SUNNEN®
Partnership · Precision · Performance

Groves INDUSTRIAL
a DGI Supply Company

1-800-343-8923
www.grovesindustrial.com

MICRODEX SOLID DRILLING TOOLS

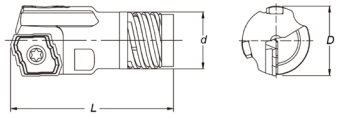
Diameter Range 12.00 mm – 33.30 mm (0.472 in – 1.311 in)

Drill Heads and Drill Tubes

Sunnen's MicroDex deep hole drilling heads, inserts and pads are designed to provide close diameter tolerances and high surface finish. With ideal machine part setup conditions, .003" per/ft tool centerline deviation is attainable.

The MicroDex line is an economical and simple to use replacement for traditional brazed drill heads.

MicroDex Single Tube System



Diameter Range 12.00 mm – 33.30 mm (0.472 in – 1.311 in)

Drill Head Part Numbering Code Example: Metric: MDM#####M401 Imperial: MD#####M401

MD		M02000		M		4		01	
Microdex Prefix		Bore Size		Connection Type		Thread Starts		Connection Size	
Description	Code	Description	Code	Description	Code	Description	Code	Description	Code
MicroDex	MD	Size in Metric (###.## mm) Size in Imperial (##.### in)	M##### #####	Male / External Female / Internal	M F	Four-Start Single-Start	4 1	range()	01

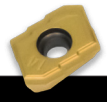
Connection Size Numbering Code

Bore Size Range	12.0 - 13.60 mm	13.61 - 14.60 mm	14.61 - 15.59 mm	15.6 - 16.0 mm	16.71 - 17.70 mm	17.01 - 18.90 mm	18.91 - 20.00 mm	20.0 - 21.80 mm	21.81 - 22.00 mm	22.01 - 24.10 mm	24.11 - 25.0 mm	25.01 - 26.40 mm	26.41 - 28.70 mm
	0.472 - 0.535 in	0.535 - 0.575 in	0.576 - 0.614 in	0.615 - 0.657 in	0.658 - 0.696 in	0.697 - 0.744 in	0.745 - 0.787 in	0.788 - 0.858 in	0.859 - 0.866 in	0.867 - 0.948 in	0.949 - 0.984 in	0.985 - 1.039 in	1.040 - 1.130 in
Code	94	95	96	97	98	99	00	01	02	02	03	03	04

Drill Ø	Item Code	Drill Tube	Dimensions		Components	
'D'			d'	'L'	Insert	Pad
12.00 - 13.60 mm	MDM#####M294	94	9.6 mm	58 mm	BTMDN06P	GPS0418D0110
.472 - .535 in	MD#####M294		0.378 in	2.28 in		
13.61 - 13.99 mm	MDM#####M295	95	10.6mm	58 mm	BTMDN06P	GPS0618D0110
.536 - .550 in	MD#####M295		.417 in	2.28 in		
14.00 - 14.62 mm	MDM#####M295	95	10.6 mm	58 mm	BTMDN06P	GPS0618D0130
.551 - .575 in	MD#####M295		.417 in	2.28 in		
14.63 - 14.99 mm	MDM#####M296	96	11.6 mm	58 mm	BTMDN08P	GPS0618D0130
.576 - .590 in	MD#####M296		.457 in	2.28 in		
15.00 - 15.59 mm	MDM#####M296	96	11.6 mm	58 mm	BTMDN08P	GPS0618D0140
.591 - .613 in	MD#####M296		.457 in	2.28 in		
15.60 - 15.99 mm	MDM#####M497	97	12.6 mm	60 mm	BTMDN08P	GPS0618D0140
.614 - .629 in	MD#####M497		.496 in	2.36 in		
16.00 - 16.69 mm	MDM#####M497	97	12.6 mm	60 mm	BTMDN09P	GPS0618D0150
.630 - .657 in	MD#####M497		.496 in	2.36 in		
16.70 - 17.69 mm	MDM#####M498	98	13.6 mm	60 mm	BTMDN09P	GPS0618D0150
.658 - .696 in	MD#####M498		.535 in	2.36 in		
17.70 - 17.99 mm	MDM#####M499	99	14.5 mm	60 mm	BTMDN09P	GPS0618D0150
.697 - 708 in	MD#####M499		.571 in	2.36 in		
18.00 - 18.89 mm	MDM#####M499	99	14.5 mm	60 mm	BTMDN10P	GPS0618D0170
.709 - .743 in	MD#####M499		.571 in	2.36 in		
18.90 - 19.99 mm	MDM#####M400	00	15.5 mm	61 mm	BTMDN10P	GPS0618D0170
.744 - .787 in	MD#####M400		.610 in	2.40 in		
20.00 - 21.79 mm	MDM#####M401	01	16.0 mm	61 mm	BTMDN11P	GPS0618D0190
.788 - .857 in	MD#####M401		.630 in	2.40 in		
21.80 - 21.99 mm	MDM#####M402	02	18.0 mm	61 mm	BTMDN11P	GPS0618D0190
.858 - .865 in	MD#####M402		.709 in	2.40 in		
22.00 - 24.09 mm	MDM#####M402	02	18.0 mm	61 mm	BTMDN13P	GPS0618D0210
.866 - .948 in	MD#####M402		.709 in	2.40 in		
24.10 - 24.99 mm	MDM#####M403	03	19.5 mm	65 mm	BTMDN13P	GPS0618D0210
.949 - .983 in	MD#####M403		.768 in	2.56 in		
25.00 - 26.39 mm	MDM#####M403	03	19.5 mm	65 mm	BTMDN14P	GPS0618D0240
.984 - 1.039 in	MD#####M403		.768 in	2.56 in		
26.40 - 28.69 mm	MDM#####M404	04	21.0 mm	68 mm	BTMDN14P	GPS0618D0240
1.040 - 1.129 in	MD#####M404		.827 in	2.68 in		
28.70 - 30.99 mm	MDM#####M405	05	23.5 mm	73 mm	BTMDN15P	GPS0618D0260
1.130 - 1.220 in	MD#####M405		.925 in	2.87 in		
31.00 - 33.30 mm	MDM#####M406	06	25.5 mm	75 mm	BTMDN16P	GPS0720DD
1.221 - 1.311 in	MD#####M406		1.004 in	2.96 in		

MicroDex Spare Parts

Insert



Insert	
Insert	Insert Screw
BTMDN06P	PHSM1349
BTMDN08P	PHSM1326
BTMDN09P	PHSM1326
BTMDN10P	PHSM1328
BTMDN11P	PHSM1329
BTMDN13P	PHSM1330
BTMDN14P	PHSM1330
BTMDN15P	PHSM1364
BTMDN16P	PHSM1364

*Insert Ordering Example: BTMDN10PDU1TE (Universal grade), BTMDN10PDU1TES (Grade for Nickel-based alloys).

Support Pad

Support Pad	
Solid Pad	Pad Screw
GPS0418D0110	PHSM1349
GPS0618D0130	PHSM1349
GPS0618D0140	PHSM1327
GPS0618D0150	PHSM1327
GPS0618D0170	PHSM1327
GPS0618D0190	PHSM1327
GPS0618D0210	PHSM1327
GPS0618D0240	PHSM1327
GPS0618D0260	PHSM1327
GPS0720DD	PHSM1155

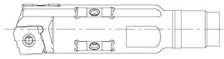
MicroDex - Feed & Speed

P M K N S TE

Inch values

ISO	ANSI	Material	Specific cutting force kc1 lbs/in²	Hardness Brinell HB	Geometry / Grade	Cutting speed vc ft/min	Drill diameter, inch ≥ 2.500 Feed f_n inch/rev
P		**Unalloyed steel**					
	1018, 1020, 1215	Non-hardened 0.10-0.25% C	290 000	90-200	TE	260-330	.004-.012
	1045, 1050, 1335	Non-hardened 0.25-0.55% C	304 500	125-225	TE	260-330	.004-.012
	1055, 1060	Non-hardened 0.55-0.80% C	316 100	150-250	TE	260-330	.004-.012
	1095	High carbon steel, annealed	336 400	180-275	TES	260-330	.004-.012
		Low alloy steel					
	4140, 52100, 8620	Non hardened	304 500	150-260	TE	230-330	.004-.012
	4140, 52100, 8620	Hardened and tempered	402 400	220-450	TE	200-330	.004-.012
		High alloy steel					
	D3, H13, A2	Annealed	362 500	150-250	TE	200-330	.004-.012
	M3, M35	Annealed HSS	398 750	150-250	TE	200-330	.004-.012
	D3, H13, A2	Hardened tool steel	543 750	250-350	TE	200-330	.004-.012
	D3, H13, A2	Hardened steel, others	580 000	250-450	TE	200-330	.004-.012
		Castings					
	1018, 1045, 1055	Unalloyed	261 000	90-225	TE	165-330	.004-.012
	4140, 52100, 8620	Low alloyed (alloying elements < 5%)	2304 500	150-250	TE	165-330	.004-.012
M		**Rolled/forged**					
	403, 405, 410	Ferritic/Martensitic, non hardened	333 500	150-270	TE	165-300	.004-.012
	15-5, 17-4	Corrosion Resistance	350.000	277-352	TE	128-190	.004-.012
	304, 316, 318	Austenitic	377 000	150-270	TE	165-300	.004-.012
K		**Malleable**					
	32510	Ferritic	137 750	110-145	TE	260-330	.004-.012
	40010, 50005	Pearlitic	159 500	150-270	TE	260-330	.004-.012
		Grey					
	Class 20, 25, 30	Low tensile strength	159 500	150-220	TE	200-330	.004-.012
	Class 45, 50, 60	High tensile strength	187 050	200-330	TE	200-330	.004-.012
		Nodular					
	60-40-18, 80-55-56	Ferritic	152 250	125-230	TE	165-330	.004-.012
	100-70-03	Pearlitic	253 750	200-300	TE	165-330	.004-.012
N		**Aluminium alloys**					
	7075, 2024, 7010	Wrought or wrought and coldworked, non- aging	72 500	30-100	TE	210-600	.004-.012
	7075, 2024, 7010	Wrought or wrought and aged	116 000	30-150	TE	210-600	.004-.012
	7075, 2024, 7010	Cast, non aging	108 750	40-100	TE	210-600	.004-.012
	7075, 2024, 7010	Cast or cast and aged	130 500	70-140	TE	210-600	.004-.012
		Copper and copper alloys					
	Copper	Free cutting alloys (Pb > 1%)	101 500	70-160	TE	210-600	.004-.012
	Copper	Brass and leaded alloys (Pb < 1%)	101 500	50-200	TE	210-600	.004-.012
S	330	**Iron base** Annealed or solution treated	435 000	180-230	TES	65-210	.004-.012
	Waspaloy, Inconel	**Nickel base** Annealed or solution treated	481 400	140-300	TES	65-210	.004-.012
	Air Resistant 213, Jetalloy 209	**Cobalt alloys** Annealed or solution treated	478 500	180-230	TES	65-210	.004-.012
	Ti6Al4V	**Titanium** Alfa- , near Alfa- and Alfa + Beta alloys annealed	242 875	600-1100	TES	100-330	.004-.012

Note: Tools in all sizes are available on special order with two rows of guide pads for cross-hole drilling applications. Please call Customer Service at 800-325-3670 for ordering details.



Cross Hole Drill

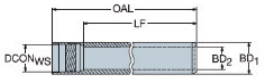
MicroDex - Feed & Speed

P M K N S TE

Metric values

ISO	ANSI	Material	Specific cutting force kc1 N/mm²	Hardness Brinell HB	Geometry / Grade	Cutting speed vc m/min	Drill diameter, mm ≥ 63.50 Feed f_n mm/r
P		**Unalloyed steel**					
	1018, 1020, 1215	Non-hardened 0.10-0.25% C	1500	90-200	TE	80-100	0.10-0.30
	1045, 1050, 1335	Non-hardened 0.25-0.55% C	1600	125-225	TE	80-100	0.10-0.30
	1055, 1060	Non-hardened 0.55-0.80% C	1700	150-250	TE	80-100	0.10-0.30
	1095	High carbon steel, annealed	1800	180-275	TES	80-100	0.10-0.30
		Low alloy steel					
	4140, 52100, 8620	Non hardened	1700	150-260	TE	70-100	0.10-0.30
	4140, 52100, 8620	Hardened and tempered	1900	220-450	TE	60-100	0.10-0.30
		High alloy steel					
	D3, H13, A2	Annealed	1950	150-250	TE	70-100	0.10-0.30
	M3, M35	Annealed HSS	2150	150-250	TE	70-100	0.10-0.30
	D3, H13, A2	Hardened tool steel	2900	250-350	TE	60-100	0.10-0.30
	D3, H13, A2	Hardened steel, others	3100	250-450	TE	60-100	0.10-0.30
		Castings					
	1018, 1045, 1055	Unalloyed	1400	90-225	TE	50-100	0.10-0.30
	4140, 52100, 8620	Low alloyed (alloying elements < 5%)	1600	150-250	TE	50-100	0.10-0.30
M		**Rolled/forged**					
	403, 405, 410	Ferritic/Martensitic, non hardened	1800	150-270	TE	50-90	0.10-0.30
	16-5, 17-4	Corrosion Resistance	1900	277-352	TE	39-58	0.10-0.30
	304, 316, 318	Austenitic	1950	150-275	TE	50-90	0.10-0.30
K		**Malleable**					
	32510	Ferritic	790	110-145	TE	80-100	0.10-0.30
	40010, 50005	Pearlitic	900	150-270	TE	80-100	0.10-0.30
		Grey					
	Class 20, 25, 30	Low tensile strength	890	150-220	TE	60-100	0.10-0.30
	Class 45, 50, 60	High tensile strength	1100	200-330	TE	60-100	0.10-0.30
		Nodular					
	60-40-18, 80-55-56	Ferritic	900	125-230	TE	50-100	0.10-0.30
	100-70-03	Pearlitic	1350	200-300	TE	50-100	0.10-0.30
N		**Aluminium alloys**					
	7075, 2024, 7010	Wrought or wrought and cold-worked, non-aging	400	30-100	TE	65-130	0.10-0.30
	7075, 2024, 7010	Wrought or wrought and aged	650	30-150	TE	65-130	0.10-0.30
	7075, 2024, 7010	Cast, non aging	600	40-100	TE	65-130	0.10-0.30
	7075, 2024, 7010	Cast or cast and aged	700	70-140	TE	65-130	0.10-0.30
		Copper and copper alloys					
	Copper	Free cutting alloys (Pb > 1%)	550	70-160	TE	65-130	0.10-0.30
	Copper	Brass and leaded alloys (Pb < 1%)	550	50-200	TE	65-130	0.10-0.30
S	330	**Iron base** Annealed or solution treated	2400	180-230	TES	20-65	0.10-0.30
	Waspaloy, Inconel	**Nickel base** Annealed or solution treated	2650	140-300	TES	20-65	0.10-0.30
	Air Resistant 213, Jetalloy 209	**Cobalt alloys** Annealed or solution treated	2700	180-230	TES	20-65	0.10-0.30
	Ti6Al4V	**Titanium**	1400	600-1100	TES	30-60	0.10-0.30
		Alfa- , near Alfa- and Alfa + Beta alloys annealed			TES	30-100	0.10-0.30

SDT Drill Tubes



D		DT		803		L01600		T1	
Tube Type				Connection Size		Tube Length		Threads	
Description	Code	Description	Code	Description	Code	Description	Code	Description	Code
Single Tube	S	Drill Tube	DT	Sandvik # (Female 4-start thread)	803	Length in Metric (##### mm)	L#####	Threaded One End	T1
Double Tube (Ejector)	D			BTA Heller # (Male 1-start thread)	03M			Threaded Both Ends	T2
				SPECIAL	S##			Flange	FL
								Special	S## S01, S02, S03, S...

NOTES:
Sandvik 794 - 798; 2-Start thread
Sandvik 800 - 813; inner tube 30mm longer than outer tube
Sandvik 814 - 820; inner tube 190mm longer than outer tube
Sandvik 821-825; inner tube 220mm longer than outer tube
Sandvik Double tubes 814 and larger ,threads on both ends, no inner tube flange
Other BTA Heller Connections, not common, doesn't need to be in chart; A, B, C, G (GH), M, W (HW)

STS Drill Tube (threaded one end)

Sunnen #	Sandvik Ref.	Connection Size	Tube OD (mm)	Tube ID (mm)	Tube OD (in)	Tube ID (in)
SDT-794-L#####-T1	420.5-794-L####	794	11.0	7.0	0.433	0.276
SDT-795-L#####-T1	420.5-795-L####	795	12.0	8.0	0.472	0.315
SDT-796-L#####-T1	420.5-796-L####	796	13.0	8.5	0.512	0.335
SDT-797-L#####-T1	420.5-797-L####	797	14.0	9.0	0.551	0.354
SDT-798-L#####-T1	420.5-798-L####	798	15.0	10.0	0.591	0.394
SDT-799-L#####-T1	420.5-799-L####	799	16.0	10.5	0.630	0.413
SDT-800-L#####-T1	420.5-800-L####	800	17.0	11.5	0.669	0.453
SDT-801-L#####-T1	420.5-801-L####	801	18.0	12.0	0.709	0.472
SDT-802-L#####-T1	420.5-802-L####	802	20.0	13.0	0.787	0.512
SDT-803-L#####-T1	420.5-803-L####	803	22.0	14.0	0.866	0.551
SDT-804-L#####-T1	420.5-804-L####	804	24.0	15.5	0.945	0.610
SDT-805-L#####-T1	420.5-805-L####	805	26.0	17.0	1.024	0.669
SDT-806-L#####-T1	420.5-806-L####	806	28.0	18.5	1.102	0.728
SDT-807-L#####-T1	420.5-807-L####	807	30.0	20.0	1.181	0.787
SDT-808-L#####-T1	420.5-808-L####	808	33.0	23.0	1.299	0.906
SDT-809-L#####-T1	420.5-809-L####	809	36.0	25.5	1.417	0.984
SDT-810-L#####-T1	420.5-810-L####	810	39.0	28.0	1.535	1.102
SDT-811-L#####-T1	420.5-811-L####	811	43.0	31.0	1.693	1.220
SDT-812-L#####-T1	420.5-812-L####	812	47.0	35.0	1.850	1.378
SDT-813-L#####-T1	420.5-813-L####	813	51.0	39.0	2.008	1.535
SDT-813E-L#####-T1	420.5-813E-L####	813E	56.0	39.0	2.205	1.614

Sunnen's SHDD Series Deep Hole Drills
Easy-to-use, efficient, heavy-duty

- **Available in three standard models**
  – 2-meter maximum part length (SHDD-2500)
  – 4-meter maximum part length (SHDD-4500)
  – 6-meter maximum part length (SHDD-6500)
- Large 394 mm (15.5 in) color HMI with intuitive controls for ease of use.
- Heavy-duty Bosch-Rexroth 55 mm (2.16 in) linear rails for maximum durability.
- Standard safety system with a combination of multiple E-stops, light curtains, interlocked guarding and fencing.
- 67 kw (90 hp) tool motor with headstock drive for optimum power.
- Beckhoff servo driven heavy-duty ball screws for tool feed.
  – 80 mm ball screw (3.15 in) SHDD-2500 / SHDD-4500
  – 100 mm ball screw (3.84 in) SHDD-6500
- Electrical enclosure air conditioning unit standard to protect critical electronics in high temperature environments.
- Heavy-duty welded base.
- Heavy-duty 3-jaw chucks standard.

- Automatic lubrication system for ball screw, rack and pinion, and linear rails standard.
- Heavy-duty servo rack and pinion driven work piece positioning and clamping.
- Spindle carriage control station for ease of driveshaft installation.
- Sunnen is the complete system supplier ... machines, tools, chip management, cooling systems and cutting fluids.
- Standard 38 kw (50 HP) workpiece headstock drive (counter rotation).

Sunnen Designed and Developed Intuitive Control System

Features include:

- Beckhoff PLC with 394 mm (15.5 in) color touchscreen
- All machine functions controlled from the operator station
- Real time graphical display of tool position, tool feed load, spindle loads, and coolant pressure and volume
- Two-button part-to-part mode for high production operation
- Slow start tool feed for setup
- Tool protection function
- USB port for ease of backup
- Metric/inch units screen selectable
- Up to 500 part setups can be saved and retrieved
- Machine diagnostics
- On-screen, multi-language selection

Heavy-Duty Sunnen Designed and Built Coolant System

Features include:

- Modular clean and dirty tanks with 6245 liter (1650 gallon) maximum capacity and 3765 liter (1000 gallon) operating capacity
- Heavy-duty welded construction using 4.75 mm (.187 in) plate with a double wall option available
- High flow 10-micron, four-bag filtration system
- Heavy-duty screw type pump with 757 lpm (200 gpm) max flow and 5.2MPa (750 psig) max pressure
- 70-micron inlet filter
- Standard chiller for hot environments
- Designed for maintainability with multiple level sensors, clean-out ports and instrumentation
- Heavy-duty chip conveyor
- Active coolant level monitoring

A LEGACY OF EXCELLENCE SINCE 1924.

SUNNEN WORLDWIDE

With world headquarters in St. Louis, Missouri, Sunnen is the largest fully integrated company in the world specializing in precision bore creation, sizing and finishing equipment. A Sunnen solution might include honing, lapping, skiving/roller burnishing or deep hole machining...or a combination of those processes.

Our 13 international subsidiaries and over 40 authorized distributors allow us to deliver top quality Sunnen machines, tools, service and training wherever they are needed around the globe.

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