smartTensioner®
Hamburg · Germany

HydraulicTensioningUnit

HTU HydraulicTensioningUnit
HMTU HydraulicMechanicTensioningUnit
BT BoltTensioner
IBT IntegratedBoltTensioner
STD SubseaTensioningDevices
HP HydraulicPump

Tools for highly loaded bolted connections

HTU

HydraulicTensioningUnit

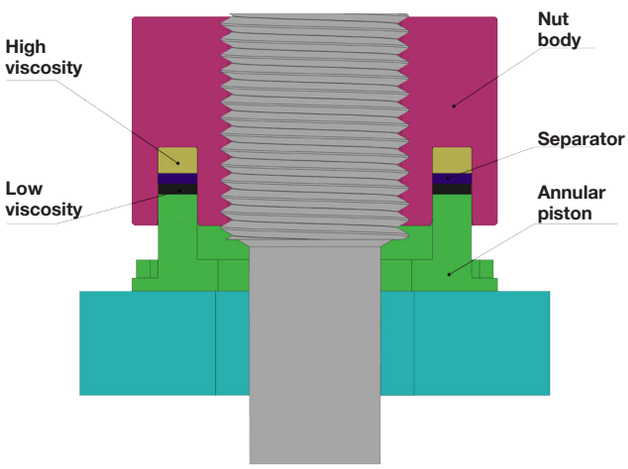
PATENTS PENDING!

Specifications

HTU / High Force								
Type	Bolt load [kN]	Height H [mm]	Diameter D [mm]	Thread			Stroke [mm]	Mass [kg]
101F-008	29.3	36.0	29.4	M8	1/4-UNC	Blind hole thread	5	0.2
101F-010	46.4	36.0	37.3	M10	3/8-UNC		5	0.3
101F-012	67.4	41.0	43.5	M12	1/2-UNC		5	0.5
101F-014	92.0	43.0	32.6	M14			5	0.3
101F-016	125.6	44.0	38.8	M16	5/8-UNC		5	0.4
101F-018	153.6	49.0	42.1	M18			10	0.5
101F-020	196.0	49.0	46.2	M20	3/4-UNC		10	0.6
101F-022	266.0	49.0	51.7	M22	7/8-UNC	Through hole thread	10	0.6
101F-024	287.0	49.0	54.0	M24	1-UNC		10	0.7
101F-027	308.0	49.0	56.8	M27			10	0.7
101F-030	336.0	56.0	62.0	M30	1 1/8-8UN		10	1.0
101F-033	371.0	56.0	65.5	M33	1 1/4-8UN		10	1.1
101F-036	455.0	56.0	71.0	M36	1 3/8-8UN		10	1.3
101F-039	522.2	56.0	75.6	M39	1 1/2-8UN		10	1.4
101F-042	593.6	56.0	80.1	M42	1 5/8-8UN		10	1.6
101F-045	623.0	56.0	85.1	M45	1 3/4-8UN		10	1.7
101F-048	732.2	66.0	90.6	M48	1 7/8-8UN		10	2.3
101F-052	880.6	66.0	97.7	M52	2-8UN		10	2.7
101F-056	1093.4	66.0	106.2	M56	2 1/8-8UN		10	3.2
101F-064	1317.4	74.0	116.9	M64	2 1/2-8UN		10	4.2
101F-068	1458.8	78.0	122.7	M68			10	4.9
101F-072	1744.4	82.0	133.5	M72	2 3/4-8UN		10	6.2
101F-080	2249.8	90.0	148.6	M80	3 1/8-8UN		10	8.4
101F-090	2837.8	100.0	165.1	M90	3 1/2-8UN		10	11.4
101F-095	3024.0	105.0	171.2	M95	3 3/4-8UN		10	12.7
101F-100	3452.4	110.0	181.0	M100	4-8UN		10	14.9
101F-110	3939.6	120.0	194.3	M110	4 3/8-8UN		10	18.4
101F-125	5348.0	135.0	224.0	M125	5-8UN		10	27.8
101F-140	6935.6	150.0	251.3	M140	5 1/2-8UN		10	39.0
101F-150	7917.0	160.0	267.6	M150	6-8UN		10	46.9

HTU are available for other threads on request.

smartTensioner HTUs are used instead of conventional hexagon nuts.
Multiple HTUs are often mounted on a multi-stud flange connection.



How does it work?

All HTUs are pressurized using the very small smartTensioner Hydraulic-Pump HP. Hydraulic pressure (up to 300 MPa) presses an annular piston against the flange and leads to a defined elongation of the bolt.

The innovation:

The HTU uses two different hydraulic media simultaneously separated by a splitter: while one is of high viscosity but still pumpable, the other medium is extremely viscous and not pumpable at all. Its volume stays constant over the lifetime of the nut. It is pressed against the sealings on the annular piston.

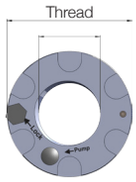
No leakage

Because of the oil‘s high viscosity in combination with the smartTensioner sealing, leakages do not occur. Since all other openings of the HTU are equipped with metallic sealings, leakage of any kind is impossible. The pressure remains locked in place over infinite time.

After reaching the targeted pressure, the HTU pressure valve seals the pressure space within the nut.

smartTensioner®

No setting losses!
Small diameters!
High forces!



Specifications

HTU / Low Diameter								
Type	Bolt load [kN]	Height H [mm]	Diameter D [mm]	Thread			Stroke [mm]	Mass [kg]
101D-008	11.0	36.0	22.1	M8	1/4-UNC	Blind hole thread	5	0.1
101D-010	17.4	36.0	25.6	M10	3/8-UNC		5	0.1
101D-012	25.3	41.0	29.7	M12	1/2-UNC		5	0.2
101D-014	34.5	43.0	24.8	M14			5	0.1
101D-016	47.1	44.0	27.8	M16	5/8-UNC		5	0.2
101D-018	57.6	49.0	31.5	M18			10	0.3
101D-020	73.5	49.0	34.4	M20	3/4-UNC		10	0.3
101D-022	171.0	49.0	43.2	M22	7/8-UNC	Through hole thread	10	0.4
101D-024	184.5	49.0	45.4	M24	1-UNC		10	0.4
101D-027	198.0	49.0	49.3	M27			10	0.5
101D-030	216.0	56.0	52.3	M30	1 1/8-8UN		10	0.6
101D-033	238.5	56.0	55.6	M33	1 1/4-8UN		10	0.7
101D-036	292.5	56.0	62.6	M36	1 3/8-8UN		10	0.9
101D-039	335.7	56.0	66.7	M39	1 1/2-8UN		10	1.0
101D-042	381.6	56.0	70.7	M42	1 5/8-8UN		10	1.1
101D-045	400.5	56.0	73.6	M45	1 3/4-8UN		10	1.1
101D-048	470.7	66.0	80.6	M48	1 7/8-8UN		10	1.7
101D-052	566.1	66.0	86.8	M52	2-8UN		10	1.9
101D-056	702.9	66.0	94.0	M56	2 1/8-8UN		10	2.2
101D-064	846.9	74.0	103.8	M64	2 1/2-8UN		10	2.9
101D-068	937.8	78.0	109.0	M68			10	3.4
101D-072	1121.4	82.0	118.6	M72	2 3/4-8UN		10	4.3
101D-080	1446.3	90.0	131.6	M80	3 1/8-8UN		10	5.9
101D-090	1824.3	100.0	146.1	M90	3 1/2-8UN		10	7.9
101D-095	1944.0	105.0	151.8	M95	3 3/4-8UN		10	8.8
101D-100	2219.4	110.0	160.2	M100	4-8UN		10	10.3
101D-110	2532.6	120.0	174.6	M110	4 3/8-8UN		10	13.2
101D-125	3438.0	135.0	198.5	M125	5-8UN		10	19.1
101D-140	4458.6	150.0	222.1	M140	5 1/2-8UN		10	26.6
101D-150	5089.5	160.0	236.5	M150	6-8UN		10	31.9

Permanent Flange Pressure Monitoring (PFPM)

With smartTensioner HTUs, high hydraulic pressure is used to stress the bolts of a flange connection and therefore to press the flange parts against each other. The higher and the more even the bolt forces, the tighter and more reliable the flange. Both can be ensured using HTUs pressurized by smartTensioner hydraulic pumps that are electronically synchronized and ensure even pressures and bolt forces on all bolts.

However, even in this case flange connections might fail. The pressure between the flange parts might be reduced because of:

- Permanent plastic strain of the flange material
- (Local) thermal impact
- Sealing failure due to geometric tolerances
- Sealing failure due to unexpected chemical reaction

Safety first

HTUs allow the operator to permanently measure the internal hydraulic pressure using smartTensioner sensors that communicate via cable or wirelessly. The internal pressure is directly proportional to the applied bolt force and flange pressure. Any failure is detected at once. Leakages due to flange failure can be minimized or excluded.

Advantages of hydraulic locking compared to conventional tensioning nuts

High tensioning forces

The bolt is loaded with tensile stress only. There is no torque stress and virtually no shear stress. The bolt material's load bearing capacity is used to its full extent for the bolted connection.

Permanent bolt force monitoring

The hydraulic pressure within the HTU can easily be measured. Any unexpected changes in the flange pressure, e.g. due to flange leakages, are detected at once.

Easy bolt relaxing / nut removal

No pump or hydraulic aggregate is needed for the removal of the HTU. Any discharging hydraulic medium can easily be absorbed.

No setting losses

Due to the lack of mechanical locking, after reaching the target pressure the force flow within the HTU remains unchanged.

Very high forces - small geometry

The nut body can be fully used for straining the bolt. There is no need for mechanical locking. The result is an extremely high tensioning force and very small contact area, usable even with threads as small as M8.

Advantages of PFPM:

- Reduced risk of environmental damage
- Reduced risk of plant or process shutdown
- Simplified diagnostics in the event of process problems
- Supports comprehensive quality assurance

Tools for highly loaded bolted connections.
Our products:

HTU
HydraulicTensioningUnit

M8 - M200 / ¼” – 8”

The HTU replaces conventional (hexagonal) nuts. The bolt force is locked hydraulically.

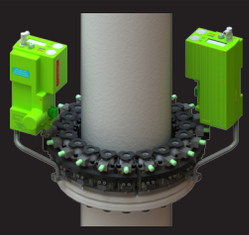
HMTU
HydraulicMechanicTensioningUnit

M22 - M200 / 7/8” – 8”

The HTU replaces conventional (hexagonal) nuts. The bolt force is locked mechanically.

BT & CFBT
BoltTensioner CompactFlangeBoltTensioner

M08 - M100 / ¼” – 4”



The conventional (hexagonal) nut remains on the bolt.
Bolt strained torque-free with Bolt-Tensioner.
Nut is turned by manually.

IBT
IntegratedBoltTensioner

M30 - M64 / 1 1/8”– 2 1/2”

Made for tensioning situations where extremely high bolt forces are needed and very little free area on the flange is available.

STD
SubseaTensioningDevices

M8 - M200 / ¼” – 8”

Made for environments where handling is very difficult, e.g. in subsea-projects.

HP
HydraulicPump

The heart of our innovations: Very high pressure, low pressurized volume.
Perfect for bolt tensioning!

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