



OPERATIONAL GUIDE

Proper Operation of the PD Drilling Jar (with internal mechanical lock)

The Knight Energy Services PD Drilling Jar is a double acting hydraulic jar designed for use during drilling operations to apply an intensified force either up or down against a stuck portion of the drilling string.

Following these standard procedures will ensure proper operation of the jar while drilling, tripping in and out of the hole, jarring up or down and while racking back in the derrick.

MECHANICAL LOCK

Due to the internal mechanical locking device, the Megaton™ Drilling Jar does not require a safety clamp or special handling procedures during transport or on the rig floor. The Jar is shipped in the “locked” position and will not release from the lock until the up or down lock release load values are exceeded. These lock release load values are pre-set at the service center and cannot be adjusted in the field.

The up and down lock release load values are paint stenciled on the jar before shipment and are also listed on the Knight Oil Tools Delivery Ticket. These settings should be recorded by the Driller before the tool is run into the hole. The UP lock setting is the amount of over pull that must be overcome plus the string weight to release from the lock and begin jarring UP. The DOWN lock setting is the amount of set down weight that must be overcome plus the pump open force to release from the lock and begin jarring DOWN. The Driller will feel vibration and see a flick on the indicator when the jar releases from the internal lock, this is when the hydraulic time delay starts, then the jar will fire shortly after.

JAR PLACEMENT GUIDELINES

The Megaton™ Drilling Jar can be run in tension or compression. Avoid placing the jar at a cross over between BHA components of different diameters, such as drill collars and heavy weight drill pipe. The jar should be placed a minimum of two joints above or below any crossover sub. Never run the jar below a reamer, stabilizer, or any other tool with a larger O.D. than the jar. The jar should never be run at or near the neutral point in the string and should be kept at least 5,000 lbs. away from this weight transition zone. The Megaton™ Drilling Jar should never be run in close proximity to another Megaton™ Drilling Jar or any other type jar. See figure 1 for recommended jar size vs. hole size. Jar Placement is critical; always contact your Knight Oil Tools representative for proper Jar placement recommendations.

TRIPPING IN

If the placement of the jar is such that the weight below the jar is within the nominal lock settings, i.e. low in the string near the BHA, the tool will stay in the locked position while tripping in hole until ready to fire up or down. Use caution to start and stop slowly when running in to avoid a “yo-yo” effect, which could cause the jar to release from the lock.

If the placement of the Jar is such that the weight below the jar exceeds the maximum setting of the mechanical lock, i.e. very high in the drill string, the jar will then be shipped in the fully open position with a safety clamp installed. Once the jar is installed in the drill string, and with the jar in tension from the weight of the BHA below the jar, remove the safety clamp and trip in the hole.

OPERATION

The Megaton™ Drilling Jar must be installed in the drill string with the box end up. Prior to make up, a suitable thread compound meeting A.P.I. Spec. 7, such as Kopper Kote, should be applied to the end connections.

In order to protect the polished mandrel sealing surface from possible damage during handling or storage, never apply tongs, slips, chains, or slings to this area.

When making up & breaking out the jar, the rig tongs should be placed immediately adjacent to the top and bottom connections to avoid breaking or applying torque to the jar body connections. All internal body connections are torqued to specifications at the service center. Avoid breaking these internal connections at the rig.

JARRING UP

To jar upward, apply the desired overpull (within the safe working loads outlined in figure 3) and set the draw-works brake. The mechanical lock will release and the hydraulic delay sequence will begin. After approximately 30 seconds, the jar will fire up. Lower the drill string until the weight indicator reads 15,000 lbs. less than the free string weight indicating that the lock has re-engaged (due to static friction in some case more than 15,000 lbs. will be needed to cock the jar). The jar is ready for another jarring cycle or to resume normal drilling operations.

JARRING DOWN

To jar downward, lower the drilling string until the desired slack off weight is obtained (within the safe working loads outlined in figure 3), at which point the mechanical lock is released. After a time delay of approximately 60 seconds, the jar will fire down. To re-cock the jar, raise the drill string until the weight indicator shows a 15,000 lbs. increase above free string weight (due to static friction in some case more than 15,000 lbs. will be needed to cock the jar). This indicates that the lock has re-engaged and that the jar is ready for another jarring cycle or to resume normal drilling operations. It may be necessary to reduce the pump pressure to overcome the pump open force on the Jar created by the pressure drop across the bit when attempting to jar down. See figure 2 below.

It is not necessary to “warm-up” or circulate to cool off the PD Drilling Jar during jarring. Torque can be applied while jarring without affecting impact or time delay of the jarring action. (See chart on reverse side – Max Allowable torque while jarring)



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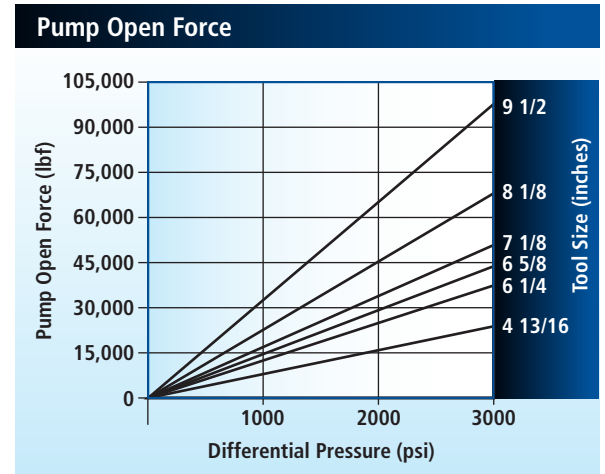
Figure 1: Recommended Jar Size For Applicable Hole Size

4 13/16"	6 1/4"	6 5/8"	7 1/8"	8 1/8"	9 1/2"
6 1/8"	7 7/8"	8 1/2"	9 7/8"	9 7/8"	>12 1/4"
6 3/4"	8 1/2"	9 7/8"	10 5/8"	12 1/4"	13 3/8"
7 7/8"	9 7/8"	12 1/4"	12 1/4"	13 3/8"	17 1/2"
	10 5/8"	13 3/8"	14 3/4"	17 1/2"	26"

Max Allowable Dogleg (deg./100ft)		
Tool Size (in.)	Sliding	Rotating
4 13/16"	21.5	12.0
6 1/4"	18.0	9.0
6 5/8"	17.0	8.5
7 1/8"	16.0	8.0
8 1/8"	13.0	7.5
9 1/2"	10.5	5.5

Max Allowable torque while jarring (lbf-ft)	
Tool Size (in.)	Torque (lbf-ft)
4 13/16"	8,000
6 1/4"	17,000
6 5/8"	21,000
7 1/8"	24,000
8 1/8"	35,000
9 1/2"	40,000

Figure 2:



RACKING BACK

Before racking back in the derrick the driller should always ensure that jar is in the locked position. This can be confirmed by measuring the open mandrel length which should be +/-13" from shoulder to shoulder. The jar can be racked back in any position within the stand, whether on the top, middle or bottom. If the jar has released from the lock due to excessive wall drag while tripping out of hole and is in the fully open position (+/- 24 1/2" from shoulder to shoulder), take the following precaution:

The tool needs to be set back to neutral position before it can be racked back. With the lower end of the tool / string in the slips, slack off weight from above the tool slowly until the open mandrel area measures 13". There should be an 'audible' clunk as the tool enters the lock (neutral) position.

Figure 3:

Specifications							
Jar Series	Units	41	47	62	65	80	95
Tool Size OD (New)	inches	4.20"	4.89"	6.36"	6.64"	8.17"	9.69"
Bore ID	inches	1.56"	2.25"	2.38"	2.56"	3.00"	3.25"
Overpull Max (pre-jarring at jar)	lbf	75,000	90,000	165,000	180,000	280,000	410,000
Tensile Yield	lbf	323,280	402,740	831,360	921,000	1,564,000	2,014,000
Torsional Yield	lbf-ft	12,990	17,700	50,850	58,400	112,800	162,300
Pump Open Area	sq. in	5.60	7.43	12.6	14.48	22.40	32.99
Total Stroke	in.	18	20	20	20	20	20
Max Temp (standard)	°F (°C)	350 (176)	350 (176)	350 (176)	350 (176)	350 (176)	350 (176)
Max Temp (high)	°F (°C)	450 (232)	450 (232)	450 (232)	450 (232)	450 (232)	450 (232)
Max Drilling Hrs Up to 350° F	hours	350	350	350	350	350	350
Max Drilling Hrs Up to 450° F	hours	200	200	200	200	200	200
Length Approx.*	feet (m)	17 (5.2)	22 (6.7)	22 (6.7)	22 (6.7)	22 (6.7)	22 (6.7)
Weight Approx.	lb (kg)	620 (290)	880 (400)	1,670 (760)	1,800 (820)	2,970 (1,350)	4,180 (1,900)

*Range 2 length tool can be achieved with the use of the optional Upper Connector.