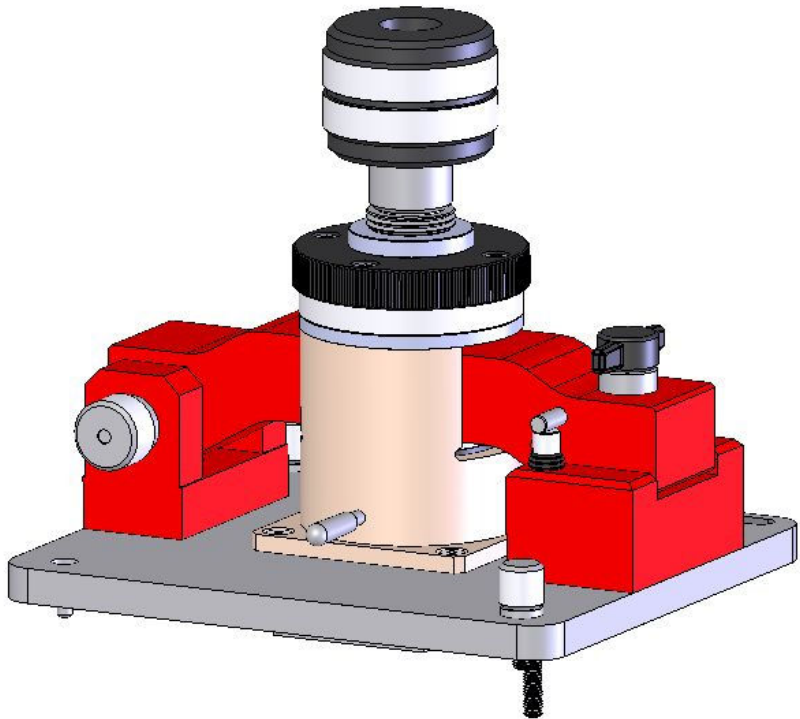




# Heated Envirochamber Golden Gate™ Diamond ATR Top Plate

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## *User Manual*



2I-10660-2



Heated Envirochamber  
Golden Gate™ Diamond ATR Top Plate

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*User Manual*

# *Heated Envirochamber Golden Gate™ Diamond ATR Top Plate P/N GS10660*

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## 1. Introduction

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Thank you for buying a product from Specac.

The Heated Envirochamber Golden Gate™ diamond ATR top plate P/N GS10660 is designed for use on the Golden Gate™ ATR optical unit. This top plate can be used with solid or liquid samples for their spectral analysis, measured via the ATR spectroscopic technique at ambient (room) and up to 200°C temperature conditions. It differs from the standard P/N GS10563 Golden Gate™ diamond ATR top plate, by having an external PEEK (polyetheretherketone) material chamber attached to the bridge and clamp anvil assembly which is used to surround and enclose the diamond /tungsten carbide puck at the sample analysis area of the ATR plate.

A solid or liquid sample can be placed over the diamond ATR crystal for spectral analysis in the usual way for sample handling on the Golden Gate™ accessory, but if the sample is air sensitive or is considered toxic or harmful on exposure to the environment, the chamber of the Heated Envirochamber Golden Gate™ bridge assembly is lowered to seal around the sample analysis area to contain the sample safely and isolate it from the external environment. There are flow ports on the chamber to introduce a particular flow of vapour into the surrounding environment or to evacuate the chamber if necessary. The PEEK chamber seals against a PEEK material surface plate via a sealing O-ring of Viton material. In turn the PEEK plate is sealed on its underside against the diamond/tungsten carbide puck piece of the Golden gate with a smaller Kalrez 7090 O-ring. All other O-ring seals used for isolation of the PEEK chamber when sliding against the bridge components are in Viton material. The aperture hole of the PEEK surface plate allows for use of the Golden Gate™ anvils, P/N GS10531 Sapphire anvil and P/N GS10532 Pellet anvil. These anvils are provided as standard with the Heated Envirochamber Golden Gate™ top plate.

This instruction manual describing the Heated Envirochamber top plate is to be used with the general instruction manual provided for use and explanation of the Golden Gate™ ATR accessory system.

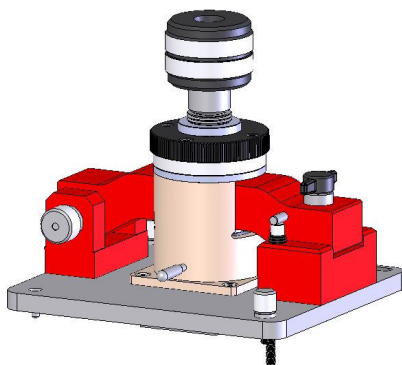
## 2. Checklist of Contents

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On receipt of the equipment please check that the following have been supplied:

- Heated Envirochamber Golden Gate™ diamond ATR top plate assembly. (If ordered as P/N GS10660.)
- Golden Gate™ optical unit with choice of ZnSe or KRS-5 lenses and appropriate Benchmark baseplate. (If ordered as P/N GS10662.)
- 1 Sapphire anvil P/N GS10531.
- 1 Pellet anvil P/N GS10532.
- Instruction manual for use of P/N GS10660.
- Instruction manual (GS10500) for use of the Golden Gate™ ATR Accessory system. (If ordered as P/N GS10652.)

Carefully remove the top plate and Golden Gate™ optical unit from their packing and install the Golden Gate™ ATR optical unit and the top plate into the spectrometer (see Golden Gate™ Manual GS10500).



**Fig 1. Heated Envirochamber Golden Gate™ Top Plate Assembly**

### 3. Installation of the Heated Envirochamber Golden Gate™ ATR Accessory

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If the Heated Envirochamber Golden Gate™ ATR Accessory under P/N GS10662 has been supplied then the Heated Envirochamber Golden Gate™ top plate (1) is already fixed to the Golden Gate™ optical unit (2) (see Fig 2.) and the whole is mounted on an appropriate Benchmark™ type baseplate within the sample compartment of a Spectrometer. (See installation procedure of the Golden Gate™ optical unit for your Spectrometer from the Golden Gate instruction manual (P/N GS10500)).

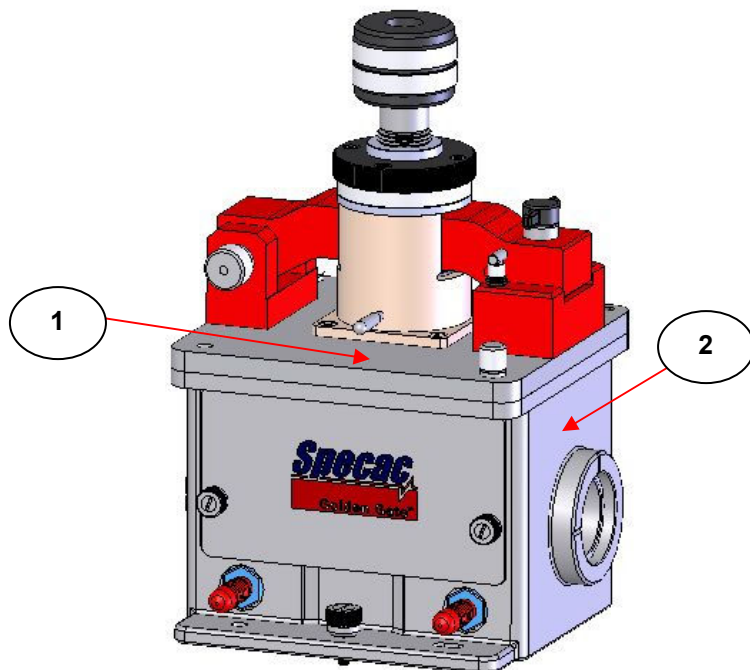


Fig 2. Envirochamber Golden Gate™ ATR Accessory

## Fitting of P/N GS10660 Top Plate

If the Heated Envirochamber Golden Gate™ ATR top plate has been purchased as P/N GS10660, as an alternative top plate to use for an existing Golden Gate™ ATR accessory, it attaches to the Golden Gate™ optical unit (2) by use of the two thumbs screws (3). (See Fig 3.)

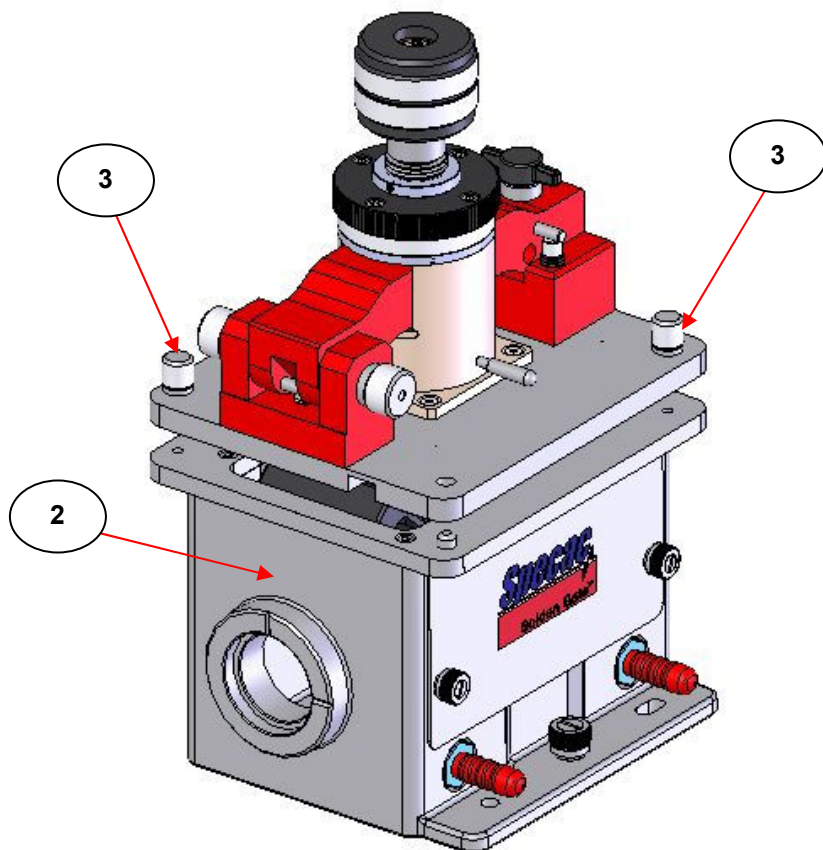


Fig 3. GS10660 Top Plate Fixing to Golden Gate™ Optical Unit



## 4. Operation of the Heated Envirochamber Golden Gate™ ATR Accessory

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### General Safety

For general operation of the Heated Envirochamber Golden Gate™ ATR Accessory, the greatest risk may be presented from the actual chemicals and samples to be studied in order to obtain an ATR spectrum for them. Therefore it is very important to take care that any sample to be analysed is safely contained within the chamber environment, if the sample itself is injurious to health on exposure.

For these reasons if a liquid or solid sample is hazardous in any way, the sample can be prepared for ATR analysis by placing it against the diamond crystal of the Golden Gate™ top plate within a safe preparation area e.g. a glove box or fume hood. The Heated Envirochamber Golden Gate™ top plate alone or the complete accessory (top plate on optical unit) is typically small enough to be contained in these safe preparation areas in this way.

When the sample has been positioned on the diamond the Envirochamber cap can be lowered to seal the sample from an external environment. The Heated Envirochamber Golden Gate™ top plate or accessory can then be removed from the safe preparation area and placed into the spectrometer system for safe containment of the sample whilst it is being measured.

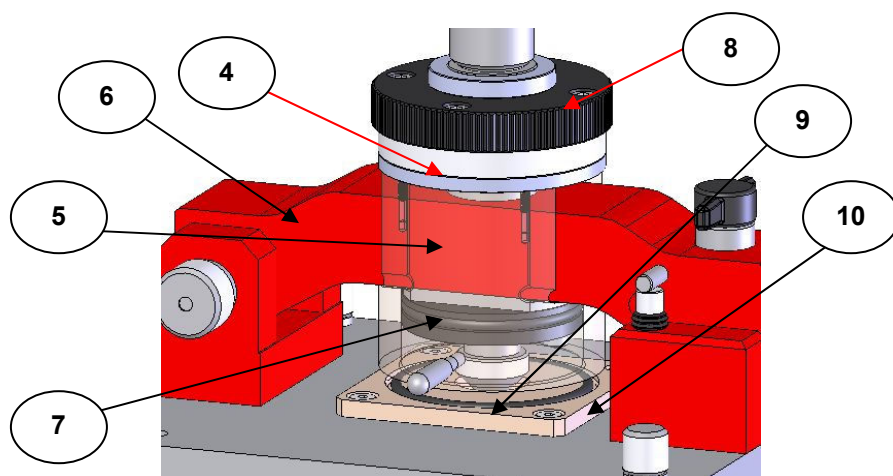
### Sample Handling

The Heated Envirochamber Golden Gate™ diamond ATR top plate or Accessory is supplied with the sapphire tipped anvil P/N GS10531 and the stainless steel pellet anvil P/N GS10532 as standard. Either of these anvils can be used for particular **solid** sample types to bring the sample into close contact with the diamond crystal for analysis. If the sample is **liquid** in nature there is no need for an external force to be

applied via an anvil head for the sample to make good contact with the diamond ATR crystal for analysis of the sample. To understand the use of the anvils supplied and how particular solid and liquid samples can be analysed with the Heated Envirochamber Golden Gate™ Accessory, please refer to the general instruction manual for the Golden Gate™ Accessory in the Sections 8 (Anvil Options) and 9 (Sampling using the Accessory).

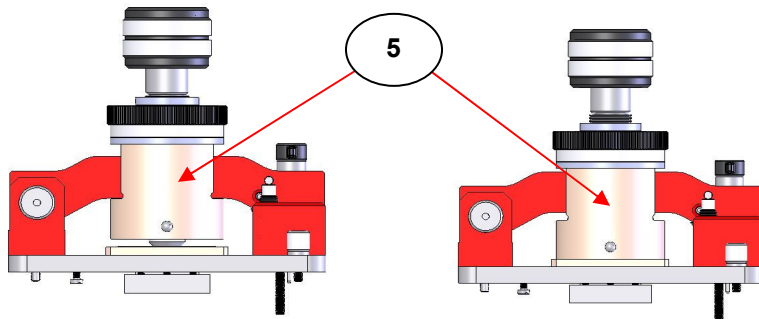
## Envirochamber Cap Assembly

The Envirochamber Cap assembly (4) of the Heated Envirochamber Golden Gate™ top plate has been incorporated into the general bridge, clamp anvil and torque knob assembly mechanism. The PEEK cap part (5) slides past the bridge (6) and sealing is created for this sliding action by use of a Viton O-ring (7). The cap (5) is raised or lowered by rotating the black coloured, knurled knob (8). Rotating the knob (8) clockwise lowers the cap (5) and turning it anticlockwise raises the cap (5). When lowered, the circumference edge of the cap (5) presses and seals against a Viton O-ring (9) that is held within the PEEK material surface plate (10). (See Fig 4.)



**Fig 4. Envirochamber Golden Gate™ Cap Assembly detail – PEEK Cap (5) made transparent to see internal Viton O-ring (7)**

The difference between the PEEK cap (5) being fully raised and fully lowered can be seen in Fig 5.



**Fig 5. Heated Envirochamber Golden Gate™ PEEK Cap in Raised (Left) and Lowered (Right) Position**

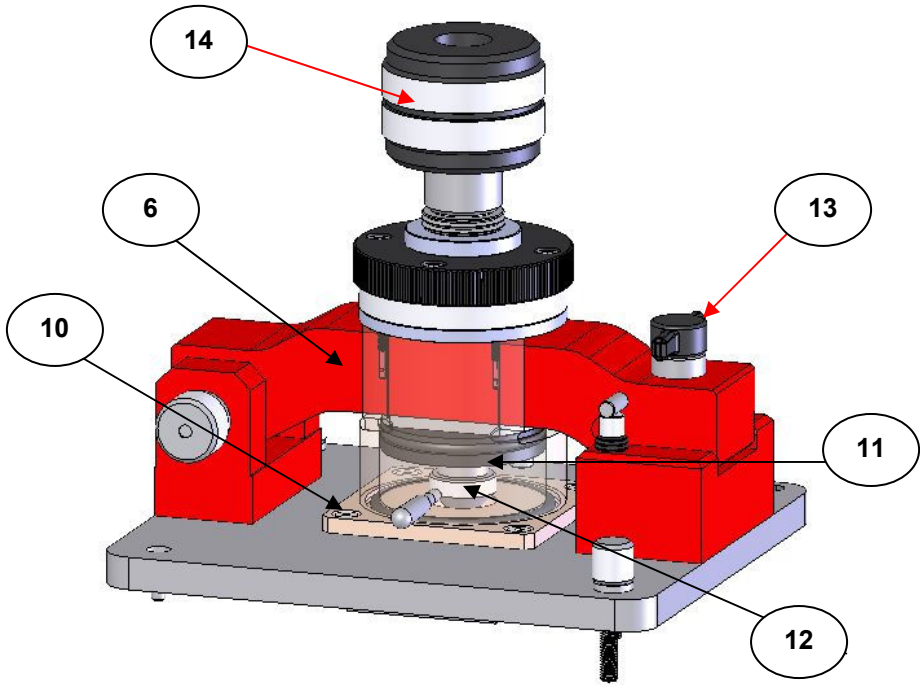
**Warning:** *Always ensure the PEEK Cap (5) is in its raised position before closing and locking the bridge (6).*

### **Using Clamp Anvil Assembly and Envirochamber Cap**

The design of the Envirochamber cap assembly (4) allows for independent movement of raising or lowering the internal clamp anvil screw assembly (11). (See Fig 6.)

For a solid sample analysis, an appropriate anvil (12) (sapphire tipped or pellet anvil) is fitted to the clamp anvil screw assembly (11). (The bridge (6) must be opened/raised to fit the anvil). A solid sample is placed over the diamond crystal and then the bridge is lowered and locked using the quick lock mechanism (13) “T” knob. The solid sample is then forced into contact against the diamond ATR crystal in the usual way by rotation of the torque screw knob (14).

For liquid sample analysis, the clamp anvil screw assembly (11) with an anvil (12) is not required for use. In addition, the bridge (6) of the Heated Envirochamber Golden Gate™ top plate does not need to be closed.



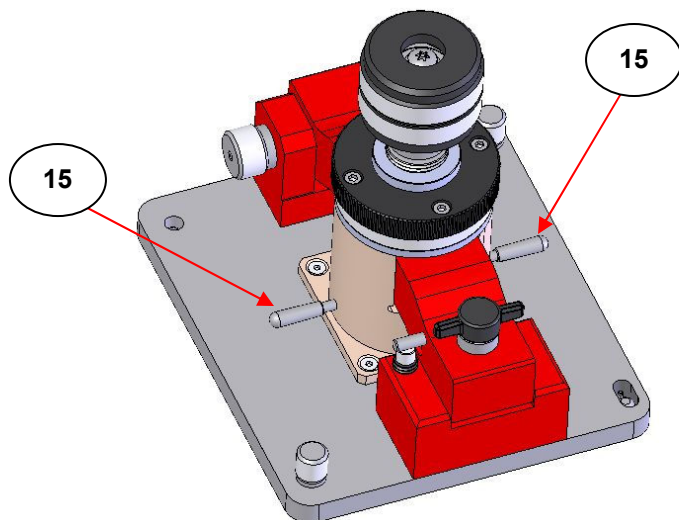
**Fig 6. Heated Envirochamber Golden Gate™ Top Plate Bridge closed, Anvil and Envirochamber Cap lowered – PEEK Cap (5) made transparent to see Clamp Screw (11) and Anvil (12) parts**

A liquid sample just needs to be spotted into position over the diamond at the central aperture of the PEEK surface plate (10) to make sufficient contact for analysis. Keeping the bridge open allows for easier access in placement of a liquid sample on the diamond.

However, in any sampling operation, for either **solid** or **liquid** samples, if the Envirochamber Cap assembly (4) is to be used for sealing the sample against an external environment, the bridge (6) **must** be closed and locked by the quick lock mechanism (13) “T” knob. The PEEK Cap (5) can then be lowered to form the seal with the Viton O-ring (9) in the PEEK surface plate (10).

## Flow Port Connections on the PEEK Cap (5)

An added feature on the Envirochamber Cap assembly (4) is the inclusion of two flow port connection tubes (15). These 3mm O.D. flow tubes have their own plastic covers which are kept in position on the flow tubes to isolate the Heated Envirochamber Golden Gate™ top plate when being used for environmental containment. (See Fig 7.)



**Fig 7. Flow Port Connection Tubes on Heated Envirochamber Golden Gate™ Top Plate**

The plastic covers from the flow tubes (15) can be removed if a flow of vapour or an alternative environment is to be created around a solid or liquid sample which is in contact with the diamond ATR crystal and when the PEEK Cap (5) has been lowered and is sealing around the Viton O-ring (9) and the PEEK surface plate (10). Suitable gas flow connection piping can be attached to the “barbed” ended flow tubes (15) for introduction of an alternative gaseous environment. The pressure sealing capability of the PEEK Cap (5) is no greater than +5psi and down to vacuum capability.

## 5. Displayable Parameters on Temperature Controller for Heated Envirochamber Golden Gate™ Top Plate

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The Heated Envirochamber Golden Gate™ Top Plate is provided with its own dedicated 4000 Series™ Temperature Controller. A separate instruction manual is supplied for specific operation of the 4000 Series™ Temperature Controller.

For operation of the Heated Envirochamber Golden Gate™ Top Plate the parameters of the 4000 Series™ Temperature Controller have been factory set as shown on the following page. Not all of the displayable parameters can be changed but have been listed for reference purposes. If you ever need to change a parameter or autotune the controller for a particular temperature range certain parameter settings will be altered. You can get back to original factory settings by reprogramming the controller with these original values.

### Specifications

Accessory Type GS10660 or GS10662

Voltage	230V	110V	100V
Frequency	50HZ	60HZ	50/60HZ
Max Power	150W	150W	150W
Fuse Rating	1.5A	3A	3A
Fuse Type	T	T	T

Insulation rating of external circuits (appropriate for single fault condition) = basic insulation and protective (earth) bonding.

Humidity operation range – 20% to 90% relative humidity non-condensing.

**Displayable Parameters For Heated Envirochamber Golden Gate™ GS10660 with WEST 6100+ (4000 Series™) Controllers**

<b>Parameter Display (In Green)</b>	<b>Parameter Name</b>	<b>Parameter Factory Set Value</b>
FiLt	Input Filter Time Constant	3.0
OFFS	Process Variable Offset	0
PP <sub>LD</sub>	Primary (Heat) Output Power	0
Pb_P	Primary Output Proportional Band	3.8
ArSt	Automatic Reset (Integral Time Constant)	0.31
rAtE	Rate (Derivative Time Constant)	0.07
biAS	Manual Reset (Bias)	25
SPuL	Setpoint Upper Limit	200
SPLl	Setpoint Lower Limit	0
OPuL	Primary (Heat) Output Upper Power Limit	100
Ct l	Output 1 Cycle Time	4
PhAl	Process High Alarm	200
AHy1	Alarm 1 Hysteresis	1
PLA2	Process Low Alarm	0
AHy2	Alarm 2 Hysteresis	2
APt	Auto Pre-Tune enable/disable	diSA
PoEn	Manual Control select enable/disable	diSA
SPr	Setpoint Ramping enable/disable	EnAb
rP	Setpoint Ramp Rate Value	1800
SP	SP Value	1
SLoc	Set-up Lock Code	10

This is to certify that the:

**HEATED ENVIRO-CHAMBERGOLDEN GATE  
10660/10662**

Manufactured by:  
**SPECAC LIMITED**

Conforms with the protection requirements of Council directives 2004/108/EC , relating to the EMC DIRECTIVE,

by the application of:

- 1) Testing to the following standard:  
EN-61326:2006/8 EMC (Emissions/Immunity) requirements for Electrical Equipment for measurement, control and laboratory use.
- 2) Supported by SPECAC Technical File No. **TF10660**

and also conforms to the general safety requirements of Council Directives 2006/95/EC , relating to the LOW VOLTAGE DIRECTIVE,

by the application of:

- 1) EN61010-1:2001, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use.
- 2) Supported by SPECAC Technical File No. **TF10660**


Conforms with the protection requirements of Council directives 97/23/EC , relating to the PRESSURE DIRECTIVE,

by the application of:

- 1) The Pressure Equipment Regulations 1999 amendment 2002.  
The Pressure Systems Safety Regulations 2000.  
The Simple Pressure Vessels (Safety) Regulations 1991.
- 2) Supported by SPECAC Technical File No. **TF10660**  
And adopting (SEP) Sound Engineering Practice as referenced in the above Regulations.

Responsible Person:

**Name:** Mr.G.Poulter  
**Position:** Technical Director  
**Serial No:**  
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**Signature:**   
**Of:** Specac Ltd. **Date:** 18th Mar 2011  
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A SMITHS INDUSTRIES COMPANY



## *6. Spare Parts for Heated Envirochamber Golden Gate™ Top Plate*

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P/N GS10531 Sapphire tipped anvil.

P/N GS10532 Stainless steel pellet anvil.

P/N GS10550 Essential Spares Kit.

### **Legend for Heated Envirochamber Golden Gate™ Top Plate**

(1) Heated Envirochamber Golden Gate™ top plate.

(2) Golden Gate™ optical unit.

(3) Top plate fitting thumb screw.

(4) Envirochamber cap assembly.

(5) PEEK cap.

(6) Golden Gate™ bridge.

(7) Viton O-ring to seal PEEK cap.

(8) Knob to raise/lower PEEK cap.

(9) Viton O-ring in PEEK surface plate.

(10) PEEK surface plate.

(11) Clamp anvil screw assembly.

(12) Anvil.

(13) Bridge quick lock mechanism “T” knob.

(14) Torque screw knob assembly.

(15) Flow port connections on PEEK cap.



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