Venturi Jet Junk Basket

2.250 inch

MAN-TTT-320-2250 (R01)

Thru-Tubing Technology

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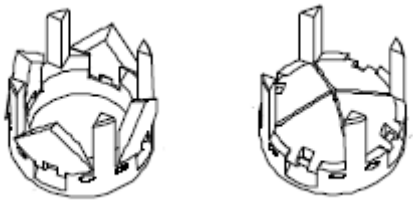
Description

The Venturi Jet Junk Basket is used to retrieve junk from the wellbore. When fluid is pumped though the coil tubing to the Venturi, nozzles direct the flow to the OD of the tool toward the bottom, a vacuum is created in the Venturi chamber and fluid and debris is drawn into the bottom of the tool. A debris screen is located between the Venturi chamber and the cages that will hold the debris inside the tool. The cages are used to trap the debris from falling out, and the screen prevents it from recirculating around the ports. The volume of the debris chamber may be enlarged by the addition of extensions between the cage housing and the screen housing. The nozzles are replaceable to achieve any possible ratio of flow rate and psi combination. The Cage Housing on the bottom of the tool can also be dressed with carbide for milling or washing over a fish. The housing are also available with CS threads. An important feature of the Venturi is that it is not dependant on the hole size to work. The rate of the Venturi action is much higher than the pump rate, no matter the hole size and nitrogen can be used without any damaging the tool. The Venturi can be run with or without a mud motor.

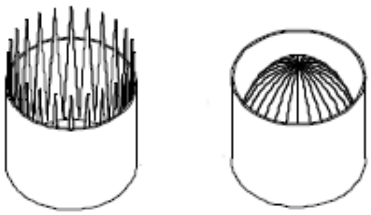
Note: Unless otherwise indicated, all the strength figures given in this manual, are the result of calculations based on the yield strength of the material used in the manufacture of this product. These strength calculations are considered accurate within plus or minus 20% and are to be used only as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

Finger and Flutter cages - open and closed.

Finger Cage and Flutter Cage



Finger Cages



Flutter Cages

Nozzle Flow Chart, Water

Nozzle Number	Nozzle Size (in.)	Capacity in Gallons Per Minute at psi						
		500 psi	600 psi	700 psi	800 psi	1,000 psi	1,500 psi	2,000 psi
25	0.129	10.5	11.5	12.4	13.2	14.8	18.1	20.9
30	0.141	12.5	13.7	14.8	15.8	17.7	21.7	25
35	0.147	13.7	15	16.2	17.3	19.4	23.7	27.4
40	0.156	15.4	16.9	18.2	19.5	21.8	26.7	30.8
50	0.172	18.7	20.5	22.2	23.7	26.5	32.4	37.4
60	0.188	22.3	24.4	26.4	28.2	31.5	38.6	44.6
70	0.196	24.3	26.7	28.8	30.8	34.4	42.2	48.7
80	0.203	26.1	28.6	30.9	33.1	37	45.3	52.3
90	0.219	30.3	33.2	35.9	38.4	42.9	52.5	60.6
100	0.234	34.8	38.1	41.2	44	49.2	60.3	69.6
110	0.242	37.1	40.7	43.9	46.9	52.5	64.3	74.2
120	0.250	39.6	43.4	46.9	50.1	56	68.6	79.2
130	0.272	46.9	51.4	55.5	59.3	66.3	81.2	93.8
140	0.281	50.1	54.9	59.3	63.4	70.9	86.8	100
150	0.297	55.9	61.2	66.1	70.7	79	96.8	112
160	0.302	57.8	63.3	68.4	73.1	81.7	100	116
170	0.313	61.9	67.8	73.2	78.3	87.5	107	124
180	0.316	63.3	69.3	74.9	80	89.5	110	127

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

Weight of Soluction	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 -WATER	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

To calculate flow rates for other fluids than fresh water, multiply the tabulated capacities by the conversion factor that applies to the specific gravity of the desired liquid from the chart at the left.

Nozzle capacities vary with different pressures. As a rule of thumb to the relationship between GPM & Pressure is as follows:

$$\frac{GPM_1}{GPM_2} = \frac{\sqrt{psi_1}}{\sqrt{psi_2}}$$

Nozzle Flow Chart, Gas

Using a Gas at 80° F with a Specific Gravity Gas of 0.967

Nozzle Number/Size (in.)	Capacity in Standard Cubic Feet Per Minute at psi													
	200 psi	300 psi	400 psi	500 psi	600 psi	700 psi	800 psi	900 psi	1,000 psi	1,100 psi	1,200 psi	1,300 psi	1,400 psi	1,500 psi
0025/.129	47	69	91	113	134	156	178	200	222	244	266	287	309	331
0030/.14	56	82	109	135	161	187	213	239	266	292	318	344	370	396
0035/.147	62	90	119	147	176	205	233	262	290	319	348	376	405	433
0040/.156	69	101	134	166	198	230	263	295	327	359	391	424	456	488
0050/.172	84	123	162	201	241	280	319	358	397	436	475	514	553	593
0060/.188	100	147	193	240	286	333	379	426	472	519	565	612	659	705
0070/.196	109	160	211	262	313	364	414	465	516	567	618	669	720	770
0080/.203	117	172	227	281	336	390	445	500	554	609	663	718	773	827
0090/.219	136	199	263	326	389	453	516	579	643	706	769	833	896	959
0100/.234	156	229	302	375	447	520	593	665	738	811	884	956	1,029	1,102
0110/.242	167	244	322	399	477	554	632	709	787	864	942	1,019	1,097	1,174
0120/.250	178	261	343	426	509	592	674	757	840	922	1,005	1,088	1,171	1,253
0130/.272	211	308	406	504	602	700	798	896	994	1,092	1,190	1,288	1,386	1,484
0140/.281	225	329	434	538	643	747	852	956	1,061	1,165	1,270	1,374	1,479	1,584
0150/.297	251	368	485	601	718	835	952	1,068	1,185	1,302	1,419	1,535	1,652	1,769
0160/.302	260	380	501	622	742	863	984	1,105	1,225	1,346	1,467	1,588	1,708	1,829
0170/.313	278	407	536	665	795	924	1,054	1,183	1,312	1,441	1,571	1,700	1,829	1,958
0180/.316	282	413	544	675	806	937	1,068	1,200	1,331	1,462	1,593	1,724	1,855	1,986

Note: The above results are calculated and are not taken from actual test flow rates. Actual flow rates will vary from calculated results. The above calculated results do not constitute a guarantee, actual or implied, as to the flow rate actually

To calculate flow rates for a gas at a different temperature or a different specific gravity gas (S.G.G.), use the following formula to estimate the new standard cubic feet per minute (S.C.F./Min.) rate for the

$$\frac{22.8513 \; x \; (S.C.F./Min.)*}{\sqrt{S.G.G. \; x \; (Gas \; Temp. @ \; °F. + 460 \; °F.)}}$$

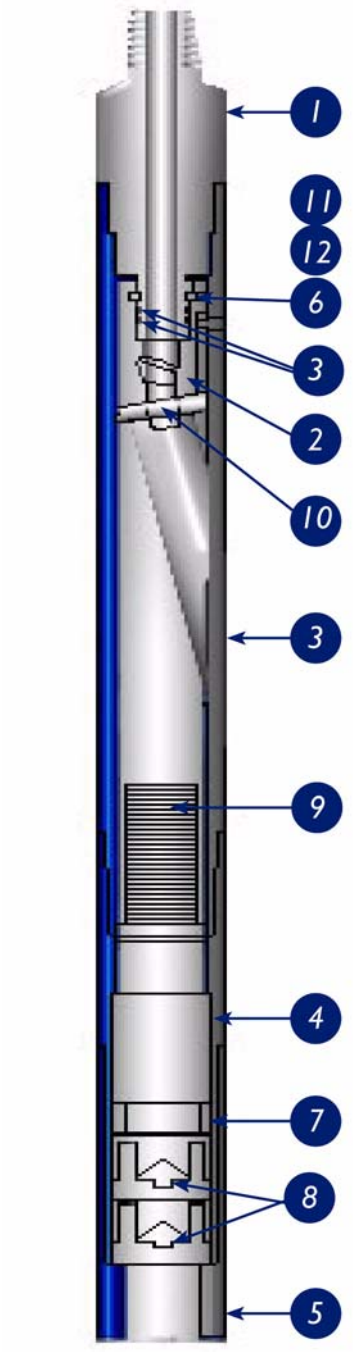
= Adjusted S.C.F./Min. for New Temperature/Gas

* Rate from above chart

Nozzle Size Chart

Nozzle Number	Nozzle ID (inches)	(mm)
10	0.086	2.184
15	0.107	2.718
25	0.129	3.277
30	0.141	3.581
35	0.147	3.734
40	0.156	3.962
50	0.172	4.369
60	0.188	4.775
70	0.196	4.978
80	0.203	5.156
90	0.219	5.563
100	0.234	5.944
110	0.242	6.147
120	0.250	6.350
130	0.272	6.909
140	0.281	7.137
150	0.297	7.544
160	0.302	7.671
170	0.313	7.950
180	0.316	8.026

TT0320-225A BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0320-206A-001
2	1	Nozzle Carrier	TT0320-206A-002
3	1	Venturi Section	TT0320-206A-006
4	1	Magnetic Bushing	TT0320-225A-001
5	1	Cage Housing	TT0320-225A-002
6	1	Bearing Cap	TT0320-206A-010
7	1	Magnetic Insert Lock Ring	TT0321-225D-005
8	2	Finger Cages	TT0321-225A
9	1	Debris Screen	TT0321-225B
10	1	Nozzle (comes in a Kit)	TT0321-168O
11	2	Internal Retainer Snap Rings 5/16" Bore	PUR-TSRI020-000
12	17	Steel Ball Bearings 3/16"	PUR-TSBC000-012
13	2	O-Rings 3/4" x 15/16" x 3/32" 2-116	PUR-TORV000-116
14	3	Steel Allen Set Screws 5/16-24 x 1/4"	PUR-TSAS201-016

Tool Name: 2.250 in. OD Venturi Jet Junk Basket

Product Code: TT0320-225A **Tool OD:** 2.250 in. **Tool ID:** 1.313 in.

Material: AISI 4140 HT **Tool Length:** 48 in.

Minimum Yield: 100,000 psi

Strength Properties of Tool:

Minimum Yield Point and Load to Yield: Pin Connection on Venturi Section PN-TT0320-206A-006 Load to Yield: 86,883 lbs.

Burst Point and Burst Pressure: N/A

Torsional Weak and Ft-Lbs to Yield: 2-1/16" CWP Connections Torsional: 1,067 ft-lbs, 2-1/4 in. CWP Connections Torsional: 1,308 ft-lbs.

Recommended Make Up Torque:

1st Connection: 2-1/16 in. CWP - 267 ft-lbs

2nd Connection: 2-1/4 in. CWP - 327 ft-lbs

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 Install the 2 O-rings (item #13), onto the Top Sub (item#1). Grease the O-rings, the pin threads near the O-rings, the entire ID of the Top Sub, and then place in a vise.

2.2 Grease the entire ID of the Nozzle Carrier (item #2) and then install it onto the Top Sub until the carrier holes line up with the groove on the Top Sub.

Note: You may need to tap the carrier over the O-rings with a rubber mallet.

2.3 Place a Bearing Cap (item #6) into one of the Nozzle Carrier holes, then install the Snap Ring (item #11).

2.4 Turn the carrier 180°, then insert 16 of the Steel Ball Bearings (item #12). Complete by repeating step 2.3.

2.5 Grease the entire ID of the Venturi Section (item #3). Look in the box end of the Venturi Section and find the alignment lug. Now match it with the slot on the Nozzle Carrier and screw the section onto the Top Sub, wrench tight.

2.6 Insert the Screen (item # 9) into the end of the Venturi Section.

2.7 Next install the Magnetic Busing (item #4) and make wrench tight. If needed, grease and make up the required length of Debris Catchers/Extensions. Standard lengths come in 1-6 ft sections. Now install the Magnetic Insert Lock Ring (item #7). This will keep the Finger/Flutter Cages from traveling up into the section/extentions.

2.8 Grease the entire ID of the Cage Housing (item #5) and then insert the 2 Finger Cages/Flutter Cages (item #8), fingers up, into the housing. Screw on the housing wrench tight.

Note: Finger Cages come standard with the tool, however, Flutter Style Cages can be used and are optional.

2.9 Make up the Cage Housing to the Extension/Screen Sub.

2.10 Put the required Nozzle (item #8), as per the flow chart, into the Venturi slot and make wrench tight.

3.0 Disassembly

3.1 Place the tool in a vise on the section closest to the Cage Housing (item #5). Depending on the tool configuration, this could be an extention or Magnetic Bushing (item #4).

3.2 Unscrew the Cage Housing and drop it, box end first, on a wood block to remove the 2 Finger Cages/Flutter Cages (item #6).

3.3 Remove any installed Debris Catchers/Extensions by moving the tool in the vise to the Magnetic Bushing.

3.4 Move the tool down in the vise to the Venturi Section (item #3).

Caution: ***Do not vise on the Venturi nozzle slot, as it could damage the tool!***

3.5 Remove the Magnetic Bushung (item #4), then the Screen (item #9), then remove the Nozzle (item #10) from the Venturi slot.

Note: If the Screen can not be removed by hand, drop the Venturi Section, pin end first, on a wood block to dislodge it.

3.6 Move the tool in the vise to the Top Sub (item#1) and unscrew the Venturi Section (item #3) from sub.

3.7 Remove and discard a Snap Ring (item #11) from one of the Nozzle Carrier (item #2) holes, then remove the Bearing Cap (item #6) and put to the side for later cleaning.

3.8 Rotate the carrier 180° and repeat step 3.7.

3.9 To remove the Steel Ball Bearings, hold your hand underneath the carrier and rotate it back and forth until all 16 balls have been removed.

Note: You may have to use de-greaser or small length of plastic cord to remove all of the ball bearings.

3.10 Finally, remove the Top Sub from the vise.

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.