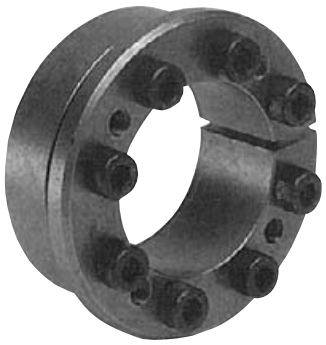
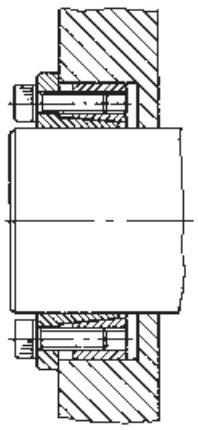
Clamping Elements Type RCK 16



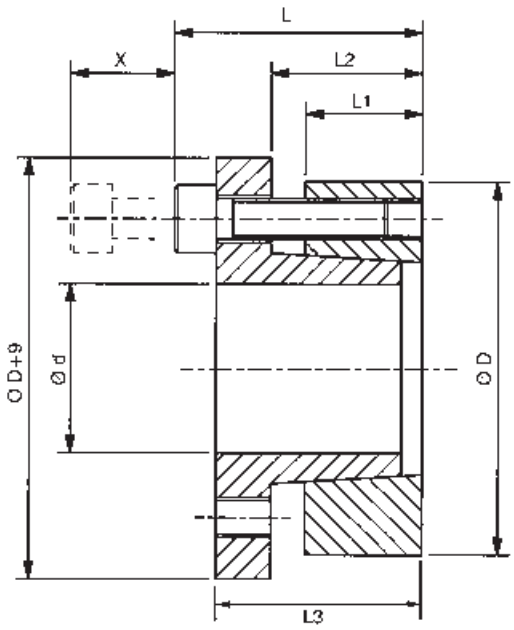
These clamping elements are basically to same design as RCK 13, but with increased diameter flange to locate hub and prevent axial movements, so combining good concentricity with positive axial location. The increase in friction between the cones due to axial restriction results in torque reduction of approx 20%, but this also means reduced surface pressures to both hub and shaft.



Recommended tolerances for full torque transmission are:-

Shaft h8
Hub H8

Clamping surfaces to be finished to Rz ≤ 15 μm.



X = Distance required to remove screws, additional clearance for alan key may be required.

Dimensions

Part No.	Dimensions mm							Torque Cap. M Nm	Axial Force F kN	Surface Pressure		Clamping Screws		Approx. Weight	Min. Hub Dia* mm		
	d	D	L	L_1	L_2	L_3	X			Shaft Ps N/mm²	Hub Ph N/mm²	Size	Torque Nm	kg	Assy Type A	Assy Type B	Assy Type C
RCK16-18x47	18	47	34	17	22	28	20	264	29	215	93	M6	17	0.28	63	60	56
RCK16-19x47	19	47	34	17	22	28	20	274	29	215	93	M6	17	0.27	63	60	56
RCK16-20x47	20	47	34	17	22	28	20	284	28	215	93	M6	17	0.26	63	60	56
RCK16-22x47	22	47	34	17	22	28	20	314	29	196	93	M6	17	0.25	63	60	56
RCK16-24x50	24	50	34	17	22	28	20	401	33	215	107	M6	17	0.28	71	66	61
RCK16-25x50	25	50	34	17	22	28	20	441	35	210	107	M6	17	0.27	71	66	61
RCK16-28x55	28	55	34	17	22	28	20	490	35	196	98	M6	17	0.35	75	71	66
RCK16-30x55	30	55	34	17	22	28	20	529	35	186	98	M6	17	0.32	75	71	66
RCK16-32x60	32	60	34	17	22	28	20	755	47	210	112	M6	17	0.38	86	80	74
RCK16-35x60	35	60	34	17	22	28	20	824	47	186	107	M6	17	0.35	85	79	74
RCK16-38x65	38	65	34	17	22	28	20	892	47	191	112	M6	17	0.41	94	87	80
RCK16-40x65	40	65	34	17	22	28	20	941	47	186	102	M6	17	0.39	90	84	79
RCK16-45x75	45	75	41	20	25	33	25	1716	76	225	132	M8	41	0.65	116	106	97
RCK16-50x80	50	80	41	20	25	33	25	1893	76	205	127	M8	41	0.69	122	111	102
RCK16-55x85	55	85	41	20	25	33	25	2403	87	210	132	M8	41	0.75	132	120	109
RCK16-60x90	60	90	41	20	25	33	25	2648	88	186	122	M8	41	0.80	134	123	114
RCK16-65x95	65	95	41	20	25	33	25	3188	98	196	132	M8	41	0.85	147	134	122
RCK16-70x110	70	110	50	24	30	40	30	4905	140	215	137	M10	83	1.35	174	157	143
RCK16-75x115	75	115	50	24	30	40	30	5150	137	195	127	M10	83	1.42	175	160	147
RCK16-80x120	80	120	50	24	30	40	30	5490	137	185	122	M10	83	1.51	179	164	151
RCK16-85x125	85	125	50	24	30	40	30	6620	156	195	132	M10	83	1.58	194	176	161
RCK16-90x130	90	130	50	24	30	40	30	6960	155	185	127	M10	83	1.66	198	181	166
RCK16-95x135	95	135	50	24	30	40	30	8190	172	195	137	M10	83	1.73	213	193	176
RCK16-100x145	100	145	56	26	32	44	35	10100	202	205	145	M12	145	2.64	236	212	192
RCK16-110x155	110	155	56	26	32	44	35	11030	201	190	135	M12	145	2.84	243	220	201
RCK16-120x165	120	165	56	26	32	44	35	13600	227	205	142	M12	145	3.05	266	239	217
RCK16-130x180	130	180	64	34	40	52	35	19000	292	186	137	M12	145	4.70	284	257	234
RCK16-140x190	140	190	68	34	40	54	40	21800	311	177	127	M14	230	4.95	289	264	242
RCK16-150x200	150	200	68	34	40	54	40	25600	341	185	130	M14	230	5.30	308	280	256
RCK16-160x210	160	210	68	34	40	54	40	31300	391	174	150	M14	230	5.60	349	311	280
RCK16-170x225	170	225	78	44	49	64	50	33200	391	147	110	M14	230	7.90	322	298	277
RCK16-180x235	180	235	78	44	49	64	50	35000	389	139	100	M14	230	8.30	325	303	284
RCK16-190x250	190	250	78	44	49	64	50	46500	489	132	120	M14	230	8.80	371	341	314
RCK16-200x260	200	260	78	44	49	64	50	49000	500	125	110	M14	230	9.20	372	345	321
RCK16-220x285	220	285	88	51	57	72	55	57100	519	132	97	M16	360	12.30	390	365	343
RCK16-240x305	240	305	88	51	57	72	55	77800	649	134	113	M16	360	13.30	441	408	378
RCK16-260x325	260	325	88	51	57	72	55	101200	778	145	127	M16	360	14.30	495	452	414
RCK16-280x355	280	355	102	60	66	84	65	113300	808	120	101	M18	480	21.00	492	460	430
RCK16-300x375	300	375	102	60	66	84	65	136500	910	123	107	M18	480	22.20	531	493	460

*Minimum outside diameter of hubs manufactured in medium carbon steels with yield strength ≥ 320 N/mm^2.
For hub types, and other materials, refer to page 3.
For assembly and disassembly instructions refer to page 24.

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Cross Shaft Clamping Elements

In order to make the best selection of a Cross Shaft Clamping Element for your application a number of factors must be taken into consideration. These include the shaft diameter; the outside diameter of the hub of connecting component; the drive torque to be transmitted, and axial thrust loads, and tilting or bending loads, maximum shaft speeds, operating temperature, and general design parameters and space restrictions.

Shaft Diameter:-

The shaft diameter will determine the particular size of clamping element in any series, and by reference to the catalogue details the suitability of that to meet the other parameters can be checked. Also hollow shafts must be checked for any load carrying strength, see below.

Hub Outside Diameter:-

The Hub Diameter has to be sufficient to support the stresses imposed by the shaft clamping element. The catalogue gives maximum hub diameters for medium carbon steel, but for other materials and method of determining refer below. Generally if hub diameter is over 2.5 times shaft diameter all series are suitable, but for smaller ratios consider types RCK 80, ACE 81, CCE 54 and CCE 55, and for very thin walled hubs use types RCK 19, RCK 20 and RCK 25.

Determination of Minimum Hub Diameter and Max. Hollow Shaft Bore:-

The following calculations are for static conditions only, considering only stresses imposed by the clamping element. The hub diameter is controlled by the pressure applied by the outer cone of the clamping element; the shape of the hub bore and total length of hub; and yield stress for permanent elongation of 0.2%.

Minimum Hub Dia. $Dm = D \sqrt{\frac{\sigma + PhC}{\sigma - PhC}}$

Where
- D = Clamping element outside diameter mm
- σ = Yield strength of material N/mm²
- Ph = Surface pressure on hub N/mm²
- C = Constant for Hub shape - see drawings

The tables in the catalogue give minimum hub diameters for hubs manufactured in medium carbon steel (080M40 or C45) or other material where σ = 320 N/mm². Values for σ on other commonly used hub materials are:-

220 Grade Cast Iron	σ =	150 N/mm²
260 Grade Cast Iron	σ =	180 N/mm²
Mild Steels	σ =	220 N/mm²
070M55 (En9)	σ =	350 N/mm²
Stainless Steel	σ =	200 N/mm²
Aluminium	σ =	100 N/mm²

For hollow bored Shafting:-

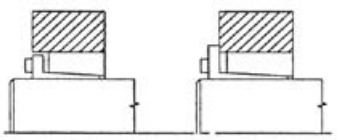
Max. Bore in Shaft $Dm = d \sqrt{\frac{\sigma - 1.6\ Ps}{\sigma}}$

Where
- d = Clamping element bore mm
- Ps = Surface pressure on Shaft N/mm²

For solid shafting yield strength of material σ must be higher than surface pressure Ps.

Hub Assembly Type A

C=1.0



$L_1 \leq Hw < 2L_1$ $L_2 \leq Hw < 2L_2$

Where Hw = Hub Width

For Dimensions L_1 & L_2 ref. Product Pages

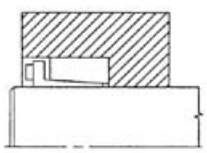
Hub Assembly Type B

C=0.8

$Hw \geq 2L_1$ $Hw \geq 2L_2$

Hub Assembly Type C

C=0.6



$Hw \geq 2L_1$ (All Types)

Maximum Shaft Speed:-

The centrifugal forces generated by high shaft speeds can reduce torque capacity and increase stress loads on hubs. Consult Cross & Morse if speed of shaft results in outer clamping diameter D running above 25M/sec.

Operating Temperature:-

Maximum temperatures should not exceed 100˚C. At temperatures above 70˚C the locking screws should be rechecked after 1 hour operation, whilst assembly is still warm.

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Installation Instructions

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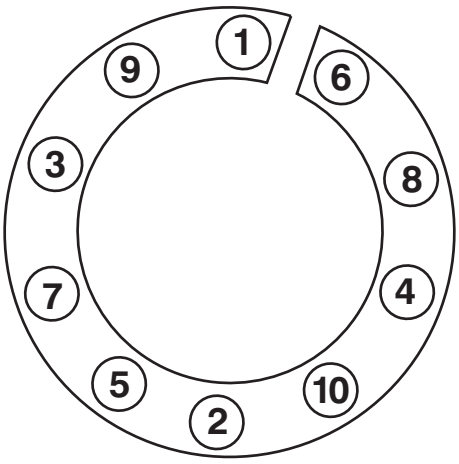
Installation and Removal of Cross Shaft Clamping Elements

Types RCK 10, 11, 12, 13, 15, 16, 61, 70, 71, 80 and ACE81



Installation:-

1. Slacken all screws in element by approx. two turns.
2. Remove two or three screws completely, and fit into equally spaced empty release thread holes. Tighten these screws lightly so as to ensure inner and outer cones are kept apart.
3. Clean all contact surfaces including screw threads, and lightly oil with clean thin unmodified oil.*
4. Insert clamping element into hub and push onto shaft and locate.
5. Remove screws from release holes and replace in original holes.
6. Tighten all screws finger tight and align hub.
7. Tighten all screws evenly in a diametrically opposite sequence (see typical progression in sketch) using a torque wrench, initially at half screw catalogue torque, then 3/4 value, and finally full torque. Check all screws at full torque until no further rotation of screws occurs.

Disassembly:-

1. Slacken all clamping screws by couple of turns, completely removing as many as release holes in element.
2. Fit screws in release holes and tighten in sequence as clamping to force inner and outer cones apart.
3. Carefully remove hub and clamping element from shaft, and take element from hub.

Types RCK 40 and 45

Installation:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Fit hub to shaft and insert clamping element.
3. Tighten all screws finger tight and align hub.
4. Tighten all screws evenly in a diametrically opposite sequence (see typical progression in sketch) using a torque wrench, initially at half catalogue torque for screw, then at 3/4 value, and finally at full torque. Check all screws are at full torque until no further rotation of screws can be achieved.

Disassembly:-

1. Release clamping screws in same sequence as for clamping. Element should now self release. If required lightly tap clamping screws to aid release. If still not released remove light coloured screws completely and replace with next larger metric size and tighten these screws to jack the cones apart.

Type RCK 50

Installation procedure depends detailed design, but following is typical:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Push hub onto shaft and insert spacer sleeves and clamping ring sets according to application drawing.
3. Insert distance ring if fitted and attach clamping flange lightly tightening screws. Align hub.
4. Tighten all screws in a diametrically opposite sequence, in several stages up to max. torque for screw size.

Disassembly:-

The taper of the individual rings is such that the assembly should automatically release when the locking screws are slackened. If not light tapping on the hub circumference should release them.

Types CCE 54 and 55

Installation:-

1. Clean all contact surfaces, and lightly oil with clean unmodified mineral oil.*
2. Turn locking nut anticlockwise until outer sleeve loose on inner cone.
3. Position hub on shaft and insert clamping element.
4. Align hub and tighten locking nut to catalogue torque value, and bend suitable tab on lock washer to prevent further rotation.

Disassembly:-

1. Release bent washertab and undo nut until sleeve loose.
2. Remove clamping element, If tight give end of tab gentle tap to release.

Types RCK 19/20 and 95

Installation:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Slacken all clamping bolts by a couple of turns.
3. (RCK 19/20 only) Fit clamping element on outer diameter of hub, and slide assembly onto shaft and position.
   (RCK 95 only) Fit shaft ends equally into clamping element ensuring small clearance between shafts.
4. Tighten all bolts in a diametrically opposite sequence, in several stages up to max. specified torque.

Disassembly:-

Slacken all bolts and gently tap on bolts to release clamping element.

*WARNING: Never use, lubricant containing Molydenum or E.P. additives, synthetic lubricant, or grease.