



Size $\phi 1 \sim \phi 20$

CZS



Patented in Japan, China, Korea, Taiwan, Germany, Switzerland, and Liechtenstein

Material Applications (☆ Highly Recommended ○ Recommended ○ Suggested)

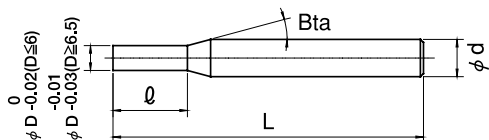
| Work Material | | | | | | | | | | | | | | | |
|-------------------------------|---------------------------------|----------------------------------|-----------------|--------|--------|-----------|-----------------|----------|--------|----------|-----------------------|-----------------|-----------------------|------------------|---------------------------------------|
| Carbon Steels S45C S55C | Alloy Steels SK / SCM SUS | Prehardened Steels NAK HPM | Hardened Steels | | | Cast Iron | Aluminum Alloys | Graphite | Copper | Plastics | Glass Filled Plastics | Titanium Alloys | Heat Resistant Alloys | Cemented Carbide | Hard Brittle (Non-Metallic) Materials |
| | | | ~55HRC | ~60HRC | ~70HRC | | | | | | | | | | |
| ○ | ○ | ○ | ○ | | | ○ | ○ | | ○ | | | | ○ | ○ | |

Features

The new tip geometry is ideal for vertical milling on horizontal surfaces.

The carbide grade specified offers excellent resistance to chipping.

The low friction characteristics of the coating offers excellent chip evacuation as well as longer tool life.



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Total 49 models

Unit (mm)

| Model Number | Outside Diameter ϕD | Length of Cut l | Shank Taper Angle Bta | Overall Length L | Shank Diameter ϕd | Price (¥) |
|---------------|---------------------------|-------------------|-------------------------|--------------------|-------------------------|-----------|
| CZS 4010-0150 | 1 | 1.5 | 16° | 50 | 4 | 6,900 |
| CZS 4010-0250 | 1 | 2.5 | 16° | 50 | 4 | 6,900 |
| CZS 4015-0225 | 1.5 | 2.25 | 16° | 50 | 4 | 6,900 |
| CZS 4015-0400 | 1.5 | 4 | 16° | 50 | 4 | 6,900 |
| CZS 4020-0300 | 2 | 3 | 16° | 50 | 4 | 6,300 |
| CZS 4020-0600 | 2 | 6 | 16° | 50 | 4 | 6,300 |
| CZS 4025-0375 | 2.5 | 3.75 | 16° | 50 | 4 | 6,300 |
| CZS 4025-0800 | 2.5 | 8 | 16° | 50 | 4 | 6,300 |
| CZS 4030-0450 | 3 | 4.5 | 16° | 60 | 6 | 7,500 |
| CZS 4030-0800 | 3 | 8 | 16° | 60 | 6 | 7,500 |
| CZS 4035-1000 | 3.5 | 10 | 16° | 60 | 6 | 8,700 |
| CZS 4040-0600 | 4 | 6 | 16° | 60 | 6 | 7,800 |

Next Page ➡

Unit (mm)

| Model Number | Outside Diameter ϕD | Length of Cut ℓ | Shank Taper Angle $B\alpha$ | Overall Length L | Shank Diameter ϕd | Price (¥) |
|---------------|---------------------------|----------------------|-----------------------------|------------------|-------------------------|-----------|
| CZS 4040-1100 | 4 | 11 | 16° | 60 | 6 | 7,800 |
| CZS 4045-1100 | 4.5 | 11 | 16° | 60 | 6 | 9,300 |
| CZS 4050-0750 | 5 | 7.5 | 16° | 60 | 6 | 8,400 |
| CZS 4050-1300 | 5 | 13 | 16° | 60 | 6 | 8,400 |
| CZS 4055-1300 | 5.5 | 13 | 16° | 60 | 6 | 9,600 |
| CZS 4060-0900 | 6 | 9 | — | 60 | 6 | 8,700 |
| CZS 4060-1300 | 6 | 13 | — | 60 | 6 | 8,700 |
| CZS 4060-1800 | 6 | 18 | — | 60 | 6 | 9,600 |
| CZS 4065-1600 | 6.5 | 16 | 16° | 70 | 8 | 12,600 |
| CZS 4070-1050 | 7 | 10.5 | 16° | 70 | 8 | 11,300 |
| CZS 4070-1600 | 7 | 16 | 16° | 70 | 8 | 11,300 |
| CZS 4070-2100 | 7 | 21 | 16° | 70 | 8 | 12,500 |
| CZS 4075-1600 | 7.5 | 16 | 16° | 70 | 8 | 12,600 |
| CZS 4080-1200 | 8 | 12 | — | 70 | 8 | 11,300 |
| CZS 4080-1900 | 8 | 19 | — | 70 | 8 | 11,300 |
| CZS 4080-2400 | 8 | 24 | — | 70 | 8 | 12,500 |
| CZS 4085-1900 | 8.5 | 19 | 16° | 80 | 10 | 14,600 |
| CZS 4090-1350 | 9 | 13.5 | 16° | 80 | 10 | 13,200 |
| CZS 4090-1900 | 9 | 19 | 16° | 80 | 10 | 13,200 |
| CZS 4090-2700 | 9 | 27 | 16° | 80 | 10 | 16,700 |
| CZS 4095-1900 | 9.5 | 19 | 16° | 80 | 10 | 14,600 |
| CZS 4100-1500 | 10 | 15 | — | 80 | 10 | 13,200 |
| CZS 4100-2200 | 10 | 22 | — | 80 | 10 | 13,200 |
| CZS 4100-3000 | 10 | 30 | — | 80 | 10 | 14,600 |
| CZS 4105-2200 | 10.5 | 22 | 16° | 100 | 12 | 21,000 |
| CZS 4110-1650 | 11 | 16.5 | 16° | 100 | 12 | 19,300 |
| CZS 4110-2200 | 11 | 22 | 16° | 100 | 12 | 19,300 |
| CZS 4110-3300 | 11 | 33 | 16° | 100 | 12 | 23,000 |
| CZS 4115-2200 | 11.5 | 22 | 16° | 100 | 12 | 21,000 |
| CZS 4120-1800 | 12 | 18 | — | 100 | 12 | 19,300 |
| CZS 4120-2600 | 12 | 26 | — | 100 | 12 | 19,300 |
| CZS 4120-3600 | 12 | 36 | — | 100 | 12 | 21,300 |
| CZS 4130-2600 | 13 | 26 | — | 110 | 12 | 26,500 |
| CZS 4160-2400 | 16 | 24 | — | 110 | 16 | 54,200 |
| CZS 4160-3200 | 16 | 32 | — | 110 | 16 | 57,000 |
| CZS 4200-3000 | 20 | 30 | — | 125 | 20 | 79,800 |
| CZS 4200-4000 | 20 | 40 | — | 125 | 20 | 84,000 |

Square

Square

Long Neck Square

Radius

Radius

Long Neck Radius

Ball / Long Shank Ball

Ball

Long Neck Ball

Taper Neck Ball

Taper

Taper

Spiral V Cutter

Drill Thread Mill

EURO Series

Technical Data

CZS Series
S50C
Milling Video



Milling Conditions for CZS

◆1.5D flute length type

| WORK MATERIAL | | | CARBON STEELS S45C / S50C (~225HB) | | | | ALLOY STEELS SK / SCM (225~325HB) | | | | STRUCTURAL STEELS SS400 Recommend water soluble coolant. (Use water soluble coolant when vertical milling.) | | | |
|---------------------|-----------------------|--------------------|--|--|--|---|---|--|--|--|--|--------------------|----------|--------------|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4010-0150 | 1 | 1.5 | 18,000 | 150 | 200 | 1,200※ | 14,500 | 50 | 150 | 900※ | 18,000 | 100※1 | 400※1 | 1,200※ |
| 4015-0225 | 1.5 | 2.25 | 16,000 | 200 | 550 | 1,800※ | 13,000 | 80 | 400 | 1,200※ | 16,000 | 100※1 | 600※1 | 1,800※ |
| 4020-0300 | 2 | 3 | 12,000 | 200 | 550 | 1,800※ | 10,000 | 80 | 400 | 1,200※ | 12,000 | 200※1 | 600※1 | 1,800※ |
| 4025-0375 | 2.5 | 3.75 | 10,000 | 300 | 950 | 2,400※ | 8,000 | 100 | 650 | 1,800※ | 10,000 | 300 | 950 | 2,400※ |
| 4030-0450 | 3 | 4.5 | 8,500 | 300 | 950 | 2,400※ | 6,800 | 100 | 650 | 1,800※ | 8,500 | 300 | 950 | 2,400※ |
| 4040-0600 | 4 | 6 | 7,200 | 300 | 950 | 1,350 | 5,700 | 110 | 650 | 1,000 | 7,200 | 300 | 950 | 1,350 |
| 4050-0750 | 5 | 7.5 | 6,000 | 300 | 1,000 | 1,500 | 4,800 | 110 | 700 | 1,100 | 6,000 | 300 | 1,000 | 1,500 |
| 4060-0900 | 6 | 9 | 5,000 | 300 | 1,000 | 1,600 | 4,000 | 120 | 700 | 1,200 | 5,000 | 300 | 1,000 | 1,600 |
| 4070-1050 | 7 | 10.5 | 4,200 | 300 | 1,000 | 1,500 | 3,400 | 110※1 | 700 | 1,150 | 4,200 | 300 | 900 | 1,500 |
| 4080-1200 | 8 | 12 | 3,500 | 300 | 950 | 1,400 | 2,700 | 110※1 | 700 | 1,050 | 3,500 | 250 | 850 | 1,400 |
| 4090-1350 | 9 | 13.5 | 2,900 | 300 | 950 | 1,300 | 2,300 | 100※1 | 700 | 1,000 | 2,900 | 250 | 800 | 1,300 |
| 4100-1500 | 10 | 15 | 2,300 | 300 | 900 | 1,200 | 1,900 | 100※1 | 650 | 900 | 2,300 | 200 | 750 | 1,200 |
| 4110-1650 | 11 | 16.5 | 2,050 | 280 | 900 | 1,150 | 1,700 | 90※1 | 650 | 850 | 2,050 | 200 | 750 | 1,150 |
| 4120-1800 | 12 | 18 | 1,850 | 260 | 850 | 1,100 | 1,550 | 80※1 | 600 | 800 | 1,850 | 180 | 700 | 1,100 |
| 4160-2400 | 16 | 24 | 1,380 | 150※ | 830※ | 550 | 1,100 | 150※2 | 400※ | 440 | 1,380 | 150※2 | 830※2 | 550 |
| 4200-3000 | 20 | 30 | 1,000 | 150※ | 830※ | 500 | 880 | 150※2 | 400※ | 440 | 1,000 | 150※2 | 830※2 | 500 |
| Milling Amount (mm) | | | Depth: 1D ※ Depth: 0.1D (Max 10mm) | a _p : 1D ※ a _p : 0.5D | a _p : Length of Cut a _e : 0.2D ※ a _e : 0.1D | 1D depth ※ 1 Max 6mm ※ 2 0.1D depth (Max 10mm) | a _p : 1D ※ 0.5D | a _p : Length of Cut a _e : 0.2D ※ a _e : 0.1D | Depth: 0.5D ※ 1 Depth: 0.25D ※ 2 Depth: 0.1D (Max 10mm) | a _p : 1D ※ 1 a _p : 0.25D ※ 2 a _p : 0.5D | a _p : Length of Cut a _e : 0.2D ※ a _e : 0.1D | | | |

| WORK MATERIAL | | | STAINLESS STEELS SUS304 Use water soluble coolant. | | | | PREHARDENED STEELS HPM / NAK (30~45HRC) | | | | HARDENED STEELS SKD / SKT / STAVAX (45~55HRC) | | | |
|---------------------|-----------------------|--------------------|--|--|---|---------------------------|---|---|---|--|---|--------------------|----------|--------------|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4010-0150 | 1 | 1.5 | 14,500 | 150 | 250 | 1,000※ | 14,500 | 100 | 120 | 600※ | 12,900 | 80 | 50※1 | 300※ |
| 4015-0225 | 1.5 | 2.25 | 13,000 | 150 | 270 | 1,500※ | 12,000 | 150 | 320 | 900※ | 10,000 | 150 | 100※1 | 650※ |
| 4020-0300 | 2 | 3 | 10,000 | 100 | 270 | 1,500※ | 9,000 | 150 | 320 | 900※ | 8,200 | 150 | 150※1 | 650※ |
| 4025-0375 | 2.5 | 3.75 | 8,000 | 100 | 300 | 2,000※ | 7,500 | 200 | 520 | 1,200※ | 7,000 | 250 | 300 | 1,000※ |
| 4030-0450 | 3 | 4.5 | 6,800 | 80 | 300 | 2,000※ | 6,800 | 200 | 520 | 1,200※ | 6,120 | 250 | 300 | 1,000※ |
| 4040-0600 | 4 | 6 | 5,700 | 90 | 350 | 1,150 | 5,100 | 220 | 520 | 700 | 5,000 | 220 | 320 | 600 |
| 4050-0750 | 5 | 7.5 | 4,800 | 100 | 400 | 1,300 | 4,050 | 240 | 520 | 850 | 4,300 | 180 | 340 | 800 |
| 4060-0900 | 6 | 9 | 4,000 | 100 | 400 | 1,300 | 3,300 | 240 | 520 | 1,000 | 3,600 | 160 | 360 | 1,000 |
| 4070-1050 | 7 | 10.5 | 3,200 | 100 | 350 | 1,300 | 2,900 | 240※ | 500※1 | 1,000 | 2,800 | 160※ | 320 | 1,000 |
| 4080-1200 | 8 | 12 | 2,400 | 90※ | 300 | 1,200 | 2,300 | 220※ | 470※1 | 900 | 2,100 | 150※ | 280 | 1,000 |
| 4090-1350 | 9 | 13.5 | 1,800 | 90※ | 250 | 1,100 | 1,900 | 220※ | 470※1 | 900 | 1,600 | 130※ | 240 | 950 |
| 4100-1500 | 10 | 15 | 1,400 | 80※ | 200 | 1,000 | 1,500 | 200※ | 450※1 | 900 | 1,250 | 120※ | 200 | 750 |
| 4110-1650 | 11 | 16.5 | 1,250 | 80※ | 200 | 900 | 1,350 | 200※ | 450※1 | 850 | 1,150 | 110※ | 190 | 720 |
| 4120-1800 | 12 | 18 | 1,250 | 70※ | 180 | 900 | 1,200 | 180※ | 420※1 | 800 | 1,050 | 110※ | 180 | 700 |
| 4160-2400 | 16 | 24 | 1,250 | 70※ | 450※ | 440 | 1,110 | 150※ | 400※2 | 440※ | 800 | 50※ | 300※2 | 320※ |
| 4200-3000 | 20 | 30 | 1,000 | 70※ | 450※ | 440 | 880 | 150※ | 400※2 | 440※ | 630 | 50※ | 300※2 | 320※ |
| Milling Amount (mm) | | | Depth: 0.25D ※ Max 2mm | a _p : 1D ※ a _p : 0.4D | a _p : Length of Cut a _e : 0.1D ※ a _e : 0.05D | 0.5D depth ※ 3mm depth | a _p : 1D ※ 1 a _p : Max 6mm ※ 2 a _p : 0.25~0.5D | a _p : Length of Cut a _e : 0.1D ※ a _e : 0.05D | Depth: 0.25D ※ Max 1.5mm (a _p : Max 3mm) | a _p : 1D ※ 1 a _p : 0.25D ※ 2 a _p : 0.1D | a _p : Length of Cut a _e : 0.1D ※ a _e : 0.05D | | | |

Milling Conditions for CZS

◆ Standard flute length type

| WORK MATERIAL | | | CARBON STEELS S45C / S50C (~225HB) | | | | ALLOY STEELS SK / SCM (225~325HB) | | | | STRUCTURAL STEELS SS400 Recommend water soluble coolant. (Use water soluble coolant when vertical milling.) | | | |
|---------------------|-----------------------|--------------------|--|--|------------------------------|--|---|---|------------------------------|--|--|--|---|--|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4010-0250 | 1 | 2.5 | 18,000 | 100 | 200※ | 1,200※ | 14,500 | 50 | 150※ | 900※ | 18,000 | 100※1 | 400※1 | 1,200※ |
| 4020-0600 | 2 | 6 | 12,000 | 150 | 400※ | 1,800※ | 10,000 | 80 | 300※ | 1,200※ | 12,000 | 200※1 | 600※1 | 1,800※ |
| 4030-0800 | 3 | 8 | 8,500 | 250 | 600 | 2,400※ | 6,800 | 100 | 400 | 1,800※ | 8,500 | 300 | 600 | 2,400※ |
| 4040-1100 | 4 | 11 | 7,200 | 270 | 650 | 1,350 | 5,700 | 110 | 450 | 1,000 | 7,200 | 300 | 650 | 1,350 |
| 4050-1300 | 5 | 13 | 6,000 | 300 | 700 | 1,500 | 4,800 | 110 | 500 | 1,100 | 6,000 | 300 | 700 | 1,500 |
| 4060-1300 | 6 | 13 | 5,000 | 300 | 700 | 1,600 | 4,000 | 120 | 500 | 1,200 | 5,000 | 300 | 700 | 1,600 |
| 4070-1600 | 7 | 16 | 4,200 | 300 | 700 | 1,500 | 3,400 | 110※1 | 500 | 1,150 | 4,200 | 270 | 700 | 1,500 |
| 4080-1900 | 8 | 19 | 3,500 | 300 | 700 | 1,400 | 2,700 | 110※1 | 500 | 1,050 | 3,500 | 250 | 700 | 1,400 |
| 4090-1900 | 9 | 19 | 2,900 | 300 | 700 | 1,300 | 2,300 | 100※1 | 500 | 1,000 | 2,900 | 220 | 700 | 1,300 |
| 4100-2200 | 10 | 22 | 2,300 | 300 | 700 | 1,200 | 1,900 | 100※1 | 500 | 900 | 2,300 | 200 | 700 | 1,200 |
| 4110-2200 | 11 | 22 | 2,050 | 280 | 670 | 1,150 | 1,700 | 90※1 | 450 | 850 | 2,050 | 190 | 680 | 1,150 |
| 4120-2600 | 12 | 26 | 1,850 | 260 | 650 | 1,100 | 1,550 | 80※1 | 450 | 800 | 1,850 | 180 | 650 | 1,100 |
| 4130-2600 | 13 | 26 | 1,400 | 80 | 300 | 700※ | 1,100 | 25※1 | 180 | 550※ | 1,100 | 55 | 180 | 550※ |
| 4160-3200 | 16 | 32 | 1,380 | 150※ | 830※ | 550 | 1,100 | 150※2 | 300※ | 440 | 1,380 | 150※2 | 830※2 | 550 |
| 4200-4000 | 20 | 40 | 1,000 | 150※ | 830※ | 500 | 880 | 150※2 | 300※ | 440 | 1,000 | 150※2 | 830※2 | 500 |
| Milling Amount (mm) | | | | Depth: 1D ※ Depth: 0.1D (Max 10mm) | a_p : 1D ※ a_p : 0.5D | a_p : 1.5D a_e : 0.2D ※ a_e : 0.1D | | 1D depth ※1 Max 6mm ※2 0.1D depth (Max 10mm) | a_p : 1D ※ a_p : 0.5D | a_p : 1.5D a_e : 0.2D ※ a_e : 0.1D | | Depth: 0.5D ※1 Depth: 0.25D ※2 Depth: 0.1D (Max 10mm) | a_p : 1D ※1 a_p : 0.25D ※2 a_p : 0.5D | a_p : 1.5D a_e : 0.2D ※ a_e : 0.1D |

| WORK MATERIAL | | | STAINLESS STEELS SUS304 Use water soluble coolant. | | | | PREHARDENED STEELS HPM / NAK (30~45HRC) | | | | HARDENED STEELS SKD / SKT / STAVAX (45~55HRC) | | | |
|---------------------|-----------------------|--------------------|--|---|--------------------------------|---|---|-------------------------|------------------------------|--|---|--|---|---|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4010-0250 | 1 | 2.5 | 14,500 | 150 | 250 | 1,000※ | 12,900 | 80 | 140 | 270 | 12,900 | 80 | 50※1 | 300※ |
| 4020-0600 | 2 | 6 | 10,000 | 100 | 270 | 1,500※ | 9,350 | 110 | 230 | 400 | 8,200 | 150 | 150※1 | 650※ |
| 4030-0800 | 3 | 8 | 6,800 | 80 | 300 | 2,000※ | 6,120 | 120 | 270 | 450 | 6,120 | 250 | 300 | 1,000※ |
| 4040-1100 | 4 | 11 | 5,700 | 90 | 350 | 1,150 | 5,250 | 130 | 320 | 500 | 5,000 | 220 | 320 | 500 |
| 4050-1300 | 5 | 13 | 4,800 | 100 | 400 | 1,300 | 4,460 | 150 | 360 | 540 | 4,300 | 180 | 340 | 520 |
| 4060-1300 | 6 | 13 | 4,000 | 100 | 400 | 1,300 | 3,600 | 160 | 360 | 540 | 3,600 | 160 | 360 | 540 |
| 4070-1600 | 7 | 16 | 3,200 | 100 | 350 | 1,300 | 2,850 | 140※ | 340 | 540 | 2,800 | 160※1 | 320 | 520 |
| 4080-1900 | 8 | 19 | 2,400 | 90※1 | 300 | 1,200 | 2,320 | 90※ | 320 | 480 | 2,100 | 150※1 | 280 | 500 |
| 4090-1900 | 9 | 19 | 1,800 | 90※1 | 250 | 1,100 | 1,700 | 80※ | 250 | 410 | 1,600 | 130※1 | 240 | 470 |
| 4100-2200 | 10 | 22 | 1,400 | 80※1 | 200 | 1,000 | 1,250 | 60※ | 180 | 340 | 1,250 | 120※1 | 200 | 450 |
| 4110-2200 | 11 | 22 | 1,250 | 80※1 | 200 | 900 | 1,100 | 55※ | 170 | 320 | 1,150 | 110※1 | 190 | 440 |
| 4120-2600 | 12 | 26 | 1,250 | 70※1 | 180 | 900 | 1,050 | 50※ | 160 | 320 | 1,050 | 110※1 | 180 | 420 |
| 4130-2600 | 13 | 26 | 1,050 | 20※2 | 120 | 900※ | 1,000 | N/A | 100※ | 300※ | 900 | N/A | N/A | 370※ |
| 4160-3200 | 16 | 32 | 1,250 | 70※1 | 450※ | 440 | 960 | 40※ | 350※ | 380※ | 800 | 50※2 | 300※2 | 320※ |
| 4200-4000 | 20 | 40 | 1,000 | 70※1 | 450※ | 440 | 770 | 40※ | 350※ | 380※ | 630 | 50※2 | 300※2 | 320※ |
| Milling Amount (mm) | | | | 0.25D depth ※1 Max 2mm ※2 Max 1.5mm | a_p : 0.5D ※ a_p : 0.1D | a_p : 1.5D a_e : 0.1D ※ a_e : 0.05D | | 0.5D depth ※ Max 2mm | a_p : 1D ※ a_p : 0.5D | a_p : 1.5D a_e : 0.2D ※ a_e : 0.1D | | 0.25D depth ※1 Max 1.5mm ※2 0.1D depth (Max 10mm) | a_p : 0.5D ※1 a_p : 0.25D ※2 a_p : 0.1D | a_p : 1.5D a_e : 0.1D ※ a_e : 0.05D |

Square

Square
Long Neck
Square

Radius

Radius
Long Neck
RadiusBall / Long
Shank BallBall
Long Neck
BallTaper Neck
Ball

Taper

Spiral
V CutterDrill
Thread Mill

EURO Series

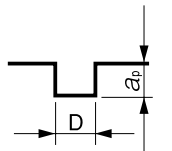
Technical Data

Milling Conditions for CZS

◆3D flute length type

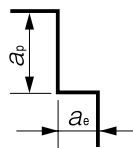
| WORK MATERIAL | | | CARBON STEELS S45C / S50C (~225HB) | | | | ALLOY STEELS SK / SCM (225~325HB) | | | | STRUCTURAL STEELS SS400 Recommend water soluble coolant. (Use water soluble coolant when vertical milling.) | | | |
|---------------------|-----------------------|--------------------|--|--------------------|------------|---------------------------------------|---|--------------------|------------|---------------------------------------|--|--------------------|------------|---------------------------------------|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4060-1800 | 6 | 18 | 5,000 | 200 | 500 | 1,600 | 4,000 | 60 | 350 | 1,200 | 4,000 | 120 | 300 | 1,300 |
| 4070-2100 | 7 | 21 | 4,100 | 200 | 450 | 1,450 | 3,400 | 60 | 330 | 1,150 | 3,400 | 110 | 280 | 1,200 |
| 4080-2400 | 8 | 24 | 3,200 | 150 | 400 | 1,300 | 2,700 | 50 | 300 | 1,050 | 2,700 | 90 | 250 | 1,150 |
| 4090-2700 | 9 | 27 | 2,400 | 140 | 350 | 1,150 | 2,050 | 50 | 270 | 1,000 | 2,100 | 80 | 230 | 1,050 |
| 4100-3000 | 10 | 30 | 1,850 | 120 | 320 | 1,000 | 1,500 | 40 | 240 | 900 | 1,500 | 70 | 200 | 1,000 |
| 4110-3300 | 11 | 33 | 1,650 | 100 | 300 | 900 | 1,350 | 40 | 220 | 850 | 1,350 | 65 | 190 | 950 |
| 4120-3600 | 12 | 36 | 1,500 | 90 | 300 | 800 | 1,200 | 30 | 200 | 750 | 1,200 | 60 | 190 | 900 |
| Milling Amount (mm) | | | | Depth: 1D | a_p : 1D | a_p : Length of Cut a_e : 0.1D | | Max 6mm depth | a_p : 1D | a_p : Length of Cut a_e : 0.1D | | Depth: 0.5D | a_p : 1D | a_p : Length of Cut a_e : 0.1D |

| WORK MATERIAL | | | STAINLESS STEELS SUS304 Use water soluble coolant. | | | | PREHARDENED STEELS HPM / NAK (30~45HRC) | | | | HARDENED STEELS SKD / SKT / STAVAX (45~55HRC) | | | |
|---------------------|-----------------------|--------------------|--|--------------------|--------------|--|---|--------------------|-----------------|--|---|--------------------|-----------------|--|
| Model Number | Outside Diameter (mm) | Length of Cut (mm) | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | | Spindle Speed (min ⁻¹) | Feed Rate (mm/min) | | |
| | | | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling | | Vertical | Slotting | Side Milling |
| 4060-1800 | 6 | 18 | 2,800 | 40 | 200 | 900 | 3,000 | — | 160 | 600 | 3,600 | — | — | 540 |
| 4070-2100 | 7 | 21 | 2,450 | 40 | 190 | 950 | 2,500 | — | 160 | 700 | 2,900 | — | — | 520 |
| 4080-2400 | 8 | 24 | 2,100 | 40 | 180 | 950 | 2,150 | — | 150 | 750 | 2,300 | — | — | 500 |
| 4090-2700 | 9 | 27 | 1,700 | 30 | 170 | 1,000 | 1,850 | — | 150 | 800 | 1,700 | — | — | 470 |
| 4100-3000 | 10 | 30 | 1,400 | 30 | 150 | 1,000 | 1,500 | — | 140 | 900 | 1,250 | — | — | 450 |
| 4110-3300 | 11 | 33 | 1,250 | 30 | 140 | 1,000 | 1,350 | — | 130 | 850 | 1,100 | — | — | 420 |
| 4120-3600 | 12 | 36 | 1,150 | 25 | 130 | 950 | 1,200 | — | 120 | 800 | 1,000 | — | — | 400 |
| Milling Amount (mm) | | | | Max 1.5mm depth | a_p : 0.5D | a_p : Length of Cut a_e : 0.05D | | setting disable | a_p : Max 6mm | a_p : Length of Cut a_e : 0.05D | | setting disable | setting disable | a_p : Length of Cut a_e : 0.05D |



Slotting

a_p : Axial Depth (mm)
D : Outside Diameter (mm)



Side Milling

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

Note:

- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed, or when burr and red-hot occur.
- These milling parameters are calculated based on the shortest overhang length. Longer overhangs may require an adjustment to the milling parameters.
- Reduce the milling amount and feed rate in accordance with required milling precision.
- Spindle rigidity should be considered when setting milling parameters, especially for Z-Axis drilling.
- When slotting, using Z-Axis drilling, the milling parameters should promote good chip evacuation.
- Reduce the milling amount when chips clog on the tool during Z-Axis drilling.
- The milling parameter of outside diameter 16 and 20 is calculated based on MT50 spindle type. Decrease 50% milling amount for BT40 spindle type.
- Adjust the feed rate with indication ※ following the conditions in milling amount columns.
- Recommend water soluble or oil coolant.
- Recommend water soluble coolant (through-spindle type) for Stainless Steels and Aluminum Alloys.
- Recommend oil coolant for Titanium Alloys and Heat Resistant Alloys.

CZS The 2 in 1 Advantage

4 Flute UTOAT Square End Mills for Part Milling

Patented special end profile design

Drilling and Milling in a Single Tool! 1/2 Cycle Time!

Tool1: Pilot Hole Drill

Tool2: Slotting End Mill

Drills and Mills - only with CZS



Drilling and Milling: 144min
CZS → 72 min

| | |
|-----------------------|------------------------|
| Tool | φ 8x12mm Length of Cut |
| Work Material | SCM420H |
| Spindle Speed | 2,700min ⁻¹ |
| Z-Drilling Feed Rate | 220mm/min |
| X-Y Milling Feed Rate | 500mm/min |
| Coolant | Water Soluble |



Pocket Size: 9mm×15mm×4mm



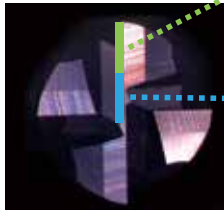
More tool life left after milling 864 holes (32 pieces)!

Z-drilling: 1mm depth x 4 times Dwell: 0.1sec

Drilling Mechanism

Normal 4 Flutes

Conventional End Profile



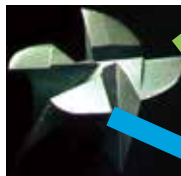
Chips made by the main flutes outer edge → Bigger

Chips made by the inner edge → Trapped

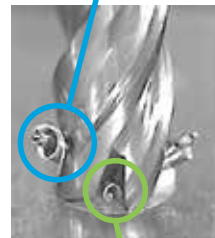
Normal 4 flute end mill easily clogs
Impossible to Drill

The outer edge of the main flutes are not used in the drilling cycle

Gap on Main Flute **CZS**



Big chips come from the sub flute



Small chips come from the main flute

Chips made by the main flutes inner edge evacuate smoothly
Giving High Speed Drilling

Variable Pitch Prevents Chattering!

| | |
|-----------------------|----------------------------|
| Tool | φ 6.5x16mm Length of Cut |
| Work Material | S45C (φ 18) |
| Spindle Speed | 2,200min ⁻¹ |
| Z-Drilling Feed Rate | 100mm/min |
| X-Y Milling Feed Rate | 400mm/min |
| Axial Depth a_p | 3mm |
| Overhang | 25mm |
| Coolant | Air Blow (Through Spindle) |



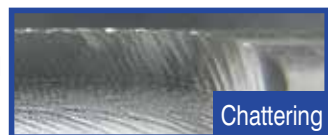
Cantilevered work piece

CZS



Excellent Surface Finish

Conventional 4 Flutes



Chattering

Square
Long Neck Square

Radius
Long Neck Radius

Ball / Long Shank Ball

Long Neck Ball
Taper Neck Ball

Taper

Spiral V Cutter

Drill Thread Mill

EURO Series

Technical Data