

POWERMASTER

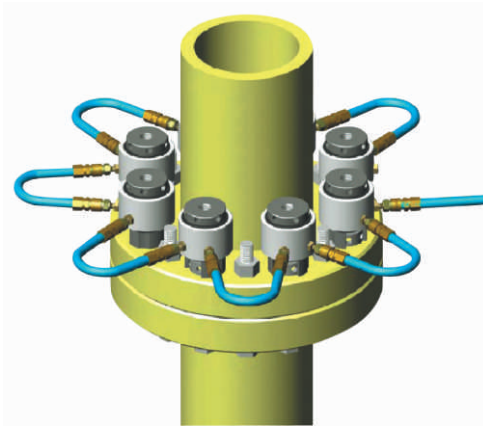
**BOLT TENSIONERS
PUMPS & ACCESSORIES**



Tools for every conceivable need.....

www.powermaster.in

BOLT TENSIONERS



Bolt tensioning is now the preferred method of tightening bolts and studs on all critical applications. Bolt tensioners are designed for operation in a wide variety of applications including pipeline flanges, heat exchangers, pressure vessels, compressor covers, boiler feed pumps, windmills and many others. We provide a comprehensive range of bolt tensioners for optimum solutions to bolt tensioning requirements. Our Bolt tensioners and accessories are CE marked in accordance with Pressure Equipment and Machinery Directives, as applicable. In comparison to traditional tightening methods, tightening with bolt tensioners offers significant advantages:

- No torsional loading of fasteners.
- Direct loading - no damage to assembly.
- Easy and fast operation.
- Very high accuracy and repeatability.
- Automation feasible and can be used for critical applications.

PST SERIES TOPSIDE BOLT TENSIONERS



PST Series Bolt Tensioners are designed for operation in a wide variety of applications including pipeline flanges, heat exchangers, pressure vessels, compressor covers, boilers feed pumps, anchors bolts and many others.

The PST Bolt Tensioner is very simple to use and consists of four parts -Threaded Puller, Load Cell, Bridge and Nut Driver (Nut Rotating Socket).

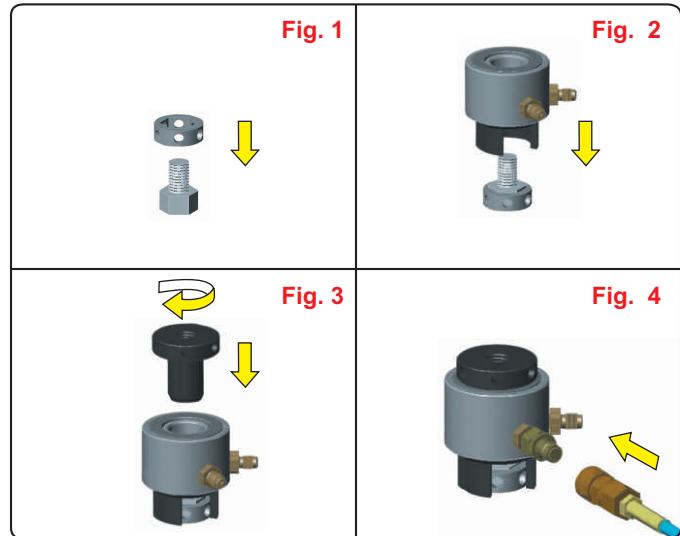
<p>THREADED PULLER</p>	<p>LOAD CELL</p>	<p>BRIDGE</p>	<p>NUT DRIVER / NUT ROTATING SOCKET</p>
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PST SERIES TOPSIDE BOLT TENSIONERS

Brief Operational Sequence

The nut-driver is placed over the nut (fig.1). The bridge and load cell is then placed over the bolt (fig.2). The Puller is then screwed over the stud protruding above the nut face (fig.3) making sure that at least 1 x diameter of bolt is engaged with the Threaded Puller.

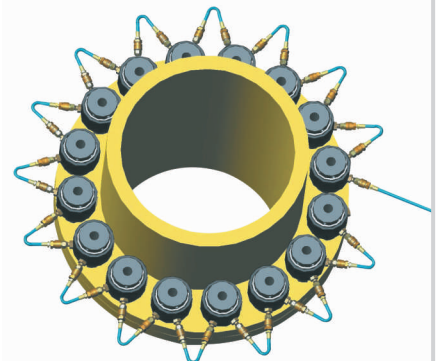
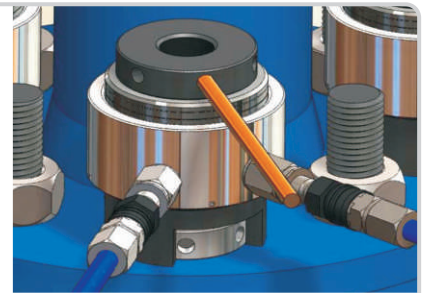
Desired hydraulic pressure is now applied to load cell, which stretches the bolt. (fig.4). The nut is turned down using the nut-driver and tommy bar. The Pressure is then released leaving the stud loaded to the desired value.



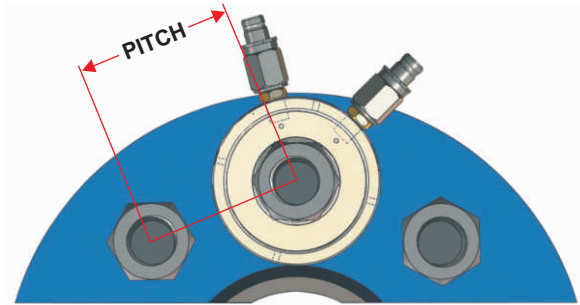
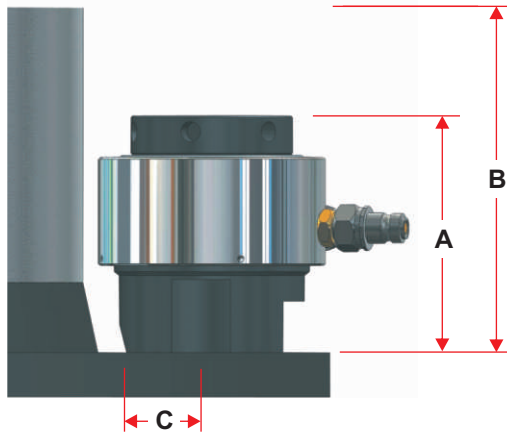
THE PST SERIES TOPSIDE BOLT TENSIONERS IS ONE OF THE MOST LIGHT, COMPACT AND VERSATILE LINE OF TENSIONERS AVAILABLE:

Features

- **Versatile Design:** The PST Series standard variable tensioners are designed to provide a wide range of flexibility, covering stud sizes from 3/4" to 5.3/4" (M-16 to M-150). Different stud sizes are accommodated by the same load cell by simply changing the adaptor kit consisting of Threaded Puller, Bridge and Nut Driver.
- **High Strength Aircraft Quality Alloy Steel:** The PST Series tensioners operate at a maximum pressure of 1500 Bar and are manufactured from high strength AISI 4340 alloy steel parts for long lasting trouble free performance.
- **Stroke Indicator:** The PST Series tensioners have and an exceptional stroke of 15 mm. The Integral Stroke Indicator allows the piston stroke to be viewed while tensioning is in progress. A Red line on piston indicates an over stroke ensuring safe operation.
- **Safe Design in event of Piston 'Over Stroke':** The PST series tensioners are designed so that in event of over-stroke the high pressure fluid will be released from the inner side of the load cell, thus saving the operator from any potential exposure.
- **Multi Tensioning:** The PST Series load cell is provisioned with two connections and this acts as a manifold for multi tensioning applications. By using high pressure link hoses, any number of bolt tensioners can be connected and used simultaneously. This ensures equal tightening of all bolts on the flange and reduces work time.
- **Anti Roll, Composite Material Seals:** All PST Tensioners are fitted with Anti Roll, Composite Material seals for longer life and high reliability. The seals used have a low coefficient of friction so that the piston can be returned to a closed position with minimal effort. PST Series tensioners can be provided with machined PU (poly urethane) seals if requested by the customer.
- **Floating Piston:** The unique piston design allows 2° tilt without any loss of load, preventing piston seizure or damage to piston bore.



PST SERIES TOPSIDE BOLT TENSIONERS

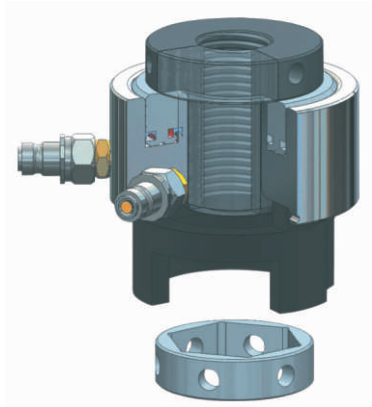


Technical Specifications

Model No.		Bolt Size		Max Load		Hyd Area		O.D.	Min Pitch	Relief C	Height A	Clearance B	Weight
Load Cell	Adaptor Kit	inch	mm	Ton	kN	in ²	mm ²	mm	mm	mm	mm	mm	kg.
PST-01	A1-0.12	3/4	20	38.1	339	3.50	2257	84	46	26	76	145	3.5*
	A1-M20		20						47	26	76	145	1.3
	A1-0.14	7/8	24						53	30	84	153	1.4
	A1-M24		24						54	30	84	153	1.4
	A1-1.00		1						55	30	84	153	1.4
PST-02	A2-M27	1.1/8	27	44.7	397	4.11	2649	98	56	29	88	157	4.5*
	A2-1.02		27						59	32	89	158	1.8
	A2-M30	30	62						32	89	162	1.9	
	A2-1.04	1.1/4	33						67	35	91	167	2.0
	A2-M33		33						68	35	91	168	2.1
	A2-1.06	1.3/8	36						72	38	93	173	2.3
PST-03	A3-1.04	1.1/4	36	71.8	639	6.60	4259	115	69	37	92	162	5.9*
	A3-M33		33						70	37	92	162	2.4
	A3-1.06	1.3/8	39						74	40	94	166	2.9
	A3-M36		36						75	40	94	167	2.9
	A3-1.08	1.1/2	39						80	43	98	175	3.0
	A3-M39		39						80	43	98	175	3.0
PST-04	A4-1.06	1.3/8	36	81.1	721	7.45	4808	128	75	41	94	167	7.7*
	A4-M36		36						76	41	94	167	3.4
	A4-1.08	1.1/2	39						81	43	98	172	3.6
	A4-M39		39						81	43	98	172	3.6
	A4-1.10	1.5/8	42						86	46	100	176	3.9
	A4-M42		42						86	46	100	177	3.9
	A4-1.12	1.3/4	42						91	49	101	181	4.0
PST-05	A5-1.10	1.5/8	42	105.9	942	9.73	6280	145	87	47	102	182	11.4*
	A5-M42		42						87	47	102	184	5.2
	A5-1.12	1.3/4	45						92	50	106	189	5.4
	A5-M45		45						93	50	106	190	5.4
	A5-1.14	1.7/8	48						98	53	109	196	5.6
	A5-M48		48						98	53	109	196	5.6
	A5-2.00	2	52						104	56	109	201	6.3
A5-M52	52	105	56	109	201	5.9							
PST-06	A6-1.14	1.7/8	48	152.2	1354	13.99	9028	165	99	54	109	194	14.8*
	A6-M48		48						99	54	109	194	7.1
	A6-2.00	2	52						105	57	112	199	7.6
	A6-M52		52						106	57	112	199	7.6
	A6-M56	56	113						61	116	208	7.8	
	A6-2.04	2.1/4	56						114	61	116	209	7.8

* Indicates weight of Load Cell +Adaptor Kit of particular size.

PST SERIES TOPSIDE BOLT TENSIONERS



Model No.		Bolt Size		Max Load		Hyd Area		O.D.	Min Pitch	Relief C	Height A	Clearance B	Weight
Load Cell	Adaptor Kit	inch	mm	Ton	kN	in ²	mm ²	mm	mm	mm	mm	mm	kg.
PST-07	A7-M56	2.1/4	56	185.6	1651	17.06	11006	180	112	59	117	205	18.1*
	A7-2.04		60						112	59	117	207	9.3
	A7-M60		60						117	61	122	214	9.4
	A7-2.08	2.1/2	64						125	66	125	221	9.7
	A7-M64		64						125	66	125	221	9.7
	A7-M68	68	129						66	130	231	10.0	
	A7-2.12	2.3/4	68						136	72	133	237	11.5
PST-08	A8-2.08	2.1/2	64	222.4	1978	20.44	13188	198	129	70	127	226	23.4*
	A8-M64								64	129	70	127	226
	A8-M68	68	132						69	132	233	12.3	
	A8-2.12	2.3/4	72						139	75	132	235	12.5
	A8-M72		72						141	75	135	240	12.5
PST-09	A9-2.12	2.3/4	72	253.7	2257	23.30	16485	215	139	75	137	241	29.3*
	A9-M72								76	141	75	137	241
	A9-M76	76	150						80	141	249	17.2	
	A9-3.00	3	150						80	141	255	17.2	
PST-10	A10-M80	3.1/4	80	342.5	3047	31.48	20312	244	160	87	152	258	40.3*
	A10-3.04		85						162	87	152	261	24.0
	A10-M85	3.1/2	85						164	87	154	264	24.5
	A10-3.08		90						174	93	158	268	22.6
	A10-M90	3.3/4	90						175	93	158	269	22.6
	A10-M95		95						179	93	164	280	22.8
	A10-3.12	4	100						191	105	164	280	22.9
	A10-M100		100						195	105	171	293	22.1
A10-4.00	4	100	197	105	171	293	22.1						
PST-11	A11-3.12	3.3/4	100	423.5	3768	38.94	25120	280	192	106	167	282	52.7*
	A11-M100								100	196	106	174	289
	A11-4.00	4.1/4	110						198	106	174	291	31.4
	A11-4.04		110						209	111	181	304	36.4
	A11-M110	4.1/2	110						210	111	181	305	36.4
	A11-4.08		120						222	118	186	316	39.7
	A11-M120	4.3/4	120						226	118	193	198	41.4
	A11-4.12		125						229	121	197	334	42.3
A11-M125	125	233	121	197	338	43.3							
PST-12	A12-M125	5	125	534.4	4754	49.13	31694	325	236	124	199	346	89.6*
	A12-5.00		130						243	129	199	351	60.3
	A12-M130	5.1/4	130						243	126	202	354	63.1
	A12-5.04		140						254	135	205	357	63.1
	A12-5.08	5.3/4	140						266	141	212	372	70.4
	A12-M140		140						260	135	212	372	70.6
	A12-5.3/4	150	276						145	213	381	70.8	
A12-M150	150	275	141	216	388	73.3							

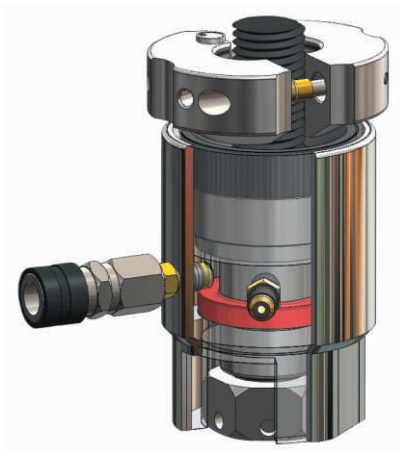
* Weight of Load Cell + Adaptor Kit of particular size.

Please refer to catalog sheet - 'Basics of Tensioning' for Bolt Tensioners application and tool pressure calculation.

TSS SERIES SUB SEA BOLT TENSIONERS

TSS Series Bolt Tensioners are specially designed for sub sea applications. These Tensioners are suitable for higher pressure rating flanges also. It's ergonomic design makes it very easy to handle and use by divers under the harsh sea conditions. These tensioners are designed to provide a wide range of flexibility, covering stud sizes 3/4" to 3.1/2" (M-18 to M-85).

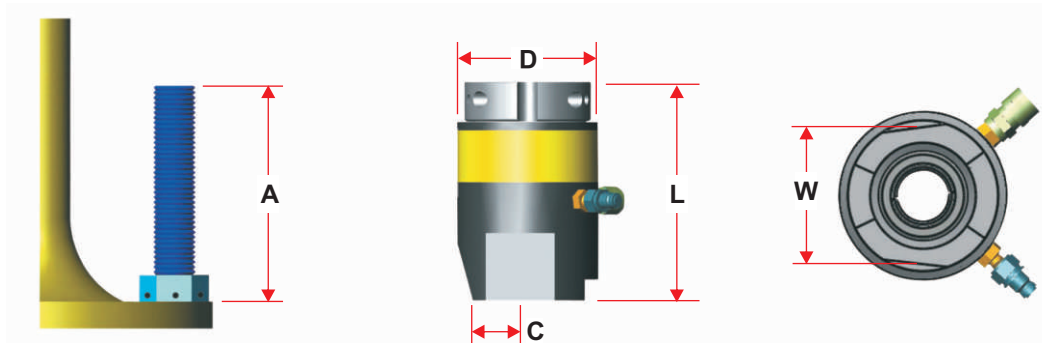
The tool consists of two basic parts - Tensioning Unit and Puller Nut as shown below:



Features

- **High Strength Stainless Steel Construction:** The Complete tool is made from high strength stainless steel for use in corrosive sea environment and to minimize maintenance.
- **Versatile Design:** Designed to provide a wide range of flexibility, covering stud sizes 3/4" to 3.1/2" (M-18 to M-85) using just 8 load cells.
- **Higher Load generation:** Generates higher load making it suitable for higher pressure rating flanges (API 170 - 10K).
- **Long Stroke And Stroke Indication:** All tensioners have a 25mm long stroke with piston marked with fluorescent rings for indication of stroke and over stroke limit.
- **Safe Design in event of Piston 'Over Stroke':** Designed to release high pressure hydraulic oil inwards in the event of over-stroke, thus saving the operator from any potential exposure.
- **Multi Tensioning:** The tensioning unit cell is provisioned with two connections that act as a manifold for multi tensioning applications.
- **Anti Roll, Composite Material Seals:** Fitted with Anti Roll, Composite Material seals for longer life and high reliability. The seals used have a low coefficient of friction so that the piston can be returned to a closed position with minimal effort. Sub Sea tensioners can be provided with machined PU (poly urethane) seals if requested by the customer.
- **Split Nut:** Optional Split Nut available for fast and easy fitment which ensures most efficient use of expensive diver time.
- **Safe Handling:** Provisioned with detachable hooks and strap for easy handling under water.
- **Non Slip Tool Surface:** Knurled and formed surface allows easy handling.
- **Fluorescent band:** Fluorescent band provided on load cell body for easy tool identification in poor visibility conditions.

TSS SERIES SUB SEA BOLT TENSIONERS



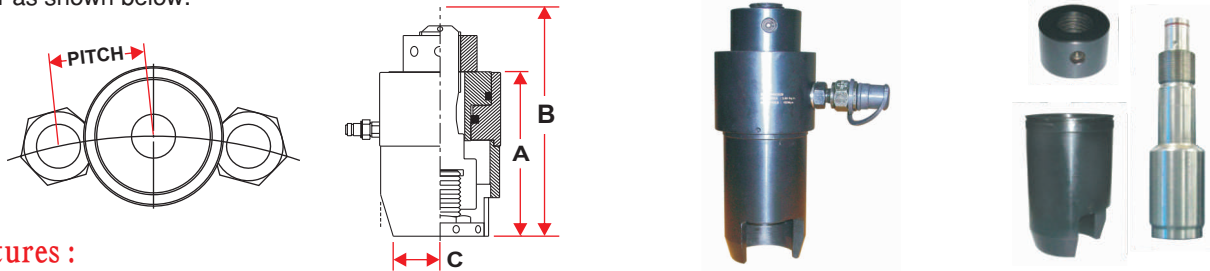
Specifications

Model No.		Bolt Size		Max Load		Hyd Area		D	C	W	L	A	Weight
Load Cell	Puller Nut.	inch	mm	Ton	kN	in ²	mm ²	mm	mm	mm	mm	mm	Kg.
TSS-03	PT03-0.12	3/4"		21.2	188	1.95	1256	65	30	46	100	122	3.6*
	PT03-M20		M20										0.4
	PT03-0.14	7/8"											0.4
TSS-04	PT04-M24			34.7	309	3.19	2061	83	30	64	123	153	6.1*
	PT04-1.00	1											0.8
	PT04-M27		M27										0.8
	PT04-1.02	1.1/8"											0.8
	PT04-M30		M30										0.8
TSS-05	PT05-1.04	1.1/4		54.2	482	4.98	3215	98	30	78	138	171	7.7*
	PT05-M33		M33										1.4
	PT05-1.06	1.3/8											1.4
	PT05-M36		M36										1.4
TSS-07	PT07-1.08	1.1/2		79.4	706	7.30	4710	113	30	93	147	186	11.3*
	PT07-M39		M39										2.1
	PT07-1.10	1.5/8											2.1
	PT07-M42		M42										2.1
TSS-11	PT11-1.12	1.3/4		119.1	1060	10.95	7065	136	60	113	152	197	19.0*
	PT11-M45		M45										3.5
	PT11-1.14	1.7/8											3.5
	PT11-M48		M48										3.5
	PT11-2.00	2"											3.8
TSS-15	PT15-M56			174.7	1554	16.06	10362	162	60	141	171	229	31.4*
	PT15-2.04	2.1/4"											7.7
	PT15-M60		M60										7.7
	PT15-2.08	2.1/2"											8.5
	PT15-M64		M64										8.5
TSS-20	PT20-2.12	2.3/4"		219.4	1952	20.17	13011	190	60	166	194	266	45.0*
	PT20-M72		M72										9.5
	PT20-M76		M76										11.0
	PT20-3.00	3"											11.0
TSS-27	PT27-M80			268.7	2390	24.70	15935	214	60	191	208	288	62.5*
	PT27-3.04	3.1/4"											13.0
	PT27-M85		M85										15.0
	PT27-3.08	3.1/2"											15.0

* Weight of Load Cell + Puller Nut.

CST SERIES COMPACT SLIMLINE BOLT TENSIONERS

CST Series are slimmer, variable type Bolt Tensioners consisting of five parts - Puller, Puller Nut, Load Cell, Bridge & Nut Driver as shown below:



Features :

- **Versatile Design:** Designed to provide a wide range of flexibility, covering stud sizes 3/4 " to 2.1/2" (M-20 to M-64).
- **High Strength Alloy Steel Construction :** All Parts are made from high strength Aircraft Quality alloy steel for long lasting performance and better safety factor.
- **Stroke Indication:** Marked Piston indicates stroke and provides an over stroke indication.
- **Safe Design:** Designed to release high pressure hydraulic oil inwards in event of over-stroke, thus saving the operator from exposure.
- **Anti Roll, Composite Material Seals :** Fitted with Anti Roll, Composite Material seals for longer life and high reliability. The seals used have a low coefficient of friction so that the piston can be returned to a closed position with minimal effort. Sub Sea tensioners can be provided with machined PU (poly urethane) seals if requested by the customer.
- **Floating Piston:** The unique piston design allows 2° tilt without any loss of load and prevents piston seizure or damage of piston bore.

Specifications

Model No.		Bolt Size		Max Load		Hyd Area		O.D.	Min Pitch	Relief C	Height A	Clearance B
Load Cell	Adaptor Kit	inch	mm	Ton	kN	in ²	mm ²	mm	mm	mm	mm	mm
CST-24	A24-0.12	3/4		26.4	235.1	2.43	1568	68	42	37	173	192
	A24-M20		M20						43	38	173	193
	A24-0.14	7/8							44	41	175	197
	A24-M24		M24						46	44	177	201
	A24-1.00	1							47	46	178	203
	A24-M27		M27						49	50	180	207
CST-36	A36-1.02	1.1/8		47.6	423.2	4.37	2822	88	53	53	240	269
	A36-M30		M30						55	55	241	271
	A36-1.04	1.1/4							56	58	243	274
	A36-M33		M33						57	60	244	277
	A36-1.06	1.3/8							59	63	246	281
	A36-M		M36						61	65	247	283
CST-41	A41-M3		M36	59.8	531.6	5.49	3545	103	76	65	267	303
	A41-1.08	1.1/2							78	69	269	307
	A41-M39		M39						79	70	270	309
	A41-1.10	1.5/8							81	74	272	314
	A41-M42		M42						82	75	273	315
CST-48	A48-M42		M42	84.6	752.7	7.78	5019	118	92	75	296	338
	A48-1.12	1.3/4							93	80	298	343
	A48-M45		M45						94	81	299	344
	A48-1.14	1.7/8							96	85	302	349
	A48-M48		M48						97	86	302	350
CST-55	A55-M48		M48	104.1	926.2	9.57	6176	130	104	86	327	375
	A55-2.00	2							106	91	330	381
	A55-M52		M52						107	93	331	383
	A55-M56		M56						109	100	335	391
	A55-2.04	2.1/4							109	102	336	393
CST-60	A60-2.04	2.1/4		191.8	1261.6	13.04	8413	148	117	102	367	424
	A60-M60		M60						120	107	370	430
	A60-2.08	2.1/2							121	113	374	437
	A60-M64		M64						124	113	374	438

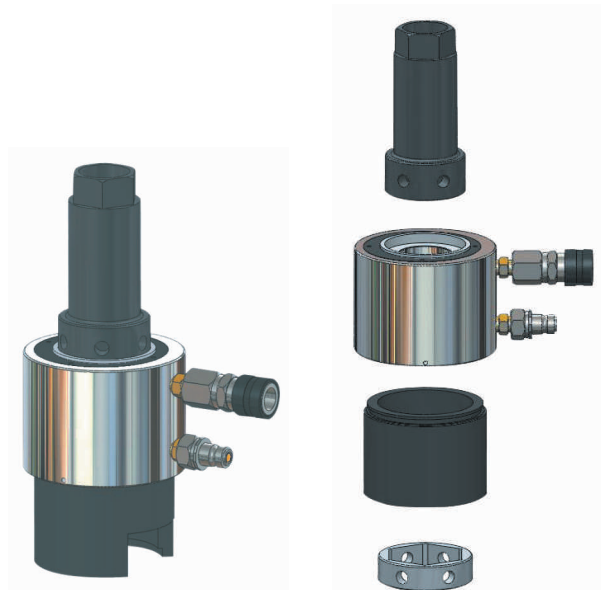
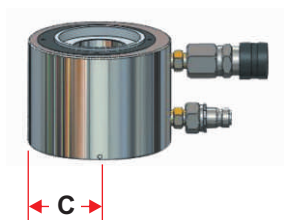
WIND MILL TENSIONERS

The wind mill bolting applications has its own restrictions for use of tools due poor open working environment and restricted space for application. Towers are high and pneumatic supply is normally not practical for tools. Tools required must be light in weight compact in size and must use energy source readily available at site.

We have two types of tensioners for WIND MILL Applications i.e. DA Series and CAT Series. The 700 bar “DA Series” are specially designed for Base Bolt applications, while the “CAT Series”, 1500 bar tensioners are for versatile applications from Tower Base to Turbine Blades.

DA Series Base Bolt Tensioner :

These tensioners are specially designed for Base Bolt applications of Wind Mill Towers. Tensioning is carried out using standard Hydraulic Torque Wrench Powerpack. Though most applications are covered by our two models as referred below, customised sizes are available against requirement.



Specifications

Model No.	Bolt Size	Max Load	Max Dia	Stroke	Dim. C	OAL	Weight
		kN	mm	mm	mm	mm	Kg.
DA - 3639	M33 - M36	385	116	25	54	138	4.3
DA - 3336	M30 - M33	357	102	25	49	138	5.2

The main features of DA Series tensioners are as below :

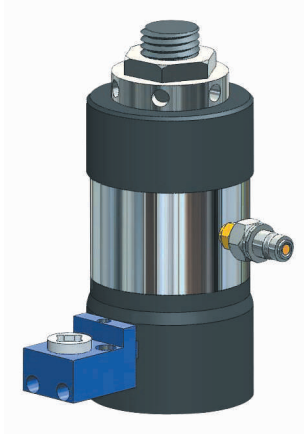
- **Double Acting Design:** The double acting action of load cell helps in fast and automatic return of the piston thus making the operation very safe, easy and fast.
- **700 Bar Working Pressure:** The 700 bar working pressure to facilitate the operation using standard Electrical Power-pack, used for hydraulic torque wrenches thus reducing inventory.
- **Versatile Sizes:** Can be used for Metric, Imperial and William Threads by changing to required puller.
- **Hard Chrome Plating:** The cylinder of DA Series tensioner is hard chrome plated for better corrosion resistance and long working life at rough working environment of wind farms.
- **Alloy Steel Construction:** All parts are made from High Strength Alloy Steel for better safety factor and compact design.
- **Long Stroke:** DA series tensioners are provisioned with 25mm long stroke for completion of bolt elongation in single pull.

NOTE : Customised design with different load capacity available to specific requirement.

WIND MILL BOLT TENSIONERS

CAT Series Bolt Tensioner :

These 1500 bar working pressure tensioners are specially developed from our Compact series to meet auto retract and ease of operation requirement of wind mill application.



With Auto Retraction



Without Auto Retraction

Specifications

Model No.	Bolt Size		Max Load kN	Max Dia mm	Stroke (mm)	
	Metric	Imperial			Standard	Long
CAT - 18	M16 - M 18	5/8 - 3/4	114	53	10	-
CAT - 22	M20 - M22	3/4 - 7/8	188	64	10	-
CAT - 27	M24 - M27	7/8 - 1	271	74	15	25
CAT - 33	M30 - M33	1.1/8 - 1.1/4	369	86	15	25
CAT - 39	M36 - M39	1.3/8 - 1.1/2	458	97	15	25

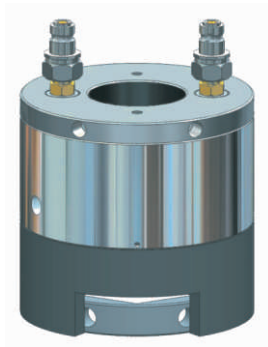
The main features of CAT Series tensioners are as below :

- **Compact Design:** The tensioners are designed with smaller dia for ease of tool fitment.
- **Higher Working Pressure:** 1500 bar working pressure to generate higher load with smaller hydraulic area of tensioner.
- **Geared Nut Drive:** Geared Nut Driver to move the nut faster and with ease using standard 1/2" Square Drive Wrench.
- **Longer Stroke:** Tool is available with standard and long stroke as per application.
- **Alloy Steel Construction :** All parts are made from High Strength Alloy Steel better strength and compact design.
- **Customised Adaptor Kits :** CAT series tensioners are available with both standard and customised adaptor kit.
- **Optional Auto Spring Return:** Standard tensioners are available with optional auto spring retraction for fast and easy retraction of piston.

SPECIFIC APPLICATION BOLT TENSIONERS

Dedicated Tensioner :

Dedicated Tensioners are used for Specific Thread Size Application. In these tensioners the threaded piston acts as a puller too. These tensioners are specially designed for applications having space restrictions, both around and above the stud bolt.



These tensioners are designed and supplied to specific application requirement and have the below specific features:

- **Compact Design:** The dedicated tensioner has a very compact dia for required load and size with nominal requirement of operational height.
- **Customised Stroke:** Tool is available with standard 15mm and customised stroke as per application.
- **Alloy Steel Construction:** All parts are made from High Strength Alloy Steel for better strength and compact design.
- **Delivery:** In-house design and production facilities ensure faster customization and delivery.

Multistage Tensioner :

These tensioners are slimmer diameter tools generating high application load. Its unique design combines the load generated by two load cells, stacked together.

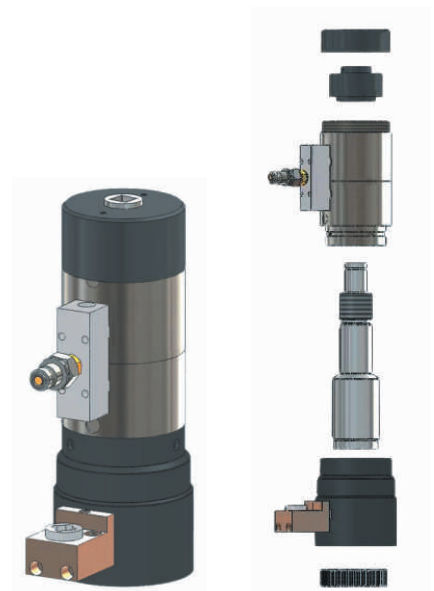
These tensioners are used for low clearance high load applications on application like Gearboxes, Gas-Turbines and Windmill applications etc.

These tensioners too have 1500 bar max operating pressure. These are available for sizes from 1" to 3" (24mm to 72mm for metric sizes) for different thread configurations. Optional Auto Spring Return Feature makes the operation very fast and easy.

Standard tools have geared Nut Driver to move the nut faster and with ease using standard 1/2" Square Drive Wrench. If required tool is supplied with standard nut driver.

All parts of these tensioners are made of Special High Strength Alloy Steel for better design and safety requirement.

These tools too are mostly made to customised requirement for specific application.



AIR OPERATED TENSIONER HYDRAULIC PUMP PU-AH-1500



The PU-AH-1500 air operated pumps are designed and manufactured in collaboration with Maximator GmbH, Germany and meet the highest technical and safety requirements of high pressure equipment.

Pump		
Pressure Ratio		1:350
Displacement Volume	Cm3	1,3
Operating Pressure, Max. (at 5.1 bar Pre Limited (PL) Air Pressure)	bar	1.800
Compressed air supply (air drive)		
System Operating Air Pressure, Max.	bar	5.1
Safety Valve Set Pressure	bar	5.5
Stainless Steel Tank Capacity		
Oil Tank capacity	litre	5

Other Models with higher maximum operating pressures, digital pressure gauges and larger hydraulic reservoir capacities are available as per customer requirements.

Technical Features :

- **Stainless Steel Frame:** The hydraulic unit is installed in a weather proof stainless steel protection frame.
- **Logical Control Panel:** Logical layout design engraved for easy operation.
- **Calibrated Pressure Gauge:** Calibrated 150mm (6"), liquid filled, SS Frame, 2500 bar rating pressure gauge with dual reading of bar & psi.
- **Complete Air System:** System includes FRL Unit, air pressure gauge and control knob for safe air control and supply.
- **Higher Operating Pressure:** Pump has max working pressure of 1500 bar to cover all bolt tensioning applications.
- **Light Weight:** Unit weighs only 18 Kg and measures 450mm x 340mm x 480mm.
- **Lower Input air Pressure:** Higher pressure ratio of 1 : 350 ensures less input air pressure for operation.
- **Quick Connect Outlet:** Pump comes fitted with quick connect outlet for easy connection of hydraulic hose.

HAND PUMP PU-HP-1500

Hand Pump

This hand pump is specially designed for bolt tensioner applications. The pump is compact and light in weight with longer handle needing very little effort to generate max working load. All pumps are supplied with suitable fittings and stainless steel 4" dia pressure gauge.



Model No.	Description	Usable Oil Capacity (Liters)	Outlet Coupler	Dimensions			Net Weight Kg.
				Length mm	Width mm	Height mm	
PU-HP-1500	1500 bar Hand Pump c/w 200 bar gauge	2.0	HCS-150-F	750	120	200	11.0

HIGH PRESSURE ACCESSORIES

High Pressure Tensioner Hoses :

High Pressure Tensioner Hoses for various tensioning applications are available in different lengths and end-fittings:



Hose Reel



Lead Hose



Connecting Hose

Features:

- 4- Ply construction.
- Available in 1.5m, 3m and 5m standard lengths. Other custom built lengths also available.
- Max. Working Pressure : 1800 Bar.
- Burst Pressure : 4500 Bar.
- Min. Bend Radius : 150mm
- All hoses fitted with quick connect Couplings at both ends.
- Working Temperature Range: -30 to 80 Deg C.
- Tensioner Hose Reel of upto 500m single hose for sub sea applications available with required end fittings.

Part No.	OAL Mtr.	QRC
PU-HG-0150	1.5	F X F
PU-HG-0300	3.0	F x F
PU-HG-0300-L	3.0	F x M
PU-HG-0500	5.0	F x F
PU-HG-0500-L	5.0	F x M

Manifolds, Fittings and Couplings :

Manifolds, Fittings and Couplings of various configurations are available for all tensioning applications:



Couplings



Fittings



Manifolds

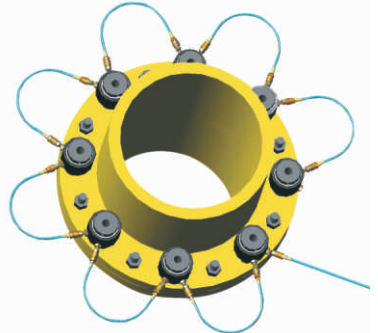
- Manifold /Blocks for 1500 working pressure.
- T-Fittings for 1500 Bar working pressure.
- Male / Female Couplings for 1500 and 2500 bar working pressure.
- High Pressure Fittings and Adaptors.

Part No.	Description
HCS-150-F	Coupling, 150 Mpa
HCS-150-M	Nipple, 150 Mpa
HCS-250-F	Coupling, 250 Mpa
HCS-250-F	Nipple, 250 Mpa
HF-G4-G4	Fitting, G 1/4 CS
HF-G4-M16	Fitting G 1/4 x M16

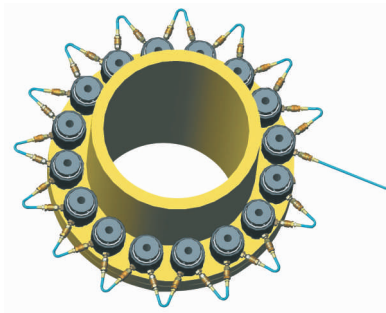
BOLT TENSIONER APPLICATION

Important formula :

- (A) **Residual Bolt Load** = Bolt Stress x Bolt Tensile Stress Area
 = (Bolt Stretch x Modulus of Elasticity x Bolt Tensile stress area) ÷ Effective Length.
- (B) **Bolt Tensile Stress Area** = $(3.14 \times D \times D) \div 4$ (D is smallest Stress Dia of Bolt)
- (C) **% of Yield Strength** = (Bolt Stress Required / Yield Strength of bolt) x 100
- (D) **Hydraulic Pressure** = (Residual Bolt Load x Load Relaxation Factor) ÷ Hydraulic Area of Load Cell.
- (E) **Load Relaxation Factor** = $1.01 + (\text{Bolt Size (Dia.)} \div \text{Effective Length})$ or 1.1 which ever is greater.



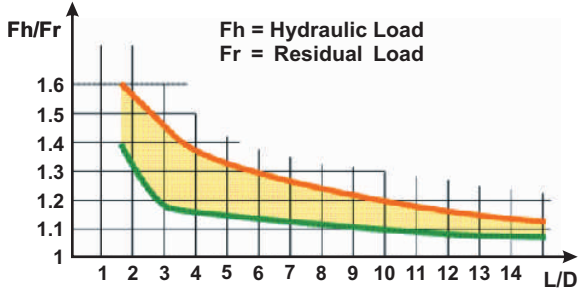
50% Tool Coverage



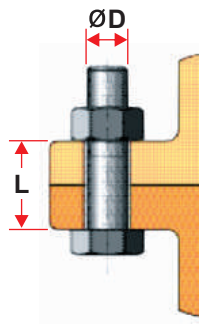
100% Tool Coverage

Basic Calculation and Working :

- a. Calculate Bolt Residual Load: Residual Load can be calculated from known stress or bolt stretch requirement.
- b. Calculate Load Relaxation factor using Bolt Dia and Effective Length. It can be calculated from below formula / Chart.



■ Fine Pitch ■ Coarse Pitch



- c. Calculate application hydraulic load.
- d. Calculate hydraulic pressure for required hydraulic load.
- e. Select Tensioning Procedure. (25%, 50%, 100%...etc.)
- f. Calculate pass load as applicable. (Max applied load should never exceed 95% bolt yield strength).

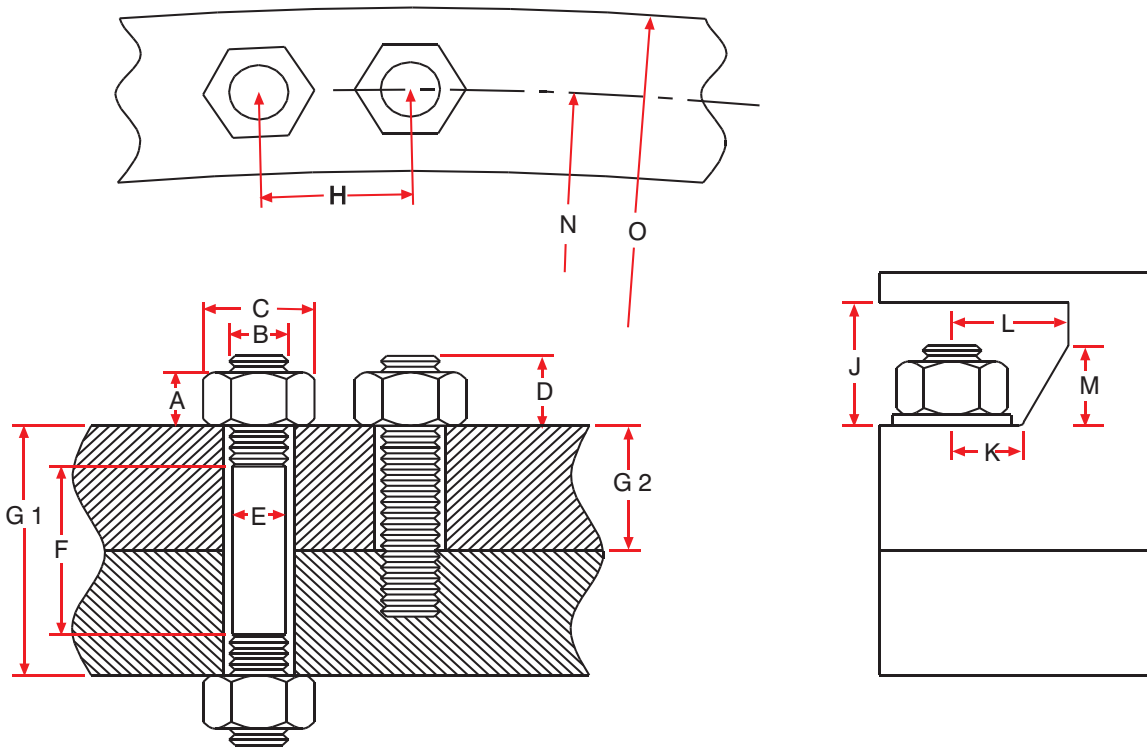
Useful Conversions :

Area	: 1 millimeter ² (mm ²) = 0.00155 inch ² : 1 centimeter ² (cm ²) = 0.155 inch ²	1 inch ² = 645.16 mm ² 1 inch ² = 6.4516 cm ²
Load (Force)	: 1 Metric Ton (mt) = 1.10231 Short Ton (US) : 1 Kilo Niwton, kN = 224.8089 lb : 1 Metric Ton (mt) = 9.8066 kN	1 mt = 0.9842 Long Ton (UK) 1 kN = 0.0958 mt 1 st = 0.0958 mt
Pressure	: 1 Megapascal (MPa) = 10 Bar : 1 Kg per cm ² (Kg/cm ²) = 0.98066 Bar	1 bar = 14.5037 psi 1 bar = 1.0197 Kg/cm ²
Pressure	: 1 Megapascal (MPa) = 10 Bar	1 bar = 14.5037 psi

APPLICATION CHECKLIST

Dimensional Details

- | | |
|-----------|----------|
| A) _____ | H) _____ |
| B) _____ | I) _____ |
| C) _____ | J) _____ |
| D) _____ | K) _____ |
| E) _____ | L) _____ |
| F) _____ | M) _____ |
| G1) _____ | N) _____ |
| G2) _____ | O) _____ |



- Number of stud threads per inch. _____ Stud material. _____
- Stud strength. _____ Desired retained stress in stud. _____
- Internal diameter if nut fits in a counterbore (or spot face diameter). _____
- Depth if nut fits in a counterbore (or spot face depth). _____
- Service temperature. _____ Desired stroke or amount of flange compression. _____
- Will studs be loaded individually or several at a time? _____
- If several, how far will studs be apart? _____ How many studs? _____

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