

TU Series

OPERATION AND MAINTENANCE

MANUAL

TU Series Hydraulic Torque Wrenches

MODELS TU-2, TU-3, TU-7, TU-11, TU-20, TU-27 & TU-60



1025 Conroy Place, Easton, PA. 18040 * U.S.A.
Phone: +1 610-250-5800 * Fax: +1 610-250-2700
Toll Free: 1-888-TORCUP-1

Email: sales@torcup.com * Website: www.torcup.com



Operational and Maintenance Manual for TorcUP
TU-2, TU-3, TU-11, TU-20, TU-27 AND TU-60
Square Drive Hydraulic Torque Wrenches
Version 1: 2014 September

NOTICE

Series TU-2, TU-3, TU-7, TU-11, TU-20, TU-27 and TU-60 Square Drive Hydraulic Torque Wrenches are designed for installing and removing threaded fasteners requiring precise high torque during bolt makeup and maximum torque during bolt breakout.

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.
- Do not remove any labels. Replace any damaged label.
- 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.

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.

For Technical Support & Information Contact:

TorcUP Inc.

1025 Conroy Place, Easton, PA 18040 USA

Phone: +1 610-250-5800 Fax: +1 610-250-2700

email: sales@torcup.com

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

- Keep hands, loose clothing & long hair away from the reaction arm and working area 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.
- Use accessories recommended by TorcUP.
- Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.
- Use only sockets and accessories that correctly fit the bolt or nut and function without tilting the tool off the axis of the bolt.
- This tool is not insulated against electric shock.
- This equipment must not be operated or serviced unless the operator read the operating instructions and fully understands the purpose, consequences and procedure of each step.
- When operating a larger tool (TU-20, TU-27 or TU-60) 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 square drive torque wrench 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.

ADJUSTMENTS

SETTING THE SQUARE DRIVE FOR ROTATION

The position of the square drive when looking toward the shroud will determine if the tool is set to tighten or loosen the nut. When the square drive extends to the left when looking at the shroud with the inlets away from you, the tool is set to loosen the nut. When the square drive extends to the right, the tool is set to tighten the nut. To change the direction of rotation for model TU-2 TU-3, TU-7 and TU-11 simply push the square drive into the housing until the drive projects out the opposite side of the tool. For model TU-20, TU-27 & TU-60, loosen and remove the square drive retaining screw and pull the square drive out of the housing. Insert the square drive into the opposite side of the housing and secure it by installing the screw in the splined end of the drive.

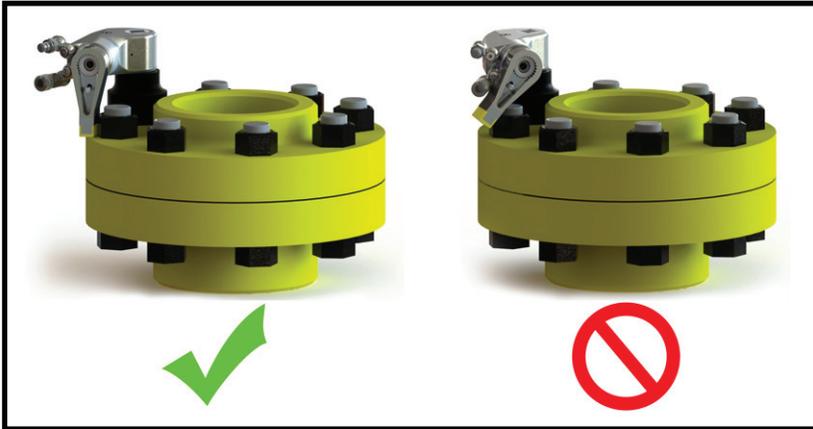
SETTING THE TORQUE

After determining the desired torque, use the calibration certificate provided with the tool to determine the pressure necessary to achieve that torque. You may also refer to the chart engraved on the shroud of the tool or the chart provided on page 7 of this manual.

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 thumb screw. 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.

SETTING THE REACTION ARM

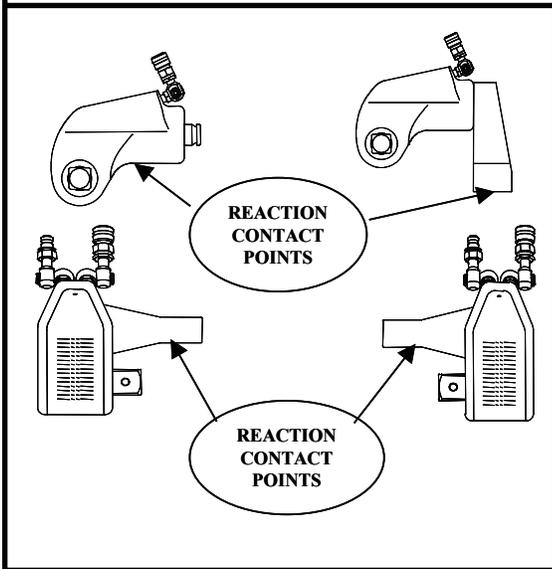
The function of a reaction device is to hold the tool in position against the forces generated to tighten or loosen bolts or nuts. Hydraulic wrenches generate tremendous force.



WARNING

An improperly positioned reaction arm may result in operator injury or damage tooling.

Square Drive Hydraulic Wrench Reaction Points (Dwg.01)



Make sure the reaction arm is positioned correctly. (Refer to Dwg. 01).

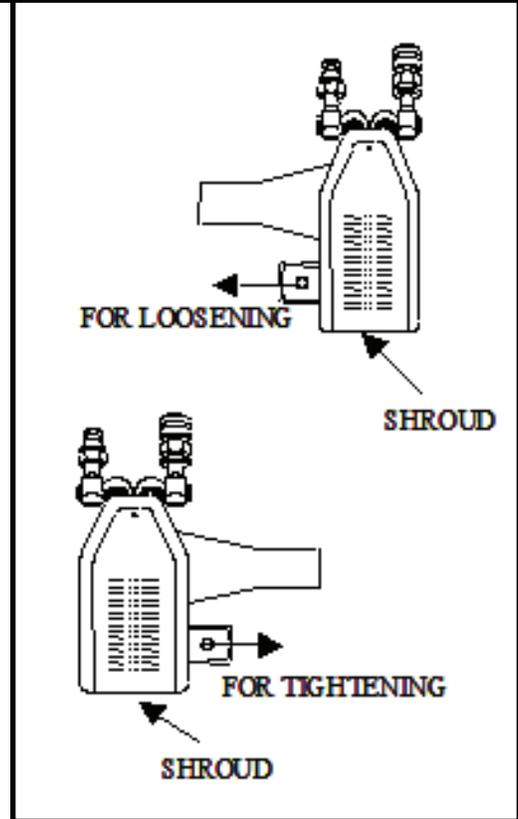
The reaction arm can be positioned numerous places within a 360° circle. However, for the arm to be correctly positioned, it must be set within a 90° quadrant of that circle. That quadrant is the area located between the protruding square drive and the bottom of the housing away from the swivel inlets. It will always be toward the lower half of the housing and on one side of the housing when tightening and the other side when loosening.

OPERATING THE WRENCH

Square Drive Position for Loosening and Tightening(Dwg.02)

The position of the square drive relative to the shroud determines whether the action will tighten or loosen the nut. (Refer to Dwg. 02 for application examples). The power stroke of the piston assembly will always turn the square drive toward the shroud.

1. Place the square driver in the socket and the socket on the nut. Make certain the square driver and socket are the correct size for the nut and that the driver fully engages the socket and the socket fully engages the nut.
2. Position the reaction arm or surface against an adjacent nut, flange or solid system component. Make certain that there is clearance for the hoses, swivels, inlets and end plug. DO NOT allow the tool to react against the hoses, swivels, inlets or end plug.
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.
4. When the wrench is started, the reaction surface of the wrench or reaction arm 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. Remove the drive plate, ratchet, drive segment and sleeves as instructed in the maintenance section and wash the components in a suitable cleaning solution in a well ventilated area.
2. After drying the components, wipe a film of Marine Moly Grease onto the wear surface of both sleeves and the ends of the ratchet.
3. Spread a light film of Marine Moly Grease onto the inner face and both sides of the Drive Plate. **Do not pack** the teeth of the drive segment or ratchet with lube. It can prevent the teeth from engaging properly.
4. Place a daub of Marine Moly Grease in the piston rod recess of the drive plate before linking the piston rod to the drive plate at assembly.

CRITICAL LUBRICATION

It is imperative to lubricate the piston rod recess of the drive plate to piston rod contact area every 80 hours of continuous duty cycling.

Lubricate as follows:

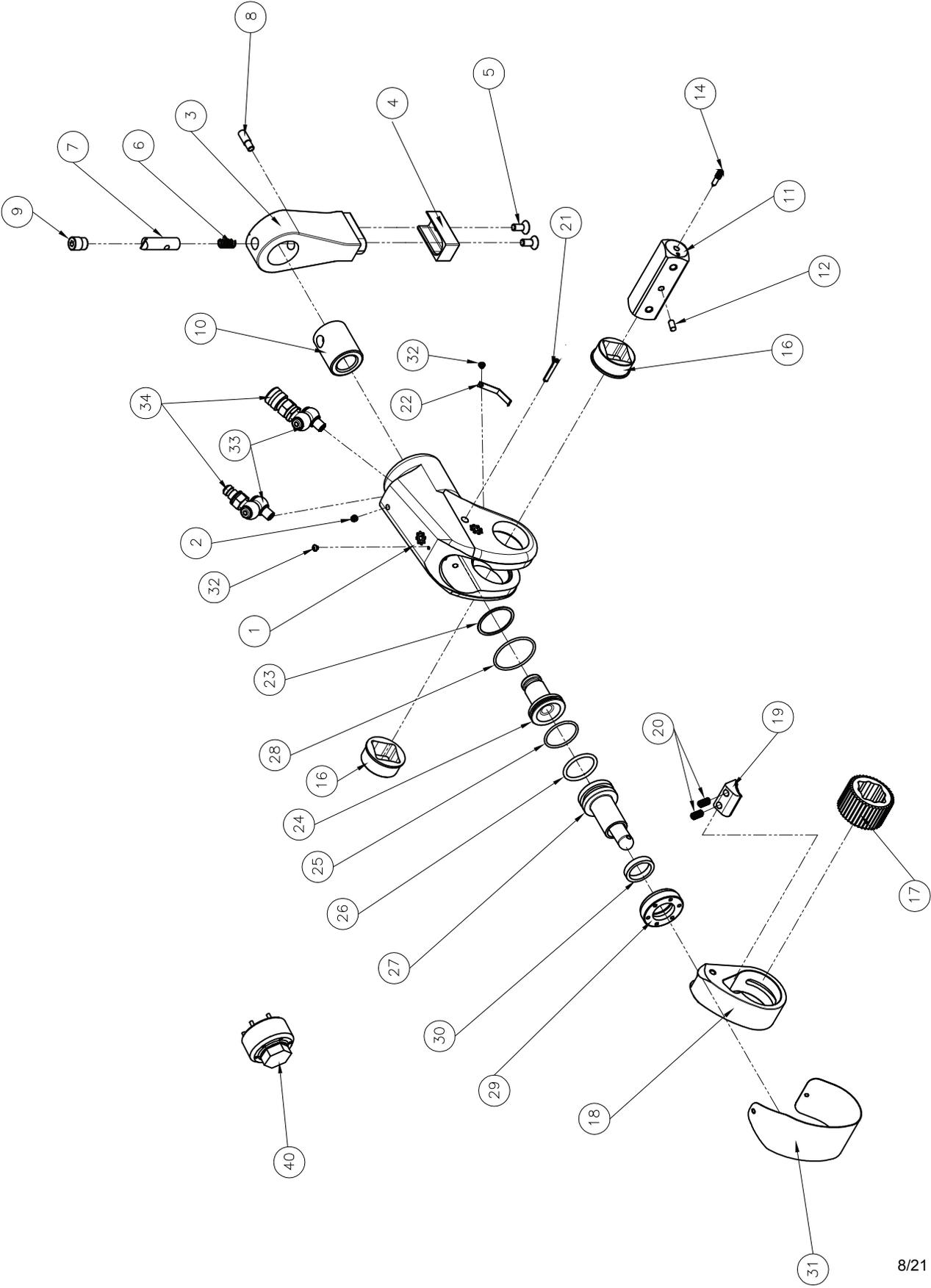
1. Remove shroud screws, shroud, and roll pin.
2. Pry the drive plate assembly forward from the piston rod to expose the recessed contact area in the drive plate.
3. With a rag, wipe clean the area and apply a sizeable amount of Marine Moly Grease.
4. Reassemble as instructed in the maintenance section.

TU Series Torque Conversion Chart

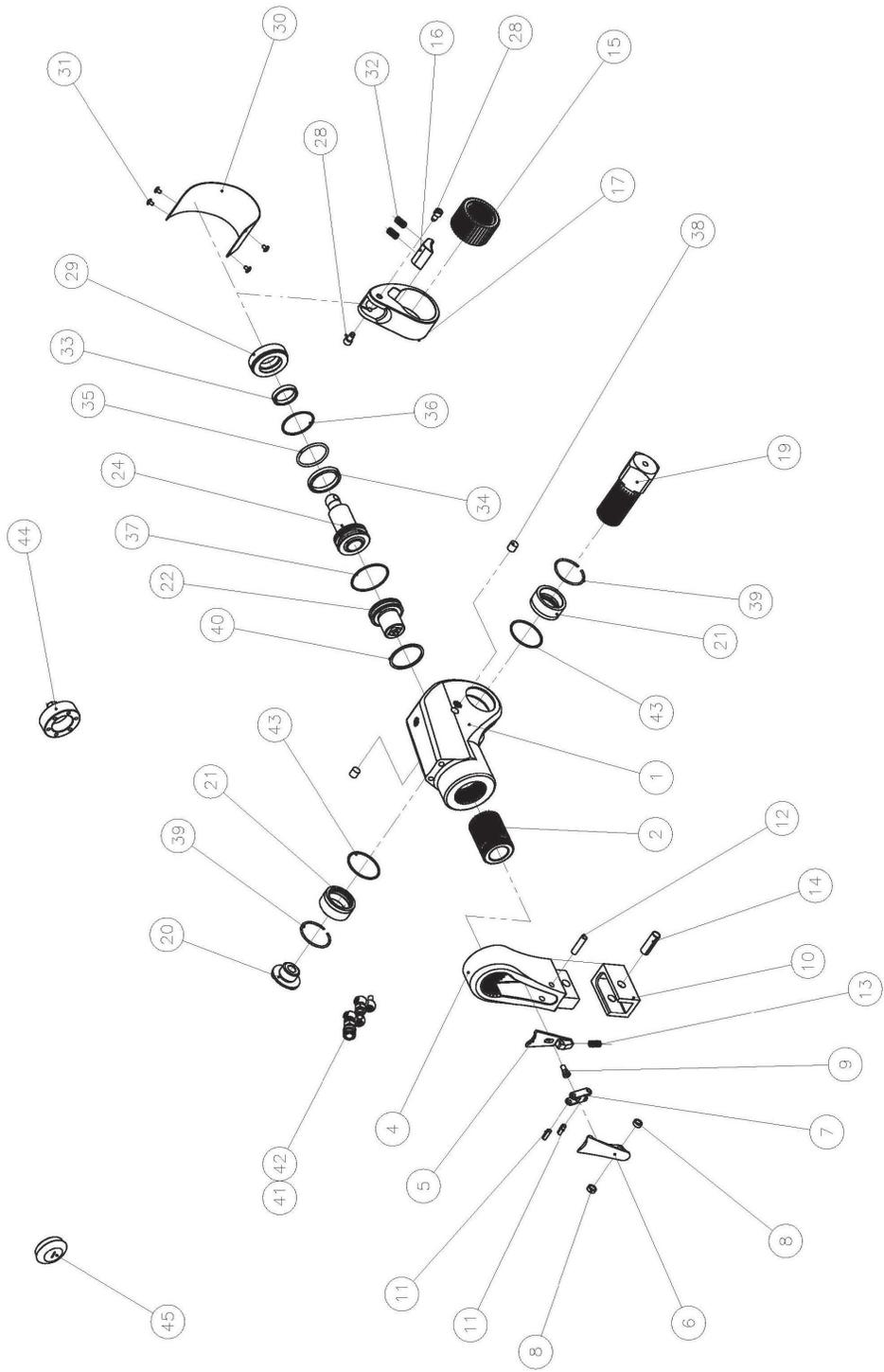
P.S.I.- FT.-lbs								Bar.N.M.							
P.S.I	TU-2	TU-3	TU-7	TU-11	TU-20	TU-27	TU-60	Bar	TU-2	TU-3	TU-7	TU-11	TU-20	TU-27	TU-60
	ft.-lbs.		N.M	N.M	N.M	N.M	N.M	N.M	N.M						
1,000	132	347	790	1198	2249	3032	6202	69	179	470	1071	1624	3049	4111	8409
1,200	159	414	947	1433	2683	3606	7422	83	215	561	1284	1943	3638	4889	10062
1,400	185	481	1104	1668	3118	4180	8641	97	251	652	1497	2262	4227	5668	11716
1,600	212	547	1262	1904	3552	4755	9861	110	287	742	1710	2581	4816	6446	13369
1,800	238	614	1419	2139	3987	5329	11080	124	323	833	1924	2900	5405	7225	15023
2,000	265	681	1576	2374	4421	5903	12300	138	359	923	2137	3219	5994	8003	16677
2,200	292	748	1734	2612	4847	6469	13477	152	396	1015	2351	3541	6572	8771	18272
2,400	319	816	1892	2850	5273	7035	14654	165	433	1106	2565	3864	7150	9538	19868
2,600	346	883	2050	3088	5700	7600	15831	179	469	1197	2779	4187	7728	10305	21464
2,800	373	951	2208	3326	6126	8166	17008	193	506	1289	2994	4509	8305	11072	23060
3,000	400	1018	2366	3564	6552	8732	18185	207	542	1380	3208	4832	8883	11839	24656
3,200	427	1085	2525	3802	6974	9302	19378	221	579	1471	3423	5155	9455	12612	26273
3,400	454	1152	2683	4041	7396	9873	20571	234	616	1562	3638	5479	10028	13386	27890
3,600	481	1220	2842	4279	7818	10443	21763	248	652	1654	3853	5802	10600	14159	29507
3,800	508	1287	3000	4518	8240	11014	22956	262	689	1745	4068	6125	11172	14932	31124
4,000	535	1354	3159	4756	8662	11584	24149	276	725	1836	4283	6448	11744	15706	32742
4,200	561	1421	3317	4990	9077	12137	25344	290	761	1926	4497	6766	12306	16455	34361
4,400	588	1487	3475	5225	9492	12690	26538	303	797	2016	4711	7084	12869	17205	35981
4,600	614	1554	3632	5459	9906	13242	27733	317	833	2107	4925	7402	13431	17954	37601
4,800	641	1620	3790	5694	10321	13795	28927	331	869	2197	5139	7719	13994	18704	39220
5,000	667	1687	3948	5928	10736	14348	30122	345	904	2287	5353	8037	14556	19453	40840
5,200	694	1754	4106	6164	11158	14911	31317	359	941	2379	5568	8357	15128	20217	42460
5,400	721	1822	4265	6400	11580	15474	32511	372	977	2470	5782	8677	15700	20980	44079
5,600	747	1889	4423	6635	12002	16037	33706	386	1013	2561	5997	8996	16273	21743	45699
5,800	774	1957	4582	6871	12424	16600	34900	400	1050	2653	6212	9316	16845	22507	47319
6,000	801	2024	4740	7107	12846	17163	36095	414	1086	2744	6427	9636	17417	23270	48938
6,200	828	2092	4901	7348	13271	17720	37293	427	1123	2837	6645	9963	17993	24026	50562
6,400	855	2160	5063	7589	13696	18278	38491	441	1160	2929	6864	10290	18569	24781	52186
6,600	883	2229	5224	7831	14120	18835	39688	455	1197	3022	7083	10617	19145	25537	53810
6,800	910	2297	5386	8072	14545	19393	40886	469	1234	3114	7302	10944	19721	26293	55434
7,000	937	2365	5547	8313	14970	19950	42084	483	1270	3207	7521	11271	20297	27049	57058
7,200	964	2432	5705	8547	15388	20510	43282	496	1306	3297	7735	11588	20863	27807	58683
7,400	990	2499	5863	8781	15806	21069	44480	510	1343	3388	7949	11905	21430	28566	60307
7,600	1017	2565	6021	9015	16223	21629	45678	524	1379	3478	8163	12223	21996	29325	61931
7,800	1043	2632	6179	9249	16641	22188	46876	538	1415	3569	8378	12540	22562	30083	63555
8,000	1070	2699	6337	9483	17059	22748	48074	552	1451	3659	8592	12857	23129	30842	65180
8,200	1098	2769	6505	9727	17492	23308	49272	565	1488	3754	8820	13188	23716	31601	66804
8,400	1126	2838	6674	9971	17925	23868	50470	579	1526	3848	9048	13518	24302	32360	68428
8,600	1153	2908	6842	10214	18357	24427	51667	593	1564	3942	9277	13849	24889	33119	70052
8,800	1181	2977	7011	10458	18790	24987	52865	607	1601	4037	9505	14179	25476	33878	71676
9,000	1209	3047	7179	10702	19223	25547	54063	621	1639	4131	9733	14510	26063	34637	73300
9,200	1236	3115	7342	10943	19653	26106	55260	634	1676	4223	9954	14837	26645	35395	74922
9,400	1263	3183	7505	11184	20082	26665	56456	648	1713	4316	10175	15164	27228	36153	76544
9,600	1291	3251	7668	11426	20512	27225	57653	662	1750	4408	10396	15491	27810	36912	78167
9,800	1318	3319	7831	11667	20941	27784	58849	676	1787	4500	10617	15818	28393	37670	79789
10,000	1345	3387	7994	11908	21371	28343	60046	689	1824	4592	10838	16145	28975	38428	81411

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

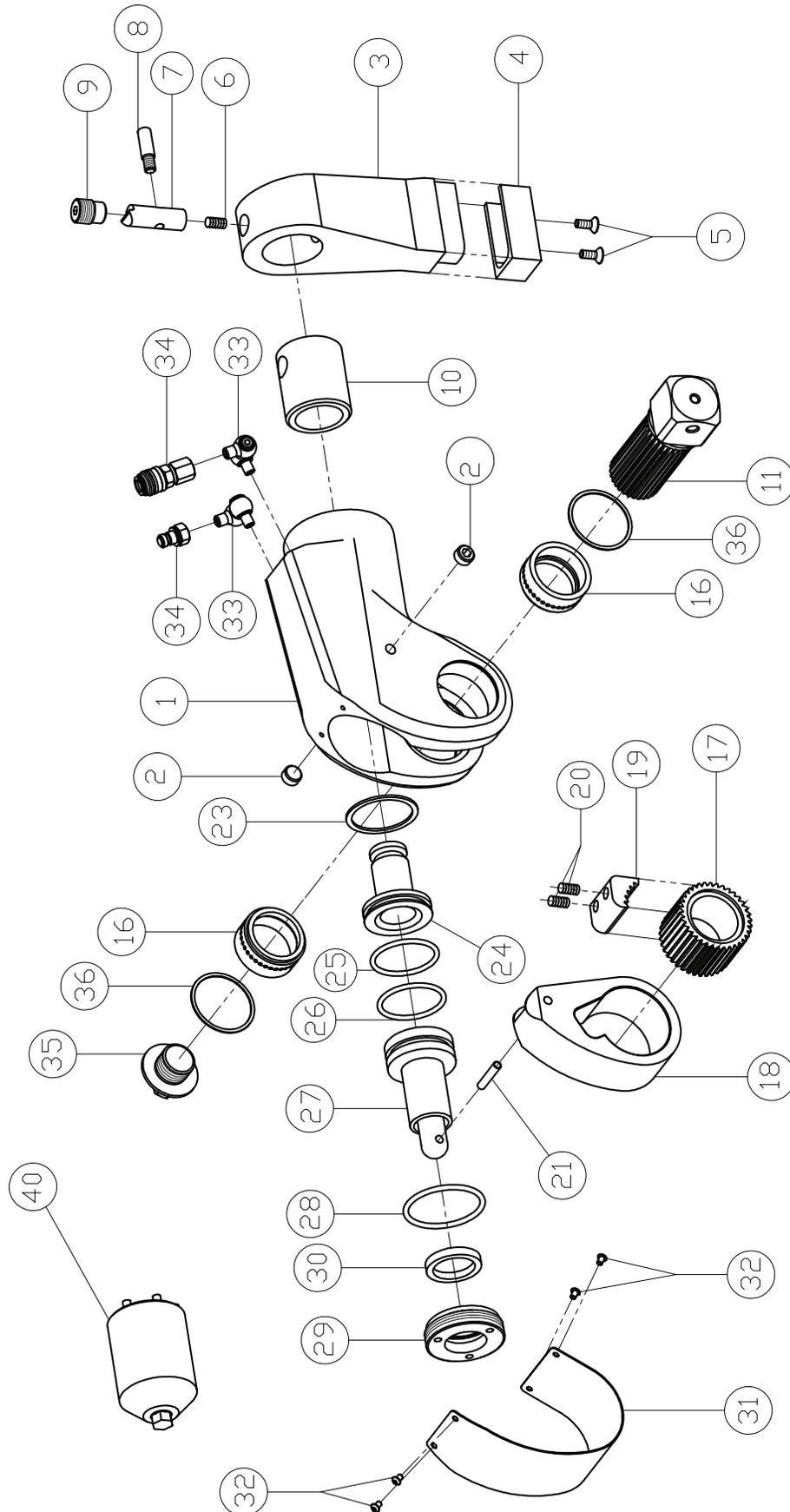
TU-2,3,7,11 Series Wrench



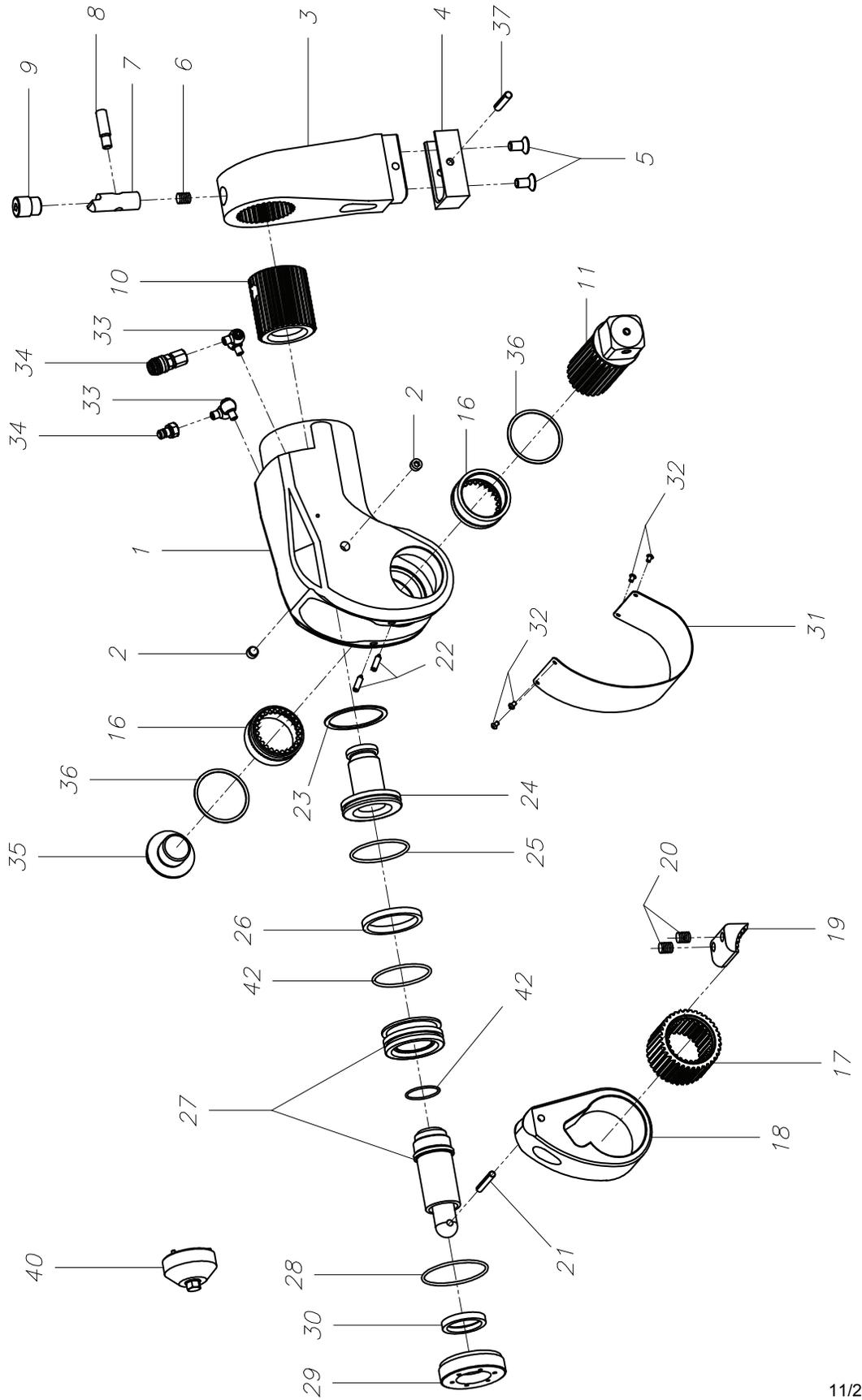
TU-20 Series Wrench



TU-27 Series Wrench



TU-60 Series Wrench



Part Numbers For Ordering TU Series

	Part	TU-2	TU-3	TU-7	TU-11	TU-27	TU-60
1	Housing	TU-2-01	TU-3-01	TU-7-01	TU-11-01	TU-27-01	TU-60-01
2	Housing Threaded Plug	N/A	N/A	N/A	TU-11-39	TU-27-39	TU-60-39
3	Reaction Arm	TU-2-03-1	TU-3-03-1	TU-7-03-1	TU-11-03-1	TU-27-39	TU-60-03-1
4	Reaction Arm Cover	TU-2-03-7	TU-3-03-7	TU-7-03-7	TU-11-03-7	TU-27-03-7	TU-60-03-7
5	Cover Screws	TU-2-03-8	TU-3-03-8	TU-7-03-8	TU-11-03-8	TU-27-03-8	TU-60-03-8
6	Reaction Arm Spring	TU-2-03-6	TU-3-03-6	TU-7-03-6	TU-11-03-6	TU-27-03-6	TU-60-03-6
7	Locking Pin	TU-2-03-3	TU-3-03-3	TU-7-03-3	TU-11-03-3	TU-27-03-3	TU-60-03-3
8	Retract Button	TU-2-03-4	TU-3-03-4	TU-7-03-4	TU-11-03-4	TU-27-03-4	TU-60-03-4
9	Reaction Arm Screw	TU-2-03-5	TU-3-03-5	TU-7-03-5	TU-11-03-5	TU-27-03-5	TU-60-03-5
10	Spline sleeve	TU-2-03-2	TU-3-03-2	TU-7-03-2	TU-11-03-2	TU-27-03-2	TU-60-03-2
11	Square Drive	TU-2-11-1	TU-3-11-1	TU-7-11-1	TU-11-11-1	TU-27-11-1	TU-60-11-1
12	Ball Plunger	TU-2-11-3	TU-3-11-3	TU-7-11-3	TU-11-11-3	N/A	N/A
14	Locking Pin	TU-2-11-2	TU-3-11-2	TU-7-11-2	TU-11-11-2	N/A	N/A
16	Sleeve	TU-2-13	TU-3-13	TU-7-13	TU-11-13	TU-27-13	TU-60-13
17	Ratchet	TU-2-05	TU-3-05	TU-7-05	TU-11-05	TU-27-05	TU-60-05
18	Drive Plate	TU-2-09	TU-3-09	TU-7-09	TU-11-09	TU-27-09	TU-60-09
19	Drive Segment	TU-2-07	TU-3-07	TU-7-07	TU-11-07	TU-27-07	TU-60-07
20	Drive Segment Spring	TU-2-27	TU-3-27	TU-7-27	TU-11-27	TU-27-27	TU-60-27
21	Roll Pin	TU-2-19	TU-3-19	TU-7-19	TU-11-19	TU-27-19	TU-60-19
22	Flat Spring	N/A	TU-3-53	TU-7-53	TU-11-53	N/A	N/A
22	Sleeve Ring	TU-2-51	N/A	N/A	N/A	N/A	N/A
22	Ball Plunger	N/A	N/A	N/A	N/A	TU-27-29	TU-60-29
23	Smalley Ring	TU-2-43	TU-3-43	TU-7-43	N/A	TU-27-43	TU-60-43
24	End Plug	TU-2-15	TU-3-15	TU-7-15	TU-11-15	TU-27-15	TU-60-15
25	End Plug Seal	TU-2-37	TU-3-37	TU-7-37	TU-11-37	TU-27-37	TU-60-37
26	Piston Seal	TU-2-33	TU-3-33	TU-7-33	TU-11-33	TU-27-33	TU-60-33
27	Piston Rod Assembly	TU-2-17	TU-3-17	TU-7-17	TU-11-17	TU-27-17	TU-60-17-1
28	Gland Seal	TU-2-35	TU-3-35	TU-7-35	TU-11-35	TU-27-35	TU-60-35
29	Cylinder Gland	TU-2-21	TU-3-21	TU-7-21	TU-11-21	TU-27-21	TU-60-21
30	Rod Seal	TU-2-31	TU-3-31	TU-7-31	TU-11-31	TU-27-31	TU-60-31
31	Shroud	TU-2-23	TU-3-23	TU-7-23	TU-11-23	TU-27-23	TU-60-23
32	Shroud Screws	TU-2-25	TU-3-25	TU-7-25	TU-11-25	TU-27-25	TU-60-25
33	Swivel (2 req)	STU-4M-4M	STU-4M-4M	STU-4M-4M	STU-4M-4M	STU-4M-4M	STU-4M-4M
34	Coupler Set	HC-S-100	HC-S-100	HC-S-100	HC-S-100	HC-S-100	HC-S-100
35	Threaded Retainer	N/A	N/A	N/A	N/A	TU-27-11-6	TU-60-11-6
36	Sleeve Retainer Clips	N/A	N/A	N/A	N/A	TU-27-41	TU-60-41
37	Cover Roll Pin	N/A	N/A	N/A	N/A	N/A	TU-60-03-9
40	Gland Wrench	ATU-2-GW	ATU-3-GW	ATU-7-GW	ATU-11-GW	ATU-27-GW	ATU-60-GW
41	Piston Inner Seal	N/A	N/A	N/A	N/A	N/A	TU-60-33
42	Piston Outer Seal	N/A	N/A	N/A	N/A	N/A	TU-60-34
~	Reaction Arm Assembly	TU-2-03	TU-3-03	TU-7-03	TU-11-03	N/A	N/A
~	Square Drive Assembly	TU-2-11	TU-3-11	TU-7-11	TU-11-11	N/A	N/A

Part Numbers For Ordering TU Series TU-20

	Part	TU-20	QTY.
1	HOUSING	TU-20-01	1
2	SPLINED SLEEVE	TU-20-02	1
4	REACTION ARM	TU-20-03-01	1
5	GATE	TU-20-03-02	1
6	GATE LEVER LINK	TU-20-03-03	1
7	GATE LEVER	TU-20-03-04	1
8	GATE LEVER SPACER	TU-20-03-05	2
9	GATE BOLT	TU-20-03-06	1
10	REACTION ARM BOOT	TU-20-03-07	1
11	GATE LINK PIN	TU-20-03-08	2
12	GATE LEVER PIN	TU-20-03-09	1
13	GATE SPRING	TU-20-03-10	1
14	BOOT PIN	TU-20-03-11	1
15	RATCHET	TU-20-05	1
16	DRIVE SEGMENT	TU-20-07	1
17	DRIVE PLATE	TU-20-09	1
19	SQUARE DRIVE	TU-20-11-1	1
20	THREADED RETAINER	TU-20-11-8	1
21	SQUARE DRIVE SLEEVE	TU-20-13	2
22	END PLUG	TU-20-15	1
24	PISTON	TU-20-17-1	1
25	PISTON ROD	TU-20-17-2	1
26	ROD WIRE RING	TU-20-17-3	1
27	ROD RETAINING RING	TU-20-17-4	1
28	RETRACT SCREW	TU-20-19	2
29	CYLINDER GLAND	TU-20-21	1
30	SHROUD	TU-20-23	1
31	SHROUD SCREWS	TU-20-25	4
32	DRIVE SEGMENT SPRING	TU-20-27	2
33	ROD SEAL	TU-20-31	1
34	PISTON U-CUP SEAL	TU-20-33	1
35	PISTON O-RING SEAL	TU-20-34	1
36	GLAND SEAL	TU-20-35	1
37	END PLUG SEAL	TU-20-37	1
38	HOUSING SIDE PLUG	TU-20-39	2
39	SLEEVE RETAINING RING	TU-20-41	2
40	CYLINDER RING	TU-20-43	1
41	SWIVEL SET	TU-20-45	1
42	COUPLER SET	TU-20-47	1
43	SLEEVE O-RING	TU-20-51	2

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 REACTION ARM ASSEMBLY

1. Push the reaction arm retract button (8) toward the reaction arm boot (4) and separate the reaction arm assembly from the housing (1).
2. While holding the button down, use a hex wrench to unscrew and remove the reaction arm spline screw (9).
3. Apply some downward pressure to the reaction arm engagement pin (7) and unscrew the reaction arm retract button from the engagement pin.
4. Remove the engagement pin by sliding it out of the top of the reaction arm (3).
5. Pull the reaction arm splined sleeve (10) out of the reaction arm.
6. Using a hooked tool through the spline screw opening, pull the reaction arm pin spring (6) out of the reaction arm.
7. To remove the reaction arm boot, use a hex wrench to unscrew the two boot mounting screws (5) and pull the boot off the reaction arm.

DISASSEMBLY OF THE SQUARE DRIVE TOOL

1. Before attempting to disassemble a square drive tool, connect the tool to a pump and operate the tool until the piston assembly (27) is in the fully retracted position.
2. Grasp the housing (1) in copper-covered or leather-covered vise jaws with the inlet end upward and using a 3/4" wrench, unscrew and remove the two swivel inlets (33) with their attached couplers (34).
3. Remove the housing from the vise jaws and with the inlet openings over a container to catch the oil, drain as much hydraulic oil as possible from the housing.
4. Grasp the cylinder housing in copper-covered or leather-covered vise jaws with the shroud (31) upward and using 1/4" allen wrench, unscrew and remove.

con't.

MAINTENANCE SECTION

CAUTION

In the following step, the Shroud will spring to a straightened position when the Screws at one end are removed. Hold the Shroud in position until the Screws are removed and control the flex of the loose end.

5. Use a hex wrench to unscrew and remove the shroud mounting screws (32). Remove the shroud.
6. **For TU-11, TU-20, TU-27 and TU-60 models**, use a hex wrench to unscrew and remove the retract pin hole plugs (2) from each side of the housing.
7. If the piston assembly is not fully retracted, use a brass drift or brass hammer to tap the assembly inward until the retract pin (21) aligns with the cross holes in the housing. Use a small drift to tap the retract pin out of the drive plate (18) and piston assembly through the openings in the housing.
- 7a. For TU-20 socket head cap screws are used in the place of retract pin. Use hex wrench to remove screws from each size fo drive plate.
8. **For TU-2, TU-3, TU-7 and TU-11, and TU-20 models**, insert a hex wrench through the larger opening in the square drive and unscrew the square drive locking pin (14) inward against the square srive spring (13) while pulling or pushing the square drive out of the tool. **For TU-27 and TU-60 models**, unscrew and remove the square drive retaining screw (35). Pull the square drive out of the tool.
9. **For TU-2, TU-3, TU-7, TU-11, and TU-20 models**, remove the drive plate, assembled with the ratchet (17), drive segment (19) and segment springs (20) from between the ears of the housing. Using finger pressure, push the sleeves (16) inward to remove them from the housing.
10. **For TU-20, TU-27 and TU-60 models**, remove the two drive sleeve retainers (36) from the housing. Pull one of the drive sleeves (16) out of the housing and while holding the drive plate, the ratchet (17), segment pawl (19) and segment pawl springs (20), pull the remaining drive sleeve out of the housing. Slide the assembled drive plate out of the housing.
11. Being careful not to let the springs eject from the assembly, slide the ratchet, drive segment and segment springs out of the drive plate.

NOTICE

Cylinder gland is staked into the housing to prevent it from loosening due to vibration or turbulence in the hydraulic oil flow. The stake point must be drilled out before attempting to remove the cylinder gland.

12. Locate the stake point on the threads of the cylinder gland (29) and housing. Using a 1/16" drill bit centered on the stake point, drill approximately 3/32" deep in one continuous motion to remove the thread and interference at that point.
13. Engage the pins of the cylinder gland wrench (40) with the holes in the cylinder gland and using a socket on the hex of the wrench unscrew and remove the cylinder gland. Should the gland not rotate freely after initial breakout, additional drilling, in small increments, may be required to remove the obstruction.
14. If the piston rod seal (30) must be replaced, remove it from the central opening of the gland.
15. If the cylinder gland seal (28) must be replaced, remove it from the groove at the bottom of the threads in the housing.

MAINTENANCE SECTION

NOTICE

In the following step, **DO NOT** grasp the shaft of the piston assembly with any device that will mar, bur or otherwise damage the shaft or the drive plate end of the shaft.

16. Pull the piston assembly out of the housing. If the assembly is tight in the housing and difficult to pull, inject air into the inlet opening while holding the Housing over a container that will not damage the piston when it is expelled. If an air hose is not available, temporarily attach the advance line from the pump and cycle the tool to advance the piston out of the housing. Hydraulic oil will be emitted with the piston, so the assembly must be held over a non-damaging container.
17. If the piston seal (26) must be replaced, remove it from the piston.
18. Push on the small end of the end plug (24) to remove it from the housing. If the end plug is tight in the housing, insert a flat face drift into the hole in the center of the small shaft, and without cocking the plug, tap it out of the housing.
 - 18 A. **For the TU-20 model**, insert a 1" square drive extension into the small hole in the end plug of the TU-20. Unscrew the end plug from the splined sleeve. Once the two pieces are fully unscrewed, slip the splined sleeve out of the end with the swivel inlets. Push the end plug out of the cylinder end of the housing. If the end plug is tight in the housing, gently tap it out with a flat face drift without cocking it.
19. If the end plug seal (25) must be replaced, remove it from the end plug.
20. If the smalley ring (23) needs replacement, use a thin blade screwdriver to work it out of the groove in the housing.

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 of threaded members and housings.
3. Apply o-ring lubricant to all o-rings before final assembly.

ASSEMBLY OF THE SQUARE DRIVE TOOL

1. If the smalley ring (23) was removed from the housing (1), install it in the internal groove near the inlet end of the Housing.
2. Grasp the housing in leather-covered or copper-covered vise jaws with the inlet end downward.
3. Apply o-ring lubricant to the end plug seal (25) and install it in the annular groove at the large end of the end plug (24).
4. Insert the assembled end plug, small end leading, into the piston bore of the housing and using a brass drift in the center of the end plug; tap the assembly to 1/8" below the gland seal (28) without cocking it.

For the TU-20 model, slip the splined sleeve into the housing from the end with the swivel inlets, with the grooved end protruding from the housing. Insert a 1" square drive extension through the splined sleeve and into the small end of the end plug. Applying force on both the splined sleeve and end plug such that they are pushed towards each other, snugly screw the male threads on the end plug into the female threads of the splined sleeve. The o-ring lubricant from step 3 is useful to ease installation.

MAINTENANCE SECTION

5. Apply o-ring lubricant to the piston seal (26) and install it in the annular groove at the large end of the piston assembly (27).
6. If the piston rod seal (30) was removed from the cylinder gland (29), install a new seal, lip end trailing, into the central opening of the gland.
7. Apply o-ring lubricant to the cylinder gland seal (28) and install it in the housing recess at the bottom of the threads for the cylinder gland.
8. Insert the piston assembly, shaft end leading, into the threaded end of the gland through the gland seal and push it inward until the large end of the piston is against the end of the gland.
9. Start threading the cylinder gland into the housing. Using the cylinder gland wrench (40) and a socket, tighten the gland in the housing.
10. Reposition the assembled tool in the vise jaws with the inlet end upward.
11. Wrap the threads of the swivel sets (33) with teflon tape. Thread the swivel with the male hose coupler (34) into the threaded hole on the right (Marked A) side of the housing when looking from the inlet end of the tool with the square drive downward. Thread the swivel with the female hose coupler into the other hole (Marked R).
12. Connect the hoses from the pump, turn the power on and cycle the tool several times to determine if the gland is leaking fluid.
13. **If the gland is leaking**, disconnect the hoses and power supply, determine the cause of the leak and take whatever steps are necessary to correct the problem. **If the gland is not leaking**, operate the tool to fully retract the piston assembly, disconnect the hoses and power supply and reposition the tool in the vise jaws with the inlet end downward.

NOTICE

In the following step, the cylinder gland must be staked into the Housing to prevent it from loosening due to vibration or turbulence in the hydraulic oil flow. Use a center punch with a 60 degree included angle and do not deform the stake point beyond 3/64" deep. Do not attempt to use the previously staked position and leave housing clearance at the new position for a 1/16" drill bit should the Gland require removal in the future.

14. Stake the thread of the gland and housing at the open area between the ears of the housing that holds the square drive (11). Make certain both the housing and gland are deformed at the stake point.
15. Wipe a thin film of Marine Moly Grease on the sides of the drive plate (18), as well as the inner race and piston rod recess of the drive plate.
16. Insert the ratchet (17) in the drive plate.
17. Position the drive segment (19) at the cavity in the drive plate. Make certain the teeth of the pawl will properly engage the teeth of the ratchet. If they will not engage properly, reverse the ratchet in the drive plate. Insert the segment pawl springs (20) into the holes in the pawl, and while compressing the springs with finger pressure, slide the pawl and springs into the drive plate.
18. **For TU-2, TU-3, TU-7 and TU-11 models**, proceed as follows:
 - a) From inside the housing ears, insert a driver sleeve (16) into each ear with the detent end of the sleeve trailing.
 - b) Position the assembled drive plate between the ears of the housing with the notch for the piston rod toward the rod end.
 - c) Insert allen hex wrench into the larger hole on the end of the square drive (11) to loosen the locking pin (14) until the ball plunger (12) is flush with the top of the square drive. Then align the square opening of the ratchet (17) with the square opening of the sleeves (16). Insert the square drive through the openings, and tighten the locking pin once in place.

Con't.

MAINTENANCE SECTION

For TU-20, TU-27 and TU-60 models, proceed as follows:

- a) Position the assembled drive plate between the ears of the housing with the notch for the position rod toward the rod end.
- b) From the outside of the housing ears, insert sleeves (16) into each ear with the small hub end leading. The small hub must enter the recess on each side of the drive plate. Then insert sleeve retainer clips (36) into groove to retain sleeves (24).

NOTICE

In the following step, the side of the housing that the square protrudes from will determine the direction of square drive rotation. If the square extends to the left side when looking from the inlet end of the housing, rotation will be clockwise to tighten. A right side extension is counterclockwise for loosening.

- c) Insert the splined end of the square drive (11) through the driver sleeves and ratchet. Install the square drive retaining screw (35) in the end of the square drive and tighten it.
19. Insert the retract pin (21) into the hole in the drive plate through the hole in the housing. Use a drift and hammer to tap the pin into the plate and rod to secure the assembly. Make certain the Pin does not protrude beyond the sides of the drive plate.
20. **For TU-11, TU-20, TU-27 and TU-60 models**, use a hex wrench to install the two retract pin hole plugs (2) flush with the sides of the housing.
21. Place one end of the shroud (31) on the housing and using a hex wrench, install the shroud screws (32) at that end.
22. Bend the shroud around the housing and install the remaining screws.

ASSEMBLY OF THE REACTION ARM ASSEMBLY

1. If the reaction arm cover (4) was removed, push it onto the end of the reaction arm (3) and using a hex wrench, secure it by installing the two reaction arm cover screws (5).
2. Insert the reaction arm pin spring (6) in the downward, blind hole below the bore for the reaction arm splined sleeve (10).
3. Position the reaction arm splined sleeve in the bore of the reaction arm with the small hub end trailing and the slightly larger hole through the side of the sleeve upward. Align the holes through the sleeve with the holes in the reaction arm.
4. Insert the reaction arm engagement pin (7), flat end leading, through the sleeve into the hole against the pin spring. Rotate the pin so that the vertical flat on the end of the pin faces away from the tool end of the arm.
5. Push downward on the engagement pin until the threaded hole in the side of the pin is visible through the slot in the end of the reaction arm away from the tool.
6. **For TU-2, TU-3, TU-7 and TU-11 models**, apply a suitable thread-locking compound to the threads of the reaction arm retract button (8) and using a screwdriver, screw the button tightly into the threaded hole in the engagement pin.

For TU-20 model see following page.

For TU-27 and TU-60 models, apply a suitable thread-locking compound to the threads of the reaction arm retract button (8) and using a hex wrench, screw the button tightly into the threaded hole in the engagement pin (7).

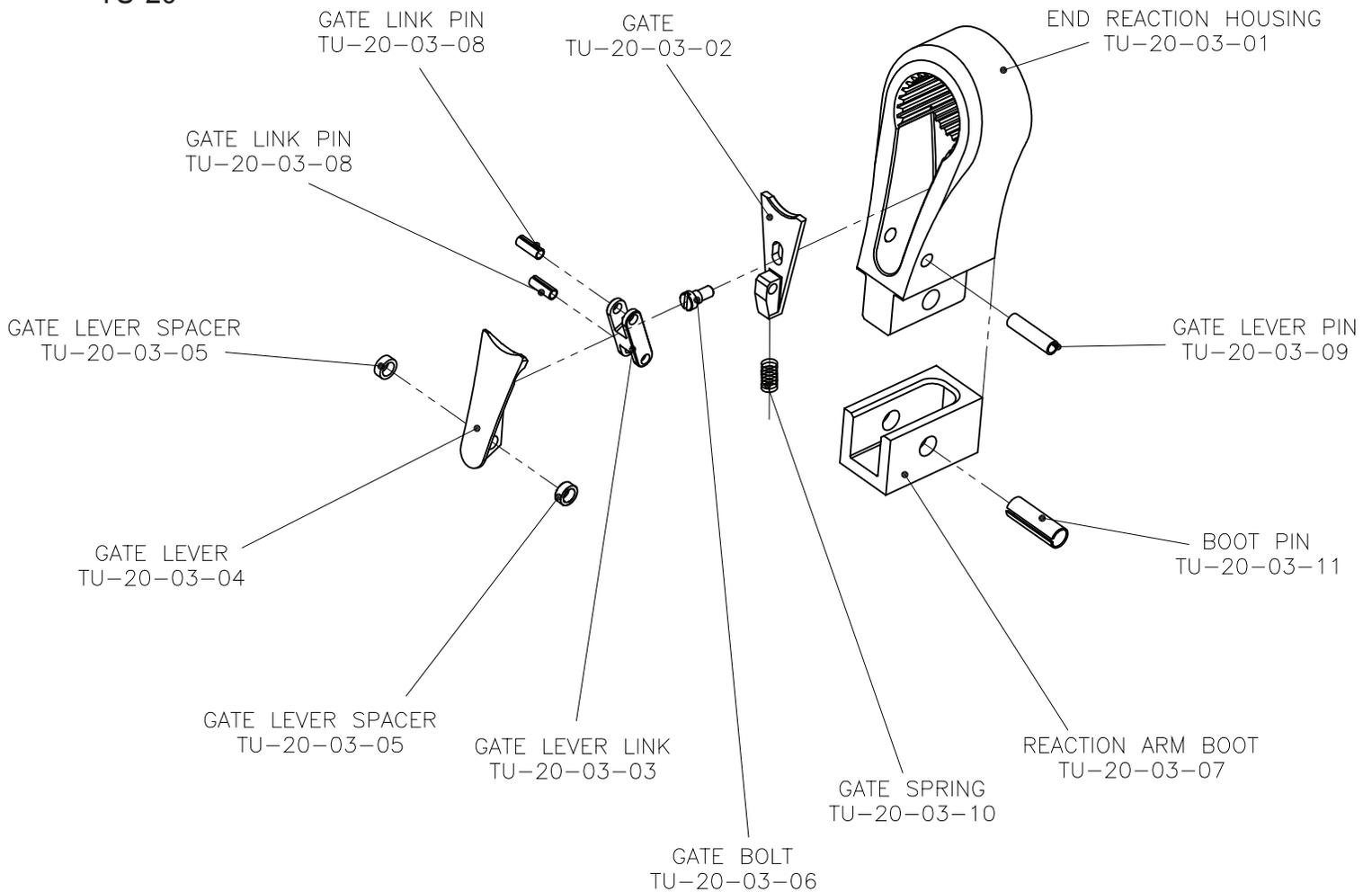
7. Using a hex wrench, thread the reaction arm spline screw (9) into the top of the reaction arm until the unthreaded end enters the hole in the splined sleeve and the threads bottom out.

MAINTENANCE SECTION

ASSEMBLY OF THE TU-20 REACTION ARM (page 10)

1. If the reaction arm boot (4) was removed, push it onto the end of the reaction arm and insert the boot pin to retain the boot using a hammer.
2. Assemble gate lever to gate lever link using gate link pin.
3. Assemble gate to gate lever link using second gate link pin.
4. Insert gate spring into gate.
5. Hold gate in reaction arm and thread gate bolt through gate into reaction arm. Use a small amount of serviceable thread locking compound on the threads. Tighten with screwdriver.
6. Place the gate lever spacers over the gate lever.
7. Swing gate lever and link into reaction arm with gate lever spacers.
8. Insert gate lever pin into reaction arm through the gate lever and gate lever spacers.

TU-20



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 pendent
	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 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
	Coupler is defective	Replace any defective coupler
Square Drive will not turn	Grease or dirt build up in the teeth of the ratchet and drive segment	Disassemble the ratchet and clean the grease or dirt out of the teeth
	Worn or broken teeth on ratchet an/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
Nut Returns with retract stroke	Ball plungers are not engaging the drive sleeves	Thread the ball plungers to the correct depth in the housing

