7.5 Hollow shaft with key

There are two ways to design the customer's solid shaft for use with a gear unit containing a keyed hollow shaft. While both designs are acceptable, the second is more advantageous to the end user because it allows for easier disassembly later, especially if corrosion exists between the two shafts.

Standard Design:

Uses the fastening parts supplied with the gear unit. This design requires a longer customer shaft that extends to the snapring. While this design is very common, it does not permit the use of a removal kit to aid with future removal of the customer's shaft.

Recommended Design:

Uses the optional installation/removal kit. This design requires a shorter customer shaft than the standard design. The shaft does **not** extend to the snapring. The area between the end of the shaft and the snapring contains a gap or a spacer tube, depending if the customer shaft contains a shoulder. During future disassembly, the gap or spacer tube is replaced with a locking nut that allows the user to push out the shaft by turning a wrench. This is especially beneficial in a humid or wet environment where corrosion between the shafts is probable.

	INFORMATION
	Always use the supplied NOCO® fluid for assembly. The fluid minimizes contact corrosion and facilitates future disassembly.

7.6 Hollow shaft with key - standard design

The standard design uses the parts that are normally supplied with every hollow shaft, as shown in Figure 4. Note the following points concerning the customer's solid shaft:

- See dimension sheets or page117 for dimension, L8.
- If there is a contact shoulder [A] on the customer shaft, the installation length should be (L8 - 1 mm) or (L8 - 0.04 in).
- If there is no contact shoulder [B] on the customer shaft, the installation length should equal L8.
- Observe the tolerances for dimension, D, in various areas along the shaft.
- Refer to the dimension pages for the diameter and length of retaining screw [2].
- X must be > D. But the key does **not** have to extend the length of shaft.

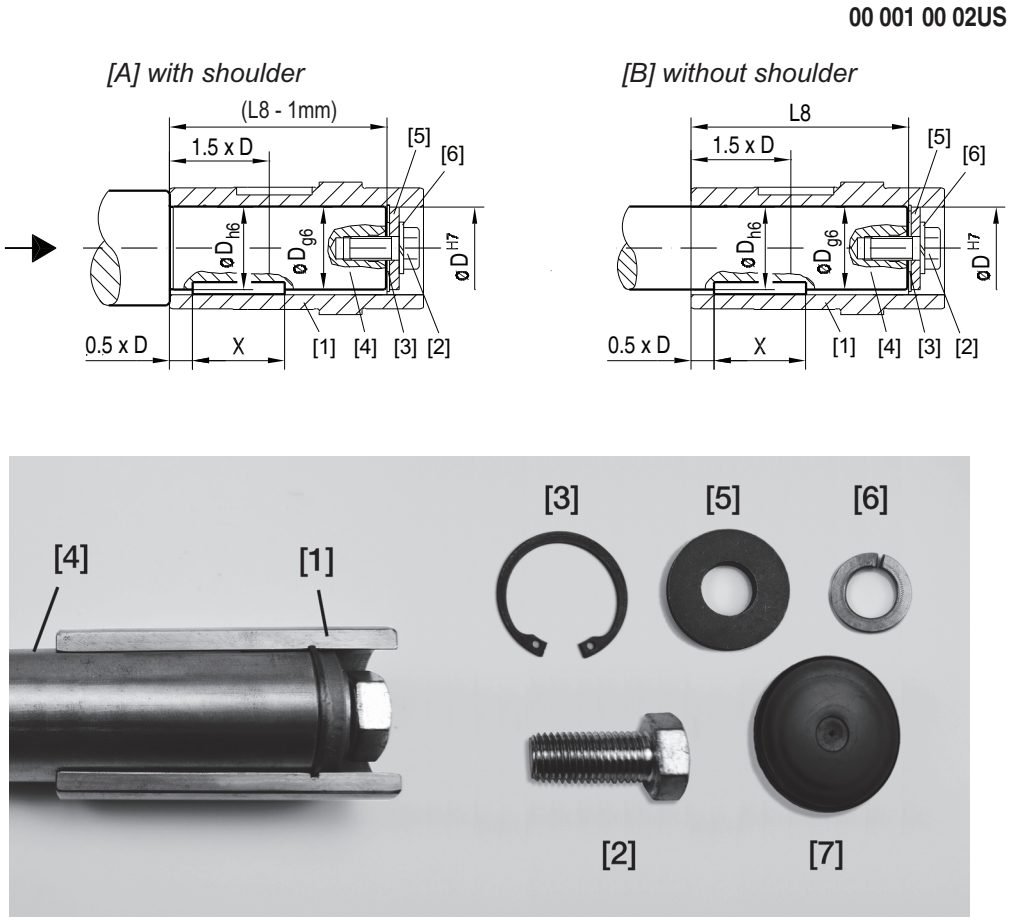


Figure 4: Customer shaft with contact shoulder [A] and without contact shoulder [B]

[1]	Hollow shaft	[5]	Flat washer
[2]	Retaining screw	[6]	Lock washer
[3]	Retaining snapring	[7]	Plastic protection cap
[4]	Customer solid shaft		

Customer shaft:

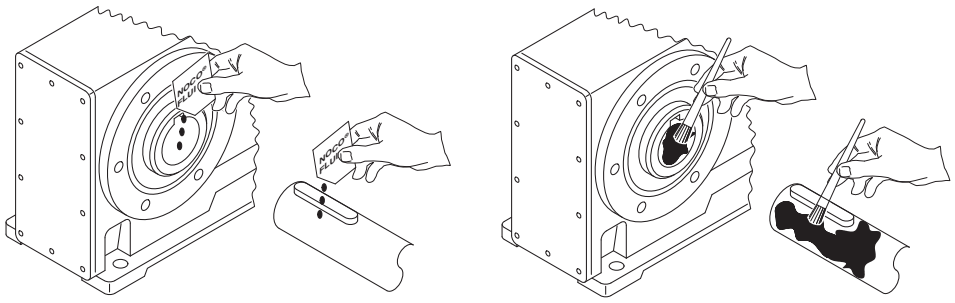
The following table lists the dimensions that are needed to design the customer shaft.

	[inch]			[mm]		
Gear Unit	**D**	**STD Screw**	**L8[1)]**	**D**	**STD Screw**	**L8[1)]**
WA..10	0.625	1/4-20 x 5/8	2.72	14	M5 x 16	69
				16		
KA..19	0.750	1/4-20 x 5/8	3.62	20	M6 x 16	92
WA..20	0.750	1/4-20 x 5/8	3.31	18	M6 x 16	84
				20		
FA..27	1.000	3/8-16 x 1	3.47	25	M10 x 25	88
KA..29	1.000	3/8-16 x 1	4.21	25	M10 x 25	107
WA..30, WA..37	0.750	1/4-20 x 5/8	4.13	20	M6 x 16	105
SA..37	0.750	1/4-20 x 5/8	4.09	20	M6 x 16	104
FA..37, KA..37	1.250	7/16-14 x 1	4.13	30	M10 x 25	105
KA..39	1.250	7/16-14 x 1	5.39	30	M10 x 25	137
	1.375	1/2-13 x 1		35	M12 x 30	
WA..47	1.000	3/8-16 x 1	4.80	30	M10 x 25	122
	1.250	7/16-14 x 1				
SA..47	1.250	7/16-14 x 1	4.13	25	M10 x 25	105
				30		
FA..47, KA..47, SA..57	1.250	7/16-14 x 1	5.20	30	M10 x 25	132
	1.375	1/2-13 x 1		35	M12 x 30	
	1.4375	5/8-11 x 1-3/4				
KA..49	1.375	1/2-13 x 1	6.30	35	M12 x 30	160
	1.500	5/8-11 x 1-3/4		40	M16 x 40	
FA..57, KA..57	1.4375	5/8-11 x 1-3/4	5.59	40	M16 x 40	142
	1.500					
FA..67, KA..67	1.4375	5/8-11 x 1-3/4	6.14	40	M16 x 40	156
	1.500					
SA..67	1.250	7/16-14 x 1	5.67	40	M16 x 40	144
	1.500	5/8-11 x 1-3/4		45		
FA..77, KA..77	1.9375	5/8-11 x 1-3/4	7.21	50	M16 x 45	183
	2.000					
SA..77	2.000	5/8-11 x 1-3/4	7.21	50	M16 x 45	183
			7.09	60	M20 x 50	180
FA..87, KA..87	2.375	3/4-10 x 2	8.27	60	M20 x 50	210
	2.4375					
SA..87	2.375	3/4-10 x 2	8.66	60	M20 x 50	220
				70		
FA..97, KA..97	2.750	3/4-10 x 2	10.63	70	M20 x 50	270
	2.9375					
SA..97	2.750	3/4-10 x 2	10.24	70	M20 x 50	260
			10.04	90	M24 x 60	255
FA..107, KA..107	3.250	3/4-10 x 2	12.32	90	M24 x 60	313
	3.4375			80	M20 x 50	
	3.625					
FA..127, KA..127	4.000	1-8 x 2-1/4	14.69	100	M24 x 60	373
FA..157, KA..157	4.500		18.11	120		460

1) If customer shaft does not contain a shoulder, then the installation length of customer shaft = L8.
If customer shaft contains a shoulder, the installation length = (L8 - 1mm) or (L8 - 0.04")

Installation procedure:

1. Apply and thoroughly spread NOCO fluid (normally supplied with unit).



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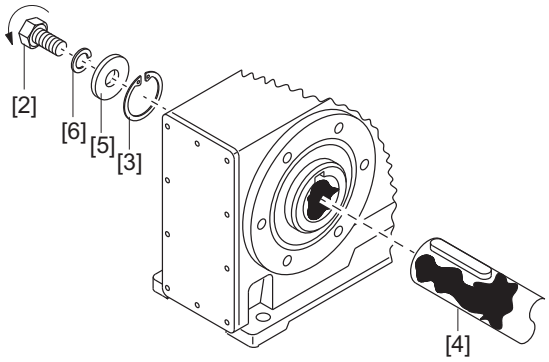
2. Install the shaft and secure it axially with the hardware supplied.



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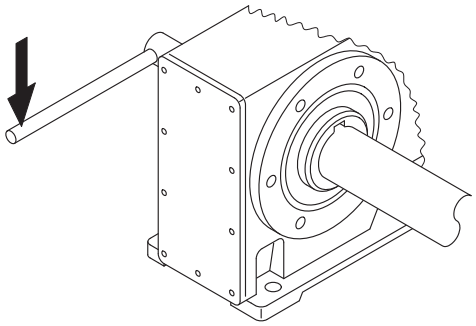
[2] Shorter retaining screw (normally supplied)
[3] Retaining snapring
[4] Customer shaft
[5] Flat washer
[6] Lock washer

3. Tighten the retaining screw to the appropriate torque shown in table below.



Screw		Tightening torque Nm / lb-in
Metric	SAE	
M5		5 / 44
M6	1/4-20	8 / 71
M10 M12	7/16-14 1/2-13	20 / 177
M16	5/8-11	40 / 355
M20	3/4-10	80 / 710
M24	1-8	200 / 1770

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7.7 Hollow shaft with key - recommended design

The recommended design uses the standard hardware along with a removal kit, as shown dotted in Figure 5. Since the normal retaining screw is too short, the removal kit includes a longer screw [2]. The customer may make his own kit or purchase it from SEW-EURODRIVE. Kit part numbers and dimensions are shown on page 121.

Please observe the following:

- Items 3, 5, 6, and 7 are normally supplied with the hollowshaft, so they are not included in the kit.
- The longer retaining screw [2] can be used for both assembly and removal.
- The installation length of the customer shaft must be LK2, regardless if the shaft has a contact shoulder or not. See page 120 for LK2 dimension. Observe that the customer shaft does not extend to the snapring.
- The spacer tube [8] is not needed if the customer shaft has a shoulder.
- X must be > D. But the key does **not** have to extend the length of shaft.

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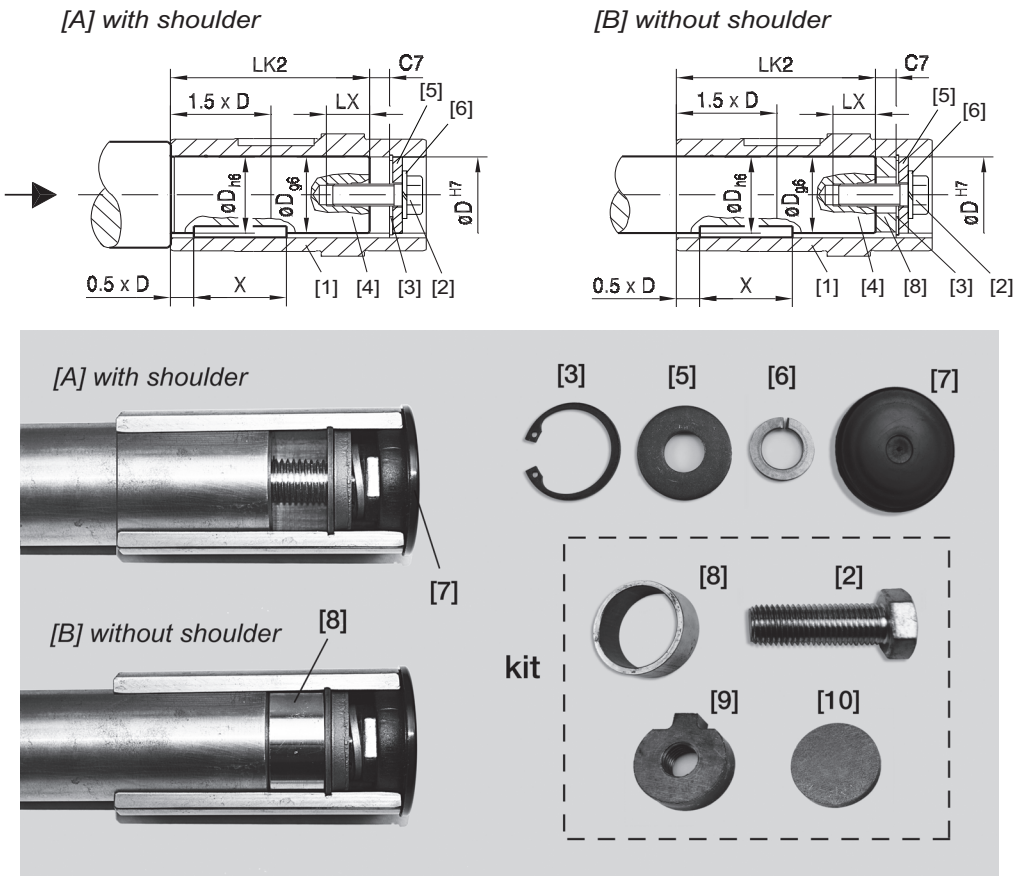


Figure 5: Customer shaft with contact shoulder (A) and without contact shoulder (B)

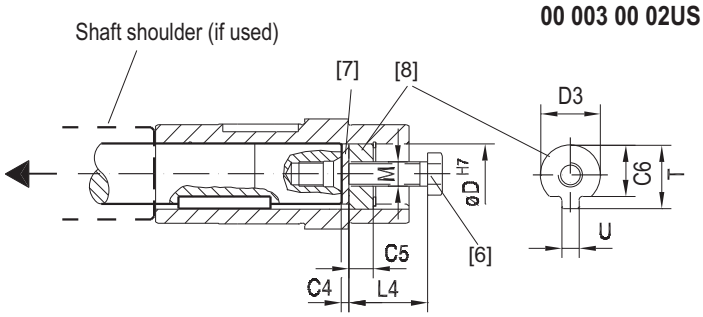
[1]	Hollow shaft	[6]	Lock washer
[2]	Retaining screw (for assembly & removal)	[7]	Protection cap
[3]	Snapring	[8]	Spacer tube (not needed w/shoulder)
[4]	Customer shaft	[9]	Locking nut (for removal only)
[5]	Flat washer	[10]	Forcing washer (for removal only)

Customer shaft:

The following table lists the recommended dimensions for the shaft length and depth of tap to enable the use of a shaft removal kit.

Gear Unit	D		LK2 [mm]	LX^{+2} [mm]	C7 [mm]
	[inch]	[mm]			
WA..10	0.625	14	58	12.5	11
		16			
KA..19	0.750	20	80	16	12
WA..20	0.750	18	72	16	12
		20			
FA..27	1.000	25	72	22	16
KA..29	1.000	25	91	22	16
WA..30, WA..37	0.750	20	93	16	12
SA..37	0.750	20	92	16	12
FA..37, KA..37	1.250	30	89	22	16
KA..39	1.250	30	121	22	16
	1.375	35			
WA..47	1.000	30	106	22	16
	1.250				
SA..47	1.250	25	89	22	16
		30			
FA..47, KA..47, SA..57	1.250	30	116	22	16
	1.375	35			
	1.4375				
KA..49	1.375	35	142	28	18
	1.500	40			
FA..57, KA..57	1.4375	40	124	26	18
	1.500				
FA..67, KA..67	1.4375	40	138	36	18
	1.500				
SA..67	1.250	40	126	36	18
	1.500	45			
FA..77, KA..77	1.9375	50	165	36	18
	2.000				
SA..77	2.000	50	165	36	18
		60	158	42	22
FA..87, KA..87	2.375	60	188	42	22
	2.4375				
SA..87	2.375	60	198	42	22
		70			
FA..97, KA..97	2.750	70	248	42	22
	2.9375				
SA..97	2.750	70	238	42	22
		90	229	52	26
FA..107, KA..107	3.250		289	52	24
	3.4375	80	287	52	26
	3.625	90			
FA..127, KA..127	4.000	100	347	62	26
FA..157, KA..157	4.500	120	434	62	26

Kit dimensions and part numbers:



[6] Longer retaining screw
[7] Forcing washer
[8] Locking nut

Metric Bores:

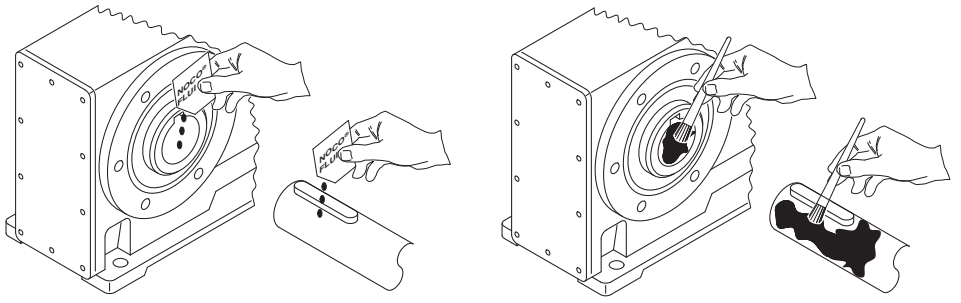
D [mm]	M	C4 [mm]	C5 [mm]	C6 [mm]	U$^{-0.5}$ [mm]	T$^{-0.5}$ [mm]	D3$^{-0.5}$ [mm]	L4 [mm]	Kit Part Number
16	M5	5	5	12	4.5	18	15.7	50	643 712 5
18	M6		6	13.5	5.5	20.5	17.7	25	643 682 X
20				15.5	5.5	22.5	19.7		643 683 8
25	M10		10	20	7.5	28	24.7	35	643 684 6
30				25	7.5	33	29.7		643 685 4
35	M12		12	29	9.5	38	34.7	45	643 686 2
40	M16			34	11.5	41.9	39.7	50	643 687 0
45				38.5	13.5	48.5	44.7		643 688 9
50				43.5	13.5	53.5	49.7		643 689 7
60	M20		16	56	17.5	64	59.7	60	643 690 0
70				65.5	19.5	74.5	69.7		643 691 9
90	M24		20	80	24.5	95	89.7	70	643 692 7
100				89	27.5	106	99.7		643 693 5
120				107	31	127	119.7		643 694 3

Inch Bores:

D [inch]	M	C4 [mm]	C5 [mm]	C6 [inch]	U$^{-0.02}$ [inch]	T$^{-0.02}$ [inch]	D3$^{-0.02}$ [inch]	L4 [inch]	Kit Part Number
0.625	1/4-20	5	5	0.500	0.168	0.701	0.6130	2.0	250 546 00
0.750	1/4-20		6	0.625		0.835	0.738	1.0	250 546 19
1.000	7/16-14		10	0.863	0.230	1.110	0.988	1.5	250 546 27
1.250	7/16-14			1.113		1.362	1.238		250 546 35
1.375	1/2-13		12	1.142	0.293	1.509	1.363	1.75	250 546 43
1.4375	5/8-11			1.205	0.356	1.602	1.4255	2.0	250 546 51
1.500	5/8-11			1.267		1.657	1.4880		250 546 78
1.9375	5/8-11			1.682	0.480	2.148	1.9255		250 546 86
2.00	5/8-11			1.744		2.224	1.9880		250 546 94
2.375	3/4-10		16	2.119	0.606	2.650	2.3630	2.5	250 247 08
2.4375	3/4-10			2.182		2.605	2.4255		250 547 16
2.750	3/4-10			2.488		3.031	2.7380		250 547 24
2.9375	3/4-10		18	2.676	0.730	3.128	2.9255	3.0	250 547 32
3.250	3/4-10			2.938		3.587	3.2380		250 547 40
3.4375	3/4-10		20	3.126	0.856	3.685	3.4255		250 547 59
3.6250	1-8			3.263	0.856	3.873	3.6130		250 547 67
4.000	1-8			3.588	0.980	4.441	3.9880	3.5	250 547 75
4.500	1-8			4.088		4.933	4.4880		250 547 83

Installation procedure:

1. Apply and thoroughly spread NOCO fluid (normally supplied with unit).



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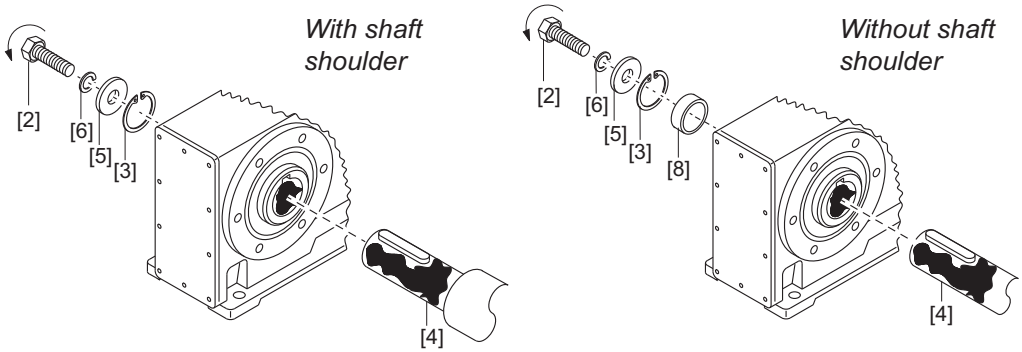
2. Install the shaft and secure it axially with the hardware supplied.



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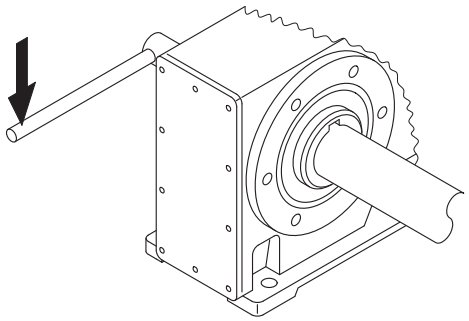
[2]	Longer retaining screw	[5]	Flat washer
[3]	Snapring	[6]	Lock washer
[4]	Customer shaft	[8]	Spacer tube

3. Tighten the retaining screw to the appropriate torque shown in table below.



Screw		Tightening torque Nm / lb-in
Metric	SAE	
M5		5 / 44
M6	1/4-20	8 / 71
M10 M12	7/16-14 1/2-13	20 / 177
M16	5/8-11	40 / 355
M20	3/4-10	80 / 710
M24	1-8	200 / 1770

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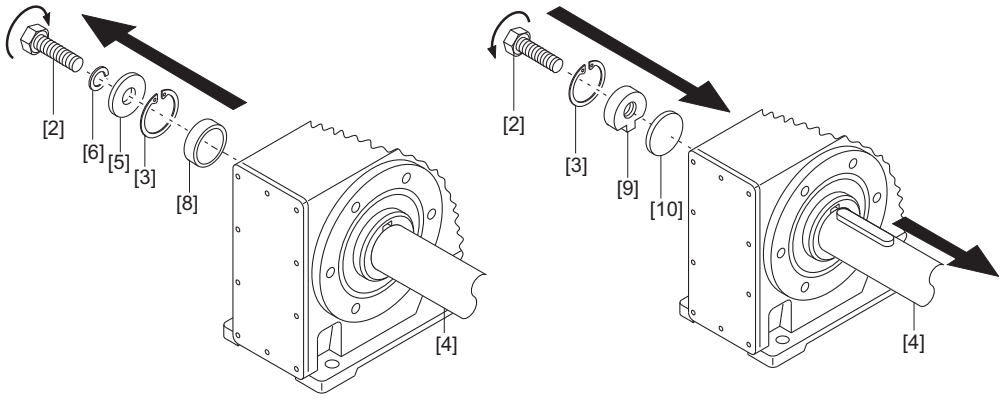
Removal procedure:



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[2]	Longer retaining screw	[6]	Lock washer
[3]	Snapring	[8]	Spacer tube
[4]	Customer shaft	[9]	Locking nut
[5]	Flat washer	[10]	Forcing washer

1. Loosen the retaining screw [2].
2. Remove parts [3], [5], and [6]. Also, remove the spacer tube, [8], if applicable.
3. Using the parts [9] and [10] from the removal kit, insert the forcing washer and the locking nut until they rest against the customer shaft [4].
4. Re-install the snapring [3].
5. Thread the retaining screw [2] into the locking nut, as shown in cutaway below.
6. Turn the screw with wrench to force the shaft out of the gear unit.