HYDRAULIC BOLT TENSIONER INSTRUCTION MANUAL

This manual is operating process, Waring ,Caution and trouble shooting guide of Bolt Tensioner. Before operating Tensioner, Please read carefully with this tmanal, and understand its content and keep it well. This manual will be just for user's referrence.
Any question or operating way, please consult with supplier before using. ATW will not take responsibility if below status is happende.
Incorrect using or operated by unprofessional operator.
Incorrect install.
Incorrect oil.
No any maintain.
Disassemble or refit without any permission by manufacturer.
The part used does not come from appointed supplier, or incorrect part.

ATTENTION OF RECEIVE:

Carefully inspect the hydraulic bolt tensioner upon arrival. If any shipping damage is found, please notify carrier at once. Shipping damage is not covered by warranty. The carrier is responsible for all repair or replacement cost resulting from damage in shipment.

SAFETY INSTRUCTION:

WARNING:There may cause the serious injury to person, animal and object if the warning is ignored.

Please strictly obey the correct operating rule, manufacturer will not have responsibility for any damage and injury by incorrect operation.

DESCRIPTION:

The hydraulic bolt tensioner is used for bolts' quick fastening or disassembling. During working, it can accurately control the recommended force without damage the bolts. It has the characteristics of operating easily, easing the working intensity, shortening the cycle of production and reparation, effectively rising the reliability of connection and intensity of anti-fatigue of bolts to improve the accuracy of assembly and safety factor. The whole device is composed of a hydraulic bolt tensioner together with a super-high oil pump (manual or electric).

PRINCIPLE OF OPERATION:

The main part is hydraulic bolt tensioner.
Afflux the hydraulic oil output by super-high pump through the quick coupling in the cylinder, under the oil pressure, the relatively movement between piston and cylinder comes about, then the inner thread in cylinder drivers the bolt to bring the tensile pull to length the bolt; swivel the nut, then the bolt is tightened or disassembled.

Hydraulic bolt tensioner works synchronically with super-high pump. The following is the working process:

2.1 Infuse the oil: when starting working, infuse the oil in low pressure.

2.2 Rise the pressure: continue to rise the pressure to a recommended point; with the pressure goes higher, the bolt stretches its length synchronal, so as the bolt reach to scheduled place.

2.3 Working: fastening or loosening the bolt through the window of supporting sheath with driving lever, then the work finished.

2.4 Release the pressure: the pressure needed to be free after working; open the pressure escaping valve, so that the hydraulic oil return back to the pump.

MAIN STRUCTURE:

A super-high oil pump and a hydraulic bolt tensioner can assemble one complete tension device with the connection of hose. Also a pump and several bolt tensioners can be assembled. The picture as follow:

System Diagram

FIG 1

The hydraulic bolt tensioner is made of: piston, cylinder, seal ring, super-high pressure escaping valve, automatic pressure release return mechanism, supporting sheath, hand, exhaust screw, steel ball, quick coupling, sheath and etc.

The cylinder should be tightened on the bolt that needed to be fixed. When working, the hydraulic oil output by the pump enters into the cylinder through the hose, and then the cylinder moves, which causes the bolt stretches. After fastening the bolt, releasing the pressure, the nut has been tied on the bolt. When you teardown the nut, stretch the bolt under the required working pressure, then loose the nut. Consulting the oil pressure indicator for the pressure of assembly and disassembly.

OPERATION:

4.1 Ready

4.1.1 read the instructions carefully: Before operating, make sure to peruse the instructions, especially that of super-high pump and hydraulic bolt tensioner.

4.1.2 check: Carefully inspect whether the hoses and bolt tensioner are damaged by shipment or improper storage; if damaged, please operate after taking the circumstances into consideration.

4.1.3 clean and wipe: the surface both inside and outside of the hydraulic bolt tensioner and pump, especially the outer, should keep clean; when washing, please use diesel oil or gasoline towel it.

4.1.4 make certain to use the proper oil and to fill the pump fully. The pump fills up the 42# antiwear hydraulic oil after producing. When using it, please fill up on time if oil is found in shortage.

4.1.5 Before puts Tensioner on Bolt, please make sure the threads in Bolt is longer enough.

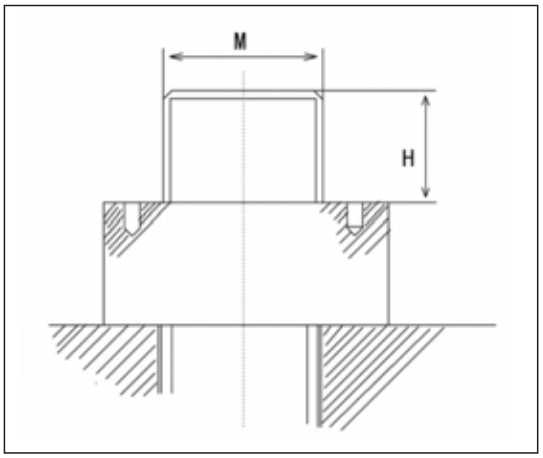


FIG 2

4.1.6 Please check the Bolt angle on supporting surface.

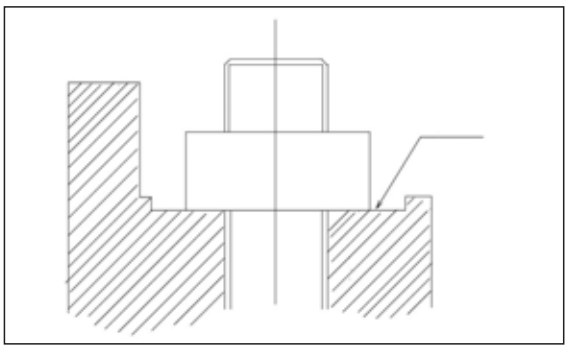


FIG 3

4.1.7 Before using Tensioner, please put some lubricant on bolt threads(you may choose the brand of lubricant).
4.1.8 Before using Tensioner, make sure the piston retracts to end, if the piston in Tensioner is not able to retract with automatic, then piston has to be retracted by operator.

Warning: Before Tensioner is fixed, please do not supply the pressure to Tensioner.

Notice: To avoid the Hose to be serious bend and intertwist, otherwise, it may cause to be broken from inside. To stop the heavy objects to drop onto Hose.

Please do not pull Hydraulic Hose.

Notice: please Hydraulic element from ATW manufacturer.

Notice: The Pressure Gauge is calibrated before sales, its period of validity is 6 months. After that, the pressure gauge should be calibrated by user or customer.

4.2 connection and operation:
Fasten the tensioner on the bolt that is need to be stretched

Warning: the piston must fully in the cylinder (0 stroke).
4.2.1 connection: clean the joints respective in pump, tensioner, and hose, connect and fasten, so it can work. The bend radius of the hose should over 200mm.
4.2.2 operation: open the exhaust screw in the first use, fasten it after the oil is filled up. Then add the pressure to the device according to the acquired pressure, read the pressure from the gauge.
4.2.3 we suggest you stretch twice when screwing; in the first time, add the pressure to rated pressure, fasten then loose the nut; in the second time, do it again, In this way, we can enhance the compactness.
4.2.4 the packing bolt osculating the rigid structural plane directly can be operated singly, as to the packing bolt with backup plate, you can operate several synchronically.

4.2.5 Put Nut ring on Nut (Nut on Bolt).
4.2.6 Please make sure the threads is longer enough and install Tensioner on Bolt.
4.2.7 Please put pole into hole on Nut Ring and tighten or loosen.

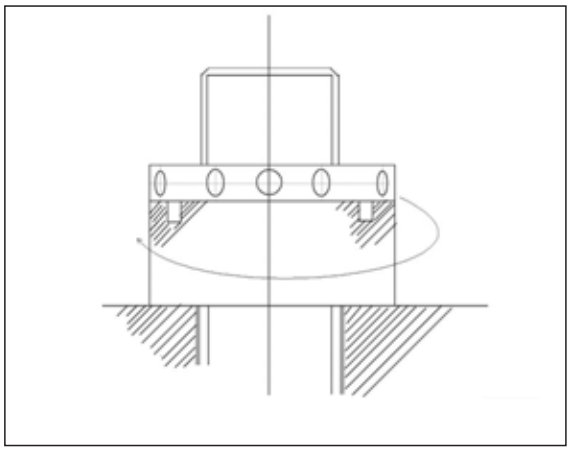


FIG 4

Notice: 1.Please do not disassemble Tensioner, for avoiding to be broken.
2.The product will continue to be improved, ATW will inform then.

Warning: Before disassembled, the piston in HTA, HTB series need to be pushed into the cylinder by outsider force (for the aim to flow the oil into cylinder from tensioner, you can't takedown the hose), and then stretch again when the stroke is 0, if not to do so, there exists danger.

Notice: after using clean and box the device up, else, coil the hose and put it into the handle.

CAUTION AND SAFETY INSTRUCTION:

5.1 Before using Tensioner, make sure Hose is not broken or bend. Please do not use broken or incompetent Hose. The bend radius for Hose≥200mm.
5.2 In process of pressure increasing, please keep distance with Tensioner at 3-5 check carefully about the process of pressure increasing (by checking pressure gauge). In this process, if pressure is not increased, stop to increase pressure immediately, Bolt may happen to be distortion. Therefor, please immediately check the status of connect of Bolt.
5.3 Operating stroke can not be over its maximum value. When the maximum is reached,you may see the mark with red colour on connect sleeve of bolt. If its maximum stroke is overed,Tensioner will lose any function and leak oil, the seals in Tensioner will be broken in process of piston retracting,the broken also included the threads on cover plate, etc.
5.4 After operating, release pressure in Pump at "0", otherwise, Oil will spray out from Pump and pollute clothing and object, it may cause to injury to person.
5.5 Please consult its manual of High Pressure Pump.

MAINTENANCE:

6.1 Assemble light and dump light. When set-up or teardown, be careful to not damage mating surface for it is accurate.
6.2 If need to fix or change seal rings, be sure to clean surface of seal ring and inside, outside of piston with diesel oil or gas.
6.3 Please put tools at dry place after using.
6.4 Please consult its manual of High Pressure Pump.

PROBLEMS AND SOLUTION:

As to the problems and solution of pump, please refer to the pump instruction.
The tensioner itself general doesn't crash easily. During the work, if the oil leaks from the connection location between the inside and outside of piston, it may caused by poor hermetization. In that condition, you should disassemble to check whether the seals are set unfit, or whether they are distorted, if so, please replace them.

OPERATING PROCESS:

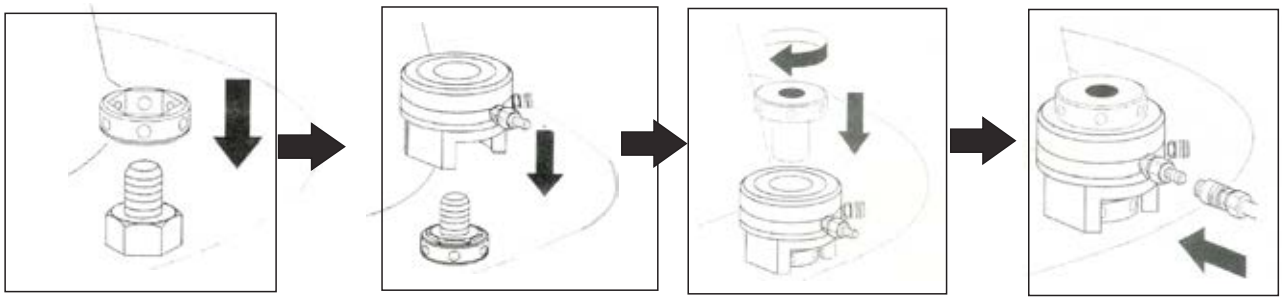


FIG 5

Notice: 1. The users are not allowed to disassemble the device freely.
2. Wren continuously innovate the production; if any changes in instruction, we will not inform you respectively.

NOISE AND TRANSPORTATION FOR TENSIONER

1. Statement for Noise and Shake
Operating Noise: ≤7 0 d b.
2. Transportation information
2.1 Moving carefully.
2.2 Tensioner should be stand up in transportation.

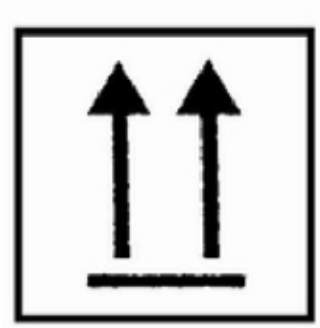


FIG 6

2.3 Transportation or moving by hand, trolley, etc.

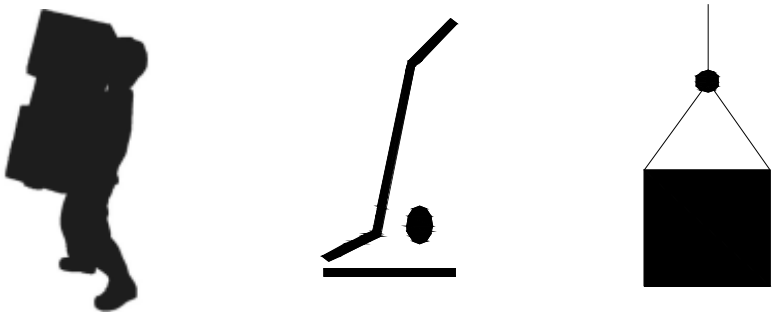
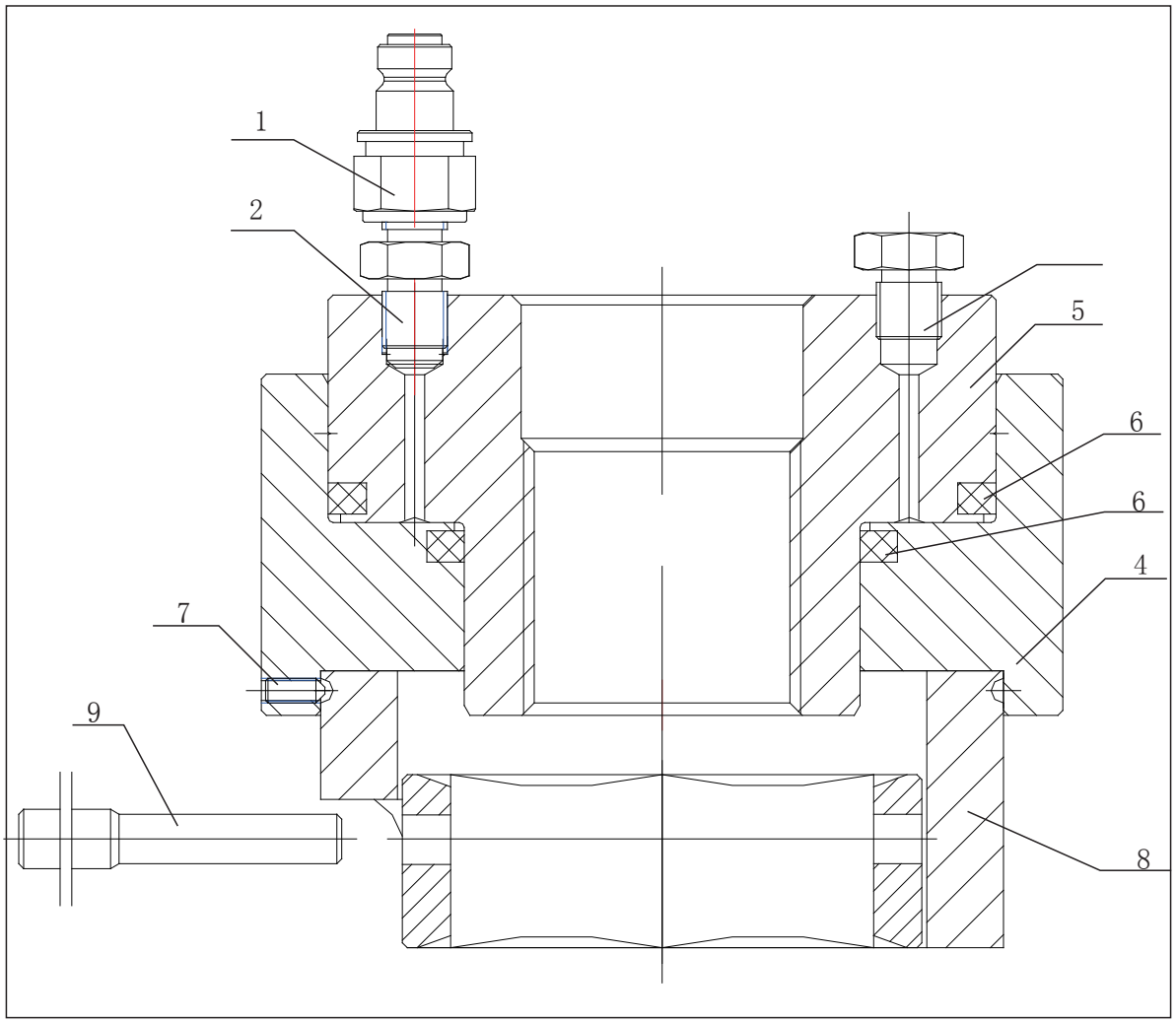


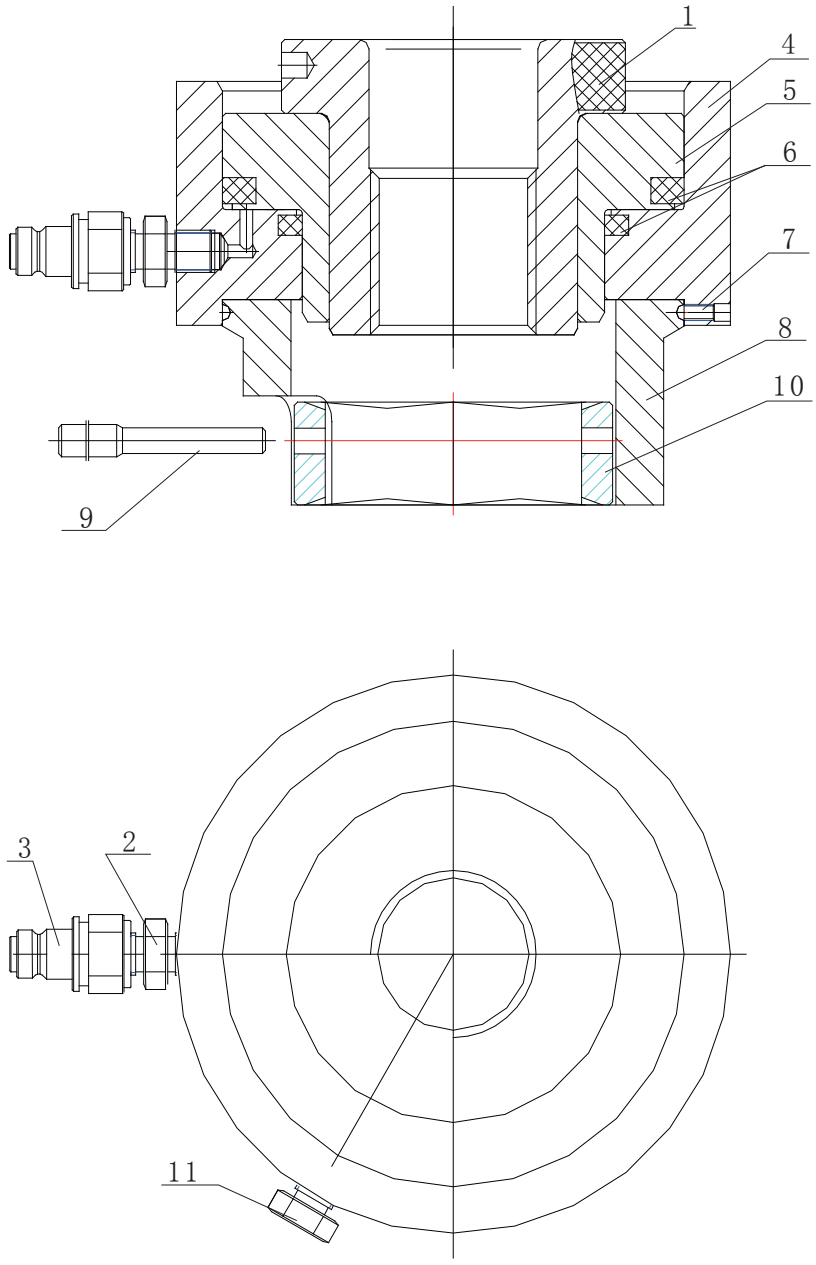
FIG 7

HTA SERIES EXTERIOR DRAWING



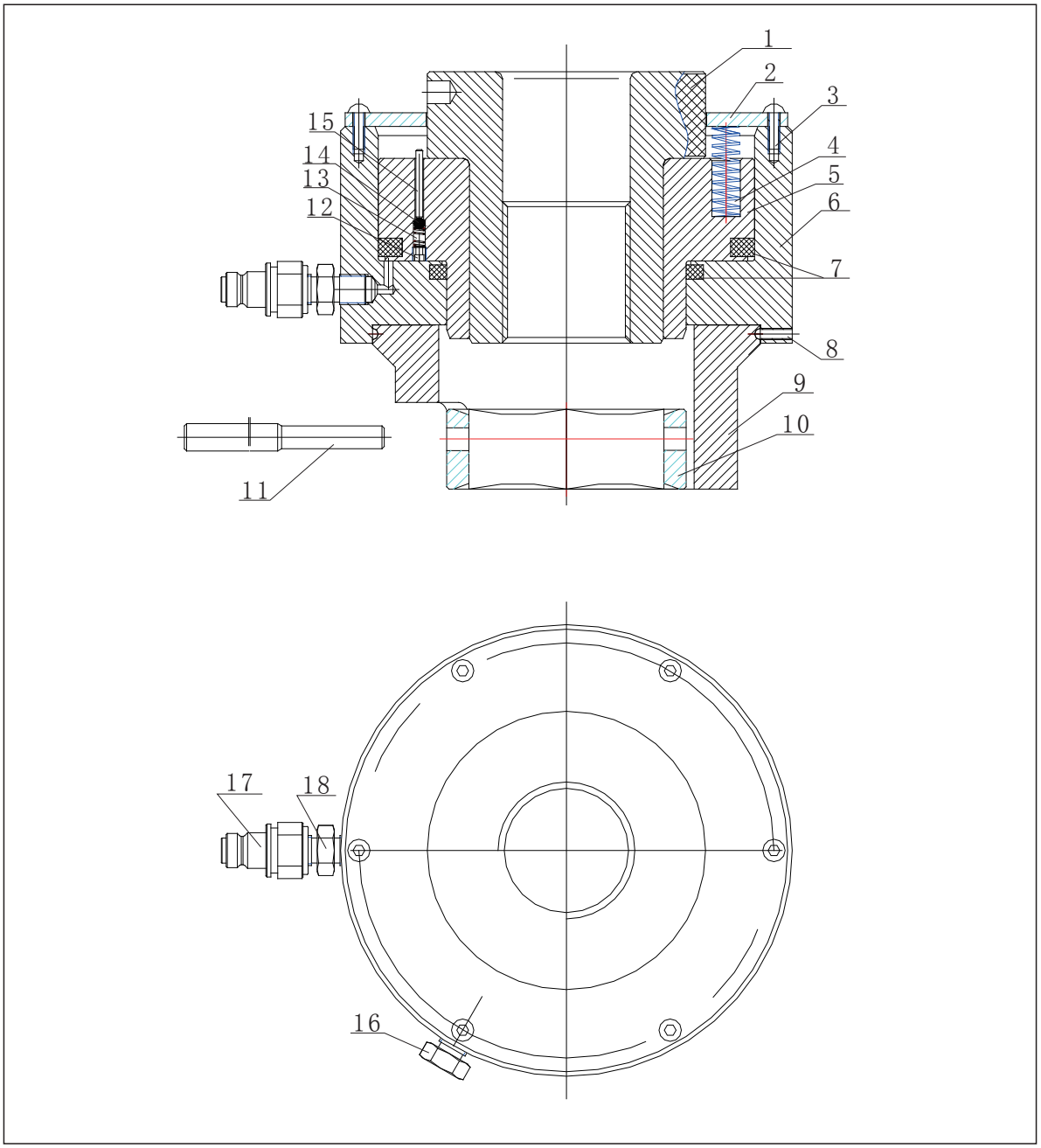
Item	Name
1	Quick Coupler
2	Fitting
3	Screw Plug
4	Cylinder
5	Piston
6	Seal Ring
7	Screw for tighten
8	Nut Pedestal
9	Pole for Nut Sleeve

HTB SERIES EXTERIOR DRAWING



Item	Name
1	Tension Bolt
2	Fitting
3	Quick Coupler
4	Cylinder
5	Piston
6	Seal Ring
7	Screw for tighten
8	Nut Pedestal
9	Pole for Nut Sleeve
10	Nut Sleeve
11	Screw Plug

HTS SERIES EXTERIOR DRAWING



Item	Name	Item	Name
1	Tension Bolt	13	Spring
2	Metal COVER	14	Ball steel
3	Screw	15	Pin
4	Spring for retract	16	Screw Plug
5	Piston	17	Quick Coupler
6	Cylinder	18	Fitting
7	Seal Ring		
8	Screw for tighten		
9	Nut Pedestal		
10	Nut Sleeve		
11	Pole for Nut Sleeve		
12	Screw Plug		

HTA SERIES PARAMETER CHART

Model	Bolt Size (M)	Rated Stroke (mm)	Pressure (Mpa/KN)														
			10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
HTA16	M16	10	12	24	36	48	60	72	84	95	107	119	131	143	155	167	179
HTA18	M18	10	13	27	40	54	67	81	94	108	121	135	148	162	175	189	202
HTA20	M20	10	14	28	42	57	71	85	99	113	127	141	155	170	184	198	212
HTA22	M22	10	19	37	56	74	93	112	130	149	167	186	205	223	242	260	279
HTA24	M24	10	22	44	65	87	109	131	153	174	196	218	240	262	283	305	327
HTA27	M27	10	26	52	78	103	129	155	181	207	233	259	285	310	336	362	388
HTA30	M30	10	30	61	91	121	151	182	212	242	272	303	333	363	393	424	454
HTA33	M33	10	41	82	122	163	204	245	286	326	367	408	449	490	530	571	612
HTA36	M36	12	51	102	154	205	256	307	358	410	461	512	563	614	666	717	768
HTA39	M39	12	55	109	164	219	274	328	383	438	493	547	602	657	712	766	821
HTA42	M42	12	58	117	175	233	291	350	408	466	524	583	641	699	757	816	874
HTA45	M45	12	64	128	191	255	319	383	447	510	574	638	702	766	829	893	957
HTA48	M48	12	75	149	224	298	373	448	522	597	671	746	821	895	970	1044	1119
HTA52	M52	12	89	177	266	354	443	531	620	708	797	885	974	1062	1151	1239	1328
HTA56	M56	12	93	186	279	371	464	557	650	743	836	929	1022	1114	1207	1300	1393
HTA60	M60	12	97	194	291	389	486	583	680	777	874	971	1068	1166	1263	1360	1457
HTA64	M64	12	113	226	339	452	565	678	791	905	1018	1131	1244	1357	1470	1583	1696
HTA68	M68	12	122	245	367	490	612	735	857	980	1102	1225	1347	1470	1592	1715	1837
HTA72	M72	12	148	297	445	594	742	890	1039	1187	1336	1484	1632	1781	1929	2078	2226
HTA76	M76	12	168	336	504	671	839	1007	1175	1343	1511	1679	1847	2014	2182	2350	2518
HTA80	M80	12	188	377	565	754	942	1131	1319	1508	1696	1885	2073	2262	2450	2639	2827
HTA85	M85	12	217	434	651	868	1085	1302	1519	1735	1952	2169	2386	2603	2820	3037	3254
HTA90	M90	15	240	481	721	961	1201	1442	1682	1922	2162	2403	2643	2883	3123	3364	3604
HTA95	M95	15	265	530	795	1059	1324	1589	1854	2119	2384	2649	2914	3178	3443	3708	3973
HTA100	MI00	15	298	597	895	1194	1492	1790	2089	2387	2686	2984	3282	3581	3879	4178	4476

HTB SERIES PARAMETER CHART

Modle	HTB1	HTB2	HTB3	HTB4	HTB5	HTB6	HTB7	HTB8	HTB9	HTB10
Bolt Size (M)	M20 M22 M24	M24 M27 M30 M33 M36	M33 M36 M39 M42	M39 M42 M45 M48	M52 M56	M56 M60 M64 M68	M72 M76	M70 M80 M85 M90	M95 M100	M105 M110 M115
Rated Stroke (mm)	8	8	8	10	10	12	12	12	12	12
Mpa	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN
10	23	32	54	66	94	110	142	170	207	253
20	45	65	109	132	188	220	284	339	413	506
30	68	97	163	198	283	330	426	509	620	759
40	90	130	217	264	377	440	568	678	827	1011
50	113	162	271	330	471	550	710	848	1034	1264
60	135	194	326	396	565	660	852	1018	1240	1517
70	158	227	380	462	659	770	994	1187	1447	1770
80	180	259	434	527	754	879	1137	1357	1654	2023
90	203	292	488	593	848	989	1279	1526	1861	2276
100	225	324	543	659	942	1099	1421	1696	2067	2529
110	248	356	597	725	1036	1209	1563	1866	2274	2782
120	270	389	651	791	1130	1319	1705	2035	2481	3034
130	293	421	705	857	1225	1429	1847	2205	2688	3287
140	315	454	760	923	1319	1539	1989	2374	2894	3540
150	338	486	814	989	1413	1649	2131	2544	3101	3793

HTS SERIES PARAMETER CHART

Model	HTS1A	HTS1	HTS2	HTS3	HTS4	HTS5	HTS6	HTS7	HTS8	HTS9	HTS10	HTS11	HTS12
Bolt Size (M)	M20 M22 M24 M27	M30 M33 M36	M33 M36 M39 M42	M39 M42 M45 M48	M52 M56	M50 M56 M60 M68	M72 M76	M76 M80 M85 M90	M95 M100	M105 M110 M115	M115 M120 M125	M130 M135 M140 M145	M145 M150 M160
Rated Stroke (mm)	8	8	8	10	10	12	12	12	12	12	12	12	12
Mpa	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN
10	32	35	54	66	94	110	142	170	207	253	327	417	562
20	65	71	109	132	188	220	284	339	413	506	653	834	1123
30	97	106	163	198	283	330	426	509	620	758	980	1251	1685
40	130	141	217	264	377	440	568	678	827	1011	1307	1668	2246
50	162	177	271	330	471	550	710	848	1034	1264	1633	2085	2808
60	194	212	326	396	565	660	852	1018	1240	1517	1960	2502	3369
70	227	247	380	462	659	770	994	1187	1447	1770	2287	2919	3931
80	259	283	434	527	754	879	1137	1357	1654	2022	2613	3336	4492
90	292	318	488	593	848	989	1279	1526	1861	2275	2940	3753	5054
100	324	353	543	659	942	1099	1421	1696	2067	2528	3267	4170	5615
110	356	389	597	725	1036	1209	1563	1866	2274	2781	3593	4587	6177
120	389	424	651	791	1130	1319	1705	2035	2481	3034	3920	5004	6738
130	421	459	705	857	1225	1429	1847	2205	2688	3286	4247	5421	7300
140	454	495	760	923	1319	1539	1989	2374	2894	3539	4573	5838	7861
150	486	530	814	989	1413	1649	2131	2544	3101	3792	4900	6255	8423

APPENDIX
A(Normalized addendum)

The 8.8 strength degree bolt permissible axial force, recommended force and recommended torque.

A1: consult the recommended force and recommended torque correctly in the appendix. The addendum is not applicable for serration thread bolt and expansion bolt.

A2: The fatigue strength of bolt has calculated into the permissible axial force F_A listed in form A1.

A3:Condition:

a. GB196 thread.

b. Axial force transfers its strength along the bolts' cente.

c. the surrounding temperature: -50～300ºC.

d. Daub lube on the bearing surface of thread, bolt head and nut.

A4: Considering to the soft material parts, you should install high-strength exclusive gasket under the bolt head and nut to avoid excess loss in recommended force.

A5:You can conversion to other degree of bolt, recommended force and recommended torque according to the following formulae:

5.6 degree: $\mathbf{F}_{V(5.6)} = 0.47\times \mathbf{F}_{V(8.8)}$

$\mathbf{M}_{A(5.6)} = 0.47\times \mathbf{M}_{A(8.8)}$

10.9 degree: $\mathbf{F}_{V(10.9)} = 1.41\times \mathbf{F}_{V(8.8)}$

$\mathbf{M}_{A(10.9)} = 1.41\times \mathbf{M}_{A(8.8)}$

12.9 degree: $\mathbf{F}_{V(12.9)} = 1.69\times \mathbf{F}_{V(8.8)}$

$M_{A(12.96)} = 1.69\times M_{A(8.8)}$

Permissible axial force

FORM A1

Notice: h_c clamping ply

Thread dimension		Nominal stress section	Permissible axial force KN					Recommended force Fv	Recommended torque M_A
			Hc/d						
Diameter(mm)	Pitch(mm)	Ac(mm)	2	3	4	6	>6	KN	N.m
M6	1	20.1	3	3	3	3	3	6.8	7
M8	1.25	36.6	7	7	7	7	7	12.5	18
M10	1.5	58	11	11	11	11	11	19.9	35
M12	1.75	84.3	16	17	17	16	16	29.1	61
M14	2	115.4	20	23	24	23	23	39.8	96
M16	2	157	27	32	33	32	32	55.3	149
M18	2.5	192	31	36	38	37	36	67.5	205
M20	2.5	245	36	42	49	51	50	86.3	290
M24	3	353	52	61	71	73	72	124.4	500
M30	3.5	561	85	100	115	118	116	199.1	1004
M36	4	817	124	146	168	173	170	291.4	1749
M42	4.5	1121	175	206	237	239	235	401.2	2806
M48	5	1473	231	273	314	315	310	528.6	4236
M56	5.5	2030	299	354	408	440	432	732.2	6791
M64	6	2676	384	454	583	586	574	958.9	10147
M72	6	3463	486	575	663	768	752	1265	14689
M80	6	4344	608	716	907	934	920	1563	19626
M90	6	5590	782	922	1168	1202	1185	2012	28584
M100	6	7000	980	1155	1463	1505	1484	2520	39960
M110	6	8560	1198	1412	1789	1840	1815	3081	53939
M120	6	10300	1442	1700	2152	2215	2183	3708	71034
M125	6	11200	1568	1848	2340	2408	2374	4032	80567
M140	6	14200	1988	2343	2968	3053	3010	5112	114800
M160	6	18700	2618	3085	3098	4020	3964	6732	173400

All atw products are guaranteed against defects in workmanship and materials for as long as you own them. Under this guarantee, free repair or replacement will be made to your satisfation.

RECYCLED PAPER

www.atwtools.com

液压螺栓拉伸器操作保养手册

本操作手册内容为液压螺栓拉伸器的操作规程、警告和注意事项以及故障排除。使用前，请仔细阅读本手册，彻底理解其内容并妥善保管。本说明书仅作为最终用户参考。
任何在此书上未提到的疑问或使用方法，请在安装和使用之前询问供应商。
ATW拒绝承担由以下情况引起的任何责任：
不适当的使用或者由非专业人士操作使用；
安装错误；
用油错误；
不进行保养维护；
未经生产商授权的改装或者拆卸；
使用非原装不见，使用型号不适用。

一 收货须知（开箱检查）

仔细检查产品外观有无损伤，是否有运输损坏。运输损坏不包括在保修范围内。如果发现因货运受损，应及时向货运商申报。货运商应支付运输损坏带来的所有维修和更换费用。

安全提示：

这是危险标记。每当你看到此标记，就意味着对人、动物和物品可能存在或多或少的危险。才此手册中这种危险和相关的预防措施都用此标记标出。

危险：忽略此警告可能会对人、动物或物品的安全存在重大风险。

敬请使用者仔细遵守这些操作，生产商拒绝对任何由使用不当引起的损坏和伤害承担任何责任。

二 概述

液压螺栓拉伸器是用于螺栓的快速紧固和拆卸上的。液压拉伸器工作时能精确控制预紧力、不损伤螺纹、操作简便、减轻劳动强度、缩短生产维修周期、有效地增加链接的可靠性及螺栓的抗疲劳强度、提高装配精度及安全系数。液压拉伸装置由螺栓拉伸器及高压油泵（手动、电动）组成。

工作原理

液压拉伸装置的主要部件是液压拉伸器。

超高压油泵输出的液压油，从拉伸器油缸上的快速接头注入，活塞与油缸在油压作用下产生相对运动，油缸的内螺纹带动螺栓产生拉伸力，使螺栓伸长；然后旋转螺母，从而实现对螺对螺栓的紧固与拆卸。

液压拉伸器与超高压油泵配合使用，同步进行，工作过程分为四步：

1 充油：油泵开始工作时，低压、大流量充油。

2 升压：在充油的基础上，不断继续加压，压力逐渐升高，螺栓也同时逐渐拉长，打到所需压力；此时螺栓打到伸长到预定值。

3 工作：用拔杆穿过支承套的窗口，锁紧或拆卸螺母，工作结束。

4 卸荷：工作完毕，需将压力调整为零；打开卸荷阀，液压油流回油泵储油箱。

三 主要结构

液压拉伸装置主要由超高压油泵和拉伸器两部分组成，由高压软管连接，成为一个完整的装置。一套拉伸装置可由1台超高压油泵与多台拉伸器组合。如下图1

系统装置简图

图1

液压拉伸器部分由活塞、油缸、密封圈、超高压泄压阀、泄压自动回复机构、支承套、手柄、排气螺钉、钢球、快速接头、护套等零配件组成。

油缸拧在需紧固的螺栓上。工作时，高压油泵出的液压油，经过高压软管，进入油腔，推动油缸移动从而使螺栓伸长。当锁紧螺母后，该压力卸除，螺母就紧锁在螺栓上。当拆卸螺母时，在所需的拆卸工作压力下，拉伸螺栓，旋松螺母。

装、卸的工作压力见使用油压表。

四 使用方法

使用前的准备

1 阅读使用说明书：使用前务必要认真阅读“超高压油泵”和“液压拉伸器”的使用说明书。

2 检查：仔细检查油泵、软管、液压拉伸器外观有否因运输或存贮不当所造成的损坏。如有损坏请酌情处理后再使用。

3 清洗、擦干：液压拉伸器及超高压油泵的内外表面特别是外露的活动表面必须保持清洁，须用清洁柴油或汽油清洗，然后用清洁毛巾擦拭干净。

4 确定用油牌号是否适当及油量是否充足。出厂前泵内均装满32#抗磨液压油。使用以后，当油量不足时，需及时补足。

5 在将螺栓拉伸器旋上螺栓之前，确保在螺母上有足够的螺纹突出量如图2。

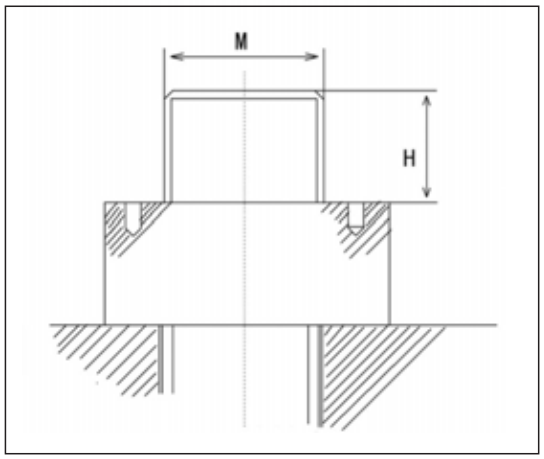


图2

6 检查螺栓在支撑面上的角度，如需要，应修正如图3。

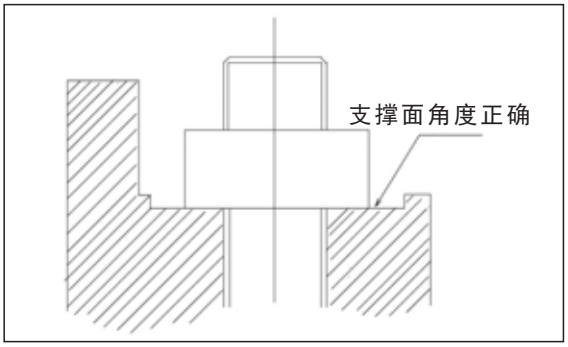


图3。

7 在使用螺栓拉伸器之前，在螺栓螺纹上涂抹润滑剂，润滑剂品种由用户自定。
8 在使用拉伸器之前，确保活塞在它的末端位置，如果螺栓拉伸器不具有活塞自动回位功能，则活塞必须用人力将它压回末端。

▲警告：在没有与螺栓联接紧固牢靠之前，不要想螺栓拉伸器输送压力。
▲注意：使用中应该避免液压油管严重弯曲和缠绕；
使用弯曲或缠绕的油管将产生过大的背压；
严重弯曲和缠绕使油管内部损坏，从而过早报废；
防止将重物掉到或压到油管上；
严重冲击可引起油管内部金属线损坏，加压时被损坏的油管可能破裂；
不能用液压油管拖拉及吊拿其它液压部件。
▲注意：使用ATW原厂高性能的液压配件。
▲注意：压力表出厂前已经校准合格，有效期为6个月。期满后，在使用过程中由用户自行校准。

连接与操作

将拉伸器旋紧在需拉伸的螺栓上。
▲警告：拉伸器的活塞必须全部进入油缸（行程为0）。
1 连接：将油泵出口接头、拉伸器进口接头及高压软管两端接头清洗干净后，相互插上，拧紧，即可进行工作。高压软管的弯曲半径应≥200mm。
2 操作：第一次使用油泵应先打开排气螺钉，充油排完空气后拧紧，根据所需压力，对装置进行加压，压力从压力表中读出。
3 紧固时，推荐两次拉伸，即第一次加压至固定压力，拧紧螺母后卸载，再加压一次，可提高紧固精度。
4 对于刚性平面接触的密封螺栓，可单只操作。对于带垫片的密封螺栓可采用多台共同操作。
5 在将螺栓拉伸器旋上螺栓之前，确保在螺母上有足够的螺纹突出量。
6 将拨套安放在螺母上。
7 一旦确认有正确的螺纹突出量，将螺母旋向支撑表面。
8 将拨杆插入拨套前方的孔中，旋紧或者拆松螺栓图4。

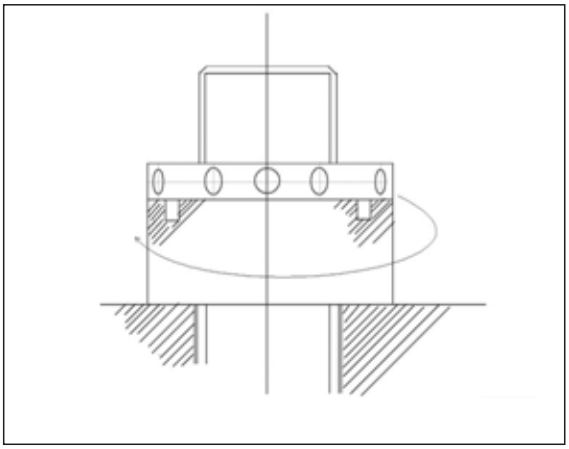


图4

注：1.用户请勿随意拆卸液压拉伸装置，以免造成损坏。
2.本产品不断进行科技创新，若本说明书内容更新，恕不通知，敬请谅解。

▲警告：拆下拉伸器前，HTA系列、HTB系列需要通过外力将活塞压入油缸（此时不能拆卸高压软管，以便使拉伸器内液压油回流油箱），使拉伸器的行程为“0”，方可再次拉伸，否则会有顶冲的危险。
▲注意：装置使用完毕，应擦拭干净，防锈后装箱；其中软管盘卷后，套入油泵手柄，以免窜动。

五 安全注意事项

1 在使用螺栓拉伸器之前，确保油管没有破损或扭结。不要使用损坏或不合格的油管。不要使用扭结的油管。高压软管的弯曲半径应≥200mm。
2 在压力升高过程中，保持与螺栓拉伸器3-5米的距离。绝对不要站在施加预紧力的正前方。液压油压的升高必须由操作人员仔细监视（通过压力表观察）。在连续压力升高的过程中，如发现压力似乎没有升高，应立即停止升压，此症状可能说明螺栓有拉伸变形的情况存在。因此必须立即检查螺联接的情况及尺寸配合的精度。
3 螺栓拉伸器不能超过它的最大行程。当达到最大行程时，在螺栓联接套上可以看到红色的标记。如果螺栓拉伸器操作超过它的最大行程，螺栓拉伸器不在起到任何功能。并且会导致漏油，拉伸器油缸密封在活塞自动回位（HTS等有自动复位功能的螺栓拉伸器）过程中损坏，及盖板螺纹损坏等情况。
4 液压拉伸装置工作完毕后，需将油泵压力减为零，否则液压油会喷射出来，污染衣物，且对人体可能会造成伤害。
5 超高压油泵见其使用说明书。

六 维护与保养

1 使用时，应轻装轻卸。液压拉伸器的配合面很精密，安装、拆卸时要注意保护，不可损坏有关配合面。
2 安装、更换密封圈时，要将密封圈表面及内、外活塞的表面用清洁柴油或汽油清洗干净。
3 使用完以后请将工具存放在干燥的地方。
4 超高压油泵见其使用说明书。

七 故障与排除

液压拉伸器本身一般不会出现故障。在工作中，液压油在内活塞与外活塞配合处渗出，可能是密封圈密封不良，应拆开检查密封圈的安装是否正确，外形是否完整。若密封圈外形变形、断裂，必须更换密封圈。
油泵的故障与排除、见油泵使用说明书。

操作步骤如图5：

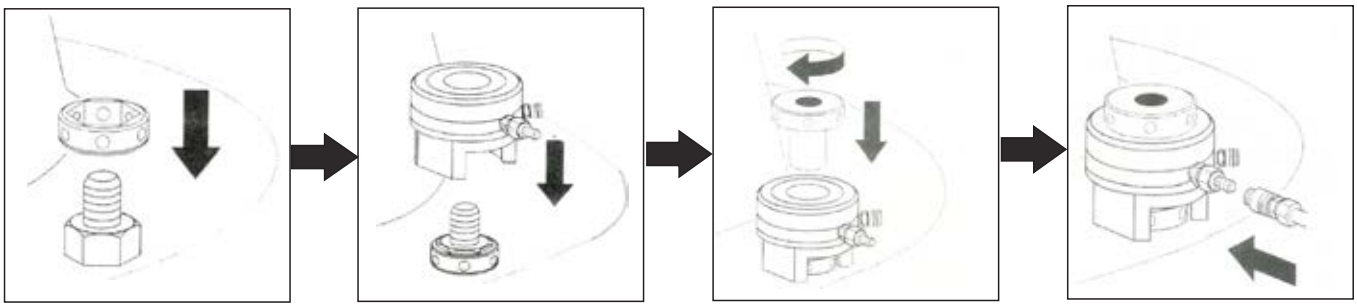


图5

注： 1.用户请勿随意拆卸液压拉伸装置，以免造成损坏。
2.本产品不断进行科技创新，若本说明书中的内容更新，恕不另行通知，敬请谅解。

八　拉伸器的使用噪音及运输

1、液压拉伸器噪音/振动声明

液压拉伸器使用噪声值为: ≤70db

2、液压拉伸器运输信息

2.1 搬运时注意轻拿轻放。

2.2 装运时应将产品立式向上，如图6所示。

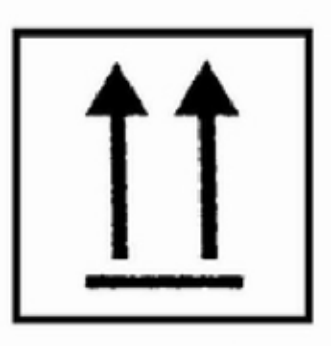


图6

2.3 产品搬运一般采用手提式或小车搬运移动、吊装移动，如图7所示。

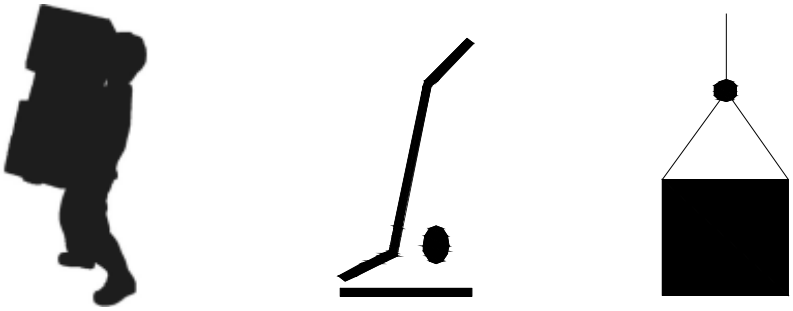
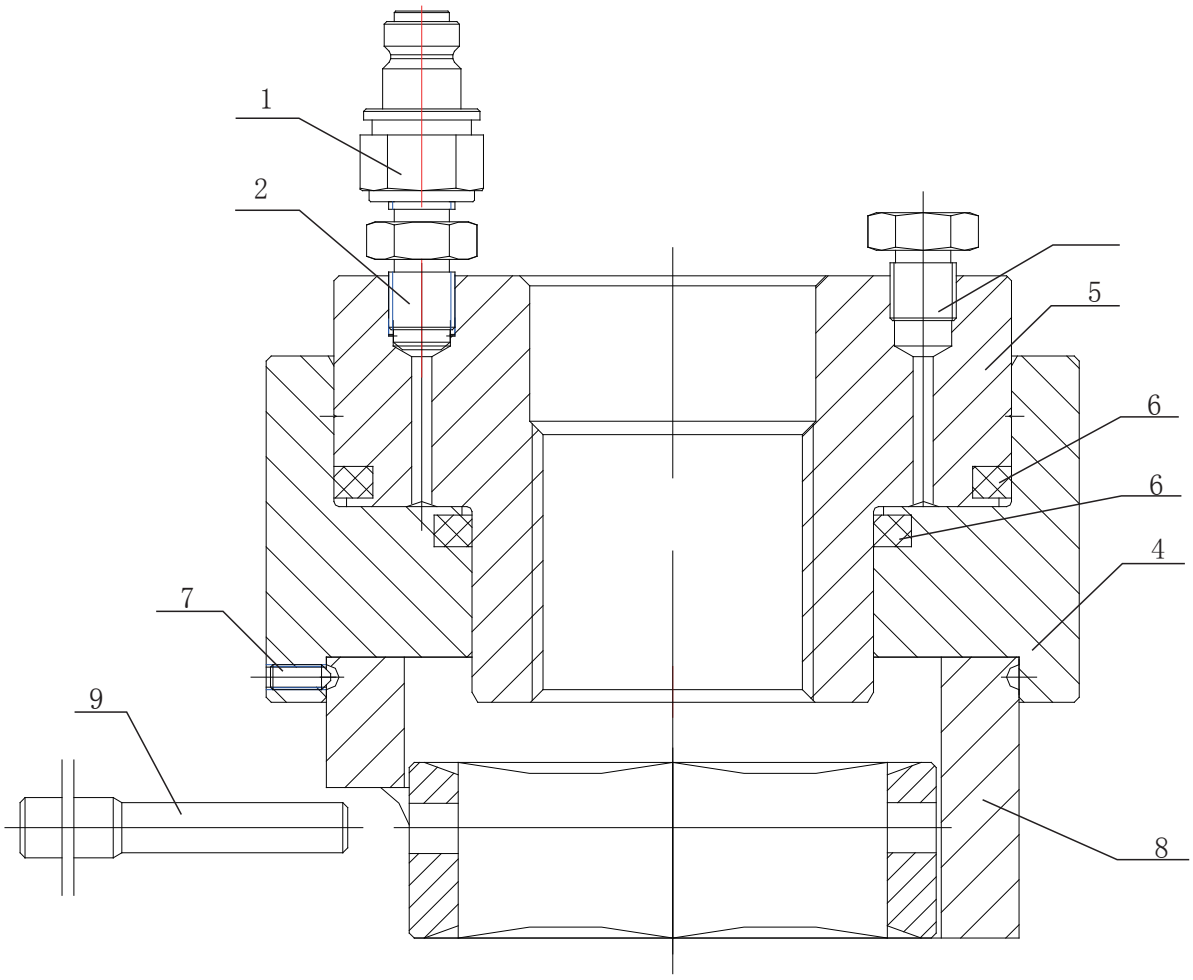


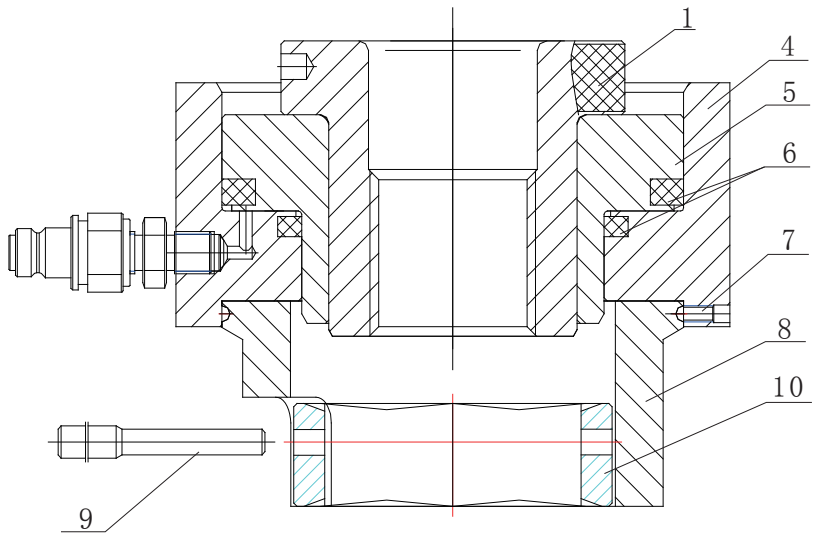
图7

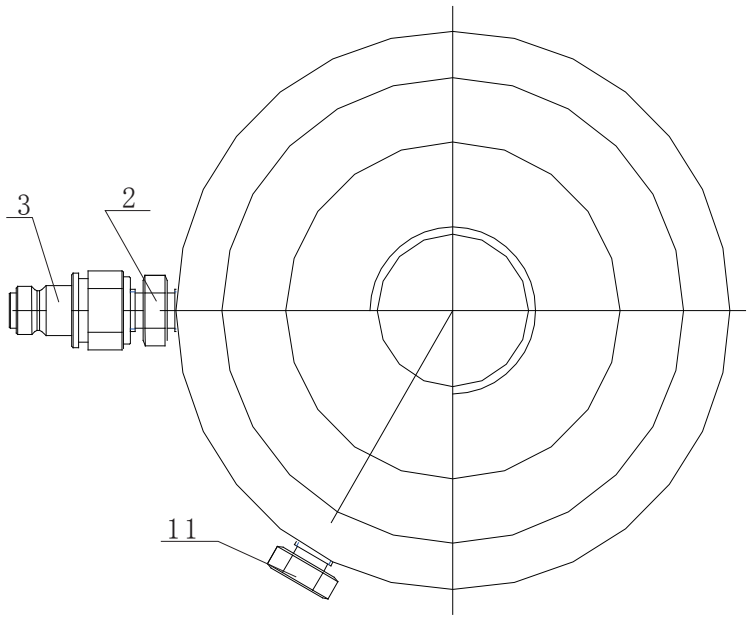
九　HTA系列外型图



序号	名称
1	快速接头
2	过渡接头
3	堵头
4	油缸
5	活塞
6	密封圈
7	紧定螺钉
8	底座
9	拔杆

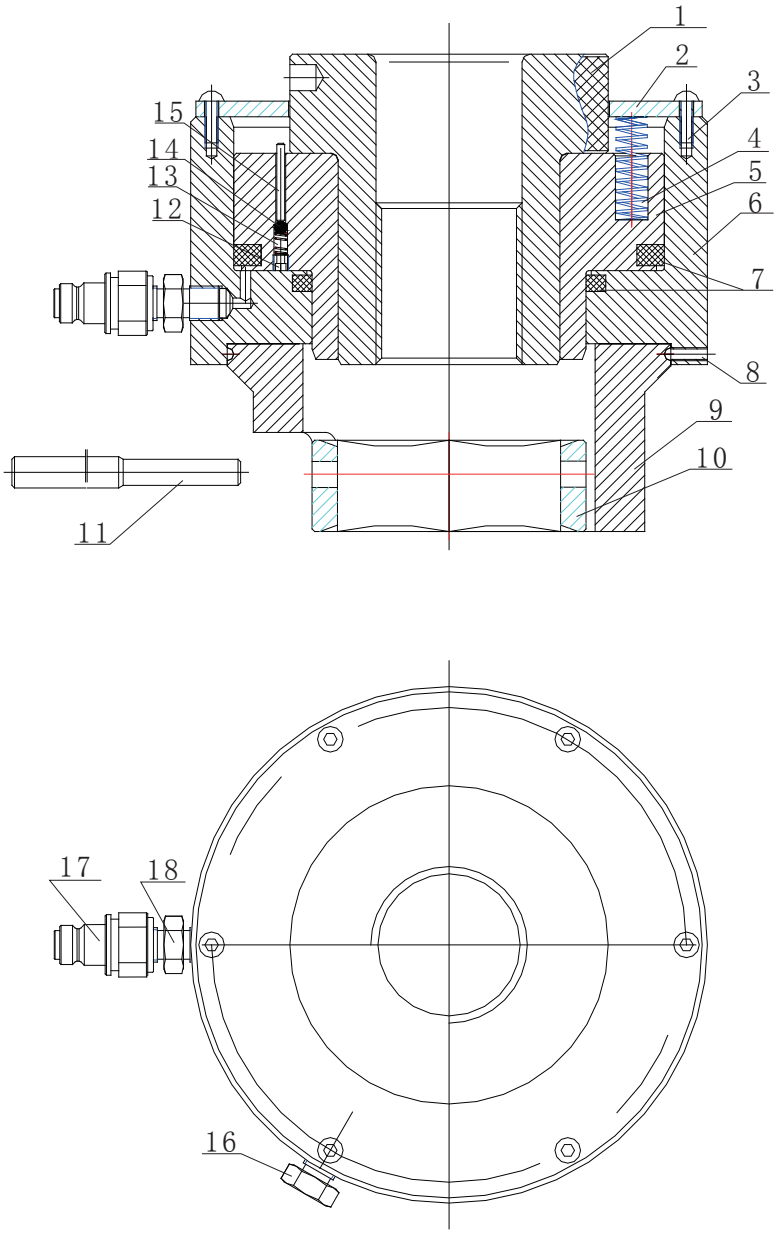
HTB系列外型图





序号	名　称
1	拉伸螺母
2	过渡接头
3	快速接头
4	油缸
5	活塞
6	密封圈
7	紧定螺钉
8	底座
9	拔杆
10	拔套
11	堵头

HTS系列外型图



序号	名称	序号	名称
1	拉伸螺母	13	弹簧
2	盖板	14	钢珠
3	螺钉	15	销
4	回复弹簧	16	堵头
5	活塞	17	快速接头
6	油缸	18	过渡接头
7	密封圈		
8	紧定螺钉		
9	底座		
10	拔套		
11	拔杆		
12	堵头		

十 HTA系列参数表

型号	适用螺栓(M)	额定行程(mm)	压力Mpa/KN														
			10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
HTA16	M16	10	12	24	36	48	60	72	84	95	107	119	131	143	155	167	179
HTA18	M18	10	13	27	40	54	67	81	94	108	121	135	148	162	175	189	202
HTA20	M20	10	14	28	42	57	71	85	99	113	127	141	155	170	184	198	212
HTA22	M22	10	19	37	56	74	93	112	130	149	167	186	205	223	242	260	279
HTA24	M24	10	22	44	65	87	109	131	153	174	196	218	240	262	283	305	327
HTA27	M27	10	26	52	78	103	129	155	181	207	233	259	285	310	336	362	388
HTA30	M30	10	30	61	91	121	151	182	212	242	272	303	333	363	393	424	454
HTA33	M33	10	41	82	122	163	204	245	286	326	367	408	449	490	530	571	612
HTA36	M36	12	51	102	154	205	256	307	358	410	461	512	563	614	666	717	768
HTA39	M39	12	55	109	164	219	274	328	383	438	493	547	602	657	712	766	821
HTA42	M42	12	58	117	175	233	291	350	408	466	524	583	641	699	757	816	874
HTA45	M45	12	64	128	191	255	319	383	447	510	574	638	702	766	829	893	957
HTA48	M48	12	75	149	224	298	373	448	522	597	671	746	821	895	970	1044	1119
HTA52	M52	12	89	177	266	354	443	531	620	708	797	885	974	1062	1151	1239	1328
HTA56	M56	12	93	186	279	371	464	557	650	743	836	929	1022	1114	1207	1300	1393
HTA60	M60	12	97	194	291	389	486	583	680	777	874	971	1068	1166	1263	1360	1457
HTA64	M64	12	113	226	339	452	565	678	791	905	1018	1131	1244	1357	1470	1583	1696
HTA68	M68	12	122	245	367	490	612	735	857	980	1102	1225	1347	1470	1592	1715	1837
HTA72	M72	12	148	297	445	594	742	890	1039	1187	1336	1484	1632	1781	1929	2078	2226
HTA76	M76	12	168	336	504	671	839	1007	1175	1343	1511	1679	1847	2014	2182	2350	2518
HTA80	M80	12	188	377	565	754	942	1131	1319	1508	1696	1885	2073	2262	2450	2639	2827
HTA85	M85	12	217	434	651	868	1085	1302	1519	1735	1952	2169	2386	2603	2820	3037	3254
HTA90	M90	15	240	481	721	961	1201	1442	1682	1922	2162	2403	2643	2883	3123	3364	3604
HTA95	M95	15	265	530	795	1059	1324	1589	1854	2119	2384	2649	2914	3178	3443	3708	3973
HTA100	M100	15	298	597	895	1194	1492	1790	2089	2387	2686	2984	3282	3581	3879	4178	4476

HTB系列参数表

型号	HTB1	HTB2	HTB3	HTB4	HTB5	HTB6	HTB7	HTB8	HTB9	HTB10
适用螺栓（M）	M20 M22 M24	M24 M27 M30 M33 M36	M33 M36 M39 M42	M39 M42 M45 M48	M52 M56	M56 M60 M64 M68	M72 M76	M70 M80 M85 M90	M95 M100	M105 M110 M115
额定行程（mm）	8	8	8	10	10	12	12	12	12	12
Mpa	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN
10	23	32	54	66	94	110	142	170	207	253
20	45	65	109	132	188	220	284	339	413	506
30	68	97	163	198	283	330	426	509	620	759
40	90	130	217	264	377	440	568	678	827	1011
50	113	162	271	330	471	550	710	848	1034	1264
60	135	194	326	396	565	660	852	1018	1240	1517
70	158	227	380	462	659	770	994	1187	1447	1770
80	180	259	434	527	754	879	1137	1357	1654	2023
90	203	292	488	593	848	989	1279	1526	1861	2276
100	225	324	543	659	942	1099	1421	1696	2067	2529
110	248	356	597	725	1036	1209	1563	1866	2274	2782
120	270	389	651	791	1130	1319	1705	2035	2481	3034
130	293	421	705	857	1225	1429	1847	2205	2688	3287
140	315	454	760	923	1319	1539	1989	2374	2894	3540
150	338	486	814	989	1413	1649	2131	2544	3101	3793

HTS系列参数表

型号	HTS1A	HTS1	HTS2	HTS3	HTS4	HTS5	HTS6	HTS7	HTS8	HTS9	HTS10	HTS11	HTS12
适用螺母（M）	M20 M22 M24 M27	M30 M33 M36	M33 M36 M39 M42	M39 M42 M45 M48	M52 M56	M50 M56 M60 M68	M72 M76	M76 M80 M85 M90	M95 M100	M105 M110 M115	M115 M120 M125	M130 M135 M140 M145	M145 M150 M160
额定行程（mm）	8	8	8	10	10	12	12	12	12	12	12	12	12
Mpa	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN	KN
10	32	35	54	66	94	110	142	170	207	253	327	417	562
20	65	71	109	132	188	220	284	339	413	506	653	834	1123
30	97	106	163	198	283	330	426	509	620	758	980	1251	1685
40	130	141	217	264	377	440	568	678	827	1011	1307	1668	2246
50	162	177	271	330	471	550	710	848	1034	1264	1633	2085	2808
60	194	212	326	396	565	660	852	1018	1240	1517	1960	2502	3369
70	227	247	380	462	659	770	994	1187	1447	1770	2287	2919	3931
80	259	283	434	527	754	879	1137	1357	1654	2022	2613	3336	4492
90	292	318	488	593	848	989	1279	1526	1861	2275	2940	3753	5054
100	324	353	543	659	942	1099	1421	1696	2067	2528	3267	4170	5615
110	356	389	597	725	1036	1209	1563	1866	2274	2781	3593	4587	6177
120	389	424	651	791	1130	1319	1705	2035	2481	3034	3920	5004	6738
130	421	459	705	857	1225	1429	1847	2205	2688	3286	4247	5421	7300
140	454	495	760	923	1319	1539	1989	2374	2894	3539	4573	5838	7861
150	486	530	814	989	1413	1649	2131	2544	3101	3792	4900	6255	8423

附 录

A(规范性附录）

8.8级螺栓许用轴向力、预紧力和预紧扭矩

A 1：参照本附录可方便地确定性能等级为8.8螺栓的预紧力和相应的预紧扭矩。本附录不适用于细牙螺纹的螺栓和膨胀螺栓。

A 2：表A1中所列的许用轴向力F_A考虑到了螺栓连接的疲劳强度。

A 3：采用本附录的条件为：

a. 螺纹符合GB 196;

b. 轴向力沿螺栓中心传递；

c. 环境温度-50—300℃；

d. 预紧时螺纹、螺栓头和螺母的承载面涂润滑油。

A 4：对于材质较软的（如A3等）被紧固件，为避免预紧力损失过大，应在螺栓头或螺母下加装高强度螺栓专用垫圈。

A 5：如采用其他性能等级的螺栓、预紧力和预紧扭矩可以按下列系数换算：

5.6级：$F_{V(5.6)} = 0.47 \times F_{V(8.8)}$

$M_{A(5.6)} = 0.47 \times M_{A(8.8)}$

10.9级：$F_{V(10.9)} = 1.41 \times F_{V(8.8)}$

$M_{A(10.9)} = 1.41 \times M_{A(8.8)}$

12.9级：$F_{V(12\ 9)} = 1.69 \times F_{V(8\ 8)}$

$M_{A(12.96)} = 1.69 \times M_{A(8.8)}$

表 A1

注:hc为紧固厚度

螺纹尺寸		螺纹公称应力截面积Ac(mm)	许用轴向力 KN					预紧力Fv KN	预紧扭MA N.m
			Hc/d						
直径 d(mm)	螺距 p(mm)		2	3	4	6	>6		
M6	1	20.1	3	3	3	3	3	6.8	7
M8	1.25	36.6	7	7	7	7	7	12.5	18
M10	1.5	58	11	11	11	11	11	19.9	35
M12	1.75	84.3	16	17	17	16	16	29.1	61
M14	2	115.4	20	23	24	23	23	39.8	96
M16	2	157	27	32	33	32	32	55.3	149
M18	2.5	192	31	36	38	37	36	67.5	205
M20	2.5	245	36	42	49	51	50	86.3	290
M24	3	353	52	61	71	73	72	124.4	500
M30	3.5	561	85	100	115	118	116	199.1	1004
M36	4	817	124	146	168	173	170	291.4	1749
M42	4.5	1121	175	206	237	239	235	401.2	2806
M48	5	1473	231	273	314	315	310	528.6	4236
M56	5.5	2030	299	354	408	440	432	732.2	6791
M64	6	2676	384	454	583	586	574	958.9	10147
M72	6	3463	486	575	663	768	752	1265	14689
M80	6	4344	608	716	907	934	920	1563	19626
M90	6	5590	782	922	1168	1202	1185	2012	28584
M100	6	7000	980	1155	1463	1505	1484	2520	39960
M110	6	8560	1198	1412	1789	1840	1815	3081	53939
M120	6	10300	1442	1700	2152	2215	2183	3708	71034
M125	6	11200	1568	1848	2340	2408	2374	4032	80567
M140	6	14200	1988	2343	2968	3053	3010	5112	114800
M160	6	18700	2618	3085	3098	4020	3964	6732	173400

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