



Choke Sub

MAN-TTT-912CC (R01)

Thru-Tubing Technology

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Description

The Choke Sub is used below the Hydraulic Bow Spring Centralizer in order to help expand the bow springs of the centralizer by differential pressure held across the tool.

Operation

To expand the bow springs on the tool in the well bore environment, simply hold pressure across the tool via an orifice placed below the tool. The centralizer can also be activated by another tool, such as a mud motor, to take advantage of the differential pressure created across the mud motor during drilling operations, that will facilitate the expansion of the bow springs. Function test the tool at surface before running the assembly in the well bore. To retract the bow springs on the assembly remove the pressure being held across the tool.



Note: Unless otherwise indicated, all the strength figures given in this manual, are the result of calculations based on the yield strength of the material used in the manufacture of this product. These strength calculations are considered accurate within plus or minus 20% and are to be used only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.

1.0 Nozzle Pressure Charts and Calculations

1.1 Choke Sub Nozzle Flow Chart for the 1.686 in. OD Hydraulic Bow Spring Centralizer

Nozzle Number	Nozzle Size (inches)	Capacity in Gallons Per Minute at PSI	
		700 PSI	850 PSI
TT0912-168CO-001	0.156	18.2	20.1
TT0912-168CO-002	0.172	22.2	24.4
TT0912-168CO-003	0.188	26.4	29.2
TT0912-168CO-004	0.196	28.8	31.7
TT0912-168CO-005	0.203	30.9	34.0
TT0912-168CO-006	0.219	35.9	39.6
TT0912-168CO-007	0.234	41.2	45.2

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1.2 Choke Sub Nozzle Flow Chart for the 1.813 in. - 2.250 in. OD Hydraulic Bow Spring Centralizer

Nozzle Number	Nozzle Size (inches)	Capacity in Gallons Per Minute at PSI	
		475 PSI	550 PSI
TT0912-168CO-001	0.156	15.0	16.2
TT0912-168CO-002	0.172	18.3	19.7
TT0912-168CO-003	0.188	21.8	23.5
TT0912-168CO-004	0.196	23.7	25.5
TT0912-168CO-005	0.203	25.5	27.4
TT0912-168CO-006	0.219	29.6	31.9
TT0912-168CO-007	0.234	33.8	36.4
TT0912-168CO-008	0.250	38.6	41.5
TT0912-168CO-009	0.281	48.8	52.5
TT0912-168CO-010	0.302	56.3	60.6
TT0912-168CO-011	0.316	61.7	66.4
TT0912-168CO-012	0.344	73.1	78.6



Note: The pressures listed above are the Minimum and Maximum preferred pressure differential to be held across tool, to function the Hydraulic Bow Spring Centralizer.

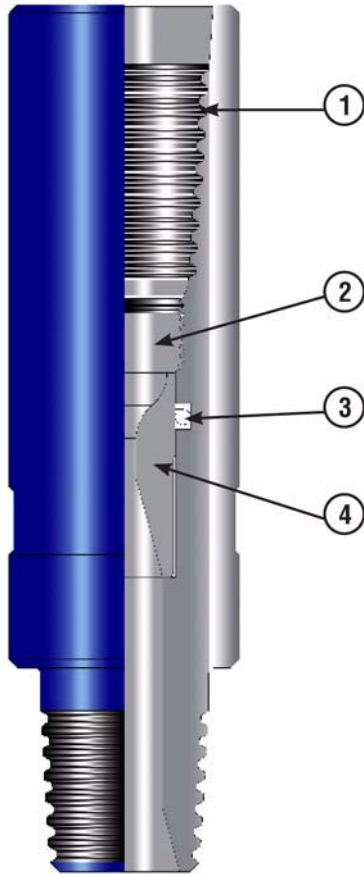


Note: All of the above flow rates and pressures are based on fresh water as a fluid.

1.3 To calculate flow rates for fluids other than water, multiply the tabulated capacities by the conversion factor (in the chart below) that applies to the specific gravity of the desired fluid.

Weight of Solution	Specific Gravity	Conversion Factor
7.0 lbs. per gallon	0.84	1.09
8.0 lbs. per gallon	0.96	1.02
8.34 lbs. per gallon	1.00	1.00
9.0 lbs. per gallon	1.08	0.96
10.0 lbs. per gallon	1.20	0.91
11.0 lbs. per gallon	1.32	0.87
12.0 lbs. per gallon	1.44	0.83
14.0 lbs. per gallon	1.68	0.77

TT0912-168CC BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Choke Housing	TT0912-168CC-001
2	1	Steel Allen Lock Screw 7/8-14 x 7/16"	PUR-THLS561-028
3	1	O-Ring 3/4" x 1" x 1/8" 2-210	PUR-TORV000-210
4	1*	Nozzle	TT0912-168CO-XXX

* Nozzle Kit available - TT0912-168CCO

3 Tool Name: 1.688 in. OD Choke Sub

Product Code: TT0912-168CC **Tool OD:** 1.688 in. **Tool ID:** 0.56 in. (w/o Choke)

Material: AISI 4140 HT 285-341 BHN **Tool Length:** 6.38 in. w/1 in. AMMT

4 Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The O-ring groove of the Choke Sub, 149,600 lbs.**

Burst Point and Burst Pressure: The O-ring groove of the Choke Sub, 42,400 psi.

Torsional Weak Point and Ft-Lbs to Yield: 5,045 ft/lbs as a function of O-ring groove collapse on the Choke Sub.

Miscellaneous Information

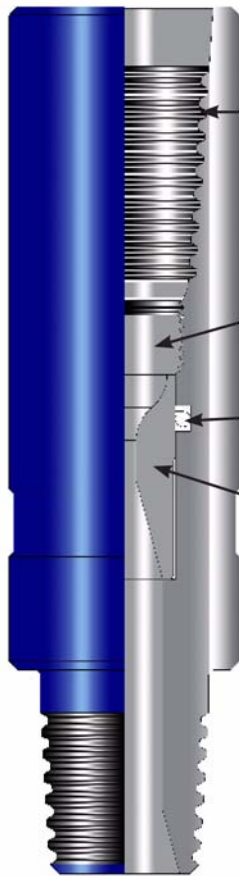
Tool Joint Torsional Yield: The 1 in. AMMT connections - 790 ft-lbs.

Tool Joint Recommended Make-Up Torque: The 1 in. AMMT connections - 450 ft-lbs.

****NOTE:** Limiting Load at 1 in. AMMT Connection is 74,200 lbs

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TT0912-213CC BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Choke Housing	TT0912-213CC-001
2	1	Steel Allen Lock Screw 1-14 x 1/2"	PUR-THLS642-032
3	1	O-Ring 3/4" x 1" x 1/8" 2-210	PUR-TORV000-210
4	1*	Nozzle	TT0912-168CO-XXX

* Nozzle Kit available - TT0912-213CCO

Tool Name: 2.125 in. OD Choke Sub

Product Code: TT0912-213CC **Tool OD:** 2.125 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 6.0 in. w/1-1/2 in. MT

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The O-ring groove of the Choke Sub, 99,200 lbs.

Burst Point and Burst Pressure: The O-ring groove of the Choke Sub, 64,900 psi.

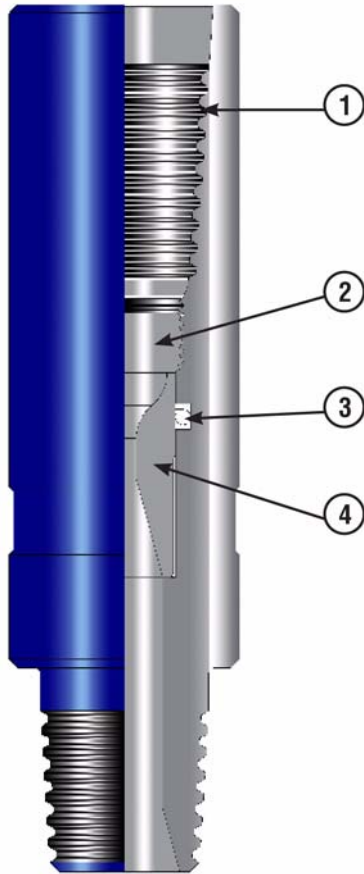
Torsional Weak Point and Ft-Lbs to Yield: 7,000 ft-lbs as a function of O-ring groove collapse on the Choke Sub.

Miscellaneous Information:

Tool Joint Torsional Yield: The 1-1/2 in. MT connections - 1,585 ft-lbs.

Tool Joint Recommended Make-Up Torque: The 1-1/2 in. MT connections - 900 ft-lbs.

TT0912-288CC BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Choke Housing	TT0912-288CC-001
2	1	Steel Allen Lock Screw 1-14 x 1/2"	PUR-THLS642-032
3	1	O-Ring 3/4" x 1" x 1/8" 2-210	PUR-TORV000-210
4	1*	Nozzle	TT0912-168CO-XXX

* Nozzle Kit available - TT0912-288CCO

Tool Name: 2.875 in. OD Choke Sub

Product Code: TT0912-288CC **Tool OD:** 2.875 in. **Tool ID:** 0.56 in.

Material: AISI 4140 HT **Tool Length:** 7.5 in. w/2-3/8 in. PAC DSI

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: The O-ring groove of the Choke Sub, 204,000 lbs.

Burst Point and Burst Pressure: The O-ring groove of the Choke Sub, 79,100 psi.

Torsional Weak Point and Ft-Lbs to Yield: 18,100 ft/lbs as a function of O-ring groove collapse on the Choke Sub.

Miscellaneous Information:

Tool Joint Torsional Yield: The 2-3/8 in. PAC DSI connections - 6,490 ft-lbs.

Tool Joint Recommended Make-Up Torque: The 2-3/8 in. PAC DSI connections - 3,250 ft-lbs.

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1.0 Pre-Assembly



Warning: *Make sure all tool parts and components have been thoroughly cleaned or serious damage and/or injury could occur!*



Note: *Verify that the correct O-ring redress kit and quantities are used as specified on the Bill Of Materials (for example, 5 each etc...). Lay out all redress kit components on a clean surface.*



Note: *Make sure to lubricate all O-rings and threaded surfaces.*



Note: *Visually inspect all parts for damage or wear. Thread parts together without the O-rings to check fit. Repair or replace damaged parts.*



Caution: *Always file wrench marks or burrs and clean off debris!*



Caution: *This tool should always be disassembled, cleaned thoroughly, inspected and reassembled after job!*

2.0 Assembly

2.1 Put the O-ring (item #2) into the Choke Housing (item #1), then grease the entire ID of the housing.

2.2 Place the required nozzle (according to the flow chart), small OD down, into the Choke Housing.



Note: *You may have to tap it down with a brass rod and rubber mallet.*

2.3 Finally, insert the Allen Lock Screw (item #3) into the Choke Housing and screw it in using an allen wrench.

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3.0 Disassembly

3.1 Remove the Allen Lock Screw (item #3) using an allen wrench.

3.2 Drop the Choke Housing (item #1) on a wood block to remove the nozzle.

3.3 Remove and discard the O-ring (item #2).



Note: Remove and discard all O-rings. Replace O-rings after each use. Thoroughly clean tool parts in a cleaner approved by state and/or local laws.



Note: Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.



Note: It is recommended that a Magnetic Particle Inspection (MPI) be completed on all components after each job.