

B-LOC WK Rigid Couplings Engineering Data

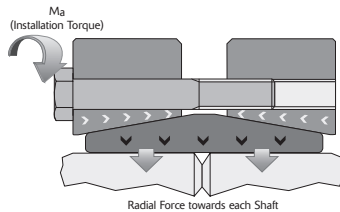
DESIGN FEATURES

External keyless locking devices that simultaneously transmit high torques and bending moments that allow your drive to be overhung shaft mounted.

- Keyless, rigid, zero backlash coupling.
- Transmits high torque and bending moments.
- Eliminates the need for costly mounting brackets and structural support.
- Compact, double taper design with self-releasing tapers for easy removal.
- Exceptional concentricity.
- Installs right over existing keyways and splines.
- Not affected by shock or reversing loads.

WORKING PRINCIPLE

Drawing the two tapered collars together with the integrated tightening screws, generates radial forces that squeeze the inner ring tightly to the two shafts. The inner ring acts as a press fit sleeve, transmitting torque, thrust, and even bending loads from one shaft to the other.



TORQUE

M_t = rated torque capacity of one B-LOC WK Coupling with all screws tightened to specified torque M_a as listed in specifications.

THRUST

T_h = transmissible thrust, determined by using the following equation:

$$T_h = \frac{2 \times M_t}{d} \quad \text{where: } d = \text{shaft diameter} \\ M_t = \text{rated torque capacity}$$

TORQUE AND THRUST COMBINED

Simultaneous transmission of torque and thrust requires calculating a resultant torque:

$$M_{t_{res}} = \sqrt{T^2 + \left(\frac{F \times d}{2}\right)^2} \quad \text{where: } T = \text{peak drive torque} \\ F = \text{peak thrust load} \\ d = \text{shaft diameter}$$

Select a unit where $M_t \geq M_{t_{res}}$

BENDING MOMENTS

WK Couplings will generally transmit a continuous bending moment equal to 25% of rated torque capacity M_t .

RELEASABILITY

Since the tapers of a B-LOC WK Coupling are self-releasing, loosening the locking screws results in releasing the shafts from the coupling. Care needs to be used by loosening each screw gradually such that the screw tension remains relatively equal on all screws.

MATERIAL

WK Coupling inner rings are manufactured from high-carbon steel. Outer rings are made from forged and heat treated alloy steel.

LUBRICANTS

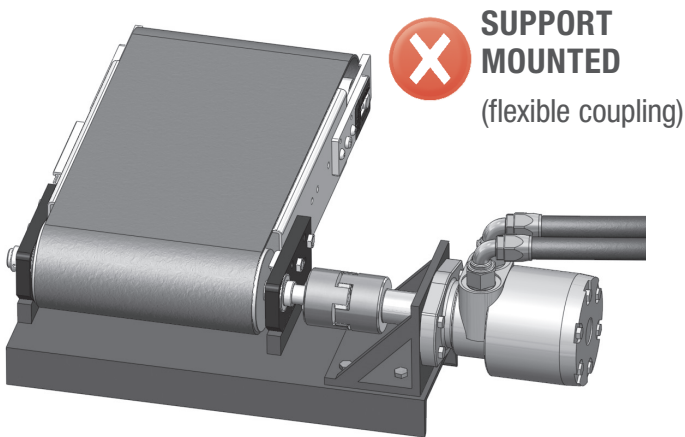
WK Couplings are supplied with molybdenum disulphide based lubricant applied to the tapers and to the locking screw threads and head contact areas. The bore of WK Couplings are supplied lightly oiled and should only be used with oil supplied on the unit.

SHAFT AND HUB MATERIAL

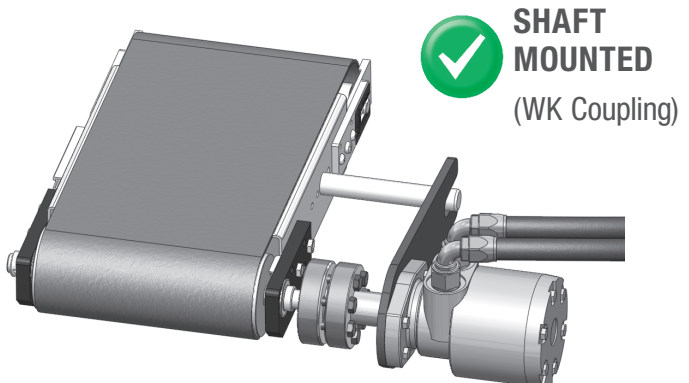
Listed specifications assume shaft material with a yield point of at least 45 ksi (310 N/mm²).

LENGTH OF FIT

Shaft engagement inside the WK Coupling must be equal for both shafts and the gap between the shafts should not exceed 5% of the shaft diameter.

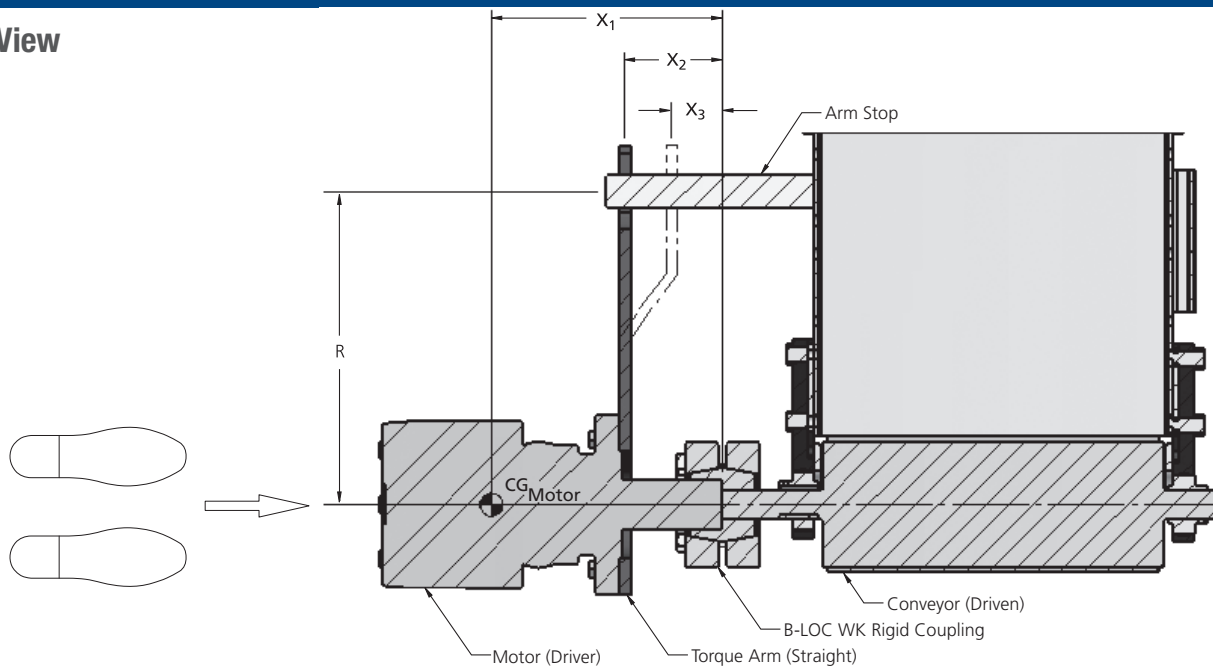


- ✗ Requires bulky frame work and supports
- ✗ Shaft misalignment issues necessitate the use of flexible couplings
- ✗ Fretted and corroded flexible couplings complicate disassembly
- ✗ Higher total cost



- ✓ Shaft mount completely eliminates shaft misalignment and frame work
- ✓ Simple torque arm prevents motor rotation
- ✓ Keyless mechanical shrink fit never corrodes to the shaft and disassembles easily
- ✓ Compact design allows for smaller drive footprint
- ✓ Lower overall cost

Plan View



Calculations

Once you have selected your WK Rigid Coupling, apply the following calculations to verify that it is suitable for your application. Please reference Plan View above.

- M_t = published max rated torque capacity of B-LOC WK Rigid Coupling = _____ ft-lb
- $M_{D_{MAX}}$ = maximum drive torque (stall torque where applicable) = _____ ft-lb
- W = weight of the overhung shaft mounted drive = _____ lb
- R = length of the torque arm = _____ ft
- F_{TA} = torque arm reaction force = $M_{D_{MAX}} \div R$ = _____ lb

- M_B = bending moment at the coupling

NOTE: M_B must be $< 0.25 \times M_t$

TORQUE ARM OPTIONS**Straight Torque Arm**

$$M_B = (W \times X_1) + (F_{TA} \times X_2) = \text{_____ ft-lb}$$

Bent Torque Arm

$$M_B = (W \times X_1) + (F_{TA} \times X_3) = \text{_____ ft-lb}$$

Double Torque Arm

$$M_B = (W \times X_1) = \text{_____ ft-lb}$$

- M_{RB} = resultant (torque & bending) = $\sqrt{(M_{D_{MAX}})^2 + (2 \times M_B)^2} = \text{_____ ft-lb}$
NOTE: M_{RB} must be $< M_t$

- If the NOTES in steps 6 and 7 are **both** satisfied, the B-LOC WK Rigid Coupling is recommended for your application.

The calculations on this page assume worst case placement of torque arm.
To optimize design contact a Fenner Industrial Motion Applications Engineer at AE@fenner.com.

Design Tips

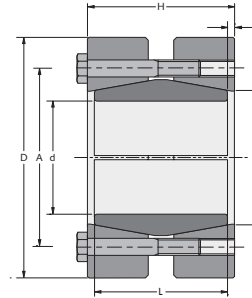
- For any WK Coupling design or engineering questions, contact a Fenner Industrial Motion Applications Engineer at AE@fenner.com.
- Shaft mounting creates bending moments in the system; coupling, shafts, bearings etc., must be designed to handle these bending moments.
- Torque arm design and placement can be used to counteract or minimize bending moments in the system.
- Torque arm and arm stop(s) must be adequately designed to handle the forces generated by the motor.
- To achieve up to a 20% increase in coupling load capacity, using a non-petroleum based solvent, clean the shafts and coupling bore to produce a completely lubricant free interface.
- WK Couplings can typically join shafts of different sizes up to a ratio of 2:1. For shaft ratios greater than this, please contact a Fenner Industrial Motion Applications Engineer.
- WK Couplings are not recommended for applications in which motor and driven component are rigidly mounted.

B-LOC WK Rigid Couplings

B-LOC
WK
SERIES
Inch



Metric hex head locking screws grade 10.9. (See M_a for install torque.)



TOLERANCE (T_L)

$T_L = .003"$ for shafts up to 1"
.006" for shafts over 1"

d = Shaft diameter machined to $d + 0/-T_L$

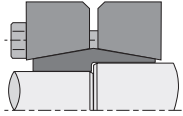
Shaft engagement equal for both ends with gap not exceeding 5% of shaft diameter.

WK Series

Part Number	Type	d (in)	D (in)	H (in)	L (in)	e (in)	d ₁ (in)	A (in)	Locking Screws		M _a Install Torque (ft lb)	M _t Maximum Transmissible Torque (ft lb)	Ship wt (lb)
									Qty	Size			
HWK0152010	WK 15	5/8	2.047	1.339	1.181	0.079	0.827	1.378	3	M6 x 30	8.7	132	0.9
HWK0152011		11/16										145	
HWK0152012		3/4										158	
HWK0202013	WK 20	13/16	2.362	1.575	1.339	0.118	1.024	1.614	5	M6 x 35	8.7	286	1.4
HWK0202014		7/8										308	
HWK0202015		15/16										330	
HWK0252100	WK 25	1	2.598	1.732	1.496	0.118	1.260	1.890	7	M6 x 35	8.7	492	1.8
HWK0252101		1 1/16										523	
HWK0252102		1 1/8										554	
HWK0302103	WK 30	1 3/16	2.992	1.890	1.654	0.118	1.496	2.126	8	M6 x 40	8.7	668	2.7
HWK0302104		1 1/4										703	
HWK0302106		1 3/8										774	
HWK0402107	WK 40	1 7/16	3.780	2.205	1.969	0.118	1.850	2.638	7	M8 x 45	22	1371	5
HWK0402108		1 1/2										1430	
HWK0402110		1 5/8										1550	
HWK0402111		1 11/16										1609	
HWK0402112		1 3/4										1669	
HWK0502114	WK 50	1 7/8	4.409	2.676	2.362	0.157	2.283	3.150	10	M8 x 50	22	2554	8
HWK0502115		1 15/16										2639	
HWK0502200		2										2724	
HWK0502202		2 1/8										2895	
HWK0602203	WK 60	2 3/16	4.724	3.071	2.756	0.157	2.598	3.504	12	M8 x 55	22	3576	10
HWK0602204		2 1/4										3678	
HWK0602206		2 3/8										3882	
HWK0602207		2 7/16										3984	
HWK0602208		2 1/2										4087	
HWK0702209	WK 70	2 9/16	5.826	3.464	3.150	0.157	3.110	4.173	12	M10 x 65	44	6642	19
HWK0702210		2 5/8										6804	
HWK0702211		2 11/16										6966	
HWK0702212		2 3/4										7128	
HWK0702214		2 7/8										7452	
HWK0802215	WK 80	2 15/16	6.693	4.095	3.701	0.197	3.701	4.961	10	M12 x 80	74	9128	28
HWK0802300		3										9323	
HWK0802302		3 1/8										9711	
HWK0802304		3 1/4										10099	
HWK0802306		3 3/8										10488	
HWK0902307	WK 90	3 7/16	7.283	4.567	4.173	0.197	4.094	5.433	12	M12 x 80	74	12819	36
HWK0902308		3 1/2										13052	
HWK0902310		3 5/8										13518	
HWK0902312		3 3/4										13984	
HWK0902314		3 7/8										14450	
HWK1002315	WK 100	3 15/16	7.756	4.960	4.488	0.236	4.488	5.866	15	M12 x 90	74	18354	43
HWK1002400		4										18645	
HWK1002404		4 1/4										19810	
HWK1202407	WK 120	4 7/16	9.055	5.984	5.433	0.276	5.276	7.087	12	M16 x 110	185	31802	65
HWK1202412		4 3/4										34041	
HWK1202415		4 15/16										35385	

If your application requires increased torque transmission and/or thrust, solvent clean the interface between the bore of the WK unit and the shaft to produce an oil free connection. This in turn will result in up to a 20% increase in M_t and T_H performance values. Contact Fenner Industrial Motion Technical Services for additional details at AE@fenner.com.

Please note not all catalog items shown are stock. Some products are make-to-order (MTO) based on annual demand. Please verify with your customer service representative for current availability of the item desired.



WK Couplings can be manufactured to accommodate different shaft diameters; this can also be accomplished using an adaptor sleeve.



WK Couplings are also available in all common metric shaft/bore diameters



WK Series

Part Number	Type	d (mm)	D (mm)	H (mm)	L (mm)	e (mm)	d ₁ (mm)	A (mm)	Locking Screws		M _a	M _t	Ship wt (kg)
									Qty	Size	Install Torque (Nm)	Maximum Transmissible Torque (Nm)	
HWK0151015	WK15	15	52	34	30	2	21	35	3	M6 x 30	12	169	0.4
HWK0151016		16										180	0.4
HWK0151017		17										191	0.4
HWK0151018		18										202	0.4
HWK0151019		19										213	0.4
HWK0201020	WK20	20	60	40	34	3	26	41	5	M6 x 35	12	377	0.6
HWK0201022		22										414	0.6
HWK0201024		24										451	0.6
HWK0251025	WK25	25	66	44	38	3	32	48	7	M6 x 35	12	657	0.8
HWK0251028		28										735	0.8
HWK0251029		29										762	0.8
HWK0301030	WK30	30	76	48	42	3	38	54	8	M6 x 40	12	900	1.2
HWK0301032		32										959	1.2
HWK0301035		35										1053	1.2
HWK0401036	WK40	36	96	56	50	3	47	67	7	M8 x 45	30	1835	2.3
HWK0401040		40										2036	2.3
HWK0401044		44										2239	2.3
HWK0501050	WK50	50	112	68	60	4	58	80	10	M8 x 50	30	3638	3.6
HWK0501051		51										3709	3.6
HWK0501054		54										3927	3.6
HWK0601055	WK60	55	120	78	70	4	66	89	12	M8 x 55	30	4797	4.5
HWK0601060		60										5231	4.5
HWK0601063		63										5500	4.5
HWK0701065	WK70	65	148	88	80	4	79	106	12	M10 x 65	60	8993	8.6
HWK0701068		68										9406	8.6
HWK0701070		70										9681	8.2
HWK0701073		73										10095	8.2
HWK0801074	WK80	74	170	104	94	5	94	126	10	M12 x 80	100	12278	12.7
HWK0801076		76										12609	12.7
HWK0801080		80										13268	12.2
HWK0801085		85										14092	11.8
HWK0901086		WK90										86	185
HWK0901090	90		17918	16.3									
HWK0901092	92		18330	15.9									
HWK0901096	96		19101	15.4									
HWK1001100	WK100	100	197	126	114	6	114	149	15	M12 x 90	100	24888	19.5
HWK1001106		106										26378	19.5
HWK1001108		108										26862	19.1
HWK1001110		110										27359	19.1
HWK1201120	WK120	120	230	152	138	7	134	180	12	M16 x 110	251	45917	31.5
HWK1201130		130										49717	29.5

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