

Size  $\phi 2 \sim \phi 12$



# HRRS



$\phi 2 \sim \phi 6$   $\phi 8 \sim \phi 12$

Applicable Work Material (◎Most Suitable ○Suitable)

Work Material										
CARBON STEELS S45C S55C	ALLOY STEELS SK·SCM SUS	PREHARDENED STEELS NAK HPM	HARDENED STEELS			CAST IRON	ALUMINIUM ALLOYS	GRAPHITE	COPPER	PLASTIC
			(~55HRC)	(~60HRC)	(~65HRC)					
		◎	◎	◎	○	○				

Suitable Coolant  
◎Recommendation

◎Airflow/Oil Mist  
Water Soluble Oil

(Total 22 models)

Unit (mm)

Model Number	Outside Diameter $\phi D$	Corner Radius CR	Effective Length $\ell_1$	Length of Cut $\ell$	Neck Diameter $\phi d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\phi d$
HRRS 4020-03-06	2	R0.3	6	2	1.91	16°	70	4
HRRS 4020-05-06		R0.5					70	4
◎ HRRS 4030-08-09-3	3	R0.8	9	3	2.92	16°	70	3
HRRS 4030-08-09							70	6
◎ HRRS 4040-05-12	4	R0.5	12	4	3.82	16°	70	4
HRRS 4040-05-12-6							70	6
◎ HRRS 4040-10-12		R1					70	4
HRRS 4040-10-12-6							70	6
HRRS 4050-12-15	5	R1.2	15	5	4.82	16°	70	6
◎ HRRS 4060-05-18	6	R0.5	18	6	5.82	—	90	6
◎ HRRS 4060-10-18		R1					90	6
◎ HRRS 4060-15-18		R1.5					90	6
◎ HRRS 4060-20-18		R2					90	6
◎ HRRS 4080-10-24	8	R1	24	8	7.82	—	100	8
◎ HRRS 4080-20-24		R2					100	8
◎ HRRS 4080-30-24		R3					100	8
◎ HRRS 4100-10-30	10	R1	30	10	9.82	—	110	10
◎ HRRS 4100-20-30		R2					110	10
◎ HRRS 4100-30-30		R3					110	10
◎ HRRS 4120-10-36	12	R1	36	12	11.82	—	120	12
◎ HRRS 4120-20-36		R2					120	12
◎ HRRS 4120-40-36		R4					120	12

◎mark denotes Straight Shank Type



**Milling Conditions for HRRS/HRRS-S**

**Roughing Parameter**

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS (35~45HRC) <small>Airblow/Oil Mist</small>				HARDENED STEELS (45~55HRC) <small>Airblow/Oil Mist</small>				HARDENED STEELS (55~65HRC) <small>Airblow/Oil Mist</small>			
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth
HRRS 4020-03-06	2	R0.3	30,000	7,650	0.03	0.41	10,000	2,160	0.08	0.36	8,000	1,170	0.04	0.36
HRRS 4020-05-06		R0.5	30,000	7,650	0.05	0.72	10,000	2,160	0.14	0.63	8,000	1,170	0.07	0.63
HRRS 4030-08-09	3	R0.8	25,000	8,100	0.07	1.08	10,000	2,970	0.16	0.95	7,000	1,710	0.09	0.95
HRRS 4040-05-12	4	R0.5	15,000	8,550	0.06	0.82	9,000	3,600	0.10	0.77	6,000	2,160	0.05	0.77
HRRS 4040-10-12		R1	15,000	8,550	0.11	1.44	9,000	3,600	0.16	1.35	6,000	2,160	0.09	1.35
HRRS 4050-12-15	5	R1.2	10,000	8,550	0.16	1.80	8,000	4,950	0.18	1.58	6,000	2,160	0.14	1.58
HRRS 4060-05-18	6	R0.5	9,000	8,550	0.10	1.23	8,000	5,400	0.11	1.08	6,000	2,070	0.11	1.08
HRRS 4060-10-18		R1	9,000	8,550	0.14	1.57	8,000	5,400	0.14	1.49	6,000	2,070	0.14	1.49
HRRS 4060-15-18		R1.5	9,000	8,550	0.17	2.16	8,000	5,400	0.18	1.89	6,000	2,070	0.18	1.89
HRRS 4060-20-18		R2	9,000	8,550	0.17	2.30	8,000	5,400	0.18	2.02	6,000	2,070	0.18	2.02
HRRS 4080-10-24	8	R1	7,000	8,550	0.05	1.92	6,000	5,850	0.06	1.80	4,000	2,070	0.05	1.80
HRRS 4080-20-24		R2	7,000	8,550	0.21	2.88	6,000	5,850	0.23	2.52	4,000	2,070	0.18	2.52
HRRS 4080-30-24		R3	7,000	8,550	0.21	3.09	6,000	5,850	0.23	2.70	4,000	2,070	0.18	2.70
HRRS 4100-10-30	10	R1	6,000	8,550	0.06	2.57	5,000	5,580	0.07	2.25	3,000	2,160	0.05	2.25
HRRS 4100-20-30		R2	6,000	8,550	0.24	3.60	5,000	5,580	0.27	3.15	3,000	2,160	0.18	3.15
HRRS 4100-30-30		R3	6,000	8,550	0.24	3.86	5,000	5,580	0.27	3.38	3,000	2,160	0.18	3.38
HRRS 4120-10-36	12	R1	5,000	8,550	0.07	3.09	4,000	7,290	0.07	2.70	2,000	2,250	0.05	2.70
HRRS 4120-20-36		R2	5,000	8,550	0.27	4.32	4,000	7,290	0.27	3.78	2,000	2,250	0.18	3.78
HRRS 4120-40-36		R4	5,000	8,550	0.27	4.63	4,000	7,290	0.27	4.05	2,000	2,250	0.18	4.05

**Finishing Parameter (Flat/Inclined surface)**

WORK MATERIAL			PREHARDENED STEELS / HARDENED STEELS (35~45HRC) <small>Airblow/Oil Mist</small>				HARDENED STEELS (45~55HRC) <small>Airblow/Oil Mist</small>				HARDENED STEELS (55~65HRC) <small>Airblow/Oil Mist</small>			
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth	Speed (min <sup>-1</sup> )	Feed (mm/min)	a <sub>p</sub> (mm) Axial Depth	a <sub>e</sub> (mm) Radial Depth
HRRS 4020-03-06	2	R0.3	30,000	850	0.10	0.03	10,000	355	0.10	0.04	8,000	240	0.05	0.03
HRRS 4020-05-06		R0.5	30,000	1,100	0.10	0.04	10,000	460	0.10	0.05	8,000	310	0.05	0.04
HRRS 4030-08-09	3	R0.8	25,000	1,100	0.10	0.04	10,000	650	0.10	0.07	7,000	350	0.05	0.05
HRRS 4040-05-12	4	R0.5	15,000	775	0.10	0.05	9,000	455	0.10	0.05	6,000	255	0.05	0.04
HRRS 4040-10-12		R1	15,000	1,100	0.10	0.07	9,000	650	0.10	0.07	6,000	360	0.05	0.06
HRRS 4050-12-15	5	R1.2	10,000	1,100	0.10	0.11	8,000	650	0.10	0.08	6,000	360	0.05	0.06
HRRS 4060-05-18	6	R0.5	9,000	690	0.20	0.08	8,000	375	0.20	0.05	6,000	215	0.10	0.04
HRRS 4060-10-18		R1	9,000	975	0.20	0.11	8,000	530	0.20	0.07	6,000	310	0.10	0.05
HRRS 4060-15-18		R1.5	9,000	1,200	0.20	0.13	8,000	650	0.20	0.08	6,000	380	0.10	0.06
HRRS 4060-20-18		R2	9,000	1,385	0.20	0.15	8,000	750	0.20	0.09	6,000	435	0.10	0.07
HRRS 4080-10-24	8	R1	7,000	845	0.05	0.12	6,000	455	0.05	0.08	4,000	265	0.05	0.07
HRRS 4080-20-24		R2	7,000	1,200	0.20	0.17	6,000	650	0.20	0.11	4,000	380	0.10	0.10
HRRS 4080-30-24		R3	7,000	1,465	0.20	0.21	6,000	795	0.20	0.13	4,000	465	0.10	0.12
HRRS 4100-10-30	10	R1	6,000	845	0.05	0.14	5,000	455	0.05	0.09	3,000	265	0.05	0.09
HRRS 4100-20-30		R2	6,000	1,200	0.20	0.20	5,000	650	0.20	0.13	3,000	380	0.10	0.13
HRRS 4100-30-30		R3	6,000	1,470	0.20	0.25	5,000	795	0.20	0.16	3,000	465	0.10	0.16
HRRS 4120-10-36	12	R1	5,000	845	0.05	0.17	4,000	455	0.05	0.11	2,000	265	0.05	0.13
HRRS 4120-20-36		R2	5,000	1,200	0.20	0.24	4,000	650	0.20	0.16	2,000	380	0.10	0.19
HRRS 4120-40-36		R4	5,000	1,695	0.20	0.34	4,000	915	0.20	0.23	2,000	535	0.10	0.27

Please adjust milling parameter referring following table

D:  $\phi$  2.0~3.0

L/D	Speed ( $\text{min}^{-1}$ )	Feed (mm/min)	$a_p$ Axial Depth (mm)	$a_e$ Radial Depth (mm)
$\phi$ D $\times$ 6	$\times 1$	$\times 1$	$\times 1$	$\times 1$
$\phi$ D $\times$ 7	$\times 0.8$	$\times 0.8$	$\times 0.8$	$\times 0.9$
$\phi$ D $\times$ 8	$\times 0.7$	$\times 0.7$	$\times 0.7$	$\times 0.9$
$\phi$ D $\times$ 9	$\times 0.7$	$\times 0.7$	$\times 0.6$	$\times 0.8$
$\phi$ D $\times$ 10	$\times 0.6$	$\times 0.6$	$\times 0.6$	$\times 0.7$

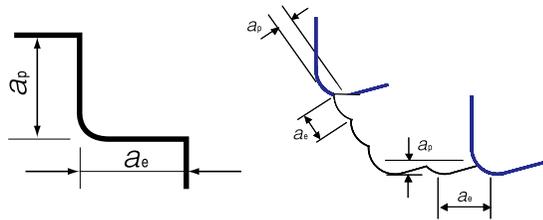
D:  $\phi$  4.0~6.0

L/D	Speed ( $\text{min}^{-1}$ )	Feed (mm/min)	$a_p$ Axial Depth (mm)	$a_e$ Radial Depth (mm)
$\sim \phi$ D $\times$ 4	$\times 1$	$\times 1$	$\times 1$	$\times 1$
$\sim \phi$ D $\times$ 5	$\times 0.9$	$\times 0.9$	$\times 0.9$	$\times 0.9$
$\sim \phi$ D $\times$ 6	$\times 0.8$	$\times 0.8$	$\times 0.8$	$\times 0.9$
$\sim \phi$ D $\times$ 7	$\times 0.7$	$\times 0.7$	$\times 0.6$	$\times 0.8$
$\sim \phi$ D $\times$ 8	$\times 0.5$	$\times 0.5$	$\times 0.6$	$\times 0.7$

D:  $\phi$  8.0~12.0

L/D	Speed ( $\text{min}^{-1}$ )	Feed (mm/min)	$a_p$ Axial Depth (mm)	$a_e$ Radial Depth (mm)
$\sim \phi$ D $\times$ 4	$\times 1$	$\times 1$	$\times 1$	$\times 1$
$\sim \phi$ D $\times$ 5	$\times 0.7$	$\times 0.7$	$\times 0.7$	$\times 0.8$
$\sim \phi$ D $\times$ 6	$\times 0.5$	$\times 0.5$	$\times 0.6$	$\times 0.7$

Roughing Parameter      Finishing Parameter (Flat/Inclined surface)



$a_p$  : (mm) Axial Depth  
 $a_e$  : (mm) Radial Depth

Note :

Recommend Using Air blow/Oil Mist

This table shows standard milling. Adjust it in accordance with milling type, purpose and used instruments in actual milling

In case of spindle rotation does not reach to target, decrease spindle and feed speed in same ratio

Use a machine that has high rigidity and generates low level of vibration

Remove chip to prevent heat generation and ignition by milling processing

Adjust only spindle speed for finishing process based on overhang length