Casing Running Tools (CRTi2-8.63)

Casing Running Tool with Internal Grip (CRTi™)

Volant's CRTi is designed for casing drilling or running with top drive equipped rigs to makeup, breakout, reciprocate, rotate, fill/circulate, and cement casing and liner strings, reducing non productive time and associated costs. This tool is mechanically activated in tension and both rotational directions solely by top drive control using TAWG™ (Torque Activated Wedge Grip) technology.

This patented architecture puts control in the hands of the driller, reducing the need for third party support to run casing. Simple intuitive operating steps for pipe engagement and release closely emulate the familiar make and break steps used to run drill pipe – stab, rotate to the right to engage and reverse to disengage. Similarly, rig-in and rig-out steps are simple, intuitive and efficient.

Starting from the insertion diameter of the base tool, selectable sizes of integral jaws/dies are used to configure the CRTi to support gripping casing of increasing internal diameter (decreasing weight). Through the use of a patent pending extended reach die structure, the gripping diameter can be further increased to include casing sizes much greater than the base tool.

Tool Model: CRTi2-8.63
Specification Summary

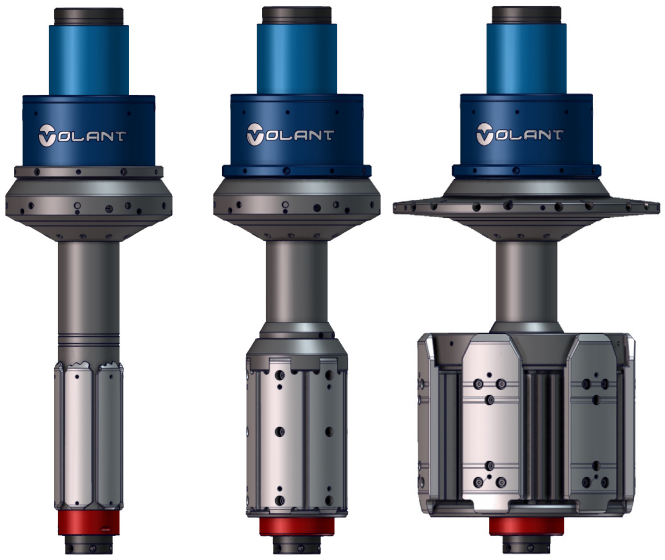
Base Tool Characteristics

CRTi Rated Load Capacity	Hoist[1,2]	ton	660
	Torque[3]	ft.lbs	85,000
Combined Load Large Hoist	Hoist	ton	575
	Torque	ft.lbs	40,000
Combined Load High Torque	Hoist	ton	475
	Torque	ft.lbs	70,000
Compression Capacity[4]		ton	110
Typical Circulation Pressure Limit[2,5]		psi	5,000
Maximum Pressure End Load		ton	500
Base Tool Length		in	66.0
Overall Tool Length[6]		in	79.0
Tool Diameter Stroke		in	0.75
Through Hole		in	2.0
Maximum Flow Rate[7]		m^3/min	4.4
Tool Joint			6-5/8 REG
Turns to Stroke Out			1.25

Tool Configuration with Integral Slip Dies

Tool Configuration with Extended Slip Dies

Tool Configuration with Extended Slip Dies and Bumper Extension



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Casing Running Tools (CRTi2-8.63)

Summary of Selected Slip Die Sizes[8]

Die P/N	Nom. Pipe Size	Max. Pipe Weight[9]	Min. Pipe Weight[10]	Die Curv. Diameter	Max. Tool Diameter	Tool Weight	Slip to Pipe Body Load Eff.[1]	Torque Factor[3]
	(in)	(ppf)	(ppf)	(in)	(in)	(lbs)	(% Fy)	(ft*lb/psi/ppf)
81024	8.63	36.0	24.0	8.04	20.0	1,350	80%	0.029
82301	9.63	32.0	32.0	9.19	20.0	1,350	80%	0.028
81756	9.63	43.5	32.0	8.91	20.0	1,350	80%	0.024
81154	9.63	53.5	40.0	8.71	20.0	1,350	80%	0.029
81881	9.63	58.4	47.0	8.6	20.0	1,350	80%	0.031
82276	10.75	40.5	32.75	10.22	20.0	1,500	80%	0.025
82275	10.75	51.0	40.5	10.02	20.0	1,500	80%	0.025
81255	10.75	65.7	51.0	9.73	20.0	1,500	80%	0.026
81494	10.75	73.2	60.7	9.57	20.0	1,500	80%	0.027
81138	10.75	79.2	71.1	9.4	20.0	1,500	80%	0.028
81495	11.75	60.0	47.0	10.94	20.0	1,600	80%	0.023
81757	11.75	71.0	60.0	10.75	20.0	1,600	80%	0.023
82039	12.75	58.4	50.0	12.03	20.0	1,850	71%	0.020
82168	13.38	54.5	48.0	12.78	20.0	2,100	74%	0.020
81897	13.38	61.0	48.0	12.68	20.0	2,100	74%	0.020
82164	13.38	68.0	54.5	12.58	20.0	2,100	75%	0.021
81150	13.38	72.0	61.0	12.52	20.0	2,100	75%	0.021
82588	13.38	77.0	61.0	12.44	20.0	2,100	75%	0.021
81431	16.0	65.0	65.0	15.42	20.0	2,500	59%	0.016
81645	16.0	84.0	75.0	15.18	20.0	2,500	63%	0.018
82100	16.0	97.0	84.0	15.03	20.0	2,500	61%	0.017
81758	16.0	109.0	97.0	14.88	20.0	2,500	64%	0.018
82532	16.77	77.0	69.4	16.09	20.0	2,600	55%	0.015
81752	17.88	105.0	93.5	16.96	20.0	2,650	53%	0.015
81434	18.63	87.5	87.5	17.88	20.0	2,800	45%	0.013
81566	18.63	97.7	87.5	17.85	20.0	2,600	55%	0.015
82101	18.63	111.0	97.7	17.71	20.0	2,600	55%	0.015
82675	18.63	117.0	111.0	17.63	20.0	2,600	56%	0.015
81880	18.63	139.0	136.0	17.39	20.0	2,600	56%	-
81759	20.0	106.5	94.0	19.19	20.0	3,000	49%	0.014
81483	20.0	133.0	129.3	18.92	20.0	3,000	50%	0.014
82740	20.0	169.0	166.4	18.58	20.0	3,000	52%	-
82102	22.0	184.5	184.5	20.53	28.0	3,100	45%	-
81750	22.0	224.0	224.0	20.11	28.0	3,100	40%	-
81462	26.0	275.0	275.0	24.09	28.0	3,700	37%	-
82486	28.0	222.7	222.7	26.59	32.0	4,400	27%	0.008
82506	30.0	233.22	233.22	28.59	32.0	4,700	24%	0.007

1 Tool hoist rating is based on API Specification 8C; however, casing load limit is further constrained by local interaction of slip dies with casing, which must not exceed the efficiency indicated for individual slip die sizes to avoid excessive deformation. The slip to casing interaction hoist limit is calculated by multiplying the slip to pipe body load efficiency number by the casing hoist limit found in API Bulletin 5C2. From 5C2 the pipe body yield for 9.63" x 40.0 ppf L-80 Casing is 916,000 lbs. The slip efficiency for die 81756 used to run this casing on the CRTi2-8.63 tool is 80%. Therefore, the casing hoist limit is 80% x 916,000 lbs = 732,800 lbs or 366.4 tons.

2 CRTi hoist capacity must be reduced by the pressure end load during circulation.

3 Torque capacity may be limited by slip die/casing interaction. Where torque factors are provided, multiply this factor by the desired casing weight in ppf then multiply the result by the casing yield strength to determine the slip die/casing interaction torque limit. If no value is provided, tool rating will be limiting for all standard casing grades.

4 Maximum allowable compressive (push down) load applied to the tool. Some compressive load may be reacted through the coupling. This rating does not take into account bearing load limitations of the coupling.

5 CRTi circulation pressure capacity is generally governed by packer cup pressure capacity. Pressure capacity may be less than indicated if alternative seal arrangements are used.

6 Overall tool length depends on seal arrangement.

7 Maximum flow rate is based on minimizing erosion rates when using typical fluids. Erosion rates may vary based on fluid contents. Please inspect tool bore regularly.

8 Common die sizes shown. Dies are available for all API casing sizes and weights with drift diameter above 7.38" are available.

9 Maximum pipe weight is defined by the API Specification 5CT drift diameter of the heaviest weight casing into which the CRTi assembled with the specified die set will fit.

10 Indicated minimum pipe weight is based on the assumption that control of average pipe inside diameter over die grip interval does not allow pipe body area reduction less than 3.5% from nominal and additionally takes into account tool wear allowances, die penetration, casing deformation and tool stroke.

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Combined Load Operation Curve

Please refer to the Base Tool Characteristics table on page 1 of this Specification Summary for numeric values (CRTi Rated Load Capacity, Combined Load Large Hoist, Combined Load High Torque) illustrated in the graph below.