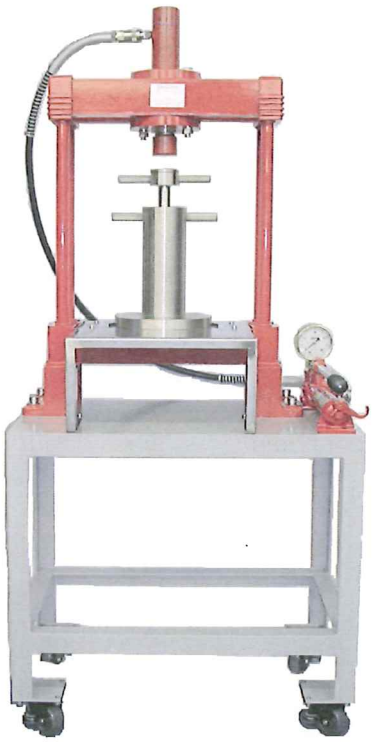
#120808C

CSC

HYDROSTATIC PRESS SYSTEM

MODEL : HPTS-M-200

Operation Manual



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1. Introduction

This system was developed to mold the feed rod efficiently in straight shape and of uniform which is used for single crystal growth in the infrared optical floating zone furnace.

At first, the raw material powder is put into rubber tube, and then set in the pressure vessel with water, and pressed and shaped by hydrostatic press method.
BY this method, thin round sample is easily prepared without contamination.

There are two types of pressure method. One is to use manual oil pressure pump, and the other is automatic oil pressure pump.

2. Specifications

2.1 Hydrostatic press system

Model	HPTS-M-200	Remark
Oil pump	manual	
Oil pressure cylinder	10t single cylinder	
Pressure vessel	SUS pressure vessel Φ90×H240 (inner diameter ϕ 25)	
Size	W660×D400×H1450 (mm)	

※Oil press system itself or Pressure vessel itself is available respectively

2.2 Oil press system

Model	HP-M	Remark
Press method	Manual	
Oil pressure	70MPa	
Max pressure	200MPa	
Stroke	120 (mm)	

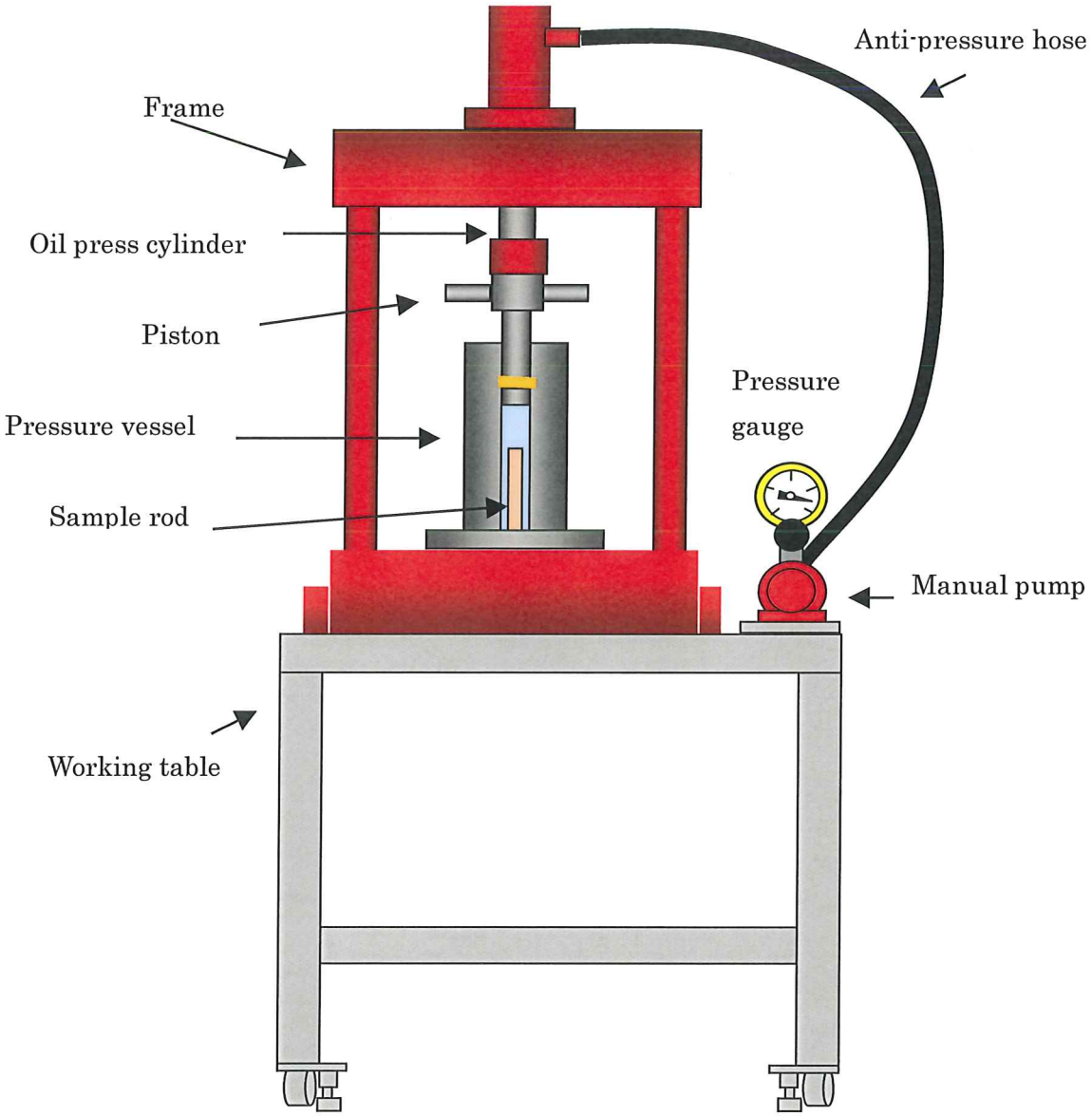
2.3 Pressure vessel

Model	HP-SD-200	Remark
Dimension	Φ90×240 (mm)	
Piston	Φ25 (mm)	
Depth	200 (mm)	
Sealing	O-ring	

2.4 Name of parts

Hydrostatic pressure system

Model : HPTS-M-200



3. Operating procedures (For your reference)

※Followings are example how to prepare the sample rod.

3.1 Preparation of sample rod

Procedures of making sample rod and sintering

As shown by photo 1 and 2, put raw material powder into rubber tube little by little, and push and press by this Acryl bar etc so that the raw material becomes uniform. At this time, please try to adjust to keep the same diameter.

Photo 1

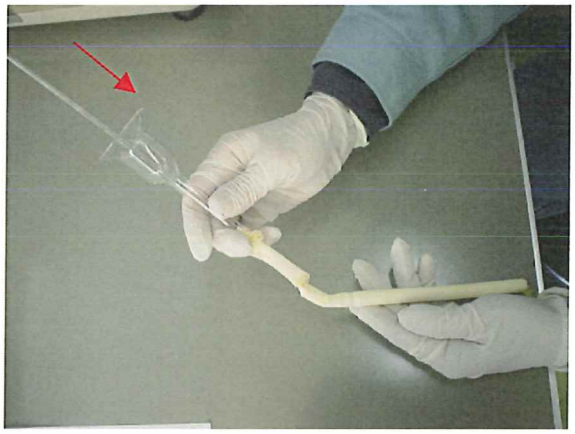


Photo 2

As shown by photo 3, please roll the sample with Acryl plate etc to make the rod diameter the same.

Photo 3

When the sample rod reaches the intended length, as shown by photo 4, please stuff the cotton into rubber tube. This is not to such up the raw material when You vacuum up the air inside.

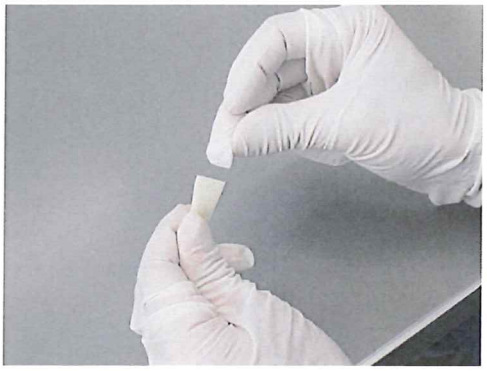


Photo 4

By the small vacuum pump as shown by the photo 6, please vacuum up the air inside the Rubber tube.

Please vacuum up the raw material for about 5 minutes. Please DONOT vacuum longer time because the raw material might be contaminated by backward oil after vacuum saturation.

Photo 5

When you remove the rubber tube, please bind rubber tube by rubber ring etc so tightly to shut the air from outside. When you bind it, you had better keep the vacuum pump on.

After the rubber tube is completely removed, the vacuum pump should be stopped.

※ The vacuum pump is optional.

3.2 Hydrostatic press preparation

Setting of O-rings

As for O-ring for the piston, please use type FO-21 (our part number) which is for the pressure application. As shown by the photo 6, remove the cap, and then fit the ring. Please faster tightly by using a bar as shown photo 7 because scratches and damage might occur with loose setting.

O ring (P-21)

Photo 6

Photo 7

Use P-11 at the cap portion. Though it is a bit difficult to fit the O-ring, please fasten the O-ring carefully without deviation.

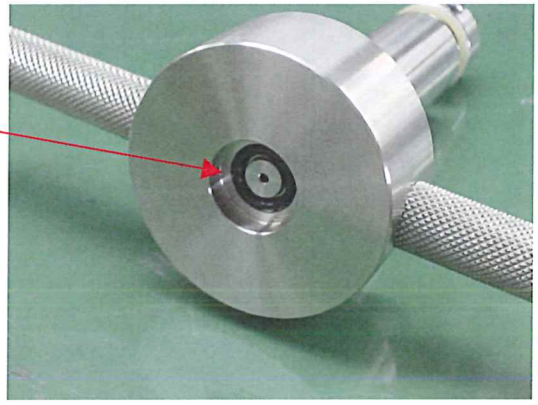


Photo 8

3.3 Insert the sample

Firstly, fill water to 90% of the chamber, then insert the rubber tube packed with the sample powder utilizing the guide.

Photo 9

3.4 Piston position

Please set the piston position with piston O-ring a bit inserted inside the pressure vessel as shown by Photo 10.

Photo 10

3.5 Position of pressure vessel

Put the lid on the top of the piston, insert the pressure vessel to the intended guide.
Adjust the position of the piston at the center of the oil press in order to avoid danger.

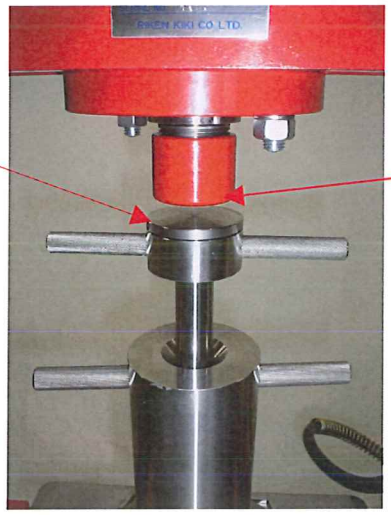


Photo 11

3.6 Air valve of the press pump

Please open when use as shown on the cylinder of the press pump.
As for details of press pump, please refer to the attached P-16B manual.

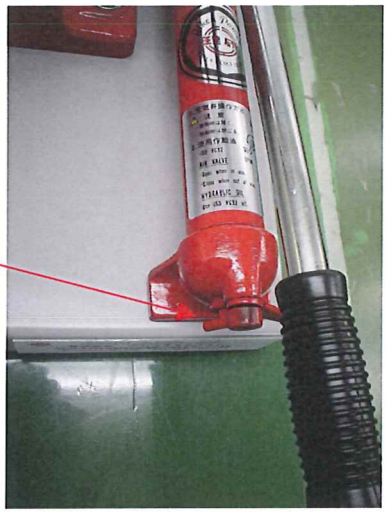


Photo 12

3.7 Operation valve of press pump

Close the operation valve
And get ready to press

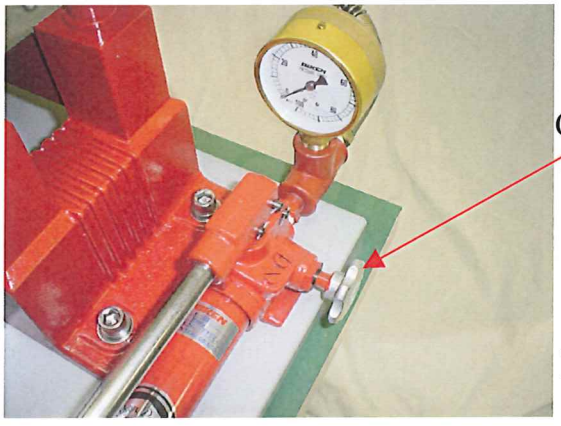


Photo 13

3.8 Operation of press pump

Increase the pressure by pushing the operation lever up and down.

Please do not stand in front of the pressure vessel when during operation. If O-ring was damaged it is possible the water flushes out. So you may cover the pressure vessel with a towel.

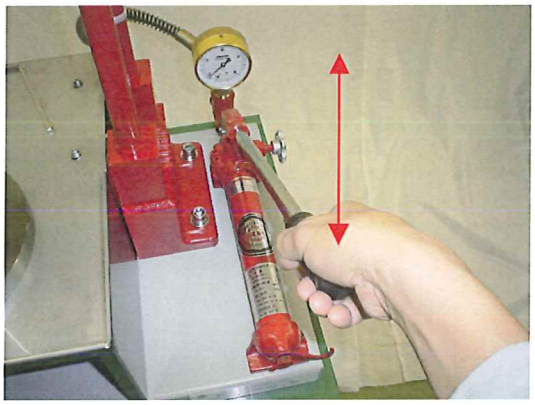


Photo 14

3.9 Max pressure

Till press gauge indicates 70Mpa, keep in pushing operation lever up and down.

At 70Mpa, inner pressure is 2ton/ c m2.

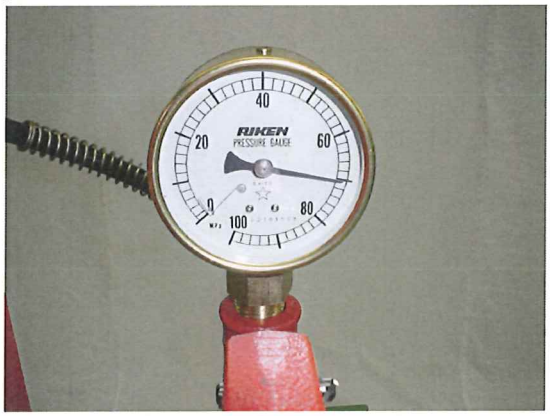


Photo 15

3.10 Pressure release

Keep on leaving it as it is for about 5 minutes, then release the operation valve slowly.

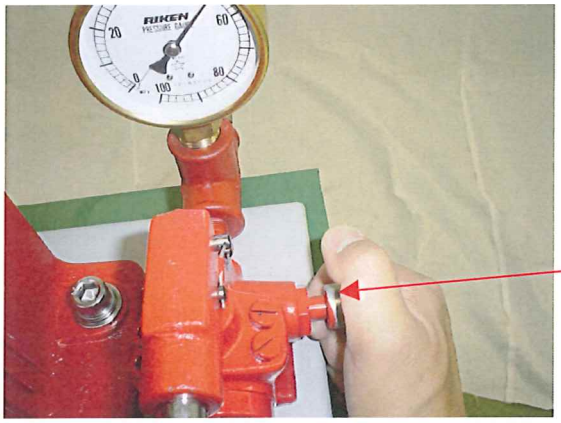


Photo 16

3.11 Sample picking up

When the pressure returns to 0(atmospheric pressure), pull the pressure vessel toward you, take off the lid , and pull out the piston and then Pick up the sample with tweezers.

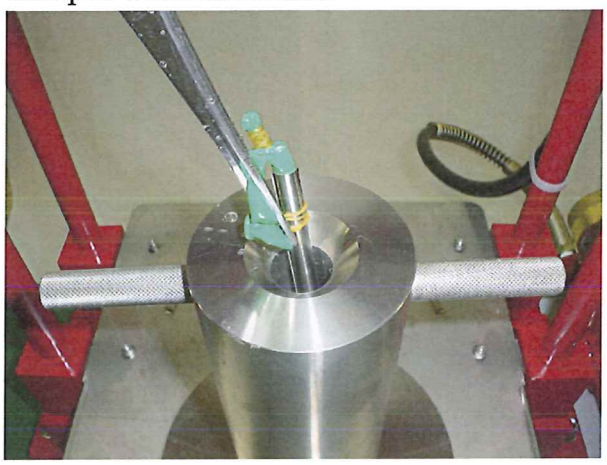


Photo 17

Wipe the rubber tube with tissue paper etc、and take out the inner sample paying attention not to break the sample.

3.12 Sintering preparation of the sample rod

As shown by photo18, make a hole to pass through Pt wire by using ϕ 1 drill.
It's fragile, so drill carefully with cleaning edge repeatedly.

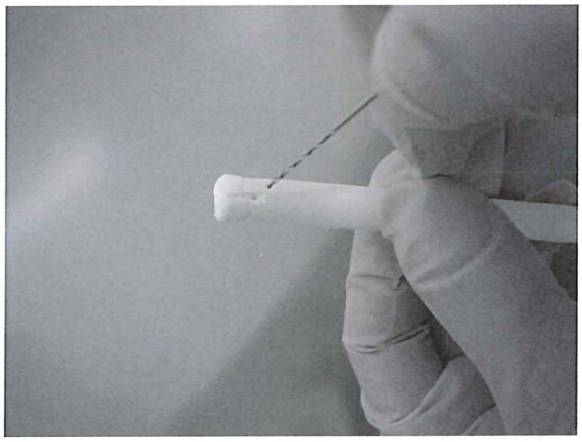


Photo 18

Through the hole, please pass through the Pt wire as photo 19 and pull down in sample rotating lifter

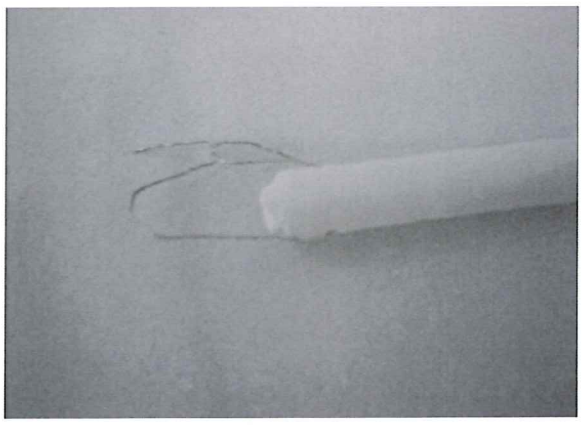


Photo 19

While passing Pt wire through the hole, please be careful because it is not sintered yet and fragile.

3.13 Sintering of sample rod

Suspend the sample rod in the rotational lifter, and start sintering.

The temperature in the electric furnace has to be increased beforehand to the intended temperature.

Pull down it to the entrance of electric furnace rapidly, then at the entrance, re-set the lowering speed as you intended.

In order to insert the sample rod, please open the upper lid as shown by photo20.

In case the atmosphere is flown, please set the flow rate.

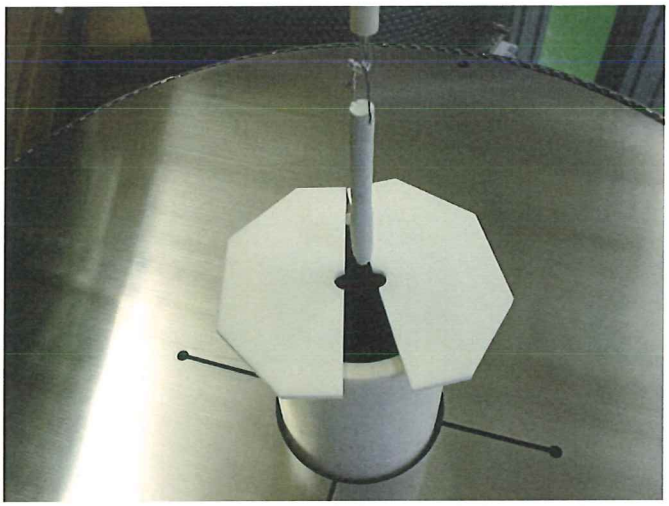


Photo 20

Shut the lid when the sample rod is inserted completely as shown by photo 21.

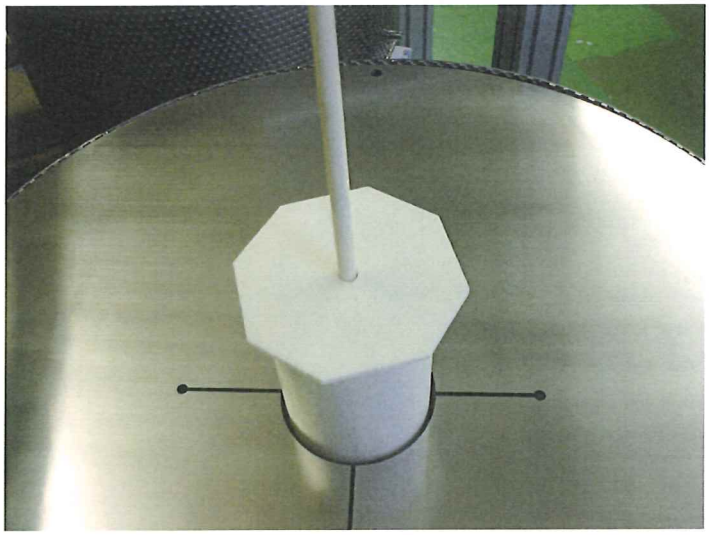


Photo 21

After that, it is automatically lifted after designed ups-and-downs. It is the end of process when the sample returns to top position(original position).

Please repeat above procedures if you have other samples to be sintered.

4 Notes:

- The operation of hydrostatic press is under high pressure. Therefore please pay attention and keep safe operation such as not to stand in front of the press machine etc.
- P-21 O-rings are expendables. So please exchange every 10-20 times.
  Before every experiment, check the surface of O-rings, and if it has scratches, cracks, damages, please exchange even it has used just several times.
  However, in case O-rings are broken just with one or two times, there might be another cause, so please inform Supplier.
- The water for hydrostatic press is not necessarily to be exchanged every time, however if it becomes dirty, please clean the inside of the vessel and use fresh water. And if you do not use it for a long time, please pour the water off the vessel and dry it.
- In case you do not use the oil pressure pump for a long time,
  please follow P-16B manual about valve operation.

5 Attachments

O-rings	P-21	10 pcs
	P-11	3 pcs
Rubber tube		1 set (100pcs)
Guide		2 set
Powder-tapping bar (Acryl)		1 pc
Plate (Acryl)		1 pc
Spoon		1pc
Funnel		1pc
tweezers.		1 pare
Rubber rings		a few

Drawing table

June.11.2012

Number	Drawing No	Name	Note
1	CIT125-100	Hydrostatic Press	
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

NO		DATE

California Institute of Technology

Production number CSS2403-4

	Date	Signature	Title
Approved by	2012/6/11	I.Shindo	Hydrostatic Press
Checked by	2012/6/11	S.Ozawa	
Drawing by	2012/6/11	S.Kimura	

Name

Crystal systems corp.

Model

HPTS-M-200

Revise	Sign
Title Hydrostatic Press	
Model HPTS-M-200	
Drawing No. CIT125-100	

PARTS LIST

Title Hydrostatic Press

Model HPTS-M-200 Drawing No CIT125-100

No	NAME	Model	QUANT	NOTE
1	PRESS BASE	CD-10-10	1	(RIKEN)
2	PRESSURE VESSEL	HPM001B HPM002B HPM003 HPM004	1set	(CSC)
3	PRESSURE GAUGE	AS75-1000	1	(RIKEN)
4	OIL CYLINDE	S1-120 (100kN)	1	(RIKEN)
5	MANUAL PUMP	P-16B(MAX 70MPa)	1	(RIKEN)