

TX Series

OPERATION AND MAINTENANCE

MANUAL

TX Series Low Profile Hydraulic Torque Wrenches

MODELS TX-1, TX-2, TX-4, TX-8, TX-16, TX-32, TX-45



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Operational and Maintenance Manual for TorcUP
TX-1, TX-2, TX-4, TX-8, TX-16, TX-32 and TX-45
Low Profile Hydraulic Torque Wrenches
Version 2: 2014 December

NOTICE

Series TX-1, TX-2, TX-4, TX-8, TX-16, TX-32 and TX-45 Low Profile Hydraulic Torque Wrenches are designed for installing and removing large bolts having minimal wrench clearance at offshore platforms, power plants, steel erection sites and other locations requiring precise high torque during bolt makeup and maximum torque for bolt breakdown.

TorcUP Inc. is not responsible for customer modification of tools for applications on which TorcUP Inc. was not consulted.

WARNING

**IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.**

**IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS
MANUAL INTO THE HANDS OF THE OPERATOR.**

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

USING THE TOOL

- Always operate, inspect and maintain this tool in accordance with American National Standards Safety Code for Hydraulic Rams and Jacks (ANSI B30.1)
- This tool will function using an air or electric powered hydraulic pump. Adhere to the pump safety requirements and follow instructions when connecting the pump to the tool.
- Use only equipment rated for the same pressure and torque.
- Use only a hydraulic pump capable of generating 10,000 psig (681 bar) maximum pressure with this tool.
- Use only twin line hydraulic hose rated for 10,000 psig (681 bar) pressure with this tool.
- Do not interchange the male and female swivel inlets on the tool or the connections on one end of the hose. Reversing the inlets will reverse the power stroke cycle and may damage the tool.
- Do not use damaged, frayed or deteriorated hoses and fittings. Make certain there are no cracks, splits or leaks in the hoses.
- Use the quick connect system to attach the hoses to the tool and pump. Make certain the spring-loaded retaining rings are fully engaged and the safety rings are tightly threaded against the spring-loaded retaining rings to prevent the connectors from disengaging under pressure.
- When connecting hoses that have not been preloaded with hydraulic oil, make certain the pump reservoir is not drained of oil during start-up.

The use of other than genuine TorcUP replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties. Repairs should be made only by authorized personnel. Consult your nearest TorcUP Authorized Service Center. Refer All Communications to the Nearest TorcUP Office or Distributor.

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FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY

Do NOT exceed Maximum Pressure. See Torque Chart with Tool. Damage May Occur.

Do not use damaged, frayed or deteriorated hydraulic hoses and fittings.



Always wear eye protection when operating or performing maintenance on this tool.



WARNING

Always wear ear protection when operating this tool.



Do not carry the tool by the hose.



Keep body stance balanced and firm. Do not overreach when operating this tool.



The Torque Reaction Arm must be positioned against a positive stop. Do not use the arm as a dead handle. Take all precautions to make certain the operator's hand cannot be pinched between the arm and a solid object.



USING THE TOOL

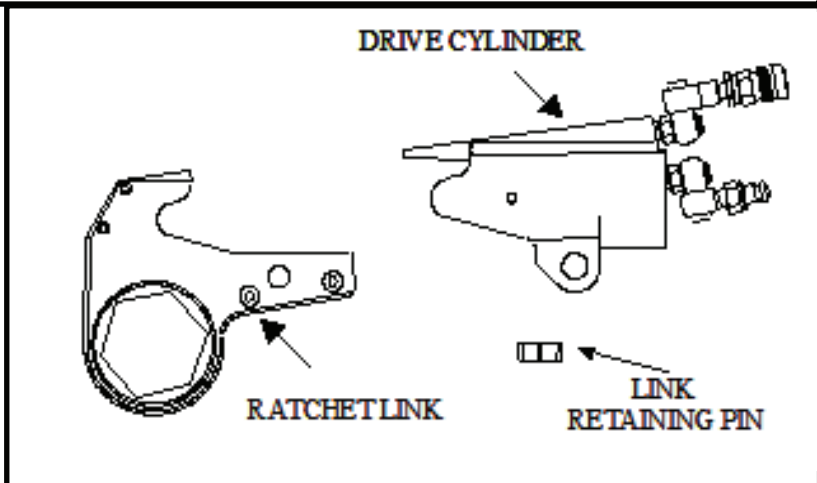
- Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.
- Never pressurize uncoupled couplers. Only use hydraulic equipment in a coupled system.
- Always wear eye protection when operating or performing maintenance on this tool.
- Always wear head and hand protection and protective clothing when operating this tool.
- Keep hands, loose clothing and long hair away from the reaction arm and working area during operation. Do not attempt to support the tool with your hands during operation.
- This tool will exert a strong reaction force. Use proper mechanical support and correct reaction arm positioning to control these forces. Do not position the reaction arm so that it tilts the tool off the axis of the bolt and never use the swivel inlets as a reaction stop.
- Avoid sharp bends and kinks that will cause severe back-up pressure in hoses and lead to premature hose failure.
- When operating a larger tool (TX-16, TX-32 or TX-45) above waist height, employ a secondary means of support for safety purposes. A tool sling or chains may be used. Consult your safety department for further suggestions.

Depending on the working environment your local health and safety regulations may require you protective gear (i.e. Ear Protection, Safety Shoes, Hard Hat, Gloves, Coveralls, etc.) In case external forces are exerted on the equipment, non-compliance with these regulations may result in injury. **EAR PROTECTION MUST BE WORN WHEN OPERATING THIS TOOL.**

PLACING THE TOOL IN SERVICE

CONNECTING THE TOOL

1. Attach the twin line hose to the swivel inlets of the low profile drive cylinder using the spring-loaded quick connect ends. After making certain that they are fully engaged, thread the safety rings tightly against the spring-loaded retainer rings.
2. Connect the opposite ends of the hose to the pump in the same manner.
3. Push the link retaining pin out of the low profile drive cylinder.
4. Mate the selected ratchet link to the cylinder by inserting the end of the cylinder opposite the Swivel inlets between the side plates of the ratchet link. (Refer to Dwg. 1)
5. Align the holes for the link retaining pin and insert the pin through the side plates and cylinder to keep the units joined together.



SETTING THE TORQUE

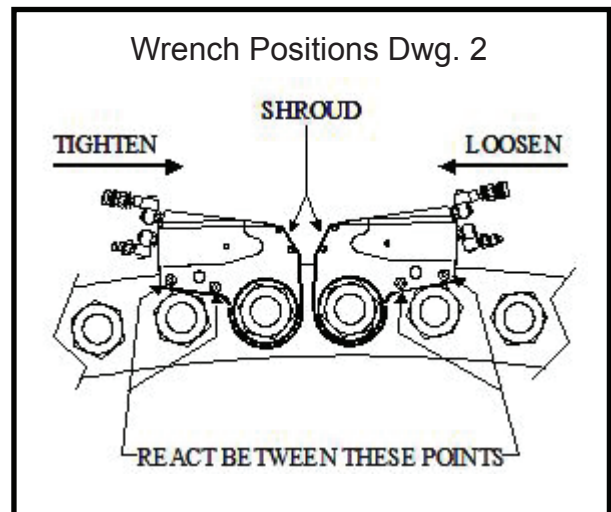
After determining the desired torque, use the torque conversion charts on pages 5 to 8 to determine the pressure that is necessary to achieve that torque.

1. Connect the tool to the power supply and turn the pump on.
2. Depress the remote control button causing the pressure to be shown on the gauge.
3. Adjust the pressure by loosening the wing nut that locks the pressure adjustment thumbscrew. Rotate the thumbscrew clockwise to increase the pressure and counterclockwise to decrease the pressure. When decreasing pressure, always lower the pressure below the desired point and then bring the gauge back up to the desired pressure.
4. When the desired pressure is reached, retighten the wing nut and cycle the tool again to confirm that the desired pressure setting has been obtained.

OPERATING THE WRENCH

The position of the tool relative to the nut determines whether the action will tighten or loosen the nut. (Refer to Dwg. 2 for application examples). The power stroke of the piston assembly will always turn the ratchet hex toward the shroud.

1. Place the ratchet hex on the nut. Make certain it is the correct size for the nut and that it fully engages the nut.
2. Position the reaction surface against an adjacent nut, flange or solid system component. Make certain that there is clearance for the hoses, swivels, and inlets. **DO NOT** allow the tool to react against the hoses, swivels, or inlets.



PLACING THE TOOL IN SERVICE

3. After having turned the pump on and presetting the pressure for the correct torque, depress the remote control button to advance the piston assembly. If the notch in the piston rod did not engage the retract pin in the ratchet link when the link was joined to the housing, it will engage the pin automatically during the first advance stroke.
4. When the link is connected to the cylinder and the wrench is started, the reaction surface of the wrench will move against the contact point and the nut will begin to turn.
5. When the nut is no longer turning and the pump gauge reaches the preset pressure, release the remote control button. The piston rod will retract when the button is released and under normal conditions, an audible “click” will be heard as the tool resets itself.
6. Continue to cycle the tool until it “stalls” and the preset psi/torque has been attained.
7. Once the nut stops rotating, cycle the tool one last time to achieve total torque.

LUBRICATION

Marine Moly Grease

Lubrication frequency is dependent on factors known only to the user. The amount of contaminants in the work area is one factor. Tools used in a clean room environment will obviously require less service than a tool used out-doors and dropped in loose dirt or sand. Marine Moly Grease is formulated not to wash out of the tool in areas where lubrication is critical. Whenever lubrication is required, lubricate as follows:

1. Separate the low profile cylinder from the ratchet link if they are joined.
2. After wiping off the old grease, apply a daub of Marine Moly Grease to the hooking notch in piston rod and wipe a film of Marine Moly Grease onto the sides and faces of the two sliders.
3. Disassemble the ratchet link as instructed in the Maintenance Section and wash the components in a suitable cleaning solution in a well ventilated area.
4. Dry the components, then wipe a film of Marine Moly Grease onto the wear surface of both side plate sleeves and the hubs of the ratchet.
5. Spread a light film of Marine Moly Grease onto the inner faces of both side plates covering the area where the drive plate and drive segment travel. DO NOT pack the teeth of the drive segment or ratchet with lube. It can prevent the teeth from engaging properly.
6. Reassemble the ratchet link as instructed in the Maintenance Section.

TX SERIES TORQUE CONVERSION CHART

PSI / FT-LBS												
Hex Sizes P.S.I.	TX-1			TX-2			TX-4		TX-8			
	Sideplate #4-6 7/8" - 1 1/8" 22 - 28 mm ft.-lbs	Sideplate# 7-10 1 3/16"- 1 5/8" 29 - 41 mm ft.-lbs	Sideplate# 11+ 1 11/16"- 2" 42 - 50 mm ft.-lbs	Sideplate # 1-8 3/4"- 1 13/16" 19 - 46 mm ft.-lbs	Sideplate # 9-12 1 7/8"- 2 9/16" 47 - 65 mm ft.-lbs	Sideplate # 14 2 5/8"- 2 15/16" 67 - 75 mm ft.-lbs	Sideplate# 1-6 1"- 2 9/16" 25 - 65 mm ft.-lbs	Sideplate # 7-9 2 5/8"- 3 1/8" 66 - 79 mm ft.-lbs	Sideplate # 1-7 1 7/8"- 3 1/8" 47 - 79 mm ft.-lbs	Sideplate # 8-9 3 3/16"- 3 9/16" 80 - 90 mm ft.-lbs	Sideplate# 12-14 3 5/8"- 4 5/8" 92 - 117 mm ft.-lbs	
	1,000	55	71	79	202	237	256	422	475	797	842	978
1,200	64	83	92	240	282	304	502	565	957	1011	1174	
1,400	74	95	105	278	326	352	582	655	1117	1180	1370	
1,600	83	106	118	317	371	400	663	745	1277	1350	1567	
1,800	92	118	131	355	415	448	743	836	1437	1519	1763	
2,000	101	130	144	393	460	496	823	926	1597	1688	1960	
2,200	110	142	158	432	506	546	906	1019	1758	1858	2157	
2,400	119	154	171	471	552	596	989	1112	1918	2027	2353	
2,600	129	165	184	511	598	645	1072	1206	2079	2197	2550	
2,800	138	177	197	550	644	695	1155	1299	2239	2366	2747	
3,000	147	189	210	589	690	745	1238	1393	2400	2536	2944	
3,200	156	200	223	629	737	795	1320	1484	2559	2704	3140	
3,400	165	212	235	669	783	845	1401	1576	2719	2873	3335	
3,600	174	223	248	708	830	896	1483	1668	2878	3041	3531	
3,800	182	235	261	748	876	946	1564	1760	3037	3210	3726	
4,000	191	246	273	788	923	996	1646	1852	3197	3378	3922	
4,200	200	258	286	827	969	1046	1726	1942	3354	3544	4114	
4,400	209	269	299	867	1015	1096	1806	2032	3511	3710	4307	
4,600	218	281	312	906	1062	1146	1887	2122	3668	3876	4500	
4,800	227	292	325	946	1108	1196	1967	2212	3825	4042	4693	
5,000	236	304	338	985	1154	1246	2047	2303	3982	4208	4885	
5,200	245	316	351	1024	1200	1295	2128	2393	4143	4377	5082	
5,400	254	327	364	1064	1246	1345	2209	2484	4303	4547	5279	
5,600	264	339	376	1103	1292	1394	2289	2575	4463	4716	5475	
5,800	273	350	389	1142	1338	1444	2370	2666	4623	4886	5672	
6,000	282	362	402	1182	1384	1494	2451	2757	4784	5055	5869	
6,200	291	374	415	1222	1431	1544	2533	2849	4946	5227	6068	
6,400	300	385	428	1261	1478	1595	2615	2942	5109	5399	6267	
6,600	309	397	441	1301	1524	1645	2698	3034	5272	5570	6467	
6,800	318	408	454	1341	1571	1696	2780	3127	5434	5742	6666	
7,000	327	420	467	1381	1618	1746	2862	3219	5597	5914	6866	
7,200	336	431	479	1421	1664	1796	2942	3309	5756	6083	7062	
7,400	344	443	492	1461	1711	1846	3021	3398	5916	6252	7258	
7,600	353	454	505	1500	1757	1897	3101	3488	6076	6420	7454	
7,800	362	466	517	1540	1804	1947	3180	3577	6236	6589	7650	
8,000	371	477	530	1579	1850	1997	3260	3667	6395	6758	7846	
8,200	380	489	543	1619	1896	2046	3343	3761	6564	6936	8052	
8,400	389	501	556	1658	1942	2096	3426	3854	6732	7113	8258	
8,600	399	512	569	1697	1988	2146	3510	3948	6900	7291	8464	
8,800	408	524	582	1737	2034	2195	3593	4041	7068	7468	8670	
9,000	417	536	596	1776	2080	2245	3676	4135	7236	7646	8877	
9,200	426	547	608	1814	2125	2294	3758	4227	7393	7813	9070	
9,400	435	559	621	1853	2170	2343	3840	4319	7551	7979	9263	
9,600	443	570	634	1892	2216	2391	3922	4412	7709	8146	9457	
9,800	452	582	646	1930	2261	2440	4004	4504	7866	8312	9650	
10,000	461	593	659	1969	2306	2489	4086	4596	8024	8479	9844	

Disclaimer: Please consult the calibration chart specific to your purchase or rental tool.

TX SERIES TORQUE CONVERSION CHART

Hex Sizes P.S.I.	Bar/N-m											
	TX-1			TX-2			TX-4			TX-8		
	Sideplate #4-6 7/8" - 1 1/8" 22 - 28 mm N-m	Sideplate# 7-10 1 3/16"- 1 5/8" 29 - 41 mm N-m	Sideplate# 11+ 1 11/16"- 2" 42 - 50 mm N-m	Sideplate # 1-8 3/4"- 1 13/16" 19 - 46 mm N-m	Sideplate # 9-12 1 7/8"- 2 9/16" 47 - 65 mm N-m	Sideplate # 14 2 5/8"- 2 15/16" 67 - 75 mm N-m	Sideplate# 1-6 1"- 2 9/16" 25 - 65 mm N-m	Sideplate # 7-9 2 5/8"- 3 1/8" 66 - 79 mm N-m	Sideplate # 1-7 1 7/8"- 3 1/8" 47 - 79 mm N-m	Sideplate # 8-9 3 3/16"- 3 9/16" 80 - 90 mm N-m	Sideplate# 12-14 3 5/8"- 4 5/8" 92 - 117 mm N-m	
69	75	96	107	274	321	347	572	644	1080	1142	1325	
83	87	112	125	326	382	412	681	766	1297	1371	1592	
97	100	128	143	378	442	477	790	888	1515	1600	1858	
110	112	144	160	429	503	543	898	1011	1732	1830	2124	
124	125	160	178	481	563	608	1007	1133	1949	2059	2391	
138	137	176	196	532	624	673	1116	1255	2166	2289	2657	
152	150	192	214	586	686	740	1228	1382	2383	2519	2924	
165	162	208	231	639	748	808	1341	1508	2601	2749	3191	
179	174	224	249	692	811	875	1453	1635	2819	2978	3458	
193	187	240	267	745	873	942	1566	1761	3036	3208	3725	
207	199	256	285	799	936	1010	1679	1888	3254	3438	3992	
221	211	272	302	853	999	1078	1789	2013	3470	3667	4257	
234	223	287	319	907	1062	1146	1900	2137	3686	3895	4522	
248	235	303	336	961	1125	1214	2010	2261	3902	4123	4787	
262	247	318	353	1014	1188	1282	2121	2386	4118	4352	5052	
276	259	334	371	1068	1251	1351	2232	2510	4334	4580	5317	
290	272	349	388	1122	1314	1418	2340	2633	4547	4805	5578	
303	284	365	406	1175	1377	1486	2449	2755	4760	5030	5840	
317	296	381	423	1229	1439	1553	2558	2877	4973	5255	6101	
331	308	396	440	1282	1502	1621	2667	3000	5186	5480	6362	
345	321	412	458	1336	1565	1689	2775	3122	5399	5705	6624	
359	333	428	475	1389	1627	1756	2885	3245	5617	5935	6890	
372	345	444	493	1442	1689	1823	2994	3368	5834	6165	7157	
386	357	459	510	1496	1752	1891	3104	3492	6051	6394	7423	
400	370	475	528	1549	1814	1958	3214	3615	6269	6624	7690	
414	382	491	545	1602	1876	2025	3323	3738	6486	6854	7957	
427	394	507	563	1656	1940	2094	3435	3863	6706	7087	8227	
441	406	522	580	1710	2003	2162	3546	3989	6927	7320	8498	
455	418	538	598	1765	2067	2231	3657	4114	7147	7552	8768	
469	431	554	615	1819	2130	2299	3769	4239	7368	7785	9038	
483	443	569	633	1873	2194	2368	3880	4365	7588	8018	9309	
496	455	585	650	1927	2257	2436	3988	4486	7805	8247	9575	
510	467	600	667	1980	2320	2504	4096	4608	8021	8476	9840	
524	479	616	684	2034	2382	2571	4204	4729	8238	8705	10106	
538	491	631	701	2088	2445	2639	4312	4850	8454	8934	10372	
552	503	647	719	2141	2508	2707	4420	4972	8671	9163	10637	
565	515	663	736	2195	2571	2775	4533	5099	8899	9403	10917	
579	528	679	754	2248	2633	2842	4646	5226	9127	9644	11196	
593	540	695	772	2301	2695	2909	4758	5352	9355	9885	11476	
607	553	711	790	2354	2758	2976	4871	5479	9583	10126	11755	
621	565	727	807	2408	2820	3044	4984	5606	9810	10367	12035	
634	577	742	825	2460	2881	3110	5095	5731	10024	10592	12297	
648	589	758	842	2512	2943	3176	5206	5856	10238	10818	12559	
662	601	773	859	2565	3004	3242	5318	5981	10452	11044	12822	
676	613	789	876	2617	3065	3308	5429	6107	10665	11270	13084	
689	625	804	893	2669	3127	3374	5540	6232	10879	11496	13346	

Disclaimer: Please consult the calibration chart specific to your purchase or rental tool.

TX SERIES TORQUE CONVERSION CHART

PSI/FT-LBS									
Hex Sizes P.S.I.	TX-16			TX-32			TX-45		
	Sideplate #1-7 2 5/8" - 3 15/16" 66 - 100mm	Sideplate# 8-10 4" - 4 5/8" 101 - 117 mm	Sideplate# 11 4 11/16" - 5 1/4" 119 - 133 mm	Sideplate # 1-7 3 1/8" - 4 5/8" 79 - 117 mm	Sideplate # 8-12 4 11/16" - 6 1/2" 119 - 165 mm	Sideplate # 15 6 9/16" - 8" 166 - 203 mm	Sideplate # 1-7 3 1/8" - 4 5/8" 79 - 117 mm	Sideplate # 8-12 4 11/16" - 6 1/2" 119 - 165 mm	Sideplate # 15 6 9/16" - 8" 166 - 203 mm
	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs	ft.-lbs
1,000	1627	1773	2075	3472	3844	4340	4543	5030	5679
1,200	1931	2104	2462	4132	4574	5165	5460	6045	6825
1,400	2234	2435	2849	4791	5305	5989	6377	7061	7972
1,600	2538	2765	3236	5451	6035	6814	7295	8076	9118
1,800	2842	3096	3623	6111	6766	7639	8212	9092	10265
2,000	3145	3427	4011	6771	7496	8463	9129	10107	11411
2,200	3448	3757	4397	7422	8217	9277	10023	11097	12529
2,400	3752	4088	4784	8073	8938	10091	10918	12088	13648
2,600	4055	4418	5170	8724	9658	10905	11813	13078	14766
2,800	4358	4749	5557	9375	10379	11718	12707	14069	15884
3,000	4661	5079	5944	10026	11100	12532	13602	15059	17002
3,200	4965	5410	6331	10684	11829	13355	14506	16061	18133
3,400	5269	5741	6719	11342	12558	14178	15411	17062	19264
3,600	5573	6072	7106	12001	13286	15001	16316	18064	20395
3,800	5876	6403	7493	12659	14015	15824	17220	19065	21525
4,000	6180	6734	7881	13317	14744	16646	18125	20067	22656
4,200	6483	7063	8266	13967	15464	17459	19026	21064	23782
4,400	6785	7393	8652	14618	16184	18272	19926	22061	24908
4,600	7087	7722	9037	15268	16904	19085	20827	23058	26033
4,800	7389	8052	9423	15918	17624	19898	21727	24055	27159
5,000	7692	8381	9808	16569	18344	20711	22628	25052	28285
5,200	8001	8718	10203	17222	19068	21528	23528	26049	29410
5,400	8311	9055	10597	17876	19791	22345	24429	27046	30536
5,600	8620	9393	10992	18529	20515	23162	25330	28044	31662
5,800	8930	9730	11387	19183	21238	23979	26230	29041	32788
6,000	9239	10067	11781	19837	21962	24796	27131	30038	33914
6,200	9553	10409	12181	20497	22693	25621	28033	31037	35041
6,400	9866	10751	12581	21157	23424	26446	28935	32035	36169
6,600	10180	11092	12981	21817	24154	27271	29837	33034	37296
6,800	10494	11434	13381	22477	24885	28096	30739	34032	38424
7,000	10808	11776	13781	23137	25616	28921	31641	35031	39551
7,200	11111	12107	14168	23786	26334	29732	32542	36029	40677
7,400	11415	12438	14556	24435	27053	30543	33443	37026	41804
7,600	11719	12769	14943	25084	27771	31355	34344	38024	42930
7,800	12023	13100	15331	25733	28490	32166	35245	39021	44056
8,000	12326	13431	15718	26381	29208	32977	36146	40019	45183
8,200	12646	13780	16126	27032	29928	33790	37047	41017	46309
8,400	12966	14128	16534	27683	30649	34603	37949	42015	47436
8,600	13286	14477	16942	28333	31369	35417	38850	43012	48562
8,800	13606	14825	17350	28984	32090	36230	39751	44010	49689
9,000	13926	15174	17758	29635	32810	37044	40652	45008	50815
9,200	14245	15521	18164	30287	33532	37859	41553	46005	51941
9,400	14563	15868	18570	30940	34255	38675	42453	47002	53067
9,600	14881	16215	18976	31592	34977	39490	43354	47999	54192
9,800	15200	16562	19382	32245	35700	40306	44254	48996	55318
10,000	15518	16909	19788	32897	36422	41122	45155	49993	56444

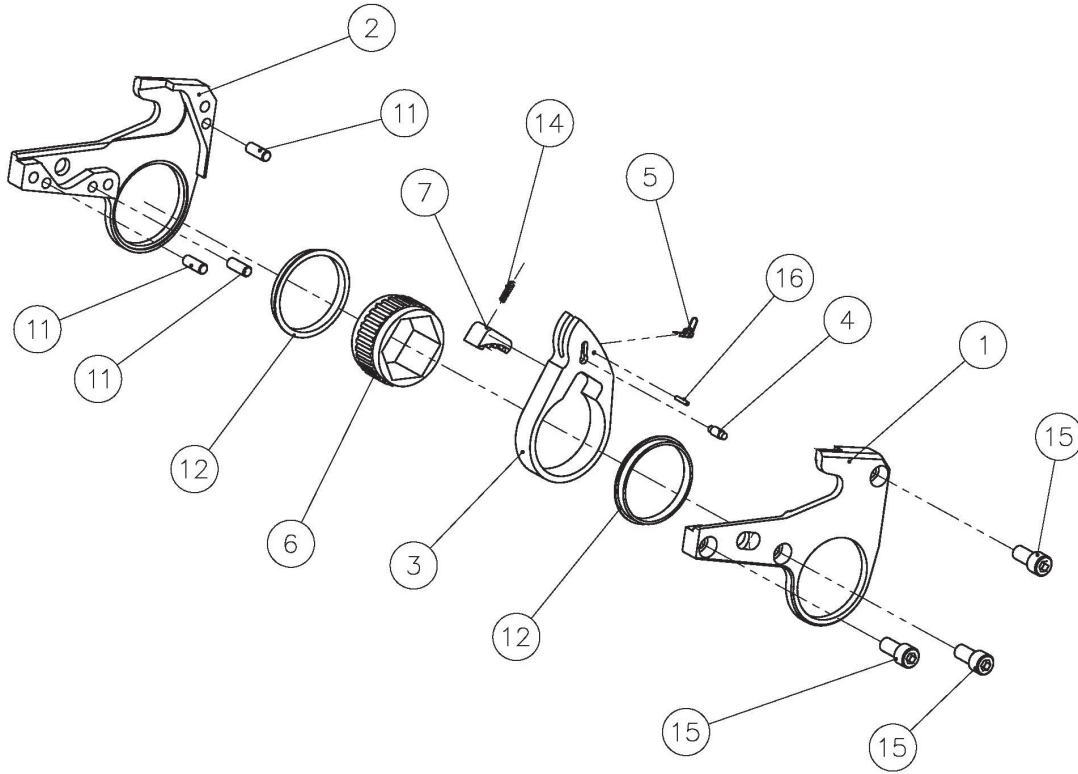
Disclaimer: Please consult the calibration chart specific to your purchase or rental tool.

TX SERIES TORQUE CONVERSION CHART

Bar/N-m									
Hex Sizes P.S.I.	TX-16			TX-32			TX-45		
	Sideplate #1-7 2 5/8" - 3 15/16" 66 - 100mm	Sideplate# 8-10 4" - 4 5/8" 101 - 117 mm	Sideplate# 11 4 11/16" - 5 1/4" 119 - 133 mm	Sideplate # 1-7 3 1/8" - 4 5/8" 79 - 117 mm	Sideplate # 8-12 4 11/16" - 6 1/2" 119 - 165 mm	Sideplate # 15 6 9/16" - 8" 166 - 203 mm	Sideplate # 1-7 3 1/8" - 4 5/8" 79 - 117 mm	Sideplate # 8-12 4 11/16" - 6 1/2" 119 - 165 mm	Sideplate # 15 6 9/16" - 8" 166 - 203 mm
	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m	N-m
69	2206	2404	2813	4707	5212	5884	6160	6820	7700
83	2618	2852	3338	5602	6202	7002	7403	8196	9254
97	3029	3301	3863	6496	7192	8120	8647	9573	10808
110	3441	3749	4388	7391	8183	9238	9890	10950	12363
124	3853	4198	4913	8285	9173	10357	11134	12327	13917
138	4264	4646	5438	9180	10163	11475	12377	13703	15471
152	4675	5094	5962	10062	11140	12578	13590	15046	16987
165	5087	5542	6486	10945	12118	13681	14803	16389	18504
179	5498	5990	7010	11828	13095	14785	16016	17732	20020
193	5909	6438	7534	12710	14072	15888	17229	19074	21536
207	6320	6886	8059	13593	15050	16991	18441	20417	23052
221	6732	7335	8584	14486	16038	18107	19668	21775	24585
234	7144	7784	9109	15378	17026	19223	20895	23133	26118
248	7555	8233	9634	16271	18014	20338	22121	24491	27651
262	7967	8681	10159	17163	19002	21454	23348	25849	29185
276	8379	9130	10685	18056	19990	22570	24574	27207	30718
290	8789	9577	11207	18937	20966	23672	25795	28559	32244
303	9199	10023	11730	19819	21943	24774	27016	29911	33770
317	9609	10470	12253	20701	22919	25876	28237	31262	35296
331	10019	10917	12775	21583	23895	26978	29458	32614	36822
345	10429	11363	13298	22464	24871	28080	30679	33966	38349
359	10848	11820	13833	23350	25852	29188	31900	35318	39875
372	11268	12277	14368	24236	26833	30296	33121	36670	41402
386	11687	12735	14903	25123	27814	31403	34342	38022	42928
400	12107	13192	15438	26009	28795	32511	35564	39374	44455
414	12527	13649	15973	26895	29776	33619	36785	40726	45981
427	12952	14112	16515	27790	30767	34737	38008	42080	47510
441	13377	14576	17058	28685	31758	35856	39231	43434	49038
455	13802	15039	17600	29580	32749	36975	40454	44788	50567
469	14228	15503	18142	30475	33740	38093	41676	46142	52096
483	14653	15966	18685	31370	34731	39212	42899	47496	53624
496	15065	16415	19210	32249	35705	40312	44121	48848	55151
510	15477	16864	19735	33129	36679	41411	45343	50201	56678
524	15889	17312	20260	34009	37653	42511	46564	51553	58205
538	16301	17761	20785	34889	38627	43611	47786	52906	59732
552	16712	18210	21311	35768	39601	44711	49008	54258	61260
565	17146	18683	21864	36651	40577	45813	50230	55611	62787
579	17580	19155	22417	37533	41554	46916	51451	56964	64314
593	18014	19628	22970	38415	42531	48019	52673	58317	65842
607	18447	20101	23523	39297	43508	49122	53895	59670	67369
621	18881	20573	24076	40179	44484	50224	55117	61023	68897
634	19313	21044	24627	41064	45464	51330	56338	62374	70423
648	19745	21514	25177	41949	46443	52436	57559	63726	71949
662	20177	21985	25728	42833	47423	53542	58780	65078	73475
676	20608	22455	26278	43718	48402	54648	60001	66430	75001
689	21040	22926	26829	44603	49382	55753	61222	67781	76527

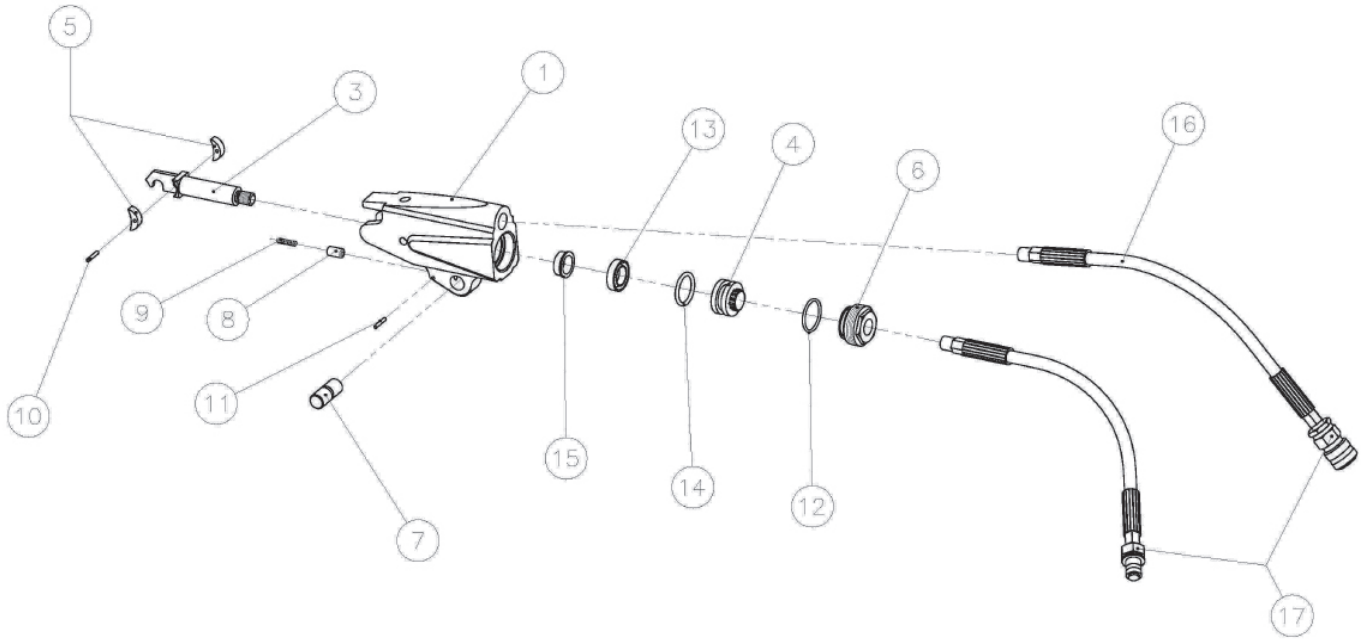
Disclaimer: Please consult the calibration chart specific to your purchase or rental tool.

TX-1 Low Profile Hydraulic Torque Wrench



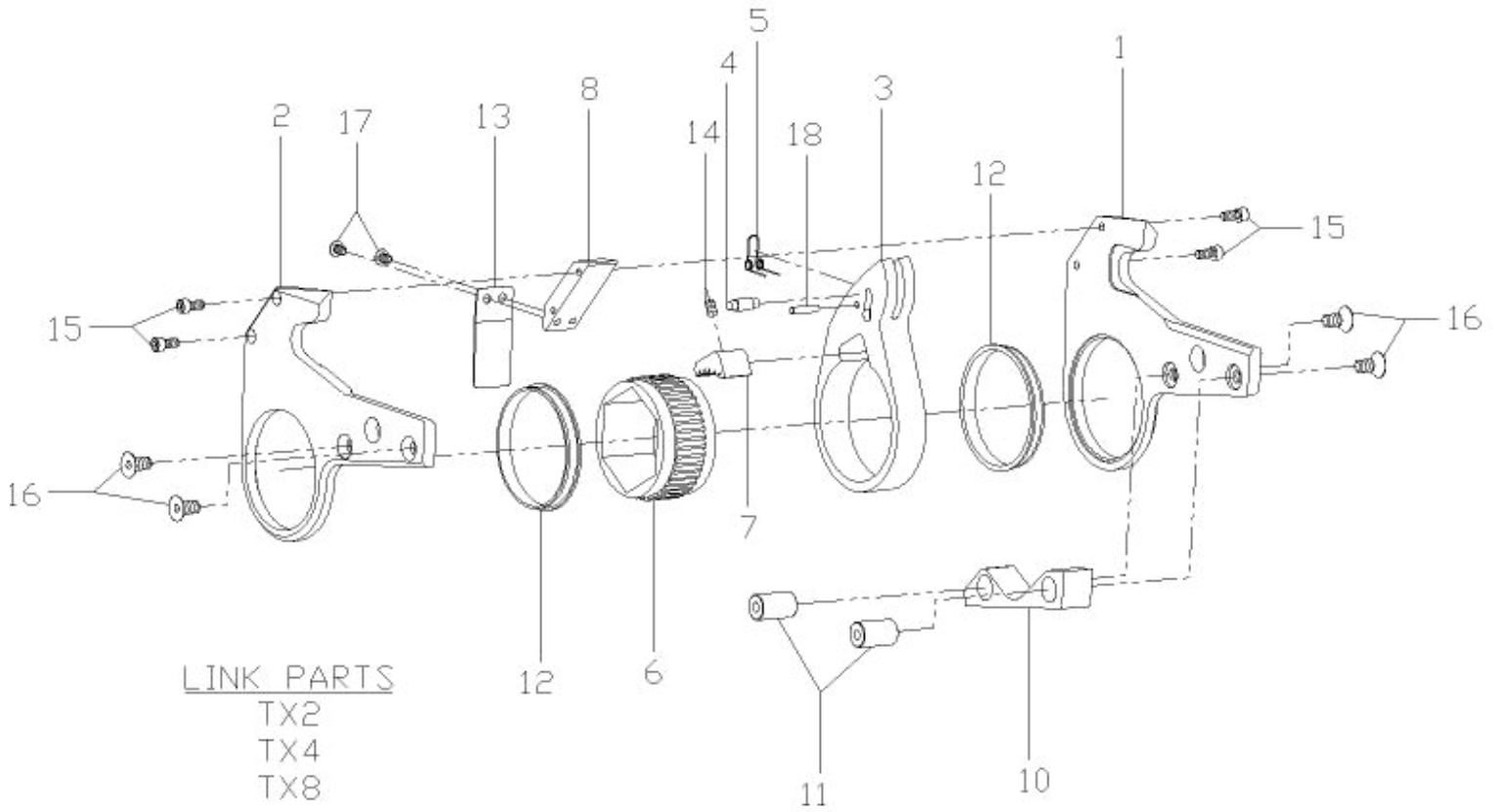
TX-1 LINK PARTS BREAKDOWN			
	Part	Qty	TX-1
1	TX-1 SIDE PLATE - LEFT	1	TX-1-L01
2	TX-1 SIDE PLATE - RIGHT	1	TX-1-L02
3	TX-1 DRIVE PLATE - SIZE	1	TX-1-L03
4	TX-1 DRIVE PIN	1	TX-1-L05
5	TX-1 DRIVE PIN SPRING	1	TX-1-L07
6	TX-1 RATCHET	1	TX-1-L09
7	TX-1 DRIVE SEGMENT	1	TX-1-L11
11	TX-1 SPACER PIN	3	TX-1-L17
12	TX-1 SIDEPLATE SLEEVES	2	TX-1-L19
14	TX-1 SEGMENT SPRING	1	TX-1-L23
15	TX-1 SIDE PLATE SCREWS	3	TX-1-L25
16	TX-1 ROLLPIN D. PIN SPRING	1	TX-1-L31

TX-1 Low Profile Hydraulic Torque Wrench

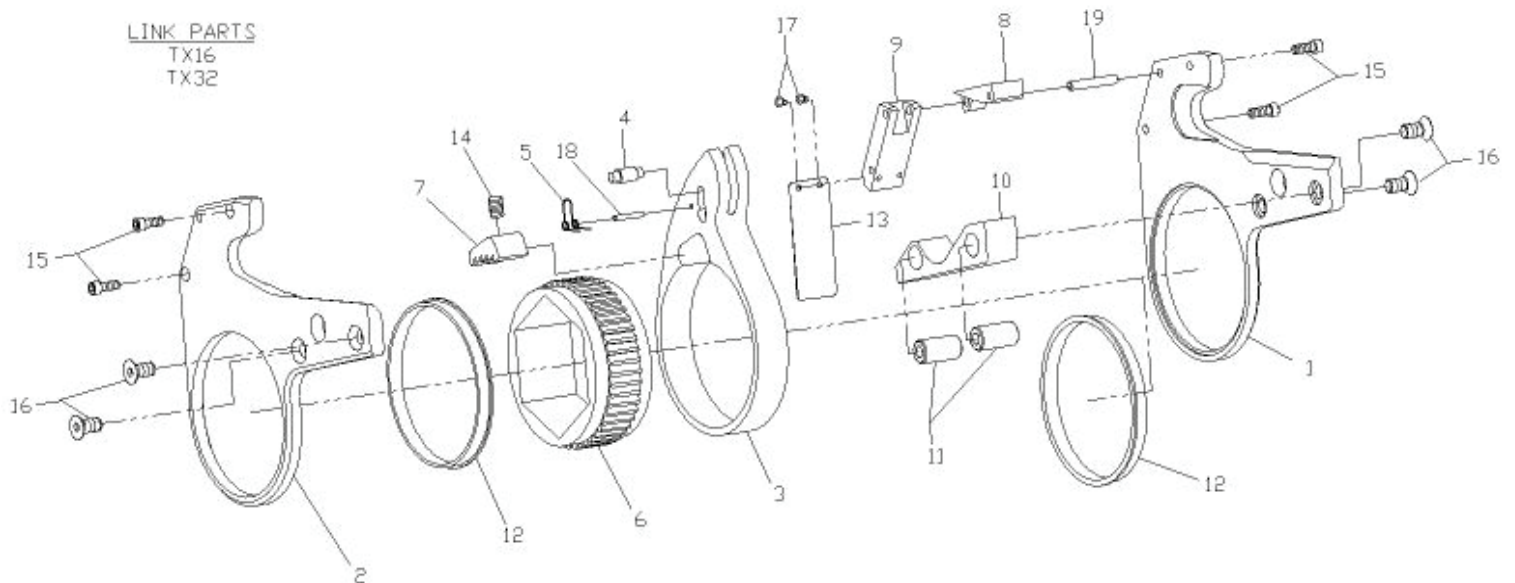


TX-1 CYCLINER PARTS BREAKDOWN			
	Part	Qty	TX-1
1	HOUSING	1	TX-1 - C01
	PISTON ROD ASSEMBLY	1	TX-1 - C03
3	PISTON ROD	1	TX-1 - C03-1
4	PISTON CAP	1	TX-1 - C03-2
5	SLIDER	2	TX-1 - C09
6	END CAP	1	TX-1 - C11
7	LINK PIN	1	TX-1 - C15
8	PLUNGER (LINK PIN)	1	TX-1 - C25
9	PLUNGER SPRING (LINK PIN)	1	TX-1 - C26
10	SLIDER PIN	1	TX-1 - C27
11	PLUNGER (ROLL PIN - LINK PIN)	1	TX-1 - C28
12	END PLUG SEAL	1	TX-1 - C29
13	ROD SEAL	1	TX-1 - C31
14	PISTON O-RING	1	TX-1 - C33
15	ROD BUSHING	1	TX-1-C51
16	WHIP HOSES - 16"	2	HPH-16"-1/8
17	QUICK CONNECT COUPLER SET	1	HC-S-100

TX-2, TX-4, TX-8 SERIES LINK



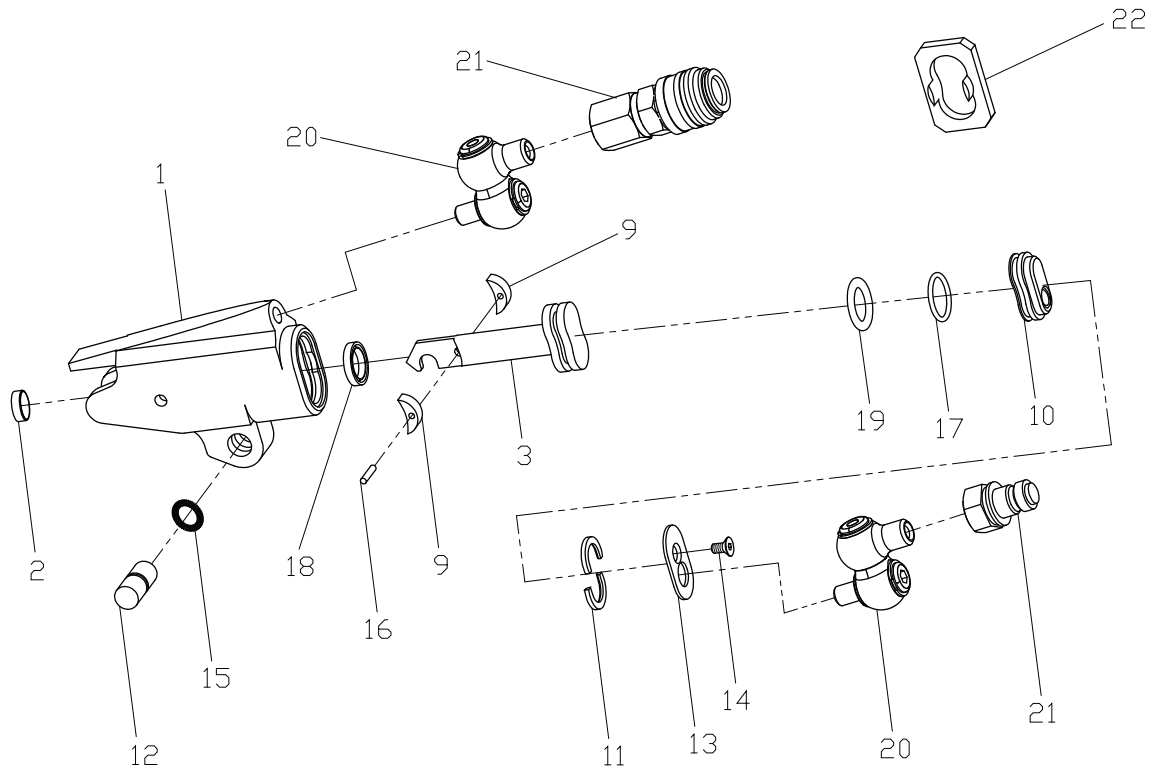
TX-16, TX-32 SERIES LINK



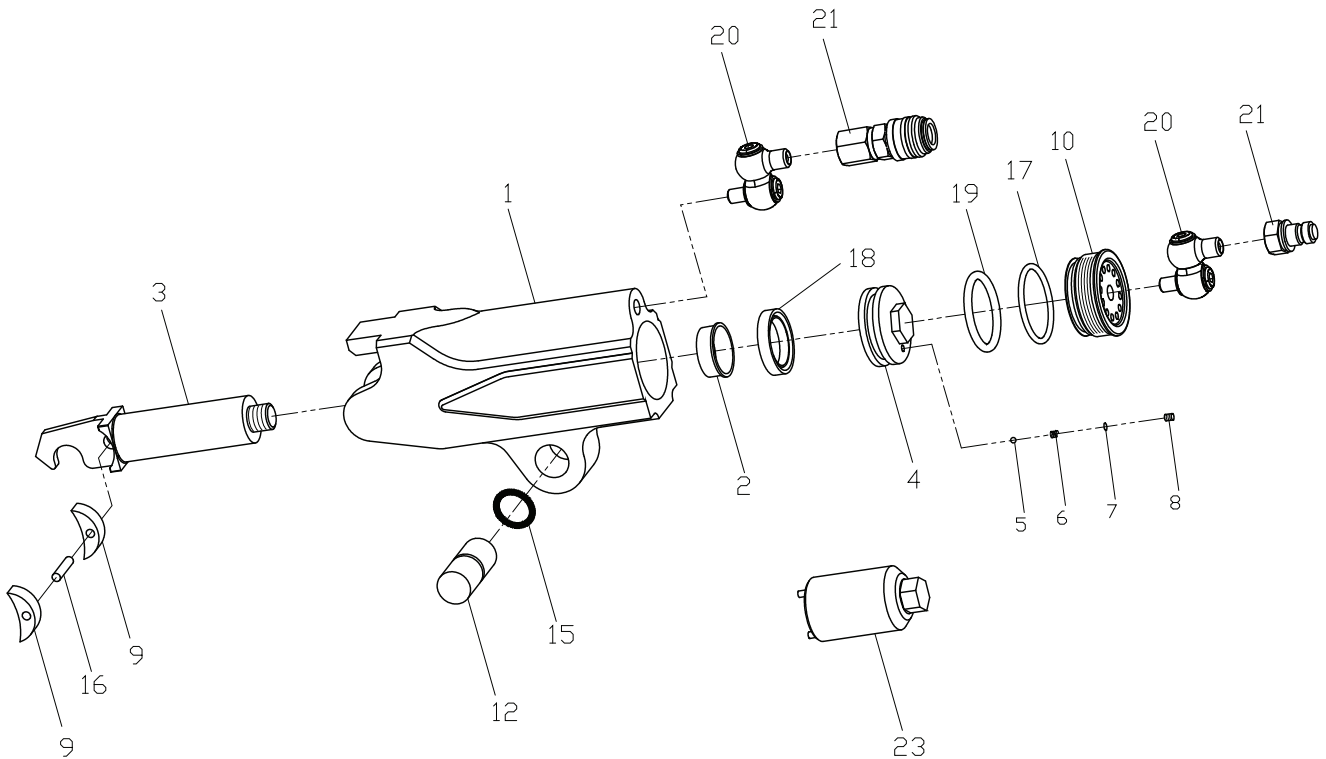
PART NUMBERS FOR ORDERING (LINKS)

	Part	TX-2	TX-4	TX-8	TX-16	TX-32
1	SIDE PLATE - L	TX-2-L01	TX-4-L01	TX-8-L01	TX-16-L01	TX-32-L01
2	SIDE PLATE - R	TX-2-L02	TX-4-L02	TX-8-L02	TX-16-L02	TX-32-L02
3	DRIVE PLATE	TX-2-L03	TX-4-L03	TX-8-L03	TX-16-L03	TX-32-L03
4	DRIVE PIN	TX-2-L05	TX-4-L05	TX-8-L05	TX-16-L05	TX-32-L05
5	DRIVE PIN SPRING	TX-2-L07	TX-4-L07	TX-8-L07	TX-16-L07	TX-32-L07
6	RATCHET	TX-2-L09	TX-4-L09	TX-8-L09	TX-16-L09	TX-32-L09
7	DRIVE SEGMENT	TX-2-L11	TX-4-L11	TX-8-L11	TX-16-L11	TX-32-L11
8	UPPER SPACER	TX-2-L13	TX-4-L13	TX-8-L13	TX-16-L13	TX-32-L13
9	MIDDLE SPACER	N/A	N/A	N/A	TX-16-L14	TX-32-L14
10	LOWER SPACER	TX-2-L15	TX-4-L15	TX-8-L15	TX-16-L15	TX-32-L15
11	LOWER SPACER PIN	TX-2-L17	TX-4-L17	TX-8-L17	TX-16-L17	TX-32-L17
12	SLEEVES - SIDEPLATE	TX-2-L19	TX-4-L19	TX-8-L19	TX-16-L19	TX-32-L19
13	SHROUD	TX-2-L21	TX-4-L21	TX-8-L21	TX-16-L21	TX-32-L21
14	SEGMENT SPRING	TX-2-L25	TX-4-L25	TX-8-L25	TX-16-L25	TX-32-L25
15	SCREWS - UPPER SPACER	TX-2-L27	TX-4-L27	TX-8-L27	TX-16-L27	TX-32-L27
16	SCREWS - LOWER SPACER	TX-2-L29	TX-4-L29	TX-8-L29	TX-16-L29	TX-32-L29
17	SHROUD SCREWS	TX-2-L31	TX-4-L31	TX-8-L31	TX-16-L31	TX-32-L31
18	DRIVE PIN SPRING ROLL PIN	TX-2-L33	TX-4-L33	TX-8-L33	TX-16-L33	TX-32-L33
19	SPACER ROLL PIN	N/A	N/A	N/A	TX-16-35	TX-32-L35

TX-2, TX-4, TX-8 SERIES CYLINDER



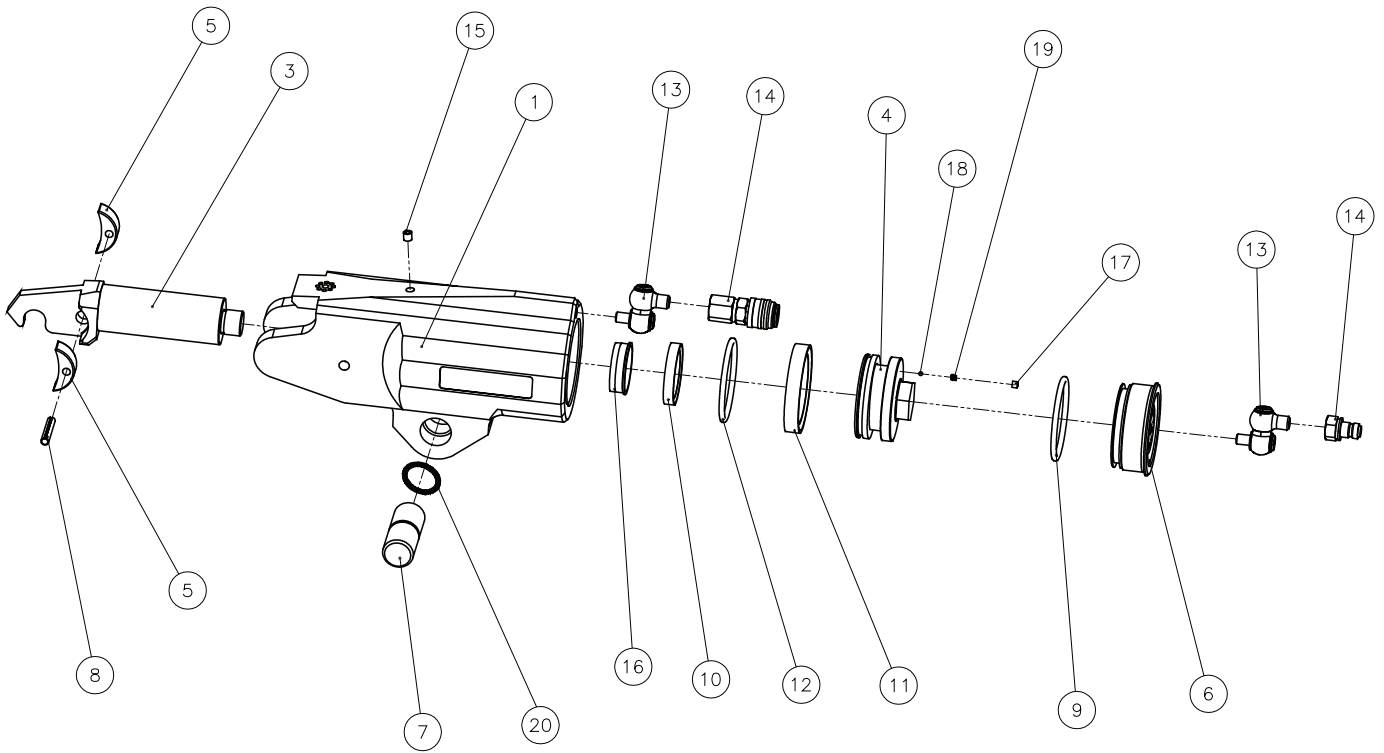
TX-16, TX-32 SERIES CYLINDER



PART NUMBERS FOR ORDERING (CYLINDERS)

	Part	TX-2	TX-4	TX-8	TX-16	TX-32
1	HOUSING	TX-2-C01	TX-4-C01	TX-8-C01	TX-16-C01	TX-32-C01
2	PISTON BRASS BUSHING	N/A	TX-4-C51	TX-8-C51	TX-16-C51	TX-32-C51
	PISTON ROD ASSEMBLY	TX-2-C03	TX-4-C03	TX-8-C03	TX-16-C03	TX-32-C03
3	PISTON ROD	N/A	N/A	N/A	TX-16-C03-1	TX-32-C03-1
4	PISTON CAP	N/A	N/A	N/A	TX-16-C03-2	TX-32-C03-2
5	VALVE BALL	N/A	N/A	N/A	TX-16-C03-3	TX-32-C03-3
6	VALVE SPRING	N/A	N/A	N/A	TX-16-C03-4	TX-32-C03-4
7	VALVE HOLLOW LOCK	N/A	N/A	N/A	TX-16-C03-5	TX-32-C03-5
9	SLIDER	TX-2-C09	TX-4-C09	TX-8-C09	TX-16-C09	TX-32-C09
10	END CAP	TX-2-C11	TX-4-C11	TX-8-C11	TX-16-C11	TX-32-C11
11	RETAINING RING	TX-2-C13	TX-4-C13	TX-8-C13	N/A	N/A
12	LINK PIN	TX-2-C15	TX-4-C15	TX-8-C15	TX-16-C15	TX-32-C15
13	END COVER	TX-2-C17	TX-4-C17	N/A	N/A	N/A
14	END COVER SCREWS	TX-2-C23	TX-4-C23	N/A	N/A	N/A
15	LINK RETAINING SPRING	TX-2-C53	TX-4-C53	TX-8-C53	TX-16-C53	TX-32-C53
16	SLIDER PIN	TX-2-C27	TX-4-C27	TX-8-C27	TX-16-C27	TX-32-C27
17	END PLUG SEAL	TX-2-C29	TX-4-C29	TX-8-C29	TX-16-C29	TX-32-C29
18	ROD SEAL	TX-2-C31	TX-4-C31	TX-8-C31	TX-16-C31	TX-32-C31
19	PISTON O-RING	TX-2-C33	TX-4-C33	TX-8-C33	TX-16-C33	TX-32-C33
20	SWIVEL (2 Required)	STX-8M-4M	STX-4M-4M	STX-4M-4M	STX-4M-4M	STX-4M-4M
21	COUPLER ASSEMBLY	HC-S-100	HC-S-100	HC-S-100	HC-S-100	HC-S-100
22	SEAL INSERTION TOOL	ATX-2-ST	ATX-4-ST	ATX-8-ST	N/A	N/A
23	END PLUG WRENCH	N/A	N/A	N/A	ATX-16-EPW	ATX-32-EPW

TX-45 SERIES CYLINDER



Part	TX-45 Part #	Part	TX-45 Part #
1 HOUSING	TX-45-C01	11 PISTON O-RING	TX-45-C33
2 PISTON ROD ASSEMBLY	TX-45-C03	12 PISTON CUP SEAL	TX-45-C32
3 PISTON ROD	TX-45-C03-1	13 SWIVEL SET	STU-4M-4M
4 PISTON	TX-45-C03-2	14 COUPLER SET	HC-S-100
5 SLIDER	TX-45-C09	15 PRESSURE PLUG	TX-45-C39
6 END CAP	TX-45-C11	16 ROD BUSHING	TX-45-C51
7 LINK PIN	TX-45-C15	17 VALVE CUP	TX-45-C03-5
8 SLIDER PIN	TX-45-C27	18 VALVE BALL	TX-45-C03-3
9 ENDPLUG SEAL	TX-45-C29	19 VALVE SPRING	TX-45-C03-4
10 ROD SEAL	TX-45-C31	20 CANTED COIL SPRING	TX-45-C53

MAINTENANCE SECTION

WARNING

Always turn off the power supply, bleed off hydraulic fluid from the hose connections on the cylinder assembly and disconnect the hoses before attempting to repair or perform maintenance on this tool. Always wear eye protection when operating or performing maintenance on this tool.

DISASSEMBLY

GENERAL INSTRUCTIONS

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Use extra care not to score, nick or damage surfaces that will contain hydraulic oil under pressure.
3. Whenever grasping a tool in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
4. Do not remove any part that is press fit in or on an assembly unless the removal of that part is necessary for repairs or replacement.
5. Do not disassemble the hydraulic cylinder assembly unless you have a complete set of seals and o-rings for replacement.
6. Use only British Standard fractional size tools when disassembling these tools.

DISASSEMBLY OF THE TOOL

1. Push the link pin (12) out of the housing (1) and side plates (1 & 2).
2. Lift the housing from between the side plates and separate the two units.

Disassembly of the TX-2, TX-4, and TX-8 Cylinder Assemblies

1. Grasp the housing (1) in copper-covered or leather-covered vise jaws with the inlet end upward and using a 1/4" hex wrench, unscrew and remove the two swivel Inlets (20) with their attached couplers (21).
2. Remove the housing assembly from the vise jaws and over a container to catch the oil, move the piston rod (3) back and forth several times to purge the hydraulic oil from the housing.
3. Grasp the housing in copper-covered or leather-covered vise jaws with the inlet end upward.
4. **For TX-2** use a 1/8" allen wrench. **For TX-4 and TX-8 models**, use a 5/32" allen wrench unscrew and remove the end cover screw (14). Remove the end cover (13).
5. Push the end cap (10) inward approximately 1/2" and remove the two retaining rings (11) by working them out of the groove in the cylinder.
6. Install the seal insertion tool (22) on the inlet end of the housing.
7. Thread one of the swivel inlets or a threaded pipe with a tee into the end cap (10). Use the inlet or tee as a handle to pull the end cap and end plug seal (17) out of the housing through the seal insertion tool.

CAUTION

The purpose of the Seal Insertion Tool in the following step is to prevent the End Plug Seal from expanding into the Retaining Ring groove. If the Tool is not used, place 2 thin pieces of flat stock at the midpoint of the opening against opposite walls to control the Seal expansion.

MAINTENANCE SECTION

8. Invert tool above vice, spreading vice open enough to catch the end plug and piston. Placing a cloth draped between the jaws of the vice will contain the parts exiting.
9. Tap piston with a brass tap lightly until both the piston and end cap slip through the housing into the catch cloth.
10. If the rod seal or end plug seal need replacement, use a hooked tool or small screwdriver to pull it from the piston rod or end cap respectively.
11. If the rod seal (18) needs replacement, use a hooked tool to pull it out of the housing.

Disassembly of the TX-1, TX-16, TX-32 and TX-45 Cylinder Assemblies

1. Grasp the housing (1) in copper-covered or leather-covered vise jaws with the inlet end upward and using a 1/4" hex wrench, unscrew and remove the two swivel inlets (20) with their attached couplers (21). NOTE: TX-1 cylinder uses 16" whip hoses instead of swivels.
2. Remove the housing assembly from the vise jaws and over a container to catch the oil, move the piston rod assembly (3&4) back and forth several times to purge the hydraulic oil from the Housing.
3. Grasp the housing in copper-covered or leather-covered vise jaws with the inlet end upward.
4. Insert the pins of the end plug wrench (23) into the holes of the end cap (10). Using a wrench on the hex of the end plug wrench, unscrew and remove the end cap with the end plug seal (17). NOTE: the TX-1 cylinder requires a 5/8" socket to unscrew and remove the end plug.
5. Push the piston rod far enough into the housing to expose the hex on the piston head.

NOTICE

During removal and after the piston shaft is removed; DO NOT grasp the round portion of the shaft with any holding device that will damage the surface. Any nicks or scratches to the surface will allow hydraulic oil to leak from the Cylinder when the tool is reassembled.

6. Using a socket on the hex of the piston head, unscrew and remove the piston head from the shaft with the piston o-ring (19).
7. Pull the piston shaft out of the housing.
8. If the sliders (9) must be replaced, position the slider pin (16) over a clearance opening in a soft block and use a small drift to tap the pin out of the sliders and shaft.
9. If the rod seal (18) needs replacement, use a hooked tool to pull it out of the housing.

Disassembly of the Ratchet Link

1. Lay the ratchet link flat on a workbench with the left side plate (1) downward and using a hex wrench, unscrew and remove the two lower spacer screws (16).
2. Using a hex wrench, unscrew and remove the two upper spacer screws (15).
3. For series TX-16 and TX-32 models, use a roll pin punch to tap the spacer roll pin (19) out of the right side plate (2).
4. While applying thumb pressure to the edge of the ratchet (6), carefully lift the side plate off the assembly.
5. Grasp the ratchet and drive plate (3) and, while maintaining their relationship, lift them both off the left side plate.

con't.

MAINTENANCE SECTION

NOTICE

In the following step, when the Ratchet is removed from the Drive Plate, the Drive Segment and Segment Spring will be free to fall from the Drive Plate recess. Do not allow the Drive Segment to fall on a hard surface that might chip the teeth.

6. Push the Ratchet out of the drive plate and remove the drive segment (7) and the segment spring (14) from the drive plate recess.
7. If the drive pin (4) or drive pin spring (5) must be replaced, use a roll pin punch to push the drive pin spring roll pin (18) out of the drive plate. Once the pin spring is removed, the drive pin (4) will drop down to the large opening at the bottom of the slot for easy removal.
8. Lift the lower spacer (10) off the lower spacer pins (11). If the pins must be replaced, use a hex wrench to remove the two lower spacer screws from the right side plate. Pull the pins out of the holes on the inner face of the right side plate.
9. **For Series TX-2, TX-4, and TX-8 models**, unscrew the two spacer screws and remove the upper spacer (8) from the right side plate. **For Series TX-16 and TX-32 models** use a roll pin punch to remove the spacer roll pin (19) from the right side plate. Unscrew the two spacer screws and remove the middle spacer (9) and upper spacer (8) from the right side plate.
10. If the side plate sleeves (12) must be replaced, press the sleeves out toward the inner face of the side plate. NOTE: TX-1 ratchet links do not have Upper Spacers or Lower Spacers.

ASSEMBLY

General Instructions

1. Use extra care not to score, nick or damage surfaces that will contain hydraulic oil under pressure.
2. Whenever grasping a tool in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true if threaded members and housings.
3. Apply o-ring lubricant to all o-rings before final assembly.

Assembly of the Ratchet Link

1. If the side plate sleeves (12) were removed, press new sleeves, shoulder end trailing, into the right and left side plates (1 & 2) from the inner face of the side plates. Make certain the sleeves are square with the side plate faces and the shoulder of the sleeves enters the recesses in the side plates and are pressed flush with the faces.
 2. **For Series TX-2, TX-4, and TX-8 models**, position the upper spacer (8) against the inside face of the right side plate. Apply a non-permanent thread-locking compound to the threads of the two upper spacer screws (15) and secure the spacer with the screws through the side plate. **For Series TX-16 and TX-32 models** press the spacer roll pin (19) into the right side plate with one end of the pin flush with the external face of the side plate. Insert the tab of the upper spacer (8) into the slot in the middle spacer (9), and after aligning the holes in both pieces, install them on the spacer roll pin (19). When they are correctly positioned, apply a non-permanent thread-locking compound to the threads of the two upper spacer screws (15) and secure the spacers with the screws through the side plate.
 3. Insert the two lower spacer pins (11) into the holes in the lower edge of the right side plate. Apply a non-permanent thread-locking compound to the threads of the lower spacer screws (16) and secure the pins with the screws through the side plate.
 4. Place the lower spacer (10) over the pins against the side plate. Make certain it is correctly oriented so that no part of the spacer extends beyond the edge of the side plate.
- NOTE: The TX-1 ratchet links do not have Upper Spacers and Lower Spacers.

MAINTENANCE SECTION

5. Insert the drive pin (4) into the small cross-hole and slot in the drive plate (3). Invert the plate causing the ends of the pin to enter the slot and move the pin to the narrow end.
6. Position the drive pin spring (5) in the drive plate slot with the two non-connected ends between the drive pin and the large hole in the slot. Position the closed end of the spring on the opposite side of the pin and then apply pressure on the spring to align the hole through it with the hole in the drive plate for the drive pin spring roll pin (18). Insert the spring roll pin into the drive plate, through the spring and into the far wall of the drive plate.

NOTICE

In the following step, an excessive amount of grease will prevent proper tooth engagement between the ratchet and the drive segment, causing the tool to malfunction.

7. Wipe a thin film of Marine Moly Grease onto the inner face of the large opening in the drive plate.
8. Position the ratchet (6) in the central opening of the drive plate.
9. Insert the drive segment (7) into the opening adjacent to the ratchet. **Make certain the teeth of the ratchet correctly engage the teeth of the drive segment.** Reverse the ratchet if they do not properly engage.
10. Slide the drive segment sideways to expose the spring hole. Install the segment spring (14) into the hole. While compressing the spring, slide the drive segment inward until the drive plate captures the segment spring.
11. Apply a light coat of Marine Moly Grease to both sides of the drive plate and drive segment. Apply some of the Marine Moly to the inner races of both side plate sleeves (12).
12. While keeping the assembly together, insert the hub of the ratchet into the side plate sleeve of the assembled side plate.
13. Place the left side plate sleeve on the hub of the ratchet and align the screw holes for the spacers.
14. After applying a non-permanent thread-locking compound to the threads and using hex wrenches, install the two remaining lower spacer screws.

Assembly of the TX-1, TX-16 , TX-32 and TX-45 Cylinder Assemblies

1. Grasp the link retaining pin lug in copper-covered, vise jaws with the housing (1) horizontal.
2. If the rod seal (18) was removed from the housing, apply a coat of o-ring lubricant to the seal and install it, lip end trailing, in the recess at the bottom of the piston bore.
3. Press the slider pin (16) into one of the sliders (9) flush with one side. Install the pin through the hole in the piston shaft and press the remaining slider onto the pin.
4. Install the piston o-ring (19) in the groove of the piston head.
5. Insert the piston rod, threaded end leading, into the small central opening from the non-piston end of the housing. The notch in the trailing end of the shaft should be toward the ball plunger (15).
6. Insert the piston, hex end trailing, into the bore of the housing, and use socket to thread and tighten the piston onto the piston shaft.
7. Install the end plug seal (17) in the groove on the hub of the end cap (10).
8. Using the end plug wrench (23), thread the assembled end cap, o-ring end leading, into the piston end of the housing and tighten it. NOTE: The TX-1 cylinder requires a 5/8" socket to screw in and tighten the end plug.
9. Wrap the threads of the swivel sets (20) with teflon tape and thread the swivel with the male hose coupler (21) into the center of the end cap. Thread the swivel with the female coupler into the hole in the housing directly above the end cap. NOTE: The TX-1 cylinder uses 16" whip hoses instead of swivels.

MAINTENANCE SECTION

Assembly of the TX-2, TX-4, and TX-8 Cylinder Assemblies

1. Grasp the link retaining pin lug in copper-covered vise jaws with the housing (1) horizontal.
2. If the rod seal (18) was removed from the housing, apply a coat of o-ring lubricant to the seal and install it, lip end trailing, in the recess at the bottom of the piston bore.
3. Insert the piston rod, notched end leading, into the rod seal and the small central opening from the piston end of the housing. The notch in the leading end of the shaft should be toward the ball plunger (15).
4. Push the piston rod (3) inward until the hole for the slider pin (16) aligns with the holes in the walls of the housing.
5. Position one slider (9) on each side of the piston shaft and insert the slider pin through the hole in the housing into both sliders and the piston shaft. The fit between the pin and sliders is an interference fit. Use a brass hammer and drift to set the slider pin below the outer edge of both sliders or deep enough to prevent the shaft ends from dragging on the housing walls.

NOTICE

In the following step, DO NOT use thread-locking compound on the screw threads.

6. Place the seal insertion tool (22) on the inlet end of the housing.
7. Install the end plug seal (17) in the groove of the end cap (10).
8. Insert the assembled end cap into the housing through the tool with the o-ring end leading and the threaded inlet hole upward. Push the cap inward beyond the retaining ring groove and approximately ½" into the cylinder.
9. Remove the seal insertion tool from the housing.
10. Install the retaining rings (8) in the housing grooves at the inlet end of the housing. Install the rings with the open ends of both rings at the middle of the opening and the beveled side of the rings toward the end cap.
11. If an air hose is available, inject some air into the threaded opening of the end cap to seat the retaining rings. If air is not available, temporarily thread one of the swivel sets (20) into the threaded opening and pull the end cap back against the retaining rings to seat them.
12. For **TX-2 and TX-4 models** position the end cover (13) against the housing and after applying a non-permanent thread-locking compound to the threads, install the end cover screw (14).
13. Wrap the threads of the swivel sets (20) with teflon tape and thread the swivel with the male hose coupler (21) into the threaded hole in the end cap.
14. Apply some Marine Moly Grease to the notch in the piston rod and the face of the sliders.

Assembly of the Tool

1. With the cylinder assembly in one hand and the ratchet link in the other, hook the notch on the shaft of the piston rod (3) onto the drive pin (4) and bring the two assemblies together.
2. Insert the link pin (12) into the hole in the side plate (1 or 2) until the ball plunger (15) snaps into the annular groove around the center of the link pin.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Piston will not advance or retract	Couplers are not securely attached to the tool or pump	Check the coupler connections and make certain that they are connected.
	Coupler is defective	Replace any defective coupler.
	Defective remote control switch	Replace the switch and/or control pendant
	Dirt in the direction-control valve of the pump unit	Disassemble the pump and clean the direction-control valve.
Piston will not retract	Hose connections reversed	Make certain the advance on the pump is connected to the advance on the tool and retract on the pump is connected to the retract on the tool.
	Retract hose not connected	Connect the retract hose securely
	Retract pin and/or spring broken	Replace the broken pin and/or spring
Cylinder will not build up pressure	Piston seal and/or end plug seal leaking	Replace any defective o-rings
	Retaining screws sheared	Replace any broken screws.
	Coupler is defective	Replace any defective coupler
Ratchet will not turn	Grease or dirt build up in the teeth of the ratchet link and drive segment	Disassemble the ratchet and clean the grease or dirt out of the teeth
	Worn or broken teeth on ratchet and/or drive segment	Replace any worn or damaged parts
Tool tightens immediately when turned on	Hose connections are reversed	Depress the advance button to release the tool; shut the pump off in the advance position and reverse the hose connection
Pump will not build up pressure	Defective relief valve	Inspect, adjust or replace the relief valve
	Air supply too low or air hose too small	Make certain the air supply and hose size comply with the pump manual recommendations.
	Electric power source is too low	Make certain the amperage, voltage and any extension cord size comply with the pump manual requirements
	Defective gauge	Replace the gauge
	Low oil level	Check and fill the pump reservoir
	Clogged filter	Inspect, clean and/or replace the pump filter
Pressure reading erratic	Defective gauge	Replace the gauge

SAVE THESE INSTRUCTIONS DO NOT DESTROY

NOTES:



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