



巨輪興股份有限公司

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方頭驅動液壓扳手 操作說明

SMX



中文 : C1~C4

中文
English
Ver.20

1. 安全預防措施



不遵守以下的注意事項和警告將引起設備損失及人員傷害。



重要事項：未滿18歲人員不得擅自操作。操作SUN RUN油壓設備前請先仔細閱讀並了解相關操作手冊、安全事項和警告事項。操作人員負有油壓設備週邊之人員及環境之安全責任。



警告事項：為確保避免人員傷害和設備作業損失，請確認所有油壓設備及週邊配件，使用最大壓力為 700 bar(10,000psi)。



警告事項：操作人員於使用期間為避免傷害，需全程配戴安全防護措施。



警告事項：系統操作壓力絕不可超過最低壓力元件之值最低值。系統中應加裝壓力錶藉以監測系統中的壓力並了解使用狀態。



警告事項：只能在已連接好的液壓油路中使用；快速接頭尚未確實連接時禁止使用或加壓，否則高壓情況下接頭的油封及鋼珠會高速噴出造成人員傷亡。



警告事項：當零件出現裂痕或損壞時，應立即以**SUN RUN**零件更換。正確標準的零件可防止人員或設備損傷。**SUN RUN**零件經特別設計可完全適用並適用產品標稱的額定荷載或壓力。



重要事項：液壓設備必需由合格的液壓技工進行維修。需要修理時，請聯繫就近的**SUN RUN**服務據點並使用**SUN RUN**液壓油保固方為有效。



警告事項：避免損壞油壓管。捲收油管時，避免油管強烈彎曲或打結。使用彎曲或打結油管易引起背壓。強烈彎曲或打結的油管亦易引起內部損壞或提早油管老化。



千萬不要重壓油管。劇烈的撞擊會造成油管內鋼絲網損壞。使用受損的油管可能導致油管破裂。



重要事項：千萬不要利用油管來提攜其他油壓設備



危險事項：不要用手對油管施加壓力(包括拉或舉高) 高壓下洩漏的液壓油會穿透皮膚造成嚴重傷害。當液壓油侵入皮膚請立即就診。



危險事項：為避免人員及設備傷害，請不要任意移除扳手上的保護蓋。也請不要任意改裝扳手。千萬不可更改旋轉接頭內的釋放閥。



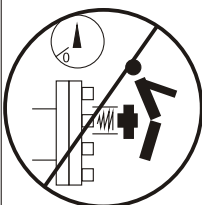
注意事項：不正確的系統安裝會造成錯誤訊息及危險。安裝前請確認旋轉接頭已完全清除雜物。使用完畢後，旋轉接頭請務必蓋上防塵蓋。



注意事項：千萬不要搭配不相符的套筒和驅動頭。



注意事項：使用時請配合套筒。



切勿在拉伸或拆卸過程中站立於螺栓同軸位置。如果螺栓出現問題、鬆脫或損壞的零件可能會射出，如此可能會導致嚴重的人員傷亡。非必要或壓力穩定情況下，才允許操作者到加壓拉伸器附近持續觀察壓力計。

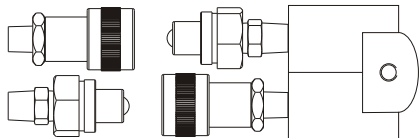
2. 操作前準備

連接

扳手及液壓泵是由工作壓力均為700bar 的鋼絲編織的複式油管連接。

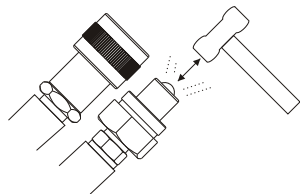
每條油管的底端均安裝公、母接頭，以確保液壓泵浦與扳手可正確連接。

不得隨意變動旋轉接頭上的任何螺栓。此為安全設定，需由專業並合於資格的液壓技師得以調整。

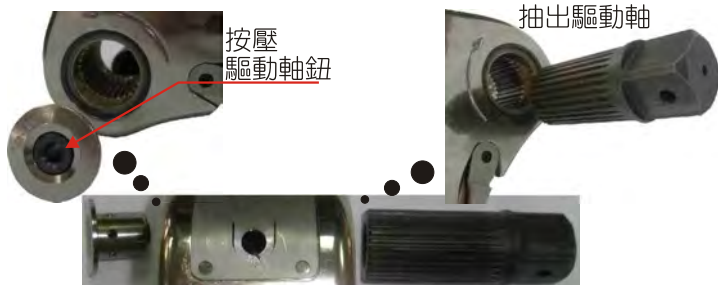


充份鎖好快速接頭，確保快速接頭完全咬合

快速接頭互相連結時，必須確保完全咬好其中間隙需<0.5mm，如此才能確保接頭內單向閥打開並確定油路暢通。否則，連接後接頭內鋼珠沒有相接觸，接頭內單向閥無法打開，致使油路不通後，接頭內將充滿壓力，會出現扳手無法運轉，從扳手旋轉體上的自動溢油孔漏油等現象。

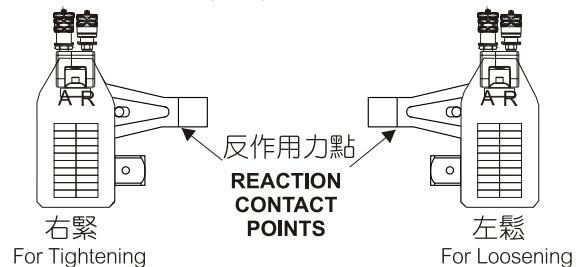
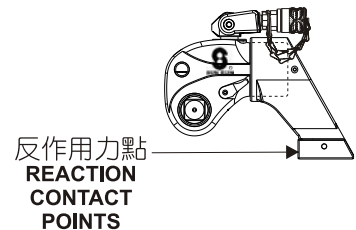


假如發現接頭內有壓力、阻塞或其他原因造成鋼珠無法按動，請利用鐵鎚或其他輔助工具輕敲鋼珠，此時會稍有液壓油噴出並無危險或損壞。當壓力或阻塞消失時再按壓鋼珠，確認其已恢復彈性。



按住驅動軸鈕中的圓鈕並輕拉驅動軸，驅動軸即可完全輕鬆取出，且在驅動軸取出後驅動軸鈕亦可完全如上圖取出。反之，將驅動軸放入孔內並與孔內的棘輪溝槽完全咬合再將驅動軸鈕扣入另一邊孔溝槽上並稍按壓圓鈕即可裝入完成。

準備



確認為鎖緊或放鬆後，依前項"驅動頭換向"步驟將驅動軸置於如上圖確認面並安裝適合的反作用力臂。

連接泵浦

將連接於泵浦上的高壓端(H或A)油管與扳手高壓端(H或A)緊密連接；反之低壓端亦同。

確認泵浦電源。

確認泵浦內是否含足夠的液壓油。

警告 嚴禁無油運轉！

空轉測試

- 1.將扳手置於空地上。
- 2.打開泵浦電源開關，啟動泵浦檢查泵浦是否運轉正常。
- 3.啟動線控開關上的[UP]鍵，此時聽見"喀"一聲，防逆卡爪跳下，扳手到位停止轉動，壓力錶由"0"急速上升至調定壓力，鬆開[UP]鍵扳手活塞自動回縮；當又聽到"喀"一聲扳手自動回縮到位，壓力錶由"0"急速上升至7.5Mpa(76.5kg/cm² / 1087.5psi)。重新按下按鈕，此時扳手轉動，一個新的循環開始。反覆數次，使扳手空轉數次，觀察扳手轉向，再將扳手置於套筒上。



警告 扳手不用時，應隨即關閉泵浦電源！

3. 操作使用

調整壓力

一手將線控開關[UP]鍵按下，當聽到扳手"喀"一聲防逆卡爪跳下，扳手到位停止轉動，壓力錶由"0"急速上升；另一手則調整泵浦調壓閥並目視壓力錶調整至所需壓力。

放鬆螺母

將泵浦壓力調整到最高，確認扳手轉向為放鬆方向。將扳手放在螺母上，確認反作用力點(請參考前頁-準備)。重覆操作〔空轉測試〕第3項動作，直至螺母放鬆。

鎖緊螺母

1. 力矩設定

可根據設計設定力矩，假如無設定力矩，則以後〔附表1〕螺栓預設緊固力表中數據來設定力矩。方法為：

設定力矩=(表中數據) $\times$ (80%~90%)

例如：螺栓M39，B.7級，摩擦係數2

附表1建議預設緊固力為4140N.m，則設定力矩為：
 $4140 \times 90\% = 3726\text{N.m}$

2. 泵浦壓力設定

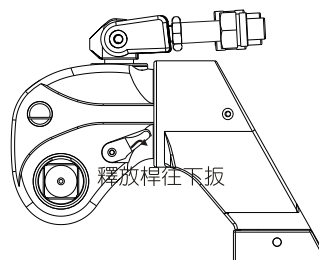
根據所需的力矩值及所用扳手型號來設定泵浦壓力。

如上述M39，B7設定力矩為3726N.m，選用SMX-3型扳手，則查附表3對應於3726N.m時泵浦的壓力應為593bar，即為泵浦壓力設定。

3. 確定扳手轉向確實為鎖緊方向時，將扳手放在螺母上反覆執行**空轉測試第3點**動作，直到螺母不動為止。

使用中扳手卡緊無法取下時

在操作中，螺栓鎖緊後，取扳手時如果扳手卡緊取不下來，千萬不可用力錘打；應將線控開關(按鈕)按著不放鬆，同時按下快速釋放桿如下圖保持者，然後再放開按鈕，此時扳手會自動鬆開，取下扳手！或將泵浦壓力再提高一些，將螺栓再扭緊一些，放鬆即可。



4.故障排除

情形	原因	解決
活塞不頂升或回縮	1.快速接頭沒有被連接到位 2.快速接頭有問題 3.線控裝置有問題 4.有雜質或異物進入泵浦的方向控制閥	1.檢查快速接頭，確保快速接頭鎖到底 2.更換任何有問題的快速接頭 3.更換按鈕或遙控器 4.拆開泵浦，將方向控制閥清理乾淨
活塞不回縮	1.泵浦油管與扳手接頭連接錯誤 2.回油管未連接好 3.回復銷或彈簧損壞	1.確保泵浦上的高壓接頭與扳手的高壓接頭相連接及泵浦上的低壓接頭與扳手低壓接頭確實連接 2.安全正確連接回油管 3.更換彈簧或插銷
油缸部份不能產生壓力	1.活塞密封部份發生洩漏 2.接頭有問題	1.更換任何有問題的密封圈 2.更換任何有問題的接頭
方頭驅動軸不能轉動	1.油污或雜質存在棘輪齒及棘爪間 2.棘輪齒或棘爪老舊或損毀	1.拆開棘輪零件將污垢及雜質清除乾淨 2.更換任何老舊或損壞的零件
泵浦不能產生壓力	1.洩壓閥有問題 2.電壓太低 3.壓力錶有問題 4.油量不足 5.過濾器阻塞	1.檢查洩壓閥，調節或更換洩壓閥 2.確保電流，電壓和其他在泵浦銘牌上標示的數據均符合泵浦的操作要求 3.更換壓力錶 4.檢查油位是否仍在標示範圍內並添加適量液壓油 5.檢查並清理洩壓閥或更換新的洩壓閥
螺母隨著回程回轉	1.棘輪和逆止棘爪未咬合	更換棘爪或更換棘爪的彈簧組

附表1

公制螺栓扭力建議表CNS3934 (實際螺栓扭力值以螺栓廠商提供技術為參考標準)

Bolt grade 螺栓等級 (強度區分)	Tensile strength 抗拉強度 RM(N/mm ²)	Yield strength(90%) 降伏點(耐力) Rp0.2(N/mm ²)	Friction application 摩擦係數 μ = 0.1 μ = 0.15 Normal-般 High-高	Tightening moment Nm																												
6.8	600	480	μ = 0.1	110	160	220	300	390	570	770	1050	1350	1740	2160	2690	3250	4180	5190	6440	7320	8520	9920	10170	10460	11720	13250	14690	16540	19650	20900	23780	25570
			μ = 0.15	150	200	290	400	500	740	1000	1370	1760	2280	2820	3530	4250	5490	6800	8480	9620	11230	13100	13470	13880	15580	17660	19620	22130	26360	28080	31980	34430
			μ = 0.2	170	240	340	460	590	870	1180	1610	2060	2690	3320	4160	5000	6470	8020	10010	11350	13270	15510	15960	16460	18510	21000	23350	26370	31450	33530	38210	41160
8.8	800	640	μ = 0.1	150	210	300	410	520	760	1030	1400	1790	2320	2880	3590	4330	5570	6920	8590	9760	11360	13220	13560	13950	15620	17670	19590	22060	26200			
			μ = 0.15	200	270	390	530	670	990	1340	1820	2340	3040	3760	4170	5660	7320	9070	11300	12830	14970	17470	17960	18510	20780	23550	26160	29510	35150			
			μ = 0.2	230	320	450	630	780	1160	1570	2140	2750	3580	4430	5550	6670	8630	10700	13350	15140	17690	20680	21280	21950	24670	28000	31140	35150	41930			
B.7 (≤2-1/2")	min. 860	min. 720	μ = 0.1	180	250	350	470	600	880	1190	1610	2080	2690	3330	4150	5010	6440	8000	9930	11280	13130	15290	15680	16130	18060	20430	22650	25510				
			μ = 0.15	230	320	450	610	770	1140	1550	2100	2700	3520	4350	5450	6550	8450	10490	13060	14830	17310	20200	20770	21400	24020	27250	30250	34120				
			μ = 0.2	270	370	530	720	910	1340	1820	2480	3180	4140	5120	6420	7710	9980	12370	15430	17500	20460	23910	24610	25380	28530	32380	36000	40650				
10.9	1000	900	μ = 0.1	220	310	440	600	760	1110	1510	2050	2640	3410	4230	5280	6360	8180	10160	12610	14330	16680	19420	19920									
			μ = 0.15	290	400	570	780	980	1450	1970	2680	3430	4460	5530	6920	8320	10740	13330	16600	18840	21990	25660	26380									
			μ = 0.2	340	470	670	920	1150	1710	2310	3150	4040	5260	6500	8150	9790	12670	15710	19600	22240	25990	30370	31260									
12.9	1200	1080	μ = 0.1	260	370	510	700	890	1300	1770	2400	3080	3990	4950	6170	7440	9570	11890	14760	16770	19520											
			μ = 0.15	340	470	670	920	1150	1700	2300	3130	4020	5220	6470	8090	9740	12570	15590	19430	22050	25730											
			μ = 0.2	400	550	780	1080	1340	2000	2700	3680	4720	6150	7610	9540	11460	14830	18380	22940	26020	30410											
			Bolt / Nut M ₁ (mm)	16/24	18/27	20/30	22/32	24/36	27/41	30/46	33/50	36/55	39/60	42/65	45/70	48/75	52/80	56/85	60/90	64/95	68/100	72/105	76/110	80/115	85/120	90/130	95/135	100/145	110/155	120/165	125/170	180

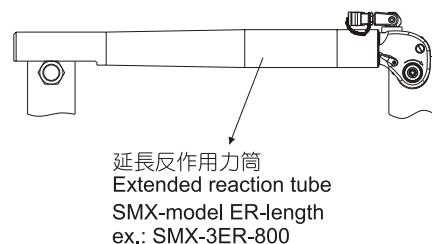
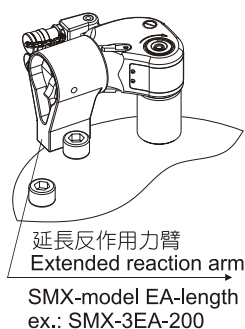
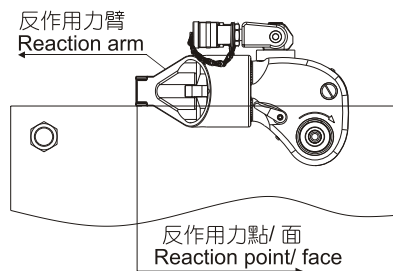
英制螺栓扭力建議表 (實際螺栓扭力值以螺栓廠商提供技術為參考標準)

SAE1 SAE2		ASEM B7 Bolt		B7 A/F Hex. Nut		ASEM 354 B8			
210bar	30000psi	Metric	Imperial	Metric	Imperial	420Nm ²	60000psi	N.m	Ft-lbs
25.4	1	22.2	7/8	36	1 7/16	22.2	7/8	400	300
28.6	1 1/8	25.4	1	41	1 5/8			570	425
						25.4	1	670	500
31.8	1 1/4							800	600
35	1 3/8	29	1 1/8	46	1 13/16	28.6	1 1/8	950	700
		32	1 1/4	50	2			1085	800
38	1 1/2							1220	900
						31.8	1 1/4	1355	1000
41.3	1 5/8	35	1 3/8	55	2 3/16			1695	1250
						35	1 3/8	1830	1350
		38	1 1/2	60	2 3/8			2030	1500
44.5	1 3/4							2160	1600
47.6	1 7/8							2440	1800
		41	1 5/8	65	2 9/16			2710	2000
50.8	2					41	1 5/8	2980	2200
		44	1 3/4	70	2 3/4			3525	2600
57	2 1/4					44	1 3/4	4060	3000
		47.6	1 7/8	75	2 15/16			5010	3700
63.5	2 1/2	50.8	2	80	3 1/8	47.6	1 7/8	5420	4000
						50.8	2	5960	4400
70	2 3/4							6915	5100
		57	2 1/4	90	3 1/2	57	2 1/4	8135	6000
76	3							9490	7000
		63.5	2 1/2	100	3 7/8			10840	8000
82.5	3 1/4					63.5	2 1/2	12200	9000
89	3 1/2	70	2 3/4	110	4 1/4			13550	10000
						70	2 3/4	15590	11500
95	3 3/4	76	3	120	4 5/8			17625	13000
102	4							19655	14500
						76	3	21015	15500
		82.5	3 1/4	130	5			22370	16500
108	4 1/4					82.5	3 1/4	26435	19500
		89	3 1/2	135	5 3/8			27790	20500
114	4 1/2							29150	21500
						89	3 1/2	33215	24500
121	4 3/4	95	3 3/4	145	5 3/4			34570	25500
165	6 1/2	108	4 1/4					39995	29500
127	5	102	4	156	6 1/8	95	3 3/4	41350	30500
		114	4 1/2	175	6 7/8			48130	35500
						102	4	50165	37000
		121	4 3/4	184	7 1/4			55585	41000
						108	4 1/4	59655	44000
		127	5	194	7 5/8			64400	47500
						114	4 1/2	70500	52000
						121	4 3/4	82700	61000
						127	5	96940	71500

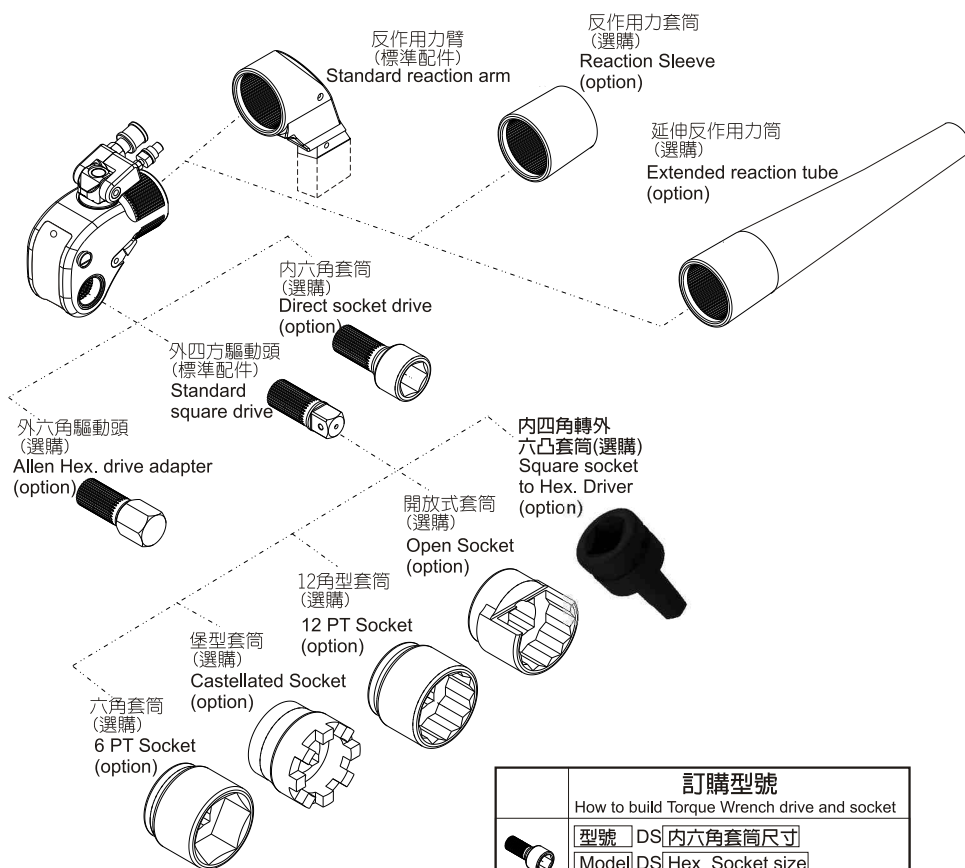
型 號 Model No.	驅動頭 Square Drive	最小扭力 Min. Torque		最大扭力 Max. Torque		螺栓範圍 Bolt size	重量 Weight	
		(lbf.ft)	(N.m)	(lbf.ft)	(N.m)		(lb)	(kg)
SMX-1N	3/4"	201	273	1409	1911	16~36	5.29	2.40
SMX-3	1"	475	645	3328	4512	22~48	11.34	5.35
SMX-5	1-1/2"	810	1099	5672	7690	27~56	19.50	9.08
SMX-8	1-1/2"	1136	1540	6951	10780	30~64	28.20	13.97
SMX-10	1-1/2"	1670	2264	11688	15847	36~72	35.90	16.00
SMX-20	2-1/2"	2864	3883	20049	27183	42~90	66.98	30.41
SMX-25	2-1/2"	3659	4961	25611	34725	48~100	85.90	39.00
SMX-35	2-1/2"	5376	7289	37632	51022	64~120	95.15	43.20

SMX 扭力扳手換算表 SMX Series Torque Conversion Chart

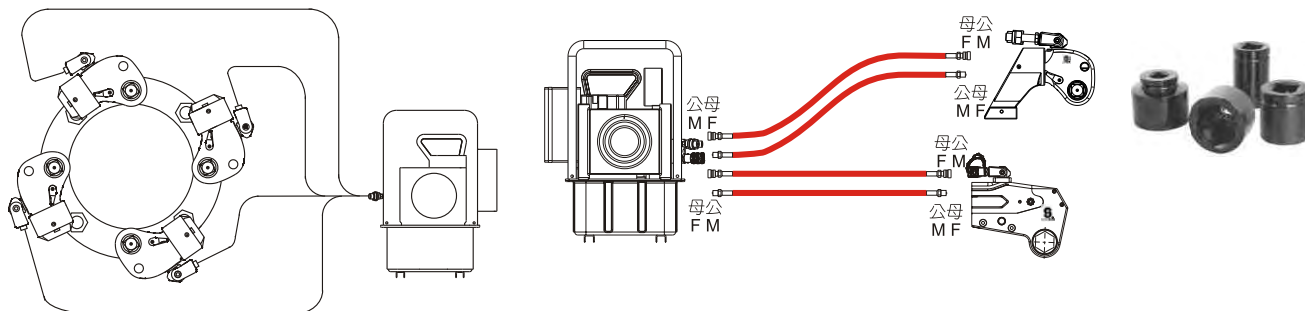
工作壓力 Work pressure		SMX-1N			SMX-3			SMX-5			SMX-8			SMX-10			SMX-20			SMX-25		
psi	bar	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m
1450	100	201	28	273	475	66	645	810	112	1099	1136	157	1540	1670	231	2264	2864	396	3883	3659	506	4961
1740	120	242	33	328	571	79	774	972	134	1318	1363	188	1848	2004	277	2717	3437	475	4660	4391	607	5953
2031	140	282	39	382	666	92	902	1134	157	1538	1590	220	2156	2338	323	3169	4010	554	5437	5122	708	6945
2321	160	322	45	437	761	105	1031	1296	179	1758	1817	251	2464	2672	369	3622	4583	634	6213	5854	809	7937
2611	180	362	50	491	856	118	1160	1459	202	1977	2044	283	2772	3006	416	4075	5155	713	6990	6586	911	8929
2901	200	403	56	546	951	131	1289	1621	224	2197	2272	314	3080	3339	462	4528	5728	792	7766	7318	1012	9921
3191	220	443	61	601	1046	145	1418	1783	246	2417	2499	345	3388	3673	508	4980	6301	871	8543	8049	1113	10913
3481	240	483	67	655	1141	158	1547	1945	269	2637	2726	377	3696	4007	554	5433	6874	950	9320	8781	1214	11906
3771	260	524	72	710	1236	171	1676	2107	291	2856	2953	408	4004	4341	600	5886	7447	1030	10096	9513	1315	12898
4061	280	564	78	764	1331	184	1805	2269	314	3076	3180	440	4312	4675	646	6339	8020	1109	10873	10245	1416	13890
4351	300	604	84	819	1426	197	1934	2431	336	3296	3407	471	4620	5009	693	6792	8592	1188	11650	10976	1518	14882
4641	320	644	89	874	1521	210	2063	2593	358	3515	3635	503	4928	5343	739	7244	9165	1267	12426	11708	1619	15874
4931	340	685	95	928	1616	223	2192	2755	381	3735	3862	534	5236	5677	785	7697	9738	1346	13203	12440	1720	16866
5221	360	725	100	983	1712	237	2321	2917	403	3955	4089	565	5544	6011	831	8150	10311	1426	13980	13172	1821	17858
5511	380	765	106	1037	1807	250	2449	3079	426	4175	4316	597	5852	6345	877	8603	10884	1505	14756	13903	1922	18850
5802	400	805	111	1092	1902	263	2578	3241	448	4394	4543	628	6160	6679	923	9055	11457	1584	15533	14635	2023	19843
6092	420	846	117	1147	1997	276	2707	3403	471	4614	4770	660	6468	7013	970	9508	12029	1663	16310	15367	2125	20835
6382	440	886	122	1201	2092	289	2836	3565	493	4834	4998	691	6776	7347	1016	9961	12602	1742	17086	16099	2226	21827
6672	460	926	128	1256	2187	302	2965	3727	515	5054	5225	722	7084	7681	1062	10414	13175	1822	17863	16830	2327	22819
6962	480	966	134	1310	2282	316	3094	3889	538	5273	5452	754	7392	8015	1108	10866	13748	1901	18640	17562	2428	23811
7252	500	1007	139	1365	2377	329	3223	4051	560	5493	5679	785	7700	8349	1154	11319	14321	1980	19416	18294	2529	24803
7542	520	1047	145	1420	2472	342	3352	4213	583	5713	5906	817	8008	8683	1200	11772	14893	2059	20193	19026	2630	25795
7832	540	1087	150	1474	2567	355	3481	4376	605	5932	6133	848	8316	9017	1247	12225	15466	2138	20969	19757	2732	26787
8122	560	1128	156	1529	2662	368	3610	4538	627	6152	6361	879	8624	9350	1293	12678	16039	2217	21746	20489	2833	27780
8412	580	1168	161	1583	2757	381	3739	4700	650	6372	6588	911	8932	9684	1339	13130	16612	2297	22523	21221	2934	28772
8702	600	1208	167	1638	2853	394	3868	4862	672	6592	6815	942	9240	10018	1385	13583	17185	2376	23299	21953	3035	29764
8992	620	1248	173	1693	2948	408	3997	5024	695	6811	7042	974	9548	10352	1431	14036	17758	2455	24076	22684	3136	30756
9282	640	1289	178	1747	3043	421	4125	5186	717	7031	7269	1005	9856	10686	1477	14489	18330	2534	24853	23416	3237	31748
9572	660	1329	184	1802	3138	434	4254	5348	739	7251	7496	1036	10164	11020	1524	14941	18903	2613	25629	24148	3339	32740
9863	680	1369	189	1856	3233	447	4383	5510	762	7470	7724	1068	10472	11354	1570	15394	19476	2693	26406	24880	3440	33732
10153	700	1409	195	1911	3328	460	4512	5672	784	7690	7951	1099	10780	11688	1616	15847	20049	2772	27183	25611	3541	34725



工作壓力 Work pressure		SMX-35			
psi	bar	lbf.ft	kgf.m	N.m	
1450	100	5376	743	7289	
1740	120	6451	892	8747	
2031	140	7526	1041	10204	
2321	160	8601	1189	11662	
2611	180	9677	1338	13120	
2901	200	10752	1486	14578	
3191	220	11827	1635	16035	
3481	240	12902	1784	17493	
3771	260	13977	1932	18951	
4061	280	15053	2081	20409	
4351	300	16128	2230	21866	
4641	320	17203	2378	23324	
4931	340	18278	2527	24782	
5221	360	19353	2676	26240	
5511	380	20429	2824	27697	
5802	400	21504	2973	29155	
6092	420	22579	3122	30613	
6382	440	23654	3270	32071	
6672	460	24729	3419	33528	
6962	480	25804	3568	34986	
7252	500	26880	3716	36444	
7542	520	27955	3865	37902	
7832	540	29030	4014	39359	
8122	560	30105	4162	40817	
8412	580	31180	4311	42275	
8702	600	32256	4459	43733	
8992	620	33331	4608	45190	
9282	640	34406	4757	46648	
9572	660	35481	4905	48106	
9863	680	36556	5054	49564	
10153	700	37632	5203	51022	



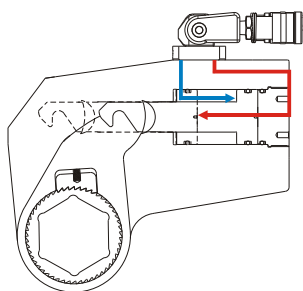
訂購型號 How to build Torque Wrench drive and socket	
	型號 DS 內六角套筒尺寸 Model DS Hex. Socket size Example: SMX-3DS1-13/16"
	型號 AH 外六角驅動尺寸 Model AH Hex. Drive size Example: SMX-3AH32mm
	6PTS- 驅動軸尺寸 - 內六角套筒尺寸 6PTS- Drive size - Socket size Example: 6PTS-1"-50
	CS- 驅動軸尺寸 - 套筒尺寸 CS- Drive size - Socket size Example: CS-1"-2-3/4"
	12PTS- 驅動軸尺寸 - 內十二套筒尺寸 12PTS- Drive size - Socket size Example: 12TPS-1"-50
	OPS- 驅動軸尺寸 - 套筒尺寸 OPS- Drive size - Socket size Example: OPS-1"-6PT50
	SMX-4F 內四角套筒-外六角驅動軸尺寸 SMX-4F Square socket Hex. Drive Example: SMX-4F1"-6M22mm



- 基礎安裝**
- 安裝A. 1台油壓扳手專用泵浦+1台四方驅動頭油壓扳手+套筒+2條油管
 安裝B. 1台油壓扳手專用泵浦+1台中空型油壓扳手+2條油管
 安裝C. 1台油壓扳手專用泵浦+1~4台四方驅動頭油壓扳手(+套筒)或
 1~4台中空型油壓扳手
 +2~8條油管

Basic System Set-up

- A. 1 Hydraulic Torque Wrench using Electric Pump+1 Square Drive Wrench +Socket+2 hoses
 B. 1 Hydraulic Torque Wrench using Electric Pump+1 Low Profile Wrench +2 hoses
 C. 1 Hydraulic Torque Wrench using Electric Pump+1~4 Square Drive Wrench (+Socket) or
 1~4Low Profile Wrench
 +2~8 hoses



油路方式 Oil Path

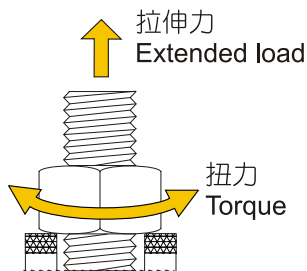
- ← 進油
Advance
- 回油
Return

扳手扭力計算公式 Wrench Torque Formula

$$T = F \times r$$

扭力 = 力量 × 力距
 Torque = Force × Lever Arm Length

Ex. :
 1000kN × 60mm = 60000 N.m



螺栓拉伸力-扭力計算公式 Bolt Load- Torque Formula

$$T = K \times D \times N$$

T : 扭力

K : 摩擦係數

D : 螺栓直徑

N : 螺栓拉伸力 = 截面積 × 降伏強度 × 降伏比

T : Torque

K : Friction Factor

D : Bolt O.D

N : Bolt extended Load = Stress area × Yield strength × Percent of Yield

Ex. : M16

$$N = 0.7854 \times (16 - 0.9382 \times 2)^2 \times 896 \times \frac{80\%}{1000} = 112N$$

截面積 Stress area mm ²	降伏強度 Yield strength N/mm ²	降伏比 Percent of Yield
16	112N	80%

$$T = 0.14 \times 16 \times 112 = 252N.m$$

摩擦係數 Friction Factor	螺栓直徑 Bolt O.D mm	螺栓拉伸力 Bolt Load
0.14	16	112N

出廠證明暨保固書

產品名稱：

型 號：

序 號：

出廠日期：

保固期間：

該產品經公司嚴格品質管制,並測試合格出廠,本產品自驗收合格日起保固一年,如非人為使用不當或天然不可抗拒之災害,本公司免費維修,如非以上之原因本公司將酌收材料成本負責維修。

公司：巨輪興股份有限公司

負責人：蘇明益

高雄市岡山區岡山北路199號

TEL:886-7-6210505

FAX:886-7-6217575



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OPERATING INSTRUCTIONS

Hydraulic Torque Wrenches

SMX



English : E1~E4

中文
English
Ver.20

1. SAFETY PRECAUTIONS



Fail to comply with the following cautions and warnings could cause equipment damage and personal injury.



IMPORTANT : Minimum age of the operator must be 18 years. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the SUN RUN equipment. The operator is responsible for this activity towards other persons.



WARNING : To avoid personal injury and possible equipment damage, make sure all hydraulic components withstand the maximum pressure of 700 bar (10,000psi).



WARNING: Always wear safety glasses. The operator must take precaution against injury due to failure of the tool or workpiece.



WARNING : The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.



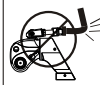
WARNING: Never pressurize uncoupled couplers. Only use hydraulic equipment in a coupled system.



WARNING: Immediately replace worn or damaged parts with genuine SUN RUN parts. SUN RUN parts are designed to fit properly and withstand rated loads.



IMPORTANT: Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the SUN RUN Service Center in your area. To protect your warranty, use only SUN RUN oil.



CAUTION: Avoid sharp bends and kinks that will cause severe back-up pressure in hoses. Bends and kinks lead to premature hose failure.



DO NOT drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.



IMPORTANT: Do not lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport.



DANGER: 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.



WARNING: To avoid personal injuries and equipment damage, do not remove the shroud of the wrench. Do not modify any component of the wrench. Do not change the relief valve which is inside the swivel couplings.



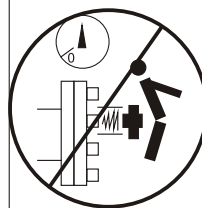
CAUTION: The incorrect system connection will cause failure and danger. Before connection, make sure the swivel couplings are clean. After application, the swivel couplings must be put on the dust caps.



CAUTION: Do not use worn socket and square drive.



CAUTION: Please use the socket of good performance.

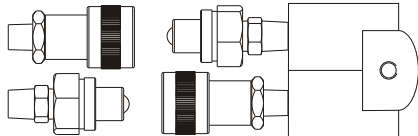


Never stand in-line with the bolt axis while tensioning or de-tensioning is in progress. If the bolt should fail, serious personal injury or death could result if loose or broken parts become projectiles. All personnel must be aware of this potential hazard at all times.

2. Use the tools

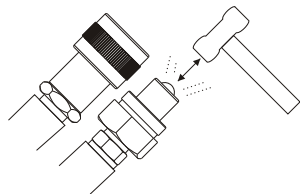
Install

The wrench and power pump are connected by a 700bar operating pressure, twin-line hose assembly. Each end of the hose will have one male and one female connector to assure proper interconnection between pump and wrench. Do not move or screw any bolt on the swivel connect that must be setted or adjust by professional engineer.



Insure the connectors are fully engaged and screwed snugly and completely together.

Insure the connectors are fully engaged that space must less than 0.5mm, so that the valve which inside of the coupler will be opened. If the ball inside of the coupler can't be touched that oil path can't be flowed, most oil will be leaked from swivel connect as below and torque wrench will not work.



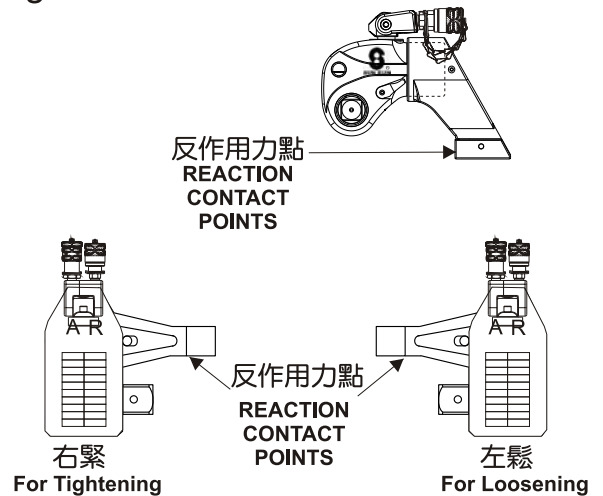
If something in the coupler that make steel ball can't be pressed or move please use little hammer or other tools to knock ball and that will spurt some oil that will not damage user or tools.

Drive Direction Change



To remove the square, disengage the drive retainer assembly by depressing the center round button and gently pulling on the square end of the square drive. The square drive will slide easily out.

Setting the Reaction Arm



After check tighten or loosen the nut and turn square drive to direct position then install direct reaction arm as up to work..

Connect Pump

Connect pump hose coupler (H or A) to torque wrench swivel coupler (H or A) that must be correct. Check power. Then check oil level.

WARNING: Can't running if no hydraulic oil !

NO LOAD test

1. Place the torque wrench on the ground.
2. Turn on the torque wrench electric pump and inspect motor run direction.
3. Continually press the remote control [UP] button till hear "creak" that because reaction pawl come down and piston reach to position. And pressure gauge will work from zero to setting pressure quickly then release your [UP] button and piston go back and hear "creak" again, pressure gauge goes from zero to 7.5Mpa(76.5kg/cm² / 1087.5psi) automatically and quickly. DO NOT WORRY about it!
4. Press [UP] button again, now torque wrench work formally and you can see socket turning.



Try several times and check turning direction then torque wrench will work correct!

Please TURN OFF the electric power after using the torque wrench !

3. Operate

Pressure adjust

One hand press the remote control [UP] button continually till hear "creak" that because reaction pawl come down and piston reach to position. And pressure gauge will work from zero to setting pressure quickly.

On the other hand, turn the valve to adjust pressure what torque wrench catalog show.

RELEASE NUT

Place torque wrench on the ground and adjust pump pressure to highest and check wrench turning direction. Put the wrench on the nut and check reaction arm as page 2 and repeat "no load test" point 3 till nut release.

LOCK NUT

1. Torque Setting

Please set torque by bolt factory provide information, if you don't have it, you can try to read Enclosure1 information to set your torque.

How to setting :

Setting Torque=(data)x(80%~90%)

Example : bolt M39 , B.7 ,friction 2

Base on Enclosure 1 torque is 4140N.m, and
Setting Torque=4140*90%=3726N.m

2. Pump pressure:

Base on Torque force and Torque Wrench
Model No. to set operating pressure.

Example, M39, B7 setting Torque=3726N.m

Use SMX-3 Torque Wrench

Look at SMX-3 data, as torque force is 3726N.m
that mean operating pressure is 593bar.

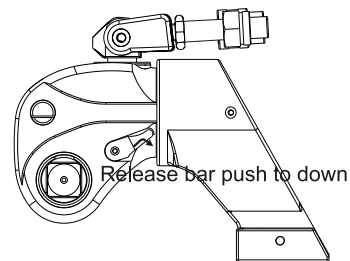
3. Check 1~2 steps are ready and start to work "NO LOAD TEST" point 3 continually to lock nut.

Can't remove Torque Wrench!

After locking nut, but torque wrench too tight to
remove from lock nut.

DO NOT HAMMER TORQUE WRENCH!

Please press [UP] button continually, on the other
hand, push release bar as below then release
the button. Torque Wrench will remove easily!



4.TROUBLE-SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Piston will not advance or retract	1. Couplers are not securely attached to the tool or pump 2. Coupler is defective 3. Defective remote control switch 4. Dirt in the direction-control valve of the pump unit	1. Check the Coupler connections and make certain that they are connected. 2. Replace any defective coupler. 3. Replace the switch and /or control pendent 4. Disassemble the pump and clean the direction-control valve.
Piston will not retract	1. Hose connections recersed 2. Retract hose not connected 3. Retract pin and/or Spring broken	1. 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. 2. Connect the retract hose securely 3. Replace the broken pin and/or spring
Cylinder will not build up pressure	1. Piston seal and/or End plug seal leaking 2. Coupler is defective	1. Replace any defective O-ring 2. Replace any defective coupler
Square Drive will not turn	1. Grease or dirt build up in the teeth of the ratchet and segment pawl 2. Worn or broken teeth on ratchet and/or segment pawl	1. Disassemble the ratchet and clean the grease or dirt out of the teeth 2. 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	1. Defective relief valve 2. Air supply too low or air hose too small 3. Electric power source is too low 4. Defective Gauge 5. Low oil level 6. Clogged filter	1. Inspect, adjust or replace the relief valve 2. Make certain the air supply and hose size comply with the pump manual recommendations 3. Make certain the amperage, voltage and any extension cord size comply with the pump manual requirements. 4. Replace the gauge 5. Check and fill the pump reservoir 6. 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

Instructions for:
Square Drive Hydraulic Torque Wrench

Models: SMX-1N, SMX-3, SMX-5, SMX-8, SMX-10, SMX-20, SMX-25

Metric stud torque CNS3934 (Please compare with stud factory provide chart in reality working.)

Bolt grade （強度区分）	Tensile strength 抗拉強度 RM(N/mm ²)	Yield strength(90%) 降伏点(耐力) Rp0.2(N/mm ²)	Friction application 摩擦係數 μ=0.1 Low 低 μ=0.15 Normal 一般 μ=0.2 High 高	Tightening moment Nm																												
				110	160	220	300	390	570	770	1050	1350	1740	2160	2690	3250	4180	5190	6440	7320	8520	9920	10170	10460	11720	13250	14690	16540	19650	20900	23780	25570
6.8	600	480	μ=0.1	150	200	290	400	500	740	1000	1370	1760	2280	2820	3530	4250	5490	6800	8480	9620	11230	13100	13470	13880	15580	17660	19620	22130	26360	28080	31980	34430
			μ=0.15	170	240	340	460	590	870	1180	1610	2060	2690	3320	4160	5000	6470	8020	10010	11350	13270	15510	15960	16460	18510	21000	23350	26370	31450	33530	38210	41160
			μ=0.2	150	210	300	410	520	760	1030	1400	1790	2320	2880	3590	4330	5570	6920	8590	9760	11360	13220	13560	13950	15620	17670	19590	22060	26200			
8.8	800	640	μ=0.1	200	270	390	530	670	990	1340	1820	2340	3040	3760	4170	5660	7320	9070	11300	12830	14970	17470	17960	18510	20780	23550	26160	29510	35150			
			μ=0.15	230	320	450	630	780	1160	1570	2140	2750	3580	4430	5550	6670	8630	10700	13350	15140	17690	20680	21280	21950	24670	28000	31140	35150	41930			
			μ=0.2	180	250	350	470	600	880	1190	1610	2080	2690	3330	4150	5010	6440	8000	9930	11280	13130	15290	15680	16130	18060	20430	22650	25510				
B 7 (≤2-1/2")	min. 860	min. 720	μ=0.15	230	320	450	610	770	1140	1550	2100	2700	3520	4350	5450	6550	8450	10490	13060	14830	17310	20200	20770	21400	24020	27250	30250	34120				
			μ=0.2	270	370	530	720	910	1340	1820	2480	3180	4140	5120	6420	7710	9980	12370	15430	17500	20460	23910	24610	25380	28530	32380	36000	40650				
			μ=0.1	220	310	440	600	760	1110	1510	2050	2640	3410	4230	5280	6360	8180	10160	12610	14330	16680	19420	19920									
10.9	1000	900	μ=0.15	290	400	570	780	980	1450	1970	2680	3430	4460	5530	6920	8320	10740	13330	16600	18840	21990	25660	26380									
			μ=0.2	340	470	670	920	1150	1710	2310	3150	4040	5260	6500	8150	9790	12670	15710	19600	22240	25990	30370	31260									
			μ=0.1	260	370	510	700	890	1300	1770	2400	3080	3990	4950	6170	7440	9570	11890	14760	16770	19520											
12.9	1200	1080	μ=0.15	340	470	670	920	1150	1700	2300	3130	4020	5220	6470	8090	9740	12570	15590	19430	22050	25730											
			μ=0.2	400	550	780	1080	1340	2000	2700	3680	4720	6150	7610	9540	11460	14830	18380	22940	28020	30410											
			Bolt / Nut 螺母 / 螺母 M (mm)	16/24	18/27	20/30	22/32	24/36	27/41	30/46	33/50	36/55	39/60	42/65	45/70	48/75	52/80	56/85	60/90	64/95	68/100	72/105	76/110	80/115	85/120	90/130	95/135	100/145	110/155	115/165	120/170	125/180

Metric stud and corresponding hex. Socket dimension

stud	M	6	8	10	12	14	16	18	20	22	24	27	30	33	36	39	42	45	48	52	56	60	64	68	72	76	80	85	90	95	100	105	110	115	120	125	130	140	150	
pitch	mm	1	1.25	1.5	1.8	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.5	4.5	5.0	5.0	5.5	5.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
hex.	mm	10	13	17	19	22	24	27	30	32	36	41	46	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	130	135	145	150	155	165	170	180	185	200	210	
thickness	mm	5	6.5	8	10	11	13	15	16	18	19	22	24	26	29	31	34	36	38	42	45	48	51	54	58	61	64		72		84									

Inched stud and corresponding hex. Socket dimension

stud	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 1/2	1 1/2	1 5/8	1 5/8	1 3/4	1 3/4	1 7/8
pitch	T 16	13	11	10	9	8	7	8	12	7	8	6	8	12	6	5	8	5	8	4.5
hex.	mm	22	27	32	36	41	46	46	46	50	50	55	55	60	60	65	65	70	70	75
thickness	mm	9.5	12.5	15.8	19	22	25	28	28	32	32	35	35	38	38	41	41	44	44	47
hex.	in	11/16	7/8	1-1/16	1 1/4	1 7/16	1 5/8	1 13/16	1 13/16	2	2	2 3/16	2 3/16	2 3/8	2 3/8	2 9/16	2 9/16	2 3/4	2 3/4	2 15/16
thickness	in	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 1/2	1 1/2	1 5/8	1 5/8	1 3/4	1 3/4	1 7/8

[illegible]

Inched stud torque (Please compare with stud factory provide chart in reality working.)

SAE1 SAE2		ASEM B7 Bolt		B7 A/F Hex. Nut		ASEM 354 B8		Tightening moment	
210bar	30000psi	Metric	Imperial	Metric	Imperial	420Nm ²	60000psi	N.m	Ft-lbs
25.4	1	22.2	7/8	36	1 7/16	22.2	7/8	400	300
28.6	1 1/8	25.4	1	41	1 5/8			570	425
						25.4	1	670	500
31.8	1 1/4							800	600
35	1 3/8	29	1 1/8	46	1 13/16	28.6	1 1/8	950	700
		32	1 1/4	50	2			1085	800
38	1 1/2							1220	900
						31.8	1 1/4	1355	1000
41.3	1 5/8	35	1 3/8	55	2 3/16			1695	1250
						35	1 3/8	1830	1350
		38	1 1/2	60	2 3/8			2030	1500
44.5	1 3/4							2160	1600
47.6	1 7/8							2440	1800
		41	1 5/8	65	2 9/16			2710	2000
50.8	2					41	1 5/8	2980	2200
		44	1 3/4	70	2 3/4			3525	2600
57	2 1/4					44	1 3/4	4060	3000
		47.6	1 7/8	75	2 15/16			5010	3700
63.5	2 1/2	50.8	2	80	3 1/8	47.6	1 7/8	5420	4000
						50.8	2	5960	4400
70	2 3/4							6915	5100
		57	2 1/4	90	3 1/2	57	2 1/4	8135	6000
76	3							9490	7000
		63.5	2 1/2	100	3 7/8			10840	8000
82.5	3 1/4					63.5	2 1/2	12200	9000
89	3 1/2	70	2 3/4	110	4 1/4			13550	10000
						70	2 3/4	15590	11500
95	3 3/4	76	3	120	4 5/8			17625	13000
102	4							19655	14500
						76	3	21015	15500
		82.5	3 1/4	130	5			22370	16500
108	4 1/4					82.5	3 1/4	26435	19500
		89	3 1/2	135	5 3/8			27790	20500
114	4 1/2							29150	21500
						89	3 1/2	33215	24500
121	4 3/4	95	3 3/4	145	5 3/4			34570	25500
165	6 1/2	108	4 1/4					39995	29500
127	5	102	4	156	6 1/8	95	3 3/4	41350	30500
		114	4 1/2	175	6 7/8			48130	35500
						102	4	50165	37000
		121	4 3/4	184	7 1/4			55585	41000
						108	4 1/4	59655	44000
		127	5	194	7 5/8			64400	47500
						114	4 1/2	70500	52000
						121	4 3/4	82700	61000
						127	5	96940	71500

Instructions for: Enclosure3
Square Drive Hydraulic Torque Wrench

Models:SMX-1N, SMX-3, SMX-5
SMX-8,SMX-10, SMX-20,
SMX-25

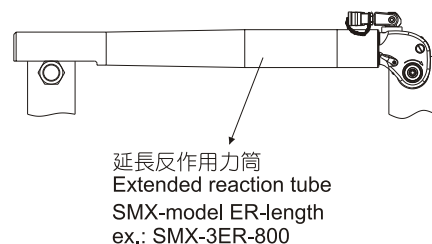
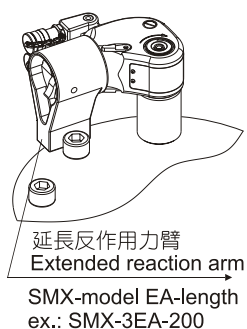
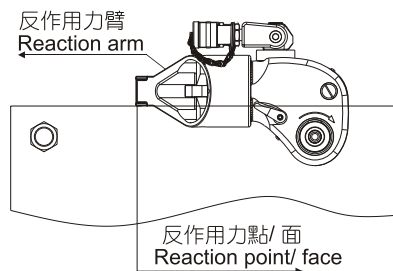
型 號 Model No.	驅動頭 Square Drive	最小扭力 Min. Torque		最大扭力 Max. Torque		螺栓範圍 Bolt size	重量 Weight	
		(lbf.ft)	(N.m)	(lbf.ft)	(N.m)		(lb)	(kg)
SMX-1N	3/4"	201	273	1409	1911	16~36	5.29	2.40
SMX-3	1"	475	645	3328	4512	22~48	11.34	5.35
SMX-5	1-1/2"	810	1099	5672	7690	27~56	19.50	9.08
SMX-8	1-1/2"	1136	1540	6951	10780	30~64	28.20	13.97
SMX-10	1-1/2"	1670	2264	11688	15847	36~72	35.90	16.00
SMX-20	2-1/2"	2864	3883	20049	27183	42~90	66.98	30.41
SMX-25	2-1/2"	3659	4961	25611	34725	48~100	85.90	39.00
SMX-35	2-1/2"	5376	7289	37632	51022	64~120	95.15	43.20

SMX 扭力扳手換算表 SMX Series Torque Conversion Chart

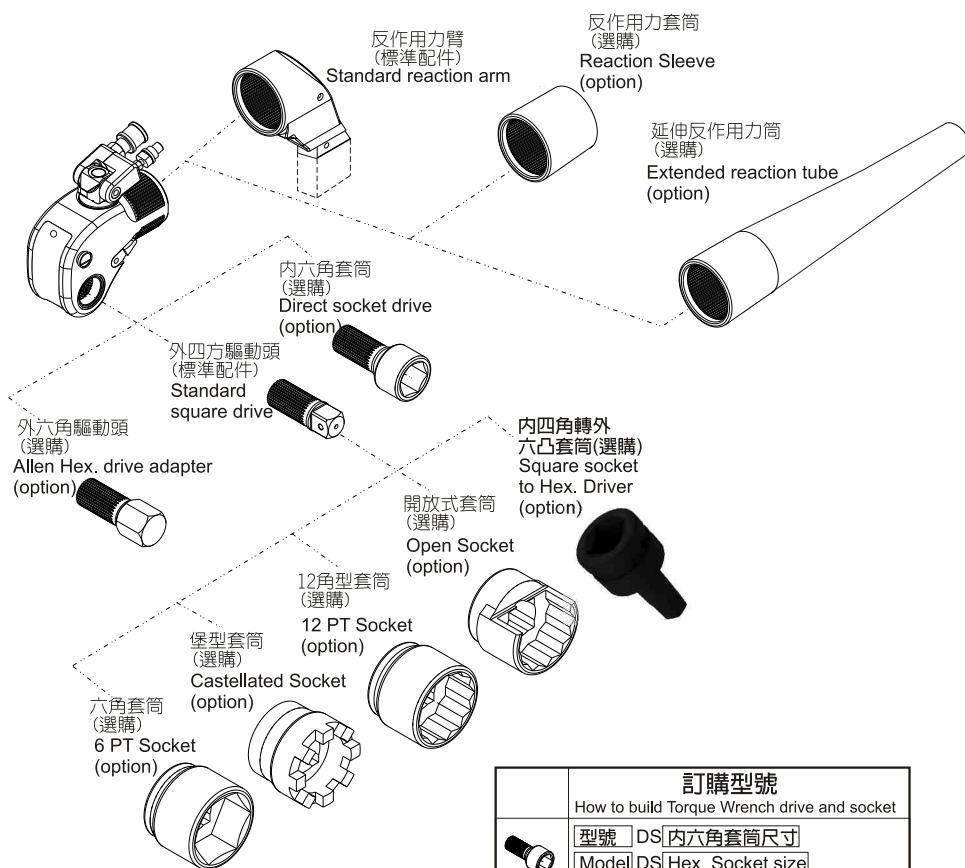
工作壓力 Work pressure		SMX-1N			SMX-3			SMX-5			SMX-8			SMX-10			SMX-20			SMX-25		
psi	bar	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m	lbf.ft	kgf.m	N.m
1450	100	201	28	273	475	66	645	810	112	1099	1136	157	1540	1670	231	2264	2864	396	3883	3659	506	4961
1740	120	242	33	328	571	79	774	972	134	1318	1363	188	1848	2004	277	2717	3437	475	4660	4391	607	5953
2031	140	282	39	382	666	92	902	1134	157	1538	1590	220	2156	2338	323	3169	4010	554	5437	5122	708	6945
2321	160	322	45	437	761	105	1031	1296	179	1758	1817	251	2464	2672	369	3622	4583	634	6213	5854	809	7937
2611	180	362	50	491	856	118	1160	1459	202	1977	2044	283	2772	3006	416	4075	5155	713	6990	6586	911	8929
2901	200	403	56	546	951	131	1289	1621	224	2197	2272	314	3080	3339	462	4528	5728	792	7766	7318	1012	9921
3191	220	443	61	601	1046	145	1418	1783	246	2417	2499	345	3388	3673	508	4980	6301	871	8543	8049	1113	10913
3481	240	483	67	655	1141	158	1547	1945	269	2637	2726	377	3696	4007	554	5433	6874	950	9320	8781	1214	11906
3771	260	524	72	710	1236	171	1676	2107	291	2856	2953	408	4004	4341	600	5886	7447	1030	10096	9513	1315	12898
4061	280	564	78	764	1331	184	1805	2269	314	3076	3180	440	4312	4675	646	6339	8020	1109	10873	10245	1416	13890
4351	300	604	84	819	1426	197	1934	2431	336	3296	3407	471	4620	5009	693	6792	8592	1188	11650	10976	1518	14882
4641	320	644	89	874	1521	210	2063	2593	358	3515	3635	503	4928	5343	739	7244	9165	1267	12426	11708	1619	15874
4931	340	685	95	928	1616	223	2192	2755	381	3735	3862	534	5236	5677	785	7697	9738	1346	13203	12440	1720	16866
5221	360	725	100	983	1712	237	2321	2917	403	3955	4089	565	5544	6011	831	8150	10311	1426	13980	13172	1821	17858
5511	380	765	106	1037	1807	250	2449	3079	426	4175	4316	597	5852	6345	877	8603	10884	1505	14756	13903	1922	18850
5802	400	805	111	1092	1902	263	2578	3241	448	4394	4543	628	6160	6679	923	9055	11457	1584	15533	14635	2023	19843
6092	420	846	117	1147	1997	276	2707	3403	471	4614	4770	660	6468	7013	970	9508	12029	1663	16310	15367	2125	20835
6382	440	886	122	1201	2092	289	2836	3565	493	4834	4998	691	6776	7347	1016	9961	12602	1742	17086	16099	2226	21827
6672	460	926	128	1256	2187	302	2965	3727	515	5054	5225	722	7084	7681	1062	10414	13175	1822	17863	16830	2327	22819
6962	480	966	134	1310	2282	316	3094	3889	538	5273	5452	754	7392	8015	1108	10866	13748	1901	18640	17562	2428	23811
7252	500	1007	139	1365	2377	329	3223	4051	560	5493	5679	785	7700	8349	1154	11319	14321	1980	19416	18294	2529	24803
7542	520	1047	145	1420	2472	342	3352	4213	583	5713	5906	817	8008	8683	1200	11772	14893	2059	20193	19026	2630	25795
7832	540	1087	150	1474	2567	355	3481	4376	605	5932	6133	848	8316	9017	1247	12225	15466	2138	20969	19757	2732	26787
8122	560	1128	156	1529	2662	368	3610	4538	627	6152	6361	879	8624	9350	1293	12678	16039	2217	21746	20489	2833	27780
8412	580	1168	161	1583	2757	381	3739	4700	650	6372	6588	911	8932	9684	1339	13130	16612	2297	22523	21221	2934	28772
8702	600	1208	167	1638	2853	394	3868	4862	672	6592	6815	942	9240	10018	1385	13583	17185	2376	23299	21953	3035	29764
8992	620	1248	173	1693	2948	408	3997	5024	695	6811	7042	974	9548	10352	1431	14036	17758	2455	24076	22684	3136	30756
9282	640	1289	178	1747	3043	421	4125	5186	717	7031	7269	1005	9856	10686	1477	14489	18330	2534	24853	23416	3237	31748
9572	660	1329	184	1802	3138	434	4254	5348	739	7251	7496	1036	10164	11020	1524	14941	18903	2613	25629	24148	3339	32740
9863	680	1369	189	1856	3233	447	4383	5510	762	7470	7724	1068	10472	11354	1570	15394	19476	2693	26406	24880	3440	33732
10153	700	1409	195	1911	3328	460	4512	5672	784	7690	7951	1099	10780	11688	1616	15847	20049	2772	27183	25611	3541	34725

Instructions for: Enclosure3 Square Drive Hydraulic Torque Wrench

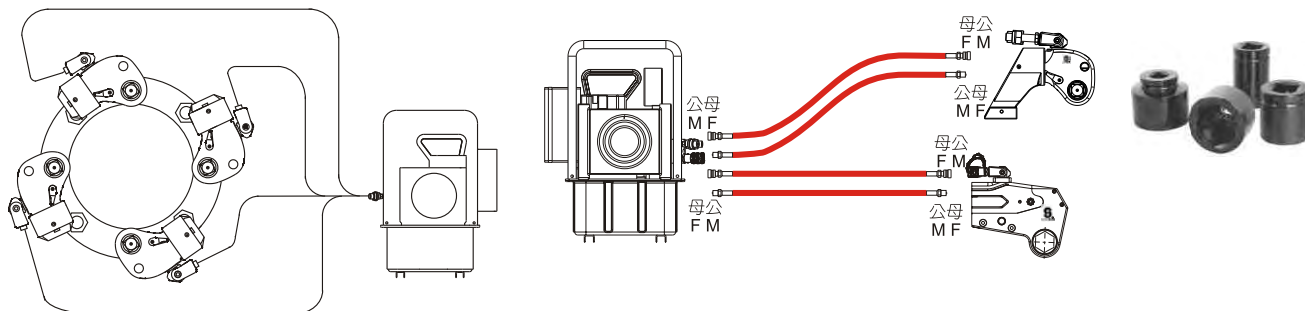
Models:SMX-1N, SMX-3, SMX-5
SMX-8,SMX-10, SMX-20,
SMX-25



工作壓力 Work pressure		SMX-35			
psi	bar	lbf.ft	kgf.m	N.m	
1450	100	5376	743	7289	
1740	120	6451	892	8747	
2031	140	7526	1041	10204	
2321	160	8601	1189	11662	
2611	180	9677	1338	13120	
2901	200	10752	1486	14578	
3191	220	11827	1635	16035	
3481	240	12902	1784	17493	
3771	260	13977	1932	18951	
4061	280	15053	2081	20409	
4351	300	16128	2230	21866	
4641	320	17203	2378	23324	
4931	340	18278	2527	24782	
5221	360	19353	2676	26240	
5511	380	20429	2824	27697	
5802	400	21504	2973	29155	
6092	420	22579	3122	30613	
6382	440	23654	3270	32071	
6672	460	24729	3419	33528	
6962	480	25804	3568	34986	
7252	500	26880	3716	36444	
7542	520	27955	3865	37902	
7832	540	29030	4014	39359	
8122	560	30105	4162	40817	
8412	580	31180	4311	42275	
8702	600	32256	4459	43733	
8992	620	33331	4608	45190	
9282	640	34406	4757	46648	
9572	660	35481	4905	48106	
9863	680	36556	5054	49564	
10153	700	37632	5203	51022	



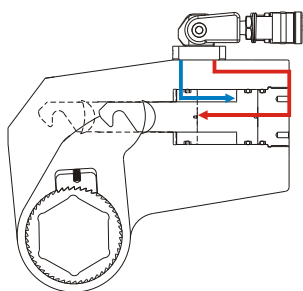
訂購型號 How to build Torque Wrench drive and socket	
	型號 DS 內六角套筒尺寸 [Model] DS [Hex. Socket size] Example: SMX-3DS1-13/16"
	型號 AH 外六角驅動尺寸 [Model] AH [Hex. Drive size] Example: SMX-3AH32mm
	6PTS- 驅動軸尺寸 - 內六角套筒尺寸 6PTS- [Drive size]-[Socket size] Example: 6PTS-1"-50
	CS- 驅動軸尺寸 - 套筒尺寸 CS- [Drive size] [Socket size] Example: CS-1"-2-3/4"
	12PTS- 驅動軸尺寸 - 內十二套筒尺寸 12PTS- [Drive size]-[Socket size] Example: 12TPS-1"-50
	OPS- 驅動軸尺寸 - 套筒尺寸 OPS- [Drive size]-[Socket size] Example: OPS-1"-6PT50
	SMX-4F 內四角套筒-外六角驅動軸尺寸 SMX-4F [Square socket] [Hex. Drive] Example: SMX-4F1"-6M22mm



- 基礎安裝**
- 安裝A. 1台油壓扳手專用泵浦+1台四方驅動頭油壓扳手+套筒+2條油管
安裝B. 1台油壓扳手專用泵浦+1台中空型油壓扳手+2條油管
安裝C. 1台油壓扳手專用泵浦+1~4台四方驅動頭油壓扳手(+套筒)或
1~4台中空型油壓扳手
+2~8條油管

Basic System Set-up

- A. 1 Hydraulic Torque Wrench using Electric Pump+1 Square Drive Wrench +Socket+2 hoses
B. 1 Hydraulic Torque Wrench using Electric Pump+1 Low Profile Wrench +2 hoses
C. 1 Hydraulic Torque Wrench using Electric Pump+1~4 Square Drive Wrench (+Socket) or
1~4 Low Profile Wrench
+2~8 hoses



油路方式 Oil Path

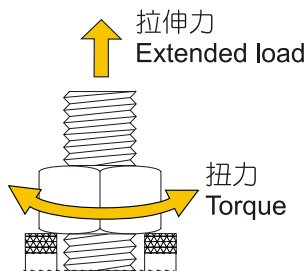
- ← 進油
Advance
→ 回油
Return

扳手扭力計算公式 Wrench Torque Formula

$$T = F \times r$$

扭力 = 力量 × 力距
Torque = Force × Lever Arm Length

Ex. :
 $1000\text{kN} \times 60\text{mm} = 60000 \text{ N.m}$



螺栓拉伸力-扭力計算公式 Bolt Load- Torque Formula

$$T = K \times D \times N$$

T : 扭力

K : 摩擦係數

D : 螺栓直徑

N : 螺栓拉伸力 = 截面積 × 降伏強度 × 降伏比

T : Torque

K : Friction Factor

D : Bolt O.D

N : Bolt extended Load = Stress area × Yield strength × Percent of Yield

Ex. : M16

$$N = 0.7854 \times (16 - 0.9382 \times 2)^2 \times 896 \times \frac{80\%}{1000} = 112\text{N}$$

截面積 Stress area mm ²	降伏強度 Yield strength N/mm ²	降伏比 Percent of Yield
16	112N	

$$T = 0.14 \times 16 \times 112 = 252\text{N.m}$$

摩擦係數 Friction Factor	螺栓直徑 Bolt O.D mm	螺栓拉伸力 Bolt Load
0.14	16	112N