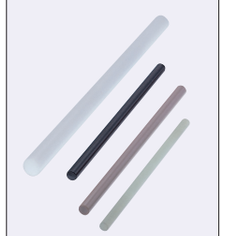
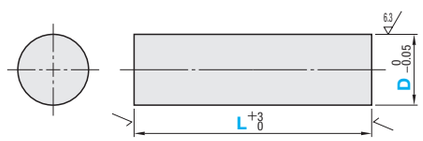
Precision Resin Rods

■ Tolerance is highly precise since the exterior surface is finished with centerless grinding.



Type	Material	Color
RDPJ	Polyacetal - Standard	White
RDPK	Polyacetal - Standard	Black
RDPP	PEEK - Standard	Gray
RDPE	Epoxy Glass - Standard	Green



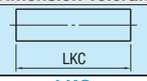
Use alteration LKC for L dimension tolerance precision grade. For characteristic values, see P.953, 954.

Part Number Type	D	L 1mm increment
RDPJ (Polyacetal - Standard, White) / RDPK (Polyacetal - Standard, Black)	3	10~250
	4	
	5	
	6	10~500
	8	
	10	
	12	10~750
	15	
	16	10~800
	20	20~800

Part Number Type	D	L 1mm increment
RDPP (PEEK - Standard) / RDPE (Epoxy Glass - Standard)	3	10~250
	4	
	5	
	6	10~500
	8	
	10	
	12	10~750

Ordering Example: Part Number RDPJ10 - L 300

Alterations: Part Number RDPJ10 - L 100 - (LKC) LKC

Alteration	L Dimension Tolerance
	
Code	LKC
Spec.	Changes L dimension tolerance as follows. 10 ~400mm±0.3 401~800mm±0.8 Ordering Code LKC 8≤D≤20 Not applicable to RDPE.

Part Number Type	D	Unit Price Min. L ~ 100	L101~200	L201~400	L401~600	L601~800
RDPJ (Polyacetal - Standard, White)	3				-	-
	4					
	5					
	6					
	8					
	10					
	12					
	15					
	16					
	20					
RDPK (Polyacetal - Standard, Black)	3				-	-
	4					
	5					
	6					
	8					
	10					
	12					
	15					
	16					
	20					

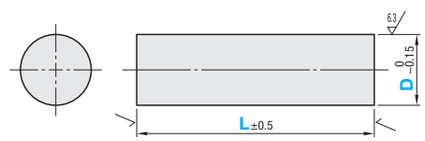
Part Number Type	D	Unit Price Min. L ~ 100	L101~200	L201~400	L401~600	L601~750
RDPP (PEEK - Standard)	3				-	-
	4					
	5					
	6					
	8					
	10					
	12					
RDPE (Epoxy Glass - Standard)	3				-	-
	4					
	5					
	6					
	8					
	10					
	12					

Ceramic Rods / Transparent Resin Rods

■ Ceramic Rods excel in insulation, abrasion resistance and heat resistance; Transparent Resin Rods excel in transparency and insulation.

■Ceramic Rods

CERAR



Material: Alumina 99.5

Part Number Type	D	L 1mm Increment	Unit Price L30~100	L101~200	L201~300
CERAR	3	30~300			
	4				
	5				
	6				
	8				
	10				

Washers and Collars (P.153), Bushings for Locating Pins (P.1-1686) and Circular Plates (P.991) are also available.

Ordering Example: Part Number CERAR6 - L 200

■Physical Properties of Alumina 99.5

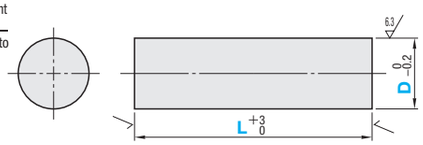
Properties	Unit	Alumina 99.5
Water Absorption Ratio	%	0
Bulk Density	g/cm³	3.9
Heat Resistance	°C	1000~1200
Compression Strength	kN/cm²	363
Bending Strength	kN/cm²	49
Linear Thermal Expansion Coefficient	-	8.0x10⁻⁶ (25~700°C)
Thermal Conductivity	W/(m・°C)	31.4 (20°C) 16.0 (300°C)
Specific Volume Resistivity	Ω・cm	10¹⁴< (20°C) 10¹⁴<(300°C)
Dielectric Constant	1MHz	9.8
Insulation Resistance	kV/mm	10

Physical property values are representative values (reference values).

■Transparent Resin Rods

Type	Material	Color
RDJA	Acrylic - Standard	Transparent
RDJC	Polycarbonate - Standard	

The acrylic rod is made by machining the cast plate into a round rod and finished by centerless grinding.



For characteristic values, see P.949.

Part Number Type	D	L 1mm increment	Unit Price RDJA L10~100	RDJA L101~200	RDJA L201~400	RDJA L401~600	RDJC L10~100	RDJC L101~200	RDJC L201~400	RDJC L401~600
RDJA Acrylic - Standard / RDJC Polycarbonate - Standard	3	10~250				-				-
	4									
	5									
	6	10~500								
	8									
	10									
	12	10~600								
	13									
	15									
	16									
	18									
	20									
	25									
	30									

The end face is not transparent because tooling marks remain on the surface.

Ordering Example: Part Number RDJA3 - L 250

Ceramic Plates
Alumina 96, Steatite, Machinable Ceramics

■Alumina 96: Excels in abrasion resistance, insulation and heat resistance.
■Steatite: Excels in insulation and high frequency characteristic.
■Machinable Ceramics: Excels in insulation, heat insulation and machinability. Can be machined into complex shapes or finished with precision.

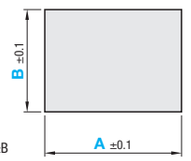
■Ceramic Plates

RoHS

Properties P.955

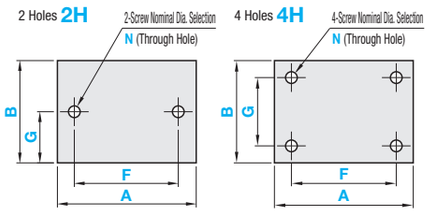
Part Number	Material	Finish Precision	Color	Operating Ambient Temperature
CEA	Alumina 96	Standard Grade	White	Ambient Temperature~1,300°C
CEAV	Alumina 96	Precision Grade (Upper-lower Surface Milling)		
CCES	Steatite	Standard Grade	White	Ambient Temperature~1,000°C
CCESV	Steatite	Precision Grade (Upper-lower Surface Milling)		
CEM	Machinable Ceramics	Standard Grade	Natural Color	Ambient Temperature~1,000°C

■Standard Type

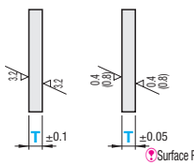


A≥B

■Pre-drilled Type



Standard Grade: CEA, CCES, CEM
Precision Grade: CEAV, CCESV



Surface Roughness of CCESV (Ra) =0.8

■Standard Type

Part Number Type	1mm Increment A	1mm Increment B	Selection T
CEA, CEM	10~200	10~100	1, 2
CEAV	10~100	10~100	2.5
CCES, CCESV	10~70	10~70	3, 5

■Accuracy Standards

Item		CEA, CCES, CEM	CEAV, CCESV
Thickness Parallelism (per 100mm)		0.1	0.05
Flatness	T=1	0.1	0.05
(per 100mm)	T=2~5	0.1	0.05

Hole Machining Details

N (Through Hole)

Screw Nominal Dia.	3	4	5	6	8	10
d	3.5	4.5	5.5	6.5	9	11

■Pre-drilled Type

Part Number Type	Number of Holes	1mm Increment A	1mm Increment B	Selection T	0.5mm Increment F	0.5mm Increment G	Screw Nominal Dia. Selection N (Through)
CEA, CEM	2H	20~200	10~100	1, 2	9~191	5~95 (2H), 9~91 (4H)	3, 4, 5, 6, 8, 10
CEAV	2H	20~100	10~100	2.5	9~91		
CCES, CCESV	4H	20~70	10~70	3, 5	9~61	5~65 (2H), 9~61 (4H)	

For F dimension, d+5≤F≤A-d-5 is required.
G Dimension: For 2H, d/2+2.5≤G≤B-d/2-2.5; for 4H, d+5≤G≤B-d-5.

Ordering Example

■Standard Type
Part Number - A - B - T
CEA - 60 - 55 - 2

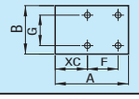
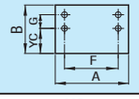
■Pre-drilled Type
Part Number - A - B - T - F - G - Screw Nominal Dia.
CEA4H - 80 - 80 - 1 - F55 - G55 - N6

Alterations: Part Number - A - B - T - F - G - Screw Nominal Dia. - (XC, YC)
CEA2H - 80 - 80 - 1 - F30 - G40 - N6 - XC15

■Standard Type

Part Number	T	A	Unit Price CEA B10~50	CEA B51~100	CEAV B10~50	CEAV B51~100	CEM B10~50	CEM B51~100
CEA	1	10~50		-		-		-
		51~100						
		101~150			-	-		
		151~200			-	-		
CEAV	2	10~50		-		-		-
		51~100						
		101~150			-	-		
		151~200			-	-		
CEM	2.5	10~50		-		-		-
		51~100						
		101~150			-	-		
		151~200			-	-		

Part Number	T	A	Unit Price CCES B10~35	CCES B36~70	CCESV B10~35	CCESV B36~70
CCES	3	10~35		-		-
		36~70				
CCESV	5	10~35		-		-
		36~70				

Alterations	Hole Position from Left	Hole Position from Bottom
		
Code	XC	YC
Spec.	XC = 1mm Increment 5≤XC≤186(CEA, CEM) 5≤XC≤86(CEAV) 5≤XC≤56(CCES, CCESV) d(d1)/2+2.5≤XC≤A-F-d(d1)/2-2.5	YC = 1mm Increment ⊗Not available for 2H. 5≤YC≤86(CEA, CEAV, CEM) 5≤YC≤56(CCES, CCESV) d(d1)/2+2.5≤YC≤B-G-d(d1)/2-2.5

■Hole Machining Charge

Pre-drilled Type	Screw Nominal N (Through)
2H	
4H	

(Ex.) Part Number - A - B - T - F - G - Screw Nominal Dia.
CEA2H - 90 - 60 - 1 - F60 - G30 - N6 >>
(Standard Type Unit Price) + (Hole Machining Charge) = Pre-drilled Type Price

Pre-drilled Type Price = Standard Type Unit Price + Hole Machining Charge

Ceramic Plates
Alumina 99

■Alumina 99: Excels in abrasion resistance, insulation and heat resistance.

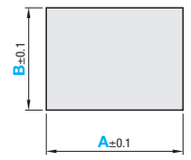
■Ceramic Plates

RoHS

Properties P.955

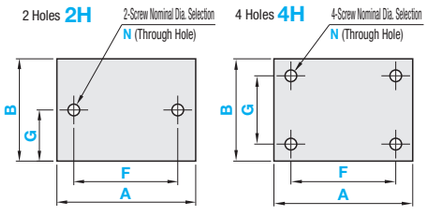
Part Number	Material	Finish Precision	Color	Operating Ambient Temperature
CEMN	Alumina 99	Standard Grade	Natural Color	Room Temp. ~ 1500°C

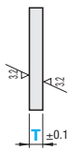
■Standard Type



A≥B

■Pre-drilled Type





■Standard Type

Part Number Type	1mm Increment A	1mm Increment B	Selection T
CEMN	50~480	50~175	3, 5, 10

■Pre-drilled Type

Part Number Type	Number of Holes	1mm Increment A	1mm Increment B	Selection T	0.5mm Increment F	0.5mm Increment G	Screw Nominal Dia. Selection N (Through)
CEMN	2H, 4H	50~480	50~175	3	9~465	5~160 (2H), 9~160 (4H)	3, 4, 5, 6, 8, 10
				5			
				10			

For F dimension, d+5≤F≤A-d-5 is required.
G Dimension: For 2H, d/2+2.5≤G≤B-d/2-2.5; for 4H, d+5≤G≤B-d-5.

Hole Machining Details

N (Through Hole)

Screw Nominal Dia.	3	4	5	6	8	10
d	3.5	4.5	5.5	6.5	9	11

Ordering Example

■Standard Type
Part Number - A - B - T
CEMN - 60 - 55 - 3

■Pre-drilled Type
Part Number - A - B - T - F - G - Screw Nominal Dia.
CEMN4H - 80 - 80 - 3 - F55 - G55 - N6

■Standard Type

T	A	Unit Price B50~100	Unit Price B101~150	Unit Price B151~175
3	50~100		-	-
	101~150			-
	151~200			
	201~250			
	251~350			
	351~480			
5	50~100		-	-
	101~150			-
	151~200			
	201~250			
	251~350			
	351~480			
10	50~100		-	-
	101~150			-
	151~200			
	201~250			
	251~350			
	351~480			

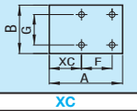
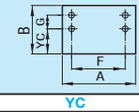
■Hole Machining Charge

Pre-drilled Type	Screw Nominal N	T 3	T 5	T 10
2H	3			
	4, 5, 6			
	8			
	10			
4H	3			
	4, 5, 6			
	8			
	10			

Pre-drilled Type Price = Standard Type Unit Price + Hole Machining Charge

(Ex.) Part Number - A - B - T - F - G - Screw Nominal Dia.
CEMN2H - 90 - 60 - 3 - F60 - G30 - N6 >>
(Standard Type Unit Price) + (Hole Machining Charge) = Pre-drilled Type Price

Alterations: Part Number - A - B - T - F - G - Screw Nominal Dia. - (XC, YC)
CEMN2H - 80 - 80 - 3 - F30 - G40 - N6 - XC15

Alterations	Hole Position from Left	Hole Position from Bottom
		
Code	XC	YC
Spec.	XC = 1mm Increment 10≤XC≤450 d(d1)/2+2.5≤XC≤A-F-d(d1)/2-2.5	YC = 1mm Increment ⊗Not available for 2H. 10≤YC≤160 d(d1)/2+2.5≤YC≤B-G-d(d1)/2-2.5

Ceramic Circular Plates

Ceramic Circular Plates

RoHS

Properties P.953

Part Number	Material	Finish Precision
PCEA	Alumina 96	Standard Grade
PCEAV	Alumina 96	Precision Grade (Upper-lower Surface Milling)
PCCES	Steatite	Standard Grade
PCCESV	Steatite	Precision Grade (Upper-lower Surface Milling)

Accuracy Standards

Item		PCEA, PCCES	PCEAV, PCCESV
Thickness Parallelism (D=50)		0.1	0.05
Flatness (D=50)	T=1	0.1	0.05
	T=2~5	0.1	0.05

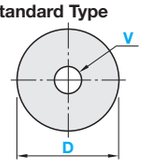
• D Dimension Tolerance (Standard Grade, Precision Grade)

D20~80 ±1%

• V Dimension Tolerance (Standard Grade, Precision Grade)

±0.15

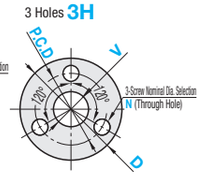
Standard Type



Pre-drilled Type

2 Holes 2H

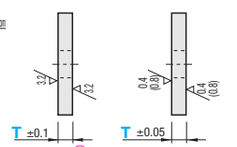
3 Holes 3H



4 Holes 4H

Standard Grade: PCEA, PCCES

Precision Grade: PCEAV, PCCESV



Surface Roughness of PCCESV (Ra) = 0.8

Washers / Collars (P.153), Rods (P.322) and Bushings for Locating Pins (P.1-1685) are also offered.

Standard Type

Part Number Type	5mm Increment D	1mm Increment V	Selection T PCEA PCEAV	Selection T PCCES PCCESV
PCEA	20~80	0~70 (V≤D-10)	1 2 5	3 5
PCEAV	20~50			
PCCES	20~50*			
PCCESV	20~50*			

* Dimension D for PCCES and PCCESV is in 10mm increment. When D≥55, T=1 and 2 are not selectable. (Only T=5 is selectable.)

Hole Machining Details

N (Through Hole)

Screw Nominal Dia.	3	4	5	6	8	10
d	3.5	4.5	5.5	6.5	9	11

Pre-drilled Type

Part Number Type	Part Number Number of Holes	5mm Increment D	1mm Increment V	Selection T PCEA PCEAV	Selection T PCCES PCCESV	1mm Increment P.C.D	Screw Nominal Dia. Selection N (Through Hole)
PCEA	2H 3H 4H	20~80	0~70 (V≤D-10)	1 2 5	3 5	10~40 3mm or more thickness is required between holes and between a hole and the perimeter.	3 4 5 6 8 10
PCEAV		20~50					
PCCES		20~50*					
PCCESV		20~50*					

* Dimension D for PCCES and PCCESV is in 10mm increment. When D≥55, T=1 and 2 are not selectable. (Only T=5 is selectable.)

Ordering Example

Standard Type

Part Number	-	D	-	V	-	T
PCEA	-	35	-	25	-	2

Pre-drilled Type

Part Number	-	D	-	V	-	T	-	P.C.D	-	Screw Nominal Dia.
PCEA2H	-	50	-	10	-	5	-	35	-	N4

The product price is the price shown in the table by the material multiplier.

(Ex.) Part Number - D - V - T >>

PCEAV - 40 - 15 - 2

(Price in the Table) x (Material Multiplier) = Standard Type Unit Price

Standard Type

Material multiplier should be noted.

Part Number	T	D \ V	Unit Price 0	1~20	21~40	41~60	61~70
Type (Material Multiplier)	1 2	20			-	-	-
		25			-	-	-
		30			-	-	-
		35				-	-
		40				-	-
		45				-	-
		50				-	-
PCEA (x1.0) PCEAV (x1.2)	5	20			-	-	-
		25			-	-	-
		30			-	-	-
		35				-	-
		40				-	-
		45				-	-
		50				-	-
		55					-
		60					-
		65					-
		70					
		75					
		80					
PCCES (x1.0)	3	20			-	-	-
		30			-	-	-
		40				-	-
		50				-	-
PCCESV (x1.2)	5	20			-	-	-
		30			-	-	-
		40				-	-
		50				-	-

Hole Machining Charge

Pre-drilled Type	Screw Nominal N (Through)
2H	
3H	
4H	

Pre-drilled Type Price = Standard Type Unit Price + Hole Machining Charge

(Ex.) Part Number - D - V - T - P.C.D - Screw Nominal Dia. >>

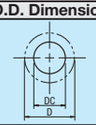
PCEA2H - 45 - 0 - 2 - 30 - N4

(Standard Type Unit Price) + (Hole Machining Charge) = Pre-drilled Type Price

Alterations

Part Number - D - V - T - (DC, PN)

PCEA - 50 - 20 - 5 - DC49

Alterations	O.D. Dimension	Through Hole Tolerance
		
Code	DC	PN
Spec.	Changes the D dimension. DC=1mm Increment DC<D 5mm or more distance is required between DC and V. 15≤DC≤79 Ex.) Changes D dimension 50 to 47. Ordering Code DC47	Alters Through Hole Tolerance. ±0.2 ±0.05 Ex.) Alters tolerance in N4 to ±0.05 Ordering Code N4-PN