



Dual Dimension

ABOUT BOLTING SYSTEMS™

Best in Class
Hydraulic Pumps,
Torque Wrenches,
Tensioners,
Nut Splitters,
Flange Spreaders,
Other Tools and Software.



Bolting Systems, a brand of Hydraulic Technologies is a full service global manufacturer of controlled bolting solutions, including hydraulic torque and tensioning systems, industry specific certified training programs, system rentals and flange management database software. We are your partner in flange management, both in regards to infrastructure construction, operations and maintenance applications, enabling you to complete your project safely, in less time and on budget.

Bolting Systems was formed when Hydraulic Technologies, acquired Torque Tension Systems LTD (TTS), of Ashington, UK. The new partnership combined the best high pressure (700 bar/10,000 psi) hydraulic power pack manufacturer, Power Team, with a premier torque and tensioning tool manufacturer, resulting in a “best-in-class” bolting system.

Bolting Systems is dedicated to furthering controlled bolting solutions, engineering and manufacturing new technologies and utilizing advancements in material technology. This resulted in the continuous development of innovative products offering weight and size reduction, with increased safety, performance and durability.

Bolting Systems has Rental, Sales & Service facilities located around the globe, with plans to add further service centers in other key locations to support our valuable customers. Repair & Calibration center locations include Houston, Texas, USA | Corpus Christi, Texas, USA | Baton Rouge, LA, USA | Additional customer service offices are located in the Singapore, and Netherlands. We also have a large distribution network that can offer local sales and service support in over 150 countries.

TOOLS

- Torque Wrenches
- Tensioners
- Nut Splitters
- Flange Spreaders

PUMPS

- Air Pumps - Torque
- Electric Pumps - Torque
- Gas Pumps - Torque
- Manual Pumps - Torque
- Air Pumps - Tension
- Electric Pumps - Tension
- Manula Pumps - Tension

ACCESSORIES

- Hoses
- Couplers / Fittings
- Hydraulic Fluids

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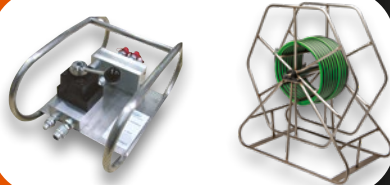
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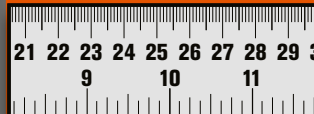
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Lifetime
WARRANTY
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Worry-Free
Ownership



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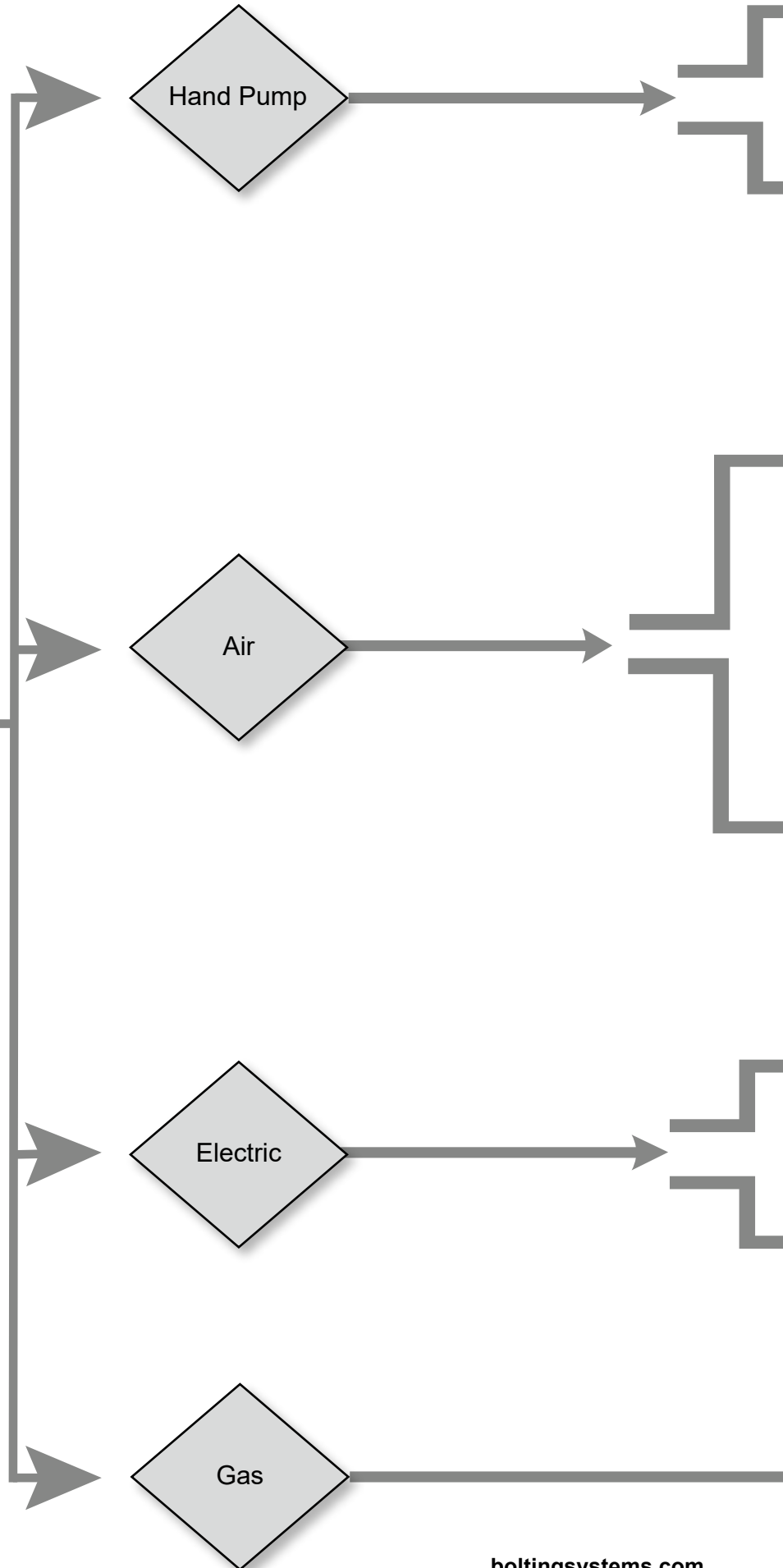
TORQUE WRENCHES

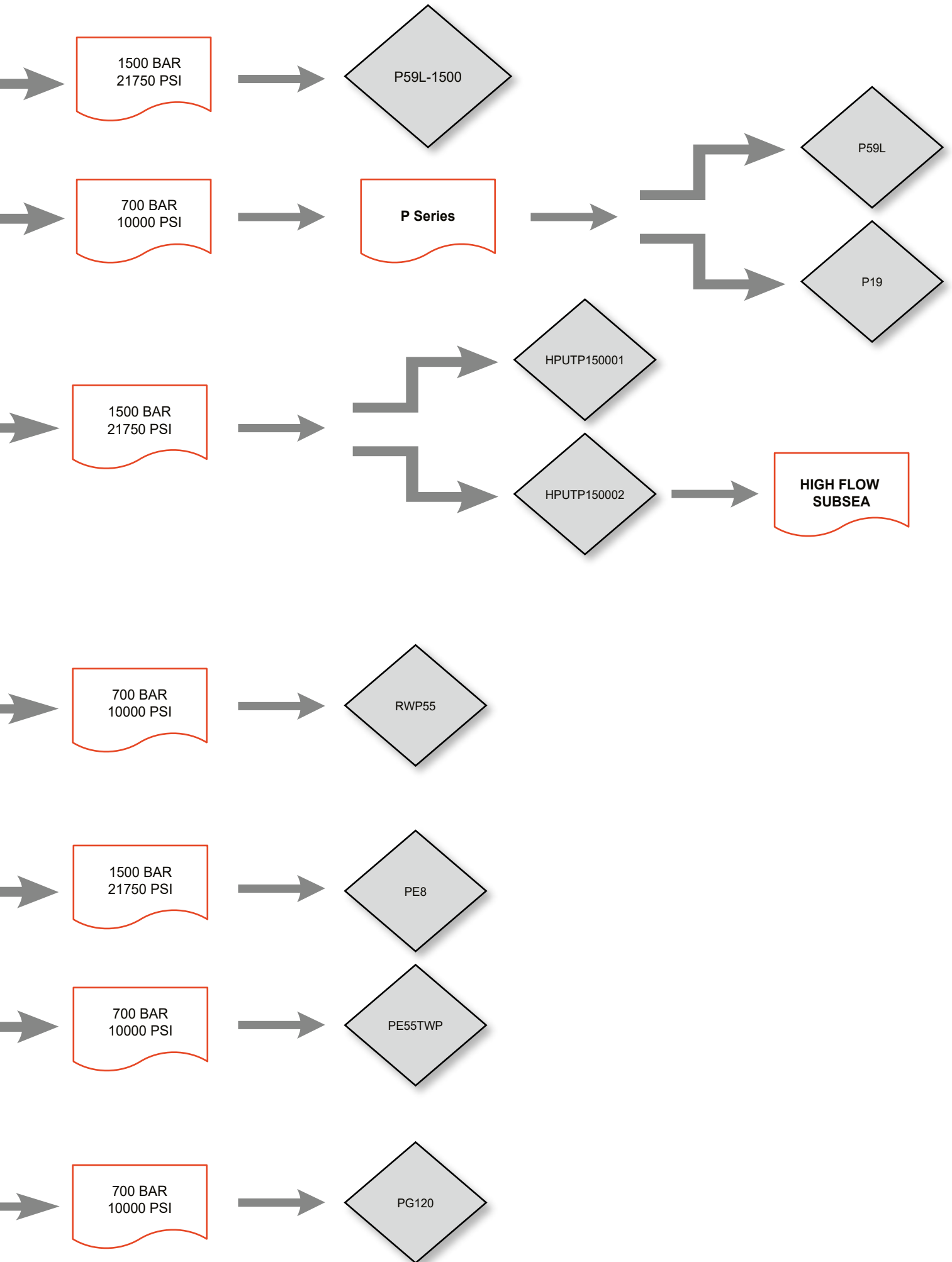
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Bolting Pump Options





TORQUE WRENCHES

Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership





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TWHC

- 1** Multi-direction swivel allows operator to align the hoses in a convenient position, for any job!
- 2** Push button feature allows quick and easy release and re-positioning of the reaction arm without any tools.
- 3** Adaptable allen drive inserts for special applications are available.
- 4** With just a push of a button, the quick change square drive requires no tools to change from breakout to makeup.



TWLC

- 1** Patented rotating slide design adapts to angle against the piston, keeping forces normal in order to reduce wear and tear.
- 2** Unique slide and shuttle piston design automatically engages without the need to manually rotate tool.
- 3** Multi way swivel allows easier positioning of the hoses on the job site.
- 4** Pin is retained to the link body and will not fall out or get lost on the job site.
- 5** Steel body link with corrosion resistant nickel plating. Aluminum power head to reduce the overall weight of the tool.
- 6** Improved hardened steel reaction pad to protect the tool during torquing and modified radius to fit tighter applications.
- 7** Fully enclosed components without use of a shroud which can bend and cause safety issues.



MEASUREMENTS/ SPECIFICATIONS

Torque Wrench Selection Guide



Specifications and Dimensional Data

Bolt Stud Size		Standard Hex Nut Size		Heavy Hex Nut Size		Break Out Tool		Make Up Tool	
in	mm	in	mm	in	mm	TWHC	TWLC	TWHC	TWLC
3/4	19	1-1/8	26	1-1/4	32	TWHC1	TWLC2	TWHC1	TWLC2
7/8	22	1-5/16	33	1-7/16	36	TWHC1	TWLC2	TWHC1	TWLC2
1	25	1-1/2	38	1-5/8	41	TWHC1	TWLC2	TWHC1	TWLC2
1-1/8	26	1-11/16	43	1-13/16	25	TWHC1	TWLC2	TWHC1	TWLC2
1-1/4	32	1-7/8	48	2	50	TWHC3	TWLC4	TWHC1	TWLC2
1-3/8	35	2-1/16	52	2-3/16	55	TWHC6	TWLC4	TWHC3	TWLC4
1-1/2	38	2-1/4	57	2-3/8	60	TWHC6	TWLC4	TWHC3	TWLC4
1-5/8	41	2-7/16	62	2-9/16	65	TWHC6	TWLC8	TWHC6	TWLC4
1-3/4	44	2-5/8	67	2-3/4	70	TWHC6	TWLC8	TWHC6	TWLC4
1-7/8	48	2-13/16	71	2-15/16	75	TWHC11	TWLC8	TWHC6	TWLC8
2	50	3	77	3-1/8	80	TWHC11	TWLC15	TWHC11	TWLC8
2-1/8	54	3-3/16	81	3-5/16	84	TWHC11	TWLC15	TWHC11	TWLC8
2-1/4	57	3-3/8	85	3-1/2	89	TWHC11	TWLC15	TWHC11	TWLC8
2-3/8	60	3-9/16	91	3-11/16	94	TWHC20	TWLC15	TWHC11	TWLC15
2-1/2	63	3-3/4	95	3-7/8	99	TWHC20	TWLC30	TWHC11	TWLC15
2-3/4	70	4-1/8	105	4-1/4	108	TWHC20	TWLC30	TWHC20	TWLC15
3	77	4-1/2	114	4 5/8	118	TWHC20	TWLC30	TWHC20	TWLC30
3-1/4	83	4-7/8	124	5	127	TWHC35	TWLC30	TWHC35	TWLC30
3-1/2	89	5-1/4	133	5 3/8	136	TWHC35	TWLC30	TWHC35	TWLC30
3-3/4	95	5-5/8		5-3/4	146	TWHC35	TWLC30	TWHC35	TWLC30
4	102	6	152	6 1/8	155	TWHC35	TWLC30	TWHC35	TWLC30
4-1/4	108			6-1/2	159	TWHC50		TWHC50	
4-1/2	114			6 7/8	175	TWHC50	TWLC30 Upon Request	TWHC50	TWLC30 Upon Request
4-3/4	120			7-1/4	184	TWHC50		TWHC50	
5	127			7-5/8	193	TWHC50		TWHC50	

Additional torque may be required for loosening in certain situations:

- Rust and corrosion: 2 X break out force
- Heat Corrosion: 3 X break out force

Only the smallest tool suitable for each application, under ideal conditions, is shown.

Tools shown are a guideline only. Chart is not a replacement for calculations. Lubrication, corrosion, material type will all effect actual torque requirement.



**TORQUE WRENCH
HIGH CYCLE - TWHC**

Max Torque 71,816 Nm at 700 bar
(53,000 lb-ft at 10,000 psi)

**TWHC CONVERSION CHART,
SEE PAGE 101.**

OK FOR SUBSEA



Features

TORQUE WRENCH - HIGH CYCLE

Quality means Lower Cost of Ownership:

- Designed for high cycle life: 2-3x more than existing technology
- Increased reliability: Simple drive assembly means less downtime
- Corrosion resistant material for use in harsh environments

Enhanced Usability:

- Compact nose radius allows the tool to fit in tighter, hard-to-reach spaces
- Low weight, high strength design
- Fast operation, long stroke and optimum flow
- Multi-direction high flow swivel manifold
- Push button square drive reversal and reaction arm positioning
- Push-button release of square drive & reaction arm for all models except TWHC50.

Designed with Safety in Mind:

- Fully enclosed drive mechanism for operator safety
- Swivel manifold internal relief valve prevents retract side over-pressurization
- Fine tooth pawl prevents tool 'lock-on'

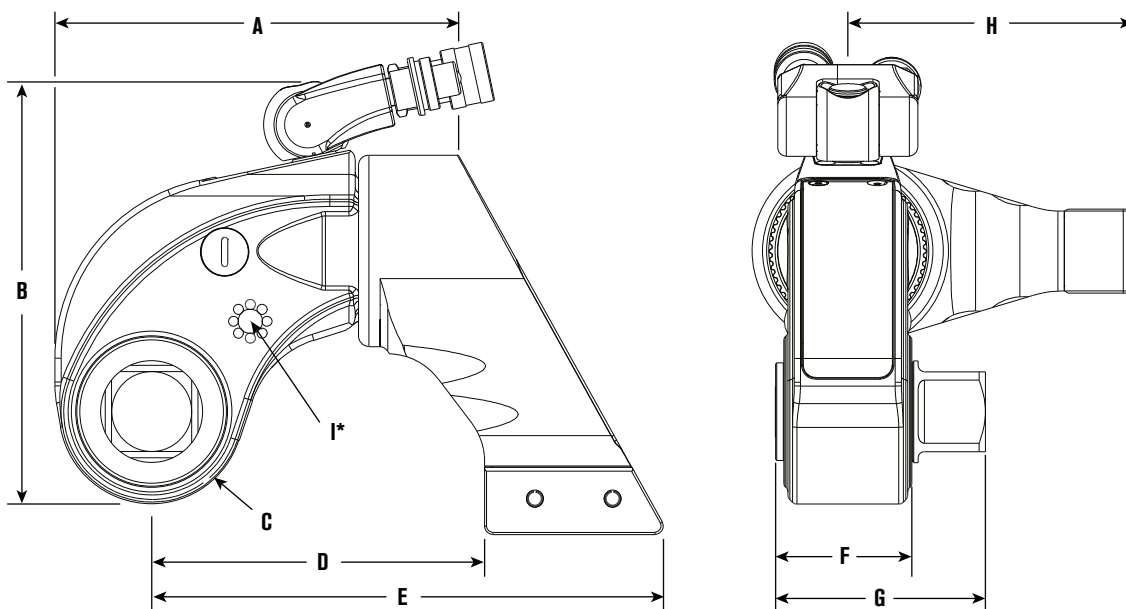


HANDLES SOLD SEPARATELY



The tool's designed long-stroke mechanism imparts a minimum 30 degree nut rotation per stroke while maintaining a tight and compact nose radius: this is a clear advantage over the short stroke and back-up pawl mechanisms of light alloy competitive models. Fewer parts and reduced torsion in operation - equals reduced wear, maintenance and associated costs.

Specifications and Dimensional Data



* Dimension I shows thread size (on both sides of the tool) for safety handle or lifting point. TWHC50 model available with lifting points only.

Model	Min Torque		Max Torque		Sq. Drive	A	B	C	D	E	F	G	H	I	Weight	
	lb-ft	Nm	lb-ft	Nm	In	Millimeters (Inches)										Kg
TWHC1	170	230	1413	1915	3/4	132 (5.20)	145 (5.71)	28 (1.10)	111.5 (4.39)	170.0 (6.69)	39.5 (1.56)	67.7 (2.67)	86.1 (3.39)	M6 X 1.0	2.8	6.2
TWHC3	376	510	3136	4249	1	165 (6.50)	173.5 (6.83)	36.5 (1.44)	129.6 (5.10)	197.7 (7.78)	53 (2.09)	83.7 (3.30)	105.1 (4.14)	M6 X 1.0	5.3	11.7
TWHC6	726	982	6050	8198	1½	192 (7.56)	201.6 (7.94)	44 (1.73)	158.5 (6.24)	243.7 (9.59)	61 (2.40)	99.9 (3.93)	135.1 (5.32)	M8 X 1.25	8.8	19.4
TWHC11	1336	1811	11134	15095	1½	231 (9.09)	233 (9.18)	53 (2.07)	186 (7.34)	300 (11.81)	86 (3.39)	130 (5.12)	207 (8.16)	M8 X 1.25	15.9	34.9
TWHC20	2439	3305	20325	27541	2½	280 (11.01)	310 (12.21)	64 (2.52)	220 (8.65)	364 (14.34)	94 (3.68)	155 (6.10)	212 (8.35)	M12 X 1.75	27.5	60.8
TWHC35	3890	5271	32418	43927	2½	340 (13.40)	346 (13.61)	78 (3.05)	251 (9.90)	425 (16.73)	121 (4.74)	182 (7.15)	228 (8.97)	M12 X 1.75	46.3	102
TWHC50	6360	8628	53000	71816	2½	404.5 (15.93)	356.6 (14.04)	88 (3.46)	266.5 (10.49)	446.6 (17.58)	115 (4.53)	192.2 (7.57)	258 (10.16)	M12 X 1.75	69	152

Ordering Information

Order No.	Description
TWHC1	Wrench
TWHC3	Wrench
TWHC6	Wrench
TWHC11	Wrench
TWHC20	Wrench
TWHC35	Wrench
TWHC50	Wrench

Order No.	Description
TWHC1H	Wrench with Handle
TWHC3H	Wrench with Handle
TWHC6H	Wrench with Handle

Order No.	Description
DFTAS000001	Handle for TWHC1
DFTAS000001	Handle for TWHC3
DFTAS000002	Handle for TWHC6
DFTAS000002	Handle for TWHC11
DFTAS000002	Handle for TWHC20
DFTAS000002	Handle for TWHC35

TWHC EXTENDED REACTION ARM TWHC-ERA

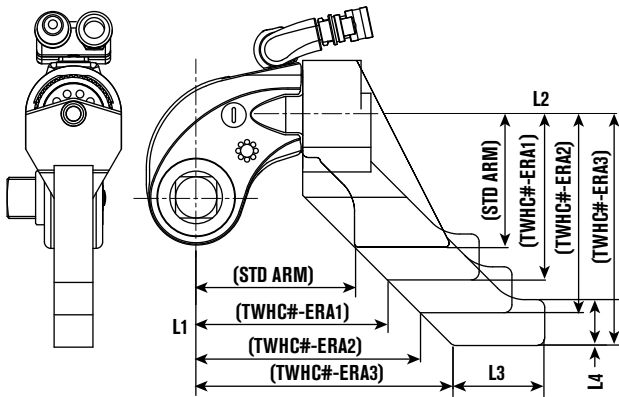
Wrenches



Features

- Long reach version of TWHC standard reaction arm
- 3 standard sizes per model (25 mm / 50 mm / 75 mm), specials upon request
- Replaces standard reaction arm via quick release locking pin
- Steel alloy construction
- 360° rotation
- Available for full range of tool sizes

Specifications and Dimensional Data



Tool Ref	Order No.	L1		L2		L3		L4		Wt. kg
		mm	in	mm	in	mm	in	mm	in	
STD ARM		112	4.41	86	3.39					
TWHC1	TWHC1-ERA1	137	5.39	111	4.37	60	2.36	30	1.18	2
	TWHC1-ERA2	162	6.38	136	5.35					2.3
	TWHC1-ERA3	187	7.36	161	6.34					2.6
STD ARM		130	5.12	105	4.13					
TWHC3	TWHC3-ERA1	155	6.10	130	5.12	70	2.76	35	1.38	3
	TWHC3-ERA2	180	7.09	155	6.10					3.5
	TWHC3-ERA3	205	8.07	180	7.09					3.9
STD ARM		159	6.23	136	5.35					
TWHC6	TWHC6-ERA1	184	7.24	161	6.34	95	3.74	40	1.57	5
	TWHC6-ERA2	209	8.23	186	7.32					5.6
	TWHC6-ERA3	234	9.21	211	8.31					6.2

TW HANDLE

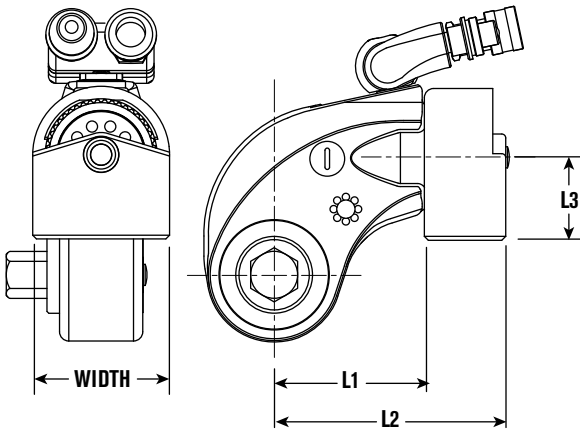


Features

- Robust steel construction with ribbed polymer grip
- Multi-position on tool for balanced handling
- Cap-screw locking with positive 'docking'
- Is suitable for all wrench models (TWHC, TWSD, TWLC). However, for larger sizes (TWSD25/TWLC 30/TWHC50) we recommend the use of eye-bolt lifting.

Order No.	Description	Tool Ref
DFTAS000001	Wrench Handle Size 1	TWSD1
		TWSD3
		TWHC1
		TWHC3
		TWLC2
DFTAS000002	Wrench Handle Size 2	TWSD6
		TWSD11
		TWHC6
		TWLC4
		TWLC8
		TWLC15

TWHC REACTION PAD TWHC-RP



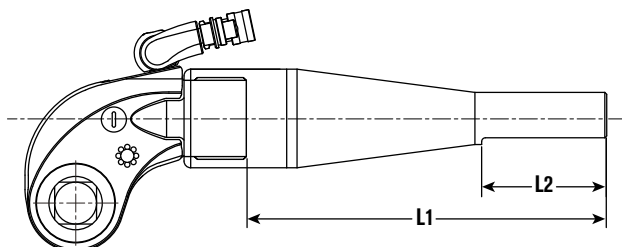
Features

- In-Line Reaction Pad for TWHC wrenches used as simple pad, or modified platform for specific application (Machine-able/Weld-able platform)
- Replaces standard reaction arm via quick release locking pin
- Steel alloy construction
- 360° rotation
- Available for full range of tool sizes (11-50 Please contact factory)

Tool Ref	Order No.	L1		L2		L3		Width		Wt
		mm	in	mm	in	mm	in	mm	in	kg
TWHC1	TWHC1-RP	72	2.835	116	4.567	49	1.93	64	2.52	1
TWHC3	TWHC3-RP	86	3.39	138	5.43	55	2.17	76	2.99	1.5
TWHC6	TWHC6-RP	99	3.90	162	6.38	62	2.44	89	3.50	2.3

Wrenches

TWHC LONG REACTION ARM TWHC-LRA



Features

- Tubular extension arm for TWHC wrenches for in-line reaction outside wrench profile
- Replaces standard reaction arm via quick release pin locking
- Steel/light alloy construction (reaction flat machined on tube end)
- Can be cut down to suit specific length
- Available for full range of tool sizes

Tool Ref	Order No.	L1		L2		Weight
		mm	in	mm	in	kg
TWHC1	TWHC1-LRA	501	19.72	152	6	4.5
TWHC3	TWHC3-LRA					6
TWHC6	TWHC6-LRA					8.1

TORQUE WRENCH

LOW CLEARANCE - TWLC

Max Torque 39,024 Nm at 700 bar
(28,800 lb-ft at 10,000 psi)

Wrenches



Shown with optional handle, refer to page 22 for details.

**TORQUE WRENCH
LOW CLEARANCE**

The TWLC Series Wrench was designed for the most inaccessible bolting areas found in the industry. Its long neck, short height and small radius have all added to its great success.



Several link sizes are available for each drive.

Combine a drive body with a link to make a wrench. Each are sold separately.

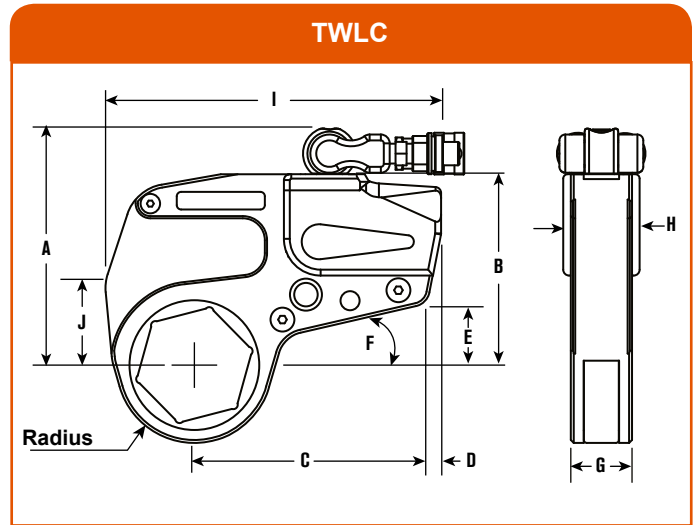
OK FOR SUBSEA



**TWHC CONVERSION CHART,
SEE PAGE 102**

Specifications and Dimensional Data

- Low weight, high strength design
- Superior torsional strength
- Fast operation cycle
- Fine tooth ratchet
- Floating piston design
- Link pin does not fall out
- Auto-connect drive piston
- Compact frame size
- Rigid steel body construction
- Swivel manifold internal relief valve prevents retract side over-pressurization
- “Hardened” steel reaction pad on TWLC8, 15 & 30
- Small nose radius
- Corrosion resistant finish
- Multi-axis high flow swivel manifold
- Simple design
- Consistent torque output



- Quick interchangeable heads, no tools necessary
- Replaceable reaction pad on larger models

Wrenches

Body Order No.	A		B		C		D		E		F		G		H	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
TWLC2	3.8	97	4.1	103	5	128	0.3	8	1.4	35	0.5	13	1.3	32	1.7	42
TWLC4	4.7	120	5.1	130	6.3	159	0.4	9	1.7	43	0.5	13	1.7	42	2	52
TWLC8	5.8	147	6.2	158	7	177	1	24.5	1.6	40	0.6	14	2.1	54	2.6	67
TWLC15	6.9	174	7.3	186	7.9	200	1.1	27	1.7	43	0.6	14	2.5	63	3	76
TWLC30	8.8	223	9.4	239	10.5	267	1	26	2.4	62	0.6	15	3.2	82	3.7	94

Body Order No.	Hex Range				Min Torque		Max Torque		Weight (Body Only)	
	in	in	mm	mm	lb-ft	Nm	lb-ft	Nm	lb	kg
TWLC2	1-1/8	2-3/8	26	60	189	256	1,575	2,134	2.2	1.0
TWLC4	1-5/16	3-1/8	33	80	477	646	3,975	5,386	4.4	2.0
TWLC8	1-7/8	3-15/16	49	100	954	1,293	7,950	10,772	7.7	3.5
TWLC15	2-7/16	4-5/8	62	116	1,782	2,415	14,850	20,122	15.4	7.0
TWLC30	3-1/8	6-1/16	80	155	3,456	4,683	28,800	39,024	31.9	14.5

CAUTION: Always read operating manual before using for proper use of tools and accessories.
 NOTE: Reference dimensions shown and vary by links size. Exacting dimensions can be found on our website.

Ordering Information

TO SPECIFY A TWLC SOLUTION:

1. Find a link for your application (nut size) (page 18-19)
2. Choose the appropriate Drive body (page 17)
3. Add reducers for additional nut sizes (pages 20-21)

Please order Drive Body and Link separately and pay attention to the same size, for Example TWLC2 and TWL2-041.

**TORQUE WRENCH
LOW CLEARANCE LINKS -
TWLC**

Parts Codes, Nose Radius

NOTE:

The sizes listed on these pages encompass both heavy hex and standard hex nut sizes. Check your local Hydraulic Technologies Bolting Office for availability as some items may be special order.

Wrenches

Nut A/F		TWLC2					TWLC4					TWLC8													
Inch	Metric	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Weight (Link Only) kg (lb)	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Weight (Link Only) kg (lb)	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Weight (Link Only) kg (lb)									
1-1/8	26	TWL2-026																							
1-1/16	27	TWL2-027																							
1-1/8	29	TWL2-029																							
1-3/16	30	TWL2-030	31.5 (1.2)	180 (7.1)	38 (1.5)	2 (4.4)																			
1-1/4	32	TWL2-032																							
1-5/16	33	TWL2-033																							
1-3/8	35	TWL2-035																							
1-7/16	36	TWL2-036																							
1-1/2	38	TWL2-150					TWL4-033																		
1-9/16	40	TWL2-040	34.5 (1.4)	181 (7.1)	40 (1.6)	2 (4.4)	TWL4-035	36.5 (1.4)	227 (8.9)	53 (2.1)	4 (8.8)														
1-5/8	41	TWL2-041																							
1-11/16	43	TWL2-043													TWL4-036										
1-3/4	44	TWL2-044													TWL4-150										
1-13/16	46	TWL2-046													TWL4-040										
1-7/8	48	TWL2-188					TWL4-041																		
1-15/16	49	TWL2-049	40 (1.6)	185 (7.3)	43 (1.7)	2 (4.4)	TWL4-043	39 (1.5)	227 (8.9)	53 (2.1)	4 (8.8)														
2	50	TWL2-050																							
2-1/16	52	TWL2-052													TWL4-044										
2-1/8	54	TWL2-054													TWL4-046										
2-3/16	55	TWL2-055													TWL4-188										
2-1/4	57	TWL2-057	42.5 (1.7)	185 (7.3)	43 (1.7)	2 (4.4)	TWL4-049	42 (1.7)	227 (8.9)	53 (2.1)	4 (8.8)	TWL8-188													
2-5/16	59	TWL2-059													TWL4-050					TWL8-049					
2-3/8	60	TWL2-060													TWL4-052					TWL8-050					
2-7/16	62														TWL4-054	44.5 (1.8)	227 (8.9)	53 (2.1)	4 (8.8)	TWL8-052	50.5 (2.0)	274 (10.8)	77 (3.0)	7 (15.4)	
2-1/2	63														TWL4-055										
2-9/16	65						TWL4-225					TWL8-055													
2-5/8	67						TWL4-059	47.5 (1.9)	227 (8.9)	53 (2.1)	4 (8.8)	TWL8-057													
2-11/16	68						TWL4-060													TWL8-059					
2-3/4	70						TWL4-062									TWL8-060									
2-13/16	71						TWL4-063					50 (2.0)	227 (8.9)	53 (2.1)	4 (8.8)	TWL8-062	53 (2.1)	274 (10.8)	77 (3.0)	7.5 (16.5)					
2-7/8	73						TWL4-065																	TWL8-063	
2-15/16	75						TWL4-067									TWL8-065									
3	77						TWL4-068	53 (2.1)	229 (9.0)	56 (2.2)	4 (8.8)					TWL8-067					56 (2.2)	274 (10.8)	77 (3.0)	7.5 (16.5)	
3-1/16	78						TWL4-070																		
3-1/8	80						TWL4-071									TWL8-070									
3-3/16	81						TWL4-073					55.5 (2.2)	229 (9.0)	56 (2.2)	4.5 (9.9)	TWL8-071	58.5 (2.3)	274 (10.8)	77 (3.0)	7.5 (16.5)					
3-1/4	83						TWL4-075																		
3-5/16	84						TWL4-077									TWL8-075									
3-3/8	85						TWL4-313	59 (2.3)	230 (9.1)	58 (2.3)	4.5 (9.9)					TWL8-077					62 (2.4)	277 (10.9)	72 (2.8)	8 (17.6)	
3-7/16	87						TWL4-080																		
	89															TWL8-081									
3-1/2	90															TWL8-083									
3-9/16	91															TWL8-084	67 (2.6)	277 (10.9)	72 (2.8)	8 (17.6)					
3-5/8	92											TWL8-085													
3-11/16	94											TWL8-087													
3-3/4	95											TWL8-089													
3-13/16	97											TWL8-090													
	99											TWL8-091													
3-7/8	100											TWL8-092	73.5 (2.9)	277 (10.9)	72 (2.8)	8 (17.6)									
												TWL8-094													
												TWL8-095													
												TWL8-097													
												TWL8-388													
												TWL8-100													

MORE SOLUTIONS ON NEXT PAGE

Ordering Information

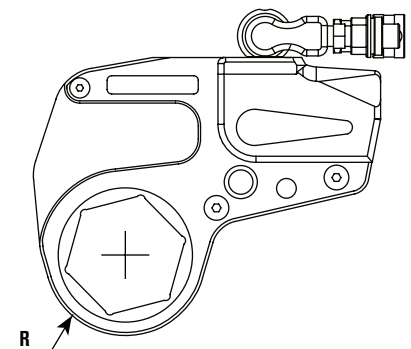
TO SPECIFY A TWLC SOLUTION:

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Please order Drive Body and Link separately and pay attention to the same size, for Example TWLC2 and TWL2-041.

Wrenches

Nut A/F		TWLC15					TWLC30					Nut A/F		TWLC30 (Continued)				
Inch	Metric	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Wt (Link Only) kg (lb)	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Weight (Link Only) kg (lb)	Inch	Metric	Link Order No.	Radius R mm (in)	I mm (in)	J mm (in)	Weight (Link Only) kg (lb)
2-7/16	62	TWL15-062										4-13/16	122	TWL30-122				
2-1/2	63	TWL15-063											123	TWL30-123				
2-9/16	65	TWL15-065	60.5 (2.4)	313 (12.3)	88 (3.5)	12.5 (27.5)						4-7/8	124	TWL30-124	99 (3.9)	400 (15.7)	109 (4.3)	28.5 (62.7)
2-5/8	67	TWL15-067										4-15/16	125	TWL30-125				
2-11/16	68	TWL15-068										5	127	TWL30-500				
2-3/4	70	TWL15-070										5-1/16	129	TWL30-129				
2-13/16	71	TWL15-071										5-1/8	130	TWL30-130				
2-7/8	73	TWL15-073	63 (2.5)	313 (12.3)	88 (3.5)	12.5 (27.5)						5-3/16	132	TWL30-132	105 (4.1)	400 (15.7)	109 (4.3)	28.5 (62.7)
2-15/16	75	TWL15-075										5-1/4	133	TWL30-133				
3	77	TWL15-077										5-3/8	135	TWL30-135				
3-1/16	78	TWL15-313	66.5 (2.6)	313 (12.3)	88 (3.5)	13 (28.6)						137	TWL30-538					
3-1/8	80	TWL15-080					TWL30-080					5-7/16	138	TWL30-138				
3-3/16	81	TWL15-081					TWL30-081					5-1/2	140	TWL30-140				
3-1/4	83	TWL15-083					TWL30-083					5-9/16	141	TWL30-141				
3-5/16	84	TWL15-084					TWL30-084	77 (3.0)	393 (15.5)	104 (4.1)	26.5 (58.3)	5-5/8	143	TWL30-143	110 (4.3)	400 (15.7)	109 (4.3)	28.5 (62.7)
3-3/8	85	TWL15-085	72 (2.8)	313 (12.3)	8 (0.3)	13.5 (29.7)	TWL30-085					5-11/16	144	TWL30-144				
3-7/16	87	TWL15-087					TWL30-087					5-3/4	145	TWL30-145				
	89	TWL15-089					TWL30-089					146	TWL30-146					
3-1/2	90	TWL15-090					TWL30-090					5-13/16	148	TWL30-148				
3-9/16	91	TWL15-091					TWL30-091					5-7/8	149	TWL30-149				
3-5/8	92	TWL15-092					TWL30-092					150	TWL30-150					
3-11/16	94	TWL15-094					TWL30-094					5-15/16	151	TWL30-151	116 (4.6)	400 (15.7)	109 (4.3)	29.5 (64.9)
3-3/4	95	TWL15-095	78 (3.1)	316 (12.4)	80 (3.1)	13.5 (29.7)	TWL30-095	83 (3.3)	393 (15.5)	104 (4.1)	26.5 (58.3)	6	152	TWL30-152				
3-13/16	97	TWL15-097					TWL30-097					6-1/16	154	TWL30-154				
	99	TWL15-388					TWL30-388					6-1/8	155	TWL30-155				
3-7/8	100	TWL15-100					TWL30-100											
4	102	TWL15-102					TWL30-102											
4-1/16	103	TWL15-103					TWL30-103											
4-1/8	105	TWL15-105	82.5 (3.2)	316 (12.4)	80 (3.1)	14 (30.8)	TWL30-105	89 (3.5)	393 (15.5)	104 (4.1)	27.5 (60.5)							
4-3/16	106	TWL15-106					TWL30-106											
4-1/4	108	TWL15-425					TWL30-425											
4-5/16	110	TWL15-110					TWL30-110											
4-3/8	111	TWL15-111					TWL30-111											
4-7/16	113	TWL15-113					TWL30-113											
4-1/2	114	TWL15-114	87.5 (3.4)	316 (12.4)	80 (3.1)	14 (30.8)	TWL30-114	92 (3.6)	393 (15.5)	104 (4.1)	27.5 (60.5)							
	115	TWL15-115					TWL30-115											
4-9/16	116	TWL15-116					TWL30-116											
4-5/8	117	TWL15-463					TWL30-463											
4-11/16	119						TWL30-119	99 (3.9)	400 (15.7)	109 (4.3)	28.5 (62.7)							
4-3/4	120						TWL30-120											



MORE SOLUTIONS ON NEXT PAGE

**TORQUE WRENCH
LOW CLEARANCE
REDUCERS - TWLC**

Special sizes available upon request.

Drive Body, Links & Reducers

Wrenches



Specifications and Dimensional Data

Body	Link	Nut A/F		Reducer			Reducer			Reducer		
		Order No.	in	mm	in	mm	Order No.	in	mm	Order No.	in	mm
TWLC2	TWL2-032	1-1/4	32	-	-	-	-	-	-	-	-	-
	TWL2-036	1-7/16	36	-	-	-	-	-	-	-	-	-
	TWL2-041	1-5/8	41	1-5/8 - 1-7/16	41-36	TWR2-041036	1-5/8 - 1-1/4	41-32	TWR2-041032	-	-	-
	TWL2-046	1-13/16	46	1-13/16 - 1-5/8	46-41	TWR2-046041	1-13/16 - 1-7/16	46-36	TWR2-046036	1-13/16 - 1-1/4	46-32	TWR2-046032
	TWL2-050	2	50	2 - 1-13/16	50-46	TWR2-050046	2 - 1-5/8	50-41	TWR2-050041	2 - 1-7/16	50-36	TWR2-050036
	TWL2-055	2-3/16	55	2-3/16 - 2	55-50	TWR2-055050	2-3/16 - 1-13/16	55-46	TWR2-055046	2-3/16 - 1-5/8	55-41	TWR2-055041
	TWL2-060	2-3/8	60	2-3/8 - 2-3/16	60-55	TWR2-060055	2-3/8 - 2	60-50	TWR2-060050	2-3/8 - 1-13/16	60-46	TWR2-060046
TWLC4	TWL4-041	1-5/8	41	1-5/8 - 1-7/16	41-36	TWR4-041036	1-5/8 - 1-1/4	41-32	TWR4-041032	-	-	-
	TWL4-046	1-13/16	46	1-13/16 - 1-5/8	46-41	TWR4-046041	1-13/16 - 1-7/16	46-36	TWR4-046036	1-13/16 - 1-1/4	46-32	TWR4-046032
	TWL4-050	2	50	2 - 1-13/16	50-46	TWR4-050046	2 - 1-5/8	50-41	TWR4-050041	2 - 1-7/16	50-36	TWR4-050036
	TWL4-055	2-3/16	55	2-3/16 - 2	55-50	TWR4-055050	2-3/16 - 1-13/16	55-46	TWR4-055046	2-3/16 - 1-5/8	55-41	TWR4-055041
	TWL4-060	2-3/8	60	2-3/8 - 2-3/16	60-55	TWR4-060055	2-3/8 - 2	60-50	TWR4-060050	2-3/8 - 1-13/16	60-46	TWR4-060046
	TWL4-065	2-9/16	65	2-9/16 - 2-3/8	65-60	TWR4-065060	2-9/16 - 2-3/16	65-55	TWR4-065055	2-9/16 - 2	65-50	TWR4-065050
	TWL4-070	2-3/4	70	2-3/4 - 2-9/16	70-65	TWR4-070065	2-3/4 - 2-3/8	70-60	TWR4-070060	2-3/4 - 2-3/16	70-55	TWR4-070055
	TWL4-075	2-15/16	75	2-15/16 - 2-3/4	75-70	TWR4-075070	2-15/16 - 2-9/16	75-65	TWR4-075065	2-15/16 - 2-3/8	75-60	TWR4-075060
	TWL4-080	3-1/8	80	3-1/8 - 2-15/16	80-75	TWR4-080075	3-1/8 - 2-3/4	80-70	TWR4-080070	3-1/8 - 2-9/16	80-65	TWR4-080065
TWLC8	TWL8-060	2-3/8	60	2-3/8 - 2-3/16	60-55	TWR8-060055	2-3/8 - 2	60-50	TWR8-060050	2-3/8 - 1-13/16	60-46	TWR8-060046
	TWL8-065	2-9/16	65	2-9/16 - 2-3/8	65-60	TWR8-065060	2-9/16 - 2-3/16	65-55	TWR8-065055	2-9/16 - 2	65-50	TWR8-065050
	TWL8-070	2-3/4	70	2-3/4 - 2-9/16	70-65	TWR8-070065	2-3/4 - 2-3/8	70-60	TWR8-070060	2-3/4 - 2-3/16	70-55	TWR8-070055
	TWL8-075	2-15/16	75	2-15/16 - 2-3/4	75-70	TWR8-075070	2-15/16 - 2-9/16	75-65	TWR8-075065	2-15/16 - 2-3/8	75-60	TWR8-075060
	TWL8-080	3-1/8	80	3-1/8 - 2-15/16	80-75	TWR8-080075	3-1/8 - 2-3/4	80-70	TWR8-080070	3-1/8 - 2-9/16	80-65	TWR8-080065
	TWL8-085	3-3/8	85	3-3/8 - 3-1/8	85-80	TWR8-085080	3-3/8 - 2-15/16	85-65	TWR8-085065	3-3/8 - 2-3/4	85-70	TWR8-085070
	TWL8-090	3-1/2	90	3-1/2 - 3-3/8	90-85	TWR8-090085	3-1/2 - 3-1/8	90-80	TWR8-090080	3-1/2 - 2-15/16	90-75	TWR8-090075
	TWL8-095	3-3/4	95	3-3/4 - 3-1/2	95-90	TWR8-095090	3-3/4 - 3-3/8	95-85	TWR8-095085	3-3/4 - 3-1/8	95-80	TWR8-095080
	TWL8-100	3-7/8	100	3-7/8 - 3-3/4	100-95	TWR8-100095	3-7/8 - 3-1/2	100-90	TWR8-100090	3-7/8 - 3-3/8	100-85	TWR8-100085

12 point links available upon request. Please contact factory.

Ordering Information

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3. Add reducers for additional nut sizes (pages 20-21)

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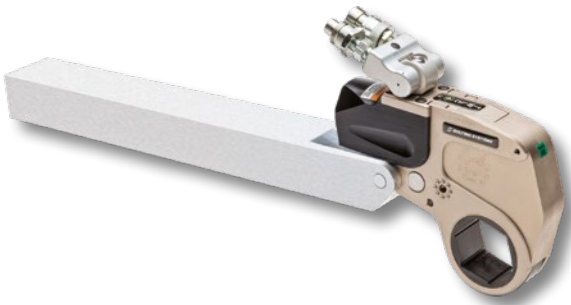
Specifications and Dimensional Data

Body	Link	Nut A/F		Reducer			Reducer			Reducer		
		Order No.	in	mm	in	mm	Order No.	in	mm	Order No.	in	mm
TWLC15	TWL15-070	2-3/4	70	2-3/4 – 2-9/16	70-65	TWR15-070065	2-3/4 – 2-3/8	70-60	TWR15-070060	2-3/4 – 2-3/16	70-55	TWR15-070055
	TWL15-075	2-15/16	75	2-15/16 – 2-3/4	75-70	TWR15-075070	2-15/16 – 2-9/16	75-65	TWR15-075065	2-15/16 – 2-3/8	75-60	TWR15-075060
	TWL15-080	3-1/8	80	3-1/8 – 2-15/16	80-75	TWR15-080075	3-1/8 – 2-3/4	80-70	TWR15-080070	3-1/8 – 2-9/16	80-65	TWR15-080065
	TWL15-085	3-3/8	85	3-3/8 – 3-1/8	85-80	TWR15-085080	3-3/8 – 2-15/16	85-65	TWR15-085065	3-3/8 – 2-3/4	85-70	TWR15-085070
	TWL15-090	3-1/2	90	3-1/2 – 3-3/8	90-85	TWR15-090085	3-1/2 – 3-1/8	90-80	TWR15-090080	3-1/2 – 2-15/16	90-75	TWR15-090075
	TWL15-095	3-3/4	95	3-3/4 – 3-1/2	95-90	TWR15-095090	3-3/4 – 3-3/8	95-85	TWR15-095085	3-3/4 – 3-1/8	95-80	TWR15-095080
	TWL15-100	3-7/8	100	3-7/8 – 3-3/4	100-95	TWR15-100095	3-7/8 – 3-1/2	100-90	TWR15-100090	3-7/8 – 3-3/8	100-85	TWR15-100085
	TWL15-105	–	105	–	105-100	TWR15-105100	–	105-95	TWR15-105095	–	105-90	TWR15-105090
	TWL15-425	4-1/4	–	4-1/4 – 3-7/8	–	TWR15-425388	4-1/4 – 3-3/4	–	TWR15-425375	4-1/4 – 3-1/2	–	TWR15-425350
	TWL15-110	–	110	–	110-105	TWR15-110105	–	110-100	TWR15-110010	–	110-95	TWR15-110095
	TWL15-115	–	115	–	115-110	TWR15-115110	–	115-105	TWR15-115105	–	115-100	TWR15-115100
	TWL15-463	4-5/8	–	4-5/8 – 4-1/4	–	TWR15-463425	4-5/8 – 3-7/8	–	TWR15-463388	4-5/8 – 3-3/4	–	TWR15-463375
TWLC30	TWL30-080	3-1/8	80	3-1/8 – 2-15/16	80-75	TWR30-080075	3-1/8 – 2-3/4	80-70	TWR30-080070	3-1/8 – 2-9/16	80-65	TWR30-080065
	TWL30-085	3-3/8	85	3-3/8 – 3-1/8	85-80	TWR30-085080	3-3/8 – 2-15/16	85-65	TWR30-085065	3-3/8 – 2-3/4	85-70	TWR30-085070
	TWL30-090	3-1/2	90	3-1/2 – 3-3/8	90-85	TWR30-090085	3-1/2 – 3-1/8	90-80	TWR30-090080	3-1/2 – 2-15/16	90-75	TWR30-090075
	TWL30-095	3-3/4	95	3-3/4 – 3-1/2	95-90	TWR30-095090	3-3/4 – 3-3/8	95-85	TWR30-095085	3-3/4 – 3-1/8	95-80	TWR30-095080
	TWL30-100	3-7/8	100	3-7/8 – 3-3/4	100-95	TWR30-100095	3-7/8 – 3-1/2	100-90	TWR30-100090	3-7/8 – 3-3/8	100-85	TWR30-100085
	TWL30-105	–	105	–	105-100	TWR30-105100	–	105-95	TWR30-105095	–	105-90	TWR30-105090
	TWL30-425	4-1/4	–	4-1/4 – 3-7/8	–	TWR30-425388	4-1/4 – 3-3/4	–	TWR30-425375	4-1/4 – 3-1/2	–	TWR30-425350
	TWL30-110	–	110	–	110-105	TWR30-110105	–	110-100	TWR30-110010	–	110-95	TWR30-110095
	TWL30-115	–	115	–	115-110	TWR30-115110	–	115-105	TWR30-115015	–	115-100	TWR30-115100
	TWL30-463	4-5/8	–	4-5/8 – 4-1/4	–	TWR30-463425	4-5/8 – 3-7/8	–	TWR30-463388	4-5/8 – 3-3/4	–	TWR30-463375
	TWL30-120	–	120	–	120-115	TWR30-120115	–	120-110	TWR30-120110	–	120-105	TWR30-120105
	TWL30-500	5	–	5 – 4-5/8	–	TWR30-500463	5 – 4-1/4	–	TWR30-500425	5 – 3-7/8	–	TWR30-500388
	TWL30-130	–	130	–	130-120	TWR30-130120	–	130-115	TWR30-130115	–	130-110	TWR30-130110
	TWL30-135	5-3/8	135	5-3/8 – 5	135-125	TWR30-135125	5-3/8 – 4-5/8	135-120	TWR30-135120	5-3/8 – 4-1/4	135-115	TWR30-135115
	TWL30-145	5-3/4	145	AVAILABLE UPON REQUEST								
	TWL30-150	–	150									
TWL30-155	6-1/8	155										

TORQUE WRENCH REACTION ARMS - TWLC

Wrenches

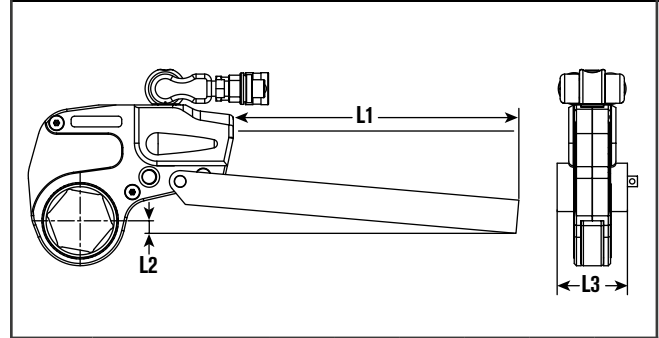
TWLC REACTION BAR TWLC-RB



- In-Line Extension Reaction Bar for TWLC wrench: allows extended reach on the same plane
- Pin engagement, no tools required
- Available for full range of tool sizes

Hydraulic Technologies Bolting Systems offer a varied range of alternative and optional reaction accessories, which help to find a reaction point solution no matter how unusual the bolted application is.

Specifications and Dimensional Data



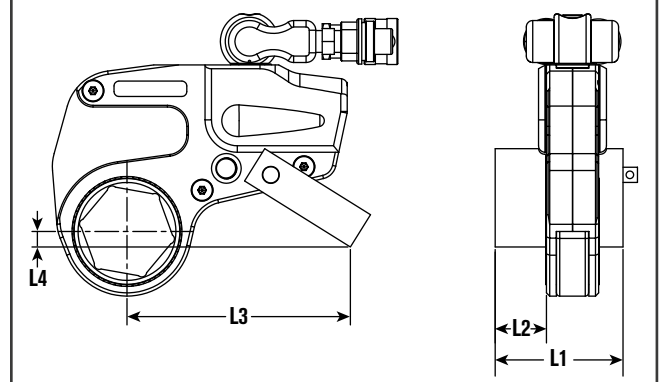
Tool Ref	Order No.	L1		L2		L3		Wt kg
		mm	in	mm	in	mm	in	
TWLC2	TWLC2-RB	381	15	28	1.10	55	2.17	2.6
TWLC4	TWLC4-RB	457	18	35	1.38	66	2.60	4.8
TWLC8	TWLC8-RB	457	18	37	1.46	85	3.35	9
TWLC15	TWLC15-RB	508	20	40	1.57	102	4.01	14.5
TWLC30	TWLC30-RB	508	20	35	1.38	127	5	27

TWLC REACTION PADDLE TWLC-RP



- Off-Set Reaction Arm for TWLC wrench: allows off-set reaction within wrench profile
- Pin engagement, no tools required
- Light alloy construction
- Available for full range of tool

Specifications and Dimensional Data



Tool Ref	Order No.	L1		L2		L3		L4		Wt kg
		mm	in	mm	in	Mm	in	mm	in	
TWLC2	TWLC2-RP	84	3.31	35	1.38	142	5.59	13	0.51	0.5
TWLC4	TWLC4-RP	109	4.29	46	1.81	178	7.01	19	0.75	0.9
TWLC8	TWLC8-RP	136.5	5.37	57	2.25	220	8.66	26	1.02	1.8
TWLC15	TWLC15-RP	165	6.50	70	2.76	252	9.92	45	1.77	3.5
TWLC30	TWLC30-RP	200	7.874	86	3.39	317	12.48	44	1.73	6

**HAVE A UNIQUE APPLICATION?
DOES STANDARD PRODUCT NOT FIT?**

Wrenches



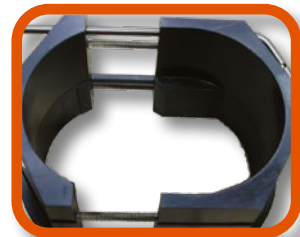
CUSTOM REACTION PADS AND REDUCERS ARE AVAILABLE.

Contact Hydraulic Technologies or an authorized distributor for more details

**WHEN NOTHING ELSE WILL WORK,
SPLIT ADAPTERS ARE MADE TO
ORDER AND AVAILABLE UPON
REQUEST.**



TWLC15 split adapter,
closed position



TWLC15 split adapter,
open position

**TORQUE WRENCH
SLIMLINE, TWSL**

**THE SLIMLINE
TORQUE WRENCH**

The SlimLine Torque Wrench is engineered to fit inaccessible applications with minimal clearance.

Features & Benefits

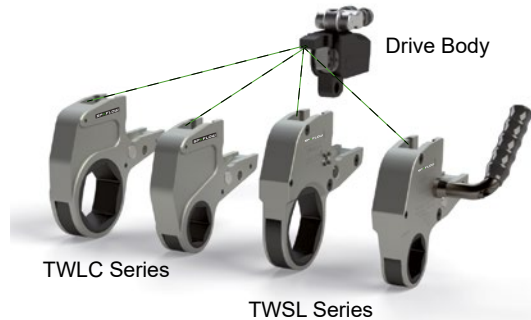
- Dynamic engineering modeling (FEA) optimized tool design to extend life and durability
- The SlimLine links use the same quick change Drive Body as the existing TWLC links
- Small nose radius, fits all standard API and ANSI flanges
- Rigid steel body construction with corrosion resistant plating
- Fully enclosed drive mechanism for operator safety
- Swivel manifold has an internal relief valve to prevent retract side over-pressurization
- Multi-axis swivel technology for free positioning of tool and hoses

Wrenches



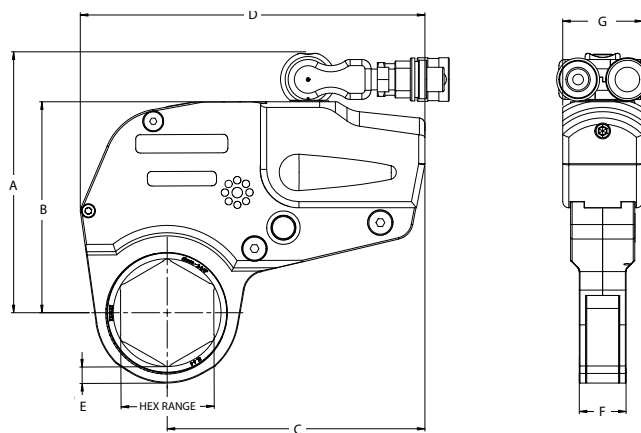
DRIVE BODY INTERCHANGES WITH THE TWLC & TWSL LINK SIZES

The Drive Body is designed to interchange with the TWLC (Low Clearance) and the new TWSL (SlimLine) Links, lowering your tool investment across each series to broaden your application reach.



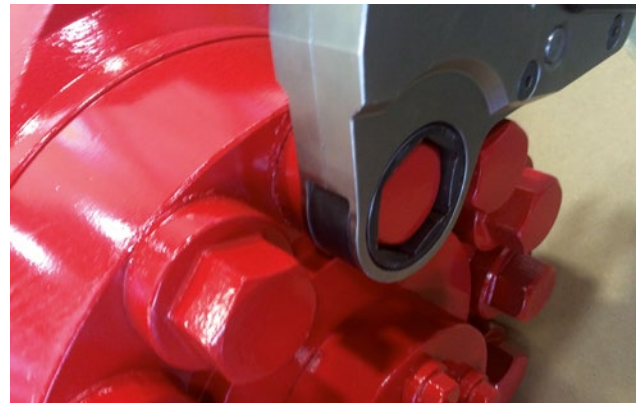
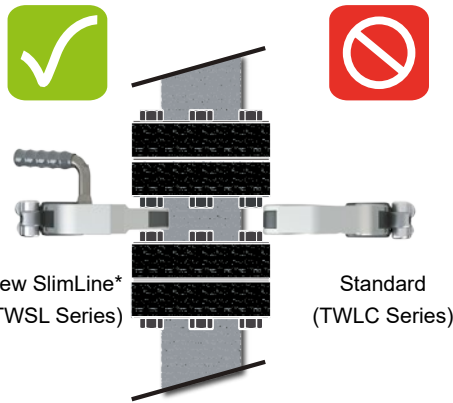
Optional Handle Order #: **DFTAS000002**

Specifications and Dimensional Data



Size	A	B	C	D	E	F	G	MIN TORQUE lb-ft (Nm)	MAX TORQUE lb-ft (Nm)
	In (mm)	In (mm)	In (mm)	In (mm)	In (mm)	In (mm)	In (mm)		
TWSL2	5.71 (145)	4.49 (114)	5.04 (128)	7.26 (185)	0.35 (8.8)	0.98 (25)	1.65 (42)		
TWSL4	6.61 (168.1)	5.39 (137.0)	6.61 (168.0)	8.83 (224.3)	0.42 (10.72)	1.20 (30.5)	2.04 (52.00)		

SlimLine Application Range



Due to the compact design, the maximum torque of the TWSL links vary depending on link size, * reference the information below for complete details.

The TWSL's narrow width and reduced radius design enables the tool to fit into tight areas where standard low clearance links cannot.

* Shown with optional handle, order # **DFTAS000002**.

Torque Wrench Drive Body Ordering Information for SlimLine

Drive Body Order No.	Hex Range for SlimLine				SlimLine Min Torque		SlimLine Max. Torque		Weight (Body Only)	
	in	in	mm	mm	lb-ft	Nm	lb-ft	Nm	lb	kg
TWLC2	1-1/8	2-3/8	28	60	Contact Factory for Details				2.2	1.0
TWLC4	1-13/16	3-1/8	46	80	505	685	2,639 ~ 4,210*	3,578 ~ 5,708*	4.4	2.0

Note: Links are sold separately from the drive body, refer to the tables below.

Torque Wrench Link Ordering Information for SlimLine

Link Order No.	Hex Range for SlimLine				SlimLine Min Torque		SlimLine Max. Torque		Weight (Link Only)	
	in	in	mm	mm	lb-ft	Nm	lb-ft	Nm	lb	kg
TWSL2-#	1-1/8	2-3/8	28	60	Contact Factory for Details					
TWSL4-#	1-13/16	3-1/8	46	80	505	685	2,639 ~ 4,210*	3,578 ~ 5,708*	8.0 - 8.4	3.7 - 3.8

Note: The "#" suffix will be replaced with the actual link size in a numeric value.

TWSL2 SlimLine Link Reference Table*

Nut A/F (mm)	Link Order No.	Max. Torque (Nm)	Weight (Link Only) (kg)
31,75	TWSL2-032	1681	1,8
36,57	TWSL2-036	1938	1,9
41,40	TWSL2-041	2169	1,95
45,97	TWSL2-046	2508	1,95
50,8	TWSL2-050	2508	1,95
55,62	TWSL2-055	2508	1,99
60,45	TWSL2-060	2508	1,99

TWSL4 SlimLine Link Reference Table*

Nut A/F (mm)	Link Order No.	Max. Torque (Nm)	Weight (Link Only) (kg)
46,0	TWSL4-046	3577	3,6
50,8	TWSL4-050	4434	3,7
55,6	TWSL4-055	4837	3,7
60,5	TWSL4-060	5242	3,8
65,0	TWSL4-065	5708	3,8
69,9	TWSL4-070	5708	3,8
74,7	TWSL4-075	5708	3,8
79,5	TWSL4-080	5708	3,8

*Contact your nearest Bolting Systems sales representative for assistance in sizing the proper tool for your application, or go to boltingsystems.com website for details about other available link sizes not listed.

TENSIONERS



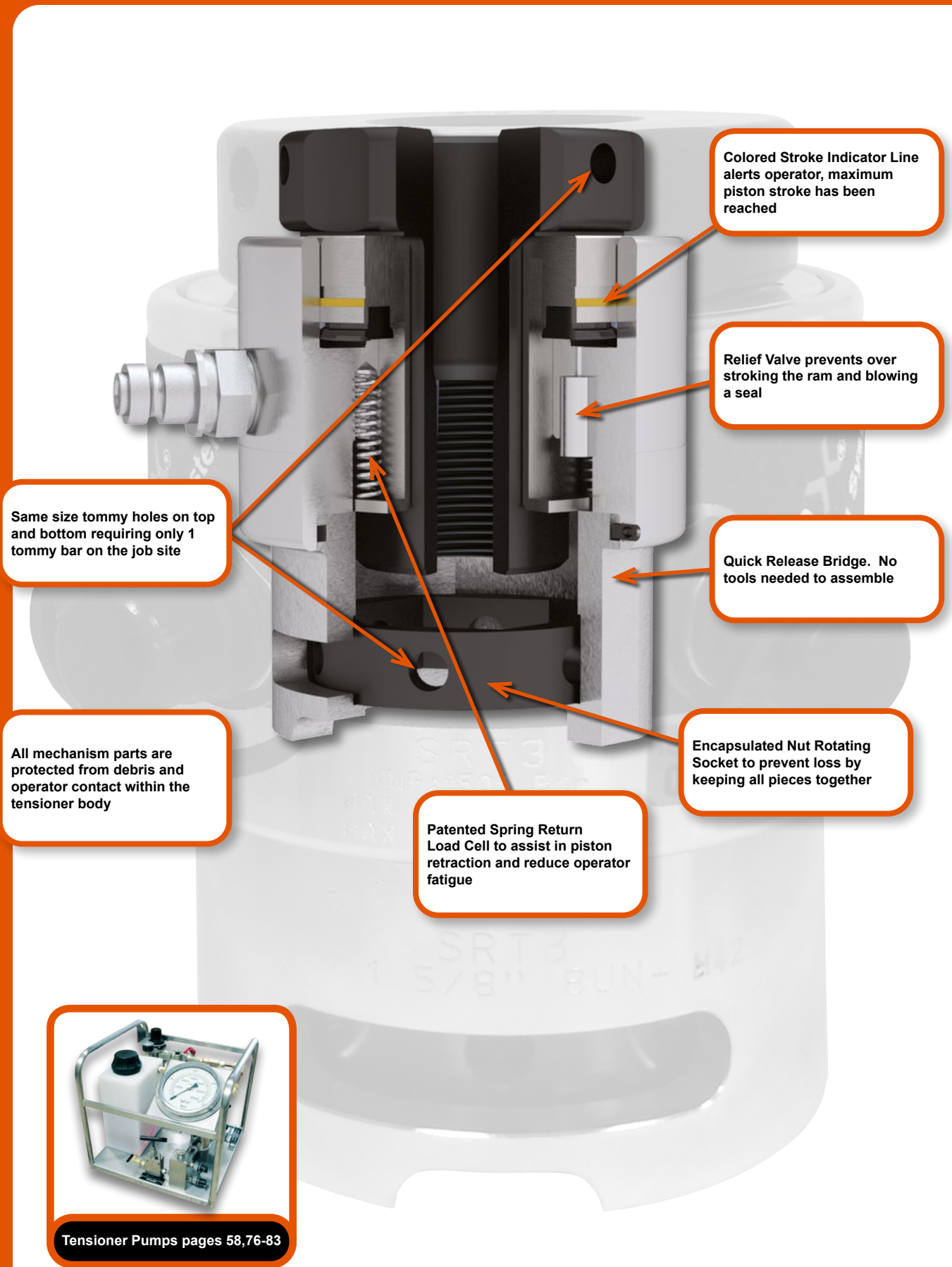
Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership



	Selection / Series	Page Description	Page(s)
	SRT	SRT Overview	28-29
	SRT	Spring Return Bolt Tensioner	30-31
	MRT	Manual Return Bolt Tensioner	32-33
	WD/WS	Wind Tensioner Overview	34
	WDD	Wind Tensioners Up Tower	35
	WSD	Wind Tensioners Compact Tower	36
	WSS/WSL	Wind Tensioners Foundation	37

Tensioners



Colored Stroke Indicator Line alerts operator, maximum piston stroke has been reached

Relief Valve prevents over stroking the ram and blowing a seal

Same size tommy holes on top and bottom requiring only 1 tommy bar on the job site

Quick Release Bridge. No tools needed to assemble

All mechanism parts are protected from debris and operator contact within the tensioner body

Encapsulated Nut Rotating Socket to prevent loss by keeping all pieces together

Patented Spring Return Load Cell to assist in piston retraction and reduce operator fatigue



Tensioner Pumps pages 58,76-83

SRT SPRING RETURN BOLT TENSIONER

The Spring Return design dramatically increases productivity and safety on the job site when compared to older technology manual return tensioners.

- Piston overstroke prevention
- Piston stroke indication
- Compatible with MRT Tensioner range
- Unique quick release bridge adaptation
- Piston/cylinder misalignment compensation
- Bolt coverage from 3/4" to 4" (20 - 115 mm) with just 8 tools
- Designed to fit BS1560/ANSI B16.5/API flanges
- Fully enclosed load cell design eliminates entry of debris into piston retraction mechanism
- Piston over-stroke eliminator to prevent over stroking and blowing a seal
- Twin hydraulic couplings for multiple tool connections
- Requires stud to protrude above nut by 1 x bolt diameter
- Application specific tooling available. Contact factory for details.
- 10 mm piston stroke

Max tool pressure: 1,500 bar (21,750 psi)

Bolt protrusion above nut: 1 x bolt diameter (minimum)



BOLT TENSIONER SPRING RETURN - SRT

Bolt coverage from 3/4" to 4"
(20 - 115 mm) with just 8 tools

BOLT TENSIONER
SPRING RETURN - SRT

Bolt coverage from 3/4" to 4"
(20 - 115 mm) with just 8 tools



Piston stroke: 10mm

Max tool pressure: 1,500 bar (21,750 psi)

Bolt protrusion above nut: minimum 1 x bolt diameter

Tensioners

Specifications and Dimensional Data															
(Tool Reference)	Stud Diameter				Tool Load		Hydraulic Area		Approx. Wt.		Minimum Bolt Protrusion Above Nut				
	Load Cell Order No.	Imperial	Adaptor Kit Order No.	Metric	Adaptor Kit Order No.	Lbf	kN	in ²	mm ²	lb	kg	Imp bolts		met bolts	
												in	mm	in	mm
(SRT0)*	3/4"	SRTAS000002	M20	SRTAS000006	35,971	160	1.654	1,067	3.1	1.4		0.75	19	0.79	20
SRTAS000001	7/8"	SRTAS000004	M22	SRTAS000008								0.87	22	0.87	22
(SRT1)	1"	SRTAS010003	M24	SRTAS010007	62,950	280	2.894	1,867	6	2.7		0.98	25	0.94	24
SRTAS010001	-	-	M27	SRTAS010009								-	-	1.06	27
	1-1/8"	SRTAS010005	-	-								1.14	29	-	-
(SRT2)	1"	SRTAS020003	M24	SRTAS020011	101,169	450	4.652	3,001	9	4.1		0.98	25	0.94	24
SRTAS020001	-	-	M27	SRTAS020013								-	-	1.06	27
	1-1/8"	SRTAS020005	M30	SRTAS020014								1.14	29	1.18	30
	1-1/4"	SRTAS020007	M33	SRTAS020015								1.26	32	1.30	33
	1-3/8"	SRTAS020009	M36	SRTAS020016								1.38	35	1.42	36
(SRT3)	1-1/4"	SRTAS030003	M33	SRTAS030011	148,381	660	6.822	4,401	11.9	5.4		1.26	32	1.30	33
SRTAS030001	1-3/8"	SRTAS030005	M36	SRTAS030012								1.38	35	1.42	36
	1-1/2"	SRTAS030007	M39	SRTAS030013								1.5	38	1.54	39
	1-5/8"	SRTAS030009	M42	SRTAS030014								1.61	41	1.65	42
(SRT4)	1-1/2"	SRTAS040004	M39	SRTAS040014	224,820	1000	10.335	6,668	18.5	8.4		1.5	38	1.54	39
SRTAS040001	1-5/8"	SRTAS040006	M42	SRTAS040015								1.61	41	1.65	42
	1-3/4"	SRTAS040008	M45	SRTAS040016								1.73	44	1.77	45
	1-7/8"	SRTAS040010	M48	SRTAS040017								1.89	48	1.89	48
	2"	SRTAS040012	-	-	2.01	51	-	-							
(SRT5)	2"	SRTAS050004	M52	SRTAS050012	337,230	1500	15.504	10,003	30.4	13.8		2.01	51	2.05	52
SRTAS050001	2-1/4"	SRTAS050006	M56	SRTAS050013								2.24	57	2.20	56
	-	-	M60	SRTAS050015								-	-	2.36	60
	2-1/2"	SRTAS050008	M64	SRTAS050016								2.52	64	2.52	64
	-	-	M68	SRTAS050018								-	-	2.68	68
	-	-	M70	SRTAS050020								-	-	2.76	70
(SRT6)	2-3/4"	SRTAS060004	M72	SRTAS060014	562,050	2500	25.84	16,671	50.7	23		2.76	70	2.83	72
SRTAS060001	3"	SRTAS060006	M76	SRTAS060016								2.99	76	2.99	76
	-	-	M80	SRTAS060018								-	-	3.15	80
	3-1/4"	SRTAS060008	M85	SRTAS060020								3.27	83	3.35	85
	3-1/2"	SRTAS060010	M90	SRTAS060022								3.50	89	3.54	90
(SRT7)	3-1/2"	SRTAS070004	M90	SRTAS070010	719,424	3200	33.076	21,339	70.5	32		3.50	89	3.54	90
SRTAS070001	-	-	M95	SRTAS070012								-	-	3.74	95
	3-3/4"	SRTAS070006	M100	SRTAS070014								3.74	95	3.94	100
	4"	SRTAS070008	-	-								4.02	102	-	-
(SRT8)*	4"	SRTAS080004	M105	SRTAS080010	921,762	4100	42.377	27,340	99.2	45		4.02	102	4.13	105
SRTAS080001	-	-	M110	SRTAS080012								-	-	4.33	110
	4-1/4"	SRTAS080006	M115	SRTAS080014								4.25	108	4.53	115
	4-1/2"	SRTAS080008	-	-								4.49	114	-	-

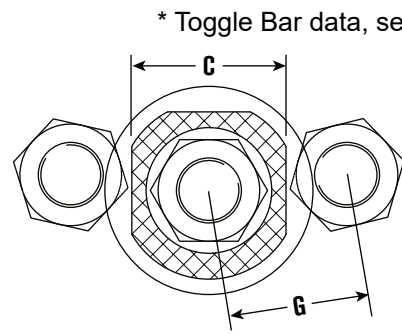
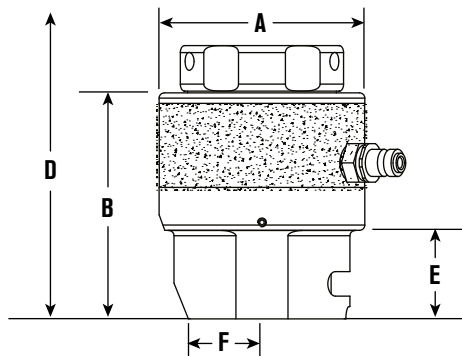
Weight excludes puller sleeve. Need to order load cell and adapter kit to have complete tensioner.

To convert to long tons, divide lbf by 2240. To convert to short tons, divide lbf by 2000.

All bolt diameters ≤ 1" are UNC and all diameters >1" are 8UN. All metric threads are Metric Coarse.

* SRT0 and SRT8 tensioners are considered special order. Minimum quantities may be required.

Specifications and Dimensional Data



'D' includes an allowance for tool removal after bolt tightening with 10 mm tool stroke

A		B		C		D				E		F		G				Stud Diameter		(Tool Reference)			
						Imp bolts		met bolts						Imp bolts		met bolts		Imperial	Met-ric	Load Cell			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm			Order No.			
2.6	66	3.7	93	2.5	63	5.4	136	5.6	142	1.4	36	1	25	2	50.8	2	49.8	3/4"	M20	(SRT0)			
		3.7	93	2.5	63	5.6	142	5.7	144	1.4	36	1	25	2.1	53.6	2	51	7/8"	M22	SRTAS000001			
3.4	87	4.6	117	2.7	68	6.9	175	6.9	175	1.5	38	1.1	28	2.3	58.8	2.2	56.5	1"	M24	(SRT1)			
		4.6	117	2.7	68	-	-	7	178	1.5	38	1.1	28	-	-	2.3	58.7	-	M27	SRTAS010001			
		4.7	120	2.8	72	7.1	181	-	-	1.6	41	1.2	31	2.7	68.3	-	44.5	1-1/8"	-	-	-		
4.1	103	4.6	117	3	75	6.9	175	6.9	175	1.5	38	1.2	30	2.6	65.2	2.5	64.5	1"	M24	(SRT2)			
		4.6	117	3	75	-	-	7	178	1.5	38	1.2	30	-	-	2.6	66	-	M27	SRTAS020001			
		4.7	120	3.1	80	7.1	181	7.2	184	1.6	41	1.2	30	2.7	67.6	2.7	67.6	1-1/8"	M30	-			
		4.8	123	3.3	84	7.4	188	7.5	190	1.7	44	1.4	35	2.8	72.3	2.8	71.9	1-1/4"	M33	-			
4.7	118	5	126	3.5	89	7.7	195	7.7	196	1.9	47	1.5	38	3.1	78	3	77	1-3/8"	M36	(SRT3)			
		4.8	123	3.5	88	7.5	190	7.6	192	1.7	44	1.4	35	3	75.9	3	76.5	1-1/4"	M33	SRTAS030001			
		5	126	3.8	96	7.8	197	7.8	198	1.9	47	1.5	38	3.2	81.1	3.2	80.8	1-3/8"	M36	-			
5.5	140.5	5.1	130	3.8	96	8	203	8	204	2	51	1.7	42	3.3	83.8	3.3	83.6	1-1/2"	M39	(SRT4)			
		5.2	133	4.1	105	8.2	209	8.3	211	2.1	54	1.6	41	3.6	91	3.6	91	1-5/8"	M42	SRTAS040001			
		5.2	132	4.4	112	8.3	211	8.3	212	2	51	1.7	42	3.6	91.8	3.6	91.6	1-1/2"	M39	-			
		5.3	135	4.5	114	8.5	217	8.6	218	2.1	54	1.8	45	3.8	95.6	3.8	95.5	1-5/8"	M42	-			
6.9	175.5	5.5	139	4.6	118	8.8	223	8.9	225	2.2	57	2	52	3.9	100	3.9	100	1-3/4"	M45	(SRT5)			
		5.6	142	4.5	114	9.1	230	9.1	231	2.4	60	2	51	4	101.1	4	101.3	1-7/8"	M48	SRTAS050001			
		5.7	145	4.7	120	9.3	236	-	-	2.5	63	2	52	4.2	106.8	-	-	2"	-	-			
		5.8	148	4.7	120	9.7	246	9.8	248	2.5	63	2	52	4.5	114	4.5	115	2"	M52	-			
		6.1	154	5.4	138	10.2	259	10.2	258	2.8	70	2.3	58	4.8	121.3	4.7	119.1	2-1/4"	M56	-			
		6.3	161	5.4	138	-	-	10.3	262	2.8	70	2.3	58	-	-	4.8	122	-	M60	-			
		6.3	161	6	153	10.7	272	10.7	273	3	76	2.5	63	5.3	134.3	5.2	132.3	2-1/2"	M64	-			
8.6	219	6.3	161	6	153	-	-	11.1	283	3	76	2.5	63	-	-	5.3	135	-	M68	(SRT6)			
		6.3	161	6	153	-	-	11.3	287	3	76	2.5	63	-	-	5.3	135.2	-	M70	SRTAS060001			
		6.6	167	6.1	156	11.2	284	11.1	283	3.2	81	2.8	70	5.6	141.3	-	-	2-3/4"	-	-			
		6.6	167	6.2	157	11.6	294	11.7	297	3.2	82	2.8	72	5.7	145.4	5.8	146.5	2-3/4"	M72	-			
		6.9	174	7.2	182	12.1	307	12.1	308	3.5	89	3.1	80	6.3	159.8	6.1	155.5	3"	M76	-			
9.9	252	6.9	174	7.2	182	-	-	12.3	312	3.5	89	3.1	80	-	-	6.2	158.4	-	M80	(SRT7)			
		7.1	180	7.5	190	12.6	320	12.7	323	3.7	95	3.3	84	6.7	169	6.5	165	3-1/4"	M85	SRTAS070001			
		7.3	186	8.1	205	13.1	332	13.1	334	4	101	3.5	88	7.2	182	7	178.6	3-1/2"	M90	-			
		7.3	186	7.9	200	13.3	339	13.4	341	4	101	3.5	88	7.1	179.8	6.9	176.1	3-1/2"	M90	-			
11.1	282	7.3	186	7.9	200	-	-	13.6	346	4	101	3.5	88	-	-	7	178.9	-	M95	(SRT8)			
		7.6	192	7.9	200	13.9	352	14	356	4.2	107	3.7	94	7.3	185.3	7.3	184.7	3-3/4"	M100	SRTAS080001			
		7.8	199	8.3	210	14.3	364	-	-	4.5	114	4.5	114	7.3	186	-	-	4"	-	-			
11.1	282	7.8	199	8.3	210	14.7	374	14.9	378	4.5	114	4.5	114	7.7	196	7.7	195	4"	M105	(SRT9)			
		7.8	199	8.3	210	-	-	15.1	383	4.5	114	4.5	114	-	-	7.8	197	-	M110	SRTAS090001			
		8.1	205	8.8	224	15.2	387	15.5	394	4.7	120	4.5	114	8.2	208	8.2	208	4-1/4"	M115	-			
Toggle Bar		8.3	212	9.1	232	15.7	400	-	-	5	127	4.6	117	8.6	218	-	-	4-1/2"	-	-			
				10mm x 200mm				SRT/MRT (up to 1-7/8" - M48)														INTTB000010	
				14mm x 200mm				SRT/MRT (2" - M52 and above)														INTTB000014	

Tensioners

**BOLT TENSIONER
MANUAL RETURN - MRT**

Bolt coverage from 1" to 3-1/2"
(24 - 100mm) with just 6 tools



**MRT MANUAL RETURN BOLT
TENSIONER**

Our economy range of bolt tensioners offer low-cost tensioning solutions.

Incorporating our unique quick-release bridge adaptation, a range of adapter kits provide maximum flexibility.

- Piston stroke limit indication
- Piston/cylinder misalignment compensation
- Bolt coverage from 1" to 3-1/2" with just 6 tools
- Designed to fit BS1560/ANSI B16.5/API flanges
- Unique quick-release bridge adaption
- Application specific tooling available. Contact factory for details.

Note: Certain tensioners may require minimum order quantity - consult factory for details.

Specifications and Dimensional Data

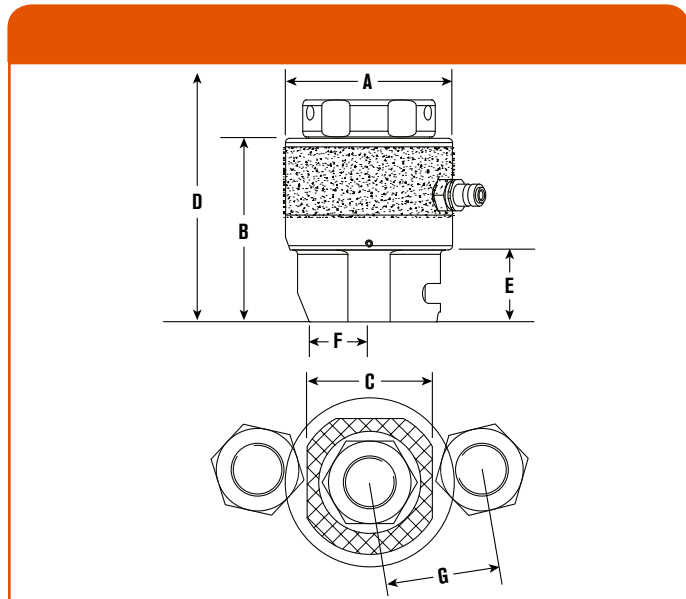
(Tool Reference) Load Cell Order No.	Stud Diameter				Tool Load		Hydraulic Area		Approx. Wt.		Minimum Bolt Protrusion Above Nut			
	Imperial	Adaptor Kit Order No.	Metric	Adaptor Kit Order No.	Lbf	kN	in ²	mm ²	lb	kg	Imp bolts		met bolts	
											in	mm	in	mm
(MRT1) MRTAS010001	1"	MRTAS010002	M24	MRTAS010004	62,900	280	2.894	1,867	6.6	3	0.98	25	0.94	24
	-	-	M27	MRTAS010005							-	-	1.06	27
	1-1/8"	MRTAS010003	-	-							1.14	29	-	-
(MRT2) MRTAS020001	1"	MRTAS020002	M24	MRTAS020006	101,100	450	4.652	3,001	9.9	4.5	0.98	25	0.94	24
	-	-	M27	MRTAS020007							-	-	1.06	27
	1-1/8"	MRTAS020003	M30	MRTAS020008							1.14	29	1.18	30
	1-1/4"	MRTAS020004	M33	MRTAS020009							1.26	32	1.30	33
(MRT3) MRTAS030001	1-3/8"	MRTAS020005	M36	MRTAS020010	148,300	660	6.822	4,401	12.98	5.9	1.38	35	1.42	36
	1-1/4"	MRTAS030002	M33	MRTAS030006							1.26	32	1.30	33
	1-3/8"	MRTAS030003	M36	MRTAS030007							1.38	35	1.42	36
	1-1/2"	MRTAS030004	M39	MRTAS030008							1.50	38	1.54	39
(MRT4) MRTAS040001	1-5/8"	MRTAS030005	M42	MRTAS030009	224,700	1,000	10.335	6,668	18.7	8.5	1.61	41	1.65	42
	1-1/4"	MRTAS040003	M39	MRTAS040008							1.26	32	1.54	39
	1-5/8"	MRTAS040004	M42	MRTAS040009							1.61	41	1.65	42
	1-3/4"	MRTAS040005	M45	MRTAS040010							1.73	44	1.77	45
(MRT5) MRTAS050001	1-7/8"	MRTAS040006	M48	MRTAS040011	337,200	1,500	15.505	10,003	30.8	14	1.89	48	1.89	48
	2"	MRTAS040007	-	-							2.01	51	-	-
	2"	MRTAS050003	M52	MRTAS050007							2.01	51	2.05	52
	2-1/4"	MRTAS050004	M56	MRTAS050008							2.24	57	2.20	56
	-	-	M60	MRTAS050009							-	-	2.36	60
	2-1/2"	MRTAS050005	M64	MRTAS050010							2.52	64	2.52	64
	-	-	M68	MRTAS050011							-	-	2.68	68
(MRT6) MRTAS060001	-	-	M70	MRTAS050012	562,000	2,500	25.84	16,671	50.6	23	-	-	2.76	70
	2-3/4"	MRTAS050006	-	-							2.76	70	-	-
	2-3/4"	MRTAS060003	M72	MRTAS060007							2.01	51	2.83	72
	3"	MRTAS060004	M76	MRTAS060008							2.99	76	2.99	76
(MRT7) MRTAS070001	-	-	M80	MRTAS060009	719,300	3,200	33	21,339	70.4	32	-	-	3.15	80
	3-1/4"	MRTAS060005	M85	MRTAS060010							3.27	83	3.35	85
	3-1/2"	MRTAS060006	M90	MRTAS060011							3.50	89	3.54	90
	3-1/2"	MRTAS070003	M90	MRTAS070006							3.50	89	3.54	90
	-	-	M95	MRTAS070007							-	-	3.74	95
(MRT7) MRTAS070001	3-3/4"	MRTAS070004	M100	MRTAS070008	4.02	102	-	-	-	-	3.74	95	3.94	100
	4"	MRTAS070005	-	-							4.02	102	-	-

To convert to long tons, divide lbf by 2240. To convert to short tons, divide lbf by 2000.

Tensioners

Specifications and Dimensional Data

Piston stroke: 15mm (excluding MRT1 - 10mm)
Max tool pressure: 1,500 bar (21,750 psi)
Bolt protrusion above nut: 1 x bolt diameter
 'D' includes an allowance for tool removal after bolt tightening with 15mm tool stroke
 Weight excludes puller sleeve
 To make a complete MRT Tensioner, choose an Adapter Kit and a Load Cell.
 Semi-compatible with SRT tensioners. Only compatible with SRT Bridges; NOT puller sleeves. SRT Puller Sleeves cannot be used with MRT Load Cell.



Tensioners

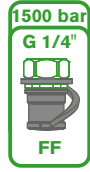
A	B		C		D				E		F		G				Stud Diameter		(Tool Reference) Load Cell Order No.	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	Imperial	Metric		
3.35	85	3.8	97	2.7	68	6.6	166.8	6.1	155.4	1.5	38	1.1	28	2.3	59	2.2	56	1"	M24	(MRT1) MRTAS010001
		3.8	97	2.7	68	-	-	6.2	158.4	1.5	38	1.1	28	-	-	2.3	59	-	M27	
		3.9	100	3	76	6.8	173.2	-	-	1.6	41	1.2	31	2.6	66	-	44	1-1/8"	-	
4.25	108	4	102.5	3	75	7.2	181.8	7.1	180.4	1.5	38	1.2	30	2.7	68	2.6	67	1"	M24	(MRT2) MRTAS020001
		4	102.5	3	75	-	-	7.2	183.4	1.5	38	1.2	30	-	-	2.7	69	-	M27	
		4.2	105.5	3.1	80	7.4	188.2	7.5	189.6	1.6	41	1.2	30	2.7	69	2.8	70	1-1/8"	M30	
		4.3	108.5	3.3	84	7.7	194.5	7.7	195.8	1.7	44	1.4	35	2.8	72	2.8	72	1-1/4"	M33	
		4.4	111.5	3.5	89	7.9	200.9	7.9	201.9	1.9	47	1.5	38	3.1	78	3	77	1-3/8"	M36	
4.9	147.5	4.3	108.5	3.5	88	7.7	196.5	7.8	197.8	1.7	44	1.4	35	3.1	79	3.1	80	1-1/4"	M33	(MRT3) MRTAS030001
		4.4	111.5	3.8	96	8	203	8	204	1.9	47	1.5	38	3.2	81	3.2	81	1-3/8"	M36	
		4.5	115	3.8	96	8.2	209.2	8.3	210.1	2	50.5	1.7	42	3.3	84	3.3	84	1-1/2"	M39	
		4.6	118	4.1	105	8.5	215.6	8.5	216.3	2.1	53.5	1.6	41	3.6	91	3.6	91	1-5/8"	M42	
5.8	147.5	4.6	116	4.4	112	8.5	215.2	8.5	216.1	2	50.5	1.7	42	3.7	94	3.7	94	1-1/4"	M39	(MRT4) MRTAS040001
		4.7	119	4.5	114	8.7	222	8.7	222	2.1	53.5	1.8	45	3.8	96	3.8	96	1-5/8"	M42	
		4.8	122.5	4.6	118	9	227.9	9	228.5	2.2	57	2	52	3.9	100	3.9	100	1-3/4"	M45	
		4.9	125.5	4.5	114	9.2	234.3	9.2	234.6	2.4	60	2	51	4	101	4	101	1-7/8"	M48	
		5.1	128.5	4.7	120	9.5	241	-	-	2.5	63	2	52	4.2	107	-	-	2"	-	
7.1	180.5	5.2	132	4.7	120	9.9	250.6	9.9	251.8	2.5	63	2	52	4.6	117	4.6	117	2"	M52	(MRT5) MRTAS050001
		5.5	138.5	5.4	138	10.4	263.3	10.3	262.2	2.7	69.5	2.3	58	4.8	121	4.7	119	2-1/4"	M56	
		5.5	138.5	5.4	138	-	-	10.5	266	2.7	69.5	2.3	58	-	-	4.8	122	-	M60	
		5.7	145	6	153	10.9	276	10.9	276.5	3	76	2.5	63	5.3	134	5.2	132	2-1/2"	M64	
		5.7	145	6	153	-	-	11	280.5	3	76	2.5	63	-	-	5.3	135	-	M68	
		5.7	145	6	153	-	-	11.1	282.5	3	76	2.5	63	-	-	5.3	135	-	M70	
		5.9	150	6.1	156	11.4	289	-	-	3.2	81	2.8	70	5.6	141	-	-	2-3/4"	-	
8.9	227	5.9	151	6.2	157	11.8	298.7	11.8	300.9	3.2	82	2.8	72	5.9	149	5.9	151	2-3/4"	M72	(MRT6) MRTAS060001
		6.2	158	7.2	182	12.3	311.4	12.3	311.2	3.5	89	3.1	80	6.3	160	6.1	156	3"	M76	
		6.2	158	7.2	182	-	-	12.4	315.2	3.5	89	3.1	80	-	-	6.2	158	-	M80	
		6.5	164	7.5	190	12.8	324.1	12.9	326.6	3.7	95	3.3	84	6.7	169	6.5	165	3-1/4"	M85	
		6.7	170	8.1	205	13.3	336.8	13.3	337.9	4	101	3.5	88	7.2	182	7	179	3-1/2"	M90	
10	252	6.8	173	7.9	200	13.6	346	13.7	347	4	101	3.5	88	7.1	180	6.9	176	3-1/2"	M90	(MRT7) MRTAS070001
		0	6.8	173	7.9	200	-	-	13.9	351.9	101	3.5	88	-	-	7	179	-	M95	
		0	7	179	7.9	200	14.1	358.5	14.3	363.3	107	3.7	94	7.3	185	7.3	185	3-3/4"	M100	
		0	7.3	186	8.3	210	14.6	371.2	-	-	114	4.5	114	7.5	190	-	-	4"	-	
Toggle Bar		10mm x 200mm				SRT/MRT (up to 1-7/8" - M48)										INTTB000010				
		14mm x 200mm				SRT/MRT (2" - M52 and above)										INTTB000014				

For smaller or larger sizes, see SRT product pages.

Tensioners



WDD



WSS & WSL



WSD

WIND TENSIONERS

Our tensioners have quality designed in with standard features that enhance durability and efficiency to get the job done faster and safer:

Quality Means Lower Life-Cycle Costs:

- Achieves 90% proof load requirement for ISO 898 Grade 10.9 bolts
- Fully enclosed load cell eliminates debris in piston retraction mechanism
- Auto-Engaging Geared Nut Rotator
- Self-energizing, long life seals

Enhanced Usability:

- Piston stroke limit indication
- High pressure swivel coupling (swivel is optional on WSS & WSL)
- 1,350 bar (19,580 psi maximum operating pressure)
- Automatic piston retraction mechanism

Designed with Safety in Mind:

- Overstroke prevention for safe operation
- Anti-slip grip surface
- Tool lifting-strap as standard

Note: Wind tensioners are considered special order. Minimum quantities may be required.



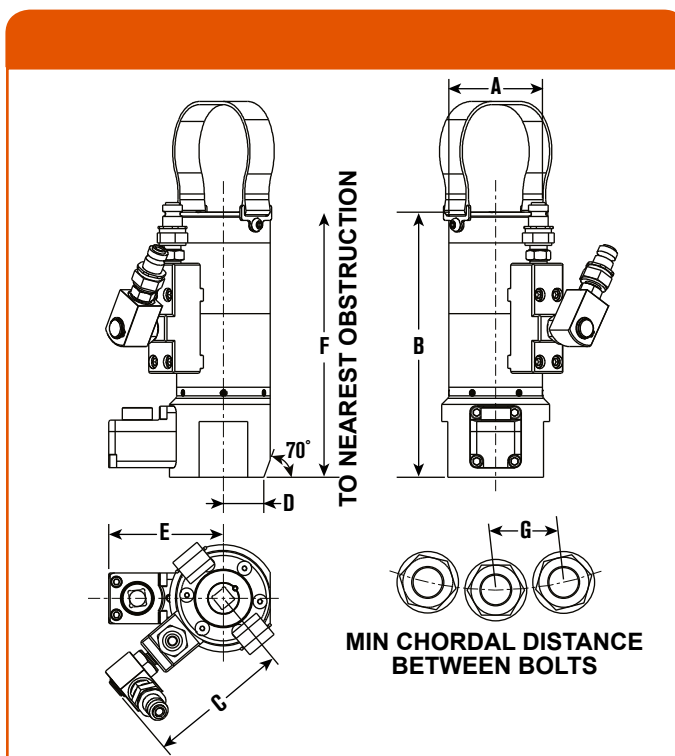
Tensioner Pumps pages 58,76-83



Specifications and Dimensional Data

WDD UP TOWER WIND TENSIONERS

- Robust Gearbox Drive
- Auto-Engaging Geared Nut Rotator
- Small diameter, high load 2-Stage hydraulic load cell
- Fast application using 1/2" drive
- Cycle counter optional (Add "A" to end of part number)
- Max Pressure: 1,350 bar (19,580 psi)
- Twin coupling optional (Add "TC" to end of part number)
- **Wind tensioners are considered special order. Minimum quantities may be required**



Tool Ref	A mm	B mm	C mm	D mm	E mm	F mm	G mm
WDD1-M30	74	210	112	37	91	290	64
WDD2-M33	79	214	115	39.5	93	298	70
WDD3-M36	85	239	117	42.5	96	332	76
WDD4-M39	92	249	121	46	99	348	79
WDD5-M42	98	255	124	49	102	360	90

Ordering Information

Order No.	Metric	Required Thread Protrusion mm	Stroke mm	Max Load kN	Hyd Area sq. mm	Wt kg
WDD1-M30	M30	63 - 70	7	467	3458	6.70
WDD2-M33	M33	67 - 74	7	569	4215	7.60
WDD3-M36	M36	71 - 80	10	671	4970	9.25
WDD4-M39	M39	72 - 86	10	801	5931	11.10
WDD5-M42	M42	80 - 92	10	926	6856	12.60

For twin hydraulic couplings (for multiple tool connection) add "TC" after part number. For cycle counter option, add "A" after code (eg. WDD1-M30A, WDD1-M30TCA)

Tensioners



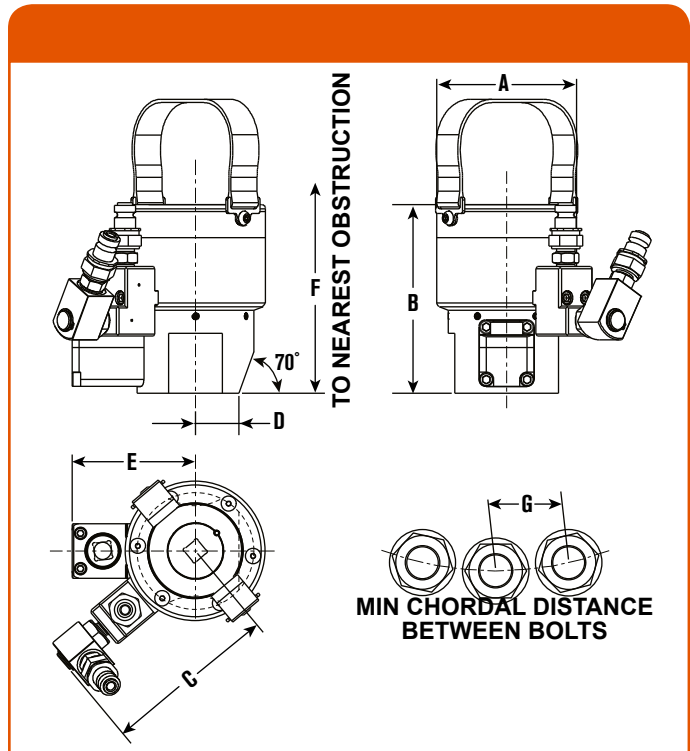
Tensioners

Specifications and Dimensional Data

WSD COMPACT TOWER WIND TENSIONERS

- Robust Gearbox Drive
- Auto-Engaging Geared Nut Rotator
- Low height hydraulic load cell
- Fast application using 1/2" drive
- Cycle counter optional (Add "A" to end of part number)
- Maximum operating pressure 1350 bar (19,580 psi)
- Twin coupling optional (Add "TC" to end of part number)

Note: Wind tensioners are considered special order. Minimum quantities may be required.



Tool Ref	A mm	B mm	C mm	D mm	E mm	F mm	G mm
WSD1-M30	103	138	127	32	91	211	68
WSD2-M33	112	140	132	35	93	218	74
WSD3-M36	122	149	136	37	96	233	82
WSD4-M39	133	153	142	42	99	238	88
WSD5-M42	140	157	146	45	102	250	93

Ordering Information

Order No.	Metric	Required Thread Protrusion mm	Stroke mm	Max Load kN	Hyd Area sq. mm	Wt kg
WSD1-M30	M30	63 - 81	7	467	3458	6.60
WSD2-M33	M33	67 - 86	7	569	4215	7.60
WSD3-M36	M36	71 - 93	10	671	4970	8.80
WSD4-M39	M39	72 - 95	10	801	5931	11.20
WSD5-M42	M42	80 - 96	10	926	6856	12.20

For twin hydraulic couplings (for multiple tool connection) add "TC" after part number. For cycle counter option, add "A" after code (eg. WDD1-M30A, WDD1-M30TCA)

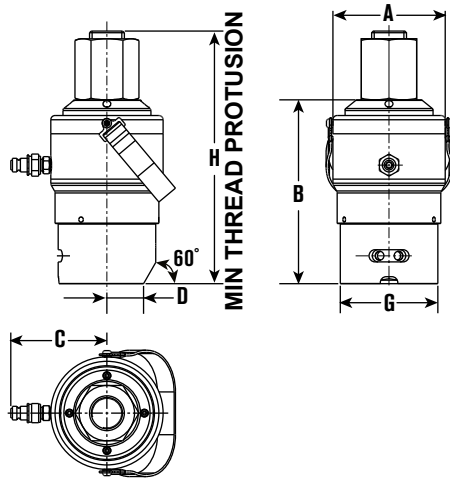
WSS & WSL FOUNDATION WIND TENSIONERS

- Suitable for ISO Metric threaded and all-thread bars
- Geared or Manual Nut Rotator
- Long & short stroke models
- Maximum operating pressure 1350 bar (19,580 psi)
- Uses standard system 'nut' for reaction
- Contact factor for optional swivel coupling
- **Wind tensioners are considered special order. Minimum quantities may be required.**

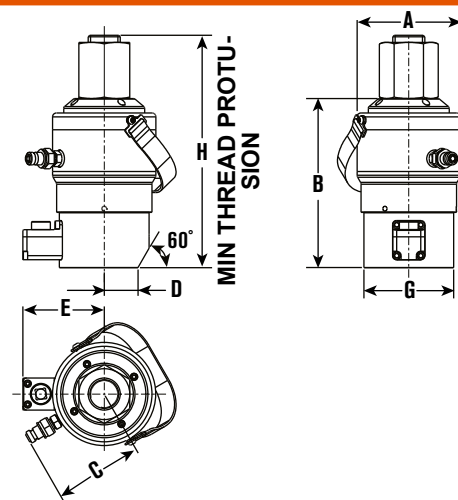


Specifications and Dimensional Data

Manual Nut Rotation Version



Gearbox Nut Rotation Version



Tool Ref	A mm	B mm	C mm	D mm	E mm	G mm	H mm
WSS1/WSS1-10	103	158	98	42	99	103	206
WSS1/WSS1-11	103	158	98	42	99	103	219
WSL1/WSL1-10	114	205	103	42	99	130	255
WSL1/WSL1-11	114	205	103	42	99	103	266
WSS2/WSS2-125	119	168	105	42	102	112	226
WSS2/WSS2-138	119	168	105	42	102	112	238
WSL2/WSL2-125	129	211	110	42	102	112	269
WSL2/WSL2-138	129	211	110	42	102	112	280

Ordering Information

Load Cell Order No.	Adaptor Kit** Order No.	Bar Size	Stroke mm	Max Load kN	Hyd Area sq mm	Wt kg
FOR GRADE 75 ksi ALL THREAD FOUNDATION BOLTS						
WSS1	WSS1-10	#10	10	470	3481	5.74
	WSS1-11	#11				5.85
WSL1	WSL1-10	#10	25	470	3481	9.00
	WSL1-11	#11				9.20
FOR GRADE 150 ksi ALL THREAD FOUNDATION BOLTS						
WSS2	WSS2-125	1-1/4"	10	760	5630	8.20
	WSS2-138	1-3/8"				8.30
WSL2	WSL2-125	1-1/4"	25	760	5630	12.30
	WSL2-138	1-3/8"				12.40

**For manual nut rotation Adaptor Kit add "M" after part number, for gearbox style nut rotation add "GB".







Note: For a complete tensioner, order load cell and adapter kit.

OTHER TOOLS



Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership

	Selection / Series	Page Description	Page(s)
	ENS	Hydraulic Nut Splitters	40-41
	HNS	Hydraulic Nut Splitters	42-45
	HS	Hydraulic Spreader	46
	FLS	Hydraulic Flange Spreader	47
	HFS	Pipe Flange Spreader	48
	EHN	Hydraulic Nut	49

Tools

NUT SPLITTERS
HYDRAULIC - ENS

3/4" to 3-1/2" bolt diameter
M20 to M90



SINGLE ACTING



DOUBLE ACTING
Ideal for Subsea use

ENS HYDRAULIC NUT SPLITTER

Our hydraulic nut splitter offers a reliable and effective solution to the removal of seized and corroded nuts.

- Triple edge replaceable cutting blade
- Blade positioning scale to eliminate bolt damage
- Cutting depth fixed - Nut size adjustable via rotating cylinder!
- Size range from 3/4" to 3-1/2" bolt diameters
- Designed to fit ANSI, ASME B.16.5 flanges
 - Will work with some API flanges – contact factory for details
- Twin line hydraulic version available for subsea use
- Versatile, reliable and trouble-free operations
- Operates off a standard 10,000 psi (700 bar) pump unit
- Built-in safety relief valve to protect tool & operator

OK FOR SUBSEA



Double acting (subsea) version comes standard with 700 bar, 1/4" NPT, Push to Connect (PTC) couplers. To use with top side pumps, change out couplers to 700 bar, 1/4" NPT, Screw-to-connect style. See page 86 for coupler details.

Ordering Information

TO SPECIFY AN ENS SOLUTION:

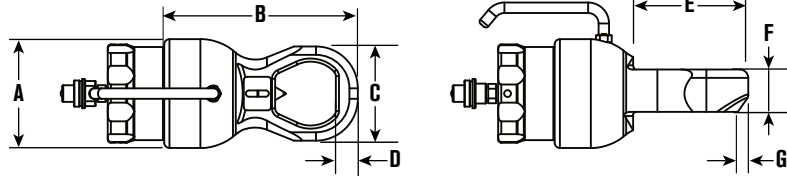
1. Use the table located on the next page to identify the nut you need to split and select the appropriate head.
2. Select a single or double acting cylinder. For subsea applications only select double acting cylinders.
3. Order extra cutting blades (optional).

Accessory Ordering Information

Order No.	Description
ENSBL010001	Cutting blade for ENS1
ENSBL020001	Cutting blade for ENS2
ENSBL030001	Cutting blade for ENS3
ENSBL040001	Cutting blade for ENS4

Specifications and Dimensional Data

Pick One Cylinder + One Head



(Tool Reference) Order Numbers

STANDARD	OPTIONAL	Head	Bolt Dia.		Nut A/F		A		B		C		D		E		F		G		Wt																		
			Imperial	in	Metric	mm	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb																	
(ENS1) ENSAS010001	(ENS1) ENSAS010002	(ENS1-1) ENSAS010004	3/4"	1-1/4	M20	30	104	4.1	228	9.0	76	3.0	18	0.7	104	4.1	40.5	1.6	9	0.4	6.7	14.8																	
			7/8"	1-7/16	M22	32																																	
			1"	1-3/8	M24	36																																	
		(ENS1-2) ENSAS010003	3/4"	1-1/4	M20	30	104	4.1	239	9.4	90	3.5	21	0.8	110	4.3	40.5	1.6	10	0.4	6.9	15.2																	
			7/8"	1-7/16	M22	32																																	
			1"	1-3/8	M24	36																																	
			1-1/8"	1-13/16	M27	41																																	
			1-1/4"	2	M30	46																																	
		(ENS2) ENSAS020001	(ENS2) ENSAS020004	(ENS2-1) ENSAS020002	1-1/8"	1-13/16	M30	46	138	5.4	305	12.0	102	4.0	22	0.9	132	5.2	57.5	2.3	6	0.2	15.8	34.8															
					1-1/4"	2	M33	50																															
1-3/8"	2-3/16				M36	55																																	
1-1/2"	2-3/8				M39	60																																	
(ENS2-2) ENSAS020003	1-1/8"			1-13/16	M30	46	138	5.4	314	12.4	114	4.5	23	0.9	141	5.6	57.5	2.3	6	0.2	16	35.3																	
	1-1/4"			2	M33	50																																	
	1-3/8"			2-3/16	M36	55																																	
	1-1/2"			2-3/8	M39	60																																	
	1-5/8"			2-9/16	M42	65																																	
	1-3/4"			2-3/4	M45	70																																	
(ENS3) ENSAS030001	(ENS3) ENSAS030006	(ENS3-1) ENSAS030002	1-3/4"	2-3/4	M45	70	190	7.5	406	16.0	132	5.2	28	1.1	189	7.4	80.5	3.2	8	0.3	42	92.6																	
			1-7/8"	2-15/16	M48	75																																	
			2"	3-1/8	M52	80																																	
		(ENS3-2) ENSAS030003	1-3/4"	2-3/4	M45	70	190	7.5	416	16.4	145	5.7	30	1.2	199	7.8	80.5	3.2	8	0.3	42.5	93.7																	
			1-7/8"	2-15/16	M48	75																																	
			2"	3-1/8	M52	80																																	
			2-1/4"	3-1/2	M56	85																																	
		(ENS3-3) ENSAS030004	1-3/4"	2-3/4	M45	70	190	7.5	426	16.8	160	6.3	31.5	1.2	200	7.9	80.5	3.2	7	0.3	43	94.8																	
			1-7/8"	2-15/16	M48	75																																	
			2"	3-1/8	M52	80																																	
			2-1/4"	3-1/2	M56	85																																	
					M64	95																																	
			(ENS3-4) ENSAS030005	1-3/4"	2-3/4	M45																	70	190	7.5	437	17.2	174	6.9	35	1.4	204	8.0	80.5	3.2	9	0.4	44	97.0
				1-7/8"	2-15/16	M48																	75																
		2"		3-1/8	M52	80																																	
		2-1/4"		3-1/2	M56	85																																	
2-1/2"	3-7/8	M60		90																																			
2-3/4"	4-1/4	M64		95																																			
		M68		100																																			
		M72	105																																				
(ENS4) ENSAS040001	(ENS4) ENSAS040004	(ENS4-1) ENSAS040002	2-3/4"	4-1/4	M76	110	235	9.3	474	18.7	189	7.4	36.5	1.4	235	9.3	110.5	4.4	4	0.2	73	160.9																	
			3"	4-5/8	M80	115																																	
		(ENS4-2) ENSAS040003	2-3/4"	4-1/4	M76	110	235	9.3	495	19.5	219	8.6	41	1.6	240	9.4	110.5	4.4	3	0.1	75	165.3																	
			3"	4-5/8	M80	115																																	
			3-1/4"	5	M85	120																																	
			3-1/2"	5-3/8	M90	130																																	

Order a cylinder and a head to make complete nutsplitter. Cylinders are interchangeable with heads within specific size ranges. Each are sold separately.

Tools

HYDRAULIC SPREADER

FLS15

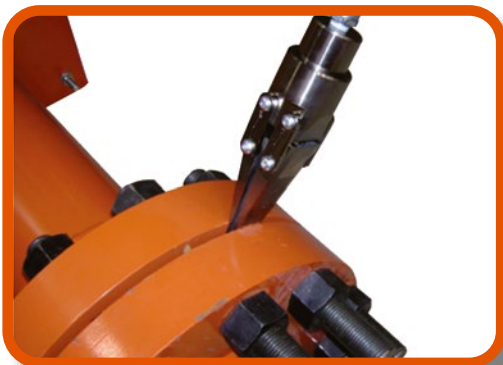
15 Metric Ton Capacity
700 bar/10,000 psi



FLS15
WITH SERRATED SHOES—WEDGE FULLY OPENED



FLS15-ST
WITH STEPPED SHOES—WEDGE CLOSED



FLS15 HYDRAULIC SPREADER

Hydraulic Technologies Bolting Systems is pleased to introduce the FLS15 hydraulic spreader. This unit is ideal for pipe and flange repair. It can also be used for removing elbows, gasket and metal seal replacement on couplers, heavy equipment maintenance, and many other tasks. The spreader is capable of developing up to 15 metric tons of force, is lightweight, and easy to use due to its ergonomic design.

- 33,000 pound (15 metric ton) wedge-driven spreader
- Jaws fully supported by wedge for excellent durability
- Low friction provided by heavy-duty extended-life lubricant
- Ideal for flanges with narrow gaps - only .2 inches (5 mm) required for entry
- Very high strength due to special alloy used
- Compact and lightweight design - only 11.28 inches (287 mm) long at a weight of 7 pounds (3.2 kg)
- Easy to use - ergonomically balanced handle (optional)
- Suitable for the offshore environment due to superior corrosion resistance
- Quick adjustments for various tasks due to interchangeable shoes (both stepped and serrated)
- Easy and quick maintenance - Only T40 Torx tool required
- Includes female half coupler - mates to standard 3/8" male half coupler (No. 9798)
- Both serrated- and stepped-shoe versions available

FLS15 HYDRAULIC SPREADER

This hydraulic spreader operates using the integrated wedge concept. It is ideal for creating space for flange surface cleaning and repair, and for gasket replacement.

The spreader is single-acting, and should be used with a hydraulic pump capable of holding pressure. Maximum operating pressure is 10,000 psi (700 bar).

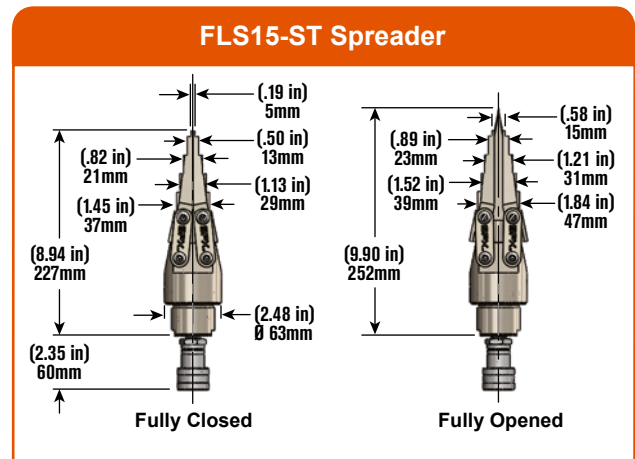
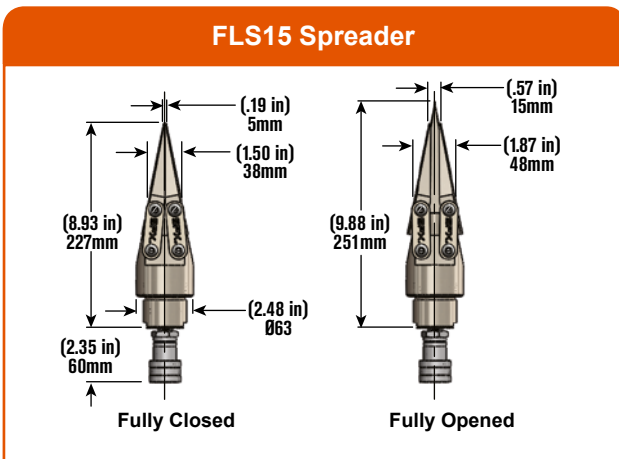
Spreading Force:

Maximum 33,000 lb (15 metric tons) per tool at 10,000 psi (700 bar). It is recommended that the tools be used in pairs, providing a maximum combined force of 66,000 lb (30 metric tons).

Typical Applications:

- Pipe and flange repair
- Removing elbows
- Couplers - gasket and metal seal replacement
- Heavy equipment maintenance

Specifications and Dimensional Data



Order No.	Maximum Spreading Force	Minimum Tip Clearance	Maximum Tip Spread	Spreader Type	Oil Capacity	Weight	Maximum Operating Pressure
FLS15 or FLS15-ST	33,000 Pounds (15 Metric Tons)	.197 Inches (5 mm)	.59 Inches (15 mm)	Hydraulic	1 Cubic Inch (16 cc)	7 Pounds (3.2 kg)	10,000 psi (700 bar)

Available FLS15 Accessories



*Two shoes required per spreader.

Recommended Components

Description	Part Number (Americas & Asia)	Part Number (Europe)
Two Speed, Single-Acting Hand Pump	P19L	P19L
Hydraulic Hose Assembly	9764	9764E
Pressure Gauge	9040 (Primary Units = psi)	9040E (Primary Units = bar)
Gauge Adapter	9670	9670
Coupler (male half coupler)	9798	9798
2 Station Manifold with Needle Valves	9642	9642
Female Half Coupler	9796	9796
Male Connector, 3/8	9682	9682

Tools

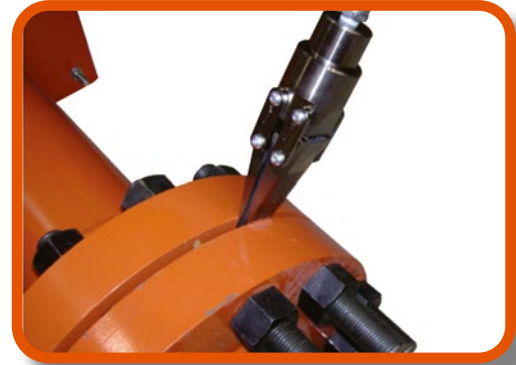
**HYDRAULIC SPREADER KIT
FLS15 KIT (TOPSIDE CASE)**

15 Metric Ton Capacity
700 bar/10,000 psi



FLS FLANGE SPREADER KIT

- Standard duty blow molded case organizes and protects the complete spreading kit
- Extra storage space for additional step shoes and up to 3 step blocks
- 15 metric ton wedge-driven spreader
- Jaws fully supported by wedge for excellent durability



*The spreader kit is available in various combinations, with a standard-duty case that is easy to transport.

Tools

FLS15 KIT (TOPSIDE CASE)

Kit Components		Order No							
		FLS15-FBK	FLS15-MBK	FLS15-FBK-ST	FLS15-MBK-ST	FLS15-FBP	FLS15-MBP	FLS15-FBP-ST	FLS15-MBP-ST
Component	Description	CE	CE	CE	CE				
FLS15	Spreader, Hydraulic	2	1	-	-	2	1	-	-
FLS15-ST	Spreader, Hydraulic Stepped	-	-	2	1	-	-	2	1
SB15	Aluminum Holding Block	2	3	2	3	2	3	2	3
P19L	Lightweight Hand Pump	1	1	1	1	1	1	1	1
Manifold Assy	Manifold, 2 Needle Valve Assembly (Incl. 2 Gauges)	1	-	1	-	1	-	1	-
2008410	Handle for FLS15	2	1	2	1	2	1	2	1
2008650	Standard Case	1	1	1	1	1	1	1	1
9765E	Hose	1	1	1	1	1	1	1	1
9767E	Hose	2	-	2	-	2	-	2	-

FLS FLANGE SPREADER KIT

- Heavy duty case is more rugged and compact, ideal for offshore applications
- Weather proof gasket seal and pressure equalization valve
- Tighter product spacing for easier helicopter transport
- 15 metric ton wedge-driven spreader
- Jaws fully supported by wedge for excellent durability
- All kits are CE rated.



**HYDRAULIC SPREADER KIT
FLS15 KIT (OFFSHORE CASE)**

15 Metric Ton Capacity
700 bar/10,000 psi



Tools

*Spreader kit in various combinations available, all in a heavy duty cases; easy to transport and stock.

		FLS15 KIT (OFFSHORE CASE)			
		Order No			
Kit Components		FLS15-FSK	FLS15-FSK-ST	FLS15-MSK	FLS15-MSK-ST
Component	Description	Spreader kit Tandem, Serrated	Spreader kit Tandem, Stepped	Spreader only kit, Serrated	Spreader only kit, Stepped
FLS15	Spreader, Hydraulic	2	-	1	-
FLS15-ST	Spreader, Hydraulic Stepped	-	2	-	1
SB15	Aluminum Holding Block	2	2	1	1
P19L	Lightweight Hand Pump with Gauge	1	1	-	-
3000827	Manifold, 2 Needle Valve Assembly (Incl. 2 Gauges)	2	2	-	-
2008577	Heavy Duty Case, Large	1	1	-	-
3000832	Heavy Duty Case, Small	-	-	1	1
9765E	Hose	1	1	-	-
9767E	Hose	2	2	-	-

NUT SPLITTERS
HYDRAULIC - HNS

15 & 25 Ton Capacity
700 bar/10,000 psi



HNS150



HNS150A



HNS225

HNS HYDRAULIC NUT SPLITTER

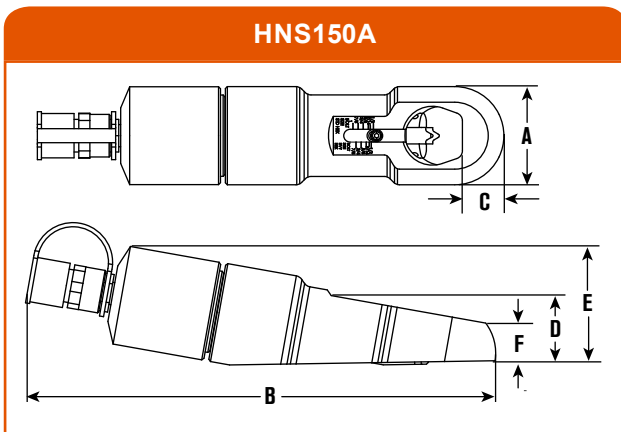
- “Dial-in” feature on HNS150 makes adjustment of splitter simple, without the worry of damaging the bolt
- Specially designed “tool steel” cutter blade penetrates the nut to the precise point where it cracks, stopping short of the bolt threads
- Nut splitter features a dramatically improved cutter blade with an 800% greater resistance to chipping and breaking over previous models
- All models feature a rugged one-piece cutting frame coupled to a heavy-duty hydraulic cylinder
- Compact size allows you to use it in confined areas where it will deliver enough force to split the toughest “fused” or rusted-on grade 2H nuts
- Simply split nut on one side, spin nut splitter 1/2 turn and make second cut on opposite side; nut separates into halves for easy removal
- Uses a standard 3/8" high flow coupler



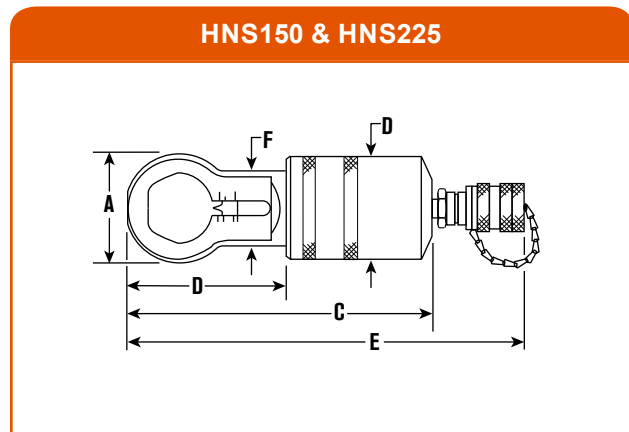
Align mark on cutter blade with scale.

Specifications and Dimensional Data

HNS150A



HNS150 & HNS225



Tool Model	A	B	C	D	E	F	HEAD THICKNESS	REPLACEMENT BLADE	TOOL Wt
HNS150	2.875	3.375	7.875	2.75	10.375	2.0625	1	308840	8.1
HNS150A	3.02	14.2	1.03	2.11	3.7	1.16	1	351985	15.8
HNS225	4.25	6	14.375	3.875	N/A	3.25	1.5	308022	29

Order No.	CAPACITIES (by Nut Grade)			
	2 or A in. hex	5 or B in. hex	8 or C in. hex	2H in. hex
HNS150	1/2 – 1-1/2	1/2 – 1-1/2	1/2 – 1-5/16	1/2 – 1-1/8
HNS150A	1/2 – 1-1/2	1/2 – 1-1/2	1/2 – 1-5/16	1/2 – 1-1/8
HNS225	1-1/8 – 2-1/4	1-1/8 – 2-1/4	1-1/8 – 2-1/4	1-1/8 – 1-11/16

Tools

HS HYDRAULIC SPREADERS

- Often used to position and align heavy pipes and flanges for easier bolting.
- Conforms to ASME B30.1 standard.
- High strength alloy steel forged upper and lower jaws on HS2000.
- Jaws are spring-return; retract automatically when pressure is released.
- Uses a standard 3/8" high flow coupler



HS2000
(Forged Steel)

HYDRAULIC SPREADERS

HS

1-1/2 Short Tons
700 bar/10,000 psi



HS3000
(High Grade Ductile Iron)

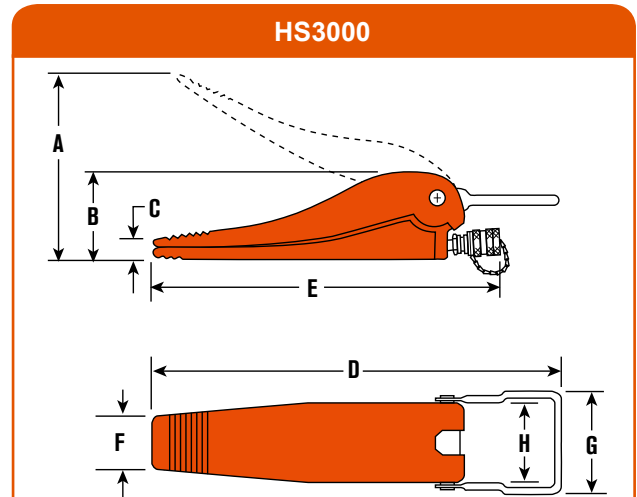
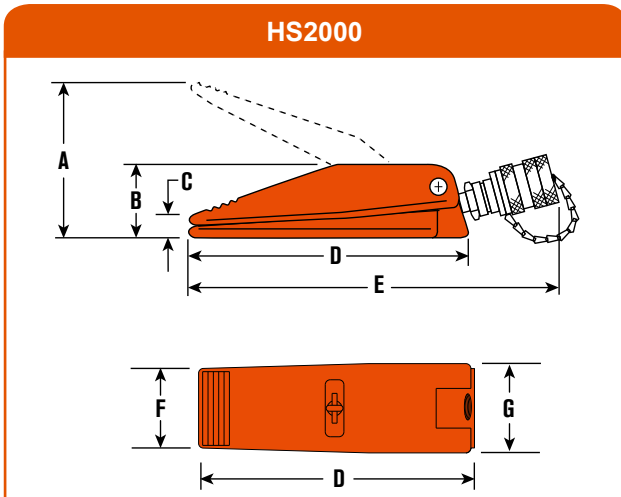
Specifications and Dimensional Data

HS2000 SPECIFICATIONS

Maximum Rated Capacity: 0.91 metric tons @ 690 bar (1 short ton @ 10,000 psi)
Maximum Spread: 101 mm (4")
Minimum Clearance Required: 14.3 mm (9/16")
Oil Required: 10.3 mL (0.63 in³)

HS3000 SPECIFICATIONS

Maximum Rated Capacity: 1.36 metric tons @ 690 bar (1-1/2 short ton @ 10,000 psi)
Maximum Spread: 292 mm (11-1/2")
Minimum Clearance Required: 31.8 mm (1-1/4")
Oil Required: 57.4 mL (3.50 in³)



Order Number	Capacity	A	B	C	D	E	F	G	H	Oil Capacity	Min. Clearance Required	Wt
	metric ton (short ton)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)			
HS2000	0.91 (1)	101 (4)	50.8 (2)	14.3 (9/16)	176 (6-15/16)	236.5 (9-5/16)	50.8 (2)	57.1 (2-1/4)	—	10.3 (0.63)	14.3 (9/16)	2.2 (4.8)
HS3000	1.36 (1-1/2)	292 (11-1/2)	108 (4-1/4)	30.2 (1-3/16)	511 (20-1/8)	450.9 (17-3/4)	57.1 (2-1/4)	142.9 (5-5/8)	92 (3-5/8)	57.4 (3.5)	31.8 (1-1/4)	10 (22)

Value(s) shown in short tons (2,000 lb). To convert to long tons, multiply by 0.893. To convert to metric tons, multiply by 0.907

Tools

PIPE FLANGE

HYDRAULIC SPREADER - HFS

5 & 10 Ton Capacity
700 bar/10,000 psi



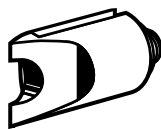
HFS3A

HFS PIPE FLANGE SPREADER

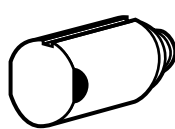
- You'll never again have to resort to "hammer and chisel" methods that waste time and effort. Flange spreaders should be used in pairs to provide even spreading force.
- Standard 60° wedge is suitable for most flanges; 30° "thin" and 60° "blunt" wedges are optional.
- The HFS3A is designed for applications where total thickness of flanges and max. spread gap is 3" or less and flange bolts are a min. of 11/16" dia.
- Use HFS6A if total thickness of flanges and max. spread gap is 6" or less, and flange bolts area min. of 13/16" dia.
- Max working pressure 700 bar (10,000 psi)
- Uses a standard 3/8" high flow coupler

Tools

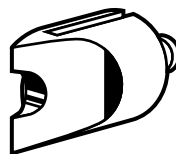
Specifications and Dimensional Data



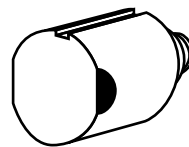
350823



350822



350549



350550

Order No.	Capacity Metric tons Short tons	Standard Wedge Type	Optional Wedges		Min. Flange Opening			Max. Flange Opening			Combined Flange Opening mm in	Min. Pin Dia.	Wt lb kg
			30°	60°	60°	60°	30°	60°	60°	30°			
			Thin	Blunt	mm in	mm in	mm in	mm in	mm in	mm in			
HFS3A	4.5	60° Sharp	350823	350822	1,6	25,4	1,6	38,1	38,1	18,3	76,2	17,4	4,1
	5				1/16"	1"	1/16"	1-1/4"	1-1/4"	23/32"			
HFS6A	9	60° Sharp	350549	350550	1,6	38,1	1,6	50,8	50,8	24,6	152,4	20,6	8,2
	10				1/16"	1-1/2"	1/16"	2"	2"	31/32"			

Value(s) shown in short tons (2,000 lb). To convert to long tons, multiply by 0.893. To convert to metric tons, multiply by 0.907.

EHN TOP COLLAR HYDRAULIC NUT

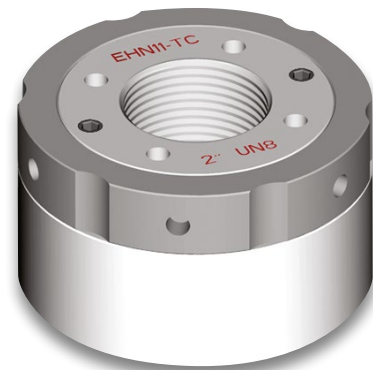
Our precision machined top collar hydraulic nuts offer a quick, accurate and cost effective solution to simultaneous tightening of multiple bolted joints.

In addition to standard features normally associated with hydraulic nuts, our system also provides the following benefits:

- Compact enough to fit the most confined spaces
- Maximum load generated at 1,500 bar (21,750 psi)
- Energized from either a hand operated or air driven pump
- Custom Hydraulic Nut designs available
- Alternative Bottom Collar and Shim type versions available

Note: Hydraulic Nuts will require minimum order quantity - consult factory for details.

HYDRAULIC NUT TOP COLLAR - EHN



Tools

Specifications and Dimensional Data

Tool Ref.	THREAD		INITIAL LOAD		HYDRAULIC AREA		NUT DIAM. mm	HEIGHT mm	STROKE mm
	Metric	in	kN	Ton F	mm ²	in ²			
EHN1-TC	M20	3/4	180	18.07	1200	1.86	68	55	5
EHN2-TC	M22	7/8	180	18.07	1200	1.86	68	55	5
EHN3-TC	M24	1	195	19.57	1300	2.02	72	55	5
EHN4-TC	M27	1-1/8	210	21.08	1400	2.17	75	55	5
EHN5-TC	M33	1-1/4	250	25.09	1667	2.58	82	57	5
EHN6-TC	M36	1-3/8	300	30.11	2001	3.10	88	57	5
EHN7-TC	M39	1-1/2	340	34.12	2267	3.51	93	58	5
EHN8-TC	M42	1-5/8	400	40.15	2667	4.13	100	62	6
EHN9-TC	M45	1-3/4	460	46.17	3067	4.75	106	64	6
EHN10-TC	M48	1-7/8	500	50.18	3334	5.17	110	64	6
EHN11-TC	M52	2	560	56.20	3734	5.79	117	67	6
EHN12-TC	M56	2-1/4	720	72.26	4801	7.44	128	74	8
EHN13-TC	M64	2-1/2	900	90.33	6002	9.30	141	77	8
EHN14-TC	M68	2-3/4	1000	100.37	6668	10.34	150	78	8
EHN15-TC	M76	3	1200	120.44	8002	12.40	162	81	8
EHN16-TC	M80	3-1/4	1400	140.51	9336	14.47	174	87	10
EHN17-TC	M90	3-1/2	1600	160.59	10669	16.54	187	95	10
EHN18-TC	M95	3-3/4	1700	170.62	11336	17.57	194	102	10
EHN19-TC	M100	4	1900	190.70	12670	19.64	205	110	10
EHN20-TC	M110	4-1/2	2200	220.81	14671	22.74	223	120	10
EHN21-TC	M125	5	2400	240.88	16004	24.81	239	135	15
EHN22-TC	M140	5-1/2	2900	291.06	19338	29.97	261	145	15
EHN23-TC	M150	6	3400	341.24	22673	35.14	282	160	15

NOTE: EHN#-TC" is not a part number that can be ordered please contact factory for ordering information.

SUBSEA TOOLS

Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership





OK FOR SUBSEA



Section/ Series	Page Description	Page(s)
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Subsea Accessories	Accessories	58-59
Other Tools For SubSea		
ENS	Hydraulic Nut Splitters	40
TWHC	High Cycle Torque Wrench	12
TWLC	Low Clearance Torque Wrench	16

SubSea Tools

SUBSEA TENSIONER

STUD TENSIONER - SST

Bolt coverage from 3/4" to 3-1/2"
only 7 tools, SST1 to SST7



Patented Quick Reaction Nut

SST STUD TENSIONER

Quick Reaction Subsea Tensioner

Our Subsea stud tensioner incorporating the quick reaction nut feature reduces diver fatigue, improving diver safety and productivity.

- Visible piston stroke indication
- Positive 'over-stroke' stop to prevent piston expulsion/seal damage.
- Piston/cylinder misalignment compensation
- Anti-slip cylinder surface for improved handling
- Low friction seals
- Anti-corrosion coating
- Bolt coverage from 3/4" to 4" (M20 to M100)
- Designed to fit BS1560/ANSI B16.5/API flanges, as well as most compact flange designs

SubSea Tools

Specifications and Dimensional Data

(Tool Reference)	Stud Diameter				Ton	Tool Load			Hydraulic Area		Approx. Wt.		Minimum Bolt Protrusion Above Nut			
	Load Cell Order No.	Imperial	Adapter Kit Order No.	Metric		Adapter Kit Order No.	Lbf	kN	in ²	mm ²	lb	kg	Imp bolts		met bolts	
												in	mm	in	mm	
(SST1)		3/4"	QRNAS010001	M20	QRNAS010004	15.7	31,500	140	1.45	934	3.30	1.50	4.09	104	4.21	107
SSTAS010001		7/8"	QRNAS010003	M22	QRNAS010005								3.98	101	4.13	105
(SST2)		1"	QRNAS020001	M24	QRNAS020004	27	53,900	240	2.48	1,600	6.16	2.80	5.24	133	5.47	139
SSTAS020001		1-1/8"	QRNAS020003	M27	QRNAS020005								5.12	130	5.35	136
		-	-	M30	QRNAS020006								-	-	5.28	134
(SST3)		1-1/4"	QRNAS030003	M33	QRNAS030005	43	85,400	380	3.928	2,534	8.80	4	5.35	136	5.59	142
SSTAS030001		1-3/8"	QRNAS030004	M36	QRNAS030006								5.24	133	5.47	139
(SST4)		1-1/2"	QRNAS040003	M39	QRNAS040005	62	123,700	550	5.685	3,668	13.20	6	5.51	140	5.79	147
SSTAS040001		1-5/8"	QRNAS040004	M42	QRNAS040006								5.35	136	5.67	144
(SST5)		1-3/4"	QRNAS050001	M45	QRNAS050005	99	197,800	880	9.095	5,868	19.80	9	5.94	151	6.3	160
SSTAS050001		1-7/8"	QRNAS050003	M48	QRNAS050006								5.83	148	6.22	158
		2"	QRNAS050004	M52	QRNAS050007								5.71	145	6.06	154
(SST6)		2-1/4"	QRNAS060001	M56	QRNAS060005	175	351,000	1,560	16.137	10,411	32.34	14.7	6.54	166	7.01	178
SSTAS060001		2-1/2"	QRNAS060003	M60	QRNAS060006								6.30	160	6.89	175
		2-3/4"	QRNAS060004	M64	QRNAS060007								6.06	154	6.77	172
		-	-	M68	QRNAS060008								-	-	6.65	169
		-	-	M70	QRNAS060009								-	-	6.5	165
(SST7)		3"	QRNAS070001	M76	QRNAS070005	289	579,000	2,575	26.623	17,176	55	25	7.13	181	7.68	195
SSTAS070001		3-1/4"	QRNAS070003	M80	QRNAS070006								6.89	175	7.56	192
		3-1/2"	QRNAS070004	M85	QRNAS070007								6.65	169	7.40	188
		-	-	M90	QRNAS070008								-	-	7.24	184
(SST8)		3-3/4"	QRNAS080001	M95	QRNAS080004	388	775,300	3,447	35.645	22,997	86.02	39.1	8.07	205	8.82	224
SSTAS080001		4"	QRNAS080003	M100	QRNAS080005								7.83	199	8.66	220

In order to form a complete tensioner, order a load cell (SSTAS0#0001) and an adapter kit (QRNAS0#00##).

Specifications and Dimensional Data

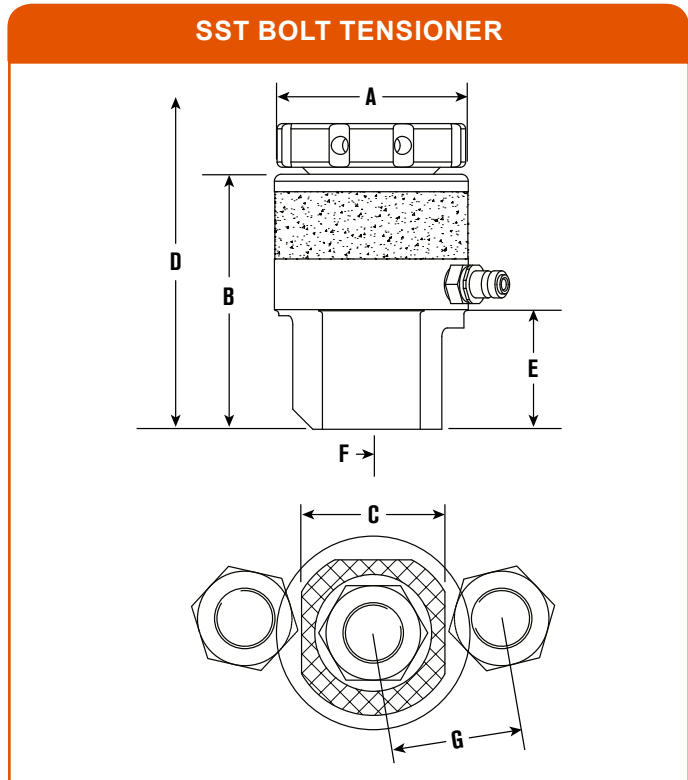
Piston stroke: 30mm except for SST1 - 20mm

Max tool pressure: 21,750 psi (1,500 bar)

Bolt protrusion above nut: refer to chart below for stud protrusion requirements

'D' includes an allowance for tool removal after bolt tightening with 30mm tool stroke

Product development is constantly taking place and dimensions may change without notice



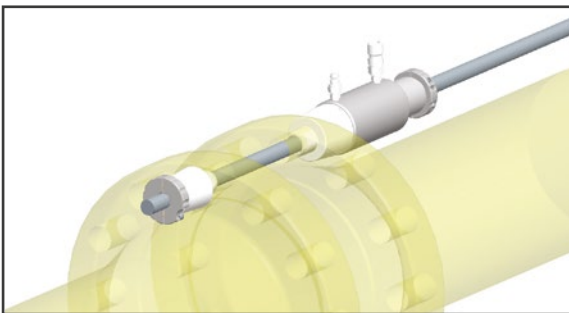
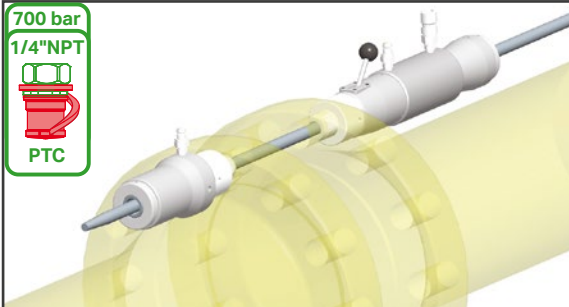
A		B		C		D				E		F		G				Stud Diameter		(Tool Reference)
in	mm	in	mm	in	mm	Imp bolts		met bolts		in	mm	in	mm	in	mm	in	mm	Imperial	Metric	Load Cell Order No.
2.6	66	3.8	97	1.9	48	9	228	9	228	1.6	40	0.7	19	1.7	44	1.7	44	3/4"	M20	SSTAS010001
						1.8	46	1.8	45					7/8"	M22					
3.2	82	5	127.5	2.4	60	11.7	296	11.7	296	2.2	56.5	1	24.5	2.2	55	2.1	54	1"	M24	(SST2)
														2.3	58	2.2	56	1-1/8"	M27	SSTAS020001
														-	-	2.3	58	-	M30	
3.8	97	5.4	137	3	77	12.2	309	12.2	309	2.5	63	1.1	28	2.7	69	2.7	68	1-1/4"	M33	(SST3)
														2.8	72	2.8	71	1-3/8"	M36	SSTAS030001
4.4	111	5.7	146	3.5	90	12.7	322	12.7	322	2.7	68	1.3	33.5	3.2	81	3.2	81	1-1/2"	M39	(SST4)
														3.3	84	3.3	84	1-5/8"	M42	SSTAS040001
5.4	136	6.2	158	4.5	114	13.5	342	13.5	342	3.1	77.5	1.6	40	3.9	98	3.9	98	1-3/4"	M45	(SST5)
														4	101	4	101	1-7/8"	M48	SSTAS050001
														4.1	104	4.1	104	2"	M52	
														4.8	122	4.7	120	2-1/4"	M56	
7	177	7.1	180.5	5.5	140	14.7	374	14.7	374	3.8	97	2.1	53	5	128	4.8	123	2-1/2"	M60	(SST6)
														5.2	133	5	126	2-3/4"	M64	SSTAS060001
														-	-	5.1	129	-	M68	
														-	-	5.2	132	-	M70	
														8.5	217	8	202	7.1	180	16.1
6.5	164	6.2	157	3-1/4"	M80	SSTAS070001														
6.7	170	6.3	160	3-1/2"	M85															
-	-	6.5	166	-	M90															
9.8	248	9.1	230	8.3	210	18.9	480	18.9	480	5	128	3.3	85	7.5	190	7.2	184	3-3/4"	M95	(SST8)
														7.7	196	7.5	190	4"	M100	SSTAS080001
Toggle Bar		6mm x 200mm				SST1, SST2										INTTB000006				
		8mm x 200mm				SST3										INTTB000008				
		10mm x 200mm				SST4, SST5 (up to 1-7/8"-M48)										INTTB000010				
		12mm x 200 mm				SST5 (2" - M52), SST6 (2-1/4" - M56)										INTTB000012				
		14mm x 200mm				SST6 (2-1/2" - M60 and above)										INTTB000014				
		16mm x 250mm				SST7, SST8										INTTB000016				

SubSea Tools

FLANGE PULLERS

SUBSEA - SFP

700 bar/10,000 psi



WIRE ROPE FLANGE PULLING SYSTEM

- Compact design
- Long Piston Stroke - 102mm (4")
- Self activating collet design
- Auto grab Anchor Collet with hydraulic release
- Manually releaseable Retract Collet prevents lock on
- High strength, low rotation wire rope
- Anti-Slip surfaces
- Operated via separate diver control valve providing precise control for up to 4 pullers

THREADED BAR FLANGE PULLING SYSTEM

- Compact design
- Long Piston Stroke - 102mm (4")
- 700 bar (10,000 psi) systems
- Rapid assembly using Quick Release Reaction Nuts
- High strength threaded bar
- Anti-Slip surfaces
- Operated via separate diver control valve providing precise control for up to 4 pullers

FEATURES

Compact Design

Designed to fit ANSI B16.5, MSS SP44, API 6A and most other flange applications dedicated flange hole adaptors.

Hydraulic Anchor Collet Release

Anchor collet automatically grips wire rope (without hydraulic pressure). Collets can be fully released by applying hydraulic pressure.

Auto Advance Collet Release

Advance collet fully disengages when the pulling cylinder is fully retracted

Manual Retract Collet Release

Retract collet can be manually disengaged, allowing the pulling cylinder (including Advance and Retract collets) to be removed from the wire rope while the rope is installed in the flanges. Also allows the pulling system to be removed when pipe spring is evident (pipe spring makes the Anchor collet difficult to release).

Low Rotation Wire Rope

Special high load, 19mm and 22mm low rotation, steel wire rope ensure effective collet grip and reduces bird caging effects and strand unwinding.

Remote Diver Control Valve

Pulling Cylinders are controlled via a separate Valve Control Console allowing the diver to control the pullers remote from the work site. This eliminates bulky cylinder mounted control valves and negates constant diver intervention between pullers when advancing and retracting the cylinders.

Drawbar System Conversion with Quick Release Nuts

Pulling Cylinders can be simply converted to use a 1-1/8" threaded drawbar instead of wire ropes. The system utilizes Quick Release Reaction nuts for speed and versatility.

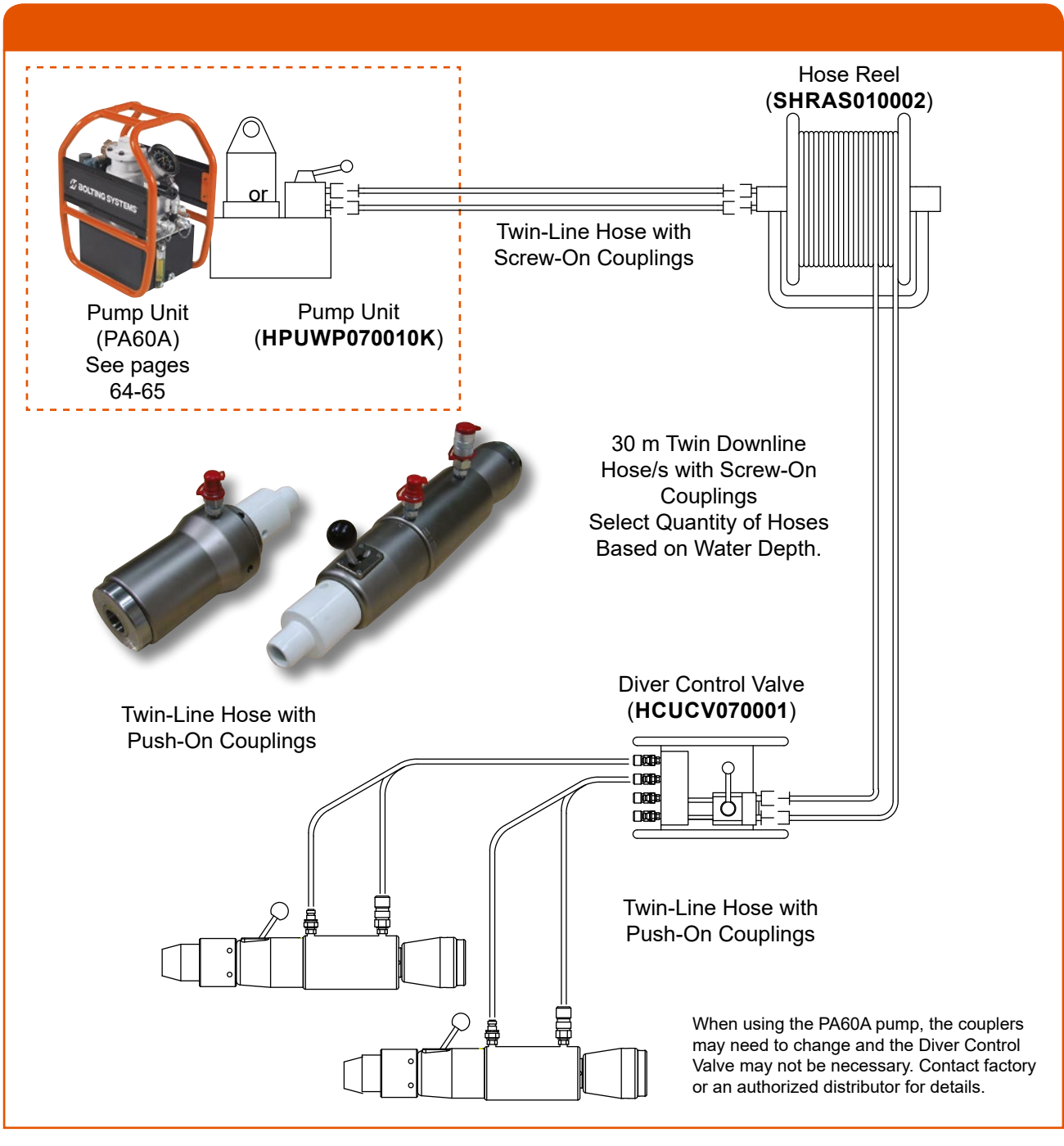
Flexible Design

Two or more cylinders can be linked together to cater for larger flange sizes/loads.

Flange Pulling Systems are made to order and may require minimum order quantities. Please consult factory for more information.

Specifications and Dimensional Data

- Max capacity of cylinder:** 20.0 tonf (199.3 kN)
- Max operating pressure of cylinder: 10,000 psi (700 bar)
- Max stroke of cylinder: 4.0" (102 mm)
- Diameter of wire ropes/drawbar available: 19.0mm, 22.0mm, 1-1/8" 8UN Drawbar
- Specified minimum breaking load of rope: 19.0mm - 307 kN (30.8 tonf), 22mm - 415 kN (41.6 tonf)
- System operating pressure with 19.0/22.0 mm rope: 5,000 psi (345 bar)
- System operating pressure with 1-1/8" drawbar (Gr B7): 10,000 psi (690 bar)

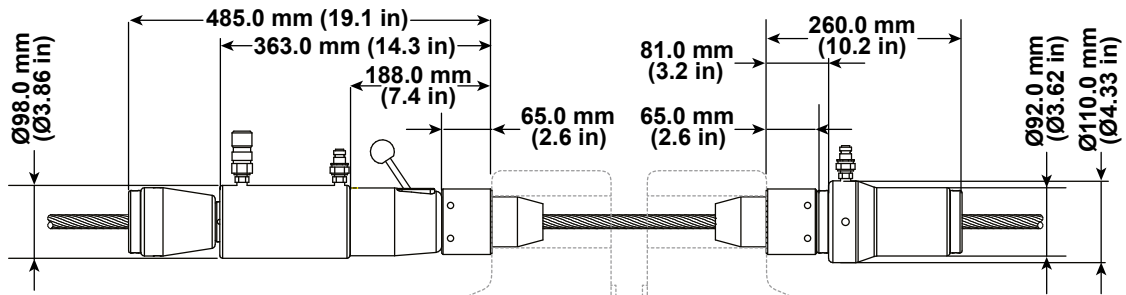
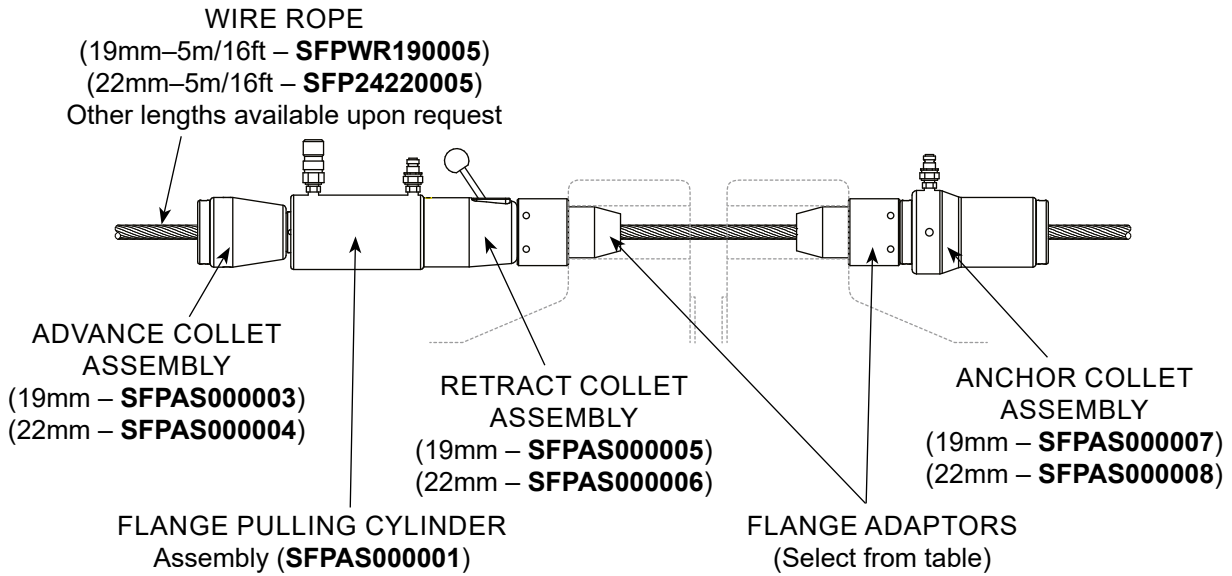


SubSea Tools

Flange Pulling Systems are made to order and may require minimum order quantities. Please consult factory for more information.

**WIRE ROPE
FLANGE PULLING SYSTEM**

Specifications and Dimensional Data



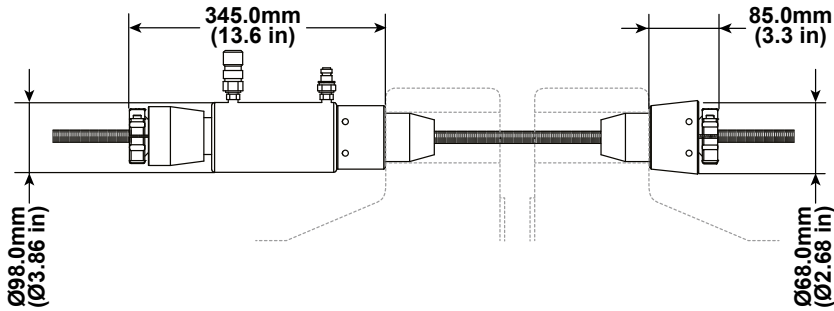
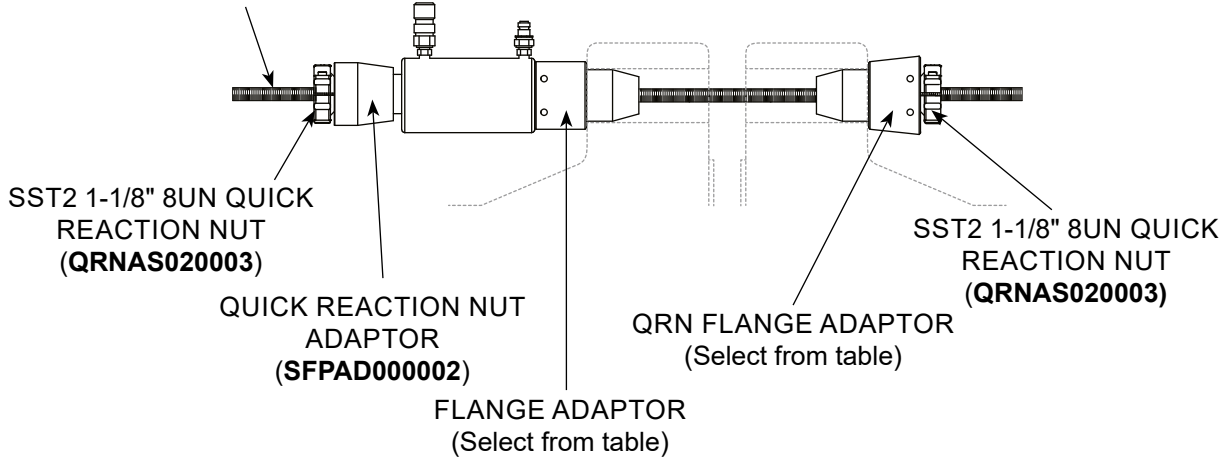
For Bolt Diameter		For Flange Hole Diameter		Wire Rope Flange Adapter Order No.
in	mm	in	mm	
3/4	M20	7/8	22.2	SFPWA000C00
7/8	M24	1	25.4	SFPWA000D00
1	M27	1-1/8	28.6	SFPWA000E00
1-1/8	M30	1-1/4	31.8	SFPWA000F00
1-1/4	M33	1-3/8	34.9	SFPWA000G00
1-3/8	M36	1-1/2	38.1	SFPWA000H00
1-1/2	M39	1-5/8	41.3	SFPWA000I00
1-5/8	M42	1-3/4	44.5	SFPWA000J00
1-3/4	M45	1-7/8	47.6	SFPWA000K00
1-7/8	M48	2	50.8	SFPWA000L00
2	M52	2-1/8	54	SFPWA000M00
2-1/4	M56	2-3/8	60.3	SFPWA000N00
2-1/2	M64	2-5/8	66.7	SFPWA000P00
2-3/4	M68/M70	2-7/8	73	SFPWA000Q00
3	M76	3-1/8	79.4	SFPWA000R00
3-1/4	M82	3-3/8	85.7	SFPWA000S00
3-1/2	M90	3-5/8	92.1	SFPWA000T00
3-3/4	M95	3-7/8	98.4	SFPWA000U00
4	M100	4-1/8	104.8	SFPWA000V00

Flange Pulling Systems are made to order and may require minimum order quantities. Please consult factory for more information.

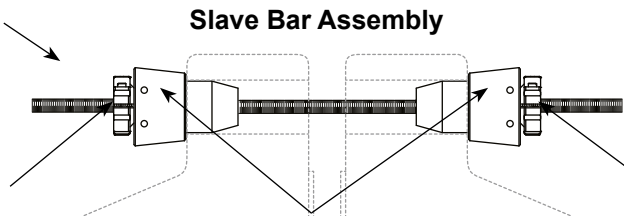
THREADED BAR
FLANGE PULLING SYSTEM

Specifications and Dimensional Data

1-1/8" 8UN THREADED DRAWBAR
(2m/6.5ft – STDFA000167)
Other lengths available upon request



1-1/8" 8UN THREADED DRAWBAR
(2m/6.5ft – STDFA000167)
Other lengths available upon request



Note: Slave bar assemblies are required with threaded drawbar type flange pullers, and are used to maintain the flange in the position while the pullers are resetting.

SST2 1-1/8" 8UN QUICK REACTION NUT (QRNAS020003)

SLAVE BAR FLANGE ADAPTORS (Select from table)

SST2 1-1/8" 8UN QUICK REACTION NUT (QRNAS020003)

For Bolt Diameter		For Flange Hole Diameter		Threaded Drawbar Flange Adaptor		
in	mm	in	mm	Flange Adaptor	QRN Flange Adaptor	Slave Bar Flange Adaptor
1-1/4	M33	1-3/8	34.9	SFPTA000H00	SFPQA000H00	SFPSA000H00
1-3/8	M36	1-1/2	38.1	SFPTA000I00	SFPQA000I00	SFPSA000K00
1-1/2	M39	1-5/8	41.3	SFPTA000J00	SFPQA000J00	SFPSA000K00
1-5/8	M42	1-3/4	44.5	SFPTA000K00	SFPQA000K00	SFPSA000M00
1-3/4	M45	1-7/8	47.6	SFPTA000L00	SFPQA000L00	SFPSA000M00
1-7/8	M48	2	50.8	SFPTA000M00	SFPQA000M00	SFPSA000M00
2	M52	2-1/8	54	SFPTA000N00	SFPQA000N00	SFPSA000Q00
2-1/4	M56	2-3/8	60.3	SFPTA000P00	SFPQA000P00	SFPSA000Q00
2-1/2	M64	2-5/8	66.7	SFPTA000Q00	SFPQA000Q00	SFPSA000Q00
2-3/4	M68/M70	2-7/8	73	SFPTA000R00	SFPQA000R00	SFPSA000T00
3	M76	3-1/8	79.4	SFPTA000S00	SFPQA000S00	SFPSA000T00
3-1/4	M82	3-3/8	85.7	SFPTA000T00	SFPQA000T00	SFPSA000T00
3-1/2	M90	3-5/8	92.1	SFPTA000U00	SFPQA000U00	SFPSA000V00
3-3/4	M95	3-7/8	98.4	SFPTA000V00	SFPQA000V00	SFPSA000V00
4	M100	4-1/8	104.8	SFPTA000V00	SFPQA000V00	SFPSA000V00

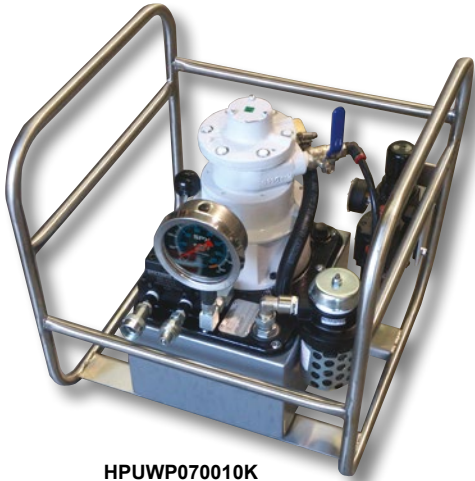
Flange Pulling Systems are made to order and may require minimum order quantities. Please consult factory for more information.

SUBSEA ACCESSORIES

HIGH FLOW PUMP

Typical use: Flange Pullers, Torque Wrenches, Nutsplitters

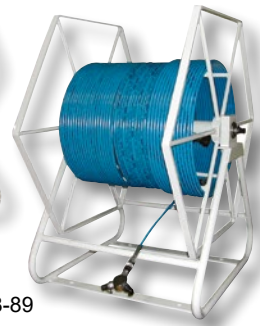
- Self priming, 2-speed operation
- 2.24 kw (3 hp) Air motor (50 CFM)
- 700 bar (10,000 psi) maximum pressure
- Calibratable 100mm (4") pressure gauge
- Adjustable pressure relief valve
- Flow rate up to 11.8 litres/min (720 cu. in/min)
- Internal oil cooler
- Low noise operation
- Pneumatic Filter/Regulator/Lubricator
- 9.5 Litre (2 gal.) Reservoir (optional oil level gauge)
- Carrying frame (WxLxH): 430 x 460 x 460 (mm)
- Weight: 40 Kg (88 lb) (inc. oil)
- Alternate Pump: PA60A can be used as an alternate to the **HPUW070010K** shown. See page 78 for details.



HPUWP070010K

SINGLE & TWIN-LINE HOSE REELS

- Hose reels available for tension and torque applications
- -30°C to 80°C working temperature range
- Female quick connect couplings as standard
- Hose Reel Dimensions (WxLxH): 750 x 1,000 x 1,050 (mm), 29" x 39" x 41"
- Hose Reel Weight: 65 Kg (145 lb) (without hose)



See page 88-89

REMOTE DIVER CONTROL VALVE

Gives diver precise control of Flange Pullers, Torque Wrenches, Nutsplitters, Jack, Cylinders, etc.

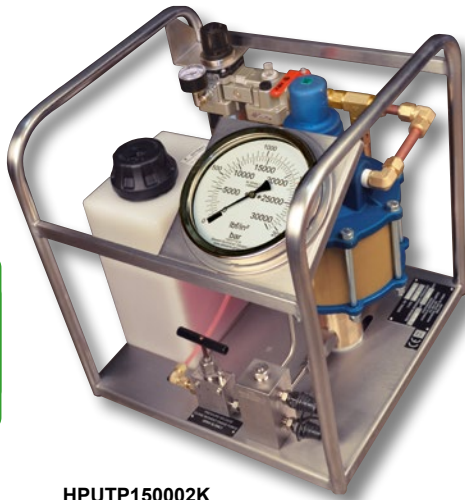
- 700 bar (10,000 psi) maximum working pressure
- Allows connection of up to 4 tools
- Stainless steel construction (rust free)
- Internal relief valve controls retract pressure
- Couplers on reel side are flat face for easy connection under water. Couplers on valve side match the required tool.
- Dimensions (WxLxH): 420 x 270 x 200 (mm)
- Weight: 9 kg (19.8 lb)



HCUCV070001



SubSea Tools



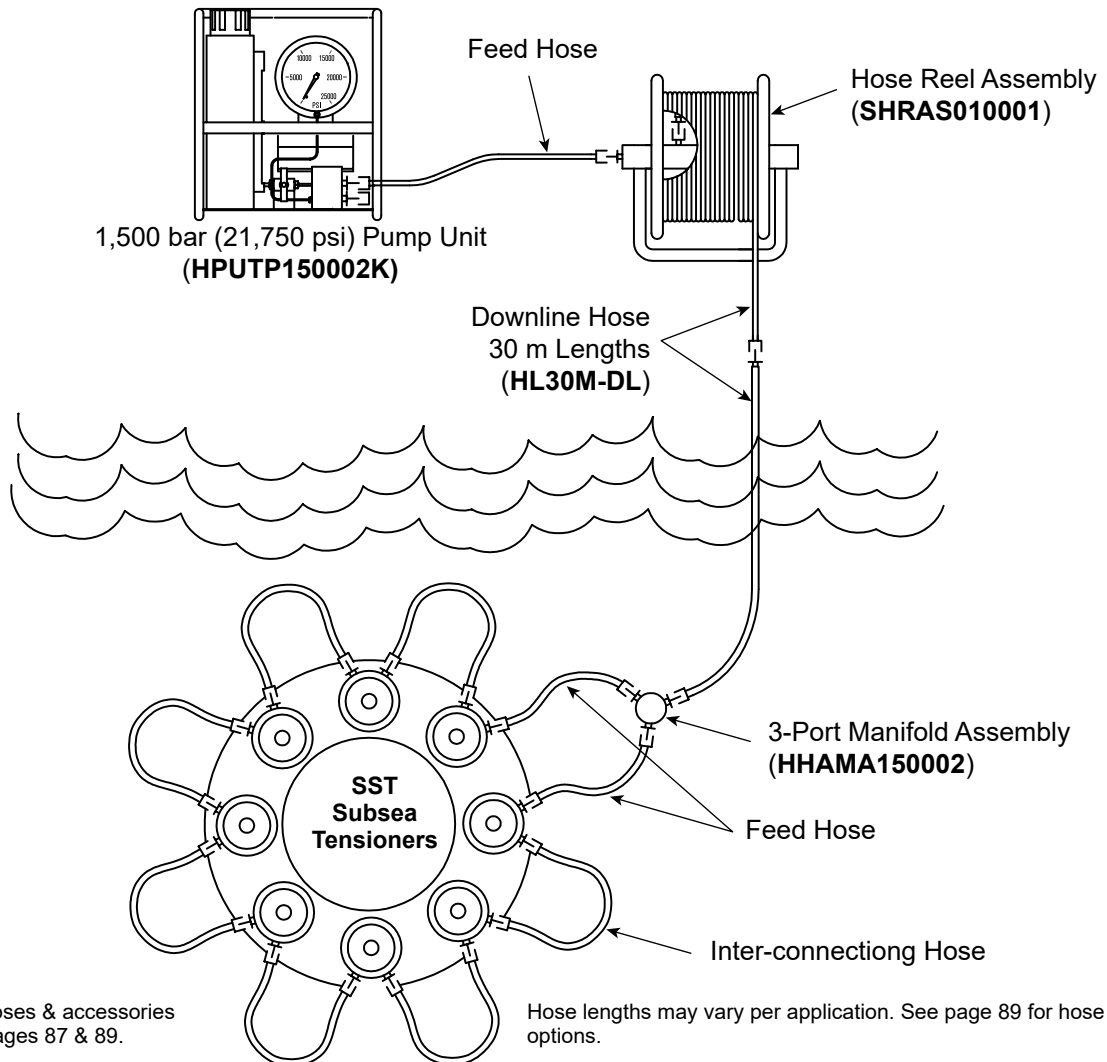
HPUTP150002K
See pages 80-81

HIGH FLOW BOLT-TENSIONING PUMP

Typical use: Subsea Bolt Tensioners, Segmented Tensioners

- 1,500 bar (21,750 psi) maximum working pressure (restricted)
- Calibrated 150mm (6") pressure gauge
- Flow rate up to 1.14 litres/min (70 cu. in/min)
- Dual oil outlets with quick-connect no spill couplings
- Pneumatic Filter/Regulator/Lubricator
- 9.5 Litre (2 gal.) polyethylene reservoir
- Dimensions (WxLxH): 465 x 530 x 515 (mm), 18" x 20" x 20"
- Approx. Weight: 23 Kg (51 lb)

OFFSHORE PUMP & HOSE ARRANGEMENT FOR SST SUBSEA TENSIONERS



SubSea Tools

TORQUE PUMPS 700 BAR (10,000 PSI)

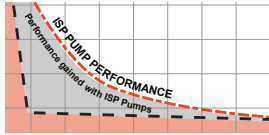
Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership





	Torque of Bolt		Tension	
	700 BAR (10,000 PSI)	10,000 PSI (700 BAR)	10,000 PSI (700 BAR)	10,000 PSI (700 BAR)
316L (18% Ni)	X	X	X	X
304 (18% Ni)	X	X	X	X
A193	X	X	X	X
A194	X	X	X	X
A320	X	X	X	X
A325	X	X	X	X
A354	X	X	X	X
A387	X	X	X	X
A429	X	X	X	X
A479	X	X	X	X
A564	X	X	X	X
A590	X	X	X	X
A619	X	X	X	X
A661	X	X	X	X
A687	X	X	X	X
A703	X	X	X	X
A743	X	X	X	X
A815	X	X	X	X
A895	X	X	X	X
A995	X	X	X	X
A1019	X	X	X	X
A1028	X	X	X	X
A1035	X	X	X	X
A1043	X	X	X	X
A1050	X	X	X	X
A1058	X	X	X	X
A1063	X	X	X	X
A1069	X	X	X	X
A1070	X	X	X	X
A1071	X	X	X	X
A1072	X	X	X	X
A1073	X	X	X	X
A1074	X	X	X	X
A1075	X	X	X	X
A1076	X	X	X	X
A1077	X	X	X	X
A1078	X	X	X	X
A1079	X	X	X	X
A1080	X	X	X	X
A1081	X	X	X	X
A1082	X	X	X	X
A1083	X	X	X	X
A1084	X	X	X	X
A1085	X	X	X	X
A1086	X	X	X	X
A1087	X	X	X	X
A1088	X	X	X	X
A1089	X	X	X	X
A1090	X	X	X	X
A1091	X	X	X	X
A1092	X	X	X	X
A1093	X	X	X	X
A1094	X	X	X	X
A1095	X	X	X	X
A1096	X	X	X	X
A1097	X	X	X	X
A1098	X	X	X	X
A1099	X	X	X	X
A1100	X	X	X	X





Section / Series	Page Description	Page(s)
Pumps	Bolting Pumps Summary Chart	62
Pumps	ISP Advantage	63
PA60A	Infinity Series Air Pump	64-65
RWP55-BS	Classic Series Air Hydraulic Pump	70-71
PE55TWP-BS	Classic Series Electric Hydraulic Pump	66-67
PG120TWP	Gas Powered Pump	68-69
P Series	Hand Pumps 700 bar (10,000 psi)	72-73

Pumps

BOLTING PUMP SUMMARY CHART

Most customers choose to use hand pumps for spreading and nutsplitting applications because of their ability to spread and hold. When using spreaders with torque wrench pumps, use only the top port advance and know that the spreader will retract when the pump is turned off.

Bold Products have higher stocking levels. X

		Torque or Split				Tension			
		PE55TWP-BS	PG120TWP	PA60A	RWP55-BS	RWP55-Dual	PE8	HPUTP-1	HPUTP-2
POWER SOURCE	ELECTRIC (110/115V)	X					X		
	ELECTRIC (220/230V)	X					X		
	AIR			X	X	X		X	X
	GAS		X						
ELECTRIC MOTOR TYPE	UNIVERSAL	X	n/a				X		
	INDUCTION		n/a						
MAX PRESSURE	10,000 PSI (700 BAR)	X	X	X	X	X		X	X
	21,750 PSI (1,500 BAR)						X	X	X
PUMP TYPE	TWO-STAGE	X	X		X	X	X		X
	INFINITE STAGE (ISP)			X					
FLOW RATE @MAX PRESSURE	LOW (<20 IN ³ /MIN, <0.33 L/min)						X		
	MED. (<40 IN ³ /MIN, <0.66 L/min)								
	HIGH (<60 IN ³ /MIN, <0.98 L/min))	X		X	X			X	
	VERY HIGH (>60 IN ³ /MIN, >0.98 L/min)		X			X			X
SPEED @MAX PRESSURE	SLOW						X		
	MED	X			X			X	
	FAST		X	X		X			X
APPLICATION TYPE	ORIGINAL INSTALL	X	X	X	X	X	X	X	X
	OPERATIONS/MRO/SERVICE	X			X		X	X	X
DUTY CYCLE	CONTINUOUS	X	X	X	X	X	X	X	X
	INTERMITTENT	X			X		X	X	X
# OF PORTS (TOOL QUANTITY)	1	X	X	X	X	X			
	2						X	X	X
	4	X		X	X	X			
OIL TANK CAPACITY	0.5 GAL (1.9 L)						X		
	1.0 GAL (3.8 L)								
	1.25 GAL (4.7 L)								
	1.5 GAL (5.7 L)								
	2.0 GAL (7.6 L)			X					
	2.5 GAL (9.4 L)	X			X			X	X
	3.0 Gal (11.3 L)		X						
5.0 GAL (18.9 L)					X				
SPECIAL CONSIDERATIONS/ LOCATIONS/ APPLICATIONS *	SUBSEA (UNDERWATER)								X
	WIND/UP-TOWER, TIGHT SPACE						X		
	WIND/FOUNDATION TENSION						X	X	X
	ATEX  II 2 GDc T4			X					
			X	X	X		X	X	X
	AUTO CYCLE								
	PENDANT INCLUDED	X	X	X	X	X	X		
OPTIONAL COOLER AVAILABLE					X				

Virtually any pump may be used for Original Installation or Service. This chart factors pump cost and usage together to determine a total cost of ownership and recommends a pump based upon value delivered.

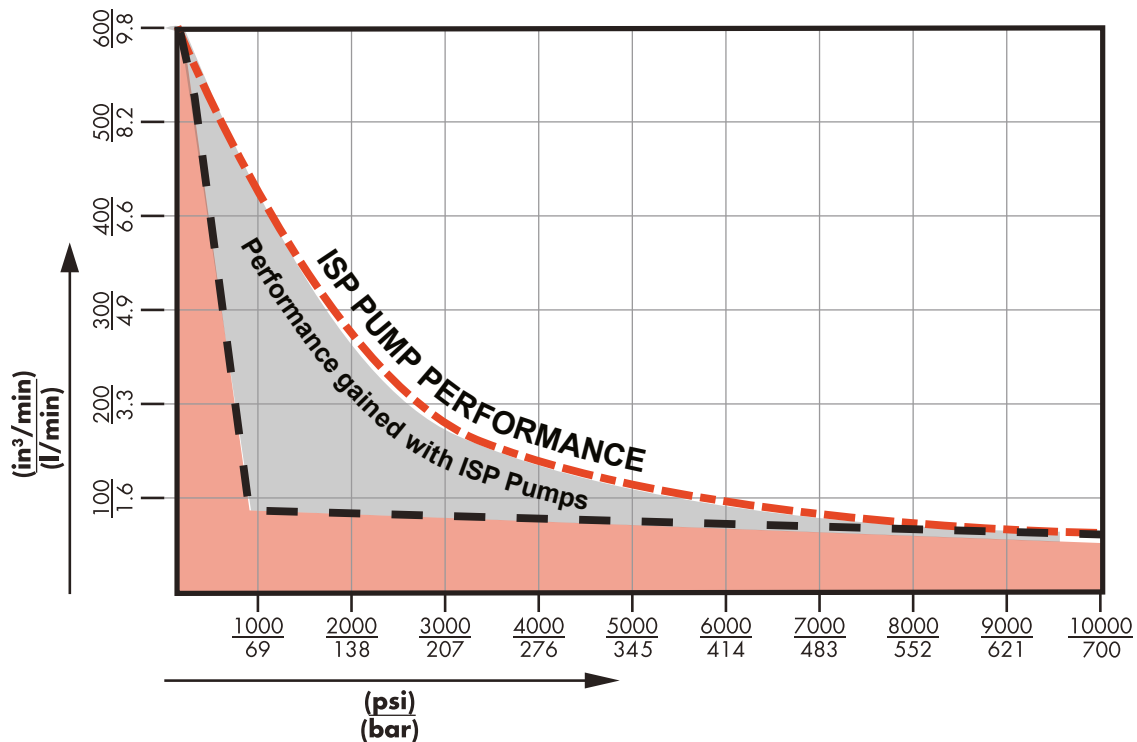
* Please contact factory of authorized reseller with questions about special applications.

Pumps designed for torque wrench applications do not hold pressure, they should NOT be used for lifting applications and should be used with caution for spreading applications.

THE ISP ADVANTAGE: INCREASED PRODUCTIVITY

The Infinity Stage Pump (ISP) from **BOLTING SYSTEMS** helps get work done faster. The innovative, patent pending design takes advantage of a continuously variable output that provides maximum flow within the rated pressure range of the pump - from 0 - 700 bar (0 to 10,000 psi). Most torquing and spreading work is done between 70 – 400 bar (1,000 – 6,000 psi), which is where the Infinity Stage Pumps (ISP) provide the most significant advantage over traditional pumps. For example, at 70 bar (1,000 psi) there is 5X as much flow as a traditional two-stage pump. At 275 bar (4,000 psi) there is 2X as much flow as a traditional pump.

The additional flow moves tools faster which allows work to be done quicker and more efficiently. The increased efficiency saves you time – allowing you to get onto your next job sooner and more profitably.



Pumps

FEATURED ON

PA60A





700 BAR (10,000 PSI) INFINITY SERIES (ISP) AIR PUMP

The PA60A is an Infinity Stage Air Pump which increases productivity on the job by providing continuous pressure for up to 2x the speed of typical 2-stage pumps. Jobs get done faster and easier.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:

- Light weight and portable: 34.9 kg (77 lb) [without oil] PA60APF5FP
- Light weight and portable: 40.1 kg (88 lb) [without oil] PA60APF5FMPR
- Removable control pendant (7.6 m/ 25 ft)
- Removable 100 mm (4"), calibration-capable gauge
- **CE**
- ATEX **Ex** II 2 GDc T4
- 4 port manifold available to power up to 4 tools from a single pump (not for lifting applications)
- Fewer parts for lower service cost

Designed with Safety in Mind:

- Easily adjusted pressure regulator (relief valve)
- Fixed 103 bar (1,500 psi) retract relief valve pressure

Pumps

DESIGNED FOR

Electric 	Air 	Gas 	Hand
MAINTENANCE & REPAIR		ORIGINAL INSTALL	
Split 	Tension 	Torque 	
Max Flow 			



Specifications and Dimensional Data

Size (L x W x H): 50 cm x 36 cm x 51 cm
19.6" x 14.0" x 20.2" (PA60APF5FMP)

Size (L x W x H): 47 cm x 30 cm x 53 cm
18.6" x 11.8" x 21.0" (PA60APF5FMPR)

Weight (Without Oil):

- 34.9 kg (76.9 lb) PA60APF5FP
- 36.9 kg (81.5 lb) PA60APF5FMP
- 37.9 kg (83.7 lb) PA60APF5FPR
- 40.0 kg (88.3 lb) PA60APF5FMPR

Maximum Oil Capacity: (vented reservoir)

- 8.5 L (2.2 Gallons) [to fill line]
- 7.0 L (1.8 Gallons) [usable]

Operating Environment:

-25°C to +50°C (-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

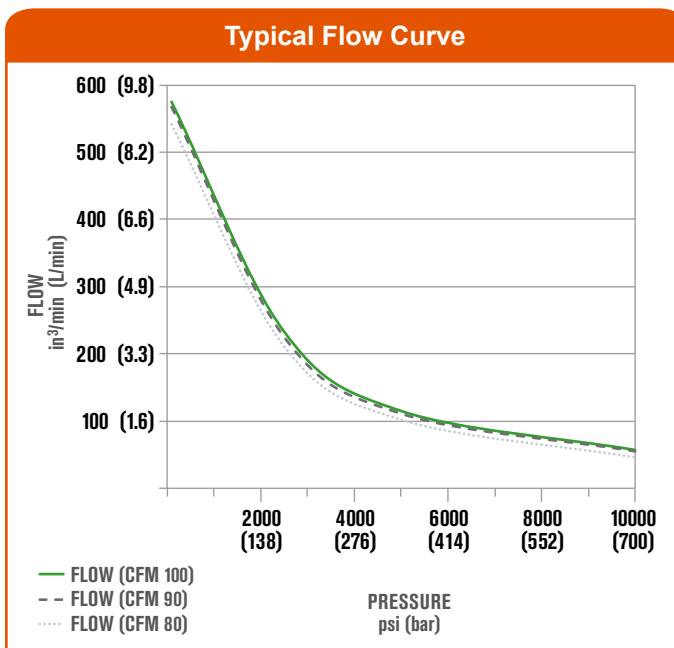
Sound Level: 76 dBA (max)

Pressure: 0 - 700 bar (0 - 10,000 psi)

Typical Flow: 9.4 L/min - 0.8 L/min
(575 in³/min - 48 in³/min)

- Air: 2.3 m³/min @ 5.5 bar (80 cfm @ 80 psi)
- 2.5 m³/min @ 6.2 bar (90 cfm @ 90 psi)
- 2.8 m³/min @ 6.9 bar (100 cfm @ 100 psi)

* Values shown are with filter/regulator/lubricator. Values will increase without filter/regulator/lubricator.



Hydraulic Oil Delivery

	@ 100 cfm	@ 90 cfm	@ 80 cfm
750 psi 51 bar	575 in ³ /min (9.4 L/min)	567 in ³ /min (9.3 L/min)	541 in ³ /min (8.9 L/min)
2,500 psi 175 bar	233 in ³ /min (3.8 L/min)	225 in ³ /min (3.7 L/min)	211 in ³ /min (3.4 L/min)
5,000 psi 350 bar	115 in ³ /min (1.9 L/min)	111 in ³ /min (1.8 L/min)	102 in ³ /min (1.7 L/min)
10,000 psi 700 bar	57 in ³ /min (0.9 L/min)	55 in ³ /min (0.9 L/min)	46 in ³ /min (0.8 L/min)

Ordering Information

Order No.	Description
PA60APF5FMP	PUMP, ISP 60 CU-IN/MIN, AIR/HYD, Four-Tool
PA60APF5FMPR	PUMP, ISP 60 CU-IN/MIN, AIR/HYD Four-Tool, Roll Cage
PA60APF5FP	PUMP, ISP 60 CU-IN/MIN, AIR/HYD
PA60APF5FPR	PUMP, ISP 60 CU-IN/MIN, AIR/HYD, Roll Cage

Pumps

700 BAR (10,000 PSI) CLASSIC SERIES AIR HYDRAULIC PUMP

The RWP55-BS has been the market leading pump for over 30 years & is therefore tried & tested. A simple, light-weight design with a recent upgrade that has created a cost-effective workhorse.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:

- Powerful 3 hp motor starts under load
- Retract side internal relief valve protects tool
- Use with single or double acting tools. Not for lifting applications
- 4" (102mm) calibration capable gauge

Designed with Safety in Mind:

- Easily adjusted pressure regulator (relief) valve
- Has a retract port pressure selector 1,500 or 10,000 psi (103 or 700 bar)



Pumps

DESIGNED FOR

<p>Electric</p>	<p>Air</p>	<p>Gas</p>	<p>Hand</p>
<p>MAINTENANCE & REPAIR</p>		<p>ORIGINAL INSTALL</p>	
<p>Split</p>	<p>Tension</p>	<p>Torque</p>	
<p>Max Flow</p>			

Specifications and Dimensional Data

Size (L x W x H): 42 cm x 24 cm x 50 cm
16.6" x 9.5" x 19.8"

Weight: 38 kg (84 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
6.8 L (1.8 Gallons) [to fill line]
5.3 L (1.4 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

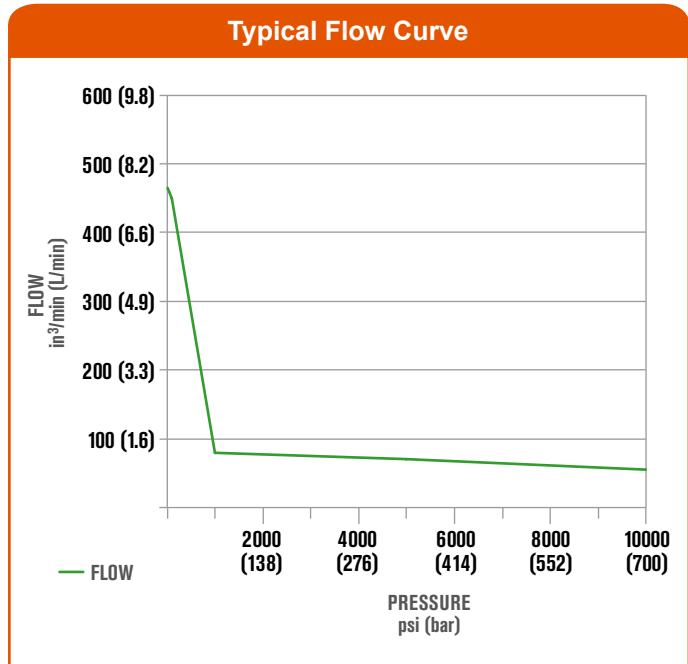
Sound Level: 85-92 dBA (max)

Pressure: 0 - 700 bar (0 - 10,000 psi)

Typical Flow: 7.6 L/min - 0.9 L/min
(465 in³/min - 55 in³/min)

Air: 1.4 m³/min @ 5.5 bar (50 cfm @ 80 psi)
1.65 m³/min @ 6.2 bar (58 cfm @ 90 psi)
1.89 m³/min @ 6.9 bar (67 cfm @ 100 psi)

* Values shown are with filter/regulator/lubricator. Values will increase without filter/regulator/lubricator.



Order No.	Oil Delivery per min	Oil Reservoir gal	Usable Oil in ³	Overall Width in	Overall Length in	Overall Height in	Pump Weight w/Oil lb
RWP55-BS	465 in ³ @ 100 psi	2.5	324	16.55	9.5	19.83	98
	55 in ³ @ 10,000 psi						
RWP55-4-BS (Four-tool manifold)	465 in ³ @ 100 psi	2.5	324	16.55	9.5	19.83	98
	55 in ³ @ 10,000 psi						

Motor Data

	Air Motor	Air Control
RWP55-BS	3 hp, 50 cfm @ 80 psi	Pneumatic remote control with 25-foot cord

Ordering Information

Order No.	Description
RWP55-BS	Air Pump, Single-tool
RWP55-BS-R	Air Pump, Single-tool, with roll cage
RWP55-4-BS	Air Pump, Four-tool
RWP55-4-BS-R	Air Pump, Four-tool, with roll cage

700 BAR (10,000 PSI) CLASSIC SERIES ELECTRIC HYDRAULIC PUMP

The PE55TWP-BS has been the market leading electric pump for over 30 years & is therefore tried & tested. A simple, light-weight design with a recent upgrade that has created a cost-effective workhorse.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:








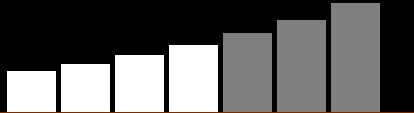
- Two Speed High Performance pump
- Retract side internal relief valve protects tool
- Hand remote
- Four-tool manifold (-4 models only) allow use of up to four tools simultaneously
- 4" calibration capable gauge
- Use with single or double acting tools

Designed with Safety in Mind:

- Easily adjusted pressure regulator (relief) valve
- 103 bar (1,500 psi) pressure retract relief valve



DESIGNED FOR

Electric 	Air 	Gas 	Hand 
MAINTENANCE & REPAIR		ORIGINAL INSTALL	
Split 	Tension 	Torque 	
Max Flow 			

Specifications and Dimensional Data

Size (L x W x H): 147 cm x 24 cm x 49 cm
18.5" x 9.5" x 19.2"

Weight: 29.5 kg (65 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
6.8 L (1.8 Gallons) [to fill line]
5.3 L (1.4 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

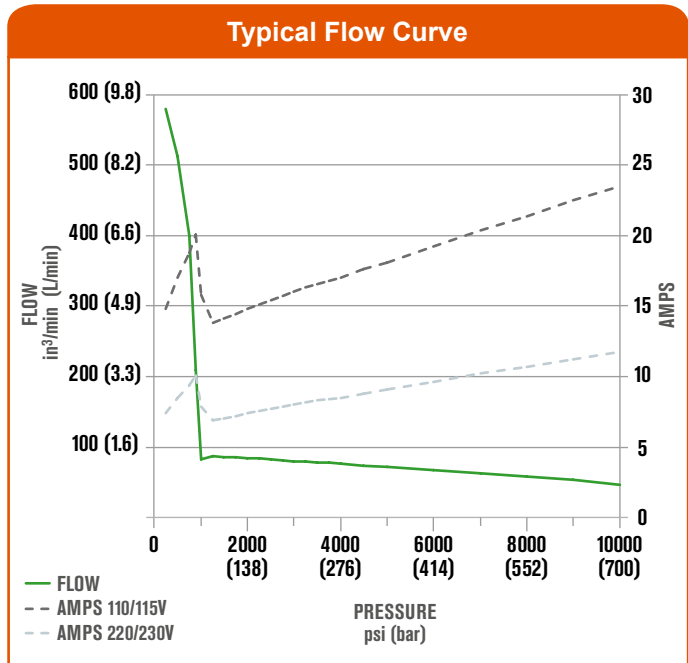
(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Sound Level: 87-92 dBA (max)

Pressure: 0 - 700 bar (0 - 10,000 psi)

Typical Flow: 11.5 L/min - 0.9 L/min
(704 in³/min - 56 in³/min)

Power: 1-1/8 hp Universal Motor
110/115V - 50/60 Hz (25 amps)
220/230V - 50/60 Hz (13 amps)



Order No.	Oil Delivery per min.	Oil Reservoir gal	Usable Oil in ³	Overall Width	Overall Length	Overall Height	Pump Weight w/Oil
PE55TWP-BS PE55TWP-220-BS	704 in ³ @ 100 psi 11.5 L/min @ 6.9 bar	2.5	324	17.14" 435 mm	9.5" 241 mm	18.12" 460 mm	75 lb 34 kg
	56 in ³ @ 10,000 psi 0.9 L/min @ 700 bar						
PE55TWP-4-BS PE55TWP-4-CF-BS PE55TWP-4-220-BS	704 in ³ @ 100 psi 11.5 L/min @ 6.9 bar	2.5	324	18.49" 470 mm	9.5" 241 mm	19.15" 487 mm	78 lb 35.5 kg
	56 in ³ @ 10,000 psi 0.9 L/min @ 700 bar						

Electrical Data		
	Electric Motor	Electrical Control
PE55TWP-BS PE55TWP-4-BS PE55TWP-4-CF-BS	1-1/8 hp, 12000 rpm 110/150V, 50/60Hz, 25 amps	Remote control with 20-foot cord
PE55TWP-220-BS PE55TWP-4-220-BS	1-1/8 hp, 12000 rpm 220/230V, 50/60Hz, 13 amps	

Ordering Information

Order No.	Description
PE55TWP-BS	110/115V, 50/60 Hz, Single-Tool
PE55TWP-4-BS	110/115V, 50/60 Hz, Four-Tool
PE55TWP-4-CF-BS	110/115V, 50/60 Hz, Four-Tool, with Cooling Fan
PE55TWP-220-BS	220/230V, 50/60 Hz, Single-Tool
PE55TWP-4-220-BS	220/230V, 50/60 Hz, Four-Tool

Contact factory for CE pump options

700 BAR (10,000 PSI) CLASSIC SERIES GAS HYDRAULIC PUMP

Gasoline powered pump for use in remote locations where electricity or compressed air are not readily available.

Operates on a powerful 5.5 hp Honda OHV-type engine.

Quality means Lower Life-Cycle Costs:

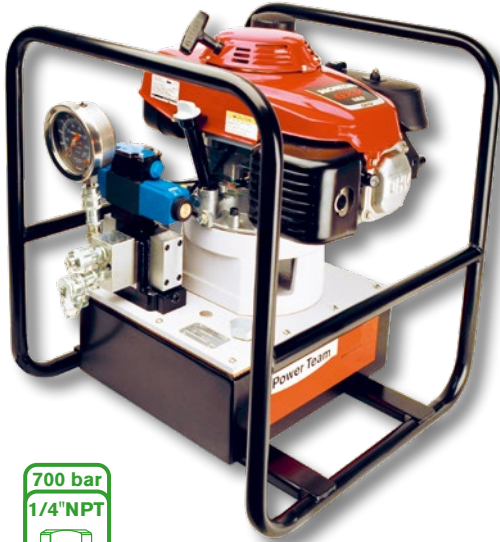
- High quality, reliable gasoline engine
- Continuous duty
- Proven design = proven reliability

Enhanced Usability:

- Air cooled 4-stroke engine
- Uses standard unleaded gasoline
- Large capacity, multi-chamber exhaust system to reduce noise

Designed with Safety in Mind:

- Fixed 48 bar (700 psi) Unload Valve
- Frame allows for easy two man carry



Pumps

DESIGNED FOR

Electric

Air

Gas

Hand

MAINTENANCE & REPAIR

ORIGINAL INSTALL

Split

Tension

Torque

Max Flow

Specifications and Dimensional Data

Size (L x W x H): 54 cm x 50 cm x 59 cm
21.25" x 19.75" x 23"

Weight: 55 kg (121 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
10.2 L (2.7 Gallons) [to fill line]
9.4 L (2.5 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

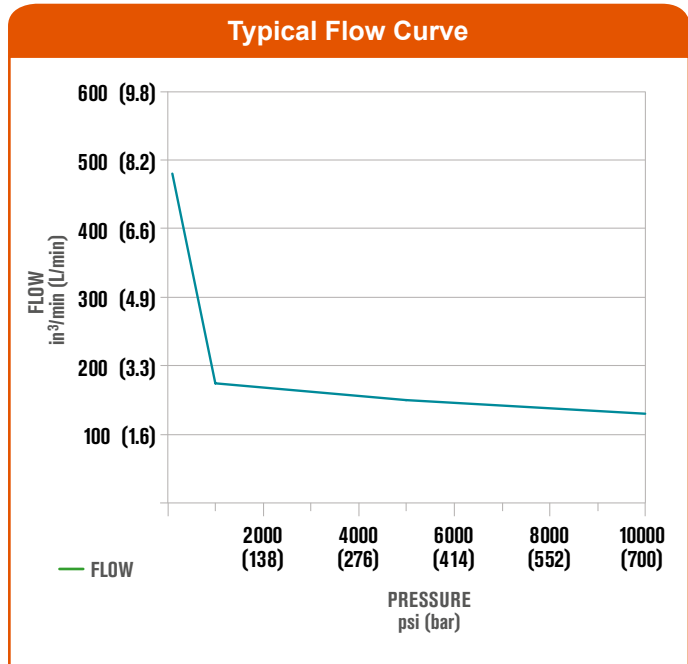
(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Sound Level: 85-92 dBA (max)

Pressure: 0 - 700 bar (0 - 10,000 psi)

Typical Flow: 7.87 L/min - 2.13 L/min
(480 in³/min - 130 in³/min)

Power: 5.5 hp Honda OHV-Type Gasoline Engine, 3600 rpm



Order No.	Oil Delivery per min.		Oil Reservoir gal	Usable Oil in ³	Overall Width		Overall Length		Overall Height		Pump Weight w/Oil	
	in ³ @ 100 psi	L/min @ 100 psi			in	cm	in	cm	in	cm	lb	kg
PG120TWP	480 in ³ @ 100 psi	7.87 L/min @ 100 psi	3	572	19.75	50	21.25	54	23	59	126	57.2

Pumps

Ordering Information

Order No.	Description
PG120TWP	Gasoline Pump, Single-Tool



P59L



P19

PUMP AUTOMATICALLY SHIFTS INTO THE HIGH PRESSURE STAGE UPON CONTACT WITH THE LOAD.

- All metal construction won't burn through in welding environments.
- Two-speed reduces handle strokes so you work faster and easier.
- Convenient fill port allows pumps to be filled in a horizontal or vertical position.
- Relief valve inboard of check valve prevents loads from drifting down.
- Large valve knob gives added control for slowly metering loads down.

P19L/P59L

- More usable oil volume — use with larger or longer stroke cylinders.
- True unloading valve set for 59 bar (850 psi) provides more efficiency and lower handle force.
- Link design reduces handle effort by 40%.
- Durable aluminum reservoir, manifold, and end cap.
- Ergonomic non-slip handle grip provides more comfort.
- Spring loaded handle lock incorporated into handle.

P19/P59/P59F

- Steel reservoir
- Strong lever
- Lower handle effort (measured)
- Higher unloading pressure 22 bar (325 psi)
- Pump is serviceable (all components available)
- Durable aluminum pump head
- No breather opening needed (so no leakage)
- True unloading (more flow/ lower effort)
- Pump mounting holes on front and back
- Solid accurate repeatable Integrated lifting system
- Can be used in welding environment (no plastic)

Pumps

DESIGNED FOR

Electric

Air

Gas

Hand

MAINTENANCE & REPAIR
ORIGINAL INSTALL

Split

Tension

Torque

Max Flow

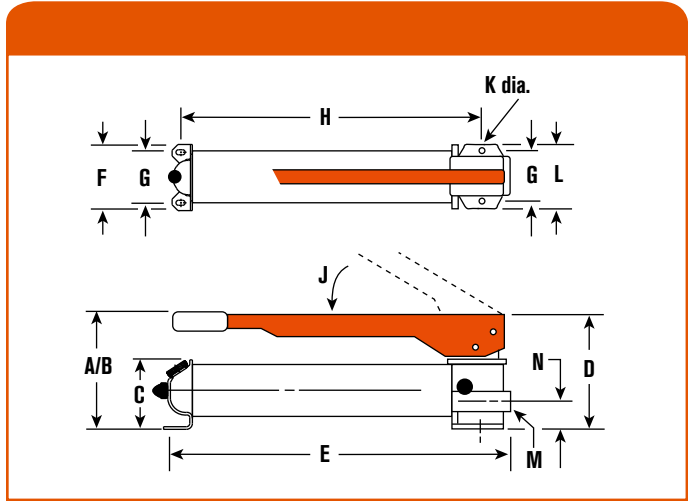
No coupler included with these pumps.

Specifications and Dimensional Data

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Pressure: 0 - 700 bar (0 - 10,000 psi)



Order No.	A in	B in	C in	D in	E in	F in	G in	H in	J deg	K in	L in	M in	N in
P19	5-1/2	14-5/8	2-7/8	4-9/16	13-11/16	4	3-1/4	11-1/16	53°	5/16	4	3/8 NPTF	1-13/32
P19L	5-1/2	—	—	—	13-11/16	4-1/8	3-1/4	11	40°	5/16	—	3/8 NPTF	—
P59	7	21	3-1/2	5	23	4-1/4	3-1/4	19-3/4	38°	5/16	4-3/4	3/8 NPTF	1-5/8
P59L	7	—	—	—	21	5	3-1/4	19-3/4	50°	5/16	—	3/8 NPTF	—
P59F	3-1/2	16-3/4	3-1/2	6	23-1/4	4-1/4	3-1/4	20-1/4	—	5/16	4-1/2	3/8 NPTF	—

Ordering Information

For Use With	Order No.	Speed	Volume & Pressure				Reservoir Handle Effort	Oil Capacity	Usable Oil Capacity	Oil Port	Product Weight
			Volume per Stroke (cu. in.)		Maximum Pressure (psi)						
			LP	HP	LP	HP	lb	cu in	cu in	in	lb
Single Acting	P19	2	0.305	0.076	325	10,000	99	24.4	20	3/8 NPTF	6.6
	P19L	2	0.250	0.050	850	10,000	78	29	27	3/8 NPTF	5.1
	P59	2	0.662	0.160	325	10,000	145	55	45	3/8 NPTF	17.2
Tools & Cylinders*	P59L	2	0.720	0.150	850	10,000	104	69	66	3/8 NPTF	8.9
	P59F	2	0.550	0.130	325	10,000	120	55	45	3/8 NPTF	14

LP = Low Pressure
HP = High Pressure
*Pump includes 2-Way Valve



Foot Pump Conversion Kit
No. FK59 - Foot pump conversion kit for use on P55/P59 pumps. Wt., 6 lb



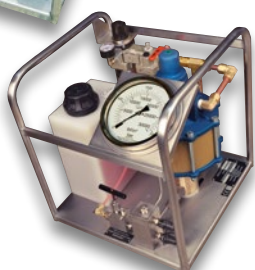

TENSION PUMPS 1,500 BAR (21,750 PSI)

Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

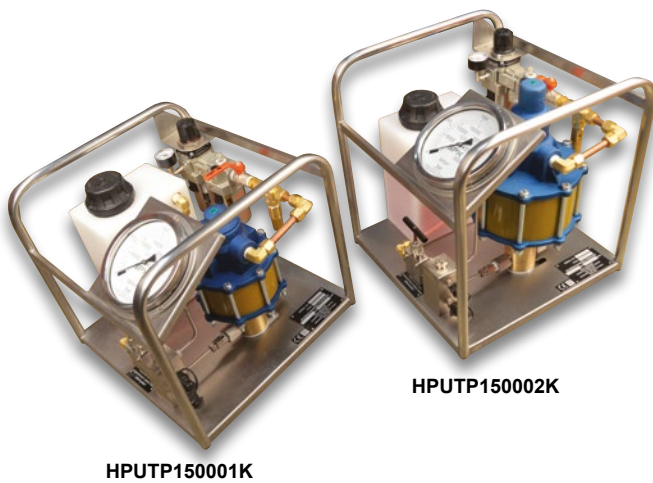
Worry-Free
Ownership





	Section / Series	Page Description	Page(s)
	PE8	High Pressure Electric Pump	76-77
	HPUTP-1	High Pressure Electric Pump	78-79
	HPUTP-2	High Flow & Subsea Tensioner Power Pack	80-81
	High Pressure Hand Pumps	High Pressure Hand Pumps	82-83

SIDE BY SIDE COMPARISON OF HPUTP-1 AND HPUTP-2 PUMPS



The HPUTP-2 produces more flow, has a larger motor and frame and weighs approximately 4 kg (9 lb) more.



CAUTION! These pumps can produce pressure in excess of 10,000 psi (700 bar). Check all components that are used with these pumps and never exceed the rated pressure of any component.



1,500 BAR (21,750 PSI) HIGH PRESSURE ELECTRIC PUMP

The PE8 is a very high pressure pump that incorporates proven design for reliable operation. It is based on proven pump design for reliability in rugged bolt tensioning applications.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:

- Light Weight and portable: 20.6 kg (45.5 lb) [without oil]
- Quick Release, removable control pendant (5 m/15 ft)
- Removable 100 mm (4"), calibration-capable, gauge
- Universal Motor for reduced voltage applications (up to -20% nominal voltage)
- Tensioners are designed to daisy-chain together so multiple tools can run off one pump
- Compact design fits into tight spaces

Designed with Safety in Mind:

- Easily adjusted pressure regulator (relief) valve

DESIGNED FOR

Electric



Air



Gas



Hand



MAINTENANCE
& REPAIR

ORIGINAL
INSTALL

Split



Tension



Torque



Max
Flow



Specifications and Dimensional Data

Size (L x W x H): 35.8 cm x 19.8 cm x 41.4 cm
14.1" x 7.8" x 16.3"

Weight: 20.6 kg (45.5 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
3.8 L (1.0 Gallons) [to fill line]
3.4 L (0.9 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Sound Level: 87-92 dBA (max)

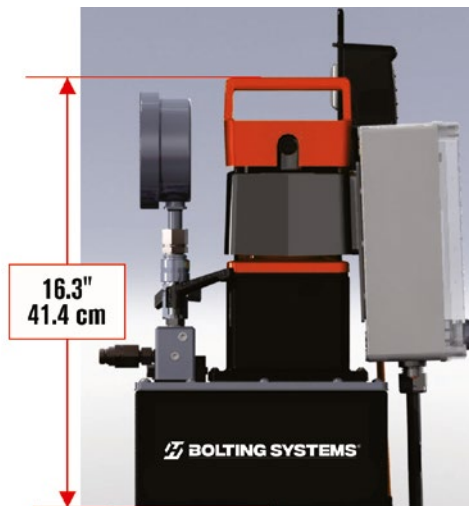
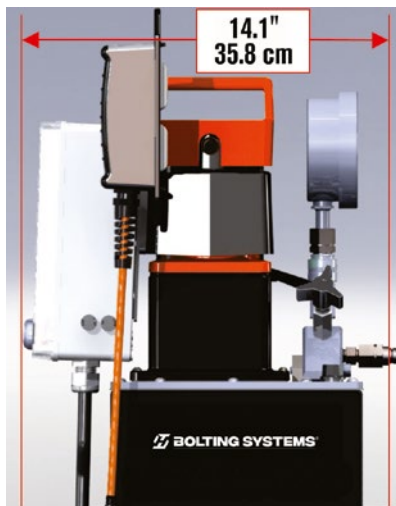
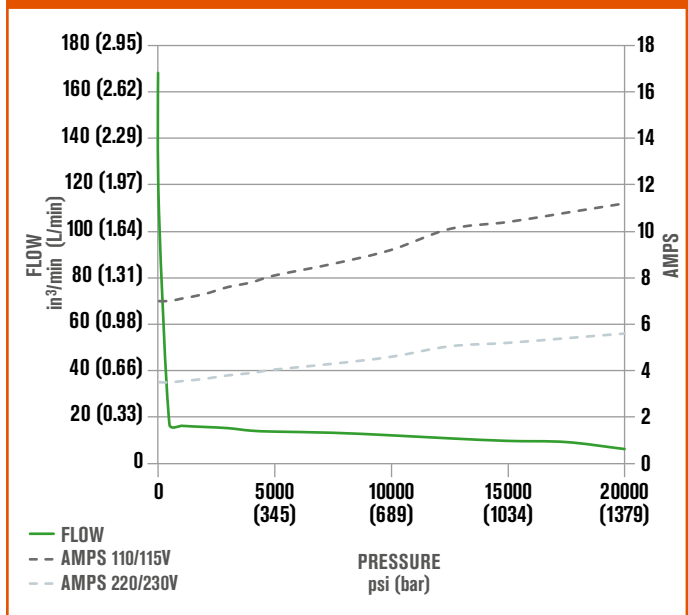
Pressure: 0 - 1,500 bar (0 - 21,750 psi)

Typical Flow: 2.7 L/min - 0.13 L/min
(168 in³/min - 8 in³/min)

Power: 0.5 hp Universal Motor
110/115V - 50/60 Hz (11 amps)
220/230V - 50/60 Hz (5.5 amps)



Typical Flow Curve



Ordering Information

Order No.	Description
PE8LXX3L	110/115VAC 50/60Hz Motor
PE8PXX3L	220/230VAC 50/60Hz Motor



HPUTP150001K



1,500 BAR (21,750 PSI) TOPSIDE BOLT TENSIONER & HYDRAULIC NUT PUMP

Standard flow tension pump. Corrosion resistant frame works well for applications near salt water. Standard flow ideal for land based (topside) tension applications where the required power source is compressed air.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:

- Calibrated 150 mm (6") Pressure Gauge
- Dual oil outlets with quick-connect, no spill couplings
- Pneumatic Filter/Regulator/Lubricator included
- Stainless Steel carrying frame

Designed with Safety in Mind:

- Easily adjusted pressure regulator valve
- Air pressure safety relief valve

DESIGNED FOR

Electric



Air



Gas



Hand



MAINTENANCE
& REPAIR

ORIGINAL
INSTALL

Split



Tension



Torque



Max
Flow



Specifications and Dimensional Data

Size (L x W x H): 42 cm x 42 cm x 39 cm
16.5" x 16.5" x 15.5"

Weight: 21 kg (46 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
9.5 L (2.5 Gallons) [to fill line]
9.4 L (2.5 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Sound Level: 85 dBA (max)

Pressure: 0 - 1,500 bar (0 - 21,750 psi)

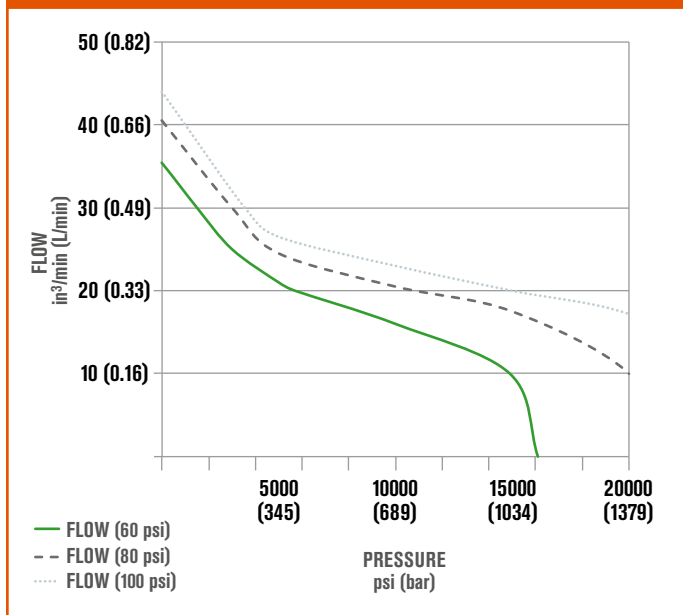
Typical Flow: 0.72 L/min - 0.28 L/min
(44 in³/min - 17 in³/min)

Air: 0.68 m³/min @ 5.5 bar (24 cfm @ 80 psi)
0.74 m³/min @ 6.2 bar (26 cfm @ 90 psi)
0.80 m³/min @ 6.9 bar (28 cfm @ 100 psi)

* Values shown are with filter/regulator/lubricator. Values will increase without filter/regulator/lubricator.



Typical Flow Curve

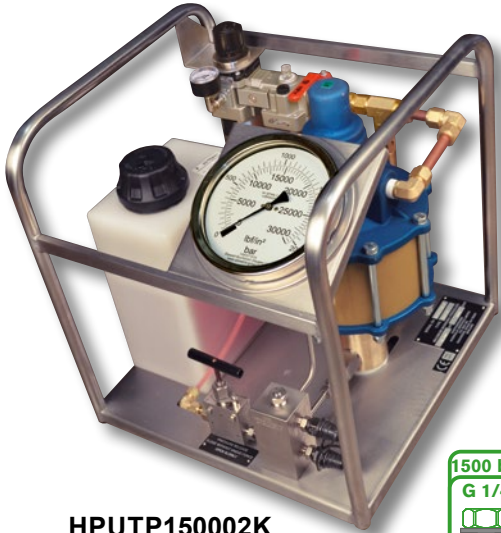


Hydraulic Oil Delivery

	@ 6.9 bar @ 100 psi	@ 5.5 bar @ 80 psi	@ 4.1 bar @ 60 psi
750 psi (51 bar)	41 in ³ /min (0.67 L/min)	38 in ³ /min (0.62 L/min)	33 in ³ /min (0.54 L/min)
2,500 psi (175 bar)	35 in ³ /min (0.57 L/min)	33 in ³ /min (0.54 L/min)	27 in ³ /min (0.44 L/min)
5,000 psi (350 bar)	27 in ³ /min (0.44 L/min)	25 in ³ /min (0.40 L/min)	21 in ³ /min (0.34 L/min)
10,000 psi (689 bar)	23 in ³ /min (0.38 L/min)	21 in ³ /min (0.34 L/min)	16 in ³ /min (0.26 L/min)
15,000 psi (1,000 bar)	20 in ³ /min (0.33 L/min)	18 in ³ /min (0.29 L/min)	9 in ³ /min (0.15 L/min)
21,750 psi (1,500 bar)	15 in ³ /min (0.24 L/min)	-	-

Ordering Information

Order No.	Description
HPUTP150001K	1,500 Bar Standard Flow Tensioner Pump



HPUTP150002K



1,500 BAR (21,750 PSI) SUBSEA & LARGE TENSIONER APPLICATIONS

High flow tension pump. Corrosion resistant frame works well for applications near salt water. High flow ideal for subsea applications where compressed air is the required power source.

Quality means Lower Life-Cycle Costs:

- Over 100,000 cycles
- Continuous duty up to 50°C (122°F) ambient
- Proven design = Proven reliability

Enhanced Usability:

- Calibrated 150 mm (6") Pressure Gauge
- Dual oil outlets with quick-connect, no spill couplings
- Pneumatic Filter/Regulator/Lubricator included
- Stainless Steel carrying frame

Designed with Safety in Mind:

- Easily adjusted pressure regulator valve
- Air pressure safety relief valve

DESIGNED FOR

Electric



Air



Gas



Hand



MAINTENANCE
& REPAIR

ORIGINAL
INSTALL

Split



Tension



Torque



Max
Flow



Specifications and Dimensional Data

Size (L x W x H): 46 cm x 53 cm x 52 cm
17.9" x 20.8" x 15.3"

Weight: 23 kg (51 lb) [without oil]

Maximum Oil Capacity: (vented reservoir)
9.5 L (2.5 Gallons) [to fill line]
9.4 L (x2.5 Gallons) [usable]

Operating Environment: -25°C to +50°C
(-13°F to +122°F)

(When operating near temperature extremes, it is recommended to use hydraulic oils that are rated for those temperatures. Refer to service manuals and cooling options)

Sound Level: 85 dBA (max)

Pressure: 0 - 1,500 bar (0 - 21,750 psi)

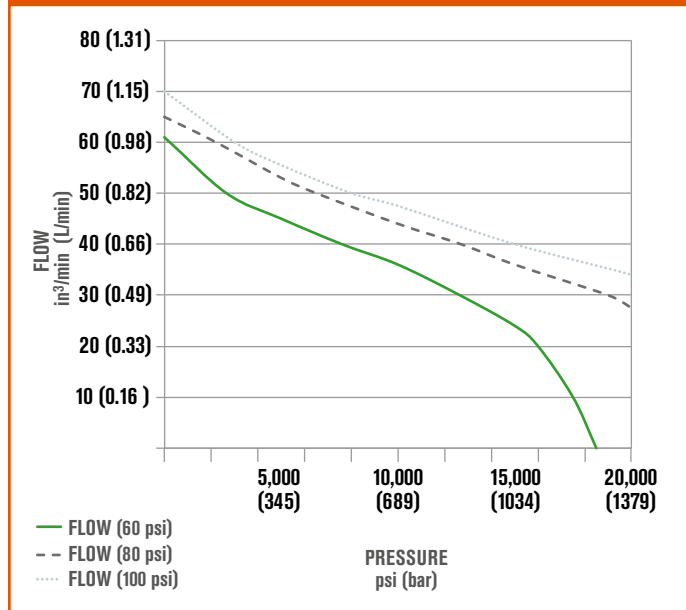
Typical Flow: 1.15 L/min - 0.50 L/min
(70 in³/min -31 in³/min)

Air: 1.42 m³/min @ 5.5 bar (52 cfm @ 80 psi)
1.53 m³/min @ 6.2 bar (54 cfm @ 90 psi)
1.60 m³/min @ 6.9 bar (56 cfm @ 100 psi)

* Values shown are with filter/regulator/lubricator. Values will increase without filter/regulator/lubricator.



Typical Flow Curve



Hydraulic Oil Delivery

	@ 6.9 bar @ 100 psi	@ 5.5 bar @ 80 psi	@ 4.1 bar @ 60 psi
750 psi (51 bar)	68 in ³ /min (1.11 L/min)	63 in ³ /min (1.04 L/min)	59 in ³ /min (0.97 L/min)
2,500 psi (175 bar)	63 in ³ /min (1.03 L/min)	59 in ³ /min (0.97 L/min)	53 in ³ /min (0.87 L/min)
5,000 psi (350 bar)	56 in ³ /min (0.91 L/min)	53 in ³ /min (0.87 L/min)	45 in ³ /min (0.74 L/min)
10,000 psi (689 bar)	48 in ³ /min (0.78 L/min)	44 in ³ /min (0.72 L/min)	36 in ³ /min (0.59 L/min)
15,000 psi (1,000 bar)	40 in ³ /min (0.66 L/min)	36 in ³ /min (0.59 L/min)	24 in ³ /min (0.39 L/min)
21,750 psi (1,500 bar)	31 in ³ /min (0.51 L/min)	-	-

Ordering Information

Order No.	Description
HPUTP150002K	1,500 Bar High Flow Tensioner Pump

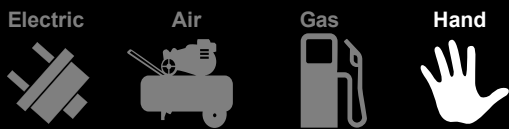
Model Shown:
P19L, P59L, P59L-1500, P59L-1500G



PUMP AUTOMATICALLY SHIFTS INTO THE HIGH PRESSURE LIFT STAGE UPON CONTACT WITH THE LOAD.

- Two-speed reduces handle strokes so you work faster and easier.
- More usable oil volume allows for use with larger or longer stroke cylinders.
- True unloading valve provides more efficiency and lower handle force.
- Link design reduces handle effort by 40%.
- Durable aluminum reservoir, manifold, and end cap.
- Ergonomic non-slip handle grip provides more comfort.
- Spring loaded handle lock incorporated into handle.
- Aluminum design reduces weight.

DESIGNED FOR



MAINTENANCE & REPAIR

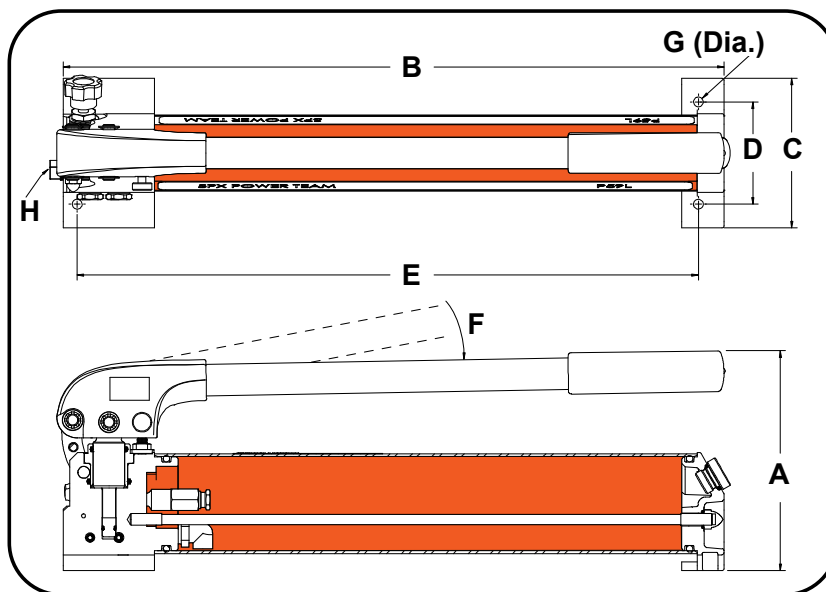
ORIGINAL INSTALL



Max Flow



Specifications and Dimensional Data



▶ The P59L hand pump is able to quickly advance the cylinder to the load with it's two speed operation.



▶ **Technical Dimensions**

Order No.	A		B		C		D		E		F	G		H	
	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(deg.)	(mm)	(in.)	(in.)	(in.)
P19L	141,5	5.50	—	13.69	104,1	4.13	82,6	3.25	347,7	11.06	40°	7,9	5/16	3/8 NPTF	3/8 NPTF
P59L	177,8	7.00		21.00		5.00	82,6	3.25	533,4	19.75	50°	7,9	5/16	3/8 NPTF	3/8 NPTF
P59L-1500	182,1	7.17	556,5	21.91	138,9	5.47	82,6	3.25	501,7	19.75	47°	7,9	5/16	9/16-18 UNF**	G1/4 M X 9/16-18 M **
P59L-1500G*	182,1	7.17	556,5	21.91	138,9	5.47	82,6	3.25	501,7	19.75	47°	7,9	5/16	9/16-18 UNF**	G1/4 M X 9/16-18 M **

* Overall length, with the skid plate, is 28.30 in. (718.8 mm.).

** High pressure 60° cone port, requires fitting 2001771

▶ **Ordering Information**

For Use With	Speed	Order No.	Volume per Stroke				Max. Pressure				Handle Effort		Reservoir				Oil Port		Prod. Wt.	
			LP		HP		LP		HP				Oil Cap.		Usable Oil Cap.					
			(cm ³)	(cu. in)	(cm ³)	(cu. in)	(bar)	(psi)	(bar)	(psi)	(kg)	(lbs.)	(cm ³)	(cu. in.)	(cm ³)	(cu. in.)	(cm)	(in.)	(kg)	(lbs.)
Single-Acting Cylinders	2	P19L	4,1	0.250	0,9	0.050	70	850	700	10,000	37	78	475	29.00	443	27.00	3/8 NPTF	3/8 NPTF	2,3	5.10
	2	P59L	12,0	0.720	2,6	0.150	59	850	700	10,000	44	104	1131	69.00	1082	66.00	3/8 NPTF	3/8 NPTF	4,1	8.90
	2	P59L-1500	11,1	0.68	0,88	0.05	20	300	1500	21,750	32,7	72	1100	67.1	729,2	44.5	3/4 - 16 UNF	9/16 High Press.	4,7	10.4
	2	P59L-1500G*	11,1	0.68	0,88	0.05	20	300	1500	21,750	32,7	72	1100	67.1	729,2	44.5	3/4 - 16 UNF	9/16 High Press.	6,5	14.4

* Equipped with a skid plate and a digital gauge.
LP = Low Pressure, HP = High Pressure

CAUTION: P59L-1500 pumps are not recommended for use with 700 bar (10,000 psi) tools.

ACCESSORIES



Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership



	Section / Series	Page Description	Page(s)
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	Topside Tension	Hoses, Couplers, and Accessories	87
	Subsea Torque Wrench	Hoses, Couplers, and Accessories	88
	Subsea Tensioners	Hoses, Couplers, and Accessories	89
	Tools	Hoses, Couplers, and Accessories	90
	Hydraulic Fluids	Standard Flame Out Biodegradeable Low Temperature	91
	Training	Hydraulic Technologies Bolting Systems is a ECITB and API approved training provider	92-93
	Rental & Service Centers	Find a location near you!	94-95

TOPSIDE TORQUE WRENCH

1/4" COUPLERS

700 bar/10,000 psi



Twin-line Topside Hoses




Standard IJ100 Twin-line Hoses (2:1 Burst)

Order No.	DESCRIPTION
TWH15-BS	15 ft twin-line hose
TWH20-BS	20 ft twin-line hose
TWH50-BS	50 ft twin-line hose

Standard CE Twin-line Hoses (4:1 Burst)

Order No.	DESCRIPTION
TWH3E	3 meter twin-line hose
TWH6E	6 meter twin-line hose
TWH10E	10 meter twin-line hose

Additional lengths (all styles) available upon request.

9072		700 bar, 10,000 psi gauge for torque wrench applications
9042DG		700 bar, 10,000 psi gauge for torque wrench applications. Custom scale enables the following units to be displayed: lb-ft or Nm
252365		Metal Dust Cover for male coupler
252364		Metal Dust Cover for female coupler
(male) 251411		Quick-connect, screw-on male nipple. Used on 700 bar torque wrenches, nutsplitters, hoses, and pumps. 1/4" NPT Female Thread
(female) 251410		Quick-connect, screw-on female coupling. Used on 700 bar torque wrenches, nutsplitters, hoses, and pumps. 1/4" NPT Female Thread

Refer to page 114 for complete calibration services

Tensioner Hoses	
Order No.	Topside, with Locking Collar DESCRIPTION
HL1M	1 m Hose, 1,500 bar, CE, with locking collar (only stocked in Europe & Asia)
HL13M	1.3 m Hose, 1,500 bar, CE, with locking collar (Optionally available in the Americas)
HL3M	3 m Hose, 1,500 bar, CE, with locking collar
HL5M	5 m Hose, 1,500 bar, CE, with locking collar
HL8M	8 m Hose, 1,500 bar, CE, with locking collar
HL10M	10 m Hose, 1,500 bar, CE, with locking collar

Hoses come standard with Locking Collar
Additional lengths available upon request.

TOPSIDE TENSION

1,500 bar/21,750 psi



2002278		2,000 bar; 30,000 psi gauge for PE8 pumps. Typically attached with quick coupler (ordered separately).
HHAMA150001		1,500 Bar Elbow Block: Used to change direction of tensioner hoses if standard orientation is not possible. Hoses can swivel around coupling axis.
HHAMA150003		1,500 Bar Tee Block Assembly: Used to interconnect tensioners with single ports.
HHAMA150004		1,500 Bar Banjo Assembly: Used to allow a hose to connect to a tool at 90 degrees. The nipple can be oriented in any direction around the port axis but must be tightened to create a seal. Does not act as a swivel around port axis.

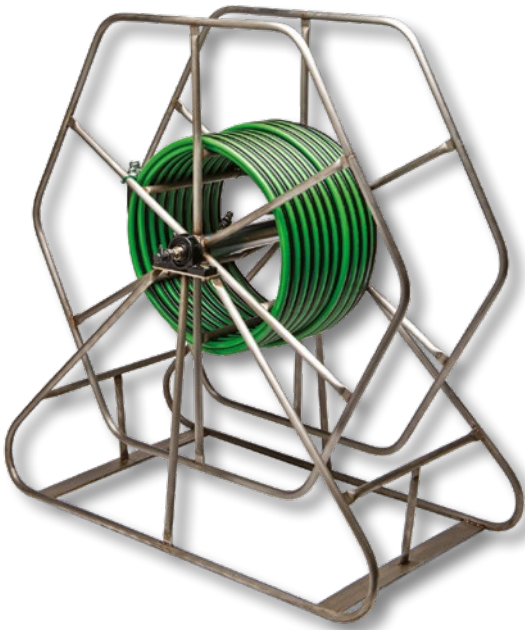
2001772		Male Coupling: Quick-connect, push-in male nipple. Used on 1,500 bar tensioners and pumps. G 1/4" Female Thread
2008547		Female Coupling: Quick-connect, push-in female coupling with locking collar. Used on 1,500 bar tensioners hoses. G 1/4" Female Thread.
STDHC000025		1/4" BSP Plug: Used to plug a port when a banjo assembly or coupling will not be used.

Hoses come standard with recessed female coupler type (2008547). Flat Face couplers available upon request.

SUBSEA TORQUE WRENCH



1/4" COUPLERS

700 bar/10,000 psi



Hose reel stand complete with twin down line for offshore equipment use.

Couplers for hose reel and offshore equipment.

(male) 251411		Quick-connect, screw-on male nipple. Used on 700 bar torque wrenches, nutsplitters, hoses, and pumps. 1/4" NPT Female Thread
(female) 251410		Quick-connect, screw-on female coupling. Used on 700 bar torque wrenches, nutsplitters, hoses, and pumps. 1/4" NPT Female Thread

Remote Diver Control Valve (HCUCV070001) uses 1 each of all four couplings shown on this page.

SUBSEA TWIN-LINE HOSES



Hydraulic Technologies can customize a reel and hose combination for your specific job. Standard reel construction is powder coated carbon steel. Aluminum reels optional. Contact factory for details.

Twin-line Subsea Hoses	
Standard CE Twin-line Subsea Hoses (4:1 Burst)	
Order No.	DESCRIPTION
TWH06E-SS	6 meter (20 ft) twin-line subsea hose, uses red couplers shown below (2008549 & 2008550)
Standard IJ100 Twin-line Hoses (2:1 Burst)	
Order No.	DESCRIPTION
TWH100	30 meter (100 ft) twin-line subsea hose, uses red couplers shown below (2008549 & 2008550)
TWH100-SS	30 meter (100 ft) twin-line subsea hose, uses stainless steel couplers

Additional lengths (all styles) available upon request.

9072		700 bar, 10,000 psi gauge for torque wrench applications
9042DG		700 bar, 10,000 psi gauge for torque wrench applications. Custom scale enables the following units to be displayed: lb-ft or Nm

Couplers for Diver Control Valve and select subsea tools.

(male) 2008549		Quick-connect, push-in male nipple. Used on Subsea 700 bar torque wrenches, nutsplitters, flange pullers, hoses, and pumps. 1/4" NPT Female Thread
(female) 2008550		Quick-connect, push-in female coupling with locking collar. Used on 700 bar torque wrenches, nutsplitters, flange pullers, hoses, and pumps. 1/4" NPT Female Thread

Accessories

SUBSEA TENSION HOSES

Hydraulic Technologies can customize a reel and hose combination for your specific job. Standard reel construction is powder coated carbon steel. Stainless hose reels optional. Contact factory for details.

Downline hoses usually supplied in 30 m lengths, male/female quick connect couplings so they can be linked together to make up the desired length of hose.

Maximum hose length capacity 500 m

SUBSEA TENSION

1,500 bar/21,750 psi



Subsea Tensioner Hoses	
Order No.	Subsea, without Locking Collar DESCRIPTION
HL1M	1 m Hose, 1,500 bar, CE, without locking collar (only stocked in Europe & Asia)
HL13M	1.3 m Hose, 1,500 bar, CE, without locking collar (only stocked in the Americas)
HL3M	3 m Hose, 1,500 bar, CE, without locking collar
HL5M	5 m Hose, 1,500 bar, CE, without locking collar
HL8M	8 m Hose, 1,500 bar, CE, without locking collar
HL10M	10 m Hose, 1,500 bar, CE, without locking collar
Order No.	Subsea down-line hose DESCRIPTION
HL30M-DL	30 m Hose, 1500 bar, CE, with locking collar, 1 x male + 1 x female coupler with locking collar. Used to link hoses together between hose reel and subsea work site.

Additional lengths available upon request.

Hose reel stand complete with tensioner down line for offshore equipment use.

HPSTP150004		2,000 bar; 30,000 psi gauge for HPOTP pumps
HHAMA15002		1,500 Bar 3-Port Manifold Assembly: Used in Subsea hose arrangement to split single downline into two hoses which connect to the first two tensioners in the circuit. Can also be used to split a single feed hose to feed 2 tensioners.

2008548		Female Coupling: Quick-connect, push-in female coupling without locking collar. Used on 1,500 bar Subsea tensioner hoses. G 1/4" Female Thread
2001772		Male Coupling: Quick-connect, push-in male nipple. Used on 1,500 bar tensioners and pumps. G 1/4" Female Thread

Hoses come standard with recessed female coupler type (2008548). Flat Face couplers available upon request.

SPLITTERS & SPREADERS

3/8" COUPLERS

700 bar/10,000 psi



9764

HYDRAULIC HOSE ASSEMBLY (AMERICAS & ASIA)

No. 9764 – Hose assembly consisting of 9767 (6' hose), 1/4" I.D. polyurethane with 9798 hose half coupler and 9800 dust cap assembly.

CE HYDRAULIC HOSE ASSEMBLY (EUROPE)

No. 9764E – Hose assembly consisting of 9767E (2m hose), 6mm I.D. polyurethane with 9798 hose half coupler and 9800 dust cap assembly. Complies to CE Standards (4:1 Burst over Nominal pressure ratio).

Note: Not for EHN Nut Splitter. For topside EHN, see page 46-47. For Subsea EHN, see page 40-41.

<p>9040 9040E</p>		<p>Gauge for 700 bar; 10,000 psi hand pumps. 9040 has psi as primary unit. 9040E has bar as primary unit.</p>
<p>9042DG</p>		<p>700 bar, 10,000 psi gauge for torque wrench applications. Custom scale enables the following units to be displayed: lb-ft or Nm</p>

<p>9670</p>		<p>Tee adapter. For installing gauge between pump and hose coupling. Has 1/4" and 3/8" NPTF female and 3/8" NPTF male ports.</p>
<p>9799</p>		<p>Optional metal dust cap (hose half)</p>
<p>9797</p>		<p>Optional metal dust cap (pump/tool half)</p>
<p>9798 (male coupler)</p>		<p>Male (hose) half coupler (with No. 9800 dust cap). 3/8" NPTF.</p>
<p>9796 (female coupler)</p>		<p>Female (pump/tool) half coupler (with No. 9800 dust cap). 3/8" NPTF.</p>
<p>9800</p>		<p>Dust cap for male or female 3/8" NPTF half couplers.</p>

See page 114 for gauge calibration services.

STANDARD HYDRAULIC OIL

- For dependable performance of all your hydraulic pumps and cylinders.
- Contains foam suppressant additives and has a high viscosity index.

FLAME-OUT® 220 FIRE RESISTANT HYDRAULIC FLUID*

- Contains anti-rust, anti-foam and anti-sludge additives.
- Provides fire resistant protection.
(Note: Will burn if heat source is extreme enough. Will not, however, propagate the flame and is self-extinguishing when there is no ignition source.)
- Provides maximum lubrication and heat transfer.
- Offers a wider operating temperature range.
- No need to change seals in your equipment. Just drain the standard oil and replace it with Flame-Out® 220.

LOW TEMPERATURE OIL

Provides smooth, reliable operation in the coldest climate conditions.

HYDRAULIC FLUIDS

Standard, Flame Out®, Biodegradable and Low Temperature

BIODEGRADABLE HYDRAULIC FLUID

- Biodegradable, non-toxic fluid withstands moderate to severe operating conditions; provides excellent protection against rust.
- Offers superior anti-wear properties, has excellent multi-metal compatibility.

Developed to meet stringent performance requirements and satisfy growing environmental needs for hydraulic fluids which are readily biodegradable and non-toxic. Depending on the contamination or degradation levels which might be present in used fluid, small amounts of this substance, if spilled, will not affect ground water or the environment. This fluid has been tested against EPA 560/6-82-003 and OECD 301 for biodegradability, and toxicity has been tested against EPA 560/6-82-002 and OECD 203: 1-12. Not recommended for operation in temperatures below 20°F (-7°C) or above 160°F (71°C). Recommended storage temperatures not below -10°F (-23°C) or above 170°F (77°C).

Specifications and Dimensional Data

Description	Grade (ASTM)	Specific Gravity @ 60°F (16°C)	Color (ASTM)	Flash Point		Fire Point		Pour Point		Viscosity			Foam Test (ASTM)
				°F	°C	°F	°C	°F	°C	SUS @ 100°F (38°C)	SUS @ 210°F (99°C)	Index min.	
Standard Oil	215	.88	2.0	400	204	430	221	-30	-34	215	48	100	Pass
Flame-Out®	220	.91	Light Amber	500	260	550	288	-15	-26	220	55	140	Pass
Biodegradable	—	.92	2.0	432	224	NA*	NA*	-22	30	183	53	213	Pass
Low Temp.	—	.87	6.5 (Red)	356	180	399	204	-48	45	183	52	190	Pass

Ordering Information

Order No.	Description	Quantity
9636	Standard Oil	1 qt. (57 cu. in.) 0.9l
9637	Standard Oil	1 gal. (231 cu. in.) 3.8l
9638	Standard Oil	2-1/2 gal. (577 cu. in.) 9.5l
9616	Standard Oil	55 gal. 208l
9639	Flame-Out®	1 gal. (231 cu. in.) 3.8l
9640	Flame-Out®	2-1/2 gal. (577 cu. in.) 9.5l
9645	Biodegradable	1 gal. (231 cu. in.) 3.8l
9646	Biodegradable	2-1/2 gal. (577 cu. in.) 9.5l
9647	Low Temp.	1 gal. (231 cu. in.) 3.8l



For additional technical information or to download a Material Safety Data Sheet visit www.boltingsystems.com.

TRAINING

Hydraulic Technologies Bolting Systems offer a range of courses covering joint integrity and flange management to industry recognized standards. All of our instructors have many years' experience in the joint integrity/flange management sector most of which have spent considerable time in a hands on role actually doing the job that they are now training others to do. Our instructors have nationally recognized teaching qualifications which reinforce the quality of the training programs that we offer.

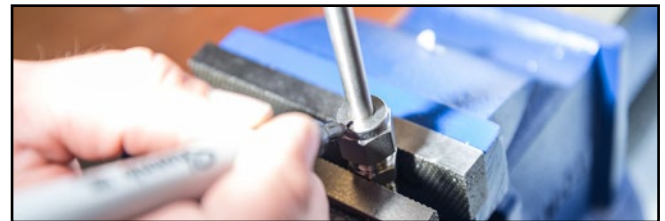
Our courses contain a mix of both theoretical and practical elements providing a positive learning experience for the learner. We have purpose built training facilities around the globe which house the latest in flange management tooling and associated equipment and in which learners are encouraged by our Instructors to embrace all aspects of Health and



Safety and to strive for a right first time approach to all joint integrity applications. Courses can be delivered in a variety of formats including:

- Industry Approved training
- Well established in-house programs
- Bespoke options tailored to a client's requirements, such as ASME PCC-1-2013

Hydraulic Technologies Bolting Systems are an ECITB and API approved training provider.



Engineering Construction Industry Training Board

APPROVED PROVIDER

ECITB APPROVED TRAINING

The ECITB has approved the following specific courses which are derived from the new Mechanical Joint Integrity and Small Bore Tubing Technical Training Standards.

- MJ110 - Hand Torque Bolted Connection Techniques – one day duration
- MJ118 - Hydraulically Tension Bolted Connection Techniques – one day duration
- MJ119 - Hydraulically Torque Bolted Connection Techniques – 1.5 days duration
- MJ1 10, 18 & 19 - Hydraulically Torque and Tension Bolted Connection Techniques – 2.5 days duration
- SBT01 Assemble and Install Small Bore Tubing with Twin Ferrule Mechanical Grip Fittings – 2 days duration

TECHNICAL TESTS

Technical Testing with an associated ECITB certificate of achievement plays a key role in validating an individual's skill, ability and job knowledge in a specific task area. Each test consists of a knowledge test and practical activity test against identified test criteria.

- There are five ECITB approved Technical Tests covering mechanical joint integrity and two covering Small Bore Tubing

- TMJI10 Dismantle, Assemble and Hand Torque Flanged Joints
- TMJI11 Dismantle, Assemble and Hand Torque Clamp Connectors
- TMJI18 Dismantle, Assemble and Tensioning Bolted Connections (Hydraulic Tensioning)
- TMJI 19 Dismantle, Assemble and Hydraulically Torque Flanged Joints
- TMJI 20 Dismantle, Assemble and Hydraulically Torque Clamp Connector Joints
- TSBT 01 Assemble and Install small bore tubing assemblies- Twin Ferrule
- TSBT 02 Disassemble and reinstall small bore tubing assemblies

ECITB courses and technical tests can be delivered at:

- Hydraulic Technologies UK ECITB approved training and testing centers
- Hydraulic Technologies Houston, TX, USA ECITB approved training and testing centers
- Hydraulic Technologies Global Training facilities – subject to approval via Hydraulic Technologies Training UK and ECITB
- Client Site UK – subject to approval via Hydraulic Technologies Training UK.
- Client Site Global - subject to approval via Hydraulic Technologies Training UK and ECITB



AMERICAN PETROLEUM INSTITUTE - APPROVED TRAINING

As an API-U approved training provider Hydraulic Technologies can offer a two day course covering the assembly, tightening and disassembly of bolted connections. This course includes in depth practical instruction on the safe and effective use of both hand and hydraulic bolt tightening equipment.

This Hydraulic Technologies API approved training course can be delivered at:

- Hydraulic Technologies global training facilities
- Client Site Global – subject to approval via Hydraulic Technologies Training UK.

API-U is dedicated to providing excellence in petroleum industry training. Because API has access to the largest pool of subject experts in the industry, API-U programs are taught by the best trainers who utilize today's innovative methods. The practical knowledge gained from API-U training enables participants to maintain professional competency.



ADDITIONAL COURSE OFFERINGS

- Hydraulic Technologies ADVISOR – controlled bolting software
- Hydraulic Technologies FLANGEPRO – joint monitoring software

Service and Maintenance of Hydraulic Technologies products



IOSH Managing Safely
IOSH Working Safely

Manual Handling

- Level 2 Award in Emergency First Aid at Work - UK
- Level 3 Award in First Aid at Work – UK
- Level 2 Award in Paediatric First Aid – UK
- Level 2 Award in CPR and AED - UK





Bolting Systems provides flexible rental solutions, giving customers access to top-of-the-line bolting equipment without the hassle of ownership. This helps optimize both resource allocation and project management. With Rental, Sales, and Service facilities strategically located worldwide, we ensure fast and efficient support for our global customers. To enhance our reach, we've expanded with new service centers in key locations. Our Repair & Calibration centers are dedicated to keeping our rental equipment in peak condition, maintaining the highest quality standards and regulatory compliance. These centers act as hubs for maintenance, repair, and calibration, ensuring your equipment performs at its best and lasts longer. At Bolting Systems, we don't just deliver solutions—we're committed to building partnerships and supporting you through every phase of your project.





HOUSTON, TEXAS

- Rental
- Sales
- Training
- Service / Repair
- Calibration
- 24/7 Availability



CORPUS CHRISTI, TEXAS

- Rental
- Sales
- Training
- Service / Repair
- Calibration
- 24/7 Availability



GONZALES, LOUISIANA

- Rental
- Sales
- Training
- Service / Repair
- Calibration
- 24/7 Availability



SINGAPORE

- Rental
- Sales
- Training
- Service / Repair
- Calibration
- 24/7 Availability



EYGELSHOVEN, NETHERLANDS

- Sales
- Training
- Service / Repair
- Calibration
- 24/7 Availability

RESOURCES



Powerthon
Limited
Lifetime
WARRANTY
ISO 9001 Certified

Worry-Free
Ownership



Section / Series	Page Description	Page(s)
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MEASUREMENTS /SPECIFICATIONS

Reference Tables

Decimal & Millimeter Equivalents

	DECIMALS	MILLIMETERS		DECIMALS	MILLIMETERS
1/64	.015625	0.397	33/64	.515625	13.097
1/32	.03125	0.794	17/32	.53125	13.494
3/64	.046875	1.191	35/64	.546875	13.891
1/16	.0625	1.588	9/16	.5625	14.288
5/64	.078125	1.984	37/64	.578125	14.684
3/32	.09375	2.381	19/32	.59375	15.081
7/64	.109375	2.778	39/64	.609375	15.478
1/8	.1250	3.175	5/8	.6250	15.875
9/64	.140625	3.572	41/64	.640625	16.272
5/32	.15625	3.969	21/32	.65625	16.669
11/64	.171875	4.366	43/64	.671875	17.066
3/16	.1875	4.763	11/16	.6875	17.463
13/64	.203125	5.159	45/64	.703125	17.859
7/32	.21875	5.556	23/32	.71875	18.256
15/64	.234375	5.953	47/64	.734375	18.653
1/4	.2500	6.350	3/4	.7500	19.050
17/64	.265625	6.747	49/64	.765625	19.447
9/32	.28125	7.144	25/32	.78125	19.844
19/64	.296875	7.541	51/64	.796875	20.241
5/16	.3125	7.938	13/16	.8125	20.638
21/64	.328125	8.334	53/64	.828125	21.034
11/32	.34375	8.731	27/32	.84375	21.431
23/64	.359375	9.128	55/64	.859375	21.828
3/8	.3750	9.525	7/8	.8750	22.225
25/64	.390625	9.922	57/64	.890625	22.622
13/32	.40625	10.319	29/32	.90625	23.019
27/64	.421875	10.716	59/64	.921875	23.416
7/16	.4375	11.113	15/16	.9375	23.813
29/64	.453125	11.509	61/64	.953125	24.209
15/32	.46875	11.906	31/32	.96875	24.606
31/64	.484375	12.303	63/64	.984375	25.003
1/2	.5000	12.700	1	1.000	25.400

1 mm = .03937"
 .001" = .0254 mm

SI* Conversion Formulas

APPROXIMATE CONVERSION

MULTIPLY SI* UNIT	BY CONVERSION FACTOR	TO GET OR MULTIPLY NON-SI UNIT	BY CONVERSION FACTOR	TO GET SI* UNIT
LENGTH				
Millimeter (mm)	X 0.03937	= inch	X 25.4	= mm (1 inch = 25.4 mm exactly)
Centimeter (cm) 10 mm	X 0.3937	= inch	X 2.54	= cm
Meter (m) 1000 mm	X 3.28	= foot	X 0.305	= m
meter (m)	X 1.09	= yard	X 0.914	= m
kilometer (km) 1000 m	X 0.62	= mile	X 1.61	= km
AREA				
millimeter ² (mm ²)	X 0.00155	= inch ²	X 645	= mm ²
centimeter ² (cm ²)	X 0.155	= inch ²	X 6.45	= cm ²
meter ² (m ²)	X 10.8	= foot ²	X 0.0929	= m ²
meter ² (m ²)	X 1.2	= yard ²	X 0.836	= m ²
hectare (ha) 10,000 m ²	X 2.47	= acre	X 0.405	= ha
kilometer ² (km ²)	X 0.39	= mile ²	X 2.59	= km ²
VOLUME				
centimeter ³ (cm ³)	X 0.061	= inch ³	X 16.4	= cm ³
liter (L)	X 61	= inch ³	X 0.016	= L
milliliter (mL)	X 0.034	= oz-liq	X 29.6	= mL (1 mL = 1 cm ³)
liter (L) 1000 mL	X 1.06	= quart	X 0.946	= L
liter (L)	X 0.26	= Gallon	X 3.79	= L
meter ³ (m ³) 1000 L	X 1.3	= yard ³	X 0.76	= m ³
MASS				
Gram (g)	X 0.035	= ounce	X 28.3	= g
kilogram (kg) 1000 g	X 2.2	= pound	X 0.454	= kg
metric ton (t) 1000 kg	X 1.1	= ton (short)	X 0.907	= t
FORCE (N = kg • m/s²)				
Newton (N)	X 0.225	= pound	X 4.45	= N
kilonewton (kN)	X 225	= pound	X 0.00445	= kN
TORQUE				
newton meter (Nm)	X 8.9	= lb. in.	X 0.113	= Nm
newton meter (Nm)	X 0.74	= lb. ft.	X 1.36	= Nm
PRESSURE (Pa = N/m²)				
kilopascal (kPa)	X 4.0	= in. H ₂ O	X 0.249	= kPa
kilopascal (kPa)	X 0.30	= in. Hg	X 3.38	= kPa
kilopascal (kPa)	X 0.145	= psi	X 6.89	= kPa
megapascal (MPa)	X 145	= psi	X 0.00689	= MPa
bar	X 14.5	= psi	X 0.0680	= bar
POWER (w = J/s)				
kilowatt (kw)	X 1.34	= hp	X 0.746	= kw
kilowatt (kw)	X 0.948	= Btu/s	X 1.055	= kw
watt (w)	X 0.74	= ft. lb/s	X 1.36	= w
TEMPERATURE				
°C = (°F - 32) ÷ 1.8 °F = (°C X 1.8) + 32				
FLOW				
cu cm/min	X 0.061	= cu in/min	X 16.4	= cu cm/min
liters/min	X 0.2642	= GPM	X 3.785	= liters/min

* System International (Modern Metric System)

MEASUREMENTS /SPECIFICATIONS

Reference Tables

TWHC High Cycle Hydraulic Torque Wrench Pressure - Torque Conversion Chart

Pump Pressure		Torque Output							
		TWHC1		TWHC3		TWHC6		TWHC11	
PSI	BAR	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
1,200	83	170	230	376	510	726	984	1336	1810
1,400	97	198	268	439	595	847	1,148	1558	2111
1,600	110	226	306	502	680	968	1,312	1781	2413
1,800	124	254	345	564	765	1,089	1,476	2003	2715
2,000	138	283	383	627	850	1,210	1,640	2226	3016
2,200	152	311	421	690	935	1,331	1,804	2449	3318
2,400	165	339	460	753	1,020	1,452	1,967	2671	3620
2,600	179	367	498	815	1,105	1,573	2,131	2894	3921
2,800	193	396	536	878	1,190	1,694	2,295	3116	4223
3,000	207	424	574	941	1,275	1,815	2,459	3339	4524
3,200	221	452	613	1,004	1,360	1,936	2,623	3562	4826
3,400	234	480	651	1,066	1,445	2,057	2,787	3784	5128
3,600	248	509	689	1,129	1,530	2,178	2,951	4007	5429
3,800	262	537	728	1,192	1,615	2,299	3,115	4229	5731
4,000	276	565	766	1,254	1,700	2,420	3,279	4452	6033
4,200	290	593	804	1,317	1,785	2,541	3,443	4675	6334
4,400	303	622	842	1,380	1,870	2,662	3,607	4897	6636
4,600	317	650	881	1,443	1,955	2,783	3,771	5120	6937
4,800	331	678	919	1,505	2,040	2,904	3,935	5342	7239
5,000	345	707	957	1,568	2,125	3,025	4,099	5565	7541
5,200	359	735	996	1,631	2,210	3,146	4,263	5788	7842
5,400	372	763	1,034	1,693	2,295	3,267	4,427	6010	8144
5,600	386	791	1,072	1,756	2,380	3,388	4,591	6233	8446
5,800	400	820	1,110	1,819	2,465	3,509	4,755	6455	8747
6,000	414	848	1,149	1,882	2,550	3,630	4,919	6678	9049
6,200	427	876	1,187	1,944	2,635	3,751	5,083	6901	9350
6,400	441	904	1,225	2,007	2,720	3,872	5,247	7123	9652
6,600	455	933	1,264	2,070	2,805	3,993	5,411	7346	9954
6,800	469	961	1,302	2,132	2,890	4,114	5,575	7568	10255
7,000	483	989	1,340	2,195	2,975	4,235	5,738	7791	10557
7,200	496	1,017	1,379	2,258	3,060	4,356	5,902	8014	10859
7,400	510	1,046	1,417	2,321	3,144	4,477	6,066	8236	11160
7,600	524	1,074	1,455	2,383	3,229	4,598	6,230	8459	11462
7,800	538	1,102	1,493	2,446	3,314	4,719	6,394	8681	11763
8,000	552	1,130	1,532	2,509	3,399	4,840	6,558	8904	12065
8,200	565	1,159	1,570	2,572	3,484	4,961	6,722	9127	12367
8,400	579	1,187	1,608	2,634	3,569	5,082	6,886	9349	12668
8,600	593	1,215	1,647	2,697	3,654	5,203	7,050	9572	12970
8,800	607	1,243	1,685	2,760	3,739	5,324	7,214	9794	13272
9,000	621	1,272	1,723	2,822	3,824	5,445	7,378	10017	13573
9,200	634	1,300	1,761	2,885	3,909	5,566	7,542	10240	13875
9,400	648	1,328	1,800	2,948	3,994	5,687	7,706	10462	14176
9,600	662	1,356	1,838	3,011	4,079	5,808	7,870	10685	14478
9,800	676	1,385	1,876	3,073	4,164	5,929	8,034	10907	14780
10,000	689	1,413	1,915	3,136	4,249	6,050	8,198	11130	15081
10,153	700	1,435	1,944	3,184	4,314	6,142	8,323	53,809	72,912

MEASUREMENTS /SPECIFICATIONS

Reference Tables

Pump Pressure		Torque Output					
		TWHC20		TWHC35		TWHC50	
		lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
1,200	83	2439	3305	3890	5271	6,360	8,618
1,400	97	2845	3856	4539	6150	7,420	10,054
1,600	110	3252	4406	5187	7028	8,480	11,491
1,800	124	3658	4957	5835	7907	9,540	12,927
2,000	138	4065	5508	6484	8785	10,600	14,363
2,200	152	4471	6059	7132	9664	11,660	15,799
2,400	165	4878	6609	7780	10542	12,720	17,236
2,600	179	5284	7160	8429	11421	13,780	18,672
2,800	193	5691	7711	9077	12300	14,840	20,108
3,000	207	6097	8262	9725	13178	15,900	21,545
3,200	221	6504	8813	10374	14057	16,960	22,981
3,400	234	6910	9363	11022	14935	18,020	24,417
3,600	248	7317	9914	11670	15814	19,080	25,854
3,800	262	7723	10465	12319	16692	20,140	27,290
4,000	276	8130	11016	12967	17571	21,200	28,726
4,200	290	8536	11567	13616	18449	22,260	30,163
4,400	303	8943	12117	14264	19328	23,320	31,599
4,600	317	9349	12668	14912	20206	24,380	33,035
4,800	331	9756	13219	15561	21085	25,440	34,472
5,000	345	10162	13770	16209	21963	26,500	35,908
5,200	359	10568	14320	16857	22842	27,560	37,344
5,400	372	10975	14871	17506	23720	28,620	38,780
5,600	386	11381	15422	18154	24599	29,680	40,217
5,800	400	11788	15973	18802	25478	30,740	41,653
6,000	414	12194	16524	19451	26356	31,800	43,089
6,200	427	12601	17074	20099	27235	32,860	44,526
6,400	441	13007	17625	20748	28113	33,920	45,962
6,600	455	13414	18176	21396	28992	34,980	47,398
6,800	469	13820	18727	22044	29870	36,040	48,835
7,000	483	14227	19278	22693	30749	37,100	50,271
7,200	496	14633	19828	23341	31627	38,160	51,707
7,400	510	15040	20379	23989	32506	39,220	53,144
7,600	524	15446	20930	24638	33384	40,280	54,580
7,800	538	15853	21481	25286	34263	41,340	56,016
8,000	552	16259	22031	25934	35141	42,400	57,453
8,200	565	16666	22582	26583	36020	43,460	58,889
8,400	579	17072	23133	27231	36899	44,520	60,325
8,600	593	17479	23684	27879	37777	45,580	61,762
8,800	607	17885	24235	28528	38656	46,640	63,198
9,000	621	18292	24785	29176	39534	47,700	64,634
9,200	634	18698	25336	29825	40413	48,760	66,070
9,400	648	19105	25887	30473	41291	49,820	67,507
9,600	662	19511	26438	31121	42170	50,880	68,943
9,800	676	19918	26989	31770	43048	51,940	70,379
10,000	689	20324	27539	32418	43927	53,000	71,816
10,153	700	1,435	1,944	3,184	4,314	53,809	72,912

MEASUREMENTS /SPECIFICATIONS

Reference Tables

TWLC Low Clearance Hydraulic Torque Wrench Pressure - Torque Conversion Chart

Pump Pressure		Torque Output									
		TWLC2		TWLC4		TWLC8		TWLC15		TWLC30	
PSI	BAR	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
1,200	83	189	256	477	646	954	1,293	1,782	2,415	3,456	4,683
1,400	97	221	299	557	754	1,113	1,508	2,079	2,817	4,032	5,463
1,600	110	252	341	636	862	1,272	1,724	2,376	3,220	4,608	6,244
1,800	124	284	384	716	970	1,431	1,939	2,673	3,622	5,184	7,024
2,000	138	315	427	795	1,077	1,590	2,154	2,970	4,024	5,760	7,805
2,200	152	347	470	875	1,185	1,749	2,370	3,267	4,427	6,336	8,585
2,400	165	378	512	954	1,293	1,908	2,585	3,564	4,829	6,912	9,366
2,600	179	410	555	1,034	1,400	2,067	2,801	3,861	5,232	7,488	10,146
2,800	193	441	598	1,113	1,508	2,226	3,016	4,158	5,634	8,064	10,927
3,000	207	473	640	1,193	1,616	2,385	3,232	4,455	6,037	8,640	11,707
3,200	221	504	683	1,272	1,724	2,544	3,447	4,752	6,439	9,216	12,488
3,400	234	536	726	1,352	1,831	2,703	3,663	5,049	6,841	9,792	13,268
3,600	248	567	768	1,431	1,939	2,862	3,878	5,346	7,244	10,368	14,049
3,800	262	599	811	1,511	2,047	3,021	4,093	5,643	7,646	10,944	14,829
4,000	276	630	854	1,590	2,154	3,180	4,309	5,940	8,049	11,520	15,610
4,200	290	662	896	1,670	2,262	3,339	4,524	6,237	8,451	12,096	16,390
4,400	303	693	939	1,749	2,370	3,498	4,740	6,534	8,854	12,672	17,171
4,600	317	725	982	1,829	2,478	3,657	4,955	6,831	9,256	13,248	17,951
4,800	331	756	1,024	1,908	2,585	3,816	5,171	7,128	9,659	13,824	18,732
5,000	345	788	1,067	1,988	2,693	3,975	5,386	7,425	10,061	14,400	19,512
5,200	359	819	1,110	2,067	2,801	4,134	5,602	7,722	10,463	14,976	20,293
5,400	372	851	1,152	2,147	2,909	4,293	5,817	8,019	10,866	15,552	21,073
5,600	386	882	1,195	2,226	3,016	4,452	6,033	8,316	11,268	16,128	21,854
5,800	400	914	1,238	2,306	3,124	4,611	6,248	8,613	11,671	16,704	22,634
6,000	414	945	1,280	2,385	3,232	4,770	6,463	8,910	12,073	17,280	23,415
6,200	427	977	1,323	2,465	3,339	4,929	6,679	9,207	12,476	17,856	24,195
6,400	441	1,008	1,366	2,544	3,447	5,088	6,894	9,504	12,878	18,432	24,976
6,600	455	1,040	1,409	2,624	3,555	5,247	7,110	9,801	13,280	19,008	25,756
6,800	469	1,071	1,451	2,703	3,663	5,406	7,325	10,098	13,683	19,584	26,537
7,000	483	1,103	1,494	2,783	3,770	5,565	7,541	10,395	14,085	20,160	27,317
7,200	496	1,134	1,537	2,862	3,878	5,724	7,756	10,692	14,488	20,736	28,098
7,400	510	1,166	1,579	2,942	3,986	5,883	7,972	10,989	14,890	21,312	28,878
7,600	524	1,197	1,622	3,021	4,093	6,042	8,187	11,286	15,293	21,888	29,659
7,800	538	1,229	1,665	3,101	4,201	6,201	8,402	11,583	15,695	22,464	30,439
8,000	552	1,260	1,707	3,180	4,309	6,360	8,618	11,880	16,098	23,040	31,220
8,200	565	1,292	1,750	3,260	4,417	6,519	8,833	12,177	16,500	23,616	32,000
8,400	579	1,323	1,793	3,339	4,524	6,678	9,049	12,474	16,902	24,192	32,780
8,600	593	1,355	1,835	3,419	4,632	6,837	9,264	12,771	17,305	24,768	33,561
8,800	607	1,386	1,878	3,498	4,740	6,996	9,480	13,068	17,707	25,344	34,341
9,000	621	1,418	1,921	3,578	4,848	7,155	9,695	13,365	18,110	25,920	35,122
9,200	634	1,449	1,963	3,657	4,955	7,314	9,911	13,662	18,512	26,496	35,902
9,400	648	1,481	2,006	3,737	5,063	7,473	10,126	13,959	18,915	27,072	36,683
9,600	662	1,512	2,049	3,816	5,171	7,632	10,341	14,256	19,317	27,648	37,463
9,800	676	1,544	2,091	3,896	5,278	7,791	10,557	14,553	19,720	28,224	38,244
10,000	689	1,575	2,134	3,975	5,386	7,950	10,772	14,850	20,122	28,800	39,024
10,153	700	1,599	2,167	4,036	5,468	8,071	10,936	15,077	20,429	29,240	39,620

MEASUREMENTS /SPECIFICATIONS

Reference Tables

Recommended Bolt Stresses for ANSI B16.5, BS1560 and MSS SP44 Flanges

Nom Bore	Flange Class					
	150 lb (PN20)	300 lb (PN50)	600 lb (PN100)	900 lb (PN150)	1,500 lb (PN250)	2,500 lb (PN420)
1/2" (15)	4 x 1/2" (M14)	4 x 1/2" (M14)	4 x 1/2" (M14)	4 x 3/4" (M20)	4 x 3/4" (M20)	4 x 3/4" (M20)
3/4 (20)	4 x 1/2" (M14)	4 x 5/8" (M16)	4 x 5/8" (M16)	4 x 3/4" (M20)	4 x 3/4" (M20)	4 x 3/4" (M20)
1" (25)	4 x 1/2" (M14)	4 x 5/8" (M16)	4 x 5/8" (M16)	4 x 7/8" (M24)	4 x 7/8" (M24)	4 x 7/8" (M24)
1-1/4" (32)	4 x 1/2" (M14)	4 x 5/8" (M16)	4 x 5/8" (M16)	4 x 7/8" (M24)	4 x 7/8" (M24)	4 x 1" (M27)
1-1/2" (40)	4 x 1/2" (M14)	4 x 3/4" (M20)	4 x 3/4" (M20)	4 x 1" (M27)	4 x 1" (M27)	4 x 1-1/8" (M30)
2" (50)	4 x 5/8" (M16)	8 x 5/8" (M16)	8 x 5/8" (M16)	8 x 7/8" (M24)	8 x 7/8" (M24)	8 x 1" (M27)
2-1/2" (65)	4 x 5/8" (M16)	8 x 3/4" (M20)	8 x 3/4" (M20)	8 x 1" (M27)	8 x 1" (M27)	8 x 1-1/8" (M30)
3" (80)	4 x 5/8" (M16)	8 x 3/4" (M20)	8 x 3/4" (M20)	8 x 7/8" (M24)	8 x 1-1/8" (M30)	8 x 1-1/4" (M33)
4" (100)	8 x 5/8" (M16)	8 x 3/4" (M20)	8 x 7/8" (M24)	8 x 1-1/8" (M30)	8 x 1-1/4" (M33)	8 x 1-1/2" (M39)
5" (125)	8 x 3/4" (M20)	8 x 3/4" (M20)	8 x 1" (M27)	8 x 1-1/4" (M33)	8 x 1-1/2" (M39)	8 x 1-3/4" (M45)
6" (150)	8 x 3/4" (M20)	12 x 3/4" (M20)	12 x 1" (M27)	12 x 1-1/8" (M30)	12 x 1-3/8" (M36)	8 x 2" (M52)
8" (200)	8 x 3/4" (M20)	12 x 7/8" (M24)	12 x 1-1/8" (M30)	12 x 1-3/8" (M36)	12 x 1-5/8" (M42)	12 x 2" (M52)
10" (250)	12 x 7/8" (M24)	16 x 1" (M27)	16 x 1-1/4" (M33)	16 x 1-3/8" (M36)	12 x 1-7/8" (M48)	12 x 2-1/2" (M64)
12" (300)	12 x 7/8" (M24)	16 x 1-1/8" (M30)	20 x 1-1/4" (M33)	20 x 1-3/8" (M36)	16 x 2" (M52)	12 x 2-3/4" (M70)
14" (350)	12 x 1" (M27)	20 x 1-1/8" (M30)	20 x 1-3/8" (M36)	20 x 1-1/2" (M39)	16 x 2-1/4" (M56)	
16" (400)	16 x 1" (M27)	20 x 1-1/4" (M33)	20 x 1-1/2" (M39)	20 x 1-5/8" (M42)	16 x 2-1/2" (M64)	
18" (450)	16 x 1-1/8" (M30)	24 x 1-1/4" (M33)	20 x 1-5/8" (M42)	20 x 1-7/8" (M48)	16 x 2-3/4" (M70)	
20" (500)	20 x 1-1/8" (M30)	24 x 1-1/4" (M33)	24 x 1-5/8" (M42)	20 x 2" (M52)	16 x 3" (M76)	
24" (600)	20 x 1-1/4" (M33)	24 x 1-1/2" (M39)	24 x 1-7/8" (M48)	20 x 2-1/2" (M64)	16 x 3-1/2" (M90)	
26" (650)	24 x 1-1/4" (M33)	28 x 1-5/8" (M42)	24 x 1-7/8" (M48)	20 x 2-3/4" (M70)		
28" (700)	28 x 1-1/4" (M33)	28 x 1-5/8" (M42)	28 x 2" (M52)	20 x 3" (M76)		
30" (750)	28 x 1-1/4" (M33)	28 x 1-3/4" (M45)	28 x 2" (M52)	20 x 3" (M76)		
32" (800)	28 x 1-1/2" (M39)	28 x 1-7/8" (M48)	28 x 2-1/4" (M56)	20 x 3-1/4" (M85)		
34" (850)	32 x 1-1/2" (M39)	28 x 1-7/8" (M48)	28 x 2-1/4" (M56)	20 x 3-1/2" (M90)		
36" (90)	32 x 1-1/2" (M39)	32 x 2" (M52)	28 x 2-1/2" (M64)	20 x 3-1/2" (M90)		

Recommended Bolt Stress

40,000 lbf/in² 45,000 lbf/in² 50,000 lbf/in²

The above stress levels are suitable for flanges with a minimum material yield stress of 30,000 lb/in² and bolt material grades ASTM A193 B7, B16, B7M and ASTM A320 L7, L43, L7M.

Information is used at the owner's discretion. All data is given in good faith and without acceptance of responsibility on the part of Hydraulic Technologies.

Typical Co-Efficient Values For Bolt Lubricants

Manufacturer	Product	Coefficient of Friction
Acheson Colloids	Anti seize	0.09
	DAG580 (Dry Lubricant)	0.16
Belzona Molecular Ltd	HP anti seize	0.15
	Copperslip	0.09
Bostik Ltd	Never seez Std grade (NS160)	0.18
	Never seez Spl grade (NS165)	0.18
Castrol	Castrol Nucleol S202	0.08
	Spherol Castrol	0.13
Comma Oil & Chemicals	Copper Ease	0.14
Chemodex	Coppergrease	0.15
Chesterton International	Anti Seize (paste)	0.14
Dow Corning	Molykote Cu-7439	0.15
	Molykote 1000	0.11
	Molykote G-Rapid	0.08
Fordec	Molykote G-Rapid Plus	0.09
	Fordec Copper Anti seize	0.15
Ilex Lubricants	Coppercrest	0.14
Molyslip	Molyslip AS60	0.07
National Chemical Co	Thread Eze	0.18
	Copaslip	0.12
OKS	OKS 240	0.12
	OKS 250	0.08
K.S. Paul	Easyrun 100	0.08
	PBC	0.13
	PBC/D Lead Free	0.12
Rocol	516	0.18
	Rocol ASP	0.10
	Rocol J166	0.15
Silkolene	Rocol 797	0.16
	Silkease Copper	0.14
Sovereign Lubricants	Omega 99	0.13
	Omega 99N	0.09
	Omega 95	0.12
Swan Chemicals	Swanlube	0.12
James Walker	Walkers Anti seize No 203	0.15
Wessex Chemical Factors	WCF Anti Seize	0.15



MEASUREMENTS / SPECIFICATIONS

Torque Requirements for Imperial Bolts

IMPERIAL TORQUE (Values = lb-ft)

METRIC TORQUE (Values = Nm)

Table with 18 columns for bolt diameters (1/2" to 3-3/4") and 10 rows of torque values. Includes color-coded sections for different torque requirements.

The torque values are for fully threaded UNC (up to 1")/UN8 stud bolts/heavy series nuts. Bolt Materials: ASTM A193 B7, B7M & B16; ASTM A320 L7, L7M & L43

Table with 18 columns for bolt diameters (1/2" to 3-3/4") and 10 rows of torque values. Includes color-coded sections for different torque requirements.



IMPERIAL TORQUE (Values = lb-ft)

Bolt Diameter Nut A/F	mm	M14	M16	M20	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56	M64	M70	M76	M85	M90
Torque figures in this section will induce Residual Bolt Loads equivalent to the white/grey section in the Imperial Torque table on the previous page. These values are typical for clamp connectors	$\mu = 0.08$	18	32	59	97	141	207	286	389	508	657	822	1,026	1,261	1,744	2,465	3,240	4,199	5,463	6,767
	$\mu = 0.11$	24	42	77	127	167	272	377	512	670	866	1,086	1,354	1,688	2,305	3,262	4,299	5,587	7,290	9,046
	$\mu = 0.13$	27	48	89	147	215	316	437	594	779	1,005	1,261	1,572	1,939	2,679	3,794	5,005	6,512	8,508	10,566
	$\mu = 0.15$	31	55	101	167	245	359	498	676	887	1,144	1,437	1,791	2,210	3,053	4,325	5,711	7,437	9,726	12,085
Torque figures in this section will induce Residual Bolt Loads equivalent to the green section in the Imperial Torque table on the previous page.	$\mu = 0.08$	29	51	94	155	225	332	457	623	812	1,051	1,314	1,642	2,017	2,790	3,943	5,183	6,718	8,740	10,827
	$\mu = 0.11$	38	66	123	203	296	436	602	819	1,072	1,385	1,737	2,166	2,668	3,687	5,218	6,877	8,938	11,663	14,474
	$\mu = 0.13$	43	77	142	235	344	505	699	951	1,246	1,607	2,018	2,516	3,102	4,286	6,069	8,007	10,418	13,612	16,905
	$\mu = 0.15$	49	87	161	267	391	574	796	1,082	1,419	1,830	2,299	2,865	3,536	4,884	6,919	9,137	11,898	15,561	19,336
Torque figures in this section will induce Residual Bolt Loads equivalent to the yellow section in the Imperial Torque table on the previous page.	$\mu = 0.08$	32	57	105	174	253	373	504	701	914	1,182	1,479	1,847	2,289	3,139	4,436	5,831	7,558	9,832	12,180
	$\mu = 0.11$	42	75	138	228	333	490	677	922	1,206	1,558	1,954	2,437	3,001	4,148	5,671	7,737	10,055	13,121	16,283
	$\mu = 0.13$	49	86	159	264	387	568	786	1,069	1,401	1,809	2,270	2,830	3,490	4,821	6,627	9,008	11,721	15,314	19,018
	$\mu = 0.15$	55	98	181	300	440	646	895	1,217	1,596	2,058	2,587	3,223	3,978	5,494	7,784	10,279	13,386	17,507	21,753
Torque figures in this section will induce Residual Bolt Loads equivalent to the red section in the Imperial Torque table on the previous page.	$\mu = 0.08$	36	63	117	194	282	414	571	778	1,015	1,313	1,643	2,052	2,521	3,487	4,929	6,479	8,397	10,925	13,534
	$\mu = 0.11$	47	83	153	253	370	544	753	1,024	1,340	1,731	2,171	2,707	3,335	4,609	6,523	8,597	11,173	14,579	18,092
	$\mu = 0.13$	54	96	177	293	430	631	874	1,188	1,557	2,009	2,522	3,144	3,877	5,357	7,586	10,009	13,023	17,015	21,131
	$\mu = 0.15$	61	109	201	333	489	717	995	1,352	1,773	2,287	2,874	3,581	4,420	6,105	8,649	11,421	14,873	19,452	24,169

Torque values all shown in lb-ft

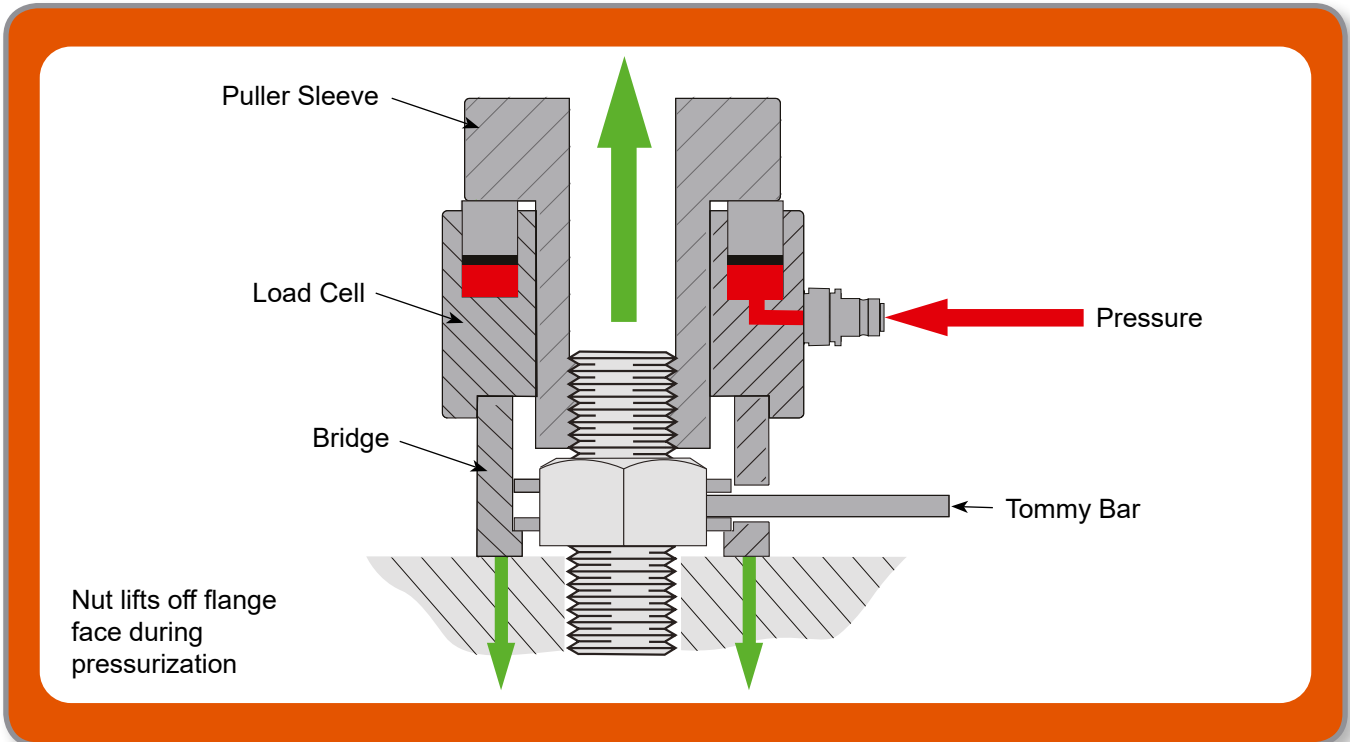
The torque values are for fully threaded coarse metric stud bolts/standard series nuts. Bolt Materials: ASTM A193 B7, B7M & B16, ASTM A320 L7, L7M & L43

METRIC TORQUE (Values = Nm)

Bolt Diameter Nut A/F	mm	M14	M16	M20	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56	M64	M70	M76	M85	M90
Torque figures in this section will induce Residual Bolt Loads equivalent to the white/grey section in the Imperial Torque table on the previous page. These values are typical for clamp connectors	$\mu = 0.08$	24	43	80	132	191	281	388	527	689	891	1,114	1,391	1,710	2,365	3,342	4,393	5,693	7,407	9,175
	$\mu = 0.11$	33	57	104	172	226	369	511	694	908	1,174	1,472	1,836	2,262	3,125	4,423	5,829	7,575	9,884	12,265
	$\mu = 0.13$	37	65	121	199	292	428	592	805	1,056	1,363	1,710	2,131	2,629	3,632	5,144	6,786	8,829	11,535	14,326
	$\mu = 0.15$	42	75	137	226	332	487	675	917	1,203	1,551	1,948	2,428	2,996	4,139	5,864	7,743	10,083	13,187	16,385
Torque figures in this section will induce Residual Bolt Loads equivalent to the green section in the Imperial Torque table on the previous page.	$\mu = 0.08$	39	69	127	210	305	450	620	845	1,101	1,425	1,782	2,226	2,735	3,783	5,346	7,027	9,108	11,850	14,679
	$\mu = 0.11$	52	89	167	275	401	591	816	1,110	1,453	1,878	2,355	2,937	3,617	4,999	7,075	9,324	12,118	15,813	19,624
	$\mu = 0.13$	58	104	193	319	466	685	948	1,289	1,689	2,179	2,736	3,411	4,206	5,811	8,228	10,856	14,125	18,455	22,920
	$\mu = 0.15$	66	118	218	362	530	778	1,079	1,467	1,924	2,481	3,117	3,884	4,794	6,622	9,381	12,388	16,132	21,098	26,216
Torque figures in this section will induce Residual Bolt Loads equivalent to the yellow section in the Imperial Torque table on the previous page.	$\mu = 0.08$	43	77	142	236	343	506	693	950	1,239	1,603	2,005	2,504	3,076	4,256	6,014	7,906	10,247	13,330	16,514
	$\mu = 0.11$	57	102	187	309	451	664	918	1,250	1,635	2,112	2,649	3,304	4,069	5,624	7,960	10,490	13,633	17,790	22,077
	$\mu = 0.13$	66	117	216	358	525	770	1,066	1,449	1,900	2,453	3,078	3,837	4,732	6,536	9,256	12,213	15,892	20,763	25,785
	$\mu = 0.15$	75	133	245	407	597	876	1,213	1,650	2,164	2,790	3,508	4,370	5,393	7,449	10,554	13,936	18,149	23,736	29,493
Torque figures in this section will induce Residual Bolt Loads equivalent to the red section in the Imperial Torque table on the previous page.	$\mu = 0.08$	49	85	159	263	382	561	774	1,055	1,376	1,780	2,228	2,782	3,418	4,728	6,683	8,784	11,385	14,812	18,350
	$\mu = 0.11$	64	113	207	343	502	738	1,021	1,388	1,817	2,347	2,943	3,670	4,522	6,249	8,844	11,656	15,149	19,767	24,529
	$\mu = 0.13$	73	130	240	397	583	856	1,185	1,611	2,111	2,724	3,419	4,263	5,257	7,263	10,285	13,570	17,657	23,069	28,650
	$\mu = 0.15$	83	148	273	451	663	972	1,349	1,833	2,404	3,101	3,897	4,855	5,993	8,277	11,726	15,485	20,165	26,373	32,769

Torque values all shown in Nm

BOLT TENSIONERS HOW IT WORKS



Hydraulic tensioning is a method of stretching the stud in lieu of turning the nut as with traditional torquing. Each stud has a yield strength, and can be stretched as a form of tightening, eliminating galling and friction, and the need for lubricants.

Hydraulic Bolt Tensioners are used to provide the most accurate residual bolt load and uniform compression on the gasket. The bolt tensioner can be applied to a single bolt or any number of bolts depending upon access and the application. However, to give the most accurate residual load, a bolt tensioner should be placed on, ideally, 50% or 100% of the studs. (See graphic next page).

The load cell and adapter kit is placed over the top of each stud and nut. The puller is then threaded onto the stud above the nut and sits flush against the hydraulic load cell. Each tool is interconnected with hoses to insure all tools are pressurized simultaneously.

The hydraulic pump unit is activated and as pressure builds throughout the system. The load cell starts to extend and push against the puller, stretching the stud. As this continues, the nut lifts off the flange face. Once the desired pressure is met, the pump valve is closed

to hold the pressure. The socket ring is turned down using a tommy bar so the nut is now back sitting flush on the flange face. Once all the nuts have been turned down, the pump pressure is released and the stud attempts to return to it's normal state thus creating a clamping force on the gasket. Since all bolts are tightened at the same time, this provides a uniform load across the joint.

TYPICAL 50% TENSIONER LAYOUT



Assemble tensioners to 50% of the bolts.
Apply 'Pressure 1' as indicated on the bolt tensioning data sheet.
Tighten down the nuts using a tommy bar.



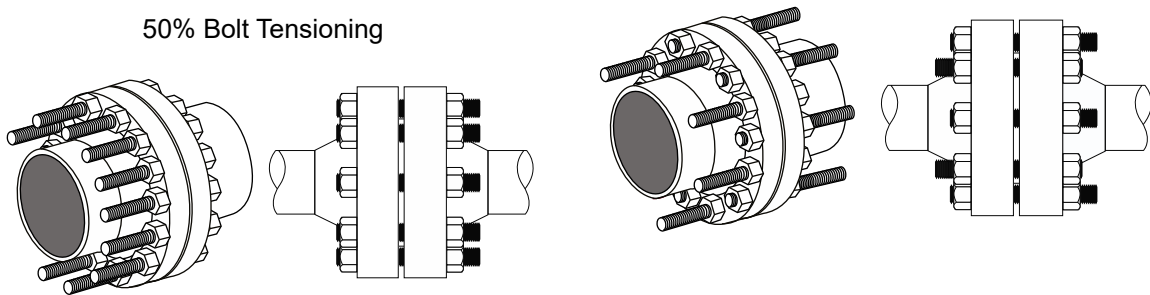
Move the tensioners to the remaining 50% of the bolts and apply 'Pressure 2' as indicated on the bolt tensioning data sheet.
Tighten down the nuts using a tommy bar.

Release the system pressure and repeat the reapplication of the pressure and tightening of the nuts a further twice.

TYPICAL 50% FLANGE SET-UP

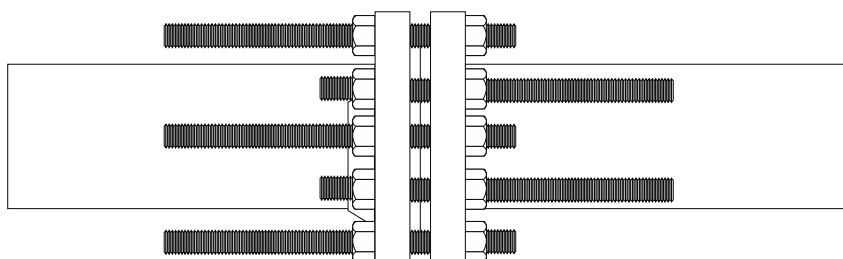
For proper tensioner tool fit, there must be ample stud above the nut
100% Bolt Tensioning

50% Bolt Tensioning



For topside applications, make sure the stud extends a minimum of one bolt diameter above the nut. For subsea applications, refer to the SST tool selection chart for dimension.

100% Tensioning Set-up for Subsea Tensioning



HYDRAULIC BOLTING SAFETY



Wear appropriate Personal Protective Equipment (PPE).



Read all instructions.



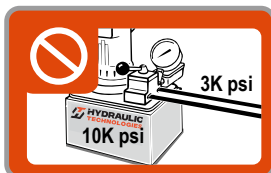
Do not exceed the rated load of any pump, tool or component.



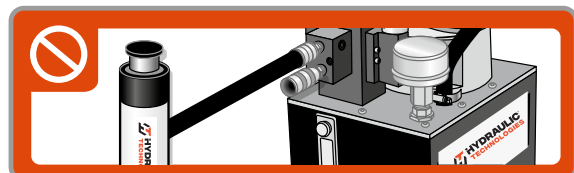
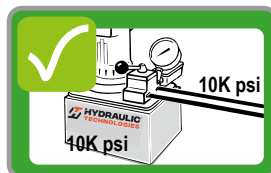
Inspect all components before use. Do not use damaged or worn components. Return to an Authorized Repair Center for repair or replacement.



Never alter internal relief valves.



Recognize system pressures. Do not use a 700 bar pump on a system with 207 bar components (hoses, fittings, valves, tools, etc.).



Do not use pumps designed for torque wrenches or tensioners for lifting.

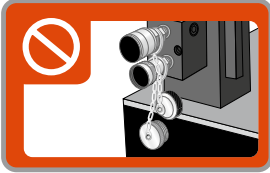


Do not overfill pump reservoirs.

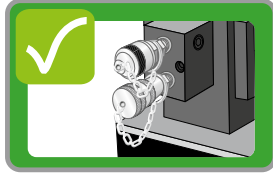


Use only high quality oil, like SPX Power Team hydraulic oil. Using the wrong fluid can lead to equipment damage and premature failure.





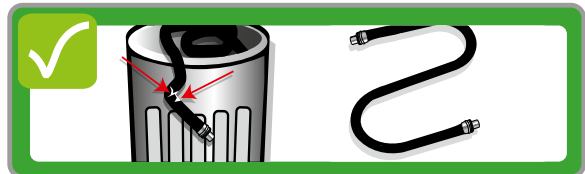
Do not operate a pump with couplers exposed or uncapped.



Clean both ends of the couplers before assembly.



Do not kink hydraulic hoses.



Replace damaged hoses immediately.



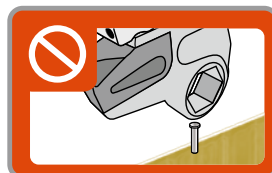
Keep equipment away from excessive temperatures. Do not weld next to unprotected equipment.



Keep couplers capped when not in use.



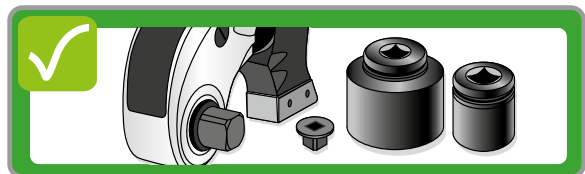
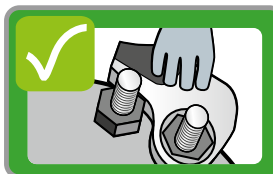
Do not drive over hoses or drop objects onto them.



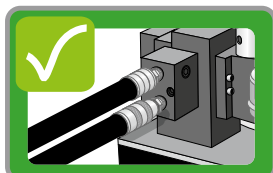
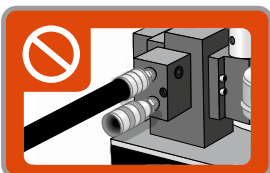
Only use tools for their intended purpose.



Keep hands clear of pinch points.



Only use high quality impact sockets and reducers with an appropriate load rating and safety factor.



APPLICATION DATA SHEET

Nut Type 1	
Ø d	in/mm
P (Pitch)	in/mm
H1	in/mm
H2	in/mm
AF	in/mm
Ø W	in/mm

Nut Type 1

Circle "in" or "mm"

Nut Type 2	
Ø d	in/mm
P (Pitch)	in/mm
H1	in/mm
H2	in/mm
Ø N	in/mm
Ø W	in/mm
H3	in/mm
Ø J	in/mm
# of Holes	-

Nut Type 2

Circle "in" or "mm"

Application Dimensions	
A	in/mm
B	in/mm
C	in/mm
D	in/mm
E	in/mm
G	in/mm
R	in/mm
# Bolts	-
PCD	in/mm

Additional Information	
Hot Dip Galvanized Threads : Y/N	

Circle "in" or "mm"

Load Requirements	
APPLIED HYDRAULIC LOAD (F_{HA})	N
RESIDUAL BOLT LOAD (F_{RB})	N

Load

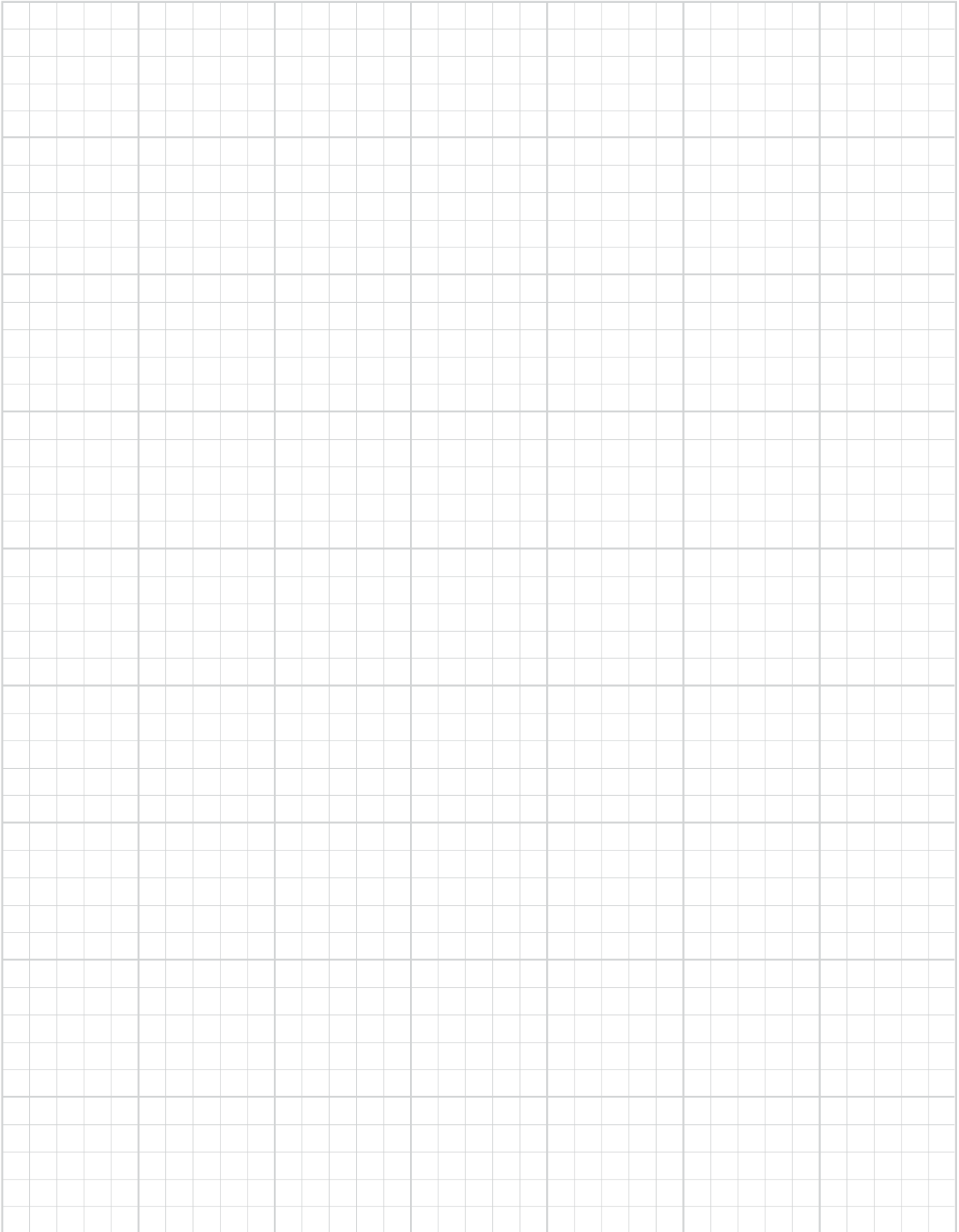
F_{HA} = Applied Hydraulic Load

Load Loss Following Pressure Release

F_{RB} = Residual Bolt Load

L/d Ratio

L = Active Bolt Grip Length



MEASUREMENTS / SPECIFICATIONS

Manufacturing Standards

Bolting Systems' commitment to quality is evident in everything we do, from raw material receipt to how we support our customers years after they purchase our products. Bolting Systems is registered to ISO 9001:2000 international quality standard. ISO 9001:2000 requires compliance with standards for management, administration, product development, manufacturing and continual improvement. Our Registration verifies that Bolting Systems has adopted and maintains documentation for processes ranging from suppliers to customers, inspection, handling, and training. ISO 9001 also requires periodic internal and external audits to ensure all aspects of work affecting quality control are monitored. This always has been, and will continue to be, our philosophy. That's our guarantee to you.

ASME B30.1

Some Bolting Systems tools are made using Power Team hydraulic cylinders which fully comply with the criteria set forth in the American Society of Mechanical Engineers standard ASME B30.1: Our cylinders are designed to have a minimum of a 2-to-1 safety factor on typical material yield strength; Each cylinder is tested at 125 percent of rated pressure at full travel and is inspected to assure functionality and freedom from leaks.

ASME B40.1

Bolting Systems heavy-duty pressure gauges are designed in accordance with the recommendations set forth in the American Society of Mechanical Engineers standard ASME B40.1, Grade 1A or B.

CE MARK

Bolting Systems is committed to designing, manufacturing, and marketing products that meet or exceed the needs of the customers we serve. Bolting Systems supplies a Declaration of Incorporation or a Declaration of Conformity and CE Marking for products that conform with European Community Directives.

CSA

Where specified, Bolting Systems electric power pump assemblies meet the design, assembly, and test requirements of the Canadian Standards Association. Note: If CSA certification is required, it must be requested at the time the pump is ordered.

NEMA

Where specified, Bolting Systems electric power pump assemblies meet the design, assembly, and test requirements of NEMA 12, a National Electrical Manufacturers' Association standard relating to electrical components used to resist moisture and dust.

BOLTING SYSTEMS PRODUCT DESIGN CRITERIA

All Bolting Systems brand hydraulic components are designed and/or tested to be safe for use at maximum operating pressures of 10,000 psi (690 bar) unless otherwise specifically noted.

QUALITY ASSURANCE

All of our products are subjected to quality checks during production. All materials are certified and have traceability to the mill. Before leaving the factory, all pressure containing products are tested to maximum working pressure to ensure on-the-job reliability. We have made every effort to include the latest specifications for our products in this catalog. Please call the Bolting Systems factory for the most current product specifications. The Bolting Systems Lifetime Powerthon™ Warranty is described in more detail on page 113 of th



POWERTHON™ LIFETIME WARRANTY

“Bolting Systems” is a registered trademark of the Hydraulic Technologies US, LLC. All Bolting Systems products and parts, with the exceptions noted below, are warranted against defects in materials and workmanship for the life of the product or part. (The life of the product or part is defined as that point in time when it no longer safely or properly functions due to normal wear). Inflatable jacks, chains, batteries, electric motors, gas engines, knives and cutter blades which are sold with Bolting Systems products are not covered by this warranty and instead are warranted as follows:

Consumable parts or accessories, including without limitation, chains, batteries, knives and cutter blades are warranted against defects in materials and workmanship for a period of one year from date of purchase.

All electric motors and gas engines are separately warranted by their respective manufacturer under the terms and conditions stated in their separate warranty.

The foregoing warranties do not cover ordinary wear and tear or any product or part that has been worn out, abused, heated, ground or otherwise altered, used for a purpose other than that for which it was intended or used in a manner inconsistent with any instructions regarding its use.

To qualify for warranty consideration, return the Bolting Systems product, freight prepaid, to a Bolting Systems authorized repair center or to the Hydraulic Technologies factory. If any product or part manufactured by Hydraulic Technologies found to be defective by Hydraulic Technologies, in its sole judgment, Hydraulic Technologies will, at its option, either repair or replace such defective product or part and return it via best ground transportation, freight prepaid. THIS REMEDY SHALL BE THE EXCLUSIVE REMEDY AVAILABLE FOR ANY DEFECTS IN THE PRODUCTS OR PARTS MANUFACTURED AND SOLD BY Hydraulic Technologies OR FOR DAMAGES RESULTING FROM ANY OTHER CAUSE WHATSOEVER, INCLUDING WITHOUT LIMITATION, Hydraulic Technologies'S NEGLIGENCE. Hydraulic Technologies SHALL NOT, IN ANY EVENT, BE LIABLE TO ANY BUYER FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, WHETHER FOR DEFECTIVE OR NON-CONFORMING GOODS, NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY OR FOR ANY OTHER REASON.

Hydraulic Technologies's Warranty is expressly limited to persons who purchase Bolting Systems products or parts for the resale or for use in the ordinary course of the buyer's business.

THIS WARRANTY IS EXCLUSIVE, AND MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS MANUFACTURED AND SOLD BY IT, WHETHER AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER. No agent, employee, or representative of Hydraulic Technologies has any authority to bind Hydraulic Technologies to any affirmation, representation, or warranty concerning Bolting Systems products or parts, except as stated herein.

The purpose of this exclusive remedy shall be to provide the buyer with repair or replacement of products or parts manufactured by Hydraulic Technologies found to be defective in materials or workmanship or negligently manufactured. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as Hydraulic Technologies is willing and able to replace said defective products or parts in the prescribed manner.

CUSTOM PRODUCTS AVAILABLE

SPANNER LINK & REACTION ROLLER



- For low height applications.
- For radially close applications
- Open ended spanner configurations
- Multi-plate applications for extreme low height applications
- Reaction 'roller' rolls around flange periphery during operation
- Manufactured to order

RING TENSIONER



- Custom tensioners designed to meet specific applications needs.

Contact your Hydraulic Technologies representative for details on any of these custom products or we can develop a custom product for your application.

THREADED PISTON TENSIONERS



THREADED PISTON TENSIONERS FOR WIND TURBINE LOAD CHECKS

- Compact size
- High load
- Simple assembly
- Cost effective
- Light-weight and flexible
- Manufactured to order

TWHC ACCESSORIES



CUSTOM WRENCH ACCESSORIES AVAILABLE

Should our standard reaction device be unsuitable, Hydraulic Technologies can design special reaction devices and drives upon request.

CUSTOMER SERVICE & SUPPORT

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info.emea@hytec.com

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info.amer@hytec.com

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bolting.amer@hytec.com

Rail Systems

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info.rail@hytec.com

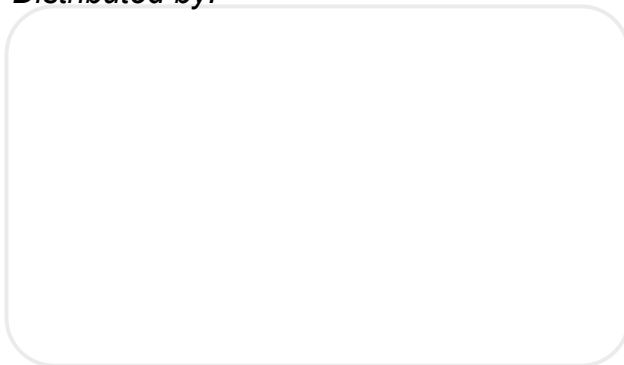
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