Mini-Film Maker Kit

User Manual

2I-03970-9

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Mini-Film Maker Kit P/N GS03970

CONTENTS

1. Introduction

Thank you for buying a product from Specac.

The Mini-Film Maker Kit P/N GS03970 has been designed to produce thin films of certain polymer/plastic materials quickly and easily.

It consists of a set of purpose built heated platen assemblies within a Mini-Pellet Press to allow for introduction of a separate, matching film maker assembly of parts for production of thin films of suitable polymer materials. The thin films produced have dimensions of 15mm diameter and nominal thicknesses of 0.015, 0.025, 0.05, 0.10, 0.25 and 0.5mm, depending upon which sizing ring is used.

The heated surfaces of the Mini-Pellet Press are controlled for their temperature up to a maximum of 260°C (250°C at the sample), by their own dedicated temperature controlling system. (The temperature controller is permanently linked/connected via a power cable and sensing thermocouple to the heated surfaces.)

To make a suitable thin film, a solid pellet of polymer material is placed within the separate Film Maker Assembly with a specific sizing ring. The press surfaces are heated to a specific temperature that will enable melting and softening of the specific polymer material in the Film Maker Assembly to be formed into a thin film. When the operating temperature has stabilized, the Film Maker Assembly with the polymer sample is transferred into the heated press. The Film Maker Assembly is loosely clamped into position within the press by turning of the leadscrew assembly on the press to allow for heat transfer to the polymer material to melt the sample.

When the sample has melted and softened sufficiently, which typically takes three to four minutes, a tonnage load (typically 0.5 tons as indicated on the load gauge of the press) is applied to compress the polymer sample into a uniform thin film. After holding this load typically for 2 minutes, the load is reduced to zero tons and the Film Maker Assembly is removed from the heated press and placed on a cooling plate.

After allowing for some time to cool, a formed thin film can be removed using tweezers from the Film Maker Assembly. The prepared film is then mounted into a 3” x 2” sized Specacard, which in turn allows for correct positioning of the thin film within an Infrared spectrometer system sample compartment to obtain a transmission infrared spectrum of the thin film polymer sample.

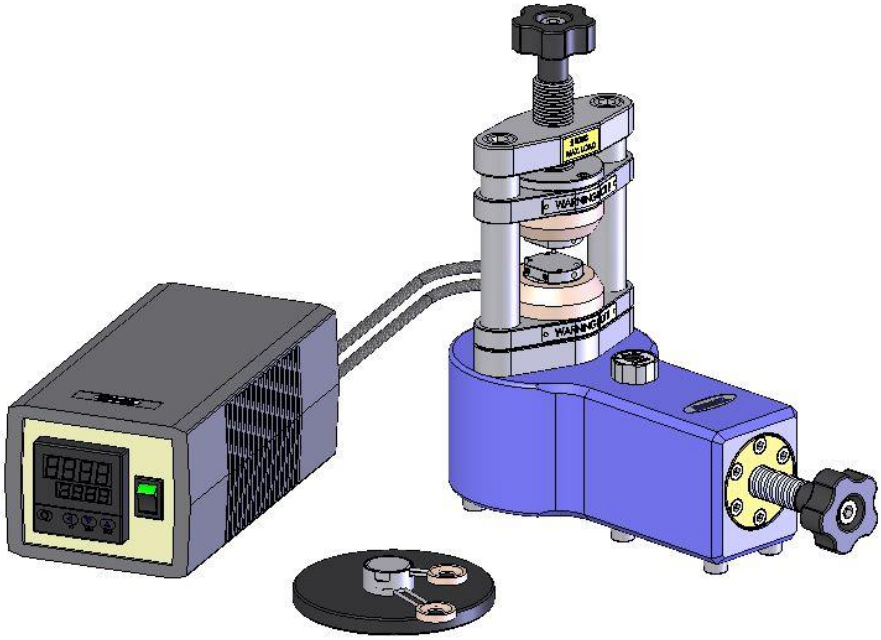
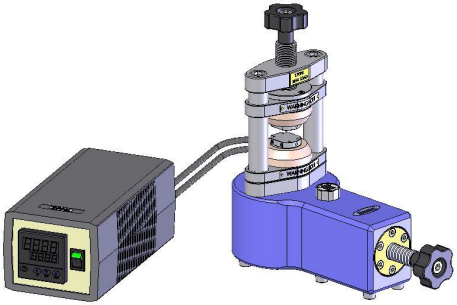


Fig 1. Mini-Film Maker Kit of Parts P/N GS03970

2. Checklist of Contents

Check that the following items have been supplied with the Mini-Film Maker Kit P/N GS03970.

- Mini-Film Maker Press and Controller Parts



- Mini-Film Maker Assembly with 6 sizing rings

  P/N GS03971.

- Mini-Film Maker Cooling Plate P/N GS03974.

- 30V Power pack supply block with three different mains leads.

- Specacards 10mm dia. aperture (100 cards) P/N GS03800.
- Aluminium Foil Discs 1 large, 1 small dia. (200 pairs) P/N GS03973.
- Tweezers P/N GS15628

Carefully remove the Mini-Film Maker parts and other items supplied from their packaging and prepare the items for use.

3. Operation of the Mini-Film Maker Kit

The Mini-Film Maker Press

The Mini-Film Maker Press (**1**) has been designed to produce up to a maximum 2 tons load to the heated pressing surfaces (**2**) for a sufficient force to compress a melted polymer sample contained in the Film Maker Assembly (**3**). (See Fig 2.) To make a thin film within the Mini-Film Maker Kit, typically a 0.5 Ton load is applied from the press (**1**) itself.

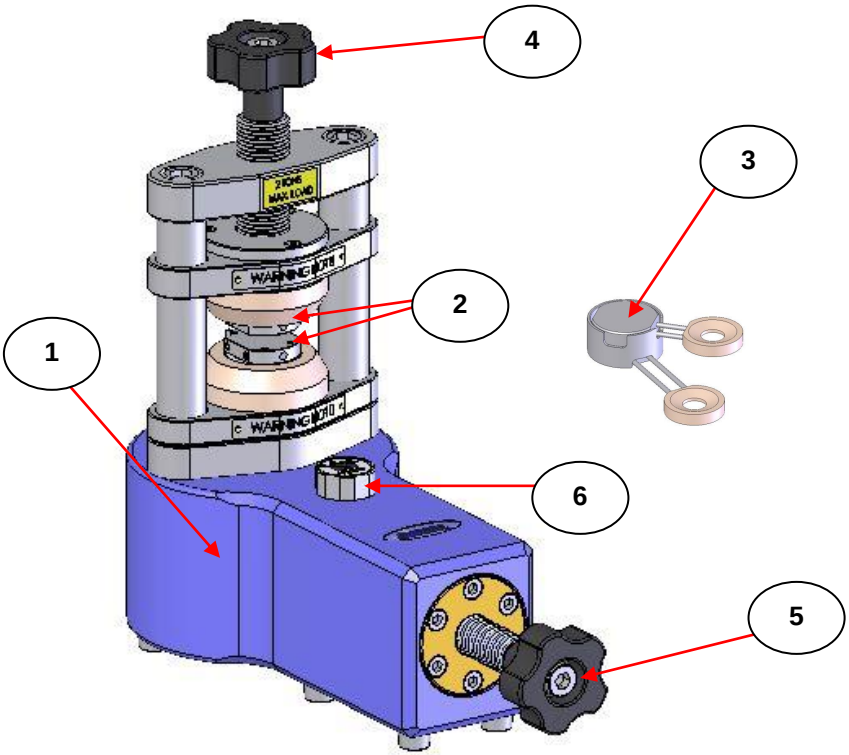


Fig 2. Mini-Film Maker Press (1) and Mini-Film Maker Assembly (3)

When the Film Maker Assembly (**3**) is placed into the press (**1**) it is loosely clamped into position to force the component parts together by turning the leadscrew assembly knob (**4**). When the sample for pressing has reached its melting point temperature equilibrium, the force for compression of the sample into a thin film can be applied by turning the pressure screw knob (**5**) clockwise. This action compresses a hydraulic fluid (oil) to raise a pressing piston from below and compress the film maker assembly of parts (**3**) between the heated pressing surfaces (**2**).

Note: *Before applying any load from turning of the pressure screw knob (**5**) clockwise ensure that this screw assembly is opened fully anticlockwise for the start of its travel.*

To help in knowledge of the load being applied there is a small pressure indicator gauge (**6**) on the press body which shows the actual tonnage load being applied and when to stop turning the pressure hand knob (**5**) when the tonnage load has been reached.

The Mini-Film Maker press (**1**) is small and relatively light enough in weight that it could be considered as a portable device to be held in one hand whilst turning the pressure screw hand knob (**4**) with the other. However, because of the high temperatures (typically 200°C to 250°C) used for thin film formation, in operation the press (**1**) **MUST** be used on a secure work bench surface. One hand may be used to support the press body (**1**) when working on this solid surface whilst the other hand turns the pressure knob (**4**).

Warning: *If you use the Mini-Film Maker press (**1**) near the edge of a bench surface to turn the pressure screw knob (**4**), be careful that as much of the weight of the press as possible is on the bench surface itself, to prevent the press from falling to the floor.*

There is no requirement to permanently bolt the Mini-Film Maker press (**1**) to a work surface to apply a load safely to a sample, thus enabling easy storage of the press and controller parts if needed.

The Mini-Film Maker Temperature Controller

Prior to placing the Mini-Film Maker Assembly (**3**) into the press (**1**), a temperature is set for the heated pressing surfaces (**2**) of the press. The temperature is set by selecting a value on the dedicated temperature controller (**7**) connected to the press (**1**). (See Fig 3.)

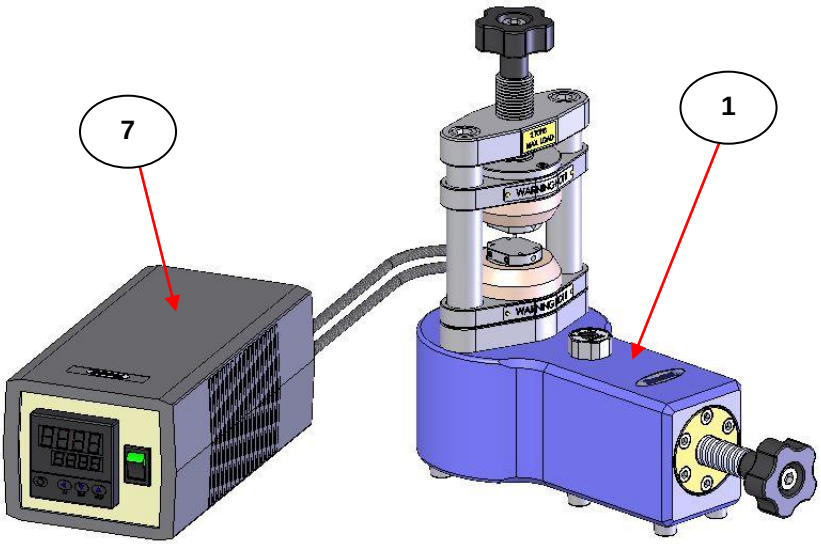


Fig 3. Mini-Film Maker Temperature Controller (7) and Press (1)

Fig 4. shows the rear and front panel details of the controller (**7**). For the rear panel details the socket connection (**8**) is where the power connection cable is placed from the 30V power supply pack supplied. (See checklist of contents). Three different mains power supply cable leads have been provided to connect the power supply pack to a mains supply. Choose the appropriate power cable for your mains supply wall socket and connect the mains cable lead to the three-pin connection socket on the 30V power supply pack.

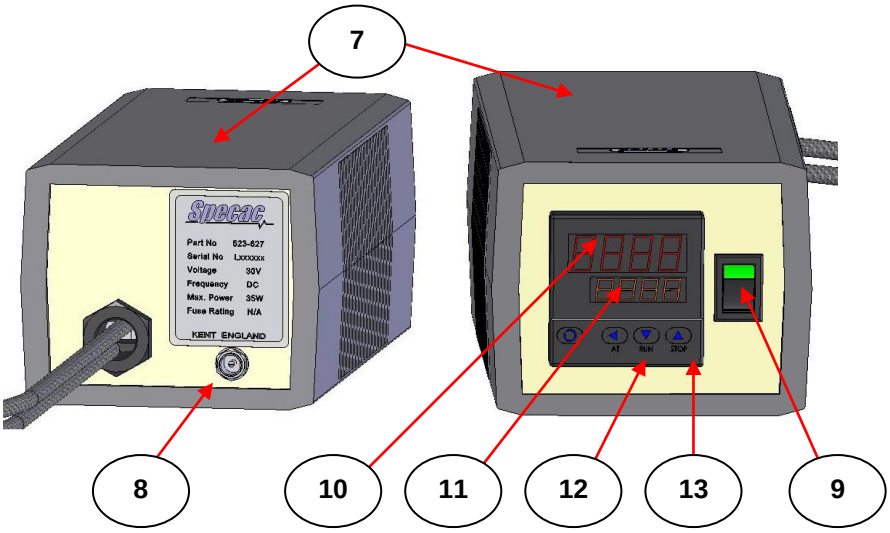


Fig 4. Rear and Front Views of Mini-Film Maker Controller

When the 30V power supply pack has been connected, the controller (**7**) is switched on by the rocker switch (**9**) on the front panel. When switched on, a green colour strip is seen on the top edge of the rocker switch.

There are two temperature display readings on the front panel of the controller (**7**). The top display (**10**) is for the **actual** operating temperature reading in °C at the heated surfaces (**2**) themselves. The lower display (**11**) is the **set** temperature to be applied. For a film sample itself, typically the temperature value for the sample will be 10°C less than the **actual** (**10**) temperature being displayed. Therefore, if a sample requires a temperature of 180°C to melt, then a value of 190°C should be input for the **set** display (**11**). When the temperature value in both the actual (**10**) and set (**11**) displays read the same (i.e. 190°C), the system is at equilibrium and the sample can be pressed under a tonnage load to form a thin film. The set (**11**) temperature value is adjusted by use of the down (**12**) and up (**13**) buttons. Pressing the buttons (**12/13**) once changes the temperature in 1°C steps. Holding the buttons (**12/13**) down accelerates the °C step change. (The other buttons on the panel are redundant.)

The Mini-Film Maker Assembly

Prior to placing a polymer sample in the Mini-Film Maker press (**1**) set at a specific operating temperature to form a thin film, the polymer/plastic sample is prepared in the Film Maker Assembly (**3**). Fig 5. shows an exploded view of the Film Maker Assembly (**3**) parts for the sequence of their construction.

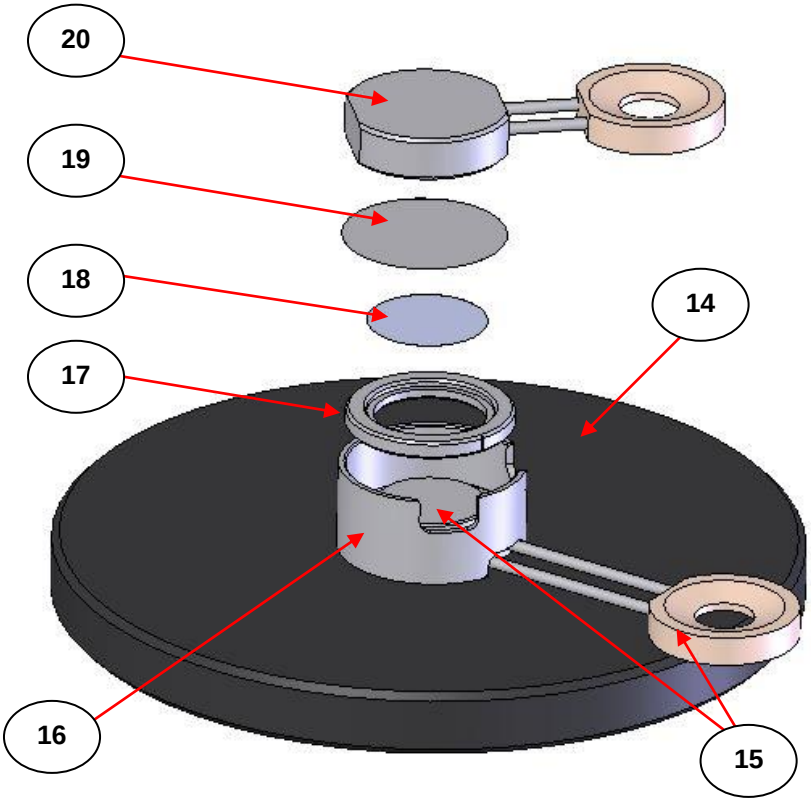


Fig 5. Mini-Film Maker Assembly

A cooling plate (**14**) is provided to place a **hot** Mini-Film Maker Assembly (**3**) when it is taken out of the press (**1**) after pressing. In Fig 5. the lower film platen assembly (**15**) is seen resting on the cooling plate (**14**). The film maker shield (**16**) has been placed the correct way up over the lower film platen assembly (**15**).

Note: *The shield (**16**) component acts to keep all of the other parts assembled together when the Mini-Film Maker Assembly has been constructed to contain a sample.*

There are six different thickness sizing rings (**17**) to choose. The nominal thickness of a film that can be prepared are 0.015, 0.025, 0.05, 0.10, 0.25 or 0.5mm. The diameter of any thickness of film is 15mm. The sizing rings are marked with a groove on their outer circumference edge. Accordingly, the sizing rings are identified as:

0.015mm (15um) ring has 6 grooves.
0.025mm (25um) ring has 5 grooves.
0.05mm (50um) ring has 1 groove.
0.10mm (100um) ring has 2 grooves.
0.25mm (250um) ring has 3 grooves.
0.50mm (500um) ring has 4 grooves.

Take one of the six sizing rings (**17**) and place it the correct way up into the shield (**16**) to rest over the lower film platen assembly (**15**). (See detail in Fig 6.)

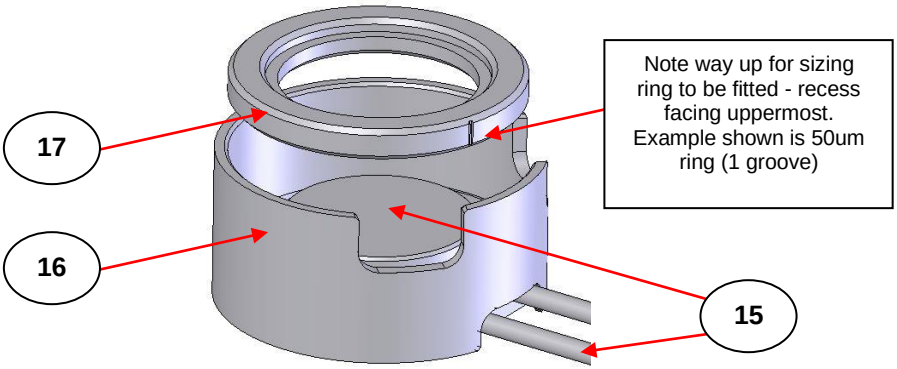


Fig 6. Sizing Ring (17) Placed Into Shield (16)

Next, take the smaller diameter aluminium foil (**18**) and carefully place within the sizing ring (**17**) to rest over the surface of the lower film platen assembly (**15**). Ensure that the shiny surface side of the foil (**18**) is facing uppermost, as this surface of the foil is to come into contact with the sample to be pressed.

Note: *The aluminium foil discs have a matt surface and a shiny surface. They are 12microns thick. Contact of a specific foil surface with the sample whilst pressing, will determine the amount of spectroscopic interference fringes produced by the thin film. If a reduction in spectroscopic interference fringing is sought, the matt surfaces of the two foils should be in contact with the sample. Conversely, if fringes are required, (e.g. to measure the film thickness) then the shiny surfaces should be in contact with the sample.*

Although not shown in Fig 5., the next stage for construction is introduction of a polymer/plastic sample. (The amount of sample to use will vary dependent upon the thickness of film to produce and the sample type itself.) Carefully place the polymer/plastic sample to be pressed centrally over the smaller diameter foil (**18**) surface. Now, take the larger diameter aluminium foil (**19**) and carefully place it over the sample ensuring that the shiny side of the foil is downwards such that it will be in contact with the sample whilst pressing.

Finally, carefully place the top film platen assembly (**20**) over the foil/sample/foil “sandwich” and locate the top film platen (**20**) into the shield (**16**). You should have a construction of parts as seen in Fig 7.

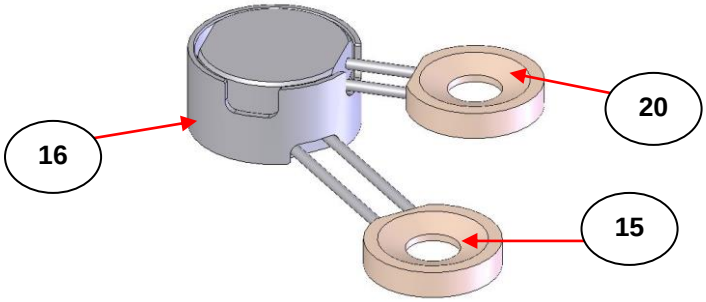


Fig 7. Completed Construction of Mini-Film Maker Assembly (3)

4. Procedure for Making a Polymer Thin Film

The procedure below can be followed for production of a polymer thin film using a specific PVC (polyvinylchloride) material which melts at 180°C as an example. Temperatures and pressing conditions may be different if you wish to prepare a thin film of an alternative polymer material.

As a guide to help, please see the table in Section 5) for some alternative polymer materials and their melting points.

Setting of Temperature on Press

The following procedure is to make a PVC thin film. It is to be melted at 180°C prior to compression in the Film Maker Assembly (**3**) at a 0.5 tons load.

Ensure that the temperature controller (**7**) is connected via its power pack to the mains and switched on via the on/off rocker switch (**9**).

Ensure that the heated surfaces (**2**) of the press (**1**) are touching by bringing them together from rotation of the lead screw knob (**4**) before setting any temperature.

Using a combination of pressing the up (**13**) and down (**12**) temperature control buttons select a temperature value of 190°C for the **set** display (**11**). 190°C should be set to ensure a sample melt temperature of 180°C. Typically it takes approximately 4 to 5 minutes for the **actual** temperature display (**10**) to reach equilibrium at 190°C from room temperature (circa 25°C) and to coincide with the set temperature display value (**11**).

Whilst the heated surfaces (**2**) of the press are reaching their operating temperature the PVC sample can be prepared in the Film Maker Assembly (**3**).

Film Maker Assembly – Sample Construction

Choose one of the six sizing rings (**17**) to use in the construction for the optimum thickness of film. E.g. the one groove sizing ring will produce films of at least a minimum 0.05mm (50 um) thickness, provided the sample size/amount and melt point conditions are correct.

Note: *For the first couple of times in film preparation with a new sample type it may be necessary to vary a sample amount and slightly adjust the melting point temperature to ensure consistent thickness films. It is the slight changes of these conditions (and a tonnage load to apply) that establishes a set procedure for a specific thickness of film to be produced each time with the sample type.*

Follow the procedure for construction of the Film Maker Assembly (**3**) with a sample from pages 11 to 13 of this instruction manual using your sample polymer/plastic material. (Our example sample is PVC). When constructed the whole assembly is ready to be placed into the press (**1**). Ensure the heated surfaces (**2**) have reached stability at the equilibrium temperature.

Insertion of Film Maker Assembly into Press

To insert the constructed Film Maker Assembly (**3**) with sample into the press at its operating temperature turn the lead screw knob (**4**) anticlockwise to create a sufficient gap between the heated surfaces (**2**) for accommodation of the cold Film Maker Assembly (**3**).

On the lower heated surface there are two small location pins (**21**) that help to correctly centralise the Film Maker Assembly (**3**) into position. (See Fig 8.) Insert the Film Maker Assembly (**3**) until the parts engage and touch both location pins (**21**).

Note: *Prior to any insertion of the Film Maker Assembly (**3**) into the press (**1**) between the heated surfaces (**2**) and before any tonnage load is to be applied, ensure that the pressure screw assembly knob (**5**) is fully unwound anticlockwise to its start position.*

When the Film Maker Assembly (**3**) has been positioned correctly and centrally onto the **lower** heated surface (**2**), turn the leadscrew knob (**4**) clockwise to bring the **top** heated surface (**2**) into close contact to force the film maker parts loosely together to begin the process of heat transfer to the polymer sample.

Initially, there will be a reduction in the **actual** temperature display (**10**) value, as the cold Film Maker Assembly (**3**) is introduced into the hot environment, but within a couple of minutes the actual temperature display (**10**) and the set temperature display (**11**) values will read the same as the sample temperature reaches equilibrium. (For our example PVC polymer sample the actual (**10**) and set (**11**) temperature values will both read 190°C, but typically the sample temperature itself will be circa 10°C lower at 180°C.)

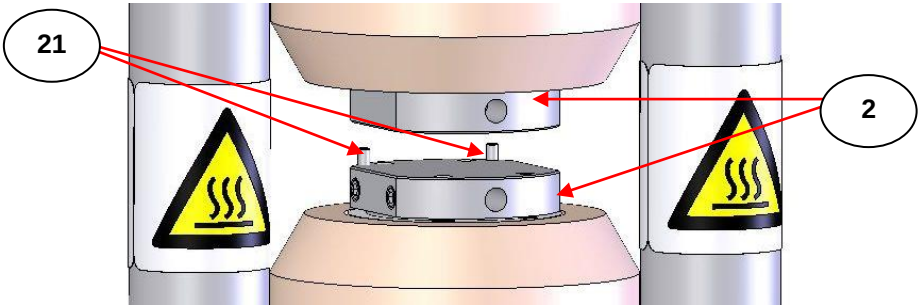


Fig 8. Location Pins on Lower Heated Surface for Central Positioning of the Film Maker Assembly (3)

Applying a Tonnage Load to the Film Maker Assembly

When the actual (**10**) and set (**11**) temperature values have reached equilibrium and stability, the polymer sample within the Film Maker Assembly (**3**) will have melted or softened sufficiently to apply a tonnage load to fully compress into a thin film.

Important! *When at temperature equilibrium and before applying a tonnage load via turning of the pressure screw assembly knob (**5**), apply a further force to the Film Maker Assembly (**3**) between the heated surfaces (**2**) by hand tightening (turning clockwise) the lead screw assembly knob (**4**).*

When the lead screw assembly (**4**) is hand tight, begin applying a tonnage load via clockwise turning of the pressure screw assembly knob (**5**). Usually a 0.5 tons load as indicated at the pressure gauge (**6**) is sufficient for the formation of a thin film. (See Fig 9).

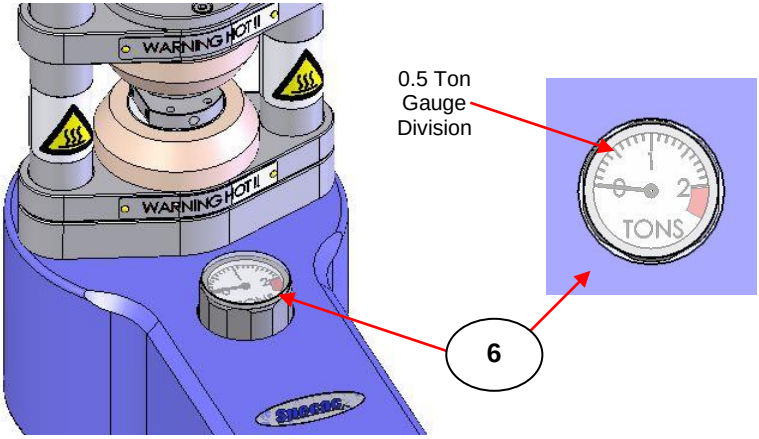


Fig 9. Mini-Film Maker Pressure Gauge

When the tonnage load has been reached as indicated at the gauge (**6**) stop turning the pressure screw assembly knob (**5**). Hold the tonnage load for typically 30 seconds and then release the tonnage load by anticlockwise turning of the pressure screw assembly knob (**5**) all the way back to its start position. (Open fully anticlockwise.)

Removal of Film Maker Assembly from Press

When the compressive tonnage load has been released the **hot** Film Maker Assembly (**3**) containing a compressed sample film is removed from the press (**1**).

Separate the heated surfaces (**2**) further to aid in removal of the Film Maker Assembly (**3**) by turning slightly anticlockwise the lead screw assembly knob (**4**). Now, very carefully remove the **hot** Film Maker Assembly (**3**) and place it onto the cooling plate (**14**).

Note*: At this stage retighten the lead screw assembly knob (**4**) to ensure the heated surfaces (**2**) are touching each other to stabilise the temperature in readiness for the next sample.*

It is possible whilst the hot Film Maker Assembly (**3**) is resting on the cooling plate (**14**) to separate the components using the tweezers supplied with the kit to gain access to the large diameter foil (**19**), sample and small diameter foil (**18**) sandwich of thin film parts. Place this “film sandwich” separately onto the cooling plate (**14**) to aid in a quicker cooling of these parts if desired.

Removal of Foils to Access a Thin Film Sample

When sufficiently cool to touch, the aluminium foils (**18** and **19**) are carefully peeled away from the thin polymer film that has been formed from the heating and pressing process. The tweezers supplied can help in the process of separation of the foils, although a sharp scalpel blade may also be of help to initially prise apart the film from (specifically) the smaller diameter foil edge.

Warning! *Be careful if using a sharp scalpel blade etc, for the film removal from the aluminium foils.*

Depending upon the polymer sample type used, certain samples (particularly those containing fillers), may give release problems from the aluminium foils. If the sample tends to stick to the aluminium foil, the foil may be pre-coated with a light smear of a non silicone based releasing agent. This requires treating a batch of aluminium foils according to the instruction of the releasing product. Any contamination of the pressed film may be removed by wiping clean. If the sample sticks stubbornly to the aluminium foil, the foils can be removed by immersion of the sample film and foils into a solution of concentrated sodium hydroxide. Be sure to check prior to this procedure that the sample itself will not be attacked by the sodium hydroxide.

Mounting the Thin Film Sample into a Spectrometer

When the aluminium foils (**18** and **19**) have been removed, a thin film of circa 15mm diameter and of a thickness corresponding to the sizing ring (**17**) chosen will have been produced.

Supplied with the kit of parts are some Specacards. These cards are designed to mount the thin film made by placing the film carefully and centrally over one of the 10mm diameter aperture holes on the adhesive surface side of the card. The Specacard is then folded over along its central fold line to bring the two adhesive surfaces together to trap the film into position between the aperture holes.

The resultant Specacard with the thin film sample is 3” x 2” in size (75mm x 50mm) and slide fits into a spectrometer/instrument that utilises a 3” x 2” slide mount plate system within the sample compartment.

Notes on Mini-Film Maker Sample Preparation

To produce a consistent thin film, it is very important the Mini-Film Maker parts that come into contact with any polymer sample are kept as clean as possible between individual sample preparations.

The film thickness produced may sometimes deviate from the specified sizing ring thickness. This is due to the nature of the material being pressed. However, the film thickness achieved will be reproducible, provided a consistent method of preparation is adopted.

Tips on Pressing

Warning! *Samples **should not** be pressed in the Mini-Film Maker accessory when cold.*

With a new sample type some experiments will be required to determine the optimum amount of sample to load for any given thickness. If the pressed film does not completely cover the aluminium foil (**18** and **19**) surfaces the film will be too thin and probably wedge-shaped. If the film does completely cover the aluminium foil surfaces,

the 15mm diameter area will give the required thickness. This thickness can be measured independently and the pressing cycle procedure can be adjusted accordingly for the sample amount, possibly the melting temperature, tonnage load and duration of tonnage load whilst pressing to alter a thickness of film. If too much sample is loaded, a thick rim may be obtained on the resultant film which may make mounting of the film difficult or cause the sizing ring to become stuck and fused together with the aluminium foils.

Careful monitoring of a melting temperature will be required for samples (e.g. Nylon) which oxidize at temperatures slightly above the softening temperature. The sample should be pressed as soon as softening is observed.

It is important to ensure that all the components used in the pressing cycle are not over pressurised in the press (**1**) when the sample is **cold** and not at its melting or appropriate softening temperature. Failure to observe this will result in the sample cutting through the aluminium foils (**18** and **19**) and, when subsequently melted and pressed, sticking to the surfaces of the lower (**15**) and top (**20**) film platen assemblies.

Cleaning of Parts

Ensure that the lower (**15**) and top (**20**) film platen assemblies and sizing rings (**17**) are kept clean for every use. Remove all sticky materials by carefully scraping with a sharp blade (avoid gouging any surfaces) and wipe the surfaces with lint-free tissues and a suitable solvent. **DO NOT** use acidic or basic solutions to clean the metal parts.

As new small (**18**) and large (**19**) diameter aluminium foils are used for each new thin film preparation there is a minimal risk of cross-contamination between sample preparations. It is important though that the film platen assembly parts (**15** and **20**) are as clean and smooth for their surfaces as possible, as the overall quality of a film is dependent upon their condition.

5. Melting Point Temperatures for Some Common Polymers

For a typical pressing procedure to form a thin film with the Mini-Film Maker Kit a PVC (polyvinylchloride) polymer material has been used at a melting temperature of 180°C and a pressing load of 0.5 tons.

The maximum temperature of operation for the Mini-Film Maker Kit is 260°C at the heated surfaces (**2**) but typically the temperature value is 10°C lower for the sample itself within the Film Maker Assembly (**3**).

The table below shows typical melting point temperatures and ranges for some common polymer materials that can be used with the Mini-Film Maker Kit to form thin films. The generic name for the polymer material itself has been used. A specific material of this type may vary in its content of fillers of additives and so a specific melting point for this material may or may not be known. An overall typical melting point temperature range has been given.

Specac would suggest that the table below for setting of a suitable melting point temperature should be treated as a guide only. The actual formation of a specific thickness of film for the sample material you are to use will not only be dependent upon the correct melting point temperature being set but also the amount of sample and tonnage load to be applied.

Polymer Material	Melting Point (Range) °C
Polyethylene Terephthalate	(250-260)
High Density Polyethylene	(212-265)
Low Density Polyethylene	(98-115)
Polyvinyl Chloride (PVC)	(100-260)
Polypropylene	(160-175)
Polystyrene	240
Nylon 6	223
Polymethyl Methacrylate	160

6. Spare Parts for Mini-Film Maker Kit

GS03971 Film Maker Assembly complete for Mini-Film Maker (consists of top platen assembly, shield, lower platen assembly and set of six sizing rings).
GS03972 Set of sizing rings (6) for Mini-Film Maker (15um, 25um, 50um, 100um, 250um and 500um sizes).
GS03973 Set of aluminium foils (large and small diameter) for Mini-Film Maker. (200 pairs).
GS03974 Cooling plate for Mini-Film Maker.
GS03975 Mini-Film Maker platens set (consists of top platen assembly, shield, lower platen assembly).
GS03800 Specacards (pkt 100) 10mm diameter aperture.
GS15628 Tweezers (forceps).

Specifications for the Mini-Film Maker Kit

Maximum load capability of press - 2 tons.
Maximum temperature (at heated pressing faces) - 260°C.
Temperature change – 1°C steps.
Power of heaters (Watts) – 35Watts.
Thermocouple – K-type (NiCr/NiAl).
Thin film formed diameter – 15mm.
Thin film formed thicknesses (nominally) – 0.015, 0.025, 0.05, 0.10, 0.25, 0.50 mms.
Maximum space between heated pressing faces – 20mm.
Minimum space between heated pressing faces – 0mm (faces touch).
Press piston stroke – 0.5mm.
Top heated pressing face diameter – 25mm.
Lower heated pressing face diameter – 25mm.
Dimensions of press (excluding leadscrew assemblies) - W 104mm x H 198mm x L 197mm.
Dimensions of controller - W 101mm x H 80mm x L 200mm.
Weight of press and controller - 5.7Kg.

Legend of Parts for Mini-Film Maker Kit

(**1**) Mini-Film Maker press.
(**2**) Heated pressing surfaces of Mini-Film Maker press.
(**3**) Film Maker Assembly
(**4**) Lead screw assembly knob.
(**5**) Pressure screw assembly knob.
(**6**) Pressure (tonnage load) indicator gauge.
(**7**) Temperature controller of Mini-Film Maker press.
(**8**) Rear power socket connection on temperature controller.
(**9**) On/off rocker switch on temperature controller.
(**10**) Top (actual) temperature display.
(**11**) Lower (set) temperature display.
(**12**) Down (reduce) temperature button.
(**13**) Up (increase) temperature button.
(**14**) Cooling plate for Film Maker Assembly.
(**15**) Lower film platen assembly.
(**16**) Film maker shield.
(**17**) Sizing ring.
(**18**) Small diameter aluminium foil.
(**19**) Large diameter aluminium foil.
(**20**) Top film platen assembly.
(**21**) Location pins on lower heated pressing surface.

WEEE Directive For Equipment Disposal

The symbol (above) on the back of the controller indicates that this product complies with the Waste Electrical and Electronic Equipment Directive (WEEE). If this product is in use and was purchased within the European Union, please contact your local sales agent or Specac for arrangement in disposal of this equipment.

EC Certificate of Conformity for Mini-Film Maker GS03970

Declaration of Conformity

According to

EMC Directive 2014/30/EU
LVD Directive 2014/35/EU
RoHS Directive 2011/65/EU

Specac Ltd, River House, 97 Cray Ave, Orpington, Kent BR5 4HE, United Kingdom declare under our sole responsibility that the following product:

Product Name: Mini Film-Maker
Model No. GS03970

Has been tested and found in conformity with the following European harmonized standards:

EN61000-3-2:2014, EN61000-3-3:2013, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11.	EMC Part 3-2: limits – Limits for harmonic current emissions. Limitation of voltage changes, voltage fluctuations and flicker in public LV supply systems. ESD immunity, Radiated Immunity, EFT/Burst, Surge, Conducted Immunity, Magnetic Field, Dips & interruptions.
EN61010-2-1-1:2003 EN61010-2-010:2014	LVD Safety requirement. Particular requirements for laboratory equipment for the heating of material.
Directive 2011/65/EU EN50581:2012	RoHS Directive and the technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Signed: Date: 23/05/2018

Ian Gaskin
Engineering Manager

Specac Document Number: GS03970_CE_DoC_20180523 Date: 23 May 2018

RoHS – China Certificate of Conformity for Mini-Film Maker Kit P/N GS03970

RoHS 符合性声明

China RoHS 2.0 Declaration of Conformity

产品名称 (Product Name)： Mini Film-Maker

产品型号 (Product No.)： GS03970

注册商标 (Trade Mark)：

制造商名称及地址(Company Address)：
Specac Ltd, River House, 97 Cray Avenue, Orpington, Kent, BR5 4HE, UK.

生产厂名称及地址(Production Factory Address)：
Specac Ltd, River House, 97 Cray Avenue, Orpington, Kent, BR5 4HE, UK.

Specac Ltd 特此声明，我公司所生产的以上产品，符合欧盟 Directive 2011/65/EU 及中国 GB/T 26572-2011《电子电气产品中限用物质的限量要求》的标准。产品中的各项限用物质含量，符合如下列表的要求，并遵循 SJ/T 11364-2014 的标识要求。

Specac Ltd hereby declares that the products listed above are compliant with requirements of EU Directive 2011/65/EU, China GB/T 26572-2011 and SJ/T 11364-2014. The products contain less than the limits stated below for the six restricted substances.

有害物质或元素名称 Restricted Substance	最高允许含量 Maximum Allowable Limit
铅(PB)	1000 ppm
汞(Hg)	1000 ppm
镉(Cd)	100 ppm
六价铬(Cr^{6+})	1000 ppm
多溴联苯(PBB)	1000 ppm
多溴二苯醚(PBDE)	1000 ppm

遵循标准 (Test Standard)：
中国（China）：GB/T 26572-2011, SJ/T 11364-2014,
欧盟（EU）： Directive 2011/65/EU, IEC 62321:2013, IEC 62321:2008.

签字(Sign) **日期**(Date): 23/05/2018

Ian Gaskin
工程经理 (Engineering Manager)

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Notes for Use of Mini-Film Maker Kit

Notes for Use of Mini-Film Maker Kit

Worldwide Distribution

France
Eurolabo - Paris.
Tel.01 42 08 01 28
Fax 01 42 08 13 65
email: contact@eurolabo.fr

Germany
L.O.T. - Oriel GmbH & Co,
KG - Darmstadt
Tel: 06151 88060
Fax: 06151 880689
email:info@LOT-Oriel.de
Website: www.LOT-Oriel.com/de

Japan
Systems Engineering Inc. -Tokyo
Tel: 03 3946 4993
Fax: 03 3946 4983
email:systems-eng@systems-eng.co.jp
Website: www.systems-eng.co.jp

Spain
Teknokroma S.Coop C. Ltda
Barcelona
Tel: 93 674 8800
Fax: 93 675 2405
email: comercial@teknokroma.es

Switzerland
Portmann InstrumentsAG
Biel-Benken
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Brilliant Spectroscopy™

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