

suttontools
world class cutting tools

**HSS-PM
UNI DRILL**



Bridging the gap...
with carbide drills

Application Guide Speeds & Feeds

Product Information

The 130° four facet point with a web profile grind combined with a 40° helix and parabolic flute shape produces an extremely strong wedge angle, providing increased stability enabling drilling of accurate straight holes up to 3 x D without pecking.

The above features combined, provides the optimal performance in a wide range of materials, particularly steels to a hardness of 1300 N/mm², allowing higher speeds and feeds to be achieved, resulting in higher productivity and bridging the gap with expensive carbide tooling.

Features

- Rigid strong design
- High performance solution for wide range of materials
- Endmill type plain shank, h7 tolerance, for use in collet chuck
- SPM contains Co 10%, greater toughness than Carbide & higher performance than HSS Co

Benefits

- Capable of drilling 3 times dia without pecking
- Significantly reduces cycle times
- Self centering, web thinned point

Tool Material

Made from Powdered Metallurgy grade of High Speed Steel (SPM) which incorporates a much finer grain & homogeneous structure than conventional HSS, this allows for higher hardness of the tool, whilst maintaining toughness, and capable of operating at high cutting edge temperatures.

Point Geometry

130° four facet drill point with the profile web grind is designed to provide strength at the drill point, whilst maintaining excellent chip flow with optimized CNC generated profile flute shape at 40° helix angle.

Tool Coating

The super smooth Futura Nano coating provides low friction, reducing cutting edge temperature and improving wear resistance.

ISO	VDI	Material Group	Sutton
P	A	Steel	N
M	R	Stainless Steel	VA
K	F	Cast Iron	GG
N	N	Non-Ferrous Metals, Aluminiums & Coppers	Al W
S	S	Titaniums & Super Alloys	Ti Ni
H	H	Hard Materials (≥ 45 HRC)	H

^ VDI 3323 material groups can also be determined by referring to the workpiece material cross reference listing.

For expert tooling recommendations, go to: www.suttontools.com/expert-tool-selector



Catalogue Code	D155	D168
Material	SPM	SPM
Surface Finish	TiAlN	TiAlN
Sutton Designation	UNI	UNI
Geometry	R40	R40
Drilling Depth	≤ 3xØ	≤ 5xØ

ISO	VDI [^] ₃₃₂₃	Material	Condition	HB	N/mm ²	Vc	Feed #	Vc	Feed #	
P	1	Steel - Non-alloy, cast & free cutting	~ 0.15 %C	A	125	440	65	6	60	7
	2		~ 0.45 %C	A	190	640	55	6	45	7
	3		~ 0.75 %C	QT	250	840	50	6	45	7
	4			A	270	910	50	6	45	7
	5	QT		300	1010	25	6	20	6	
	6	Steel - Low alloy & cast < 5% of alloying elements	A	180	610	50	6	45	7	
	7		QT	275	930	35	6	30	7	
	8		QT	300	1010	25	6	20	6	
	9		QT	350	1180	15	5	12	6	
	10	Steel - High alloy, cast & tool	A	200	680	25	6	20	6	
	11		HT	325	1100	15	5	12	6	
	12	Steel - Corrosion resistant & cast	Ferritic / Martensitic	A	200	680	14	4	10	3
	13		Martensitic	QT	240	810	15	5	12	6
M	14.1	Stainless Steel	Austenitic	AH	180	610	16	5	10	4
	14.2		Duplex	250	840	12	5	8	4	
	14.3		Precipitation Hardening	250	840	14	4	10	3	
K	15	Cast Iron - Grey (GG)	Ferritic / Pearlitic		180	610	44	6	40	6
	16		Pearlitic		260	880	39	6	35	6
	17	Cast Iron - Nodular (GGG)	Ferritic		160	570	44	5	40	5
	18		Pearlitic		250	840	44	5	40	5
	19		Ferritic		130	460	44	5	40	5
20	Pearlitic		230	780	44	5	40	5		
N	21	Aluminum & Magnesium - wrought alloy	Non Heat Treatable		60	210	88	5	80	5
	22		Heat Treatable	AH	100	360	88	5	80	5
	23	Aluminum & Magnesium - cast alloy ≤ 12% Si	Non Heat Treatable		75	270	53	5	48	5
	24		Heat Treatable	AH	90	320	53	5	48	5
	25	Al & Mg - cast alloy > 12% Si	Non Heat Treatable		130	460	-	-	30	6
	26		Copper & Cu alloys (Brass/Bronze)	Free cutting, Pb > 1%	110	390	39	4	35	4
	27		Brass (CuZn, CuSnZn)		90	320	44	5	40	5
	28	Bronze (CuSn)		100	360	33	4	30	5	
	29	Non-metallic - Thermosetting & fiber-reinforced plastics				70	5	60	4	
30	Non-metallic - Hard rubber, wood etc.				-	-	-	-		
S	31	High temp. alloys	Fe based	A	200	680	-	-	-	-
	32		AH	280	950	-	-	-	-	
	33		Ni / Co based	A	250	840	8	4	8	4
	34			AH	350	1180	-	-	-	-
	35	C	320	1080	-	-	-	-		
	36	Titanium & Ti alloys	CP Titanium		400 MPa	-	-	-	-	
	37.1		Alpha alloys		860 MPa	9	4	9	4	
	37.2		Alpha / Beta alloys	A	960 MPa	-	-	-	-	
37.3	AH		1170 MPa	-	-	-	-			
37.4	Beta alloys		A	830 MPa	-	-	-	-		
37.5		AH	1400 MPa	-	-	-	-			
H	38.1	Hardened steel	HT	45 HRC		10	4	8	4	
	38.2		HT	55 HRC	-	-	-	-		
	39.1		HT	58 HRC	-	-	-	-		
	39.2		HT	62 HRC	-	-	-	-		
	40	Cast Iron	Chilled	C	400	1350	39	6	35	6
	41		HT	55 HRC	-	-	-	-		

Condition: A (Annealed), AH (Age Hardened), C (Cast), HT (Hardened & Tempered), QT (Quenched & Tempered)
Bold = Optimal | Regular = Effective

LEGEND	FORMULAS
n = rev. per minute	$n = (v_c \times 12) / (\phi \times \pi)$
v_c = cutting speed (SFM)	$v_c = (\phi \times \pi \times n) / 12$
f = feed (inch/rev)	$f_i = f \times n$
v_f = feed rate (inch/min)	
ϕ = diameter (inch)	

Ø	Feed Table (f) (mm/rev)									
	1	2	3	4	5	6	7	8	9	10
2.0	0.020	0.025	0.030	0.040	0.050	0.060	0.075	0.095	0.120	0.15
3.0	0.030	0.035	0.045	0.055	0.070	0.090	0.110	0.135	0.17	0.21
4.0	0.040	0.045	0.060	0.075	0.090	0.115	0.140	0.18	0.22	0.27
5.0	0.045	0.055	0.070	0.090	0.110	0.135	0.17	0.21	0.26	0.32
6.0	0.055	0.065	0.080	0.100	0.125	0.16	0.19	0.24	0.30	0.37
8.0	0.070	0.085	0.105	0.130	0.16	0.20	0.25	0.31	0.38	0.47
10.0	0.085	0.105	0.125	0.16	0.19	0.24	0.30	0.37	0.46	0.56
12.0	0.095	0.120	0.15	0.18	0.23	0.28	0.34	0.42	0.52	0.64
16.0	0.125	0.15	0.19	0.23	0.29	0.36	0.44	0.54	0.66	0.82
20.0	0.15	0.18	0.23	0.28	0.34	0.42	0.52	0.64	0.80	0.98
25.0	0.18	0.22	0.27	0.33	0.41	0.50	0.60	0.74	0.90	1.10
32.0	0.23	0.27	0.33	0.41	0.50	0.60	0.74	0.88	1.10	1.30
38.0	0.26	0.32	0.38	0.46	0.56	0.68	0.82	1.00	1.20	1.45
45.0	0.30	0.36	0.43	0.52	0.64	0.76	0.92	1.10	1.35	1.60
52.0	0.33	0.40	0.48	0.58	0.70	0.84	1.00	1.20	1.45	1.75
63.0	0.39	0.47	0.56	0.67	0.80	0.96	1.14	1.35	1.65	1.95

Bridging the gap

Solid Carbide drills are not always cost effective on small batch sizes or less than perfect machines, and HSS drills don't always meet the demands of the component to be machined. It is this area the R40 UNI drill has distinct benefits, not only does it bridge the gap between carbide and HSS drills, but to out perform carbide in some applications, with lower tool costs and shorter cycle time.



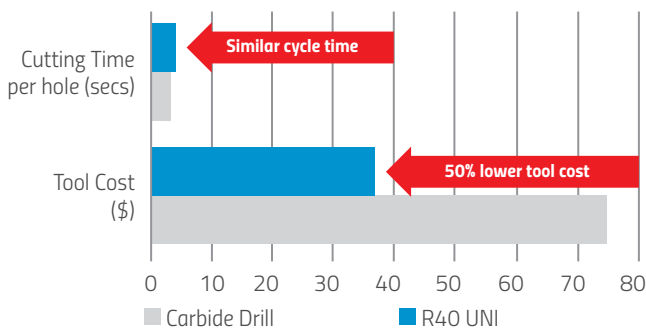
Case Study 1

Set Up

Application:	Drilling
Workpiece:	Pre-harden Mold Steel
Material:	AISI-P20
Hardness:	32 HRc
Machine:	HAAS VF2 SS
Spindle:	BT40 ER Collet
Coolant Supply:	External
Tool Diameter (mm):	8

Results

Drill Type	Carbide Drill Universal	R40 UNI
Material	Carbide	HSS-PM
Drill Size	8mm	8mm
V_c:	80m/min	45m/min
n:	3180rev/min	1789rev/min
f_z:	0.13mm/rev	0.20mm/rev
V_f:	413mm/min	358mm/min
a_p:	20mm/depth	20mm/depth
Tool Cost	\$74.44	\$37.50
Cutting Time (per hole)	2.9 secs	3.4 secs



Case Study 2

Set Up

Material:	Inconel 625
Tool:	HSS-PM UNI Drill
Tool Diameter:	2.8



Results

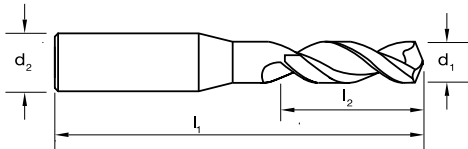
Drill Type	R40 UNI
Material	HSS-PM
Drill Size	2.8mm
V_c:	6m/min
n:	681rev/min
f_z:	0.06mm/rev
V_f:	38mm/min
a_p:	10mm/depth
Tool Life	120 holes



Component Material: Inconel 625

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- Endmill shank for greater accuracy
- TiAlN for longer tool life



Catalogue Code	D155
Product Group	A1502
Material	SPM
Surface Finish	TiAlN
Sutton Designation	UNI
Geometry	R40
Point Type	130° 4 Facet Form B
Shank Tolerance	h7

Size Ref.	d ₁ (h8)	l ₁	l ₂	d ₂	Item #
0100	1.0	38	6	3	D155 0100
0110	1.1	39	7	3	D155 0110
0120	1.2	40	8	3	D155 0120
0130	1.3	40	8	3	D155 0130
0140	1.4	41	9	3	D155 0140
0150	1.5	41	9	3	D155 0150
0160	1.6	42	10	3	D155 0160
0170	1.7	42	10	3	D155 0170
0180	1.8	43	11	3	D155 0180
0190	1.9	43	11	3	D155 0190
0200	2.0	44	12	3	D155 0200
0210	2.1	44	12	3	D155 0210
0220	2.2	45	13	3	D155 0220
0230	2.3	45	13	3	D155 0230
0240	2.4	46	14	3	D155 0240
0250	2.5	46	14	3	D155 0250
0260	2.6	46	14	3	D155 0260
0270	2.7	46	16	3	D155 0270
0280	2.8	46	16	3	D155 0280
0290	2.9	46	16	3	D155 0290
0300	3.0	46	16	3	D155 0300
0310	3.1	49	18	4	D155 0310
0320	3.2	49	18	4	D155 0320
0330	3.3	49	18	4	D155 0330
0340	3.4	52	20	4	D155 0340
0350	3.5	52	20	4	D155 0350
0360	3.6	52	20	4	D155 0360
0370	3.7	52	20	4	D155 0370
0380	3.8	55	22	4	D155 0380
0390	3.9	55	22	4	D155 0390
0400	4.0	55	22	4	D155 0400
0410	4.1	55	22	6	D155 0410
0420	4.2	55	22	6	D155 0420
0430	4.3	58	24	6	D155 0430
0440	4.4	58	24	6	D155 0440
0450	4.5	58	24	6	D155 0450
0460	4.6	58	24	6	D155 0460
0470	4.7	58	24	6	D155 0470
0480	4.8	62	26	6	D155 0480
0490	4.9	62	26	6	D155 0490

Size Ref.	d ₁ (h8)	l ₁	l ₂	d ₂	Item #
0500	5.0	62	26	6	D155 0500
0510	5.1	62	26	6	D155 0510
0520	5.2	62	26	6	D155 0520
0530	5.3	62	26	6	D155 0530
0540	5.4	66	28	6	D155 0540
0550	5.5	66	28	6	D155 0550
0560	5.6	66	28	6	D155 0560
0570	5.7	66	28	6	D155 0570
0580	5.8	66	28	6	D155 0580
0590	5.9	66	28	6	D155 0590
0600	6.0	66	28	6	D155 0600
0610	6.1	70	31	8	D155 0610
0620	6.2	70	31	8	D155 0620
0630	6.3	70	31	8	D155 0630
0640	6.4	70	31	8	D155 0640
0650	6.5	70	31	8	D155 0650
0660	6.6	70	31	8	D155 0660
0670	6.7	70	31	8	D155 0670
0680	6.8	74	34	8	D155 0680
0690	6.9	74	34	8	D155 0690
0700	7.0	74	34	8	D155 0700
0710	7.1	74	34	8	D155 0710
0720	7.2	74	34	8	D155 0720
0730	7.3	74	34	8	D155 0730
0740	7.4	74	34	8	D155 0740
0750	7.5	74	34	8	D155 0750
0760	7.6	79	37	8	D155 0760
0770	7.7	79	37	8	D155 0770
0780	7.8	79	37	8	D155 0780
0790	7.9	79	37	8	D155 0790
0800	8.0	79	37	8	D155 0800
0810	8.1	79	37	10	D155 0810
0820	8.2	79	37	10	D155 0820
0830	8.3	79	37	10	D155 0830
0840	8.4	79	37	10	D155 0840
0850	8.5	79	37	10	D155 0850
0860	8.6	84	40	10	D155 0860
0870	8.7	84	40	10	D155 0870
0880	8.8	84	40	10	D155 0880
0890	8.9	84	40	10	D155 0890

ISO	P											M			K							N										S						H														
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41			
D155	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

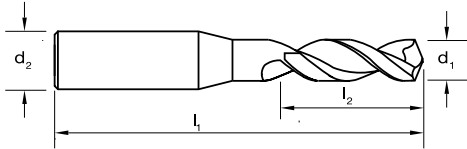
P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metals S Titanium & Super Alloys H Hard Materials

● Optimal ○ Effective

Drills Stub, R40 UNI



- SPM offers superior performance
- Suitable for production drilling as an alternative to carbide drills
- Suitable for materials up to 1500N/mm²
- Point geometry ensures high strength & short chips
- Endmill shank for greater accuracy
- TiAlN for longer tool life



Catalogue Code	D155
Product Group	A1502
Material	SPM
Surface Finish	TiAlN
Sutton Designation	UNI
Geometry	R40
Point Type	130° 4 Facet Form B
Shank Tolerance	h7

Size Ref.	d ₁ (m7)	l ₁	l ₂	d ₂	Item #
0900	9.0	84	40	10	D155 0900
0910	9.1	84	40	10	D155 0910
0920	9.2	84	40	10	D155 0920
0930	9.3	84	40	10	D155 0930
0940	9.4	84	40	10	D155 0940
0950	9.5	84	40	10	D155 0950
0960	9.6	89	43	10	D155 0960
0970	9.7	89	43	10	D155 0970
0980	9.8	89	43	10	D155 0980
0990	9.9	89	43	10	D155 0990
1000	10.0	89	43	10	D155 1000
1010	10.1	89	43	10	D155 1010
1020	10.2	89	43	10	D155 1020
1030	10.3	89	43	10	D155 1030
1040	10.4	89	43	10	D155 1040
1050	10.5	89	43	10	D155 1050
1060	10.6	95	47	12	D155 1060
1070	10.7	95	47	12	D155 1070
1080	10.8	95	47	12	D155 1080
1090	10.9	95	47	12	D155 1090
1100	11.0	95	47	12	D155 1100
1110	11.1	95	47	12	D155 1110
1120	11.2	95	47	12	D155 1120
1130	11.3	95	47	12	D155 1130
1140	11.4	95	47	12	D155 1140
1150	11.5	95	47	12	D155 1150
1160	11.6	95	47	12	D155 1160
1170	11.7	95	47	12	D155 1170
1180	11.8	95	47	12	D155 1180
1190	11.9	102	51	12	D155 1190
1200	12.0	102	51	12	D155 1200
1210	12.1	102	51	12	D155 1210
1220	12.2	102	51	12	D155 1220
1230	12.3	102	51	12	D155 1230
1240	12.4	102	51	12	D155 1240
1250	12.5	102	51	12	D155 1250
1260	12.6	102	51	12	D155 1260
1270	12.7	102	51	12	D155 1270
1280	12.8	102	51	12	D155 1280
1290	12.9	102	51	12	D155 1290

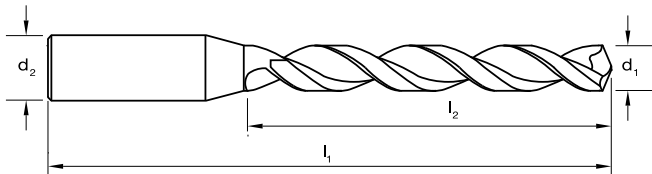
Size Ref.	d ₁ (m7)	l ₁	l ₂	d ₂	Item #
1300	13.0	102	51	12	D155 1300
1350	13.5	107	54	16	D155 1350
1400	14.0	107	54	16	D155 1400
1450	14.5	111	56	16	D155 1450
1500	15.0	111	56	16	D155 1500
1550	15.5	115	58	16	D155 1550
1600	16.0	115	58	16	D155 1600
1650	16.5	119	60	20	D155 1650
1700	17.0	119	60	20	D155 1700
1750	17.5	123	62	20	D155 1750
1800	18.0	123	62	20	D155 1800
1850	18.5	127	64	20	D155 1850
1900	19.0	127	64	20	D155 1900
1950	19.5	131	66	20	D155 1950
2000	20.0	131	66	20	D155 2000

ISO	P				M				K				N				S				H																												
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41
D155	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

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Surface Finish	TiAIN
Sutton Designation	UNI
Geometry	R40
Point Type	130° 4 Facet Form B
Shank Tolerance	h7

Size Ref.	d ₁ (h8)	l ₁	l ₂	d ₂	Item #
0880	8.8	125	81	10	D168 0880
0890	8.9	125	81	10	D168 0890
0900	9.0	125	81	10	D168 0900
0910	9.1	125	81	10	D168 0910
0920	9.2	125	81	10	D168 0920
0930	9.3	125	81	10	D168 0930
0940	9.4	125	81	10	D168 0940
0950	9.5	125	81	10	D168 0950
0955	9.55	133	87	10	D168 0955
0960	9.6	133	87	10	D168 0960
0970	9.7	133	87	10	D168 0970
0980	9.8	133	87	10	D168 0980
0990	9.9	133	87	10	D168 0990
1000	10.0	133	87	10	D168 1000
1010	10.1	133	87	10	D168 1010
1020	10.2	133	87	10	D168 1020
1030	10.3	133	87	10	D168 1030
1040	10.4	133	87	10	D168 1040
1050	10.5	133	87	10	D168 1050
1060	10.6	133	87	12	D168 1060
1070	10.7	142	94	12	D168 1070
1080	10.8	142	94	12	D168 1080
1090	10.9	142	94	12	D168 1090
1100	11.0	142	94	12	D168 1100
1110	11.1	142	94	12	D168 1110
1120	11.2	142	94	12	D168 1120
1130	11.3	142	94	12	D168 1130
1140	11.4	142	94	12	D168 1140
1150	11.5	142	94	12	D168 1150
1160	11.6	142	94	12	D168 1160
1170	11.7	142	94	12	D168 1170
1180	11.8	142	94	12	D168 1180
1190	11.9	151	101	12	D168 1190
1200	12.0	151	101	12	D168 1200
1210	12.1	151	101	12	D168 1210
1220	12.2	151	101	12	D168 1220
1230	12.3	151	101	12	D168 1230
1240	12.4	151	101	12	D168 1240
1250	12.5	151	101	12	D168 1250
1260	12.6	151	101	12	D168 1260

Size Ref.	d ₁ (h8)	l ₁	l ₂	d ₂	Item #
1270	12.7	151	101	12	D168 1270
1280	12.8	151	101	12	D168 1280
1290	12.9	151	101	12	D168 1290
1300	13.0	151	101	12	D168 1300
1350	13.5	160	108	16	D168 1350
1400	14.0	160	108	16	D168 1400
1450	14.5	169	114	16	D168 1450
1500	15.0	169	114	16	D168 1500
1550	15.5	178	120	16	D168 1550
1600	16.0	178	120	16	D168 1600
1650	16.5	184	125	20	D168 1650
1700	17.0	184	125	20	D168 1700
1750	17.5	191	130	20	D168 1750
1800	18.0	191	130	20	D168 1800
1850	18.5	198	135	20	D168 1850
1900	19.0	198	135	20	D168 1900
1950	19.5	205	140	20	D168 1950
2000	20.0	205	140	20	D168 2000

ISO	P										M					K					N										S					H														
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41	
D168	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

P Steel
 M Stainless Steel
 K Cast Iron
 N Non-Ferrous Metals
 S Titanium & Super Alloys
 H Hard Materials

● Optimal ○ Effective

Distributed by:



Sutton Tools Pty Ltd ABN 12 004 175 731

Australia (Head Office) 378 Settlement Road, Thomastown 3074, Victoria Australia
T +61 3 9280 0800 **F** +61 3 9464 0015

Customer Service: **T** 1800 335 350 **F** 1800 333 127 **E** cservice@sutton.com.au

Special Sales: **T** 1800 035 010 **F** 1800 804 084 **E** specsales@sutton.com.au

The Netherlands (Europe Head Office) Bruijellestraat 4, 5048 Ae Tilburg, Nederland
T +31 13 220 1480 **E** suttontools.eu@sutton.com.au

Global Offices

France **T** +33 788 557 404 **E** suttontools.fr@sutton.com.au

UK and Ireland **T** +44(0) 7725 846 432 **E** suttontools.uk@sutton.com.au

Central and Eastern Europe **T** +421 948 520 246 **E** suttontools.ceu@sutton.com.au

Spain **T** +34 648 020 098 **E** suttontools.es@sutton.com.au

www.suttontools.com

