



**Bolt Tensioning Technology
for Wind Turbines**



www.torcup.com

WTB Series

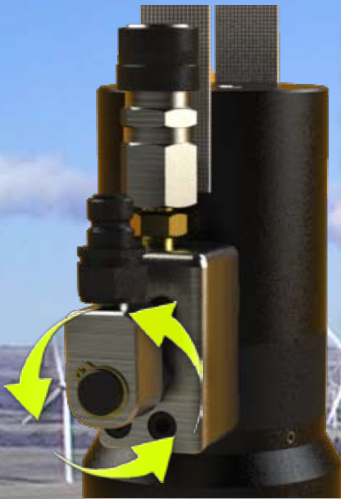
Fully aware of the difficulties associated with wind turbine blade tensioning, the new TorcUP WTB Series is a purpose designed range of hydraulic bolt tensioning tools to suit most wind turbine bolting applications. All WTB Tensioning tools have the capacity to achieve the specified proof load requirements as detailed in EN ISO 898-1:1999 and ASTM A490M for grade 10.9 Bolts. These feature packed tensioners have been designed with rapid tensioning in mind and offer a safe, reliable and consistent method to simultaneously tension many bolts.

Main Wind Turbine Bolted Applications for WTB Series

- Rear Main Bearing
- Blade to Bearing
- Nacelle Frame
- Bearing to Hub
- Nacelle/Yaw Bearing
- Front Main Bearing
- Intermediate Tower Bolting

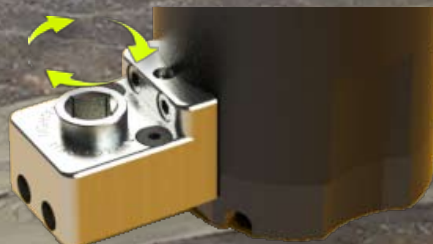
Swivel movement ensures versatility

Due to the very limited space available in many blade bolt compartments and to help where many tensioners are connected together every WTB tensioner has the option of a 360° swivel connection. This 360° swivel operation allows the hydraulic hoses to be positioned in the best possible position to allow open access to the tensioning tools.



Geared Nut Run-Down

The inclusion of a gear nut run-down mechanism offers a very rapid and consistent way of seating the hexagon nuts during the tensioning procedure. A common 1/2" square drive hand torque wrench can be used to rapidly seat the nuts to the required 14.75 ft.lbs (Max) torque.



Important Safety Information

At the heart of all TorcUP WTB tensioners is the Puller. Manufactured from high grade space material and carefully designed to give the maximum possible life.

All TorcUP WTB tensioners have a feature that ensures the tool fails safely in the event of a puller failure.



WT-Slip

To ensure the nut rotation gearbox is not over torqued, TorcUP can supply an optional slip wrench **WT-Slip**, preset to an optimum 14.75 ft.lbs torque.

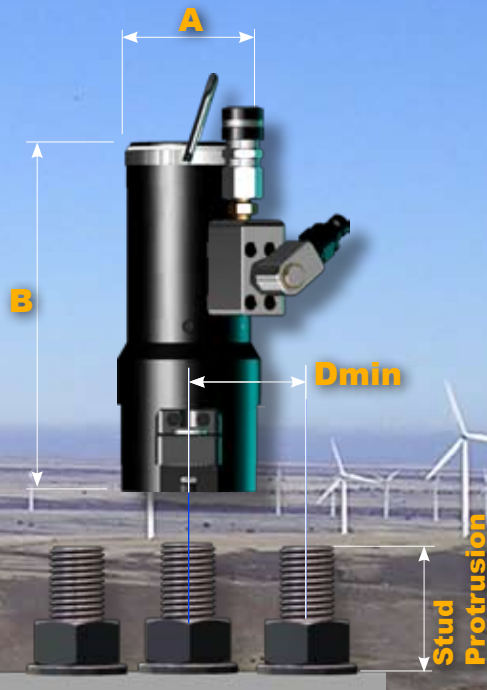
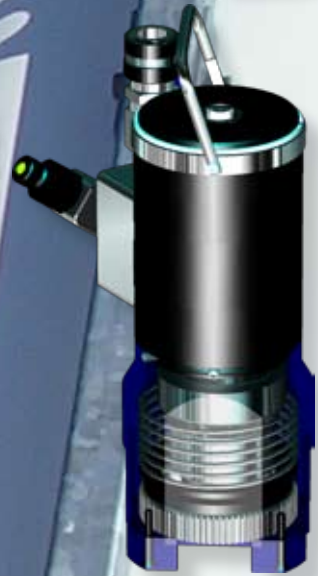


'Best Fit'

WTB Tensioners are profile cut at the base to ensure they fit onto as many applications as possible. The interchangeable profile cut spacer at the base of the tool gives the tensioner the flexibility to be used on many different applications. The replaceable Spacer is also a good maintenance feature allowing "swap out" of a damaged tensioner base.

Automatic Tensioner Reset

To increase speed all WTB tensioners are fitted with a spring mechanism that automatically resets the tensioner once the pressure has been released to zero. The tensioner is then automatically ready to tension the next bolt, no operator intervention is required.



"Snap-Down" Nut Drive.

Again to increase speed all WTB tensioners are fitted with a spring loaded device that automatically engages the tensioner drive socket with the hexagon nut. The operation is completely transparent to the operator and no time is wasted aligning the tensioner with the nut.

Specially Designed Tools

TorcUP can supply bespoke special Bolt Tensioning Tools for instances where standard tools are not suitable. Contact TorcUP for more information

WTB Series

Maximum Working Pressure = 19580psi

Ident	Bolt Diameter	Stud Protrusion (mm)		Max Stroke	Maximum Load		Hydraulic Pressure Area		Dia A	Height B	D	Weight
	Metric	Min	Max	mm	kN	lbs	mm2	ln2	ln	ln	ln	lbs
WTB30	M30	59	69	8	465.38	104622	3447.21	5.343	2.83	8.07	2.52	13.58
WTB33	M33	64	73	10	575.80	129444	4265.09	6.611	3.11	8.56	2.80	15.96
WTB36	M36	71	81	10	678.26	152478	5024.05	7.787	3.33	9.04	3.03	19.29
WTB39	M39	76	86	10	810.58	182225	6004.20	9.307	3.62	10.35	3.27	24.51
WTB42	M42	83	93	10	929.67	208999	6886.37	10.674	3.82	10.33	3.74	28.10

WTB Series - Low Height

Maximum Working Pressure = 19580psi

Ident	Bolt Diameter	Stud Protrusion (mm)		Max Stroke	Maximum Load		Hydraulic Pressure Area		Dia A	Height B	D	Weight
		Min	Max		mm	kN	lbs	mm2				
	Metric	Min	Max	mm	kN	lbs	mm2	ln2	ln	ln	ln	lbs
WTBLH36	M36	71	91	10	678.14	152452	5023.4	7.79	4.84	6.59		21.97
WTBLH42	M42	83	103	10	930.15	209106	6889.96	10.68	5.61	7.14		30.72

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WTF Series

The new WTF is a purpose designed range of hydraulic bolt tensioning tools designed to suit most wind turbine foundation bolting applications. The WTF tensioning tools can be supplied to suit many different All Thread Bars and the more conventionally ISO metric and Imperial Unified Thread forms. These feature packed tensioners have been designed with rapid tensioning in mind and offer a safe, reliable and consistent method to simultaneously tension many Foundation bolts. The TorcUP WTF range of tensioning tools have been fully site evaluated in the wind energy industry.

25mm (1") Ram stroke for 'One Pull' Tensioning

Due to the unusual length of foundation bolts and the methods used to anchor the bolts into the foundation structure, it is usual to experience relatively large amount of bolt extension during foundation bolt tensioning. For this reason it is very important that the bolt tensioning tool used has plenty of piston/ram stroke capacity. The WTF range of tensioners offer up to 25mm piston/ram stroke capability for "one Pull" uninterrupted tensioning. Shorter Stroke foundation tensioners are available from TorcUP to be used where bar protrusion is limited.

Short Stroke Foundation Tool



Elliptical Foundation Tool

Low Height Foundation Tool

Long Stroke Foundation Tool

Wind Turbine Foundation/Base Bolting



Geared Nut run-down

TorcUP offer a gear nut run-down mechanism which provides a very rapid and consistent way of seating the foundation hexagon nuts during the tensioning procedure. A common 1/2" Square drive hand torque wrench can be used to rapidly seat the nuts to the recommended 30Nm (max) torque. Alternatively TorcUP offer the same foundation tensioning tools but with manual nut run-down.



Important Safety Information

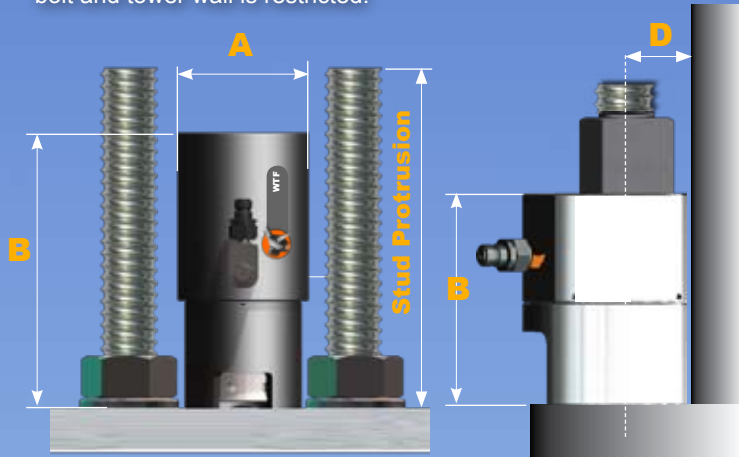
Many competitive wind turbine tensioners rely on the operator to continually monitor the stroke of the tensioning tool. Over extending the maximum piston stroke can lead to early seal failure or internal damage to the tool

All TorcUP WTF tensioners have a feature that physically prevents piston overstroke.

Suitable Load Capacity for Grade 75ksi & 150ksi All Thread Foundation Bolts. Variable Bar Diameter, Variable Bar Protrusion

Versatile.

The amount of thread protruding from a foundation bolt nut can vary significantly from turbine to turbine. To overcome this variation the WTF Bolt tensioning tool is available in both short and long stroke variations. An elliptical WTF tool is also available for use when clearance between the bolt and tower wall is restricted.



Long Stud Protrusion Models

When the amount of stud protrusion allows, the long stroke tensioner is ideally suited, offering a 25mm uninterrupted bolt pull.

Short Stud Protrusion Models

When the stud protrusion is limited, the long stroke tensioners may not be suitable, in this instance a short stroke WTF tensioner is available.

Automatic Tensioner Reset

Again to increase speed all WTF tensioners are fitted with a spring mechanism that automatically resets the tensioner once the pressure has been released to zero. The tensioner is then ready to tension the next bolt, no operator intervention is required.



WTF Series - 75ksi - All Thread Bar

Maximum Working Pressure = 19580psi
Except WTF-7566 MWP = 21750psi

Tool Ident	Foundation Bolt Type	Gear Box	Stud Protrusion (In)		Max Stroke	Maximum Load		Hydraulic Pressure Area		Dia A	Height B	D	Weight
			#10	#11	In	kN	lbs	mm2	In2				
WTF-8041	Grade 75ksi All Thread	Y	10.236	10.118	0.98	472.6	106245	3500.72	5.426	4.33	9.09	2.20	23.89
WTF-8148	Grade 75ksi All Thread	N	10.236	10.118	0.98	472.6	106245	3500.72	5.426	4.33	9.09	2.20	23.08
WTF-8040	Grade 75ksi All Thread	Y	7.874	7.756	0.39	472.6	106245	3500.72	5.426	4.25	6.22	2.17	15.56
WTF-8147	Grade 75ksi All Thread	N	7.874	7.756	0.39	472.6	106245	3500.72	5.426	4.25	6.22	2.17	14.74
WTF-7566 Elliptical	Grade 75ksi All Thread	N	8.071	7.795	0.39	469.3	105503	3128.83	4.85	5.59	5.67	1.61	22.04

WTF Series - 150ksi - All Thread Bar

Tool Ident	Foundation Bolt Type	Gear Box	Stud Protrusion (In)		Max Stroke	Maximum Load		Hydraulic Pressure Area		Dia A	Height B	D	Weight
			1 3/8	1 1/4	In	kN	lbs	mm2	In2				
WTF-8342	Grade 150ksi All Thread	Y	10.630	10.827	0.98	762.45	171405	5647.79	8.754	4.92	9.65	2.43	31.61
WTF-8343	Grade 150ksi All Thread	N	10.630	10.827	0.98	762.45	171405	5647.79	8.754	4.92	9.65	2.43	31.61
WTF-8340	Grade 150ksi All Thread	Y	8.465	8.780	0.39	762.45	171405	5647.79	8.754	4.84	6.89	2.46	21.42
WTF-8341	Grade 150ksi All Thread	N	8.465	8.780	0.39	762.45	171405	5647.79	8.754	4.84	6.89	2.46	21.42

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Typical Tensioner Bolting Area's on a Wind Turbine.

TorcUP offer a complete range of wind turbine bolt tensioning tools. Due to the variations in wind turbine designs and manufacture, special and modified tensioner solutions are available from TorcUP. Below are details of typical bolting areas on a generic wind turbine.

- Quick Delivery Local Stock
- On-Site Support
- On-Site Training
- Technical Assistance
- Easy On-Site Tool Maintenance



1 Rear Main Bearing



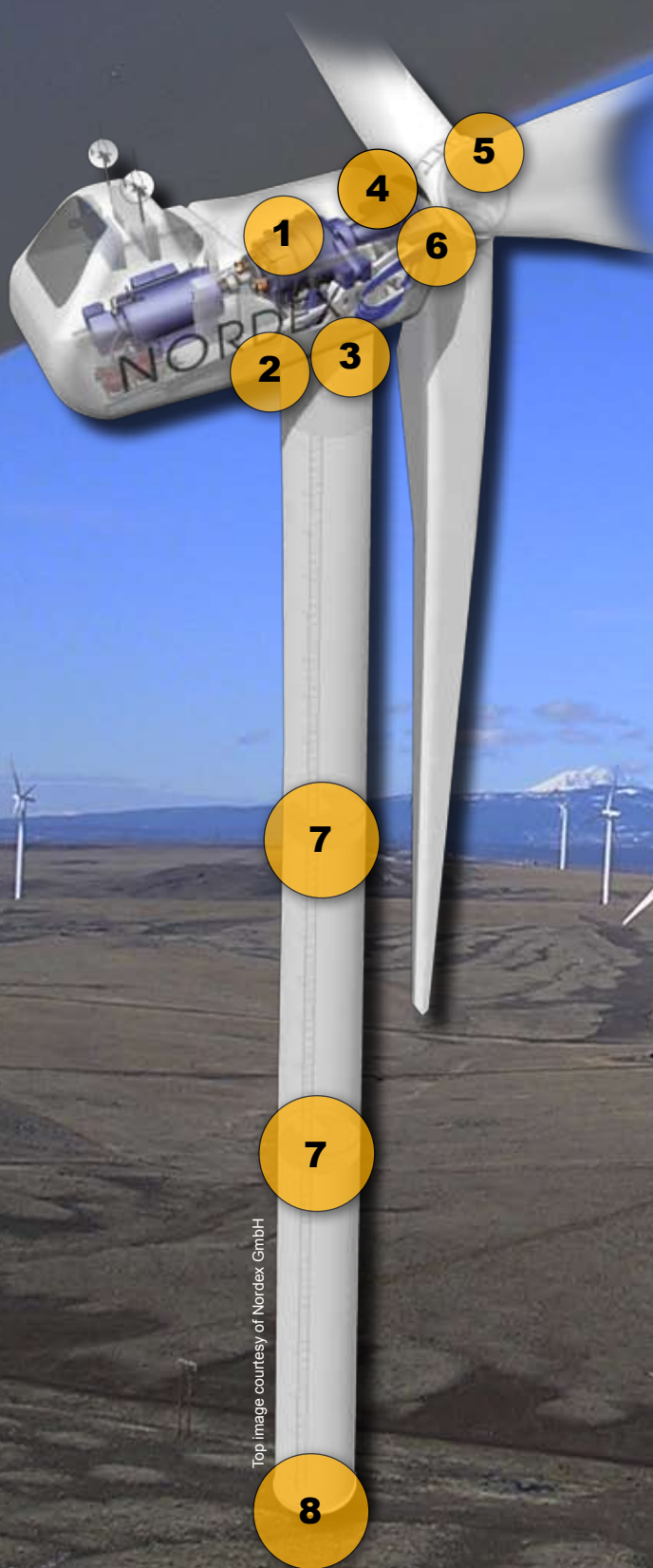
2 Nacelle Frame



3 Nacelle / Yaw Bearing



4 Main Shaft to Hub



5 Blade to Bearing



6 Front Main Bearing



7 Tower Bolting



8 Foundation Bolting

Top image courtesy of Nordex GmbH

WTP3

Wind Turbine Bolt Tensioning Electric Driven Pump Unit

The TorcUP WTP3 is a self contained electric driven high pressure hydraulic pump unit that can generate pressures of up to 1600 bar. The unit is a perfect match with the wind turbine range of bolt tensioning tools from TorcUP. One of the major features of the WTP3 Pump unit is the ability to totally remote control the pump from the controller hand grip. The WTP3 unit is designed to work in adverse environmental conditions, to ensure its durability the unit is certified to IP-56.

External Dimensions

- Length = 15.75 In
- Width = 11.02 In
- Height = 22.44 In
- Weight (Empty) = 81.54 lb
- Weight (Full) = 91.9 lb

Oil Capacity

- Total Oil Capacity = 1.24 Gal
- Usable Oil Capacity = 0.449 Gal

Pressure

• Pressure = 23206 psi
(Available in higher pressure configurations)

Oil Flow

- Max Flow at Low Pressure (below 11603 psi) = 0.06604 Gal/min
- Max Flow at High Pressure (over 11603 psi) = 0.01611 Gal/min

Controller Hand Grip

Ergonomic hand remote controller
Controlling functions:-

- Start Up
- Pressure Rise
- Unit Stop
- Pressure Relief
- Emergency Pressure Relief Button.

Optionally available with hydraulic pressure display.

WTP3 - Available Power Supplies

230v - 50 Hz

115v - 60 Hz

Contact TorcUP to discuss alternative electrical configurations.





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