

Multiple Gradient Caster

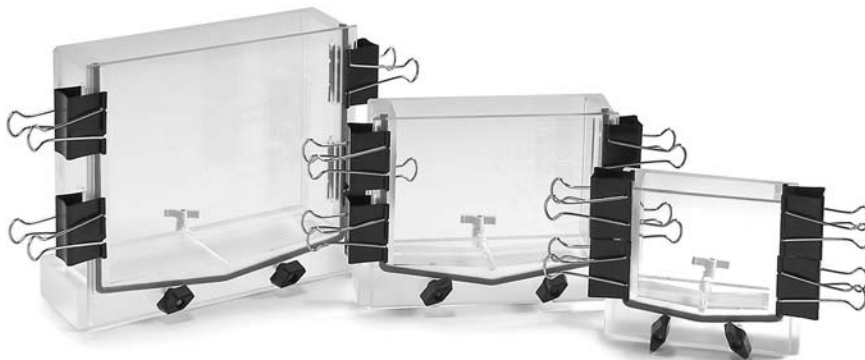
Models P7-CST, P1-CST and P2-CST

Operating and Maintenance Manual 7217837 Rev. 0



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MANUAL NUMBER 7217837

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REV	ECR/ECN	DATE	DESCRIPTION	By



Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

Material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. Thermo Scientific makes no representations or warranties with respect to this manual. In no event shall Fisher be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

Statement of Proper Use:

Use this product only for its intended purpose as described in this manual. Do not use this product if the power leads are damaged or if any of its surfaces are cracked.

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Important operating and/or maintenance instructions. Read the accompanying text carefully.



Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.



Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.



Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.



Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.



This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the WEEE symbol. Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo Scientific's compliance with this directive, the recyclers in your country and information on these products will be available at www.fishersci.com.

- ✓ Always use the proper protective equipment (clothing, gloves, goggles, etc.)
- ✓ Always dissipate extreme cold or heat and wear protective clothing.
- ✓ Always follow good hygiene practices.
- ✓ Each individual is responsible for his or her own safety.

Do You Need Information or Assistance on Thermo Scientific Products?

If you do, please contact us 8:00 a.m. to 6:00 p.m. (Eastern Time) at:

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Our **Sales Support** staff can provide information on pricing and give you quotations. We can take your order and provide delivery information on major equipment items or make arrangements to have your local sales representative contact you. Our products are listed on the Internet and we can be contacted through our Internet home page.

Our **Service Support** staff can supply technical information about proper setup, operation or troubleshooting of your equipment. We can fill your needs for spare or replacement parts or provide you with on-site service. We can also provide you with a quotation on our Extended Warranty for your Thermo Scientific products.

Whatever Thermo Scientific products you need or use, we will be happy to discuss your applications. If you are experiencing technical problems, working together, we will help you locate the problem and, chances are, correct it yourself...over the telephone without a service call.

When more extensive service is necessary, we will assist you with direct factory trained technicians or a qualified service organization for on-the-spot repair. If your service need is covered by the warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

Regardless of your needs, our professional telephone technicians are available to assist you Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please contact us by telephone or fax. If you wish to write, our mailing address is:

Thermo Fisher Scientific
401 Millcreek Road, Box 649
Marietta, OH 45750

International customers, please contact your local Thermo Scientific distributor.

Table of Contents

Section 1	General Information	1-1
	Parts List	1-1
	Specifications	1-2
Section 2	Setting Up	2-1
	Gel Cassette Assembly	2-1
Section 3	Technical Tips	3-1
	Combs	3-1
	Offset vs. Notched	3-1
	Glass	3-1
	Spacers	3-2
	Reagent Information	3-2
	Acrylamide*	3-3
Section 4	Troubleshooting	4-1
Section 5	Care and Cleaning	5-1
	Care of Acrylic	5-2
Section 6	Optional Equipment	6-1

Section 1 General Information

The Multiple Gradient Caster System features an easy-to-use casting base and spacer plates for quick casting of high quality linear or gradient gels. Using the acrylic and foam spacer plates allows you to cast from one to five gels simultaneously. A silicone gasket provides a leak proof seal and casting port allows the casting of gradient gels from the base of the caster.

Before starting, unpack the unit and inventory your order. If any parts are missing, contact Technical Services immediately.

Reference the order or catalog number on your invoice and check the corresponding parts list.

Table 1-1. Parts List

Description	P7-CST	Qty	P1-CST	Qty	P2-CST	Qty
Casting Stand	-	1	-	1	-	1
Front Plate	P7-CST-007	1	P1-CST-007	1	P2-CST-007	1
Knobs	R10446	2	R10446	2	R10446	2
Acrylic Spacer Plate 1/2"	P7-CST-006	1	P1-CST-006	1	P2-CST-006	1
Acrylic Spacer Plate 3/8"	JGC4-006	1	P1-CST-005	1	P2-CST-005	1
Acrylic Spacer Plate 1/4"	P-7-CST-004	3	P1-CST-004	3	P2-CST-004	3
Blank Glass	P7-10G	1	P1-14G	1	P10-20G	1
Foam Spacer Plate 3/8"	R10711	2	R10707	2	R10709	2
Foam Spacer Plate 1/8"	R10712	1	R10708	1	R10710	1
Spacer Placer	R10559	1	R10359	1	R10360	1
Binder Clamps	CL-12	4	CL-12	4	CL-12	4
Stopcock	R10717	1	R10717	1	R10717	1

Table 1-2. Specifications

Unit/Model Number	P7-CST	P1-CST	P2-CST
Gel size	10cm W x 10cm L 10cm W x 8cm L	16cm W x 14cm L 16cm W x 16cm L	20cm W x 20cm L
Sample Capacity	20	30	40
Dimensions (cm) W x D x H	15 x 13 x 13	20 x 13 x 18	25 x 13 x 23
Glass Size (cm) W x L	10 x 10	16 x 14	20 x 20
Compatible w/ Owl Units	P8DS, P82	P9DS	P10DS

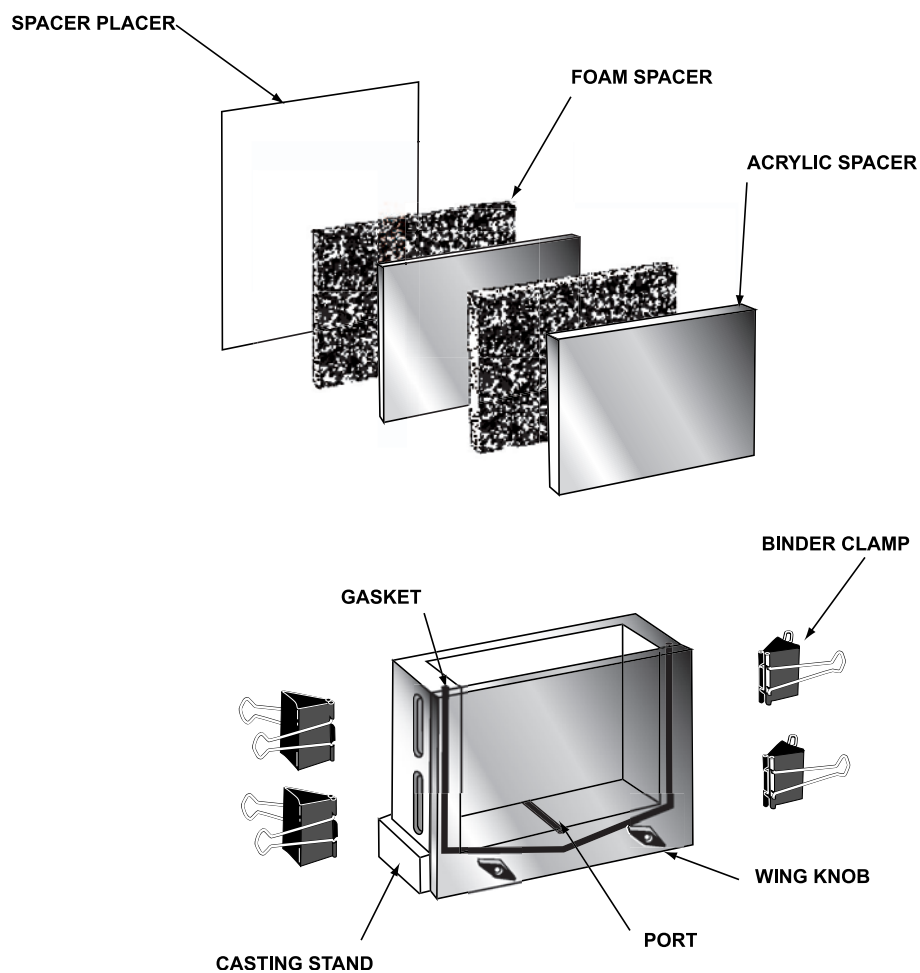


Figure 1-1. Exploded Parts

Section 2 Setting Up

Assemble the Gel Cassette by following the procedure below.

Gel Cassette Assembly

1. Attach the casting valve to the port located on the back of the caster base.
2. Assemble glass plates and spacers in this order: blank plate, spacers, notched plate. Continue to assemble glass and spacers in this order for as many gels as are going to be cast. Place the gel assembly into the caster. One to five gels may be cast simultaneously in the unit.
3. Foam and acrylic spacer plates are provided for casting less than five gels. The foam spacer plates can be used in combination with the acrylic spacer plates to achieve a tight fit. These spacer plates are designed to fill the gap between the glass plates and the front plate. A Spacer Placer™ aligner is provided to assist in the alignment of spacers by slipping it between the spacers of each gel assembly.
4. Once the glass plates and spacer plates are assembled, place the front plate onto the unit so that the notches on the front plate fit onto the screws.
5. Clamp the front plate to the caster using the 4 binder clamps provided. The binder clamps fit into the groove located on each side of the caster.
6. Place the knobs onto the screws of the caster and tighten to create a seal between the front plate and the gasket.



Figure 2-1. Spacer Placer

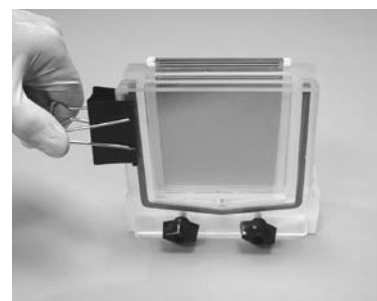


Figure 2-2. Attach Clamps

Gel Cassette Assembly (continued)

7. Gels may either be cast from the top of the unit by pouring acrylamide solution into the top of the caster or from the base by pumping acrylamide into the port. If casting from the base is desired, attach tubing to inlet of valve. The casting valve is in the open position when the white toggle switch is parallel to the valve. Conversely, the casting valve is closed when the white toggle switch is perpendicular to the valve.
8. If pouring linear gels from the top of the caster is desired, be sure valve is in the closed (white toggle switch perpendicular to valve) position before pouring gels.

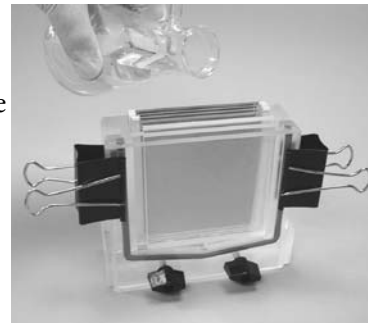


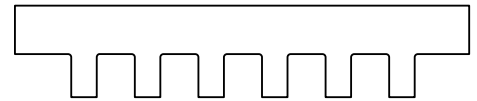
Figure 2-3. Casting From Top

Section 3 Technical Tips

Combs

STANDARD

0.5mm(A), 0.8mm (C) and 1.5mm (D) thicknesses



STANDARD

PREPARATIVE

One long well and one marker lane



PREPARATIVE

CUSTOM COMBS

Figure 3-1. Combs

Call Technical Services for more information.

Offset vs. Notched

All units require a blank piece of glass and an offset or notched piece of glass. Offset glass is glass that is about 2cm shorter than the blank piece without "ears" on the sides. Notched glass has two "ears" that are left behind when a cut is made in the middle of the top of the glass. Both offset glass and notched glass allow the gel and samples to make contact with the upper buffer chamber. Offset glass has to be used with sponge tips, which take the place of the notches on the glass. The advantage of offset glass is that this glass is more rigid. Notched glass is easier to use and does not require the addition of sponge tips.

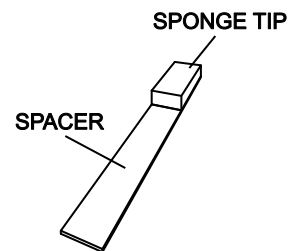
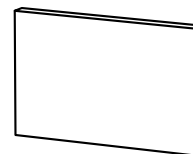


Figure 3-2. Assembly

Glass BLANK

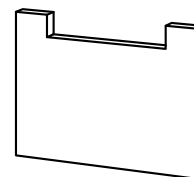
The plate which faces you during electrophoresis. All gel sandwiches require one piece of blank glass.



BLANK

NOTCHED

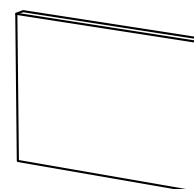
The plate which faces the chamber during electrophoresis. Spacers are placed over the "ears" of the plate when casting vertical gels. Buffer accesses the gel between the ears.



NOTCHED

OFFSET

Offset plates may be used in place of notched plates. They require sponge tips mounted on the spacers. Sponge tips take the place of the "ears", and prevent buffer from running out of the upper buffer chamber from the sides.



OFFSET

FROSTED

Frosted plates are used for vertical agarose electrophoresis. One side of the plate has a rough surface to prevent agarose from sliding down.

Figure 3-3. Glass

Spacers STANDARD

Protein spacer sets include two side spacers and one bottom spacer. Spacers and combs must be of identical thickness to be used together.

WEDGE

Linear wedge spacers (0.4 – 0.8mm) provide a current gradient allowing a single percent gel to separate disparate sized DNA fragments.

Reagent Information

RUNNING BUFFER

TGS

Tris - 3.0285g/L

Glycine - 14.4g/L

SDS - 1.0g/L

pH 8.3 (Laemmli, 1970)

q.s. to 1L

Note For Native Protein Electrophoresis, do not add SDS.

Table 5-1. Sample Buffer

2X Concentration Stock		/L	/10 mL	Final Concentration With Sample*
2%	SDS	20g	0.2	1%
10%	BME	10mL	0.1	5%
250mM	Tris	6.057g	.0606g	125mM
30%	Glycerol	300 mL	3 mL	15%
0.002%	Bromo Phenol Blue	.02g	.0002g	0.001%

* add sample buffer 1:1 with sample solution.

Caution 2X Sample Buffer containing 2-mercaptoethanol should be prepared in a fume hood. 0.2M (final concentration) Dithiothreitol (DTT) may be used in place of 2-mercaptoethanol. ▲

Acrylamide*

Table 5-2. Gel Preparation (SDS-Page continuous buffer system)

	% Acrylamide*				
Stock Solution	20.0	15.0	12.5	10.0	5.0
Acrylamide-Bisacrylamide (30:0.8)	20.0	15.0	12.5	10.0	5.0
0.5 M Sodium Phosphate Buffer pH 7.2	6.0	6.0	6.0	6.0	6.0
10% (w/v) SDS	0.3	0.3	0.3	0.3	0.3
Water	2.2	7.2	9.7	12.2	17.2
1.5% (w/v) APS	1.5	1.5	1.5	1.5	1.5
TEMED	0.015	0.015	0.015	0.015	0.015

Electrophoresis buffer: 0.1 M sodium phosphate pH 7.2, 0.1% (w/v) SDS.

* The columns represent volumes (ml) of stock solutions required to prepare 30ml of gel mixture.

Section 4 Troubleshooting

Below are some possible solutions to potential problems. If these suggestions are unclear or unsuccessful, contact Technical Services.

PROBLEM	SOLUTION
Polyacrylamide is leaking from front plate.	Remove the front plate and take out the gasket. Rinse the gasket thoroughly and reseal the gasket making sure that it is firmly and evenly placed within the groove.
Separating individual "gel sandwiches" is difficult.	This occurs because small amounts of acrylamide will polymerize between the plates. This problem may be eliminated by placing a piece of plastic wrap or wax paper between each gel assembly. Be sure to cut the plastic wrap or wax paper larger than the plates so you will have a "tab" to hold onto and lift plates apart.
Acrylamide is polymerizing to the caster and in the port.	If pouring gels from the top of the caster, pump a small amount of glycerol into the caster base from the port located at the base of the unit before pouring acrylamide. Be sure to close the valve before pouring gels.
	If casting gels using the port in the base of the caster, pump a small amount of glycerol into the caster base after the acrylamide has been pumped into the caster. This will prevent the acrylamide from polymerizing directly onto the caster.

Section 5 Care and Cleaning

A few tips about caring for your system follow.

Caution Organic solvents cause acrylic to “craze” or crack. Clean all acrylic systems with warm water and a mild detergent. Do not use ethanol or other organic solvents to clean these products. Do not autoclave, bake, or microwave your unit. Temperatures over 50°C can do damage to the acrylic. ▲

Note If an RNase free electrophoresis system is desired, there are various methods to rid the system of RNA contamination. For fast and easy decontamination, use RNase AWAY[®]*. Spray, wipe or soak labware with RNase Away then wipe or rinse the surface clean; it instantly eliminates RNase. RNase Away eliminates the old methods that include treatment with 0.1% Diethyl Pyrocarbonate (DEPC) treated water and soaking in dilute bleach. DEPC is suspected to be a carcinogen and should be handled with care. This electrophoresis system should never be autoclaved, baked, or placed in a microwave. ▲

To order RNase AWAY[®], contact Technical Services:

Part Number

7000250ml bottle
7002475ml spray bottle
70031 liter bottle
70054 liter bottle

**Rnase AWAY[®] is a registered trademark of Molecular BioProducts*

Care of Acrylic

The following chemical compatibility chart is supplied for the convenience of our customers. Although acrylic is compatible with most solvents and solutions found in the biochemical laboratory, some solvents can cause substantial damage. Keep this chart handy to avoid harm to your apparatus by the use of an inappropriate solvent.

Codes:

S - Safe (no effect, except possibly some staining)

A - Attacked (slight attack by, or absorption of, the liquid)

(slight crazing or swelling, but acrylic has retained most of its strength)

U - Unsatisfactory (softened, swollen, slowly dissolved)

D - Dissolved (in seven days, or less)

Table 5-1. Chemical Compatibility for Acrylic-Based Products

Chemical	Code	Chemical	Code	Chemical	Code
Acetic acid (5%)	S	Ethyl alcohol (50%)	A	Naptha	S
Acetic acid (Glacial)	D	Ethyl alcohol (95%)	U	Nitric acid (10%)	S
Acetic Anhydride	A	Ethylene dichloride	D	Nitric acid (40%)	A
Acetone	D	Ethylene glycol	S	Nitric acid concentrate	U
Ammonia	S	2-Ethylhexyl Sebacate	S	Oleic acid	S
Ammonium Chloride (saturated)	S	Formaldehyde (40%)	S	Olive oil	S
Ammonium Hydroxide (10%)	S	Gasoline, regular, leaded	S	Phenol 5% solution	U
Hydroxide (10%)	S	Glycerine Heptane (commercial grade)	S	Soap solution (Ivory)	S
Ammonium Hydroxide concentrate	S	Hexane	S	Sodium carbonate (2%)	S
Aniline	D	Hydrochloric acid (10%)	S	Sodium carbonate (20%)	S
Benzene	D	Hydrochloric acid concentrate	S	Sodium chloride (10%)	S
Butyl Acetate	D	Hydro uric acid (40%)	U	Sodium hydroxide (1%)	S
Calcium chloride (saturated)	S	Hydrogen peroxide (3% solution)	S	Sodium hydroxide (10%)	S
Carbon tetrachloride	U	Hydrogen peroxide (28% solution)	U	Sodium hydroxide (60%)	S
Chloroform	D	Isooctane	S	Sodium hydrochlorite (5%)	S
Chromic acid (40%)	U	Isopropyl alcohol (100%)	A	Sulfuric acid (3%)	S
Citric acid (10%)	S	Kerosene (no. 2 fuel oil)	S	Sulfuric acid (30%)	S
Cottonseed oil (edible)	S	Lacquer thinner	D	Sulfuric acid concentrate	U
Detergent Solution (Heavy Duty)	S	Methyl alcohol (50%)	A	Toluene	D
Diesel oil	S	Methyl alcohol (100%)	U	Trichloroethylene	D
Diethyl ether	U	Methyl Ethyl Ketone	U	Turpentine	S
Dimethyl formamide	U	Methylene chloride	D	Water (distilled)	S
Diocetyl phthalate	A	Mineral oil (white)	S	Xylene	D
Ethyl acetate	D				

This list does not include all possible chemical incompatibilities and safe compounds. Acrylic products should be cleaned with warm water, a mild detergent such as Alconox™, and can also be exposed to a mild bleach solution (10:1). In addition, RNase removal products are also safe for acrylic. Contact Technical Services with any questions.

Section 6 Optional Equipment

Contact Technical Services to order replacement parts and accessories.

Table 6-1. Accessories

Description	P7-CST	P1-CST	P2-CST
Blank Glass Plates 3/32" Thick	P7-10G, 10cm W x 10cm L	P1-14G, 16cm W x 14cm L	P2-20G, 20cm W x 20cm L
Blank Glass Plates 1/8" Thick	--	--	P7-10-20G, 20cm W x 20cm L
Blank Glass Plates 1/8" Thick	--	--	P7-10-18G, 20cm W x 18cm L
Notched Glass Plates 3/32" Thick	P7-10R, 10cm W x 10cm L	P1-14R, 16cm W x 14 cm L	P2-20R, 20cm W x 20cm L
Notched Glass Plates 1/8" Thick	--	--	P10-20R, 20cm W x 20cm L
Frosted Notched Glass Plates 3/32" Th.	P7-10FR, 10cm W x 10cm L	P1-14FR, 16cm W x 14 cm L	P2-20FR, 20cm W x 20cm L
Frosted Notched Glass Plates 3/32" Th.	P7-10FG, 10cm W x 10cm L	P1-14FG, 16cm W x 14 cm L	P2-20FG, 20cm W x 20cm L
Offset Glass 3/16" Thick	--	--	P2-18G, 20cm W x 18cm L
Notched Alumina Plates 1.0mm Thick	P7-10RA, 10cm W x 10cm L	--	--
Spacers, 0.5mm Thick	P7-SA	--	--
Spacers, 0.8mm Thick	P7-SC	P1-CS	P2-CS
Spacers, 1.5mm Thick	--	P1-SD	P2-SD
Blocking Plate for Single Gel Operation	P8DS-016	P9DS-006	P10DS-006
Spacer Placer (pkg of 3)	JG4-PL	JG2-PL	JG3-PL

Table 6-2. Replacement Parts

Description	P7-CST	P1-CST	P2-CST
Front Plate	P7-CST-007	P1-CST-007	P2-CST-007
Knob	R10446	R10446	R10446
Acrylic Spacer Plate 1/2"	P7-CST-007	P1-CST-006	P2-CST-006
Acrylic Spacer Plate 3/8"	JGC4-006	P1-CST-005	P2-CST-005
Acrylic Spacer Plate 1/4"	P7-CST-004	P1-CST-004	P2-CST-004
Foam Spacer Plate 3/8"	R10711	R10707	R10709
Foam Spacer Plate 1/8"	R10712	R10708	R10710
Spacer Placer Package of 3	JG4-PL	JG2-PL	JG3-PL
Binder Clamps Package of 12	CL-12	CL-12	CL-12
Stopcock	R10717	R10717	R10717

Table 6-3. Combs Options

Model P7-CST					
Catalog Number	Comb Type	Number of Teeth	Thickness of Tooth	Width of Teeth	EST Well Volume (ul)
MP-6A	Well	6	0.5	11.1	89
MP-6C	Well	6	0.8	11.1	142
MP-6D	Well	6	1.5	11.1	266
MP-8A	Well	8	0.5	7.7	62
MP-8C	Well	8	0.8	7.7	99
MP-8D	Well	8	1.5	7.7	185
MP-10A	Well	10	0.5	5.7	46
MP-10C	Well	10	0.8	5.7	73
MP-10D	Well	10	1.5	5.6	134
MP-12A	Well	12	0.5	4.3	34
MP-12C	Well	12	0.8	4.3	55
MP-12D	Well	12	1.5	4.3	103
MP-15A	Well	15	0.5	2.9	23
MP-20A	Well	20	0.5	1.6	13
XCM	Custom		0.5, 0.8		

Table 6-4. Comb Options (continued)

Model P1-CST					
Catalog Number	Comb Type	Number of Teeth	Thickness of Tooth (mm)	Width of Teeth (mm)	EST Well Volume (ul)
P1-10C	Well	10	0.8	10.4	183
P1-10D	Well	10	1.5	10.4	343
P1-15C	Well	15	0.8	6.1	107
P1-15D	Well	15	1.5	6.1	201
P1-20C	Well	20	0.8	3.9	69
P1-20D	Well	20	1.5	3.9	129
P1-24C	Well	24	0.8	2.9	51
P1-24D	Well	24	1.5	2.9	96
P1-PREP	Prep	2	1.5	119.7/4.7	3630/152
XCM	Custom		0.5, 0.8		

Table 6-5. Comb Options (continued)

Model P2-CST					
Catalog Number	Comb Type	Number of Teeth	Thickness of Tooth (mm)	Width of Teeth (mm)	EST Well Volume (ul)
P2-10C	Well	10	0.8	13.6	239
P2-10D	Well	10	1.5	13.6	449
P2-15C	Well	15	0.8	8.2	144
P2-15D	Well	15	1.5	8.2	271
P2-20C	Well	20	0.8	5.5	97
P2-20D	Well	20	1.5	5.5	182
P2-25D	Well	25	0.8	3.9	69
P2-25D	Well	25	1.5	3.9	129
P2-PREP	Prep	2	1.5	148.1/4.7	4885/155
XCM	Custom		0.5, 0.8		

THERMO FISHER SCIENTIFIC OWL PRODUCTS WARRANTY USA

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner.

During the first thirty-six (36) months, component parts proven to be non-conforming in material or workmanship will be replaced at Thermo's expense, including labor. Installation, calibration and certification is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.
Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contract your local distributor for warranty information.



Rev. 0 9/12

THERMO FISHER SCIENTIFIC OWL PRODUCTS WARRANTY INTERNATIONAL

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During the first thirty six (36) months, component parts proven to be non-conforming in material or workmanship will be replaced at Thermo's expense, excepting labor. Installation, calibration and certification is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA or Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contract your local distributor for warranty information.



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