Advanced Solid Pack
User Manual

2I-01160 Issue 4

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Advanced Solid Pack P/N GS01160

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1. Introduction

Thank you for purchasing a Specac product.

The Advanced Solid Pack P/N GS01160 consists of the Specac Atlas™ Manual 15T Hydraulic Press P/N GS15011, offered together with a 13mm diameter Evacuable Pellet Die P/N GS03000 for the formation of 13mm diameter KBr pellets/discs typically used for the study of solid samples by transmission IR spectroscopy. Additional to the pack of parts is a pellet holder P/N GS03410 to hold a 13mm diameter KBr pellet that is made, an agate pestle and mortar set P/N GS03600 and a bottle (50g) of KBr powder P/N GS03610.

The Advanced Solid Pack can be offered alone as a cost effective way to procure a manual hydraulic press and 13mm evacuable pellet die combination, but when combined with particular liquid and gas pack offerings, forms a part offering for the analysis of solid samples from the individual Specac **Starter Kit** options that are available.

The Starter Kit options from the liquids, solids and gas pack combinations available are as follows:-

Basic Starter Kit P/N GS01180 (Consists of Liquid Pack P/N GS01140 and Basic Solid Pack P/N GS01150).

Analyst Starter Kit P/N GS01185 (Consists of Liquid Pack P/N GS01140 and Advanced Solid Pack P/N GS01160).

Research Starter Kit P/N GS01190 (Consists of Liquid Pack P/N GS01140, Basic Solid Pack P/N GS01150 and Quest ATR Accessory P/N GS10802).

Advanced Starter Kit P/N GS01195 (Consists of Liquid Pack P/N GS01140, Advanced Solid Pack P/N GS01160 and Quest ATR Accessory P/N GS10802).

A Gas Pack P/N GS01170 can be offered for inclusion to any of the above Starter Kit offerings. Respectively, the Starter Kit part numbers become GS01181, GS01186, GS01191 and GS01196 with inclusion of the Gas Pack.

2. Unpacking and Installation of the Press

From the Advanced Solid Pack P/N GS01160 offering, the Atlas™ Manual 15T Hydraulic Press and 13mm Evacuable Pellet Die and other parts are shipped in appropriate packaging, primarily for safe transportation of the press itself.

Beware! *This press is very heavy and care must be taken to transport it properly. This will protect you and the press from accidental damage or injury.*

The press leaves the factory in specially designed packaging. It sits on a wooden pallet and has a thick outer cardboard casing held to the pallet by three tie straps. There are direction arrows on the casing indicating which way up the press is to be handled. To unpack the press first cut the three straps with a sharp knife and lift up the outer cardboard casing from the pallet.

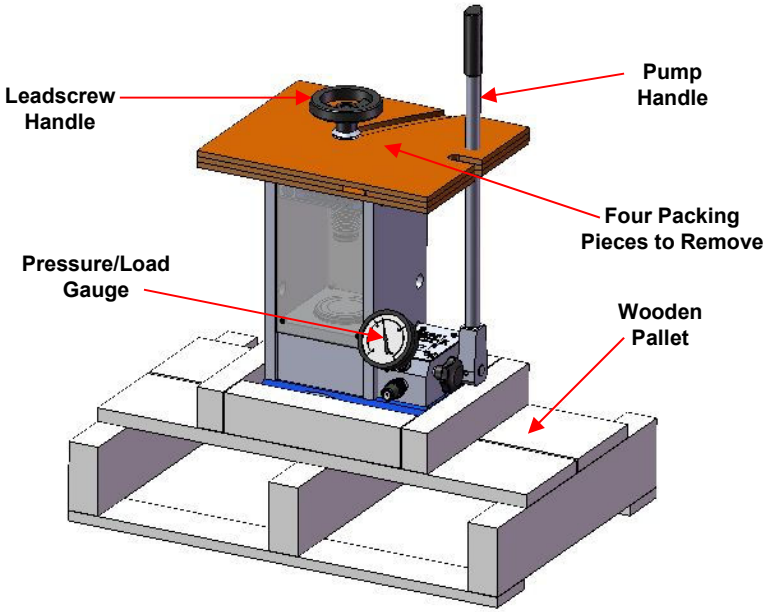


Fig 1. Atlas™ Manual Hydraulic Press Provided as Packaged

The press has internal transport packing around the top, by the lead screw handle. (See Fig 1.) This packing is four pieces of cardboard stacked on top of each other, held tight by the lead screw handle and supporting the pump handle in an upright position. To remove these four pieces loosen the lead screw handle (turn anticlockwise) and then carefully lift them up and over the lead screw handle.

The press is now ready to be lifted off of the wooden pallet. There are two holes in the upright frame supports on the sample pressing side of the press (used for vacuum tubing when an evacuable pellet die is in the press – see Fig 2.). These two holes can be used to lift up and position the press by passing strong nylon rope through them to provide a sling. If available, a hoist can be used to lift the press via this sling. If a hoist is not available, then a minimum of two people will be required to lift the press. Use heavy-duty gloves and lift the press from underneath by the base casting**. DO NOT ATTEMPT TO LIFT THE PRESS BY THE LEAD SCREW HANDLE OR PUMP HANDLE.**

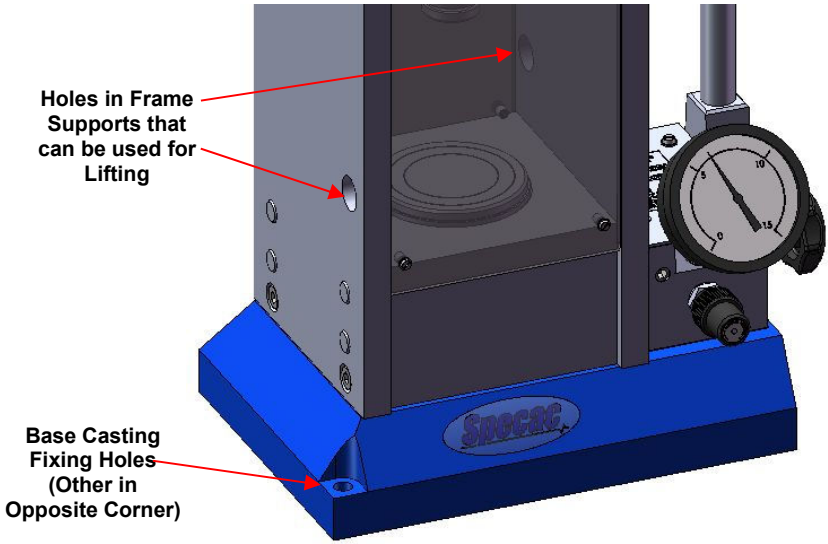


Fig 2. Lifting Holes and Base Casting Fixing Holes

Place the press in its working position. In certain circumstances, it may be necessary to attach the press permanently to a laboratory bench. Two 10 mm diameter holes are provided in the base casting for this purpose. (See Fig 2.) It is recommended that M8 diameter bolts are used to secure the press and that the bench top is at least 25 mm thick to take the weight of the press.

The press is supplied filled with hydraulic oil and is ready to use. The only preparation required before operation is to remove the nylon vent screw (**37**) from the pump plate (**36**) of the pump block assembly.

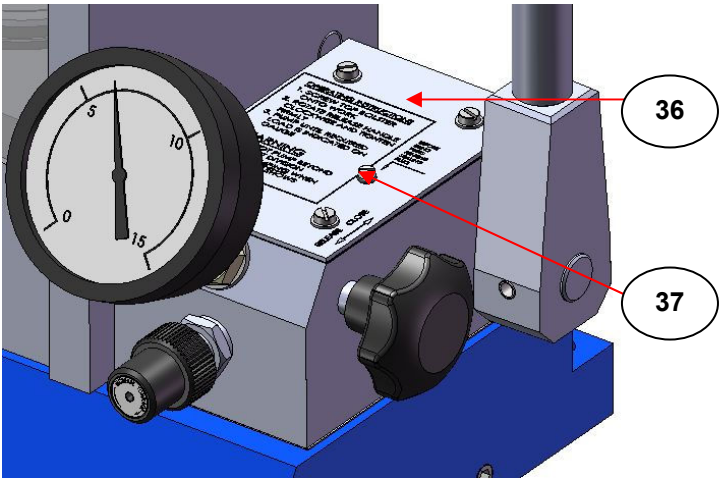


Fig 3. Nylon Vent Screw (Transportation Screw) to Remove

Note: *A light smearing of oil is applied around the main pressing piston area (**4** and **5**) when the press is supplied as new. It is perfectly normal and not a sign that oil is leaking.*

Please keep the press packing materials for future transportation. Replacing a press in its packaging is the reverse of the procedure described previously.

For any inquiries to Specac regarding the press **the serial number must be quoted**. The serial number is a five digit number preceded by a letter of the alphabet e.g. H, and is found engraved on the press at the rear of the pump block assembly. The serial number is also on the Test Certificate found at the rear of this manual.
If you need to contact Specac regarding a service or repair issue relating to an Atlas™ Manual Hydraulic Press, please be as specific as possible regarding the nature of the enquiry. Please quote the serial number for the press, identify how the press is being used and provide as much information as you can.

Where possible, if contacting by email, please provide photographs too as these can help greatly to understand the nature of the enquiry.

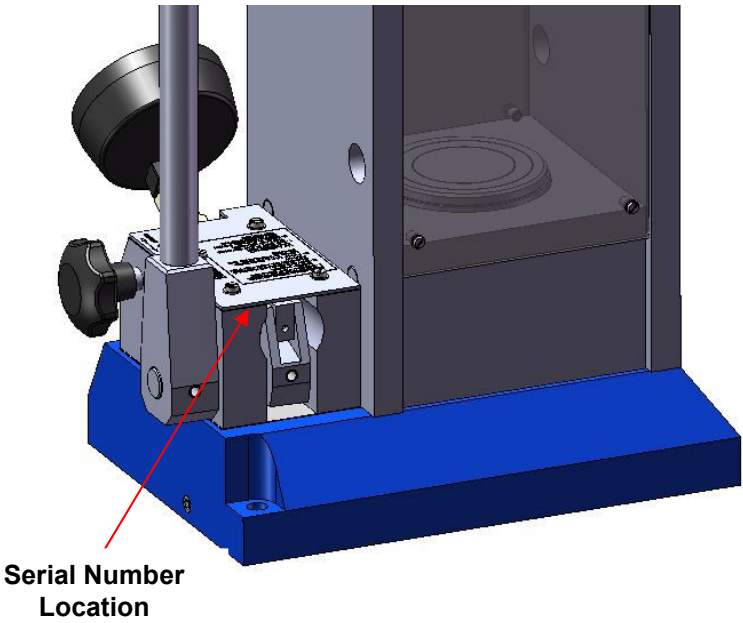
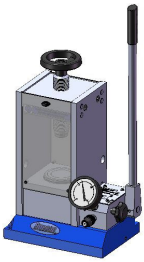


Fig 4. Rear View of 15/25 Ton Atlas™ Manual Hydraulic Press

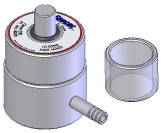
3. Checklist of Contents

Once the press has been removed from it packaging and safely positioned to where it will be used, check that the following items have been supplied in the Advanced Solid Pack.

- P/N GS15011 Atlas™ Manual 15T Hydraulic Press.

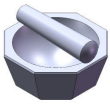


- P/N GS03000 13mm Evacuable Pellet Die.



- P/N GS03410 13mm diameter pellet holder (3" x 2" slide mount plate) for 13mm diameter KBr pellets.

- P/N GS03600 Agate pestle and mortar.



- P/N GS03610 Bottle of KBr powder (50g).
- Instruction manual for Advanced Solid Pack.

Please refer to instructions in the following Sections of this instruction manual for operation and understanding of the Atlas™ 15T manual hydraulic press (Sections 4, 5 and 6), the 13mm evacuable pellet die (Section 7) and the 13mm diameter pellet holder (Section 8).

4. The Atlas™ Manual 15T Hydraulic Press

This instruction manual for the press has been written in three main Sections. Section 4 is the general introduction and specifications. Section 5 is for instruction on general everyday operation of the press. Section 6 is for the diagrams bubble part number explanations and for the respective spare parts.

The Specac Atlas™ Manual 15T Hydraulic Press has been designed for a wide variety of pressing applications, but is specifically suited to the preparation of KBr discs using Specac evacuable pellet die assemblies.

The press can be adapted to provide heated pressing surfaces with Specac Atlas™ Heated Platens and a Temperature Controller (GS15515). Heated pressing surfaces can be used for the preparation of thin films with the Atlas™ Constant Thickness Film Maker accessory (GS15640). The Atlas™ High Temperature Constant Thickness Film Maker accessory (GS15800) can also be used with the Specac presses (the Atlas™ Heated Platens are not required with the high temperature version).

The press works by pumping a hydraulic fluid (oil) to raise a piston and compress a sample held in the pressing area. The press consists of a pump block assembly, where the oil is pressurized by the simple pumping action from a handle, and the sample pressing side, where the pressurized oil is forced under the piston assembly. When resistance is offered by a sample, the pressure build up in the system is shown on the 15 ton load gauge, located on the pump block assembly.

In addition to the standard version of the press providing a maximum tonnage load of 15 tons, there are gauge conversion kits available allowing for finer load readings over smaller ranges. These ranges are from 0-1 tons, 0-2 tons and 0-5 tons. The lower tonnage gauges are connected in line with the standard 15 ton gauge. With these lower tonnage gauges switched on, the press can only be used up to the maximum limit of the lower gauge.

Specifications - Atlas™ Manual 15T Hydraulic Press

Maximum Height (at pump handle)	610 mm
Maximum Width	310 mm
Maximum Depth	190 mm
Weight	50 Kg
Lower Piston Stroke	25.4 mm
Upper Lead Screw Travel	89 mm
Minimum Daylight (Distance Between Pressing Faces)	38 mm
Maximum Daylight (Distance Between Pressing Faces)	152 mm
Lower Pressing Face Diameter	86 mm
Upper Pressing Face Diameter	32 mm
Maximum Width Of Sampling Area (side to side)	134 mm
Maximum Depth Of Sampling Area (back to front)	141 mm
Oil Capacity	0.284 Liters (0.5 Pint)
Oil Type	Shell Tellus 37

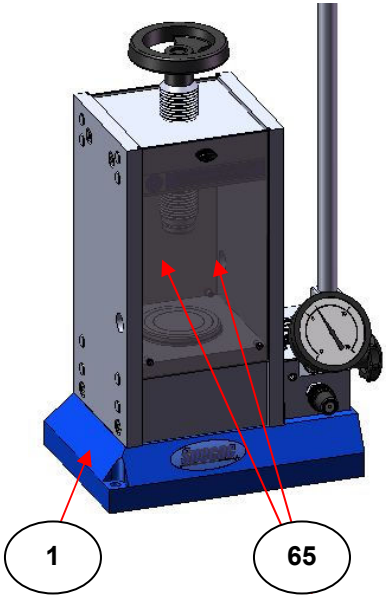
5. General Operation of the Manual 15T Press

Safety Considerations

The Atlas™ Manual Hydraulic Press is provided with front and rear safety guards (**65**). These must be kept closed (lowered) at all times when a sample is being pressed. The guards will fall to the lowered, safe position if not purposefully raised or kept open by other means.

Note: *The use of press guards is a requirement for any high tonnage load applications. When using the Specac Film Making Accessories P/N's GS15640 and GS15800, although the tonnage loads to apply are typically 1 to 2 tons, Specac advise that the safety guards are used wherever possible.*

*When using a Film Making Accessory it is a requirement that the pressure relief valve assembly (**66 to 72**) on the Atlas™ Manual Hydraulic Press is adjusted to read a 2 tons maximum load at the load gauge (**31**) for safety and prevention of tonnage overloading to the Film Making Accessory itself.*



If you ever need to move or reposition the press, always lift it from underneath the base casting (**1**). Do not move it by pulling or lifting the pump handle (**32**), load gauge (**31**), or lead screw handle (**20**). It is recommended that a minimum of two people are used to lift or move the press.

Operation of the Press

(The text for “bubble part” number identification also refers to the 2D Diagrams Figs 13. to 18. found on pages 28 to 33 of this manual).

The press is supplied filled with hydraulic oil and is ready to use. The only preparation required before operation is to remove the nylon vent screw (**37**) from the pump plate (**36**) of the pump block assembly. (Please refer to Fig 3. on page 8.)

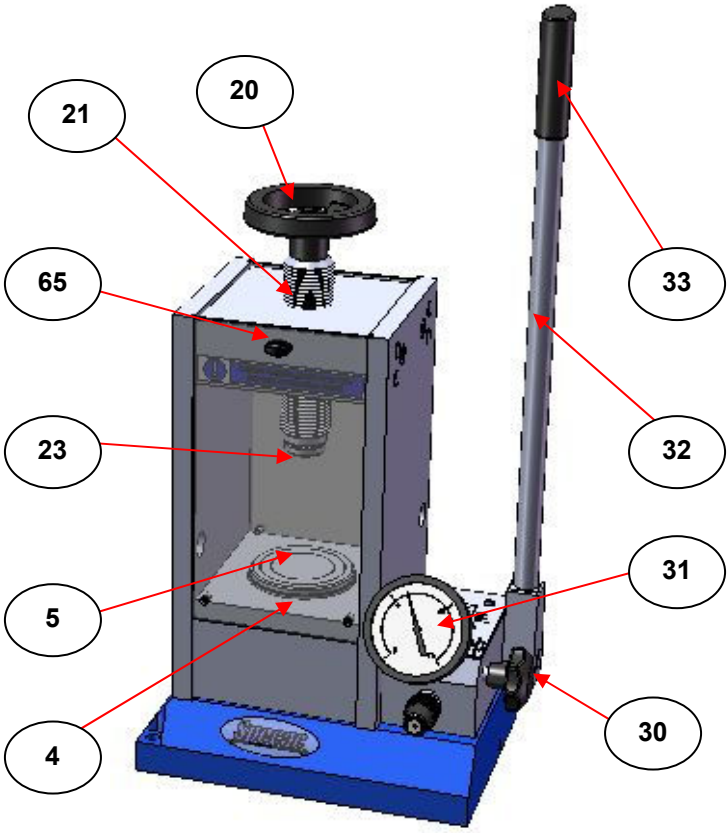


Fig 5. Front View of 15 Ton Atlas™ Manual Hydraulic Press

Raise the front safety guard (**65**) and place the work to be pressed on the lower bolster pressing face (**5**) covering the piston (**4**). Ensure that the work is positioned centrally and lower the safety guard. Screw down the top bolster pressing face (**23**) attached to the lead screw (**21**), by turning the lead screw handle (**20**) clockwise.

Important: *Ensure that all the components of the work to be pressed (usually a die set) have been squeezed tightly together before starting to pump a pressure. However, leave a 1mm gap between the top of the die set and the top bolster (**23**) pressing surface to allow for some initial travel of the pressing piston (**4**) on the press.*

Rotate the pressure release handle (**30**) clockwise until it has tightened firmly. This closes the pumping system so that it is ready for you to build up the pressure with the pump handle grip (**33**).

Warning: *Ensure that the safety guard is lowered before pumping.*

Now start to pump the press by pulling and pushing gently, but smoothly, on the pump handle grip (**33**). (The correct leverage and force is applied by holding at the rubber handle.) It will take a few strokes to build up pressure in the oil, but once resistance is offered by the work to the raising of the piston, the load will be indicated on the load gauge (**31**). Keep on pumping until the required load is achieved.

There is a maximum piston (**4**) travel of 25 mm. There is a red ring around the piston (**4**) showing when the limit is reached (See Fig 6.) **DO NOT CONTINUE PUMPING WHEN THIS RED RING SHOWS.** If you do not stop pumping, you will cause damage to the press mechanism.

There is an internal spring stud (**16**) within the piston (**4**) assembly that is designed to break, protecting the press if the allowed piston travel is exceeded. This spring stud (**16**) allows the action of the piston spring (**19**) to pull the piston (**4**) back down when the oil pressure in the system is released. If the stud (**16**) breaks, the spring (**19**) is not compressed when the piston (**4**) is pumped, consequently the piston will not return easily to the start position once the pressure is released.

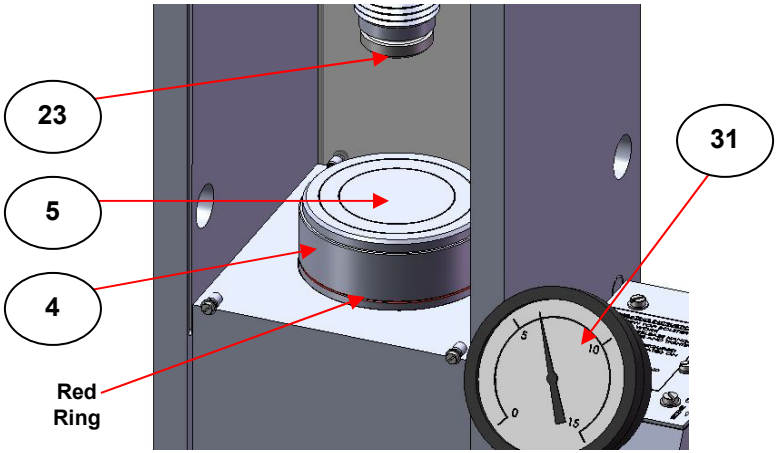


Fig 6. Maximum Limit of Piston (4) Travel (Red Ring Showing)

If the work (e.g. a sample in a die set) is compressing to the extent that the piston (**4**) has travelled to show the red line but the compression load has not been reached, release the pressure by turning the pressure release handle (**30**) anticlockwise (**slowly**) by about one complete rotation. This will allow the piston (**4**) to return to rest. The work will sink down with retraction of the piston (**4**) and a gap will be created between the work and the top bolster pressing face (**23**). Turn the lead screw handle (**20**) clockwise to bring the top bolster pressing face onto the work again, and reapply the load from the piston (**4**) - retighten the release handle (**30**) and pump via pump handle (**33**).

Note: *This procedure should be followed with samples that are highly compacted when compressed within an evacuable pellet die.*

When the required load is indicated on the load gauge (**31**), stop pumping. The pressure and applied tonnage load against the work will be held for as long as required. You may observe a slight decrease in the pressure applied, indicated at the load gauge (**31**), as the work (sample) being pressed may relax over time. You can bring the pressure back up to the required load if desired by pulling gently on the pump handle grip (**33**) again.

Note: *If the applied tonnage load set at the load gauge (**31**) drops by more than one ton over a 15 minute period, this **may indicate** that there is a fault in the system for holding the applied pressure, rather than from any relaxation in the work being pressed. The press system may require bleeding of any trapped air in the oil to function correctly. (See Fault Finding, Causes and Remedy, pages 20 to 25.)*

To release the load on the work turn the pressure release handle (**30**) anticlockwise, **slowly**, by about one complete rotation. (There is no need to turn this handle completely open.) Slow rotation of the release handle (**30**) allows for a gradual and controllable release of the pressurised oil within the system (indicated by a gradual drop of the applied tonnage load at the load gauge (**31**)), to drain back into the oil reservoir and helps to reduce the possibility of any bubbles that might form in the oil from a rapid release of pressure.

Control of a Maximum Applied Load

Beneath the pressure gauge (**31**) there is a pressure relief valve assembly (**66 to 72**) which may be set so that any load between 0-15 tons is the maximum load that can be obtained. (See Fig 7.)
The relief valve set knob (**69**) can be rotated clockwise to increase the maximum pressure in the system, and hence the applied load, or rotated anticlockwise to decrease the pressure in the system.

Note: *When supplied the pressure relief valve will be set for a 10 ton load on the 15 ton press.*

To set a specific maximum load, first rotate the relief valve set knob (**69**) anticlockwise until it is held loosely by a couple of screw threads. (Be careful, as if you unscrew the knob completely the relief valve ball bearing (**70**) held behind the knob (**69**) could fall out of position and be lost. (If the ball bearing (**70**) does fall out just simply place it into the knob (**69**) head recess and screw back into position.)

Place a piece of work to be pressed in the usual way, close the pressure release handle (**30**) and start to pump. If the pressure relief

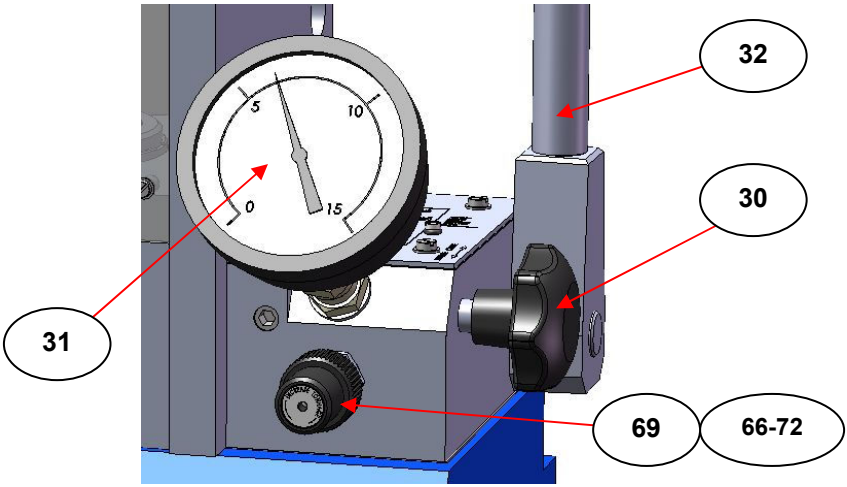


Fig 7. Pressure Relief Valve for Setting a Maximum Load

valve is fully open, there will be no pressure build up in the system (the pressure/load gauge (**31**) indicator will not rise and show a load) and excess pressure being pumped will vent off at the relief valve. Now, start to turn the relief valve set knob (**69**) clockwise, (one complete rotation at a time) and continue pumping. Eventually, pressure will begin to build up in the system and the gauge (**31**) indicator will rise to show a tonnage load. Once the load limit for the setting of the pressure relief valve knob (**69**) has been reached, excess pressure will once again vent off at the relief valve. Continue to turn the relief valve set knob (**69**) clockwise until the required pressure/load is reached.

If you overshoot the pressure and hence load limit you require from over-adjustment clockwise of the knob (**69**) and continuous pumping of the handle (**32**), simply release the pressure from the system by opening the pressure release handle (**30**) and then closing the release handle again. Turn the pressure relief valve knob (**69**) anticlockwise to reduce the load limit and re-pump the press via the handle (**32**).

Repeat the process as necessary to achieve the maximum applied load setting required.

Tip: *This is a useful feature for pressing applications where a maximum load limit is required. For example, 10 Tons maximum for 13 mm evacuable pellet dies P/N GS03000.*

Beware! *With the pressure relief valve set knob (**69**) turned fully clockwise it is possible that the press will reach and go beyond the maximum load rating for the press; that is beyond the 15 ton load indiaction. Therefore, the pressure relief valve knob (**69**) **must** only be turned clockwise as far as to obtain the 15 ton gauge division indication when a maximum load is being applied.*

Over pressurization of the pressure gauge will cause damage to the gauge mechanism resulting in the need for replacement.

Lead Screw Assembly

In operation the lead screw assembly (handle (**20**) and lead screw (**21**)) is used to adjust for the height of the work to be pressed. Rotating the lead screw clockwise lowers the lead screw bolster (**23**) pressing face towards the work and turning the lead screw anticlockwise raises the bolster (**23**) away from the work.

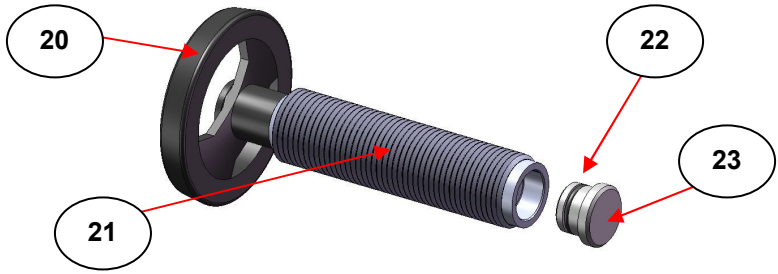


Fig 8. Lead Screw Assembly and Top Bolster Parts of the Press

The bolster (**23**) push fits into the hollow of the lead screw (**21**) and is retained by an O-ring (**22**). **Any pressing of work must always be carried out using the bolster (23) pressing face** suitably attached into the lead screw (**21**) assembly via the O-ring (**22**) fixing.

Fault Finding, Causes and Remedy

The Atlas™ Manual 15T Hydraulic Press should give years of trouble free operation, if used and cared for correctly. If there is a failure of the press operation, it is recommended that you contact your local Specac representative immediately, particularly if your press is still within a warranty period of usage. It will be a requirement to identify your press from its unique serial number found at the rear of the press and provide a brief and clear description of the fault. For technical faults Specac may be contacted via email at techsupport@specac.co.uk.

However, certain faults can be easily identified and repaired without the potential need for return of the press to Specac. The following information is provided to identify faults and carry out the necessary repairs and adjustments should you decide to do so.

Fault: Loss of Pressure in the Pumping System

Cause 1: **Oil Seal or Gasket Has Failed.** This will be evident by excessive oil leaks around the piston, cylinder block, or pump block.

Remedy: It may only be necessary to re-tighten the six cylinder block securing screws (**3**), and/or the four pump block securing screws (**29**). If the oil leak continues, it will be necessary to renew the individual seal(s) and gasket(s), depending on age and usage. (Seals and gaskets that may need replacing are numbered (**8**), (**9**) (2 off), (**11**), (**27**), (**28**), (**38**), (**43**), (**44**), (**48**), (**53**), (**57**) and (**67**). Instructions on how to replace these seals and gaskets are found in the **Atlas™ Manual Hydraulic Press Servicing Guide**.

Cause 2: Non-Return Valve is Leaking. (This is a ball bearing (**50**) trapped in position by the load gauge (**31**).) It is likely that the non-return valve ball bearing (**50**) is not seating correctly due to foreign matter adhering to the seat or the ball.

Remedy: By pumping the press without the pressure release handle (**30**) tightened, the foreign matter may be removed from the valve seat by a flow of oil washing through the system. Pump the press about ten times. If this does not work, then you will need to gain access to the non-return valve ball bearing (**50**) for inspection. The procedure to gain access to this ball bearing is found in the **Atlas™ Manual Hydraulic Press Servicing Guide**.

Cause 3: **Release Valve Leaking.** (This is a ball bearing (**58**) trapped behind the pressure release handle (**30**).) It is likely that the ball bearing (**58**) is not seating correctly due to foreign matter adhering to the seat or to the ball.

Remedy: Similar to the non-return valve procedure, pumping the press without the pressure release handle (**30**) tightened may remove the foreign matter from the valve seat by a flow of oil washing through the system. Pump the press about ten times. If this does not work, you will need to gain access to the ball bearing (**58**) for inspection. Unscrew the pressure release handle (**30**) completely. A small dribble of oil may flow from the hole when the release handle assembly (**30**) is removed, but the amount lost is not significant. Check the O-ring (**57**) for signs of wear or cracks etc and replace if necessary. The ball bearing (**58**) can be seen inside the hole resting in the area of the valve seat. To remove the ball bearing the press needs to be tipped over slightly, allowing the ball to roll out**. Be careful when lifting the press as it is heavy**, and also be careful not to lose the ball bearing if it rolls out onto the work bench. Inspect the ball bearing, clean and replace in the hole. Ensure that it rolls back into its valve seat area. Replace the pressure release handle (**30**), tighten and re-pump.

Fault: Failure to Achieve Pressure in the Pumping System

Cause 4: **The oil filter (55) is blocked**.

Remedy: The procedure to gain access to the oil filter (**55**) for cleaning and/or replacement is found in the **Atlas™ Manual Hydraulic Press Servicing Guide**.

Cause 5: **Airlock in Pump Assembly**.

Remedy: The pump block assembly and possibly the piston side of the press must be bled of air trapped within the oil. The procedure can be split into two distinct operations: Bleeding air from the pump block assembly and bleeding air from the piston assembly.

Bleeding Air from the Pump Block Assembly

To gain access to the oil bleed screw (**40**), the pump plate (**36**) must first be removed. (In Fig 9. the transport screw (**37**) is shown but normally this has been removed for use.)

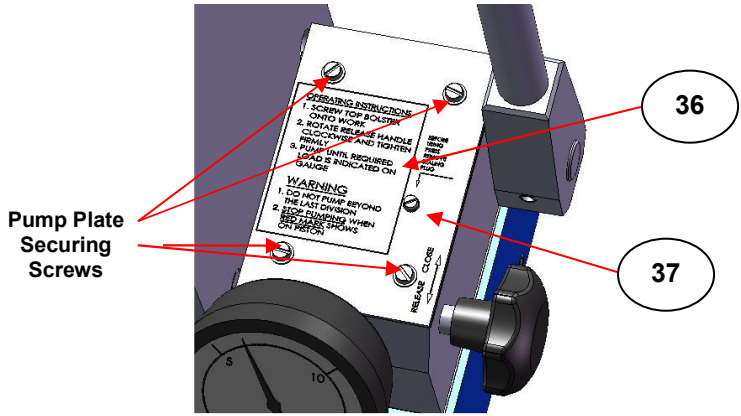


Fig 9. Pump Plate Removal

Loosen and remove the four securing screws and lift the pump plate and the pump block upper gasket (**38**) clear. Be careful not to tear the gasket material. Loosen, but do not remove the oil bleed screw (**40**) by turning anticlockwise. (See Fig 10.)

Take a piece of work (for example, a block of metal) and place it into the pressing area on the lower pressing face, and press it in the usual way (Close pressure release handle (**30**) and pump via the pump handle (**32**)).

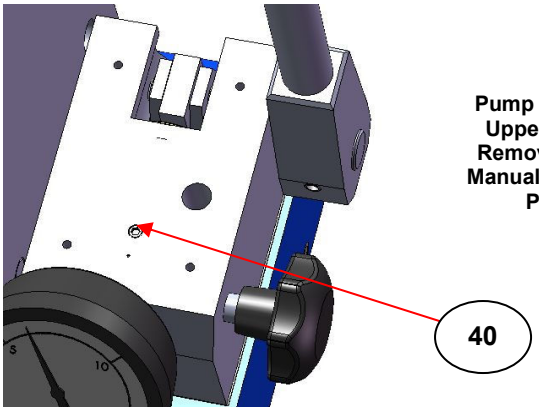


Fig 10. Oil Bleed Screw on Pump Block Assembly

As the pressure tries to build up in the system, any trapped air in the pump block will start to bubble out from the opened oil bleed screw (**40**). Keep on pumping until the oil flows clearly, without bubbling. (See Fig 11.)

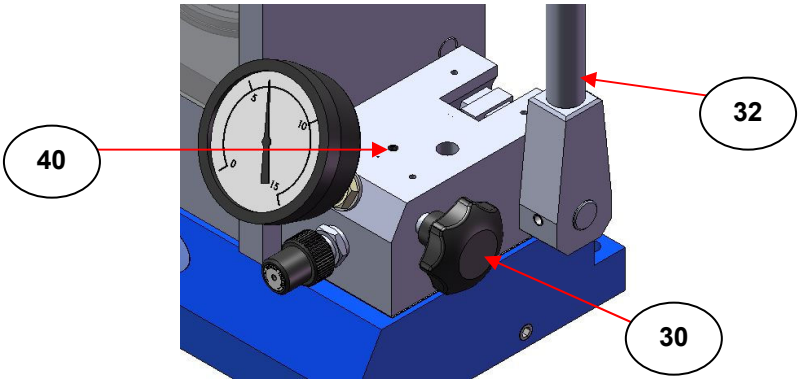


Fig 11. Bleeding Air from the Oil in the Pump Block Assembly

Retighten the bleed screw (**40**) and wipe away any expelled oil. Now release the pressure from the system (open the pressure release handle (**30**)) and remove the work from the press. Carefully replace the pump block upper gasket (**38**) and the pump plate (**36**) and secure with the four fixing screws.

The pump block assembly side of the press has now been primed and purged of air in the oil. The press may now operate but it is advisable to also purge the piston assembly side of the press.

Bleeding Air from the Piston Assembly

The pump block assembly side of the press should have already been purged of air (see pages 22 to 23). If any trapped air remains in the system, it will be in the piston assembly pressing side of the press.

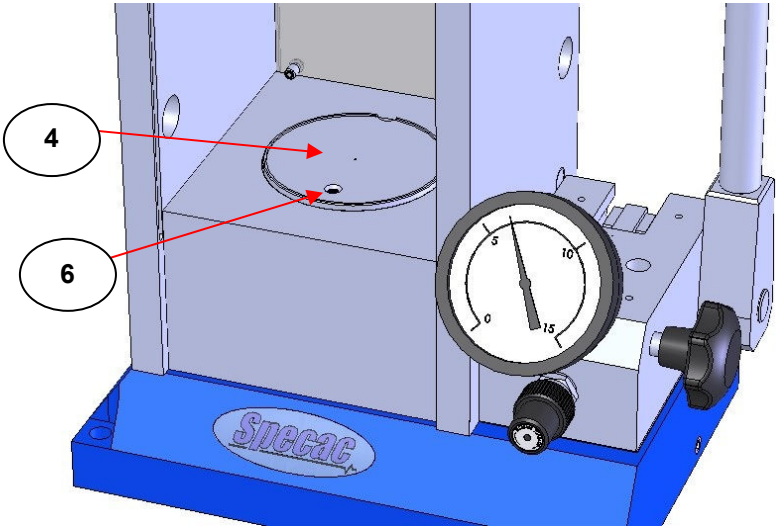


Fig 12. Bleeding Air from Oil in the Piston Assembly

There is a second oil bleed screw (**6**) on the top of the piston (**4**). Remove the lower bolster pressing face (**5**) on the piston, to gain

access to the bleed screw (**6**). (The bolster simply lifts clear of the piston. There may be some suction due to a thin film of oil on the bolster and piston contact faces). Loosen, but do not remove this bleed screw and take a piece of work (e.g. a block of metal) and place it on the piston (**4**), but do not obscure the bleed screw (**6**). Press the work in the usual way. As pressure tries to build up in the system, any trapped air in the piston will start to bubble out from the open oil bleed screw (**6**). Keep on pumping until the oil flows clearly, without bubbling. Retighten the bleed screw (**6**) and wipe away any expelled oil. Now release the pressure from the system (open the pressure release handle (**30**)) and remove the work from the press. Replace the lower pressing face bolster (**5**) onto the piston (**4**).

The piston pressing side of the press has now been primed and purged of air.

Fault: Piston Does Not Return When Pressure is Released

Cause 1: **Foreign matter has become lodged between the piston (4) and the cylinder block (2)**.

Remedy: It will be necessary to remove the piston and clean or replace any damaged parts. The procedure to do this is found in the **Atlas™ Manual Hydraulic Press Servicing Guide**.

Cause 2: **The piston has been pumped beyond the warning red ring causing damage to the return mechanism**.

Remedy: It will be necessary to remove the piston and clean or replace any damaged parts. The procedure to do this is found in the **Atlas™ Manual Hydraulic Press Servicing Guide**.

6. Legend (Bubble Number Part Identification)

Item	Description
1	Base casting
2	Cylinder block
3	Cylinder block screw * (6 off)
4	Piston
5	Piston lower bolster
6	Piston bleed screw *
7	Bleed ball 3/16” dia.
8	Piston wiper O-ring
9	Piston O-ring (2 off)
10	Upright screw * (4 off)
11	Cylinder block O-ring
12	Spring housing *
13	Copper sealing washer (3 off)
14	Piston spring housing screw * (3 off)
15	Piston spring spacer
16	Piston spring stud *
17	Piston spring locking nut *
18	Piston spring nut and washer
19	Piston spring
20	Lead screw handle
21	Lead screw
22	Lead screw top bolster O-ring
23	Lead screw top bolster
24	Oilway plug seal ball 9/32” dia.
25	Oilway plug screw *
26	Pump block *
27	Pump block lower gasket
28	Pump block O-ring
29	Pump block screw * (4 off)
30	Pressure release handle *
31	Load gauge
32	Pump handle
33	Pump handle grip
34	Upright screw * (8 off)
35	Upright dowel (16 off)
36	Pump plate
37	Pump vent screw (not needed)
38	Pump block upper gasket
39	Gauge connector
40	Pump bleed screw *
41	Bleed ball 3/16” dia.
42	Pump piston
43	Pump piston seal
44	Pump piston O-ring
45	Pump piston sealing housing
46	Pump piston gasket (not needed)
47	Pump piston screws * (4 off)
48	Pressure gauge seal
49	Non-return valve spring
50	Non-return valve ball 9/32” dia.
51	Inlet ball stop
52	Non-return valve ball 9/32” dia.

Item	Description
53	Oil intake seal
54	Oil intake pipe
55	Oil intake filter
56	Oil intake circlip
57	Release handle O-ring
58	Release ball 9/32” dia.
59	Crank pin circlip
60	Crank
61	Crank shaft
62	Crank shaft bearing (2 off)
63	Crank fixing spiral pin (2 off)
64	Crank pin
65	Safety guard
66	Relief valve body
67	Relief valve O-ring
68	Relief valve plunger
69	Relief valve set knob
70	Relief valve ball 3/8” dia.
71	Relief valve spring
72	Relief valve ball 1/16” dia (24 off)
73	Relief valve seating

Spare Parts

The above list of parts can be ordered as spares from Specac.

Note: *When ordering spares, you must include a full description of the item (from the parts list) and where marked with an asterisk * also provide the serial number of your press.*

Parts (**20**) and (**21**) (lead screw handle and lead screw) are supplied as a complete assembly.

The O-ring seals and gaskets from parts (**8**), (**9**), (**11**), (**13**), (**22**), (**27**), (**28**), (**38**), (**43**), (**44**), (**48**), (**53**), (**57**) and (**67**) have been collected together for the Atlas™ Manual Hydraulic Press Seals and Gaskets Kit as P/N GS15100.

1 Liter of CL37 oil is provided as P/N GS15101.

2D Diagrams of Atlas™ Manual Hydraulic Press

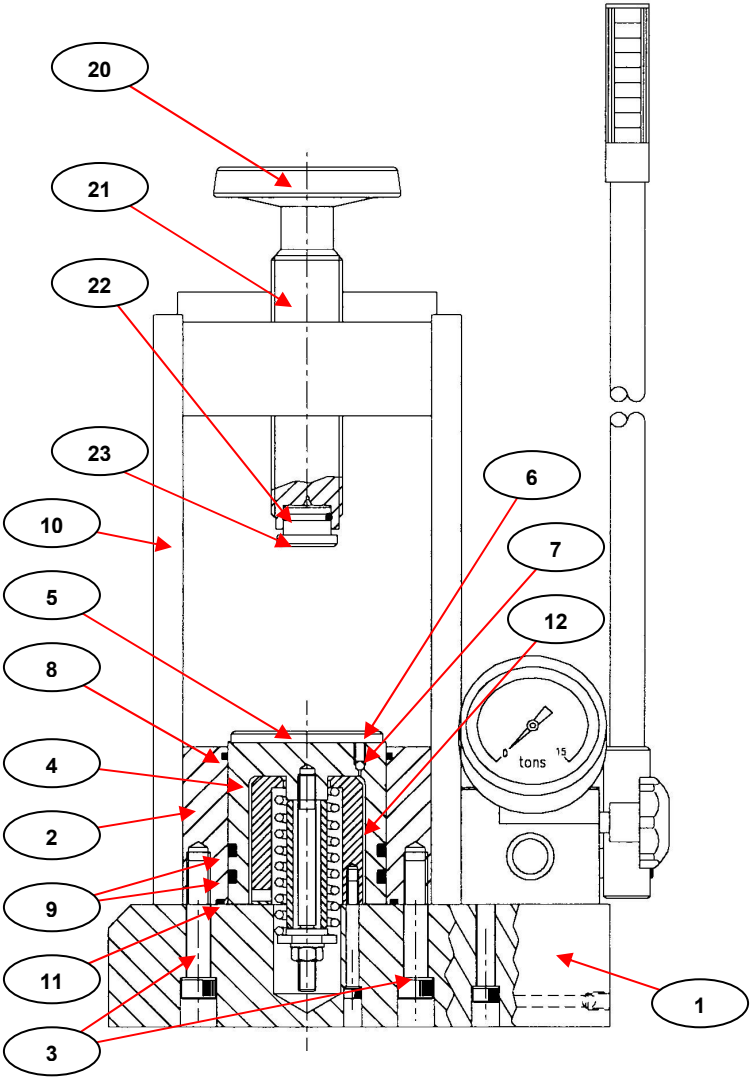


Fig 13. Front Cutaway View of Manual Hydraulic Press

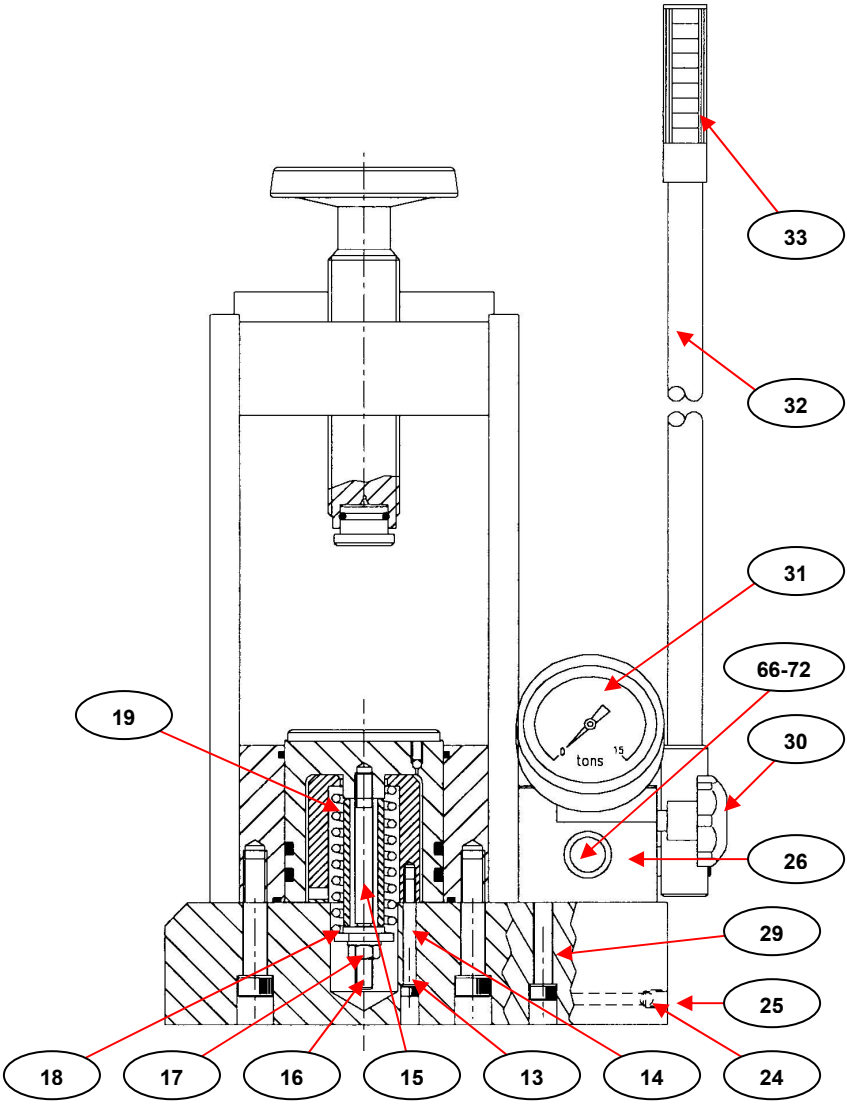


Fig 14. Front Cutaway View of Manual Hydraulic Press

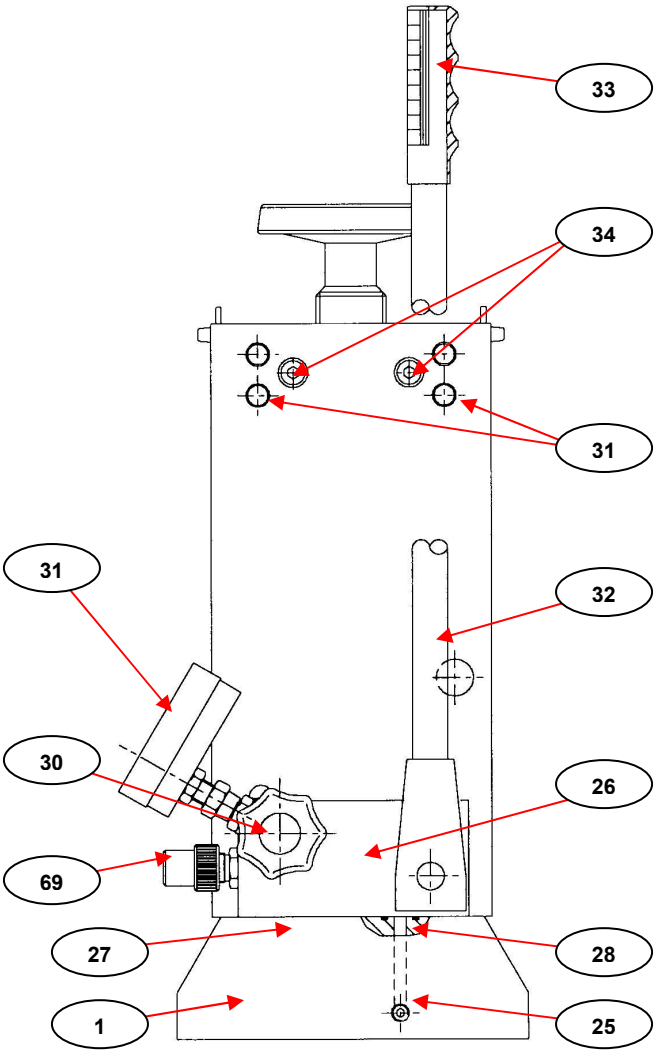


Fig 15. Side View of Manual Hydraulic Press

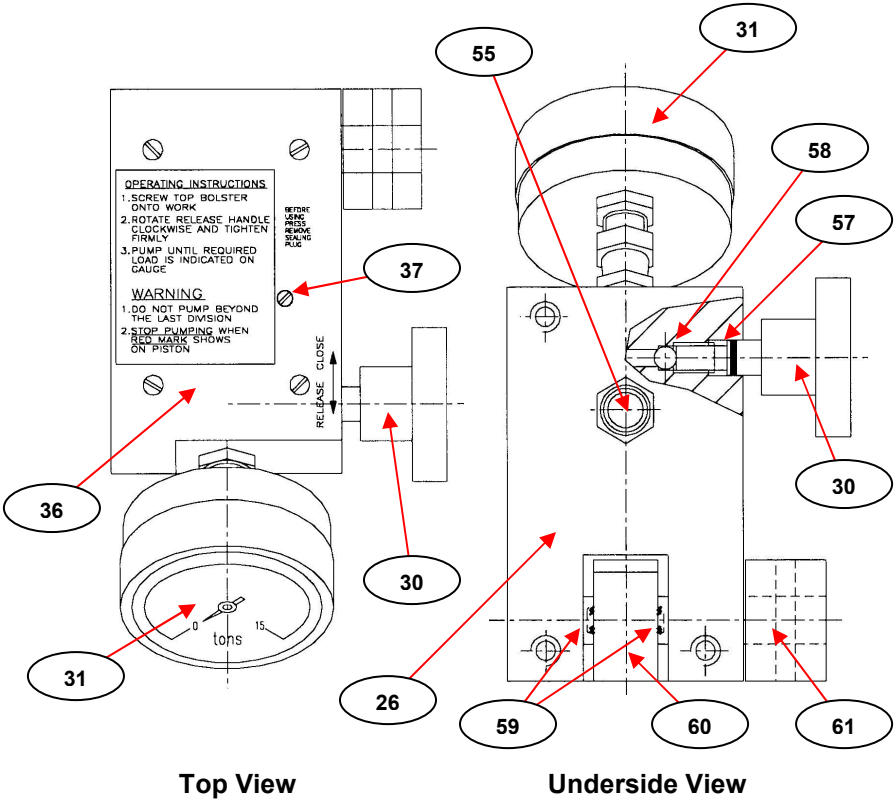


Fig 16. Top and Underside View of Pump Block Assembly

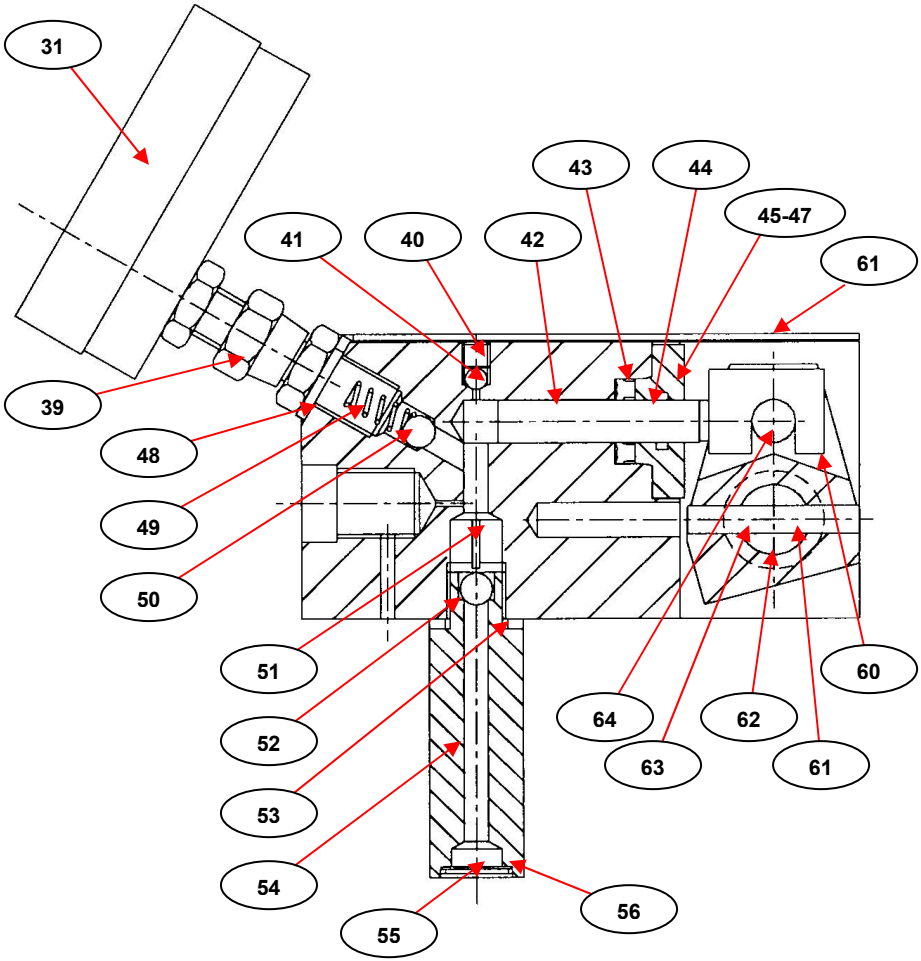


Fig 17. Side Cutaway View of Manual Hydraulic Press

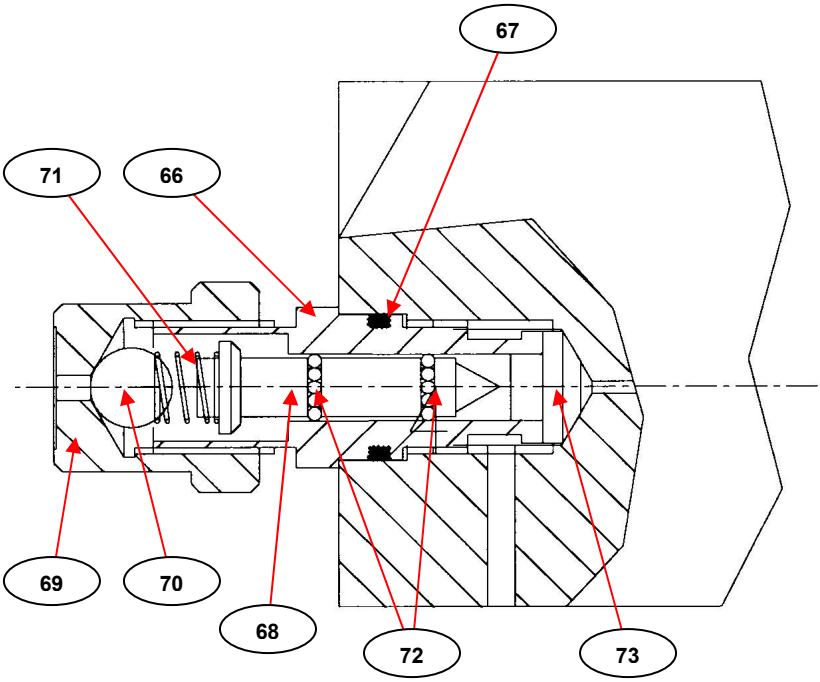


Fig 18. Side Cutaway View of Pressure Relief Valve Assembly

Test Certificate - Atlas™ Manual Hydraulic Press

Product Number: GS15011 GS25011

Serial No:_____ Order No:_____

Item	Check/Test	Checked
1	Visual inspection of Guard	
2	Visual inspection of gauge nuts	
3	Visual inspection of bolts	
4	Condition of paint	
5	Correct function of gauge	
6	Check for oil leaks	
7	Check piston release	
8	Press able to reach 15 tons / 25 tons	
9	Drop back @ 15 tons /25 tons = less than 1 ton in 15 minutes	
10	Pressure release valve - set to 10 tons -15011 - set to 15 tons -25011	

Tested By:_____

Approval By:_____ Date:_____

Original to file

Drg No.: 3MZ13066
3MZ13067

Completed TAG Label on Press

7. Instructions for Use of Evacuable Pellet Dies

Introduction

The Evacuable Pellet Dies available from Specac are manufactured in a wide range of diameters for both infrared and XRF applications. The standard dies, made from 440C stainless steel, offer an ideal solution for preparing sample discs/pellets prior to analysis. However, care must be taken where extremely hard, corrosive or irregular shaped samples are to be compressed, as stainless steel dies and pellets can be damaged.

All of the dies are evacuable, enabling dry, uncontaminated and clear pellets to be prepared.

Unpacking and Checklist

On receipt of your evacuable pellet die (specifically the 13mm diameter pellet die P/N GS03000 with Advanced Solid Pack P/N GS01160), please ensure that the following parts have been supplied.

- 1 Die body (this part carries the evacuation port on dies of 20mm diameter sizes and above).
- 1 Base (this part requires the evacuation support ring for dies up to 13mm diameter pellet size).
- 1 Plunger (this is stepped on dies smaller than 10mm diameter pellet size).
- 1 Pair of stainless steel internal pressing pellets (unless stated).
- 1 Extractor ring (in Perspex, Delrin or aluminium depending on size of die).

Note: *Pellet/disc holders for mounting the sample disc in a spectrometer are not supplied with the dies but can be purchased separately from Specac. (e.g. P/N GS03410 for the 13mm diameter pellet.) P/N GS03410, a 3" x2" slide mount plate holder,* ***is*** *supplied as part of the Advanced Solid Pack P/N GS01160 offering.*

Die Care and Use with KBr Powder

The dies are made from corrosion resistant steel, but because of the corrosive nature of wet KBr or possibly from other substances used with the dies, it is necessary to take certain precautions.

A) When not in use always ensure that the die and its component parts are thoroughly clean and dry. If possible, it is preferable to store the die and components in a drying cabinet or a desiccator.
B) When cleaning the die pellets, be careful of the polished faces. Do not use a cloth that has a hard abrasive texture. Always use a soft cloth or tissue. If KBr powder has been used as a sample for compression, any remaining powder should be washed away from the die body, plunger and pellets with distilled water and then rinsed with methanol. After drying the parts with a soft cloth they can be placed on a warming plate to keep warm and dry until use with the next sample.
C) **Never** exceed the maximum safe load when pressing.

Note: *KBr powder P/N GS03610 is supplied in a sealed glass bottle. The seal should not be broken until using the powder for the first time. Store the KBr powder in an oven at 50ºC or a desiccator to prevent absorption of moisture.*

Preparing the Evacuable Pellet Die for Use

The die and its component parts are packed at the factory in such a way that they do not suffer damage during transit. The optically polished pellets (**1**) are encapsulated in an easily removed protective material and the die may be lightly coated with a protective oil. Before use, the protective material on the pellets should be removed and all of the component parts must be thoroughly cleaned with an organic solvent (methanol is suitable) to ensure that the protective oil is fully removed. The parts should then be wiped clean taking care to use non-abrasive cleaning cloths on the polished faces of the pellets (**1**).

Place the base (**2**) of the die onto a work surface. (For dies up to 13mm in diameter the base will include a black colored surrounding evacuation ring and port (**5**)). For dies of 20mm diameter and above, the base does not have the surrounding evacuation ring and port. (The vacuum port is part of the die body). Ensure that the O-ring seal (**3**) is correctly positioned into its groove in the evacuation ring or around the smaller diameter piece of the base for dies of 20mm diameter and above.

Assembly for Evacuable Pellet Dies of 10mm Diameter and Above

*Assemble the die cylinder body (**4**) onto its appropriate base (**2**) as shown in Figs 19. and 20. Fig 19. is for the 5mm, 10mm and 13mm dies with a black support ring for the base (**2**), carrying the evacuation port (**5**). Fig 20. is for the larger dies of 20mm and above, including the evacuation port (**5**) as part of the die body.*

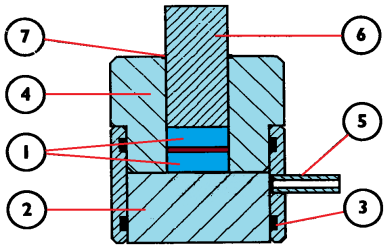


Fig 19.

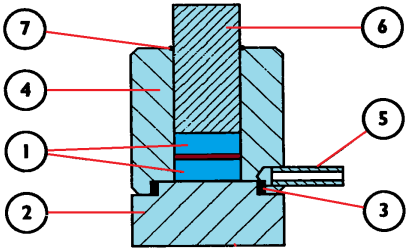


Fig 20.

Take one of the stainless steel polished pellets (**1**) and place it (polished side up) into the bore of the cylinder body (**4**). (Avoid getting fingerprints on the polished surface - wear gloves). The pellet is a very close fit in the bore but will eventually sink to the bottom of the bore in the cylinder body (**4**). (You can use the plunger (**6**) if required to aid in the travel of the pellet in the bore). When the first pellet (**1**) is in position, you can now fill the die body bore with a prepared sample powder.

Filling the Evacuable Pellet Die with Sample

This procedure is typically for the filling of a 13mm die, but can be adapted for your specific sample and size die.

Using a paper chute, funnel or spatula, pour a well ground and mixed powder (2 to 4mg sample in 175 to 225mg KBr mixture) to be compacted into the bore of the cylinder body (**4**). Tap the side of the die lightly so that the powder is evenly distributed across the face of the polished pellet (**1**). You can also use a spatula to smooth over and level the surface of the powder if tapping of the die is insufficient.

Take the second stainless steel pellet (**1**) and push this (polished face first - downwards) into the bore of the cylinder body (**4**). Take care not to force or jam the pellet (**1**) into the bore. If it is placed centrally, it should sink down in the bore onto the surface of the powder. Insert the plunger (**6**), non- chamfered edge end first into the cylinder body (**4**). Ensure that the O-ring seal (**7**) is in place around the plunger and seated in the chamfer of the cylinder body (**4**) as shown in Figures 1 and 2. The die is now ready to be placed in the press for compaction of the sample powder.

Pressing of the Sample Pellet

Place the die assembly into a hydraulic press. Make sure that the die is central on the bottom pressing face of the press.

If a vacuum supply is to be used on the die whilst pressing, connect the vacuum line tubing to the evacuation port (**5**) of the die. Switch on the vacuum line and maintain the vacuum before, during and after the pressing process.

Ensure that all safety guards on the press are closed and then start to press the die. Apply a load to the plunger (**6**) to produce the desired glassy quality of KBr/sample pellet. For the 13mm size die, a load of 7 tons indicated at the pressure gauge of the press is usually sufficient.

Note: *The following table gives typical loads to produce good quality KBr pellets.*

Die Size	Typical Load	Maximum Load Limit
10mm	3.00 tons	5.00 tons
13mm	7.00 tons	10.00 tons
20mm	18.00 tons	25.00 tons
32mm	25.00 tons	50.00 tons
40mm	25.00 tons	80.00 tons

Warning : DO NOT EXCEED THE MAXIMUM LOAD.

Hold the load on the die for 10 to 15 seconds and then release both the load and the vacuum.

Removing the Sample Pellet from the Die

This procedure is the same for all diameter size dies. Take the die out of the press and remove the base (**2**). All of the internal components in the die cylinder body (**4**) will remain in place due to compaction of the sample.

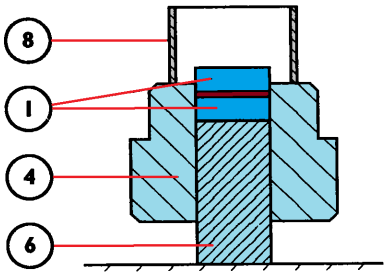


Fig 21.

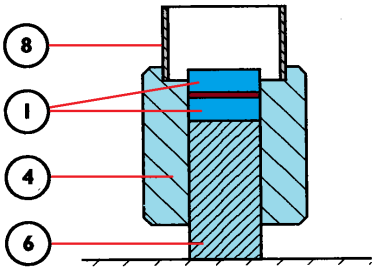


Fig 22.

Invert the die and place the extractor ring (8) into position on the cylinder body as shown in Figs 21. and 22. (Fig 21. is for the, 10mm and 13mm dies and Fig 22. for the 20mm die and above).

Replace this inverted assembly into the press and apply a light load between the plunger (**6**) and the extractor ring (**8**). The load can be applied by rotation of the lead screw assembly in the manual hydraulic press or by pumping the piston of the press. As the load is applied the bottom stainless steel pellet (1) will emerge first from the bottom of the cylinder followed by the compacted sample pellet and then the top stainless steel pellet. Usually, once the sample pellet has cleared the bore of the cylinder body (**4**), the plunger (**6**) will immediately pass through the bore to the limit of its travel, as the weight of the cylinder body sinks down due to no resistance.

Remove the die parts from the press and carefully extract the compacted sample pellet with a pair of forceps, taking care not to damage it in the process. The highly polished surfaces of the stainless steel pellets (**1**) aid in easy sample release from these pellets.

Paper Frame Mounting of Sample Pellets

To facilitate the handling of KBr sample pellets, paper frames can be used which are of a macro, micro or ultra-micro form.

The macro paper frame is a paper annulus of 13mm o.d. and 10mm i.d. These frames are to be used with the 13mm die only. When using these paper frames (**9**) they are inserted into the die prior to addition of the sample (**10**). When the sample pellet is extracted a transparent circular window in an opaque paper frame is produced.

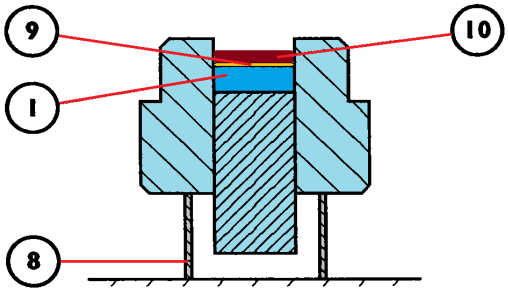


Fig 23.

The micro and ultra-micro frames are also circular with a 13mm o.d. but they have a rectangular aperture of 2mm x 11mm and 1mm and 4mm respectively. When using the micro or ultra-micro frames it is recommended that the die be loaded on the

extractor ring (**8**) as shown in Fig 23. The die is assembled inverted with the pellet (**1**) and ultra-micro frame in place. The aperture is carefully filled with the powder sample such that it is heaped 1 to 2mm above the surface of the frame (**9**). The bottom pellet (**1**) is then put into place and the base (**2**) is fixed to the cylinder body assembly. This whole assembly is then turned the right way up ready to be pressed.

Notes on Sample Pellet Quality

Generally, it is easy to produce a good quality KBr pellet if the die is used correctly. However, some faults in the produced sample pellet may occur due to a variety of reasons. Some of these faults and their remedies are tabulated below. The faults described are for pure KBr or other halide salts, which do not contaminate the sample. When the sample is added to the halide salt the clarity of the disc will depend to a large extent on the quantity and type of sample. Usually 0.1 to 2% of sample to KBr is perfectly adequate. The overall quality of a pellet is largely dependent upon the quality of the KBr or halide salt powder used, which should always be of a spectroscopic grade of purity.

Fault	Cause	Remedy
Sample pellet not clear. Lacks optical clarity.	Sample damp, contaminated KBr powder or insufficient pressure when compacting.	Dry the KBr powder or sample and increase the compacting pressure.
Sample pellet is clear but shows opaque spots.	Powder not uniformly flat in the die, leaving large particles which do not vitrify when pressed.	Sieve powder to extract coarse grains, then re-grind and re-press.
Sample pellet is cloudy.	Insufficient evacuation time or leaky seals.	Check seals on the die and lengthen evacuation period.
Sample pellet is clear at first but quickly becomes cloudy.	Damp powder or damp atmosphere.	Dry the KBr powder or sample, check seals on the die and lengthen evacuation period.

To ensure that a sample pellet is produced which will enable accurate spectra of samples to be obtained, it is essential that the sample be thoroughly blended with the halide salt powder. Blending can be achieved either by using a mortar and pestle (P/N GS03600 – supplied with the Advanced Solid Pack P/N GS01160 offering), or by using a grinding mill such as the Specamill (P/N GS06000).

Legend for Evacuable Pellet Dies

(**1**) Polished pellet
(**2**) Die base
(**3**) O-ring seal in evacuation ring
(**4**) Die cylinder body
(**5**) Evacuation port on die
(**6**) Plunger
(**7**) O-ring seal for plunger
(**8**) Extractor ring
(**9**) Paper support frames
(**10**) Paper support frames

Spare Parts for 13mm Evacuable Pellet Die

P/N GS03000 Evacuable pellet die 13mm diameter complete assembly.
P/N GS03010 Evacuable pellet die 13mm diameter internal pressing pellets (pair).
P/N GS03020 Evacuable pellet die 13mm diameter O-ring kit.
P/N GS03030 Evacuable pellet die 13mm diameter plunger.
P/N GS03040 Evacuable pellet die 13mm diameter body.
P/N GS03050 Evacuable pellet die 13mm diameter base.

All of the die parts are available for individual replacement. Because of the wide range of die sizes and parts please contact Specac for any replacement parts you may require for your specific die size.

Safety Data for Potassium Bromide (KBr)

General
Medium for making Potassium Bromide pellets for IR spectroscopy.
When fused together as a solid can be polished and used as a transmission window material. Hygroscopic material similar to Sodium Chloride (NaCl).
Soluble in water, glycerine and alcohols. Slightly soluble in ether.
Fairly good resistance to mechanical and thermal shock.
Molecular formula: KBr.
Chemical Abstracts Service (CAS) No: 7758-02-3.

Physical Data
Appearance: Odourless, white or colourless crystalline solid.
Melting point: 730°C.
Boiling point: 1380°C.
Vapour pressure: 1mm Hg at 795°C.
Specific gravity: 2.75 g cm^{-3}
Solubility in water: 53.48g/100g at 0°C.
Hardness: 6 Kg/mm^2.
Refractive Index: 1.54 (at 2000cm-1 - wavenumbers).
Spectroscopic transmission range: 43,500 to 400 cm-1 (wavenumbers).

Stability
Stable.
Incompatible with strong oxidising agents, strong acids, bromine trifluoride and bromine trichloride.

Toxicology

Harmful if ingested in large amounts, if inhaled, or if in repeated contact with the skin.

Personal Protection
Always wear safety spectacles and gloves when handling the powder or window material.
Allow for adequate ventilation.

Storage
Keep powder or windows stored in a cool, dry container.

8. Use of the 13mm Diameter Pellet Holder

Supplied with the Advanced Solid Pack is the 13mm diameter pellet holder P/N GS03410. The pellet holder consists of a 3" x "2 slide mount plate (**1**) with a central 11.8mm diameter aperture and circular clip mount and retainer assembly. A 13mm diameter KBr pellet up to 3mm thick is held between the front ring clip part (**2**) and the central retainer mount (**3**). (See Fig 24.)

When a 13mm diameter KBr pellet sample has been prepared from use of the 13mm evacuable pellet die P/N GS03000 within the 15 ton press P/N GS15011, the KBr pellet is mounted into the spectrometer sample compartment by use of the 13mm diameter pellet holder P/N GS03410 to be installed into a standard 3" x 2" slide mount plate system as normally provided for the spectrometer.

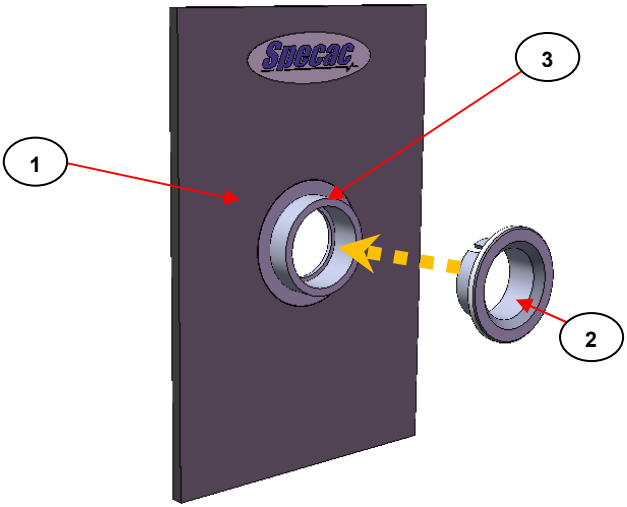


Fig 24. 13mm Diameter Pellet Holder GS03410

To mount a KBr pellet, pull the ring clip part (**2**) away from the retainer (**3**), carefully insert the KBr pellet and then hold secure by replacement of the ring clip (**2**) as a push fit into the retainer (**3**).

Notes for Use

Notes for Use

Worldwide Distribution

France
Eurolabo - Paris.
Tel.01 42 08 01 28
Fax 01 42 08 13 65
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Germany
L.O.T. - Oriel GmbH & Co,
KG - Darmstadt
Tel: 06151 88060
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