Recommended Cutting Conditions

Cutting Speed

	Workpiece Material	Properties	Cutting Speed **vc** (SFM)			
P			**FH7020**	**MP6120**	**MP6130**	**VP30RT**
	Mild Steels	Hardness ≤180HB	850 (700—1000)	750 (580—910)	685 (515—845)	620 (450—880)
	Carbon Steels Alloy Steels	Hardness 180—280HB	550 (400—700)	480 (320—630)	415 (255—565)	350 (190—500)
	Carbon Steels Alloy Steels	Hardness 280—350HB	450 (300—600)	350 (190—500)	285 (125—435)	220 (60—370)
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	450 (300—600)	350 (190—500)	285 (125—435)	220 (60—370)
	Pre-hardened Steels	Hardness 35—45HRC	—	330 (230—425)	265 (165—360)	200 (100—295)
M			**MP7130**	**MP7140**		
	Stainless Steels	Hardness ≤270HB	450 (300—600)	385 (235—535)	—	—
K			**FH7020**	**VP15TF**		
	Gray Cast Irons	Tensile Strength ≤350MPa	850 (700—1000)	—	—	—
	Ductile Cast Irons	Tensile Strength ≤800MPa	—	500 (400—700)	—	—
S			**MP9120**	**MP9130**	**MP9140**	
	Heat Resistant Alloys	Hardness ≤350HB	100 (65—130)	80 (65—115)	65 (50—100)	—
	Titanium Alloys	—	165 (130—195)	150 (100—180)	130 (100—165)	—
H			**VP15TF**			
	Hardened Steels	Hardness 40—55HRC	230 (165—295)	—	—	—

Recommended Cutting Conditions

■ Depth of Cut / Feed

	Workpiece Material	Properties	DCX=ϕ.625", ϕ.688" (ϕ16mm, ϕ17mm) (Shank Type)			DCX=ϕ.750", ϕ.875" (ϕ20mm, ϕ22mm) (Shank Type)			DCX=ϕ.750" (ϕ20mm) (Shank Type)		
			AJXU06 Type			AJXU08 Type			AJXU06 Type		
			2 (Number of Teeth)			2 (Number of Teeth)			3 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steels	Hardness ≤180HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020
	Carbon Steels Alloy Steels	Hardness 180—280HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020
	Carbon Steels Alloy Steels	Hardness 280—350HB	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
	Pre-hardened Steels	Hardness 35—45HRC	5.5	.028	.028	6.3	.031	.031	6.3	.028	.028
			7.0	.020	.020	8.3	.024	.024	8.3	.020	.020
			8.2	.012	.012	9.4	.016	.016	9.4	.016	.012
M	Stainless Steels	Hardness ≤270HB	5.5	.031	.028	6.3	.039	.031	6.3	.035	.028
			7.0	.024	.020	8.3	.031	.024	8.3	.028	.020
			8.2	.016	.012	9.4	.024	.016	9.4	.020	.012
K	Gray Cast Irons	Tensile Strength ≤350MPa	5.5	.031	.039	6.3	.039	.047	6.3	.035	.039
			7.0	.024	.031	8.3	.031	.039	8.3	.028	.031
			8.2	.016	.024	9.4	.024	.031	9.4	.020	.024
	Ductile Cast Irons	Tensile Strength ≤800MPa	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
S	Heat Resistant Alloys	Hardness ≤350HB	5.5	.024	.024	6.3	.031	.024	5.5	.024	.024
			7.0	.016	.016	8.2	.024	.016	7.0	.016	.016
	Titanium Alloys	—	8.2	.012	.012	9.4	.016	.012	8.2	.012	.012
H	Hardened Steels	Hardness 40—55HRC	5.5	.020	.020	6.3	.020	.024	6.3	.020	.020
			7.0	.016	.012	8.3	.016	.016	8.3	.016	.016
			8.2	.012	.008	9.4	.012	.008	9.4	.012	.008

* Depth of cut of JL breaker is up to .024 inch. (06 size)
* Depth of cut of JL breaker is up to .035 inch. (08 size)

(inch)

	DCX=ϕ1.000", ϕ1.125" (ϕ25mm, ϕ28mm) (Shank Type)			DCX=ϕ1.000" (ϕ25mm) (Shank Type)			DCX=ϕ1.250" (ϕ32mm) (Shank Type)			DCX=ϕ1.250" (ϕ32mm) (Shank Type)			DCX=ϕ1.500" (ϕ40mm) (ϕ1.250"Shank)			DCX=ϕ1.500" (ϕ40mm) (ϕ1.250"Shank)		
	AJXU09 Type			AJXU08 Type			AJXU12 Type			AJXU09 Type			AJXU12 Type			AJXU09 Type		
	2 (Number of Teeth)			3 (Number of Teeth)			2 (Number of Teeth)			3 (Number of Teeth)			3 (Number of Teeth)			4 (Number of Teeth)		
	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
	6.7	.039	.047	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.047	.055	7.0	.043	.047
	9.0	.031	.039	9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047	9.5	.035	.039
	11.5	.024	.031	11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039	12.0	.028	.031
	6.7	.039	.047	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.047	.055	7.0	.043	.047
	9.0	.031	.039	9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047	9.5	.035	.039
	11.5	.024	.031	11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039	12.0	.028	.031
	6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
	9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
	11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
	6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
	9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
	11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
	6.7	.031	.039	6.7	.028	.035	7.0	.039	.047	7.0	.035	.039	7.0	.039	.047	7.0	.035	.039
	9.0	.024	.031	9.0	.020	.028	9.0	.031	.039	9.0	.028	.031	9.5	.031	.039	9.5	.028	.031
	11.5	.016	.024	11.5	.016	.020	11.0	.024	.031	11.5	.020	.024	12.0	.024	.031	12.0	.020	.024
	6.7	.039	.039	6.7	.035	.035	7.0	.047	.047	7.0	.043	.039	7.0	.047	.047	7.0	.043	.039
	9.0	.031	.031	9.0	.028	.028	9.0	.039	.039	9.0	.035	.031	9.5	.039	.039	9.5	.035	.031
	11.5	.024	.024	11.5	.020	.020	11.0	.031	.031	11.5	.028	.024	12.0	.031	.031	12.0	.028	.024
	6.7	.039	.055	6.7	.035	.047	7.0	.047	.063	7.0	.043	.055	7.0	.047	.063	7.0	.043	.055
	9.0	.031	.047	9.0	.028	.039	9.0	.039	.055	9.0	.035	.047	9.5	.039	.055	9.5	.035	.047
	11.5	.024	.039	11.5	.020	.031	11.0	.031	.047	11.5	.028	.035	12.0	.031	.047	12.0	.028	.035
	6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
	9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
	11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
	6.7	.047	.024	6.3	.031	.024	7.0	.047	.024	7.0	.047	.024	7.0	.047	.024	7.0	.047	.024
	9.0	.039	.016	8.2	.024	.016	9.0	.039	.016	9.0	.039	.016	9.5	.039	.016	9.5	.039	.016
	11.5	.031	.012	9.4	.016	.012	11.0	.031	.012	11.5	.031	.012	12.0	.031	.012	12.0	.031	.012
	6.7	.020	.031	6.7	.020	.028	7.0	.024	.039	7.0	.020	.035	7.0	.024	.039	7.0	.020	.035
	9.0	.016	.024	9.0	.016	.020	9.0	.020	.031	9.0	.016	.028	9.5	.020	.031	9.5	.016	.028
	11.5	.012	.016	11.5	.012	.012	11.0	.016	.024	11.5	.012	.020	12.0	.016	.024	12.0	.012	.020

* Depth of cut of JL breaker is up to .047 inch.(09, 12, 14 sizes)

Recommended Cutting Conditions

■ Depth of Cut / Feed

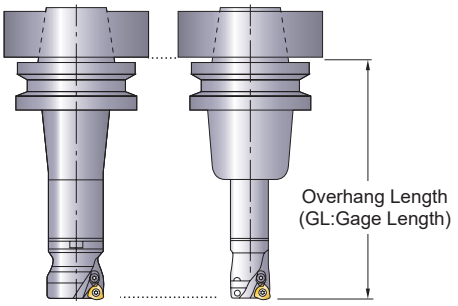
	Workpiece Material	Properties	DCX=ϕ1.500" (ϕ40mm) (ϕ1.500"Shank) AJXU12 Type 3 (Number of Teeth)			DCX=ϕ2.000" (ϕ50mm) (Shank Type) AJXU14 Type 3 (Number of Teeth)			DCX=ϕ2.000", ϕ2.500" (ϕ50mm, ϕ63mm) (Arbor Type) AJXU12 Type (ϕ2.000") AJXU14 Type (ϕ2.500") 3 or 4 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steels	Hardness ≤180HB	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steels Alloy Steels	Hardness 180—280HB	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steels Alloy Steels	Hardness 280—350HB	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
	Pre-hardened Steels	Hardness 35—45HRC	7.0	.039	.051	7.0	.047	.051	6.0	.051	.051
			9.5	.031	.043	9.5	.039	.043	10.0	.043	.043
			12.0	.024	.035	—	—	—	14.0	.035	.035
M	Stainless Steels	Hardness ≤270HB	7.0	.047	.051	7.0	.055	.051	6.0	.059	.051
			9.5	.039	.043	9.5	.047	.043	10.0	.051	.043
			12.0	.031	.035	—	—	—	14.0	.043	.035
K	Gray Cast Irons	Tensile Strength ≤350MPa	7.0	.047	.067	7.0	.055	.067	6.0	.059	.067
			9.5	.039	.059	9.5	.047	.059	10.0	.051	.059
			12.0	.031	.051	—	—	—	14.0	.043	.051
	Ductile Cast Irons	Tensile Strength ≤800MPa	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
S	Heat Resistant Alloys	Hardness ≤350HB	7.0	.047	.024	7.0	.047	.024	6.0	.047	.024
			9.5	.039	.016	9.5	.039	.016	10.0	.039	.016
	Titanium Alloys	—	12.0	.031	.012	—	—	—	14.0	.031	.012
H	Hardened Steels	Hardness 40—55HRC	7.0	.024	.043	7.0	.031	.043	6.0	.035	.043
			9.5	.020	.035	9.5	.024	.035	10.0	.028	.035
			12.0	.016	.028	—	—	—	—	—	—

(inch)

	DCX=ϕ2.000", ϕ2.500" (ϕ50mm, ϕ63mm) (Arbor Type)			DCX=ϕ3.000", ϕ4.000", ϕ4.921", ϕ6.299" (ϕ80mm, ϕ100mm, ϕ125mm, ϕ160mm) (Arbor Type)			DCX=ϕ3.000", ϕ4.000" (ϕ80mm, ϕ100mm) (Arbor Type)		
	AJXU09 Type (ϕ2.000") AJXU12 Type (ϕ2.500")			AJXU14 Type AJX14 Type			AJXU12 Type		
	5 (Number of Teeth)			4 or 5 or 6 or 7 or 8 (Number of Teeth)			6 or 7 (Number of Teeth)		
	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
	6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
	10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
	14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
	6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
	10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
	14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
	10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
	14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
	10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
	14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
	6.0	.046	.043	7.0	.051	.051	7.0	.046	.043
	10.0	.039	.035	12.0	.043	.043	12.0	.039	.035
	14.0	.032	.028	18.0	.031	.031	18.0	.028	.024
	6.0	.053	.043	7.0	.059	.051	7.0	.053	.043
	10.0	.046	.035	12.0	.051	.043	12.0	.046	.035
	14.0	.039	.028	18.0	.039	.031	18.0	.035	.024
	6.0	.053	.059	7.0	.059	.067	7.0	.053	.059
	10.0	.046	.051	12.0	.051	.059	12.0	.046	.051
	14.0	.039	.039	18.0	.039	.047	18.0	.035	.035
	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
	10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
	14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
	6.0	.047	.024	7.0	.047	.024	7.0	.047	.024
	10.0	.039	.016	12.0	.039	.016	12.0	.039	.016
	14.0	.031	.012	18.0	.031	.012	18.0	.031	.012
	6.0	.032	.039	7.0	.035	.043	7.0	.032	.039
	10.0	.025	.031	12.0	.028	.035	12.0	.025	.031
	—	—	—	—	—	—	—	—	—

* Depth of cut of JL breaker is up to .047 inch.

①Overhang Length



②Main Spindle Speed
$n(min^{-1})=(Recommended\ Cutting\ Speed \times 12)\div(DCX \times 3.14)$

③Table Feed Rate
vf(IPM)=n x feed per tooth fz x number of teeth

④Recommended width of cut (ae) is more than 60% of cutting edge diameter.

⑤The cutting condition on the left are guide when using a CAT50 size holder. In case of CAT40 and HSK63 machines, a cutter diameter of under 1.5 inch is recommended. In this case, reduce the depth of cut and table feed rate.

⑥Use of ST chip breaker with a tougher cutting edge is recommended for interrupted cutting.

⑦A cutter body with a coarse pitch is recommended for use in unstable conditions such as a long tool overhang.

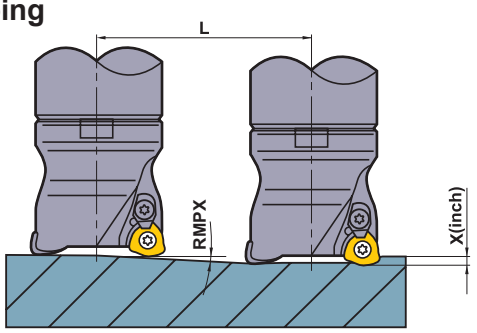
⑧Use “sharp” JM chip breaker to lower cutting forces or when there is a long tool overhang.

⑨Large chips are generated when machining with the AJX. To avoid chip jamming-related problems, machine using an air blow to disperse the chips effectively.

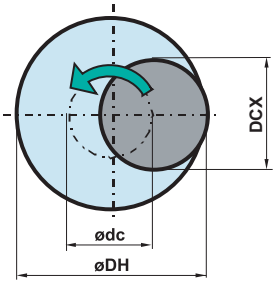
⑩The maximum depth of cut JL chip breaker is different in the insert size. 06 size is up to .024 inch, 08 size is up to .035 inch, and 09, 12, 14 size is up to .047 inch.

Maximum Capacities by Mode

■ Ramping



■ Helical Milling and Drilling



●How to calculate the theoretical center of the tool path.

$$\text{ødc} = \text{øDH} - \text{DCX}$$

ødc: Theoretical Center of the Tool
øDH: Desired Hole Diameter
DCX: Cutting Diameter Max.

●Please set the depth of cut per cycle under max. depth of cut (APMX).

●Please machine in a down (Climb) cutting direction.

●When ramping and helical milling, it is recommended to reduce the feed rate by 40%.
●When drilling, please set the feed in the axial direction .008 IPR or less.
●The long chips generated can discharge in any direction, so ensure that adequate safety precautions are taken.

(inch)

	Tool Holder Type	DCX	DC	Max. Depth of Cut APMX		Ramping machining					Helical Milling		AZ
						RMPX	L Required Distance for X Inch Depth				Min. Hole Diameter	Max. Hole Diameter	
				FT/JM/ ST	JL		Z=.039	Z=.047	Z=.059	Z=.079			
Shank Type	**AJXU06R102**	.625	.340	.039	.024	3°	.744	—	—	—	.90	1.13	.012
	AJXU06R112	.688	.400	.039	.024	2.5°	.893	—	—	—	1.02	1.26	.012
	AJXU06R123	.750	.472	.039	.024	1.7°	1.314	—	—	—	1.15	1.38	.012
	AJXU06R143	.875	.595	.039	.024	0.7°	3.192	—	—	—	1.40	1.63	.012
	AJXU08R122	.750	.410	.059	.035	3.5°	.638	.768	.965	—	.99	1.34	.020
	AJXU08R142	.875	.530	.059	.035	3°	.744	.897	1.126	—	1.24	1.59	.020
	AJXU08R163	1.000	.661	.059	.035	2°	1.117	1.346	1.690	—	1.49	1.84	.020
	AJXU08R183	1.125	.784	.059	.035	0.5°	4.469	5.386	6.761	—	1.74	2.09	.020
	AJXU09R162	1.000	.590	.079	.047	4°	.558	.672	.844	1.130	1.33	1.84	.039
	AJXU09R182	1.125	.720	.079	.047	3°	.744	.897	1.126	1.507	1.58	2.09	.039
	AJXU09R203	1.250	.854	.079	.047	3.3°	.676	.815	1.023	1.370	1.83	2.34	.039
	AJXU09R223	1.375	.976	.079	.047	2°	1.117	1.346	1.690	2.262	2.08	2.59	.039
	AJXU09R244	1.500	1.114	.079	.047	2.4°	.931	1.121	1.408	1.885	2.33	2.84	.039
	AJXU12R202	1.250	.790	.079	.047	4°	.558	.672	.844	1.130	1.59	2.34	.059
	AJXU12R243	1.500	1.040	.079	.047	3°	.744	.897	1.126	1.507	2.09	2.84	.059
	AJXU14R323	2.000	1.530	.079	.047	4.2°	.531	.640	.803	1.076	2.90	3.84	.079
Arbor Type	**AJXU09R02**	2.000	1.606	.079	.047	1.1°	2.031	2.448	3.073	4.114	3.33	3.84	.039
	AJXU12R02	2.000	1.540	.079	.047	2°	1.117	1.346	1.690	2.262	3.09	3.84	.059
	AJXU12R2505	2.500	2.039	.079	.047	1.5°	1.489	1.795	2.253	3.017	4.09	4.84	.059
	AJXU12R0306	3.000	2.543	.079	.047	1.2°	1.862	2.244	2.817	3.771	5.09	5.84	.059
	AJXU12R0407	4.000	3.539	.079	.047	0.8°	2.793	3.366	4.225	5.658	7.09	7.84	.059
	AJXU14R25	2.500	2.030	.079	.047	2.8°	.797	.961	1.206	1.615	3.90	4.84	.079
	AJXU14R03	3.000	2.530	.079	.047	1.8°	1.241	1.496	1.877	2.514	4.90	5.84	.079
	AJXU14R04	4.000	3.530	.079	.047	1.2°	1.862	2.244	2.817	3.771	6.90	7.84	.079
	AJX14RA125	4.920	4.530	.079	.047	0.8°	2.793	3.366	4.225	5.658	8.74	9.68	.079
	AJX14RA160	6.300	5.830	.079	.047	0.5°	4.469	5.386	6.761	9.053	11.50	12.44	.079

DCX = Cutting Diameter Max.
APMX = Depth of Cut Max.
DC = Cutting Diameter
RMPX = Ramping Angle Max.
DH = Desired Hole Diameter
AZ = Max. Drilling Depth