

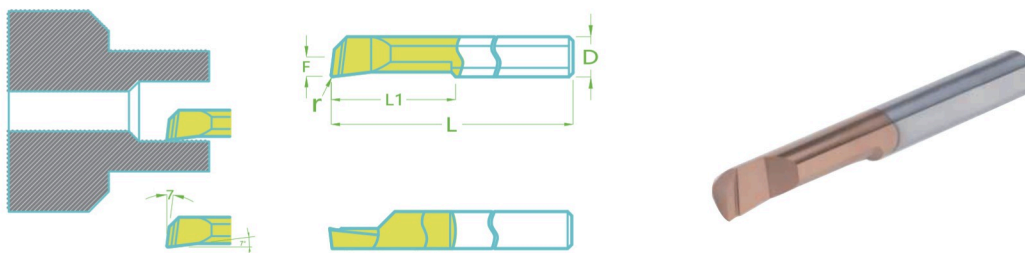
CARBIDE BORING TOOLS

2027~



SMTR

Miniature general-purpose turning and boring tool

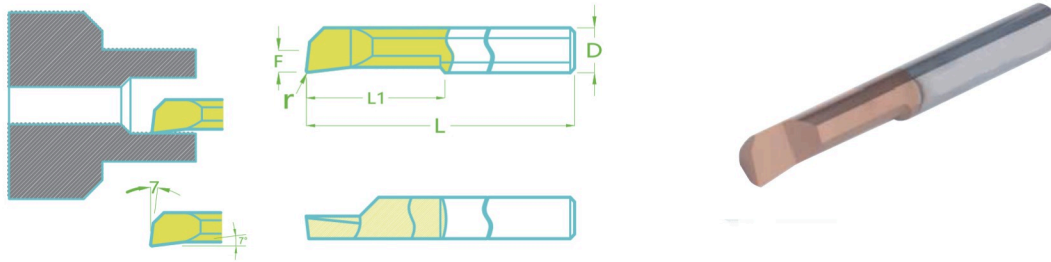


(shank D)	designation	ϕ (min)	dimensions			
			F	R	L1	L
4.0	SMTR 2 R0.05 L5/L10/L15	2.1	0.9	0.05	5/10/15	50
	SMTR 2 R0.1 L5/L10/L15	2.1	0.9	0.1	5/10/15	50
	SMTR 2 R0.15 L5/L10/L15	2.1	0.9	0.15	5/10/15	50
	SMTR 2.5 R0.05 L10/L15	2.6	1.15	0.05	10/15	50
	SMTR 2.5 R0.1 L10/L15	2.6	1.15	0.1	10/15	50
	SMTR 3 R0.1 L10/L15	3.1	1.4	0.1	10/15	50
	SMTR 3 R0.15 L10/L15	3.1	1.4	0.15	10/15	50
	SMTR 3 R0.2 L10/L15	3.1	1.4	0.2	10/15	50
	SMTR 4 R0.05 L10/L15/L22	4.1	1.9	0.05	10/15/22	50
	SMTR 4 R0.1 L10/L15/L22	4.1	1.9	0.1	10/15/22	50
	SMTR 4 R0.15 L10/L15/L22	4.1	1.9	0.15	10/15/22	50
	SMTR 4 R0.2 L10/L15/L22	4.1	1.9	0.2	10/15/22	50
	SMTR 4 R0.2 L30	4.1	1.9	0.2	30	60
	SMTR 4 R0.2 L30/L40	4.1	1.9	0.2	35/40	75
	SMTR 4 R0.2 L45/L55	4.1	1.9	0.2	45/55	100
5.0	SMTR 5 R0.1 L15/L22	5.1	2.4	0.1	15/22	50
	SMTR 5 R0.1 L30	5.1	2.4	0.1	30	60
	SMTR 5 R0.15 L15/L22	5.1	2.4	0.15	15/22	50
	SMTR 5 R0.15 L30	5.1	2.4	0.15	30	60
	SMTR 5 R0.2 L15/L22	5.1	2.4	0.2	15/22	50
	SMTR 5 R0.2 L30	5.1	2.4	0.2	30	60
6.0	SMTR 6 R0.1 L15/L22	6.1	2.9	0.1	15/22	50
	SMTR 6 R0.1 L25/L30	6.1	2.9	0.1	25/30	60
	SMTR 6 R0.1 L35	6.1	2.9	0.1	35	75
	SMTR 6 R0.2 L15/L22	6.1	2.9	0.2	15/22	50
	SMTR 6 R0.2 L25/L30	6.1	2.9	0.2	25/30	60
	SMTR 6 R0.2 L35/L40	6.1	2.9	0.2	35/40	75
	SMTR 6 R0.2 L45/L55	6.1	2.9	0.2	45/55	100
7.0	SMTR 7 R0.1 L15/L25/L30	7.1	3.4	0.1	25/30	60
	SMTR 7 R0.2 L15/L25/L30	7.1	3.4	0.2	25/30	60
8.0	SMTR 8 R0.1 L15/L25/L30	8.1	3.9	0.1	15/25/30	60
	SMTR 8 R0.1 L35/L40	8.1	3.9	0.1	35/40	75
	SMTR 8 R0.2 L15/L25/L30	8.1	3.9	0.2	15/25/30	60
	SMTR 8 R0.2 L35/L40	8.1	3.9	0.2	35/40	75
	SMTR 8 R0.2 L45/L55	8.1	3.9	0.2	45/55	100
10.0	SMTR 10 R0.2 L35/L40	10.1	4.9	0.2	35/40	75
	SMTR 10 R0.2 L45/L55	10.1	4.9	0.2	45/55	100

Legend: Right-hand tool

SMNR

Miniature general-purpose turning and boring tool

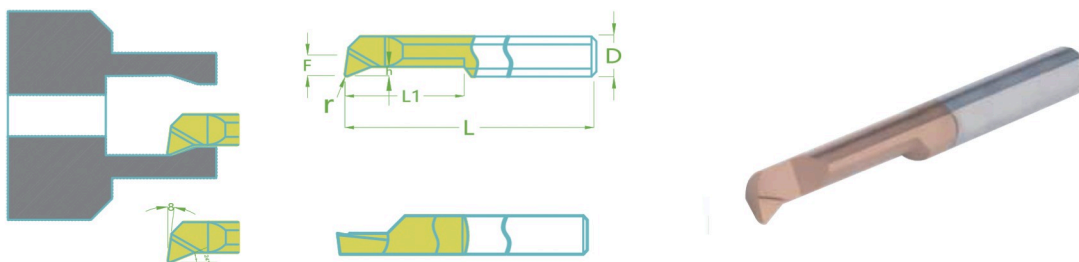


(shank D)	designation	ϕ (min)	dimensions			
			F	R	L1	L
4.0	SMNR 2 R0.05 L5/L10/L15	2.1	0.9	0.05	5/10/15	50
	SMNR 2 R0.1 L5/L10/L15	2.1	0.9	0.1	5/10/15	50
	SMNR 2 R0.15 L5/L10/L15	2.1	0.9	0.15	5/10/15	50
	SMNR 2.5 R0.05 L10/L15	2.6	1.15	0.05	10/15	50
	SMNR 2.5 R0.1 L10/L15	2.6	1.15	0.1	10/15	50
	SMNR 3 R0.1 L10/L15	3.1	1.4	0.1	10/15	50
	SMNR 3 R0.15 L10/L15	3.1	1.4	0.15	10/15	50
	SMNR 3 R0.2 L10/L15	3.1	1.4	0.2	10/15	50
	SMNR 4 R0.05 L10/L15/L22	4.1	1.9	0.05	10/15/22	50
	SMNR 4 R0.1 L10/L15/L22	4.1	1.9	0.1	10/15/22	50
	SMNR 4 R0.15 L10/L15/L22	4.1	1.9	0.15	10/15/22	50
	SMNR 4 R0.2 L10/L15/L22	4.1	1.9	0.2	10/15/22	50
	SMNR 4 R0.2 L30	4.1	1.9	0.2	30	60
	SMNR 4 R0.2 L35/L40	4.1	1.9	0.2	35/40	75
	SMNR 4 R0.2 L45/L55	4.1	1.9	0.2	45/55	100
5.0	SMNR 5 R0.1 L15/L22	5.1	2.4	0.1	15/22	50
	SMNR 5 R0.1 L30	5.1	2.4	0.1	30	60
	SMNR 5 R0.15 L15/L22	5.1	2.4	0.15	15/22	50
	SMNR 5 R0.15 L30	5.1	2.4	0.15	30	60
	SMNR 5 R0.2 L15/L22	5.1	2.4	0.2	15/22	50
	SMNR 5 R0.2 L30	5.1	2.4	0.2	30	60
6.0	SMNR 6 R0.1 L15/L22	6.1	2.9	0.1	15/22	50
	SMNR 6 R0.1 L25/L30	6.1	2.9	0.1	25/30	60
	SMNR 6 R0.1 L35	6.1	2.9	0.1	35	75
	SMNR 6 R0.2 L15/L22	6.1	2.9	0.2	15/22	50
	SMNR 6 R0.2 L25/L30	6.1	2.9	0.2	25/30	60
	SMNR 6 R0.2 L35	6.1	2.9	0.2	35	75
	SMNR 6 R0.2 L45/L55	6.1	2.9	0.2	45/55	100
7.0	SMNR 7 R0.1 L15/L25/L30	7.1	3.4	0.1	25/30	60
	SMNR 7 R0.2 L15/L25/L30	7.1	3.4	0.2	25/30	60
8.0	SMNR 8 R0.1 L15/L25/L30	8.1	3.9	0.1	15/25/30	60
	SMNR 8 R0.1 L35/L40	8.1	3.9	0.1	35/40	75
	SMNR 8 R0.2 L15/L25/L30	8.1	3.9	0.2	15/25/30	60
	SMNR 8 R0.2 L35/L40	8.1	3.9	0.2	35/40	75
	SMNR 8 R0.2 L45/L55	8.1	3.9	0.2	45/55	100
10.0	SMNR 10 R0.2 L35/L40	10.1	4.9	0.2	35/40	75
	SMNR 10 R0.2 L45/L55	10.1	4.9	0.2	45/55	100

Legend: Right-hand tool

SMPR

Miniature general-purpose turning and boring tool



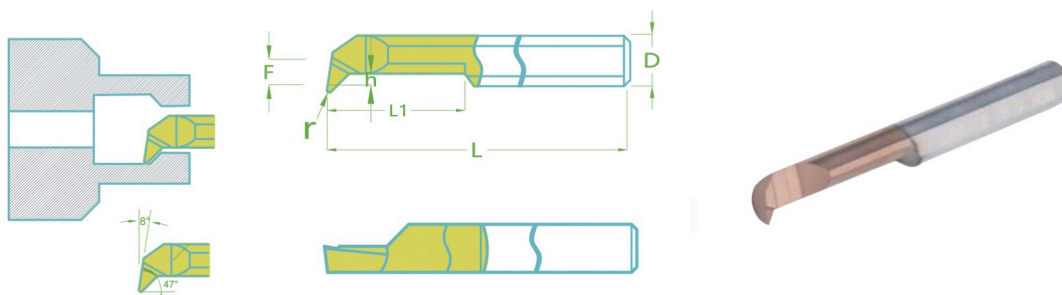
(shank D)	designation	ϕ (min)	dimensions				
			F	h	R	L1	L
4.0	SMPR 2 R0.1 L10/L15	2.1	0.9	0.5	0.1	10/15	50
	SMPR 2 R0.15 L10/L15	2.1	0.9	0.5	0.15	10/15	50
	SMPR 2 R0.2 L10/L15	2.1	0.9	0.5	0.2	10/15	50
	SMPR 3 R0.1 L10/L15	3.1	1.4	0.7	0.1	10/15	50
	SMPR 3 R0.15 L10/L15	3.1	1.4	0.7	0.15	10/15	50
	SMPR 3 R0.2 L10/L15	3.1	1.4	0.7	0.2	10/15	50
	SMPR 4 R0.05 L10/L15/L22	4.1	1.9	0.8	0.05	10/15/22	50
	SMPR 4 R0.1 L10/L15/L22	4.1	1.9	0.8	0.1	10/15/22	50
	SMPR 4 R0.15 L10/L15/L22	4.1	1.9	0.8	0.15	10/15/22	50
	SMPR 4 R0.2 L10/L15/L22	4.1	1.9	0.8	0.2	10/15/22	50
	SMPR 4 R0.2 L30	4.1	1.9	0.8	0.2	30	60
	SMPR 4 R0.2 L35/L40	4.1	1.9	0.8	0.2	35/40	75
	SMPR 4 R0.2 L45/L55	4.1	1.9	0.8	0.2	45/55	100
5.0	SMPR 5 R0.1 L15/L22	5.1	2.4	1.2	0.1	15/22	50
	SMPR 5 R0.1 L30	5.1	2.4	1.2	0.1	30	60
	SMPR 5 R0.15 L15/L22	5.1	2.4	1.2	0.15	15/22	50
	SMPR 5 R0.15 L30	5.1	2.4	1.2	0.15	30	60
	SMPR 5 R0.2 L15/L22	5.1	2.4	1.2	0.2	15/22	50
	SMPR 5 R0.2 L30	5.1	2.4	1.2	0.2	30	60
6.0	SMPR 6 R0.1 L15/L22	6.1	2.9	1.4	0.1	15/22	50
	SMPR 6 R0.1 L25/L30	6.1	2.9	1.4	0.1	25/30	60
	SMPR 6 R0.1 L35	6.1	2.9	1.4	0.1	35	75
	SMPR 6 R0.2 L15/L22	6.1	2.9	1.4	0.2	15/22	50
	SMPR 6 R0.2 L25/L30	6.1	2.9	1.4	0.2	25/30	60
	SMPR 6 R0.2 L35/L40	6.1	2.9	1.4	0.2	35/40	75
	SMPR 6 R0.2 L45/L55	6.1	2.9	1.4	0.2	45/55	100
7.0	SMPR 7 R0.1 L25/L30	7.1	3.4	1.5	0.1	25/30	60
	SMPR 7 R0.2 L25/L30	7.1	3.4	1.5	0.2	25/30	60
8.0	SMPR 7 R0.1 L15/L25/L30	7.1	3.4	1.5	0.1	15/25/30	60
	SMPR 7 R0.2 L15/L25/L30	7.1	3.4	1.5	0.2	15/25/30	60
	SMPR 8 R0.1 L15/L25/L30	8.1	3.9	1.6	0.1	15/25/30	60
	SMPR 8 R0.1 L35/L40	8.1	3.9	1.6	0.1	35/40	75
	SMPR 8 R0.2 L15/L25/L30	8.1	3.9	1.6	0.2	15/25/30	60
	SMPR 8 R0.2 L35/L40	8.1	3.9	1.6	0.2	35/40	75
	SMPR 8 R0.2 L45/L55	8.1	3.9	1.6	0.2	45/55	100
10.0	SMPR 10 R0.2 L35/L40	10.1	4.9	2.0	0.2	35/40	75
	SMPR 10 R0.2 L45/L55	10.1	4.9	2.0	0.2	45/55	100

Legend: Right-hand tool



SMQR

Miniature general-purpose turning and boring tool

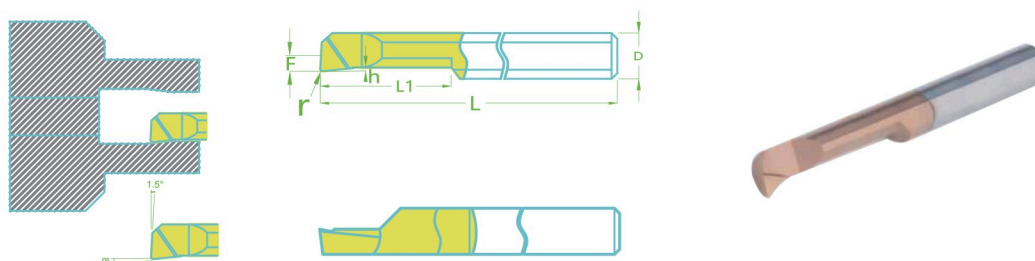


(shank D)	designation	ϕ (min)	dimensions				
			F	h	R	L1	L
4.0	SMQR 3 R0.05 L10/L15	3.1	1.4	0.8	0.05	10/15	50
	SMQR 3 R0.1 L10/L15	3.1	1.4	0.8	0.1	10/15	50
	SMQR 3 R0.2 L10/L15	3.1	1.4	0.8	0.2	10/15	50
	SMQR 4 R0.05 L10/L15	4.1	1.9	1.0	0.05	10/15	50
	SMQR 4 R0.1 L10/L15	4.1	1.9	1.0	0.1	10/15	50
	SMQR 4 R0.15 L10/L15	4.1	1.9	1.0	0.15	10/15	50
	SMQR 4 R0.2 L15/L22	4.1	1.9	1.0	0.2	10/15	50
	SMQR 4 R0.2 L30	4.1	1.9	1.0	0.2	30	60
	SMQR 4 R0.2 L35/L40	4.1	1.9	1.0	0.2	35/40	75
	SMQR 4 R0.2 L45/L55	4.1	1.9	1.0	0.2	45/55	100
5.0	SMQR 5 R0.05 L15/L22	5.1	2.4	1.3	0.05	15/22	50
	SMQR 5 R0.1 L15/L22	5.1	2.4	1.3	0.1	15/22	50
	SMQR 5 R0.15 L15/L22	5.1	2.4	1.3	0.15	15/22	50
	SMQR 5 R0.2 L15/L22	5.1	2.4	1.3	0.2	15/22	50
	SMQR 5 R0.2 L30	5.1	2.4	1.3	0.2	30	60
	SMQR 5 R0.2 L35/L40	5.1	2.4	1.3	0.2	35/40	75
	SMQR 5 R0.2 L45/L55	5.1	2.4	1.3	0.2	45/55	100
	SMQR 6 R0.1 L15/L22	6.1	2.9	1.6	0.1	15/22	50
6.0	SMQR 6 R0.1 L30	6.1	2.9	1.6	0.1	30	60
	SMQR 6 R0.2 L15/L22	6.1	2.9	1.6	0.2	15/22	50
	SMQR 6 R0.1 L30	6.1	2.9	1.6	0.1	30	60
	SMQR 6 R0.1 L30	6.1	2.9	1.6	0.2	30	60
	SMQR 6 R0.2 L35/L40	6.1	2.9	1.6	0.2	35/40	75
	SMQR 6 R0.2 L45/L55	6.1	2.9	1.6	0.2	45/55	100
	SMQR 8 R0.1 L22/L30	8.1	3.9	1.9	0.1	22/30	60
8.0	SMQR 8 R0.1 L35/L40	8.1	3.9	1.9	0.1	35/40	75
	SMQR 8 R0.2 L22/L30	8.1	3.9	1.9	0.2	22/30	60
	SMQR 8 R0.2 L35/L40	8.1	3.9	1.9	0.2	35/40	75
	SMQR 8 R0.2 L45/L55	8.1	3.9	1.9	0.2	45/55	75
	SMQR 10 R0.1 L35/L40	10.1	4.9	2.2	0.1	35/40	75
10.0	SMQR 10 R0.1 L45/L55	10.1	4.9	2.2	0.1	45/55	100
	SMQR 10 R0.2 L35/L40	10.1	4.9	2.2	0.2	35/40	75
	SMQR 10 R0.2 L45/L55	10.1	4.9	2.2	0.2	45/55	100
	SMQR 12 R0.2 L35/L40	12.1	5.9	2.5	0.2	35/40	75
12.0	SMQR 12 R0.2 L45/L55	12.1	5.9	2.5	0.2	45/55	100

Legend: Right-hand tool

SMUR

Miniature flat-bottom profiling turning and boring tool



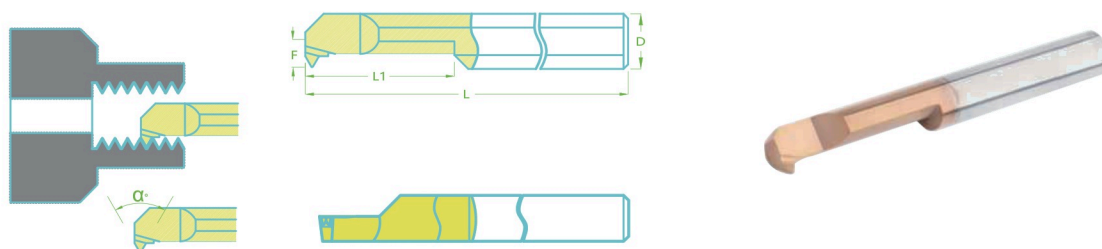
(shank D)	designation	ø (min)	dimensions				
			F	h	R	L1	L
4.0	SMUR 3 R0.05 L10/L15	3.1	1.4	0.5	0.05	10/15	50
	SMUR 3 R0.1 L10/L15	3.1	1.4	0.5	0.1	10/15	50
	SMUR 3 R0.2 L10/L15	3.1	1.4	0.5	0.2	10/15	50
	SMUR 4 R0.1 L15/L22	4.1	1.9	0.5	0.1	15/22	50
	SMUR 4 R0.15 L15/L22	4.1	1.9	0.5	0.15	15/22	50
	SMUR 4 R0.2 L15/L22	4.1	1.9	0.5	0.2	15/22	50
	SMUR 4 R0.2 L30	4.1	1.9	0.5	0.2	30	60
	SMUR 4 R0.2 L35/L40	4.1	1.9	0.5	0.2	35/40	75
	SMUR 4 R0.2 L45/L55	4.1	1.9	0.5	0.2	45/55	100
5.0	SMUR 5 R0.1 L15/L22	5.1	2.4	0.6	0.1	15/22	50
	SMUR 5 R0.15 L15/L22	5.1	2.4	0.6	0.15	15/22	50
	SMUR 5 R0.2 L15/L22	5.1	2.4	0.6	0.2	15/22	50
	SMUR 5 R0.2 L30	5.1	2.4	0.6	0.2	30	60
	SMUR 5 R0.2 L35/L40	5.1	2.4	0.6	0.2	35/40	75
	SMUR 5 R0.2 L45/L55	5.1	2.4	0.6	0.2	15/22	100
6.0	SMUR 6 R0.1 L15/L22	6.1	2.9	0.7	0.1	15/22	50
	SMUR 6 R0.1 L30	6.1	2.9	0.7	0.1	30	60
	SMUR 6 R0.2 L15/L22	6.1	2.9	0.7	0.2	15/22	50
	SMUR 6 R0.2 L30	6.1	2.9	0.7	0.2	30	60
	SMUR 6 R0.2 L35/L40	6.1	2.9	0.7	0.2	35/40	75
	SMUR 6 R0.2 L45/L55	6.1	2.9	0.7	0.2	45/55	100
7.0	SMUR 7 R0.1 L22/L30	7.1	3.4	0.8	0.1	22/30	60
	SMUR 7 R0.2 L22/L30	7.1	3.4	0.8	0.2	22/30	60
8.0	SMUR 8 R0.1 L22/L30	8.1	3.9	0.9	0.1	22/30	60
	SMUR 8 R0.1 L35/L40	8.1	3.9	0.9	0.1	35/40	75
	SMUR 8 R0.2 L22/L30	8.1	3.9	0.9	0.2	22/30	60
	SMUR 8 R0.2 L35/L40	8.1	3.9	0.9	0.2	35/40	75
	SMUR 8 R0.2 L45/L55	8.1	3.9	0.9	0.2	45/55	100
10.0	SMUR 10 R0.1 L35/L40	10.1	4.9	1.1	0.1	35/40	75
	SMUR 10 R0.1 L45/L55	10.1	4.9	1.1	0.1	45/55	100
	SMUR 10 R0.2 L35/L40	10.1	4.9	1.1	0.2	35/40	75
	SMUR 10 R0.2 L45/L55	10.1	4.9	1.1	0.2	45/55	100

Legend: Right-hand tool



SMIR

Miniature internal multi-purpose thread boring tool

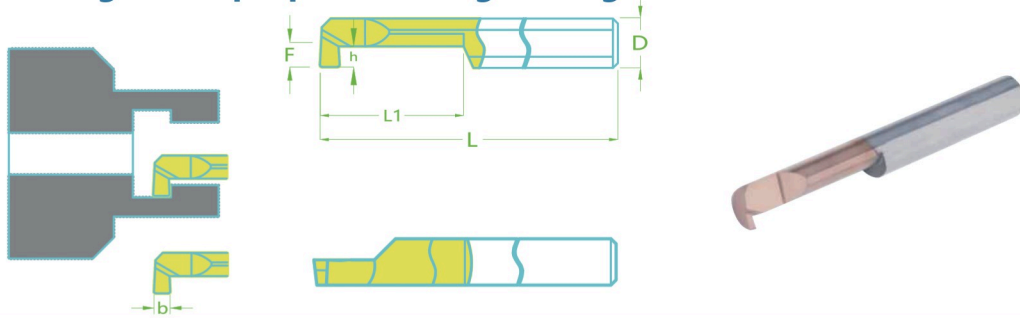


(shank D)	designation	ϕ (min)	pitch		dimensions						
			mm	TPI	R	F	α	L1	L		
4.0	SMIR 3 A55 L10/L15	3.1	0.5-1.0	48-24	R0.06	1.3	55°	10/15	50		
	SMIR 4 A55 L10/L15/L2	4.1	0.5-1.0	48-24	R0.08	1.8	55°	10/15/22	50		
	SMIR 4 A55 L30	4.1	0.5-1.0	48-24	R0.08	1.8	55°	30	60		
	SMIR 4 A55 L35/L40	4.1	0.5-1.0	48-24	R0.08	1.8	55°	35/40	75		
	SMIR 4 A55 L45/L55	4.1	0.5-1.0	48-24	R0.08	1.8	55°	45/55	100		
5.0	SMIR 5 A55 L15/L22	5.1	0.5-1.25	48-20	R0.12	2.3	55°	15/22	50		
6.0	SMIR 6 A55 L15/L2	6.1	0.5-1.5	48-16	R0.12	2.8	55°	15/22	50		
	SMIR 6 A55 L30	6.1	0.5-1.5	48-16	R0.12	2.8	55°	30	60		
	SMIR 6 A55 L35/L40	6.1	0.5-1.5	48-16	R0.12	2.8	55°	35/40	75		
	SMIR 6 A55 L45/L55	6.1	0.5-1.5	48-16	R0.12	2.8	55°	45/55	100		
7.0	SMIR 7 A55 L22/L30	7.1	1.0-2.0	20-14	R0.15	3.3	55°	22/30	60		
	SMIR 7 A55 L22/L30	7.1	1.0-2.0	20-14	R0.15	3.8	55°	22/30	60		
8.0	SMIR 8 A55 L22/L30	8.1	0.5-1.75	48-12	R0.15	3.8	55°	22/30	60		
	SMIR 8 A55 L35/L40	8.1	0.5-1.75	48-12	R0.15	3.8	55°	35/40	75		
	SMIR 8 A55 L45/L55	8.1	0.5-1.75	48-12	R0.15	3.8	55°	45/55	100		
4.0	SMIR 1.4 A60 L5	1.5	0.3-0.4	72-56	R0.04	0.6	60°	5	50		
	SMIR 1.9 A60 L8	2.0	0.3-0.5	56-32	R0.05	0.9	60°	8	50		
	SMIR 2.4 A60 L10	2.5	0.3-0.6	48-28	R0.05	1.1	60°	10	50		
	SMIR 3 A60 L10/L15	3.1	0.5-0.8	32-24	R0.06	1.3	60°	10/15	50		
	SMIR 4 A60 L10/L15/L22	4.1	0.7-1.0	32-24	R0.08	1.8	60°	10/15/22	50		
	SMIR 4 A60 L30	4.1	0.7-1.0	32-24	R0.08	1.8	60°	30	60		
	SMIR 4 A60 L35/L40	4.1	0.7-1.0	32-24	R0.08	1.8	60°	35/40	75		
	SMIR 4 A60 L45/L55	4.1	0.7-1.0	32-24	R0.08	1.8	60°	45/55	100		
5.0	SMIR 5 A60 L15/L22	5.1	1.0-1.25	24-20	R0.12	2.3	60°	15/22	50		
6.0	SMIR 6 A60 L15/L22	6.1	1.0-1.5	24-20	R0.12	2.8	60°	15/22	50		
	SMIR 6 A60 L30	6.1	1.0-1.5	24-20	R0.12	2.8	60°	30	60		
	SMIR 6 A60 L35/L40	6.1	1.0-1.5	24-20	R0.12	2.8	60°	35/40	75		
	SMIR 6 A60 L45/L55	6.1	1.0-1.5	24-20	R0.12	2.8	60°	45/55	100		
7.0	SMIR 7 A60 L22/L30	7.1	1.0-2.0	20-14	R0.15	3.3	60°	22/30	60		
	SMIR 7 A60 L22/L30	7.1	1.0-2.0	20-14	R0.15	3.8	60°	22/30	60		
8.0	SMIR 8 A60 L22/L30	8.1	1.0-2.0	20-14	R0.15	3.8	60°	22/30	60		
	SMIR 8 A60 L35/L40	8.1	1.0-2.0	20-14	R0.15	3.8	60°	35/40	75		
	SMIR 8 A60 L45/L55	8.1	1.0-2.0	20-14	R0.15	3.8	60°	45/55	100		
10.0	SMIR 10 A60 L35/L40	10.1	1.8-2.5	12-18	R0.22	4.8	60°	35/40	75		

Legend: Right-hand tool

SMGR

Miniature general-purpose radial grooving tool



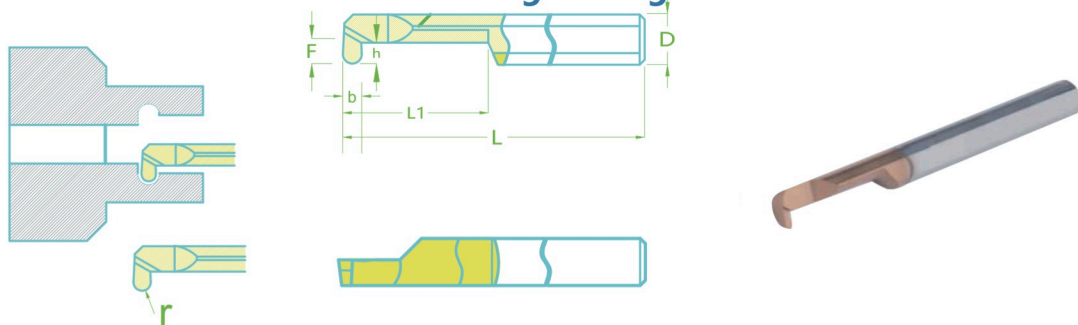
(shank D)	designation	ϕ (min)	dimensions				
			b	h	F	L1	L
4.0	SMGR 3 B0.5 L10/L15	3.1	0.5	1.0	1.3	10/15	50
	SMGR 3 B0.75 L10/L15	3.1	0.7	1.0	1.3	10/15	50
	SMGR 3 B1.0 L10/L15	3.1	1.0	1.2	1.3	10/15	50
	SMGR 3 B1.5 L10/L15	3.1	1.5	1.2	1.3	10/15	50
	SMGR 4 B0.5 L10/L15	4.1	0.5	1.0	1.8	10/15	50
	SMGR 4 B0.75 L10/L15	4.1	0.75	1.2	1.8	10/15	50
	SMGR 4 B1.0 L10/L15	4.1	1.0	1.2	1.8	10/15	50
	SMGR 4 B1.5 L10/L15	4.1	1.5	1.5	1.8	10/15	50
	SMGR 4 B2.0 L15/L22	4.1	2.0	1.5	1.8	15/22	50
	SMGR 4 B2.0 L30	4.1	2.0	1.5	1.8	30	60
	SMGR 4 B2.0 L35/L40	4.1	2.0	1.5	1.8	35/40	75
5.0	SMGR 5 B1.0 L15/L22	5.1	1.0	1.5	2.3	15/22	50
	SMGR 5 B1.0 L30	5.1	1.0	1.5	2.3	30	60
	SMGR 5 B1.5 L15/L22	5.1	1.5	1.5	2.3	15/22	50
	SMGR 5 B1.5 L30	5.1	1.5	1.5	2.3	30	60
	SMGR 5 B2.0 L15/L22	5.1	2.0	2.0	2.3	15/22	50
	SMGR 5 B2.0 L30	5.1	2.0	2.0	2.3	30	60
6.0	SMGR 6 B1.0 L15/L22	6.1	1.0	1.5	2.8	15/22	50
	SMGR 6 B1.0 L30	6.1	1.0	1.5	2.8	30	60
	SMGR 6 B1.5 L15/L22	6.1	1.5	1.8	2.8	15/22	50
	SMGR 6 B1.5 L30	6.1	1.5	1.8	2.8	30	60
	SMGR 6 B2.0 L15/L22	6.1	2.0	2.2	2.8	15/22	50
	SMGR 6 B2.0 L30	6.1	2.0	2.2	2.8	30	60
	SMGR 6 B2.0 L35/L40	6.1	2.0	2.2	2.8	35/40	75
7.0	SMGR 7 B1.0 L15/L22	7.1	1.0	1.5	3.3	15/22	60
	SMGR 7 B1.0 L30	7.1	1.0	1.5	3.3	30	60
	SMGR 7 B1.5 L15/L22	7.1	1.5	2.0	3.3	15/22	60
	SMGR 7 B1.5 L30	7.1	1.5	2.0	3.3	30	60
	SMGR 7 B2.0 L15/L22	7.1	2.0	2.5	3.3	15/22	60
	SMGR 7 B2.0 L30	7.1	2.0	2.5	3.3	30	60
8.0	SMGR 8 B1.0 L22/L30	8.1	1.0	1.5	3.8	22/30	60
	SMGR 8 B1.5 L22/L30	8.1	1.5	2.0	3.8	22/30	60
	SMGR 8 B2.0 L22/L30	8.1	2.0	2.5	3.8	22/30	60
	SMGR 8 B2.5 L22/L30	8.1	2.5	3.0	3.8	22/30	60
	SMGR 8 B3.0 L22/L30	8.1	3.0	3.0	3.8	22/30	60
	SMGR 8 B3.0 L35/L40	8.1	3.0	3.0	3.8	35/40	75
	SMGR 8 B3.0 L45/L55	8.1	3.0	3.0	3.8	45/55	100
10.0	SMGR 10 B2.0 L30/L40	10.1	2.0	2.5	4.8	30/40	75
	SMGR 10 B3.0 L30/L40	10.1	3.0	3.0	4.8	30/40	75
	SMGR 10 B3.0 L45/L55	10.1	3.0	3.0	4.8	45/55	100

Legend: Right-hand tool



SMKR

Miniature internal radiused radial grooving tool



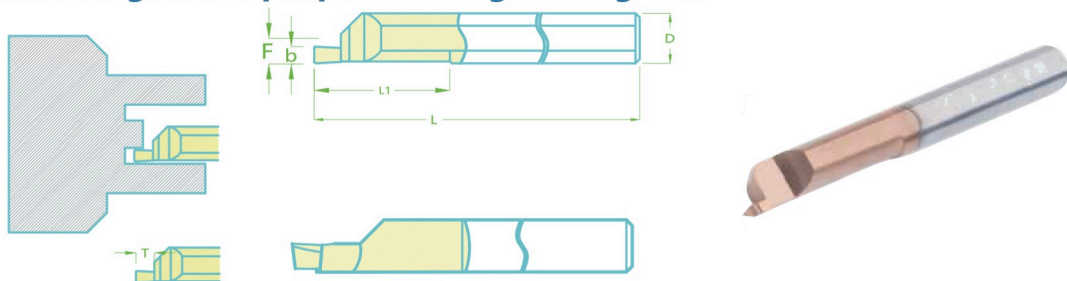
(shank D)	designation	ϕ (min)	dimensions					
			r	b	h	F	L1	L
4.0	SMKR 4 R0.3 L10/L15	4.1	0.3	0.6	1.0	1.8	10/15	50
	SMKR 4 R0.4 L10/L15	4.1	0.4	0.8	1.0	1.8	10/15	50
	SMKR 4 R0.5 L10/L15	4.1	0.5	1.0	1.2	1.8	10/15	50
	SMKR 4 R0.75 L10/L15	4.1	0.75	1.5	1.7	1.8	10/15	50
	SMKR 4 R0.75 L30	4.1	0.75	1.5	1.7	1.8	30	60
	SMKR 4 R0.75 L35/L40	4.1	0.75	1.5	1.7	1.8	35/40	75
5.0	SMKR 5 R0.5 L15/L22	5.1	0.5	1.0	1.2	2.3	15/22	50
	SMKR 5 R0.75 L15/L22	5.1	0.75	1.5	1.7	2.3	15/22	50
	SMKR 5 R1.0 L15/L22	5.1	1.0	2.0	2.2	2.3	15/22	50
6.0	SMKR 6 R0.5 L15/L22	6.1	0.5	1.0	1.5	2.8	15/22	50
	SMKR 6 R0.6 L15/L22	6.1	0.6	1.2	1.5	2.8	15/22	50
	SMKR 6 R0.75 L15/L22	6.1	0.75	1.5	1.7	2.8	15/22	50
	SMKR 6 R1.0 L15/L22	6.1	1.0	2.0	2.3	2.8	15/22	50
	SMKR 6 R1.0 L30	6.1	1.0	2.0	2.3	2.8	30	60
	SMKR 6 R1.0 L35/L40	6.1	1.0	2.0	2.3	2.8	35/40	75
	SMKR 6 R1.0 L45/L55	6.1	1.0	2.0	2.3	2.8	45/55	100
	SMKR 8 R0.5 L22/L30	8.1	0.5	1.0	1.5	3.8	22/30	60
8.0	SMKR 8 R0.6 L22/L30	8.1	0.6	1.2	1.5	3.8	22/30	60
	SMKR 8 R0.75 L22/L30	8.1	0.75	1.5	2.0	3.8	22/30	60
	SMKR 8 R1.0 L22/L30	8.1	1.0	2.0	2.5	3.8	22/30	60
	SMKR 8 R1.0 L35/L40	8.1	1.0	2.0	2.5	3.8	35/40	75
	SMKR 8 R1.0 L45/L55	8.1	1.0	2.0	2.5	3.8	45/55	100

Legend: Right-hand tool



SMFR/L

Miniature general-purpose axial grooving tool



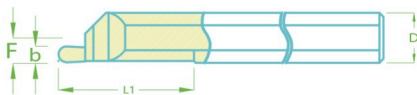
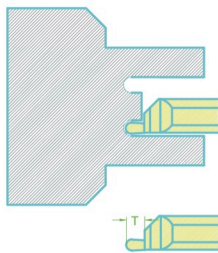
(shank D)	designation	ϕ (min)	dimensions				
			b	T	F	L1	L
4.0	SMFR 4 B0.5 L10/L15	5	0.5	1.2	1.95	10/15	50
	SMFR 4 B0.75 L10/L15	5	0.75	1.5	1.95	10/15	50
	SMFR 4 B1.0 L10/L15	5	1.0	2.0	1.95	10/15	50
	SMFR 4 B1.5 L10/L15	5	1.5	2.5	1.95	10/15	50
	SMFR 4 B2.0 L10/L15	5	2.0	3.0	1.95	10/15	50
	SMFR 4 B2.0 L30	5	2.0	3.0	1.95	30	60
	SMFR 4 B2.0 L35/L40	5	2.0	3.0	1.95	35/40	75
5.0	SMFR 5 B0.5 L15/L22	6	0.5	1.2	2.45	15/22	50
	SMFR 5 B0.75 L15/L22	6	0.75	1.2	2.45	15/22	50
	SMFR 5 B1.0 L15/L22	6	1.0	1.8	2.45	15/22	50
	SMFR 5 B1.5 L15/L22	6	1.5	2.5	2.45	15/22	50
	SMFR 5 B2.0 L15/L22	6	2.0	3.5	2.45	15/22	50
6.0	SMFR 6 B1.0 L15/L22	8	1.0	2.0	2.95	15/22	50
	SMFR 6 B1.5 L15/L22	8	1.5	2.5	2.95	15/22	50
	SMFR 6 B2.0 L15/L22	8	2.0	3.5	2.95	15/22	50
	SMFR 6 B2.5 L15/L22	8	2.5	4.5	2.95	15/22	50
	SMFR 6 B3.0 L15/L22	8	3.0	5.5	2.95	15/22	50
	SMFR 6 B3.0 L30	8	3.0	5.5	2.95	30	60
	SMFR 6 B3.0 L35/L40	8	3.0	5.5	2.95	35/40	75
8.0	SMFR 8 B2.0 L22/L30	10	2.0	3.5	3.95	22/30	60
	SMFR 8 B2.5 L22/L30	10	2.5	4.5	3.95	22/30	60
	SMFR 8 B3.0 L22/L30	10	3.0	5.5	3.95	22/30	60
	SMFR 8 B3.0 L35/L40	10	3.0	5.5	3.95	35/40	75
	SMFR 8 B3.0 L45/L55	10	3.0	5.5	3.95	45/55	100
4.0	SMFL 4 B0.5 L10/L15	5	0.5	1.2	1.95	10/15	50
	SMFL 4 B0.75 L10/L15	5	0.75	1.5	1.95	10/15	50
	SMFL 4 B1.0 L10/L15	5	1.0	2.0	1.95	10/15	50
	SMFL 4 B1.5 L10/L15	5	1.5	2.5	1.95	10/15	50
5.0	SMFL 5 B0.5 L15/L22	6	0.5	1.2	2.45	15/22	50
	SMFL 5 B0.75 L15/L22	6	0.75	1.5	2.45	15/22	50
	SMFL 5 B1.0 L15/L22	6	1.0	2.0	2.45	15/22	50
	SMFL 5 B1.5 L15/L22	6	1.5	2.5	2.45	15/22	50
	SMFL 5 B2.0 L15/L22	6	2.0	3.5	2.45	15/22	50
6.0	SMFL 6 B1.0 L15/L22	8	1.0	2	2.95	15/22	50
	SMFL 6 B1.5 L15/L22	8	1.5	2.5	2.95	15/22	50
	SMFL 6 B2.0 L15/L22	8	2.0	3.5	2.95	15/22	50
	SMFL 6 B2.5 L15/L22	8	2.5	4.5	2.95	15/22	50
	SMFL 6 B3.0 L15/L22	8	3.0	5.5	2.95	15/22	50
8.0	SMFL 8 B0.2 L22/L30	10	2.0	3.5	3.95	22/30	60
	SMFL 8 B2.5 L22/L30	10	2.5	4.5	3.95	22/30	60
	SMFL 8 B3.0 L22/L30	10	3.0	5.5	3.95	22/30	60

Legend: Right-hand tool



SMZR

Miniature general-purpose axial radiused grooving tool



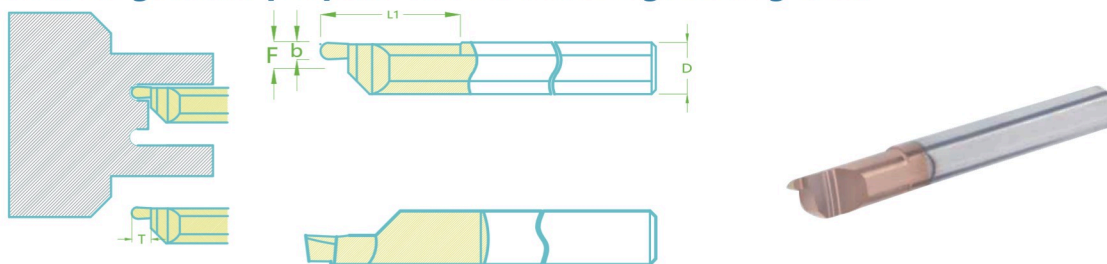
(shank D)	designation	ϕ (min)	dimensions					
			r	b	T	F	L1	L
4.0	SMZR 4 R0.3 L15	5.0	0.3	0.6	1.1	1.95	15	50
	SMZR 4 R0.4 L15	5.0	0.4	0.8	1.3	1.95	15	50
	SMZR 4 R0.5 L15	5.0	0.5	1.0	1.5	1.95	15	50
	SMZR 4 R0.75 L15	5.0	0.75	1.5	2.2	1.95	15	50
	SMZR 4 R1.0 L15/L22	5.0	1.0	2.0	3.0	1.95	15/22	50
	SMZR 4 R1.0 L30	5.0	1.0	2.0	3.0	1.95	30	60
	SMZR 4 R1.0 L35/L40	5.0	1.0	2.0	3.0	1.95	35/40	75
5.0	SMZR 5 R0.3 L22	6.0	0.3	0.6	1.1	2.45	22	50
	SMZR 5 R0.4 L22	6.0	0.4	0.8	1.3	2.45	22	50
	SMZR 5 R0.5 L22	6.0	0.5	1.0	1.5	2.45	22	50
	SMZR 5 R0.75 L22	6.0	0.75	1.5	2.2	2.45	22	50
	SMZR 5 R1.0 L22	6.0	1.0	2.0	3.0	2.45	22	50
	SMZR 5 R1.25 L22	6.0	1.25	2.5	3.5	2.45	22	50
	SMZR 5 R1.5 L22	6.0	1.5	3.0	3.5	2.45	22	50
6.0	SMZR 6 R0.3 L22	8.0	0.3	0.6	1.1	2.95	22	50
	SMZR 6 R0.4 L22	8.0	0.4	0.8	1.3	2.95	22	50
	SMZR 6 R0.5 L22	8.0	0.5	1.0	1.5	2.95	22	50
	SMZR 6 R0.75 L22	8.0	0.75	1.5	2.2	2.95	22	50
	SMZR 6 R1.0 L22	8.0	1.0	2.0	3.0	2.95	22	50
	SMZR 6 R1.25 L22	8.0	1.25	2.5	3.5	2.95	22	50
	SMZR 6 R1.5 L22	8.0	1.5	3.0	3.5	2.95	22	50
	SMZR 6 R1.5 L30	8.0	1.5	3.0	3.5	2.95	30	60
	SMZR 6 R1.5 L35/L40	8.0	1.5	3.0	3.5	2.95	35/40	75
SMZR 6 R3.0 L45/L55	8.0	1.5	3.0	3.5	2.95	45/55	100	
8.0	SMZR 8 R0.5 L22/L30	10.0	0.5	1.0	1.5	3.95	22/30	60
	SMZR 8 R0.75 L22/L30	10.0	0.75	1.5	2.2	3.95	22/30	60
	SMZR 8 R1.0 L22/L30	10.0	1.0	2.0	3.0	3.95	22/30	60
	SMZR 8 R1.25 L22/L30	10.0	1.25	2.5	3.5	3.95	22/30	60
	SMZR 8 R1.5 L22/L30	10.0	1.5	3.0	3.5	3.95	22/30	60
	SMZR 8 R2.0 L22/L30	10.0	2.0	4.0	4.5	3.95	22/30	60
	SMZR 8 R2.0 L35/L40	10.0	2.0	4.0	4.5	3.95	35/40	75
	SMZR 8 R2.0 L45/L55	10.0	2.0	4.0	4.5	3.95	45/55	100

Legend: Right-hand tool



SMZL

Miniature general-purpose axial radiused grooving tool



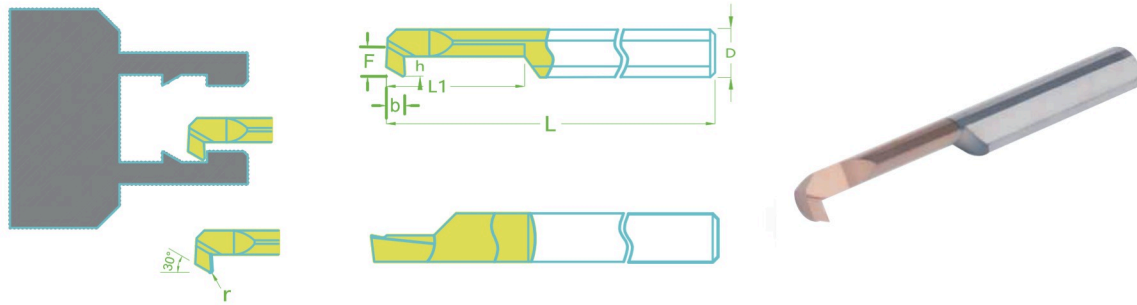
(shank D)	designation	ϕ (min)	dimensions							
			r	b	T	F	L1	L		
4.0	SMZL 4 R0.3 L5/L10/L15	5.0	0.3	0.6	0.8	1.95	15	50		
	SMZL 4 R0.4 L5/L10/L15	5.0	0.4	0.8	1.0	1.95	15	50		
	SMZL 4 R0.5 L5/L10/L15	5.0	0.5	1.0	1.2	1.95	15	50		
	SMZL 4 R0.75 L10/L15	5.0	0.75	1.5	1.7	1.95	15	50		
	SMZL 4 R1.0 L10/L15	5.0	1.0	2.0	2.2	1.95	15	50		
5.0	SMZL 5 R0.3 L10/L15	6.0	0.3	0.6	0.8	2.45	22	50		
	SMZL 5 R0.4 L10/L15	6.0	0.4	0.8	1.0	2.45	22	50		
	SMZL 5 R0.5 L10/L15	6.0	0.5	1.0	1.2	2.45	22	50		
	SMZL 5 R0.75 L10/L15/L22	6.0	0.75	1.5	1.7	2.45	22	50		
	SMZL 5 R1.0 L10/L15/L22	6.0	1.0	2.0	2.2	2.45	22	50		
	SMZL 5 R1.25 L10/L15/L22	6.0	1.25	2.5	2.7	2.45	22	50		
	SMZL 5 R1.5 L10/L15/L22	6.0	1.5	3.0	3.2	2.45	22	50		
6.0	SMZL 6 R0.3 L30	8.0	0.3	0.6	0.8	2.95	22	50		
	SMZL 6 R0.4 L30/L40	8.0	0.4	0.8	1.0	2.95	22	50		
	SMZL 6 R0.5 L45/L55	8.0	0.5	1.0	1.2	2.95	22	50		
	SMZL 6 R0.75 L15/L22	8.0	0.75	1.5	1.7	2.95	22	50		
	SMZL 6 R1.0 L30	8.0	1.0	2.0	2.2	2.95	22	50		
	SMZL 6 R1.25 L15/L22	8.0	1.25	2.5	2.7	2.95	22	50		
	SMZL 6 R1.5 L30	8.0	1.5	3.0	3.2	2.95	22	50		
8.0	SMZL 8 R0.5 L15/L22	10.0	0.5	1.0	1.2	3.95	30	60		
	SMZL 8 R0.75 L30	10.0	0.75	1.5	1.7	3.95	30	60		
	SMZL 8 R1.0 L15/L22	10.0	1.0	2.0	2.2	3.95	30	60		
	SMZL 8 R1.25 L25/L30	10.0	1.25	2.5	2.7	3.95	30	60		
	SMZL 8 R1.5 L35	10.0	1.5	3.0	3.2	3.95	30	60		
	SMZL 8 R2.0 L15/L22	10.0	2.0	4.0	4.2	3.95	30	60		

Legend: Left-hand tool



SMXR

Miniature reverse turning and boring tool

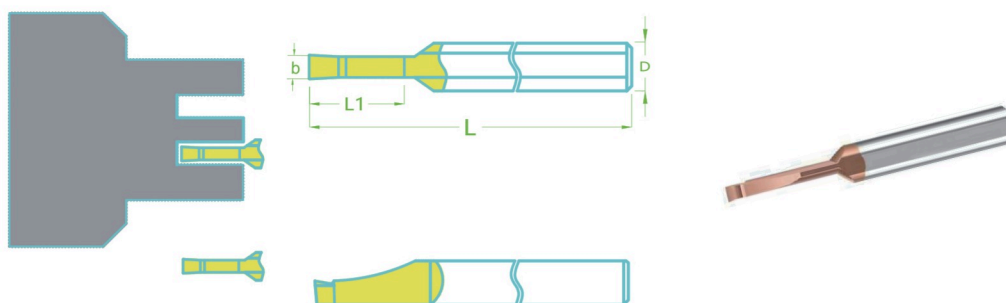


(shank D)	designation				ø (min)	dimensions				
						F	h	R	L1	L
4.0	SMXR 4	R1.0	R0.1	L10/L15	4.1	1.8	1.2	0.1	10/15	50
	SMXR 4	R1.0	R0.2	L10/L15	4.1	1.8	1.2	0.2	10/15	50
	SMXR 4	R1.5	R0.1	L10/L15	4.1	1.8	1.2	0.1	10/15	50
	SMXR 4	R1.5	R0.2	L10/L15	4.1	1.8	1.2	0.2	10/15	50
5.0	SMXR 5	R1.0	R0.1	L10/L15	5.1	2.3	1.5	0.1	15/22	50
	SMXR 5	R1.0	R0.2	L10/L15	5.1	2.3	1.5	0.2	15/22	50
	SMXR 5	R1.5	R0.1	L10/L15	5.1	2.3	1.5	0.1	15/22	50
	SMXR 5	R1.5	R0.2	L10/L15	5.1	2.3	1.5	0.2	15/22	50
6.0	SMXR 6	R1.0	R0.1	L10/L15/L22	6.1	2.8	2.0	0.1	15/22	50
	SMXR 6	R1.0	R0.2	L10/L15/L22	6.1	2.8	2.0	0.2	15/22	50
	SMXR 6	R1.5	R0.1	L10/L15/L22	6.1	2.8	2.0	0.1	15/22	50
	SMXR 6	R1.5	R0.2	L10/L15/L22	6.1	2.8	2.0	0.2	15/22	50
	SMXR 6	R2.0	R0.1	L30	6.1	2.8	2.0	0.1	15/22	50
	SMXR 6	R2.0	R0.2	L30/L40	6.1	2.8	2.0	0.2	15/22	50

Legend: Right-hand tool

SMVR

Miniature face deep-grooving boring tool



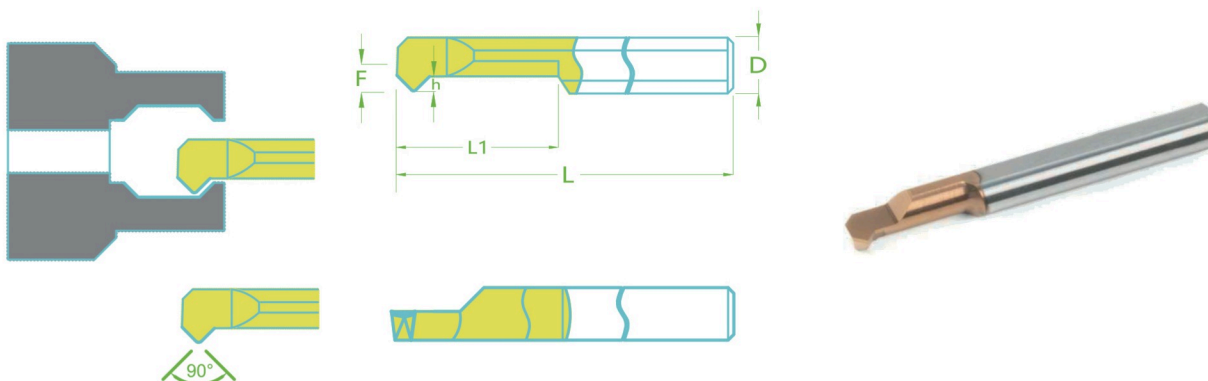
(shank D)	designation	ϕ (min)	dimensions		
			b	L1	L
4.0	SMVR 4 B1.5 L10	6.1	1.5	10	50
	SMVR 4 B1.5 L15	6.1	1.5	15	50
	SMVR 4 B2.0 L10	6.1	2.0	10	50
	SMVR 4 B2.0 L15	6.1	2.0	15	50
	SMVR 4 B2.0 L22	6.1	2.0	22	50
	SMVR 4 B2.0 L15/L22	6.1	2.0	15/22	60
	SMVR 4 B3.0 L15/L22	8.1	3.0	15/22	75
6.0	SMVR 6 B1.5 L10/L15	8.1	1.5	10/15	50
	SMVR 6 B2.0 L10/L15	8.1	2.0	10/15	50
	SMVR 6 B2.0 L22	8.1	2.0	22	50
	SMVR 6 B2.0 L30	8.1	2.0	30	60
	SMVR 6 B2.0 L30	8.1	2.0	30	75
	SMVR 6 B2.5 L15/L22	8.1	2.5	15/22	50
	SMVR 6 B2.5 L30	8.1	2.5	30	60
	SMVR 6 B2.5 L30	8.1	2.5	30	75
8.0	SMVR 8 B2.0 L15/L22	10.1	2.0	15/22	60
	SMVR 8 B3.0 L15/L22	10.1	3.0	15/22	60
	SMVR 8 B4.0 L15/L22	10.1	4.0	15/22	60
	SMVR 8 B4.0 L30	10.1	4.0	30	75

Legend: Right-hand tool



SMCR

Miniature internal chamfering tool for top and bottom edges



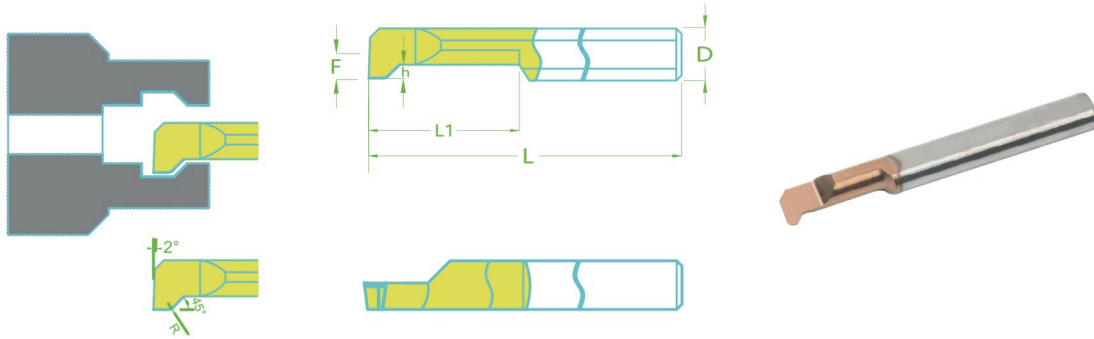
(shank D)	designation	ø (min)	dimensions				
			F	h	R	L1	L
4.0	SMCR 3 R0.1 L10/L15/L22	4.1	1.4	0.7	0.1	10/15/22	50
	SMCR 3 R0.2 L10/L15/L22	4.1	1.4	0.7	0.2	10/15/22	50
	SMCR 4 R0.1 L15/L22	4.1	1.9	0.9	0.1	15/22	50
	SMCR 4 R0.2 L15/L22	4.1	1.9	0.9	0.2	15/22	50
5.0	SMCR 5 R0.1 L15/L22	5.1	2.4	1.2	0.1	15/22	50
	SMCR 5 R0.2 L15/L22	5.1	2.4	1.2	0.2	15/22	50
6.0	SMCR 6 R0.1 L15/L22	6.1	2.9	1.5	0.1	15/22	50
	SMCR 6 R0.2 L15/L22	6.1	2.9	1.5	0.2	15/22	50
8.0	SMCR 8 R0.1 L22/L30	8.1	3.9	2.0	0.1	22/30	60
	SMCR 8 R0.2 L22/L30	8.1	3.9	2.0	0.2	22/30	60

Legend: Right-hand tool



SMDR

Miniature internal flat-bottom turning and boring tool



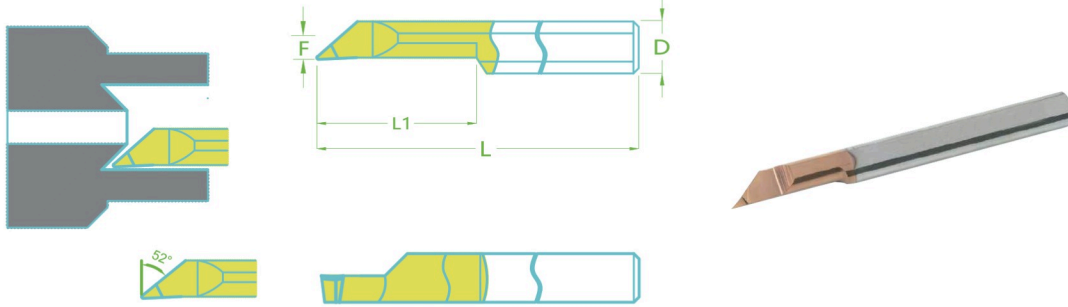
(shank D)	designation	ø (min)	dimensions				
			F	h	R	L1	L
4.0	SMDR 4 R0.1 L15/L22	4.1	1.9	0.9	0.1	15/22	50
	SMDR 4 R0.2 L15/L22	4.1	1.9	0.9	0.2	15/22	50
5.0	SMDR 5 R0.1 L15/L22	5.1	2.4	1.2	0.1	15/22	50
	SMDR 5 R0.2 L15/L22	5.1	2.4	1.2	0.2	15/22	50
6.0	SMDR 6 R0.1 L15/L22	6.1	2.9	1.4	0.1	15/22	50
	SMDR 6 R0.2 L15/L22	6.1	2.9	1.4	0.2	15/22	50
8.0	SMDR 8 R0.1 L22/L30	8.1	3.9	2.0	0.1	22/30	60
	SMDR 8 R0.2 L22/L30	8.1	3.9	2.0	0.2	22/30	60

Legend: Right-hand tool



SMAR

Miniature internal angled turning and boring tool



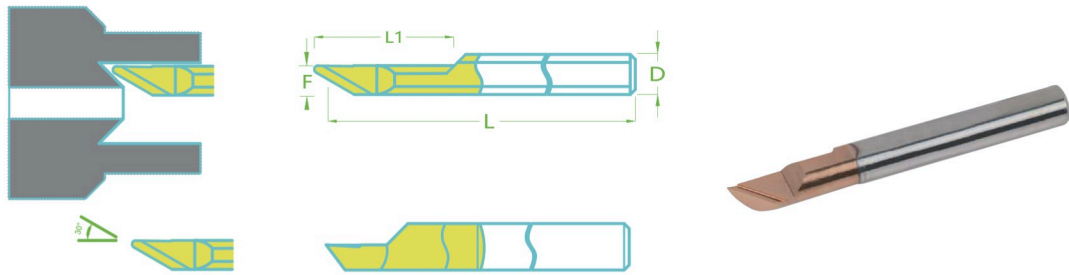
(shank D)	designation				ϕ (min)	dimensions			
						F	r	F	L1
4.0	SMAR 3	R0.1	L10/L15/L22		4.1	1.4	0.1	10/15/22	50
	SMAR 3	R0.2	L10/L15/L22		4.1	1.4	0.2	10/15/22	50
	SMAR 4	R0.1	L15/L22		4.1	1.9	0.1	15/22	50
	SMAR 4	R0.2	L15/L22		4.1	1.9	0.2	15/22	50
5.0	SMAR 5	R0.1	L15/L22		5.1	2.4	0.1	15/22	50
	SMAR 5	R0.2	L15/L22		5.1	2.4	0.2	15/22	50
6.0	SMAR 6	R0.1	L15/L22		6.1	2.9	0.1	15/22	50
	SMAR 6	R0.2	L15/L22		6.1	2.9	0.2	15/22	50
8.0	SMAR 8	R0.1	L22/L30		8.1	3.9	0.1	22/30	60
	SMAR 8	R0.2	L22/L30		8.1	3.9	0.2	22/30	60

Legend: Right-hand tool



SMWR

Miniature profiling angled turning and boring tool



(shank D)	designation	ϕ (min)	dimensions				
			F	R	cutting edge angle	L1	L
6.0	SMWR 6 R0.1 A60 L15/L22	6.1	5.3	0.1	30°	15/22	50
	SMWR 6 R0.2 A60 L15/L22	6.1	5.3	0.2	30°	15/22	50
	SMWR 6 R0.4 A60 L15/L22	6.1	5.3	0.4	30°	15/22	50
	SMWR 6 R0.1 A90 L15/L22	6.1	5.3	0.1	45°	15/22	50
	SMWR 6 R0.2 A90 L15/L22	6.1	5.3	0.2	45°	15/22	50
	SMWR 6 R0.4 A90 L15/L22	6.1	5.3	0.4	45°	15/22	50
	SMWR 6 R0.1 A60 L15/L22	6.1	5.3	0.1	30°	15/22	50
	SMWR 6 R0.2 A60 L15/L22	6.1	5.3	0.2	30°	15/22	50
	SMWR 6 R0.4 A60 L15/L22	6.1	5.3	0.4	30°	15/22	50
	SMWR 6 R0.1 A90 L15/L22	6.1	5.3	0.1	45°	15/22	50
	SMWR 6 R0.2 A90 L15/L22	6.1	5.3	0.2	45°	15/22	50
	SMWR 6 R0.4 A90 L15/L22	6.1	5.3	0.4	45°	15/22	50

Legend: Right-hand tool

Cutting Speed

IOS Standard	Material	Condition	Cutting Speed			Overhang
			Linear speed vc (m/min)	Depth of cut ap (mm)	Cutting speed vc (m/min)	
P steel material	P01-P10	↑ Hard	30-60	0.02-0.1	0.01-0.05	3-5
	P10-P20		35-70	0.02-0.4	0.01-0.05	
	P20-P30	↓ Soft	40-80	0.05-0.5	0.02-0.08	
	P30-P40		45-90	0.05-0.5	0.05-0.1	
M stainless steel material	M01-M10	↑ Hard	20-35	0.02-0.1	0.01-0.05	3-5
	M10-P20		25-45	0.02-0.2	0.01-0.05	
	M20-M30	↓ Soft	35-60	0.05-0.4	0.02-0.08	
	M30-M40		40-80	0.05-0.5	0.05-0.1	
K cast iron material	K01-K10	↑ Hard	30-40	0.05-0.2	0.02-0.05	3-5
	K10-K20		40-60	0.1-0.4	0.02-0.08	
	K20-K30	↓ Soft	50-70	0.1-0.8	0.05-0.1	
N non-ferrous metal	N01-N10	↑ Hard	30-45	0.05-0.2	0.02-0.05	3-5
	N10-N20		40-90	0.05-0.5	0.02-0.08	
	N20-N30	↓ Soft	60-120	0.05-0.8	0.05-0.12	



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