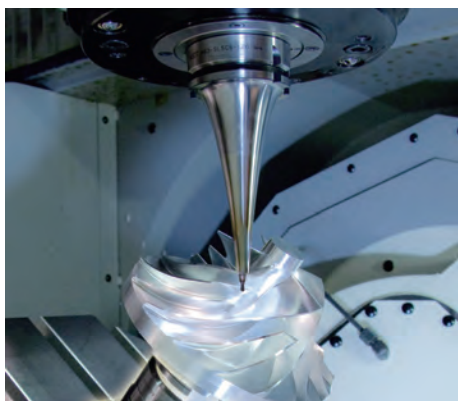




SHRINK-FIT HOLDER

SLIMLINE

MONO CURVE

PAT.P



5 轴控制加工中心用最佳刀柄

热装式刀柄 SLIMLINE **CURVE** 一体型



5축 가공센터를 위한 최적의 공구 홀더

열박음 홀더 SLIMLINE MONO **CURVE**



**ทูลโฮลเดอร์ที่เหมาะสมสำหรับเครื่องแมชชีนนิ่งเซ็นเตอร์
ระบบ 5 แกน**

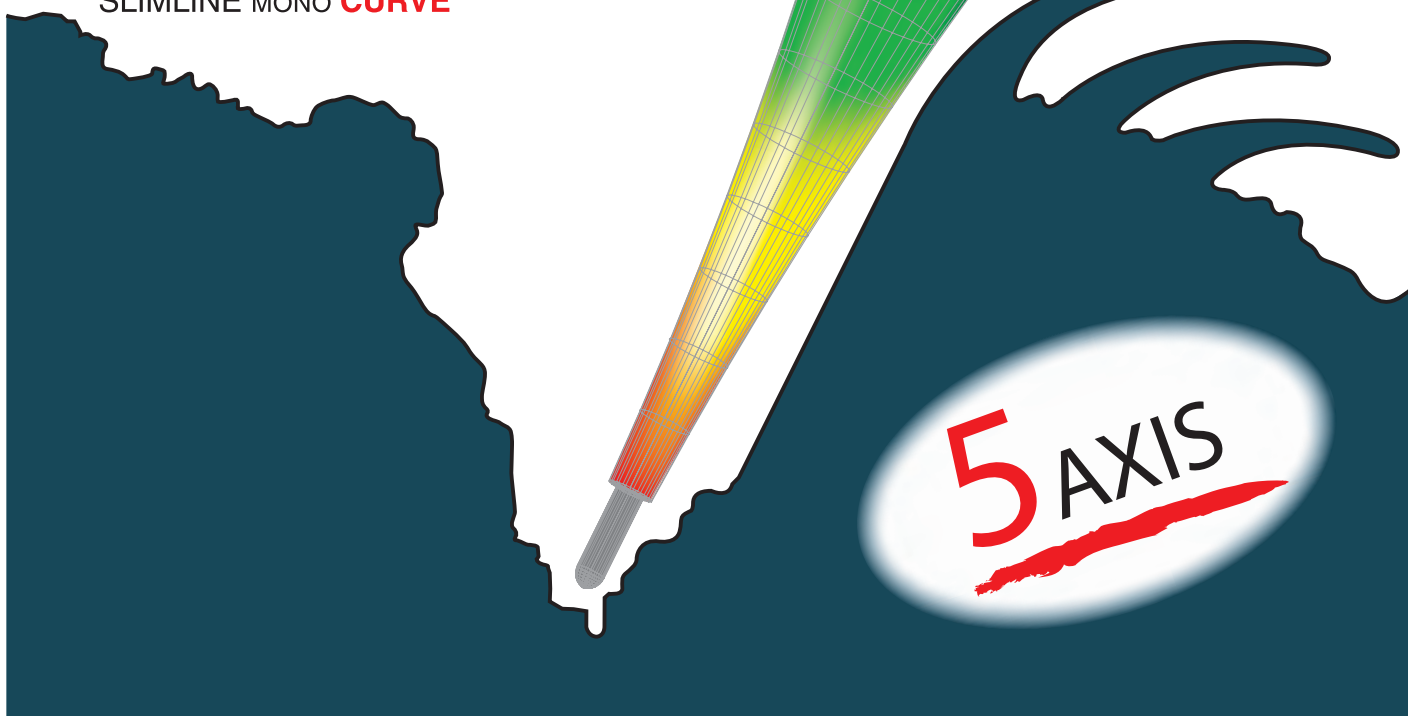
ขริงฟิต โฮลเดอร์ SLIMLINE MONO **CURVE**



**Optimum tool holder for 5 axis
machining center**

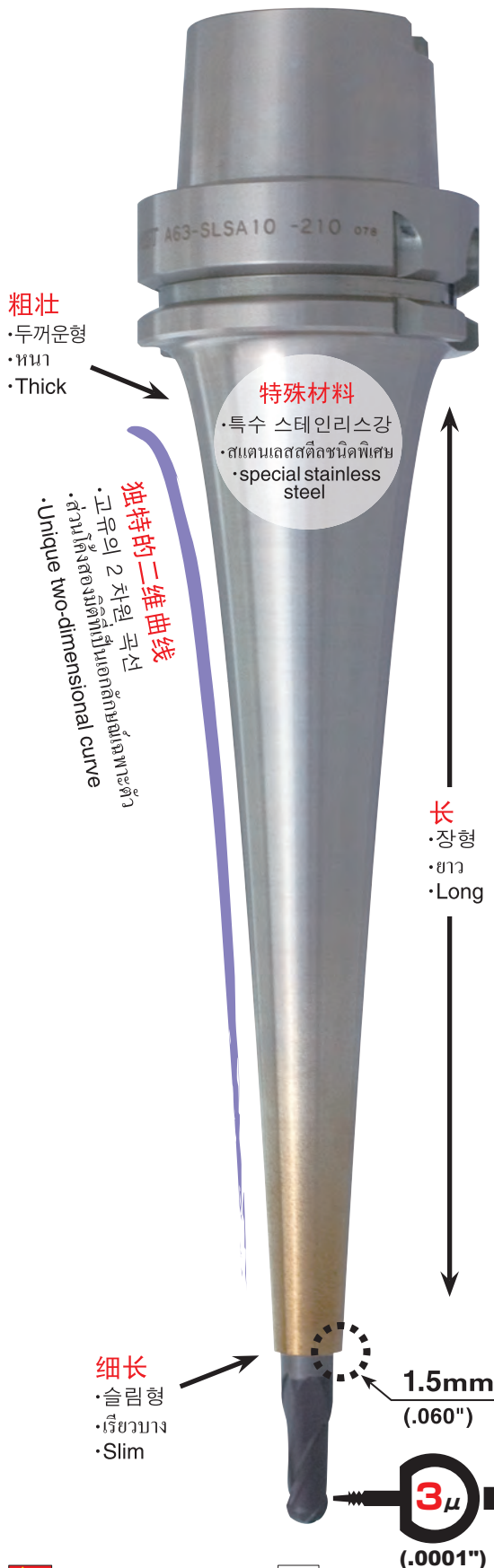
SHRINK-FIT HOLDER

SLIMLINE MONO **CURVE**



MST corporation
日本恩司迪公司

1103as



粗壮
·두꺼운형
·หนา
·Thick

特殊材料

·특수 스테인리스강
·สแตนเลสตีชนิดพิเศษ
·special stainless steel

独特的二维曲线
·고유인 2차원 곡선
·ส่วนโค้งงอที่มีลักษณะเฉพาะตัว
·Unique two-dimensional curve

长
·장형
·ยาว
·Long

细长
·슬림형
·เรียวบาง
·Slim

筒夹式刀柄 强力铣刀柄
·콜렛 홀더 밀링 척
·คอลเล็ทโฮลเดอร์ หัวจับเอ็นมิล
·Collet holder, Milling chuck

SLIMLINE
MONO
CURVE

高刚性 높은 강성 ความแข็งแรงสูง High rigidity

干涉

·간섭
·การกีดขวาง
·Interference

特殊锥颈型铣刀

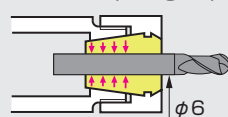
·특수 설계 테이퍼 넥 엔드밀
·엔มิล (ดอกกัด)
·แบบคอเรียวที่ออกแบบมาพิเศษ
·special design taper-necked end-mill

标准刀具 突出长度最短

·표준 절삭 공구
·เครื่องมือตัดเจาะมาตรฐาน
·standard cutting tool
·최소 오버행
·ระยะจับยึดต่ำสุด
·minimum overhang

高夹持力 강력한 체결력 แรงจับยึดที่แข็งแรง Strong chucking force

21N·m (2.1kgf·m)

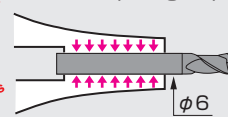


弹性形变

·탄성 변형
·การบิดเบือนเปลี่ยนรูป
·Elastic deformation

3倍
3mm
3times

62N·m (6.2kgf·m)



热膨胀

·열팽창을
·สัมประสิทธิ์ การขยายตัวทางความร้อน
·Thermal expansion

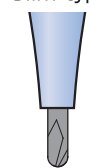
收缩力

·수축력
·แรงจากการหดตัว
·Shrinkage Force

增大产品多样性 베리에이션 추가 เพิ่มความหลากหลาย Added new variety

细长型

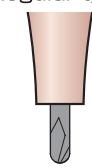
·슬림형
·แบบเพรียว
·Slim type



1.5mm

标准型

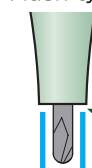
·레귤러형
·แบบธรรมดา
·Regular type



3~5mm

油孔型

·플러쉬형
·แบบมีรูสำหรับให้ สารหล่อเย็นไหลผ่าน
·Flush type



3~5mm

高精度 초정밀 런아웃 정확도 super run-out accuracy

ความร่วมมือ (run-out) ที่เที่ยงตรงอย่างยิ่ง



在5轴加工时,要求刀柄形状为前端部尽可能细长,根部尽可能粗壮,即使是很长的刀柄也不会产生颤动的刚性设计。SLIMLINE CURVE具有独特的2维曲线,实现5轴加工时的理想刀柄设计。



5축 가공에서 홀더에 요구되는 형상은 선단부가 최대한 가늘고 슬림한 것입니다. 그리고 테이퍼 시작부가 굵어 홀더가 길어도 chatter가 발생하지 않는 강성이 있는 디자인입니다. SLIMLINE MONO CURVE는 고유의 2차원 곡선으로 5축 가공에서의 홀더의 이상적인 디자인을 실현했습니다.



รูปร่างของโฮลเดอร์ ที่พึงปรารถนาสำหรับการทำงานในระบบ5แกน จะต้องเรียวบางใกล้กับความหนาของส่วนปลายให้มากที่สุด นอกจากนี้แล้วยังต้องเป็นดีไซน์ ที่มีส่วนฐานที่หนา และถึงแม้ โฮลเดอร์ จะยาวก็ยังต้องมีความแข็งแรงไม่แตกกร้าว SLIMLINE Mono Curveมีรูปร่างเป็นส่วนตัว สองมิติจึงเป็นดีไซน์ ที่ดีเลิศสำหรับการทำงานในระบบ5แกน



The optimum holder shape for 5-axis machining is as slim a design as possible in the tip. In addition, rigidity is important even if the neck of the holder is thick and long. The SLIMLINE MONO CURVE achieves such an ideal holder design for 5-axis machining with its unique secondary curve.

5 轴控制加工中心 - 控制轴的构成.

5 축 가공센터 - 축 제어 형식

เครื่องแมชชีนนิ่งเซ็นเตอร์ระบบ 5 แกน - รูปแบบการควบคุมระบบแกน

5-Axis Machining Center - Axis control type.

5 轴控制

- 5 축 제어
- การควบคุมระบบ 5 แกน
- 5 axis control



3 轴直进 (X, Y, Z)

- 3 축 직선 운동
- การเคลื่อนที่แนวตรงระบบ 3 แกน
- 3 axis straight movement



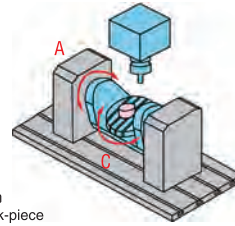
2 轴回转 (A, C)

- 2 축 테이블 포지셔닝
- การวางตำแหน่งโต๊ะงานระบบ 2 แกน
- 2 axis table positioning

工作台 旋转型

- 테이블 틸트 형식
- แบบปรับเอียงโต๊ะงาน
- Table Tilt type

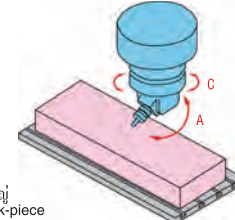
小型工件
• 소형 워크피스
• ชิ้นงานขนาดเล็ก
• Small size work-piece



主轴头 旋转型

- 헤드 틸트 형식
- แบบปรับเอียงหัวสปินเดิล
- Head Tilt type

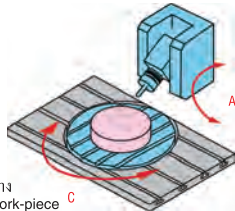
大型工件
• 대형 워크피스
• ชิ้นงานขนาดใหญ่
• Large size work-piece



工作台、主轴混合 旋转型

- 테이블 · 헤드 틸트 형식
- แบบปรับเอียงโต๊ะงาน · หัวสปินเดิล
- Table-Head Tilt type

中型工件
• 중형 워크피스
• ชิ้นงานขนาดกลาง
• Medium size work-piece



加工实例

사례 연구

กรณีศึกษา

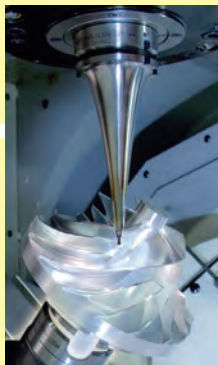
Case study

5 轴联动加工

- 동시 5 축 가공
- การทำงานพร้อมกันทั้ง 5 แกน
- Simultaneous 5 axis machining

5 个轴同时运动，加工复杂的三维形状

- 동시 5 축 가공은 복잡한 3D 형상의 워크피스에 적합합니다.
- การทำงานพร้อมกันทั้ง 5 แกน เหมาะสำหรับชิ้นงานที่มีรูปทรงสามมิติที่ซับซ้อน
- Simultaneous 5 axis machining is suitable for complicated 3D geometry work-pieces.



航空零部件

- 항공기 부품
- ชิ้นส่วนอุปกรณ์ทางอากาศยาน
- Aviation components



整体叶盘

- 블리스크
- 블ิสก์



医疗器械零部件

- 의료 부품
- ชิ้นส่วนอุปกรณ์ทางการแพทย์
- Medical components



人工骨

- 인공 뼈
- กระดูกเทียม
- Artificial bone



人工关节

- 인공 관절
- ข้อเทียม
- Artificial joint

2+3 轴加工

- 2+3 축 가공
- การทำงานในระบบ 2+3 แกน
- 2+3 axis machining

用回转 2 轴分度，用直线 3 轴进行加工

- 2 축 테이블을 회전 및 틸팅하여 워크피스를 인덱싱하고 스펀들이 3 축 직선 운동으로 작동합니다.
- ในการแบ่งพิกัดชิ้นงานโดยการหมุนและเอียงโต๊ะงานระบบ 2 แกน เพลหมุนจะทำงานร่วมกับใช้การเคลื่อนที่แนวตรงระบบ 3 แกน
- Indexing a work piece by rotating and tilting 2 axis table, a spindle works with using 3 axis straight movement.



复杂形状零部件

- 복잡한 형상의 부품
- ชิ้นงานที่มีรูปทรงซับซ้อน
- Complicated geometry components



射出成型模具

- 사출 몰드
- แม่พิมพ์ฉีด
- Injection mold



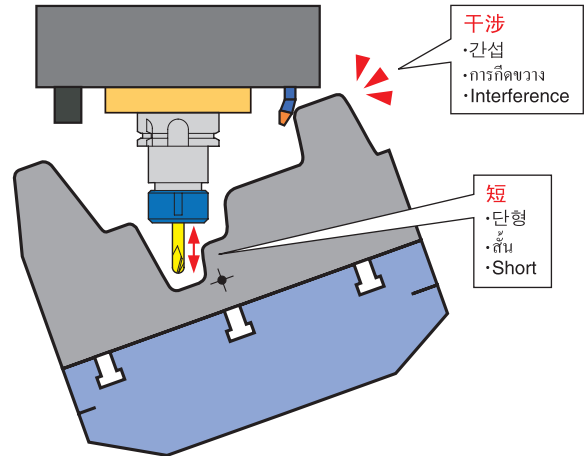
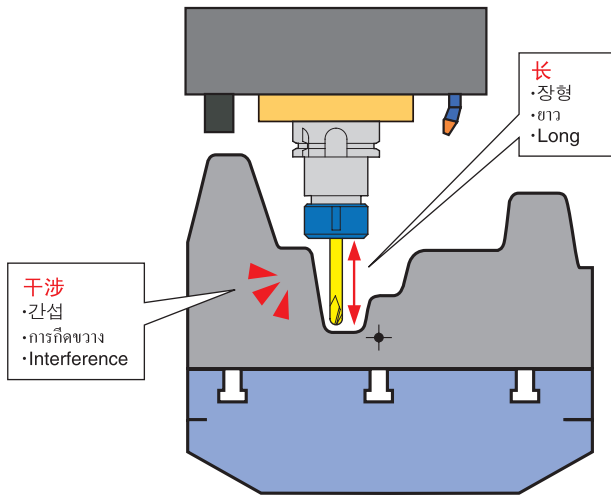
5 轴加工时最佳刀柄形状



5 축 가공을 위한 최적의 공구 홀더 설계

การออกแบบทูลโฮลเดอร์ที่เหมาะสมสำหรับการทำงานระบบ 5 แกน

The optimum tool holder design for 5 axis machining.



深腔 陡壁

3 轴加工

- 在 3 轴加工深腔且有陡壁的工件时，为了避免和刀柄前端的干涉，刀具的突出量需要放长。

5 轴加工

- 5 轴加工时，工件相对于主轴自由倾斜旋转，刀柄的干涉减少，刀具的突出长度可放短。
- 但是，主轴头和工件之间会产生干涉。



깊은 구멍 급경사 벽면

3 축 가공

- 깊은 구멍 또는 급경사 벽면을 가공할 경우 3 축 가공의 간섭을 피하기 위해 절삭 공구의 돌출량을 길게 해야 합니다.

5 축 가공

- 5 축 가공에서는 2 축 테이블을 회전 및 틸팅하여 워크피스를 자유롭게 틸팅할 수 있으므로 공구 홀더의 간섭을 줄이고 커터 돌출을 짧게 할 수 있습니다.
- 이러한 이점이 있는 반면, 스피indle 노즈와 워크피스 사이에 간섭이 발생합니다.



ร่องลึก ผังชัน

การทำงานในระบบ 3 แกน

- ในการตัดเฉือนชิ้นงานที่มีร่องลึกหรือผังชันจำเป็นต้องใช้ทูลที่มีความยาวเพิ่มมากขึ้นเพื่อหลีกเลี่ยงสิ่งกีดขวางในการทำงานที่พบในการทำงานระบบ 3 แกน

การทำงานในระบบ 5 แกน

- ในการทำงานระบบ 5 แกนนั่น สิ่งกีดขวางทูลโฮลเดอร์จะน้อยกว่าและระยะจับยึดทูลจะสั้นกว่า เนื่องจากสามารถเอียงชิ้นงานได้อย่างอิสระด้วยการหมุนและการเอียงโต๊ะหมุนระบบ 2 แกน
- แทนที่จะเกิดผลดี แต่กลับทำให้เกิดการกีดขวางระหว่างหัวเพลาหมุนกับชิ้นงาน



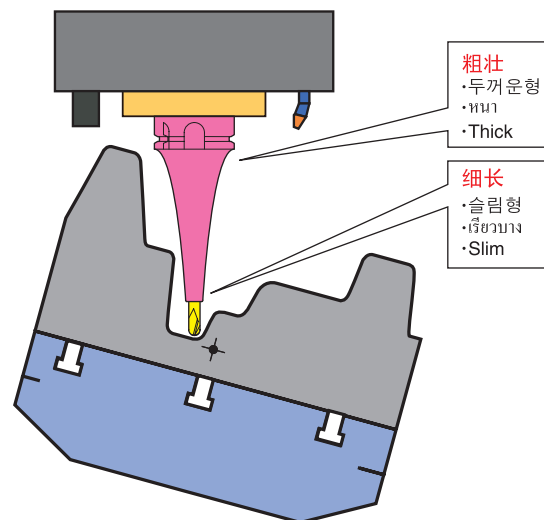
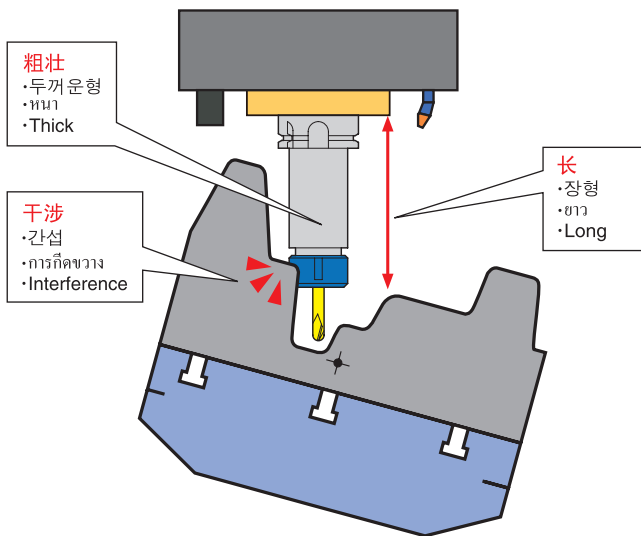
Deep cavity Steep wall

3 axis machining

- Longer cutter projection is required in deep cavity or steep wall machining in order to avoid an interference in 3 axis machining.

5 axis machining

- It becomes less interference of tool holder and cutter projection shorter in 5 axis machining because of freely tilting a work-piece by rotating and tilting 2 axis table.
- Instead of this advantage, it creates an interference between spindle nose and work-piece.



- 为了避免干涉，工具（刀柄 + 刀具）的全长必然会长。
- 传统的刀柄（筒夹式刀柄、强力铣刀柄）由于前端部体积大，容易对工件产生干涉。

理想的刀柄设计是

- 前端极限的细长，根部尽可能粗壮，不仅体长而且又具有刚性。

- 이와 같은 간섭을 피하기 위해 5 축 가공은 불가피하게 더 긴 공구 셋업 (공구 홀더 + 절삭 공구) 이 필요합니다.
- 일반적으로 사용되는 콜릿 홀더와 밀링 척의 경우 홀더의 노즈가 크고 쉽게 간섭이 발생할 수 있습니다.

최적 공구 홀더 설계

- SLIMLINE 공구 홀더는 매우 얇은 노즈와 슬림한 디자인으로 긴 게이지 길이에서도 탁월한 강성을 제공합니다.

- การทำงานในระบบ 5 แกน จำเป็นต้องใช้ทุลที่ยาวกว่า (โฮลเดอร์+ทุล) เพื่อหลีกเลี่ยงการกีดขวางที่เกิดขึ้น
- ในคอลเล็ทโฮลเดอร์และหัวจับดอกสว่านที่ใช้กันโดยทั่วไป ส่วนหัวของโฮลเดอร์จะใหญ่กว่าและก่อให้เกิดอุปสรรคในการทำงานได้มากกว่า

การออกแบบทุลโฮลเดอร์ที่เหมาะสมที่สุด

- ทุลโฮลเดอร์ซึ่งมีส่วนหัวและรูปแบบเรียวบางเป็นพิเศษนี้ มีความแข็งแรงเป็นพิเศษแม้จะต้องใช้ทุลที่ยาว

- To avoid this interference, 5 axis machining inevitably requires longer tool set-up (Tool holder+cutting tool).
- With commonly used collet holder and milling chucks, the nose of the holder is larger and more likely to interfere.

Optimum tool holder design

- The tool holder which has remarkable slim nose and design achieves super rigidity even though long gauge length.

刚性 (弯曲量)

강성 (휨)

ความแข็งแรง (การโก่งตัว)

Rigidity (Deflection)

弯曲量计算公式

휨량 계산 공식

สูตรการคำนวณหาการโก่งตัว

Calculating formula of deflection amount

弯曲量和长度的 3 次方成正比。

휨량은 길이의 3 승에 비례합니다.

ค่าการโก่งตัวจะเป็นสัดส่วนโดยตรงกับค่าความยาวยกกำลังสาม

Deflection amount is proportional to the cube of length.

$$S = \frac{6.8 \times F \times L^3}{E \times D^4}$$

弯曲量和直径的 4 次方成反比。

휨량은 직경의 4 승에 반비례합니다.

ค่าการโก่งตัวจะเป็นสัดส่วนผกผันกับขนาดเส้นผ่านศูนย์กลางยกกำลังสี่

Deflection amount is inversely proportional to the fourth power of diameter.

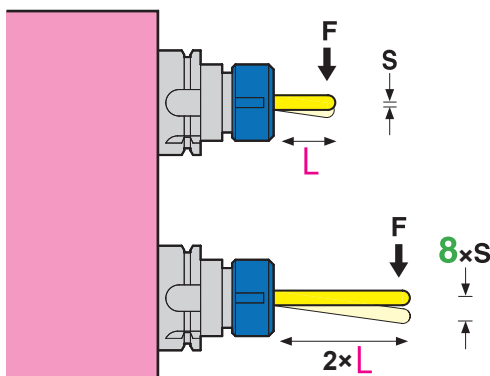
S : 弯曲量
D : 轴径
L : 突出长度
F : 负荷
E : 杨氏系数

S : 휨량
D : 상크 직경
L : 돌출
F : 부하
E : 종탄성계수 (Young's module)

S : ค่าการโก่งตัว
D : เส้นผ่านศูนย์กลางของก้าน
L : ระยะจับยึด
F : แรงที่มากระทำ
E : ค่าโมดูลัสของยัง (Young's module)

S : Deflection amount
D : Shank Diameter
L : Projection
F : Load
E : Young's module

1 8 倍弯曲
· 휨 8 배
· การโก่งตัว 8 เท่า
· Deflection 8 times



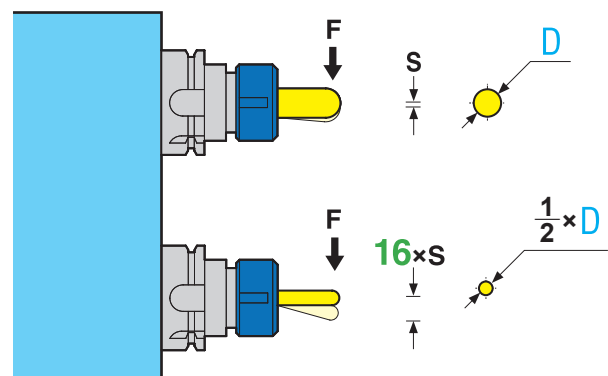
轴径相同，突出长度为 2 倍时

직경은 같으며, 커터 돌출은 2 배입니다.

เส้นผ่านศูนย์กลางเท่าเดิม
ระยะจับยึดเพิ่มเป็น 2 เท่า

Diameter is same, cutter projection is twice.

2 16 倍弯曲
· 휨 16 배
· การโก่งตัว 16 เท่า
· Deflection 16 times



突出长度相同，轴径为 2 倍时

커터 돌출은 같으며 직경은 절반입니다.

ระยะจับยึดเท่าเดิม
เส้นผ่านศูนย์กลางลดลงครึ่งหนึ่ง

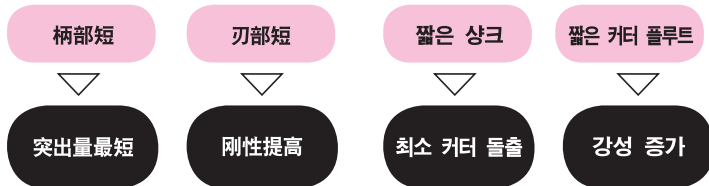
Cutter projection is same, diameter is half.

热装专用短尺寸铣刀

열박음 홀더용 짧은 전장 엔드밀
 เอ็นมิล (ดอกกัด) ที่มีความยาวรวมสั้นสำหรับขึงฟิต โฮลเดอร์
 Short allover length end-mill for shrink-fit holder.

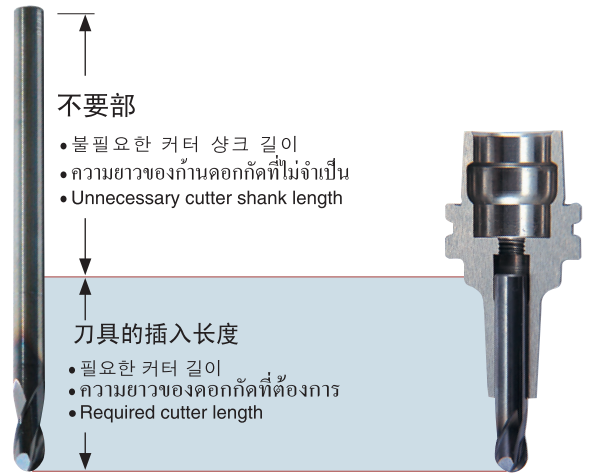
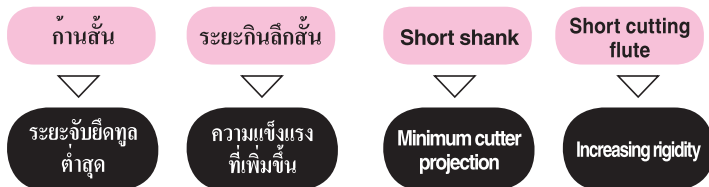
对于热装式刀柄最佳的「柄部短」、
 「刃部短」的热装专用短尺寸铣刀，
 由以下各刀具公司提供。

짧은 커터 샹크와 짧은 절삭 플루트가 있
 는 열박음 공구 홀더용 짧은 전장 엔드밀
 은 아래 제조업체에서 제공됩니다.



บริษัทผู้ผลิตเอ็นมิล(ดอกกัด)ที่มีความ
 ยาวรวมสั้นสำหรับใช้กับขึงฟิต
 โฮลเดอร์ที่มีก้านดอกกัดและระยะกิน
 ลึกสั้นจะแสดงอยู่ด้านล่าง

The short allover length end-mill
 for shrink-fit holder which has
 short cutter shank, short cutting
 flute is provided by manufacturers
 below.



普通的铣刀 • 표준 엔드밀 • เอ็นมิล (ดอกกัด) มาตรฐาน • Standard end-mill	热装专用短尺寸铣刀 • 열 박음 공구 홀더용 짧은 전장 엔드밀 • เอ็นมิล (ดอกกัด) ที่มีความยาวรวมสั้นสำหรับขึงฟิต โฮลเดอร์ • short allover length end-mill for shrink-fit tool holder
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MITSUBISHI MATERIALS

VF-2SSB
 Impact Miracle 涂层球铣刀
 임팩트 미라클 볼 엔드밀
 เอ็นมิล(ดอกกัด)หัวบอล Impact Miracle
 Impact miracle ball end mill

UNION TOOL

HFB-S
 高效短柄球铣刀
 고능률 쇼트 샹크 볼
 หัวบอล Short Shank ประสิทธิภาพสูง
 High-efficiency short shank ball

DIJET INDUSTRIAL

DZ-SSB
 超短球铣刀
 슈퍼 쇼트 볼 엔드밀
 เอ็นมิล(ดอกกัด)หัวบอล Super Short
 Super shot ball end mill

HITACHI TOOL

FSHB-TH
 热装专用球铣刀
 쉬링크 마스터 볼
 หัวบอล Shrink Master
 Shrink master ball

NS TOOL

MSB230SF
 短柄球铣刀
 쇼트 샹크 볼 엔드밀
 เอ็นมิล(ดอกกัด)หัวบอล Short Shank
 Short shank ball end mill

OSG

**WXL-HS-EBD
 WXL-HS-LN-EBD**
 WXL 短全长型铣刀
 WXL 엔드밀 단전장 타입
 WXLเอ็นมิล(ดอกกัด)แบบสั้น
 Short overall length type WXL end mill

SLIMLINE 刚性值计算软件

SLIMLINE 통계 소프트웨어

โปรแกรมคำนวณความแข็งแรงในการจับยึดสำหรับสลิมไลน์
Static rigidity calculation software for SLIMLINE

CAM 操作员必备！
CAM 오퍼레이터 필수!
คู่มือสำหรับผู้ปฏิบัติงาน CAM
Indispensable for
CAM operators!

免费提供
무료!
ฟรี
Free of
charge!

PAT.

自动选择高刚性刀柄

通过“SLIMLINE刚性值计算软件”能够简单的确认SLIMLINE装夹刀具后的刚性，以及同工件之间的干涉。可以从弊司的产品数据库中，自动为您选出无干涉，高刚性的刀柄。通过最佳的SLIMLINE刀柄，刀具和刀具突出长度的组合，可以实现高效、高品质的加工。

- SLIMLINE刀柄
- + 刀具
- + 刀具突出长度的最佳组合

강성 높은 홀더를 자동 선정

SLIMLINE 통계 소프트웨어는 SLIMLINE에 공구를 부착한 상태의 강성값과 워크와의 간섭을 간단히 확인할 수 있습니다. 가공 간섭이 없는 보다 높은 강성의 최적의 홀더를 선정할 수 있습니다. 최적의 SLIMLINE, 공구, 공구 돌출에 의해 가공 능력을 높여 고품위의 가공면을 실현합니다.

- 최적의 SLIMLINE
- + 공구
- + 공구 돌출

เลือกโฮลเดอร์ ความแข็งแรงสูงโดยอัตโนมัติ

โปรแกรมคำนวณค่าความแข็งแรง SLIMLINE สามารถตรวจสอบค่าความแข็งแรงของ SLIMLINE ในขณะที่ต่อเข้ากับทูล และความห่างจากชิ้นงานได้ โดยง่าย ทำให้สามารถเลือกใช้งานโฮลเดอร์ที่อยู่ในสภาพที่มีความแข็งแรงสูง และไม่มีปัญหาที่ในการทำงานที่มีจำกัดจากการใช้ Slim Line, ทูล, ระยะการจับยึดทูลที่เหมาะสมจะทำให้สามารถเพิ่มประสิทธิภาพการทำงานและทำให้ได้ผิวงานที่ดีขึ้นได้

- SLIMLINE
- + ทูล
- ระยะการจับยึดทูลที่เหมาะสม

Automatically selects high-rigidity holder

The SLIMLINE rigidity value calculation software can easily check both the rigidity and the workpiece interference when a tool is mounted on the SLIMLINE. You can select the optimum holder having high rigidity and no machining interference. SLIMLINE offers the optimum holder, tool and tool projection and to help you achieve increased machining efficiency and high-quality machined surfaces.

- Optimum SLIMLINE
- + tool
- + tool projection

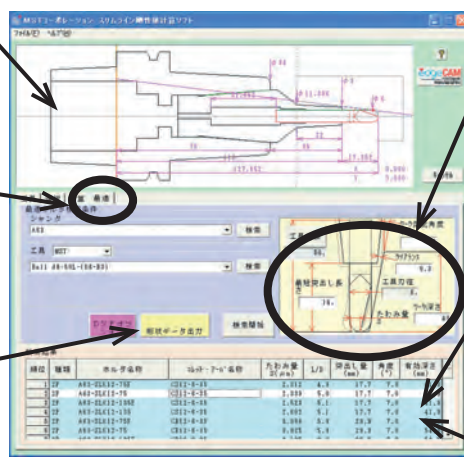


高刚性
고강성
ความแข็งแรงสูง
High rigidity

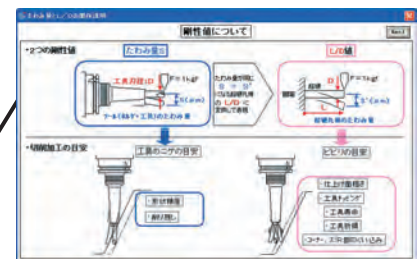
标明主要的尺寸
주요 치수를 표시
แสดงขนาดที่สำคัญ
Major dimensions are displayed.

自动选择刚性最高的SLIMLINE刀柄
강성이 높은 최적의 SLIMLINE을 자동 선택
เลือก SLIMLINE ความแข็งแรงสูงที่เหมาะสมโดยอัตโนมัติ
The optimum high-rigidity SLIMLINE is automatically selected.

以DXF,CSV格式输出形状数据
형상 데이터(DXF, CSV 형식) 출력
เอาท์พุทข้อมูลรูปร่าง (ไฟล์ DXF, CSV)
Shape data (DXF or CSV format) is output.



输入工件形状尺寸, 间隙, 刀具突出长度等
워크 형상이나 클리어런스, 공구의 돌출량 등을 입력
ใส่ข้อมูลรูปแบบของชิ้นงาน
ระยะทางและระยะการยึดจับยึดเป็นต้น
Input the workpiece shape, clearance, and tool projection.



列出最佳刀柄
최적의 홀더를 리스팅
รายการโฮลเดอร์ที่เหมาะสมที่สุด
Optimum holder is listed.

下列 CAM 软件, 可以搭载热装式刀柄的全部外观形状数据资料。

아래 CAM 시뮬레이터에는 모든 Slimline 형상 데이터가 포함되어 있습니다.

เครื่องจำลองแบบ CAM มีข้อมูลทางเรขาคณิตทั้งหมดของสลิมไลน์

Below CAM simulators have all of Slimline geometry datas.



⚠ 厂商不同对于尺寸数据的使用方法有不同之处, 详情请向厂商咨询。
형상 데이터에 대해서는 사용 방법이 다릅니다. 각사에 문의하십시오
สำหรับ ข้อมูลของรูปร่าง นั้นการนำไปใช้ งานจะแตกต่างกันกรุณาติดต่อสอบถามจากแต่ละบริษัท
Handling methods vary depending on shape data. Contact each manufacturer.

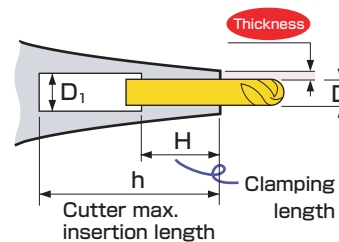
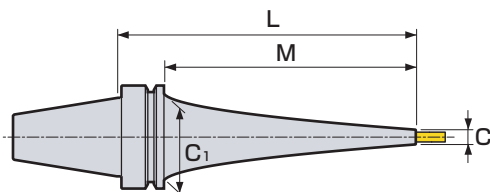
Dimensions BT30

Deflection value
($\mu\text{m/kgf}$)

S



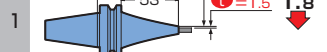
BT30 — SLSA10-90 cv



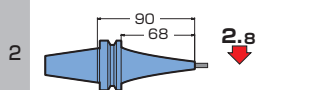
Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	BT30—SLSA 4— 75 cv	4	7	1.5	75	53	34	5	12	99	0.5	1.0	1.8
2	— 90 cv				90	68				114		1.1	2.8
3	—120 cv				120	98				144		1.2	6.6
4	—SLRA 4— 90 cv	4	10	3	90	68	34	5	12	114	0.5	1.0	2.0
5	—120 cv				120	98				144		1.1	2.9
6	—SLSA 6— 75 cv	6	9	1.5	75	53	34	7	18	99	0.5	1.3	1.5
7	— 90 cv				90	68				114		1.0	2.4
8	—120 cv				120	98				144		1.2	5.6
9	—SLRA 6— 90 cv	6	13	3.5	90	68	34	7	18	114	0.5	1.1	1.6
10	—120 cv				120	98				144		1.2	2.5
11	—SLSA 8— 75 cv	8	11	1.5	75	53	34	9	24	99	0.5	1.1	1.3
12	— 90 cv				90	68				114	0.6	1.6	2.2
13	—SLRA 8— 90 cv	8	16	4	90	68	34	9	24	114	0.5	1.2	1.1
14	—SLSA10— 75 cv	10	13	1.5	75	53	34	11	30	99	0.5	1.6	1.2
15	— 90 cv				90	68				114		1.4	2.0
16	—SLRA10— 90 cv	10	19	4.5	90	68	34	11	30	114	0.6	1.5	1.1

$\phi 4$

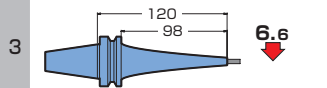
BT30—SLSA 4— 75 cv



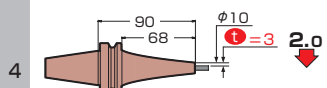
BT30—SLSA 4— 90 cv



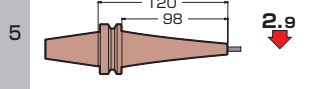
BT30—SLSA 4—120 cv



BT30—SLRA 4— 90 cv

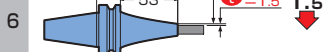


BT30—SLRA 4—120 cv

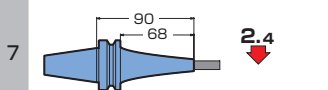


$\phi 6$

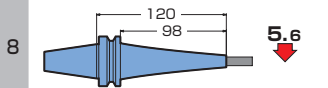
BT30—SLSA 6— 75 cv



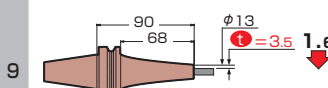
BT30—SLSA 6— 90 cv



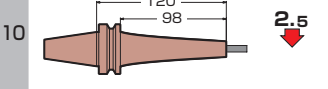
BT30—SLSA 6—120 cv



BT30—SLRA 6— 90 cv

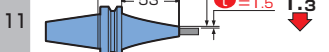


BT30—SLRA 6—120 cv

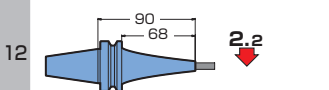


$\phi 8$

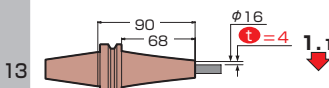
BT30—SLSA 8— 75 cv



BT30—SLSA 8— 90 cv

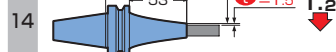


BT30—SLSA 8— 90 cv

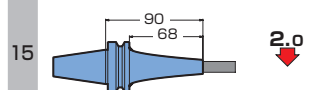


$\phi 10$

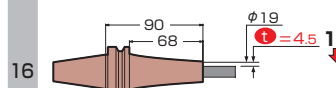
BT30—SLSA10— 75 cv



BT30—SLSA10— 90 cv



BT30—SLSA10— 90 cv

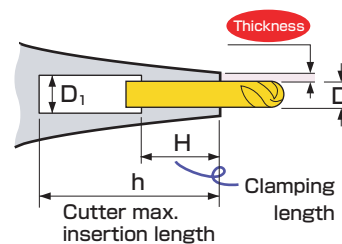
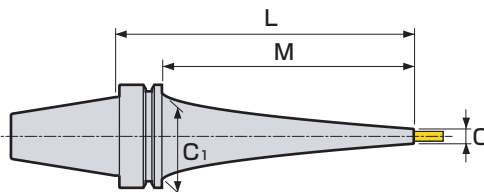


Dimensions BT40

Deflection value
($\mu\text{m/kgf}$)



BT40-SLSA6-150 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	BT40-SLSA 4- 90 cv	4	7	1.5	90	63	53	5	12	125	1.2	3.3	1.8
2	-120 cv				120	93				155	1.3	3.8	2.7
3	-150 cv				150	123				185	1.5	4.4	4.0
4	-180 cv				180	153				215		4.8	6.6
5	-210 cv				210	183				245	1.6	4.9	11.6
6	-240 cv				240	213				275	1.8	5.8	14.0
7	-SLRA 4-120 cv	4	10	3	120	93	53	5	12	155	1.3	3.9	1.9
8	-150 cv				150	123				185	1.4	4.3	2.9
9	-180 cv				180	153				215	1.5	5.1	4.2
10	-210 cv				210	183				245	1.7	5.7	5.7
11	-SLSA 6- 90 cv	6	9	1.5	90	63	53	7	18	125	1.2	3.3	1.6
12	-120 cv				120	93				155	1.3	3.8	2.3
13	-150 cv				150	123				185	1.5	4.3	3.6
14	-180 cv				180	153				215		4.9	5.7
15	-210 cv				210	183				245	1.7	5.7	7.3
16	-240 cv				240	213				275	1.8	5.9	12.0
17	-SLRA 6- 90 cv	6	13	3.5	90	63	53	7	18	125	1.2	3.3	1.2
18	-120 cv				120	93				155	1.3	4.0	1.7
19	-150 cv				150	123				185	1.5	4.8	2.1
20	-180 cv				180	153				215	1.7	5.6	2.8
21	-210 cv				210	183				245		5.9	4.8
22	-SLFA 6- 90 cv	6	13	3.5	90	63	53	7	18	125	1.2	3.3	1.2
23	-120 cv				120	93				155	1.3	4.0	1.7
24	-150 cv				150	123				185	1.5	4.8	2.1
25	-180 cv				180	153				215	1.7	5.6	2.8
26	-210 cv				210	183				245		5.9	4.8
27	-SLSA 8- 90 cv	8	11	1.5	90	63	53	9	24	125	1.2	3.3	1.4
28	-120 cv				120	93				155	1.3	4.0	2.0
29	-150 cv				150	123				185	1.5	4.8	2.7
30	-180 cv				180	153				215	1.6	4.9	5.0
31	-210 cv				210	183				245	1.7	5.8	6.6
32	-240 cv				240	213				275	1.9	6.7	8.3
33	-SLRA 8- 90 cv	8	16	4	90	63	53	9	24	125	1.2	3.8	0.7
34	-120 cv				120	93				155	1.4	4.2	1.2
35	-150 cv				150	123				185	1.6	4.9	1.8
36	-180 cv				180	153				215	1.7	5.7	2.6
37	-210 cv				210	183				245	1.8	6.5	3.5
38	-SLFA 8- 90 cv	8	16	4	90	63	53	9	24	125	1.2	3.8	0.7
39	-120 cv				120	93				155	1.4	4.2	1.2
40	-150 cv				150	123				185	1.6	4.9	1.8
41	-180 cv				180	153				215	1.7	5.7	2.6
42	-210 cv				210	183				245	1.8	6.5	3.5

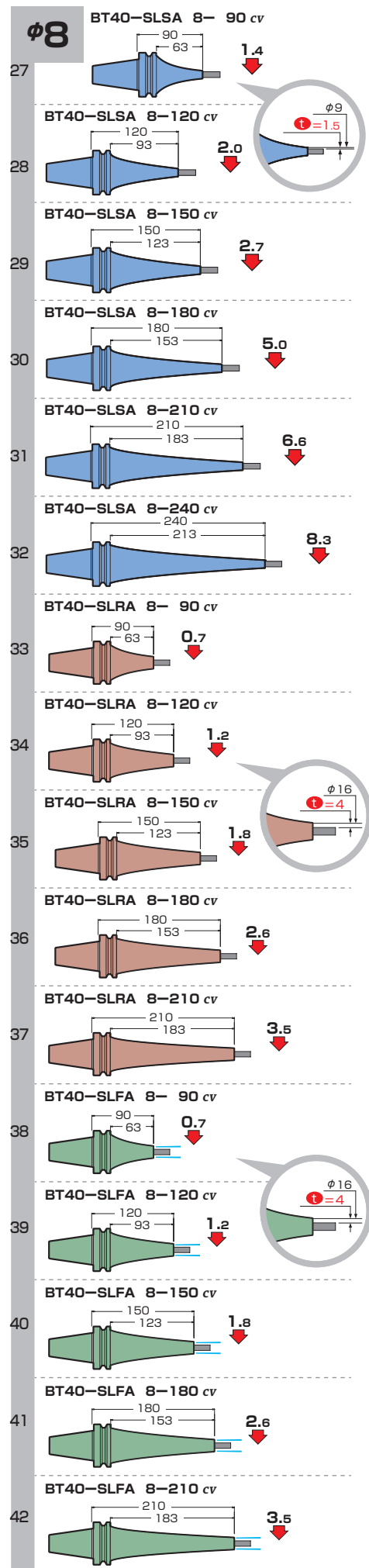
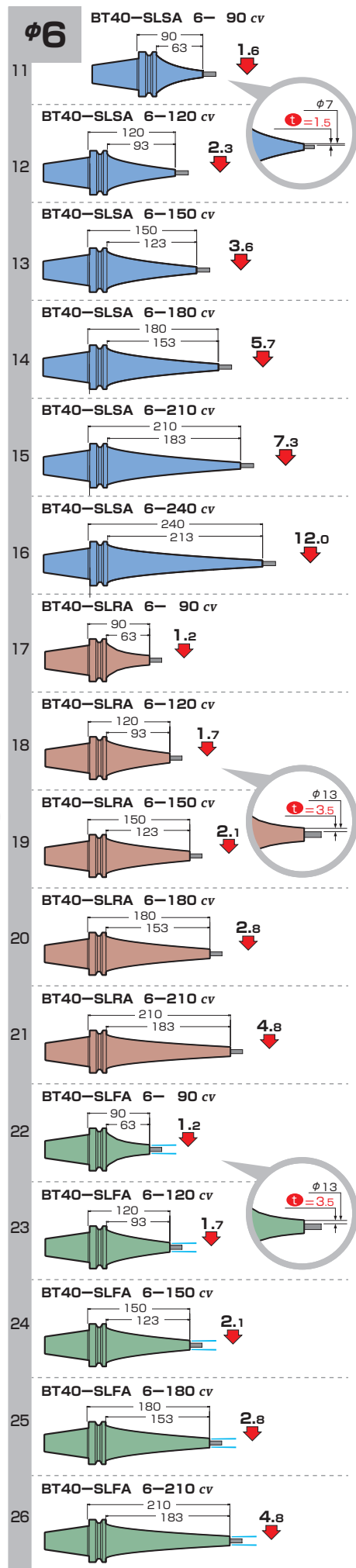
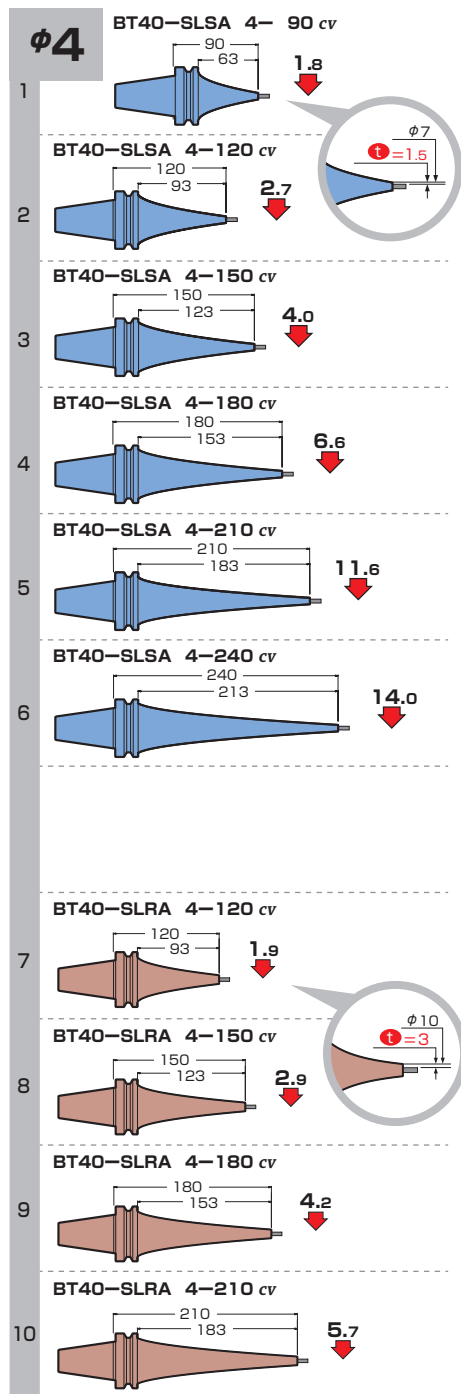
Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
43	BT40-SLSA10- 90 cv	10	13	1.5	90	63	53	11	30	125	1.2	3.3	1.8
44	-120 cv				120	93				155	1.5	4.3	1.3
45	-150 cv				150	123				185	1.6	4.9	2.2
46	-180 cv				180	153				215	1.7	5.6	3.4
47	-210 cv				210	183				245		6.0	6.0
48	-240 cv				240	213				275	2.0	7.9	5.8
49	-SLRA10- 90 cv	10	19	4.5	90	63	53	11	30	125	1.3	3.8	0.7
50	-120 cv				120	93				155	1.4	4.6	0.9
51	-150 cv				150	123				185	1.6	5.4	1.4
52	-180 cv				180	153				215	1.8	6.3	2.0
53	-210 cv				210	183				245		7.2	3.1
54	-SLFA10- 90 cv				90	63				125	1.3	3.8	0.7
55	-120 cv	10	19	4.5	120	93	53	11	30	155	1.4	4.6	0.9
56	-150 cv				150	123				185	1.6	5.4	1.4
57	-180 cv				180	153				215	1.8	6.3	2.0
58	-210 cv				210	183				245		7.2	3.1
59	-SLSA12- 90 cv	12	15	1.5	90	63	53	14	30	125	1.3	3.7	1.5
60	-120 cv				120	93		13		155	1.5	4.6	1.2
61	-150 cv				150	123				185		4.9	2.4
62	-180 cv				180	153				215	1.7	5.7	3.3
63	-210 cv				210	183				245	1.9	6.6	4.6
64	-240 cv				240	213				275	2.0	8.0	5.5
65	-SLRA12- 90 cv	12	22	5	90	63	53	14	30	125	1.3	3.9	0.6
66	-120 cv				120	93				155	1.6	5.1	0.7
67	-150 cv				150	123		13		185	1.7	6.0	1.1
68	-180 cv				180	153				215		6.9	1.9
69	-210 cv				210	183				245	1.8	7.7	2.8
70	-SLFA12- 90 cv				90	63		14	30	125	1.3	3.9	0.6
71	-120 cv	12	22	5	120	93	53			155	1.6	5.1	0.7
72	-150 cv				150	123		13		185	1.7	6.0	1.1
73	-180 cv				180	153				215		6.9	1.9
74	-210 cv				210	183				245	1.8	7.7	2.8
75	-SLSB16- 90 cv	16	21	2.5	90	63	53	17	32	100	1.3	4.2	0.6
76	-120 cv				120	93				130	1.5	5.5	0.8
77	-150 cv				150	123				160	1.6	6.2	1.5
78	-180 cv				180	153				190	1.9	7.5	1.9
79	-210 cv				210	183				220	2.0	8.2	3.0
80	-240 cv				240	213				250	2.2	9.5	3.7
81	-SLSB20- 90 cv	20	26	3	90	63	50.5	21	40	100	1.3	4.4	0.5
82	-120 cv				120	93	53			130	1.5	5.8	0.8
83	-150 cv				150	123				160	1.6	6.7	1.3
84	-180 cv				180	153				190	1.9	8.0	1.8
85	-210 cv				210	183				220	2.1	9.4	2.3
86	-240 cv				240	213				250	2.4	10.7	3.0

For SLIMLINE MONO CURVE customers.

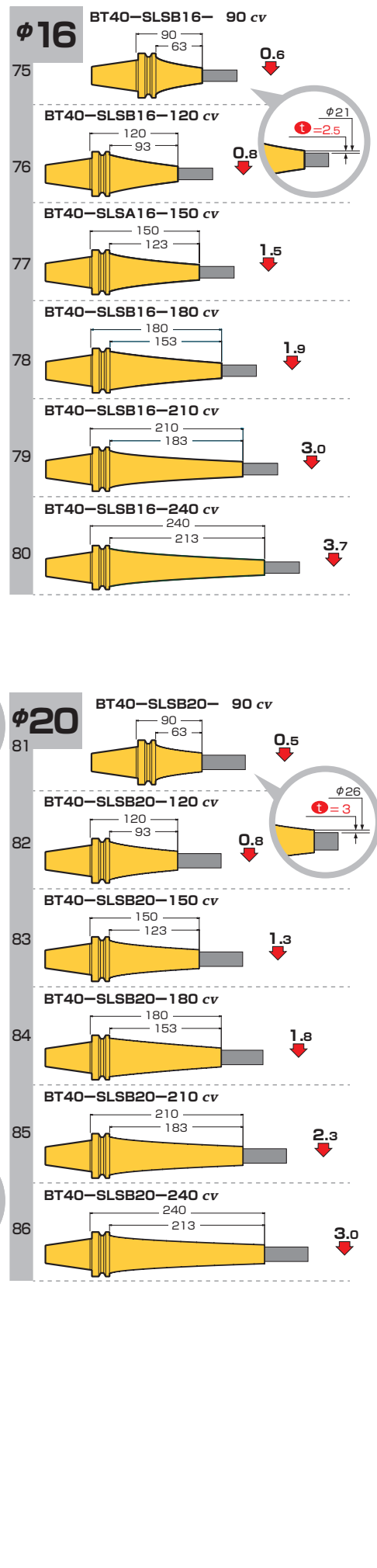
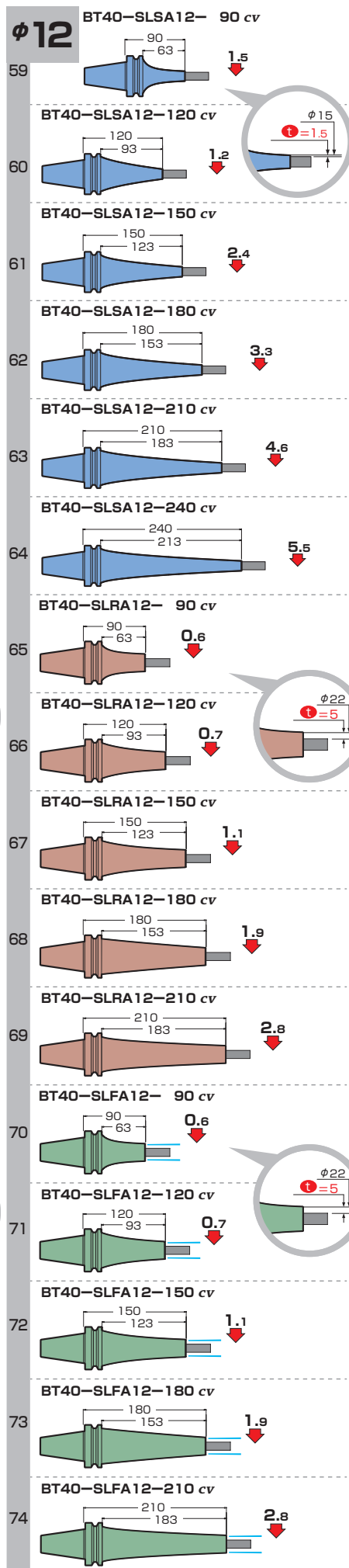
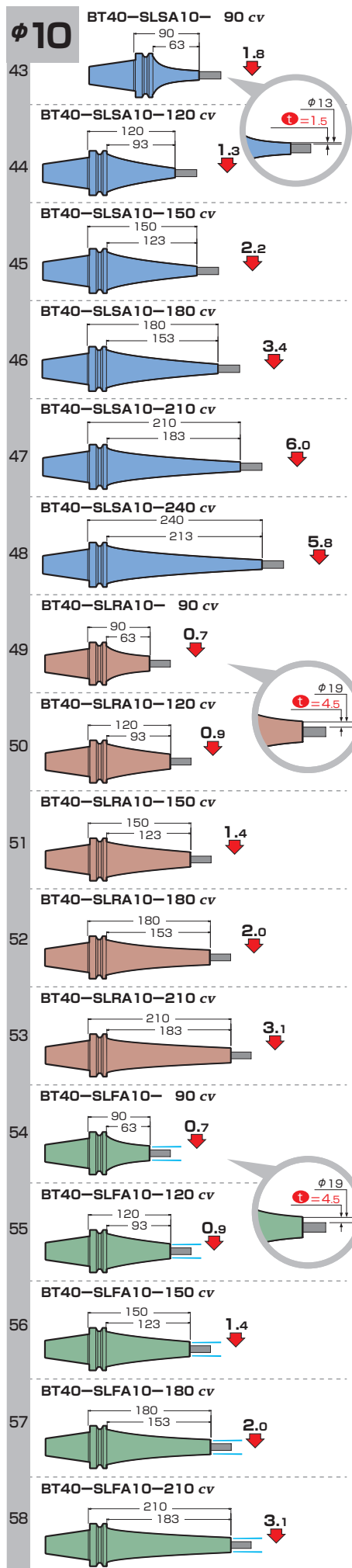
Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

Example; Previous model no. : **A63-SLSC6-120**

New model no. : **A63-SLSA6-120 cv**



BT40

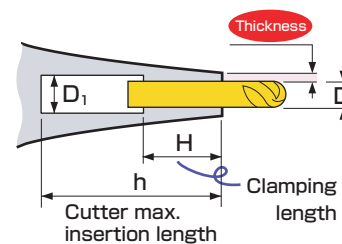
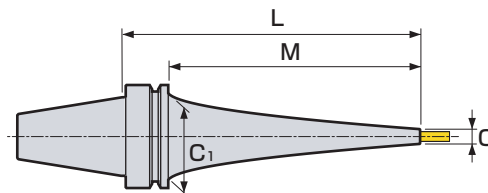


Dimensions BT50

Deflection value
($\mu\text{m/kgf}$)



BT50-SLSA6-225 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	BT50-SLSA 4-165 cv	4	7	1.5	165	127	85	5	12	220	5.2	15.4	1.8
2	-195 cv				195	157				250	5.3	15.9	2.6
3	-225 cv				225	187				280	5.5	16.4	3.8
4	-255 cv				255	217				310	5.6	16.9	5.7
5	-285 cv				285	247				340	6.4	19.5	5.9
6	-315 cv				315	277				370	8.3	26.0	7.7
7	-SLSA 6-165 cv	6	9	1.5	165	127	85	7	18	220	5.1	15.1	1.5
8	-195 cv				195	157				250	5.2	15.5	2.4
9	-225 cv				225	187				280	5.7	16.8	2.9
10	-255 cv				255	217				310	5.9	18.4	4.0
11	-285 cv				285	247				340	6.2	19.5	5.2
12	-315 cv				315	277				370	8.4	26.8	6.9
13	-SLSA 8-165 cv	8	11	1.5	165	127	85	9	24	220	4.9	14.7	1.4
14	-195 cv				195	157				250	5.3	16.1	1.9
15	-225 cv				225	187				280	5.8	17.7	2.3
16	-255 cv				255	217				310		17.9	3.7
17	-285 cv				285	247				340	6.0	19.1	4.9
18	-315 cv				315	277				370	8.4	28.0	5.0
19	-SLRA 8-195 cv	8	16	4	195	157	85	9	24	250	5.4	17.3	1.1
20	-225 cv				225	187				280	5.6	18.3	1.5
21	-255 cv				255	217				310	5.8	19.1	2.2
22	-285 cv				285	247				340	5.9	19.9	3.0
23	-SLFA 8-195 cv	8	16	4	195	157	85	9	24	250	5.4	17.3	1.1
24	-225 cv				225	187				280	5.6	18.3	1.5
25	-255 cv				255	217				310	5.8	19.1	2.2
26	-285 cv				285	247				340	5.9	19.9	3.0
27	-SLSA10-165 cv	10	13	1.5	165	127	85	11	30	220	4.9	14.9	1.2
28	-195 cv				195	157				250	5.5	16.9	1.5
29	-225 cv				225	187				280	5.4	16.8	2.4
30	-255 cv				255	217				310	6.1	19.8	2.6
31	-285 cv				285	247				340	6.3	21.2	3.7
32	-315 cv				315	277				370	8.4	28.6	4.6
33	-SLRA10-165 cv	10	19	4.5	165	127	85	11	30	220	5.1	15.9	0.7
34	-195 cv				195	157				250	5.2	16.6	1.1
35	-225 cv				225	187				280	5.9	19.7	1.2
36	-255 cv				255	217				310	6.1	20.3	1.7
37	-285 cv				285	247				340	6.2	21.1	2.4
38	-SLFA10-165 cv	10	19	4.5	165	127	85	11	30	220	5.1	15.9	0.7
39	-195 cv				195	157				250	5.2	16.6	1.1
40	-225 cv				225	187				280	5.9	19.7	1.2
41	-255 cv				255	217				310	6.1	20.3	1.7
42	-285 cv				285	247				340	6.2	21.1	2.4

Scale model	CODE	ϕ D	ϕ C	Thick- ness	L	M	ϕ C ₁	ϕ D ₁	H	h			
43	BT50-SLSA12-165 cv	12	15	1.5	165	127	84	13	30	220	4.8	14.6	1.2
44	-195 cv				195	157	85			250	5.6	17.6	
45	-225 cv				225	187				280	5.8	18.5	1.8
46	-255 cv				255	217				310	6.0	19.3	2.6
47	-285 cv				285	247				340	6.2	21.2	3.5
48	-315 cv				315	277				370	8.5	29.2	3.6
49	BT50-SLRA12-165 cv	12	22	5	165	127	85	14	30	220	5.1	16.1	0.7
50	-195 cv				195	157	13	250		5.6	18.0	0.8	
51	-225 cv				225	187		280			18.6	1.3	
52	-255 cv				255	217		310		5.8	20.7	1.6	
53	-285 cv				285	247		340		6.1	22.4	2.1	
54	BT50-SLFA12-165 cv	12	22	5	165	127	85	14	30	220	5.1	16.1	0.7
55	-195 cv				195	157	13	250		5.6	18.0	0.8	
56	-225 cv				225	187		280			18.6	1.3	
57	-255 cv				255	217		310		5.8	20.7	1.6	
58	-285 cv				285	247		340		6.1	22.4	2.1	
59	-SLSB16-165 cv	16	21	2.5	165	127	85	17	32	220	5.4	17.8	0.6
60	-195 cv				195	157				250		17.7	1.1
61	-225 cv				225	187				280	6.3	21.1	1.2
62	-255 cv				255	217				310	6.1	20.9	2.0
63	-285 cv				285	247				340	7.0	24.3	
64	-315 cv				315	277				370	8.6	30.9	2.6
65	-SLSB20-165 cv	20	26	3	165	127	85	21	40	220	5.4	17.4	0.6
66	-195 cv				195	157				250	6.1	20.8	0.7
67	-225 cv				225	187				280	5.8	20.5	1.2
68	-255 cv				255	217				310	6.7	23.9	1.3
69	-285 cv				285	247				340	7.0	25.4	1.7
70	-315 cv				315	277				370	8.9	32.4	2.3

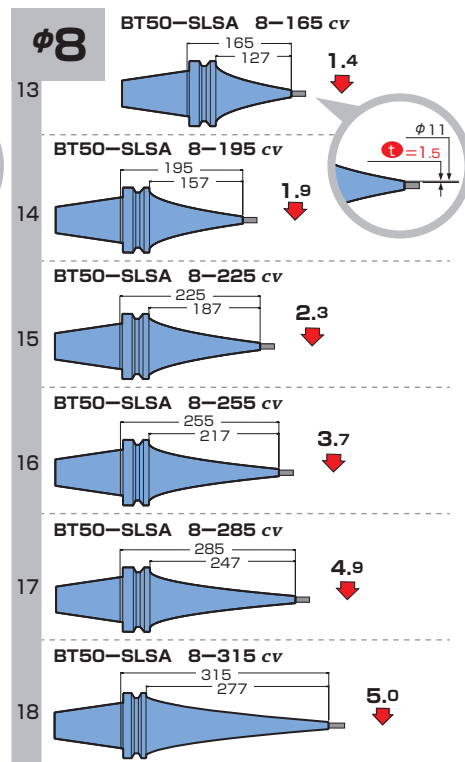
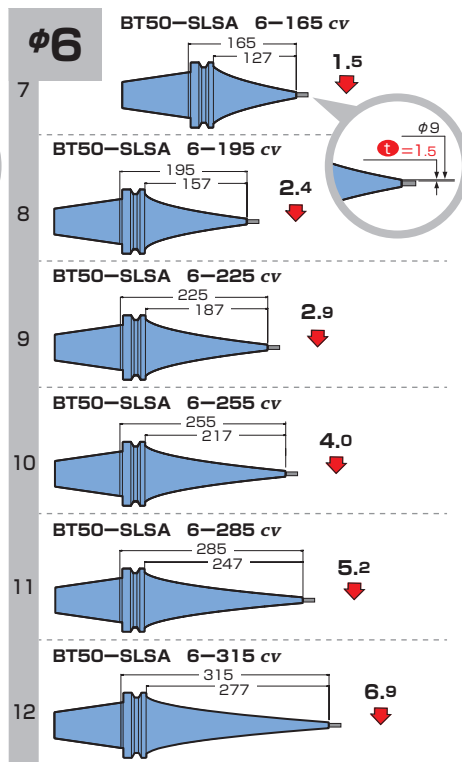
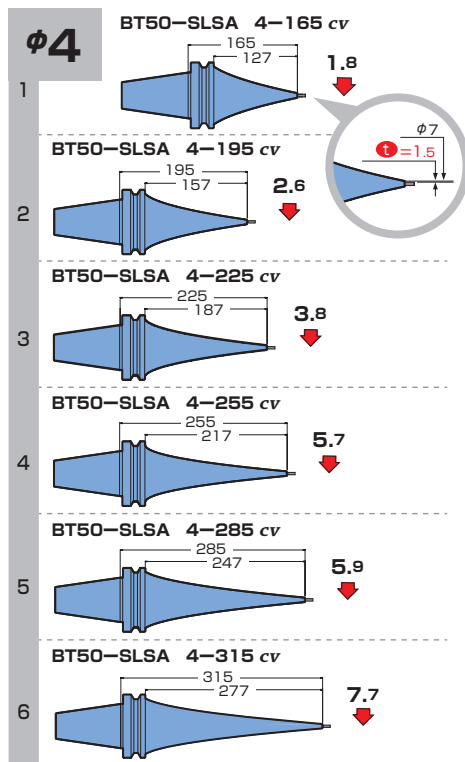
For SLIMLINE MONO CURVE customers.

Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

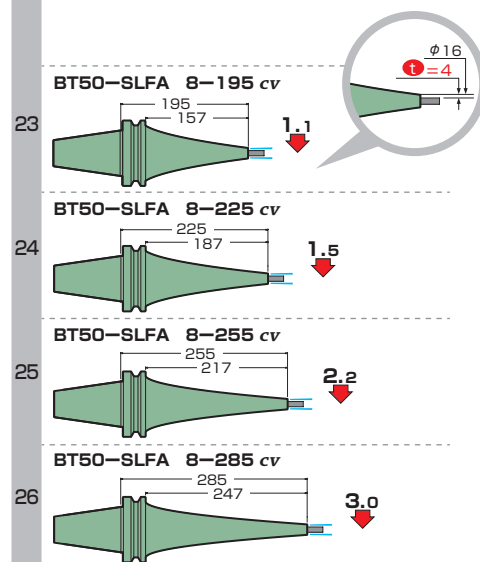
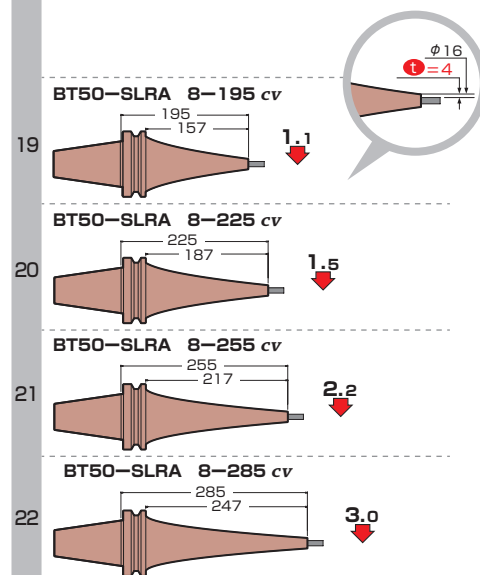
Example; Previous model no. : **A63-SLSC6-120**

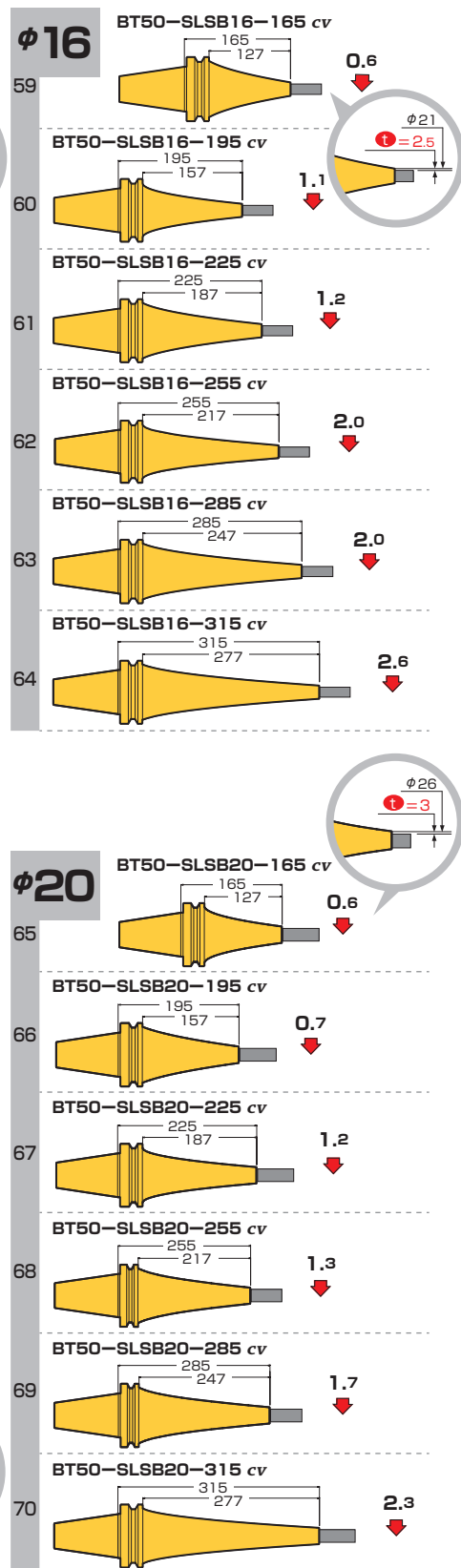
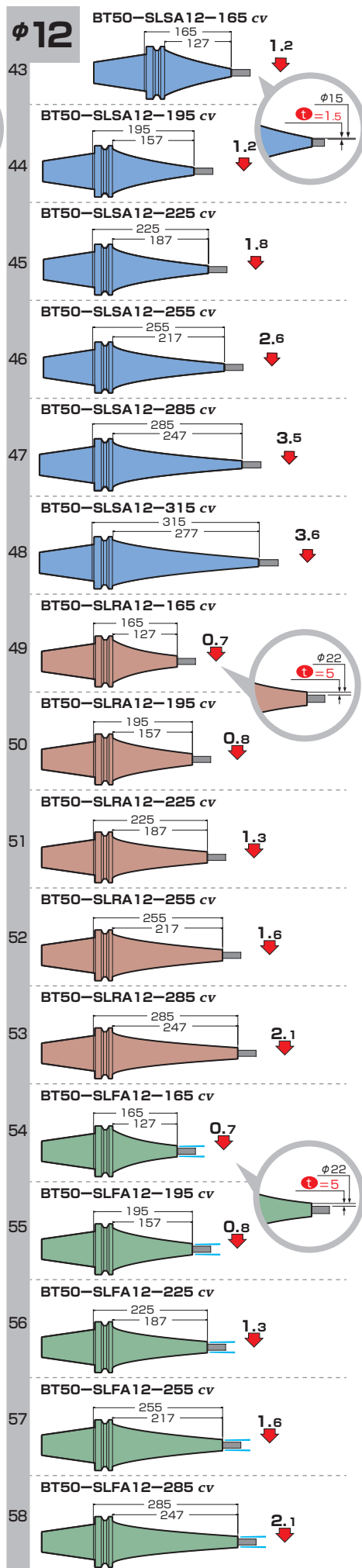
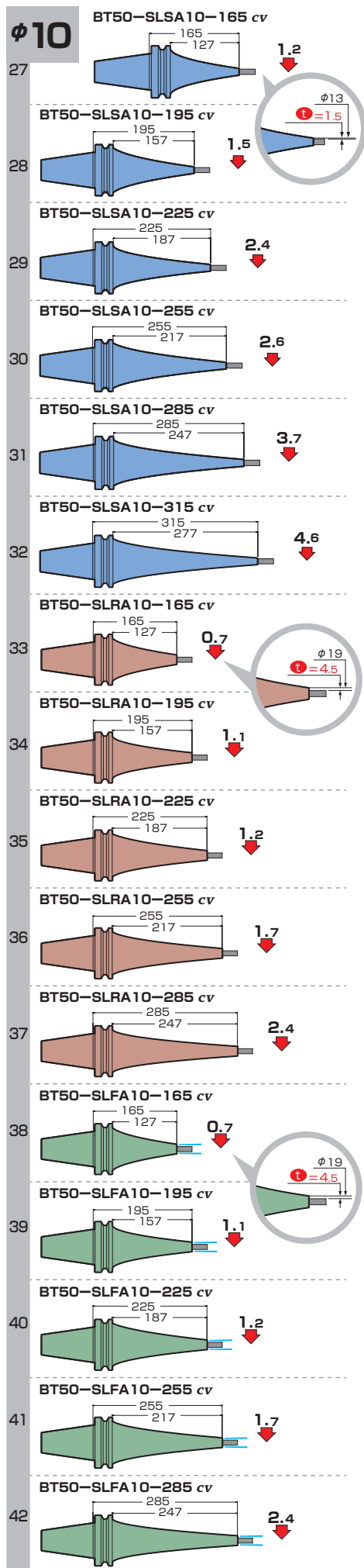


New model no. : **A63-SLSA6-120 CV**



BT50



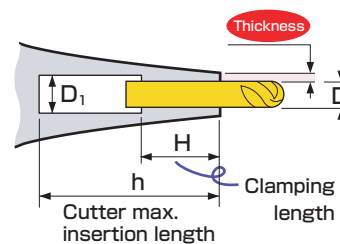
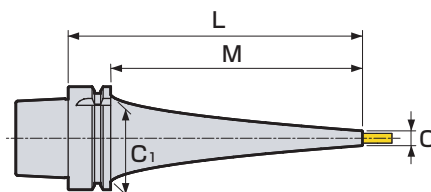


Dimensions **A63**

Deflection value
($\mu\text{m/kgf}$)



A63-SLRA6-150 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	A63-SLSA 4- 90 cv	4	7	1.5	90	64	53	5	12	65	1.0	9.3	1.8
2	-120 cv				120	94				95	1.1	10.1	2.7
3	-150 cv				150	124				125	1.3	11.0	4.0
4	-180 cv				180	154				154	1.4	11.6	6.6
5	-210 cv				210	184				185		11.8	11.6
6	-240 cv				240	214				214	1.6	13.1	14.0
7	-270 cv				270	244				245	2.0	15.4	11.9
8	-300 cv				300	274				275	2.1	16.3	15.9
9	-SLRA 4-120 cv	4	10	3	120	94	53	5	12	95	1.0	8.6	1.9
10	-150 cv				150	124				125	1.1	9.3	2.9
11	-180 cv				180	154				155	1.4	10.9	3.3
12	-210 cv				210	184				185		11.3	5.6
13	-SLSA 6- 90 cv	6	9	1.5	90	64	53	7	18	65	1.0	9.4	1.6
14	-120 cv				120	94				95	1.1	10.1	2.3
15	-150 cv				150	124				125	1.3	11.0	3.6
16	-180 cv				180	154				154	1.4	11.7	5.7
17	-210 cv				210	184				184	1.6	13.0	7.3
18	-240 cv				240	214				214		13.3	12.0
19	-270 cv				270	244				245	2.1	16.3	8.5
20	-300 cv				300	274				275	2.3	17.2	11.7
21	-SLRA 6- 90 cv	6	13	3.5	90	64	53	7	18	65	1.0	8.3	0.8
22	-120 cv				120	94				95	1.1	9.3	1.2
23	-150 cv				150	124				125	1.3	10.1	1.9
24	-180 cv				180	154				155	1.4	11.1	2.8
25	-210 cv				210	184				185		11.5	4.8
26	-SLFA 6- 90 cv	6	13	3.5	90	64	53	7	18	65	1.0	8.3	0.8
27	-120 cv				120	94				95	1.1	9.3	1.2
28	-150 cv				150	124				125	1.3	10.1	1.9
29	-180 cv				180	154				155	1.4	11.1	2.8
30	-210 cv				210	184				185		11.5	4.8
31	-SLSA 8- 90 cv	8	11	1.5	90	64	53	9	24	65	1.0	9.4	1.4
32	-120 cv				120	94				94	1.1	10.3	2.0
33	-150 cv				150	124				124	1.3	11.5	2.7
34	-180 cv				180	154				155	1.4	11.8	5.0
35	-210 cv				210	184				184	1.6	13.2	6.6
36	-240 cv				240	214				214	1.8	14.4	8.3
37	-270 cv				270	244				244	2.2	17.2	6.9
38	-300 cv				300	274				274	2.4	18.5	8.9
39	-SLRA 8- 90 cv	8	16	4	90	64	53	9	24	65	1.0	8.4	0.7
40	-120 cv				120	94				95	1.2	9.6	1.0
41	-150 cv				150	124				125	1.4	10.8	1.4
42	-180 cv				180	154				155	1.5	12.0	2.0
43	-210 cv				210	184				185	1.6	12.5	3.5
44	-SLFA 8- 90 cv	8	16	4	90	64	53	9	24	65	1.0	8.4	0.7
45	-120 cv				120	94				95	1.2	9.6	1.0
46	-150 cv				150	124				125	1.4	10.8	1.4
47	-180 cv				180	154				155	1.5	12.0	2.0
48	-210 cv				210	184				185	1.6	12.5	3.5

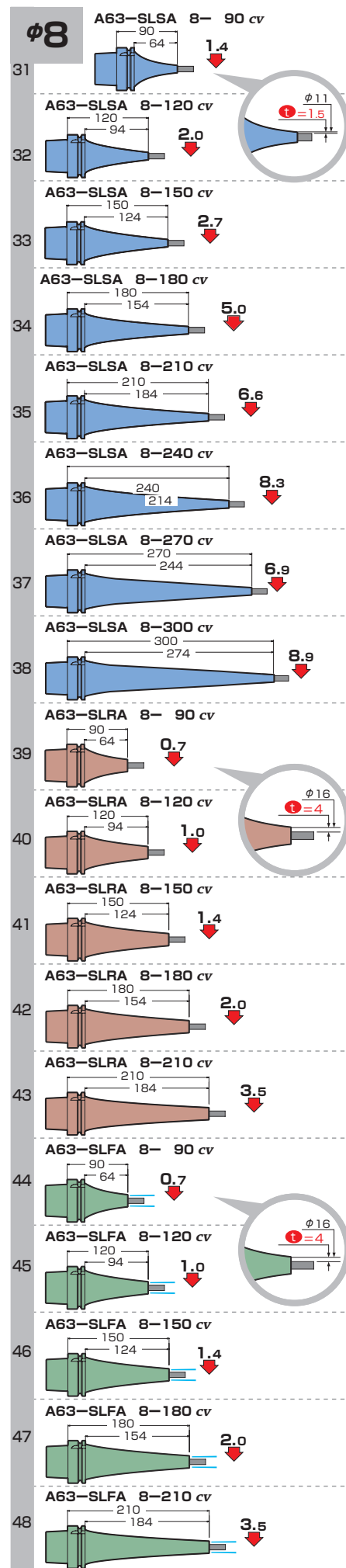
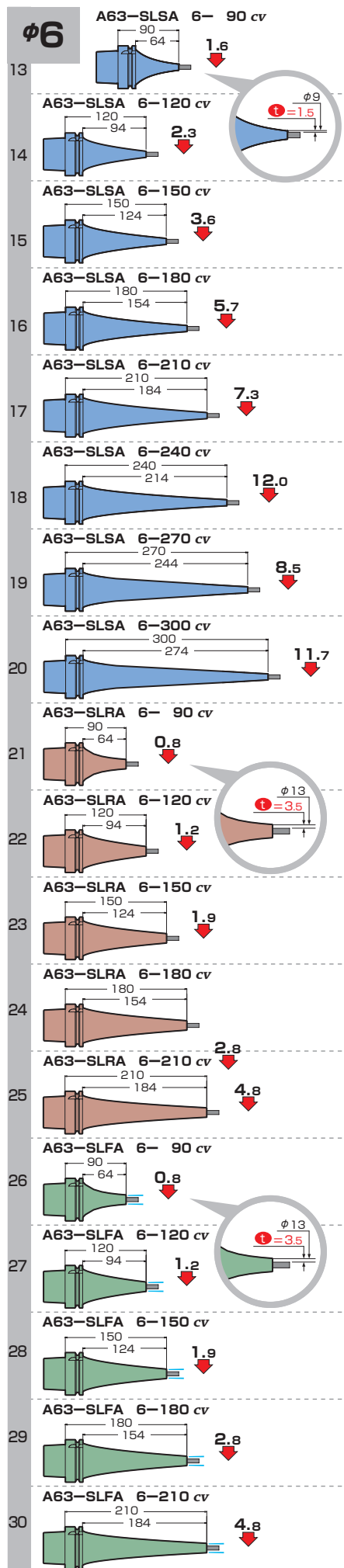
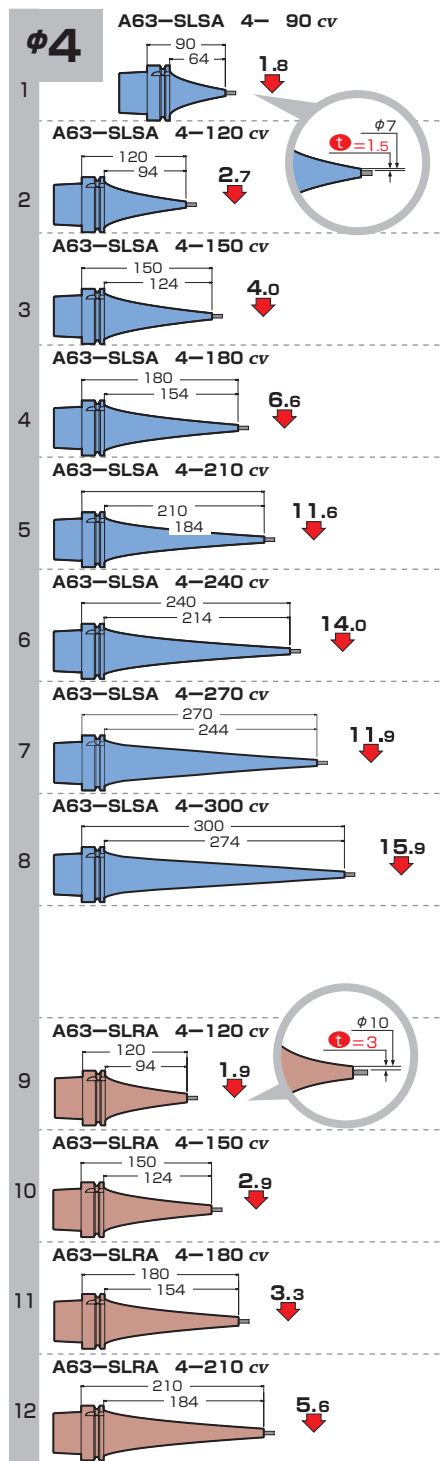
Scale model	CODE	ϕD	ϕC	Thick- ness	L	M	ϕC ₁	ϕD ₁	H	h			
49	A63—SLSA10— 90 cv	10	13	1.5	90	64	53	11	30	65	1.0	9.4	1.8
50	—120 cv				120	94				95	1.3	10.9	1.3
51	—150 cv				150	124				125	1.4	11.8	2.2
52	—180 cv				180	154				154	1.6	12.9	3.4
53	—210 cv				210	184				184	2.1	13.3	6.0
54	—240 cv				240	214				212		16.0	5.8
55	—270 cv				270	244				244		17.5	6.6
56	—300 cv				300	274				274	2.3	18.7	8.6
57	—SLRA10— 90 cv	10	19	4.5	90	64	53	11	30	65	1.0	8.5	0.6
58	—120 cv				120	94				95	1.2	9.6	0.9
59	—150 cv				150	124				125	1.3	10.9	1.4
60	—180 cv				180	154				155	1.5	12.1	2.0
61	—210 cv				210	184				185	1.6	13.3	3.1
62	—SLFA10— 90 cv	10	19	4.5	90	64	53	11	30	65	1.0	8.5	0.6
63	—120 cv				120	94				95	1.2	9.6	0.9
64	—150 cv				150	124				125	1.3	10.9	1.4
65	—180 cv				180	154				155	1.5	12.1	2.0
66	—210 cv				210	184				185	1.6	13.3	3.1
67	—SLSA12— 90 cv	12	15	1.5	90	64	53	14	30	64	1.1	9.9	1.5
68	—120 cv				120	94		13		94	1.3	11.3	1.2
69	—150 cv				150	124		13		124	1.4	11.8	2.4
70	—180 cv				180	154				154	1.6	13.0	3.3
71	—210 cv				210	184				184	1.8	14.3	4.6
72	—240 cv				240	214				212	2.1	16.2	5.5
73	—270 cv				270	244				244	2.3	18.4	5.4
74	—SLRA12— 90 cv	12	22	5	90	64	53	14	30	64	1.0	8.5	0.6
75	—120 cv				120	94		13		94	1.3	10.4	0.7
76	—150 cv				150	124				124	1.5	11.7	1.1
77	—180 cv				180	154				154	1.6	12.8	1.8
78	—210 cv				210	184				184		1.6	14.0
79	—SLFA12— 90 cv	12	22	5	90	64	53	14	30	64	1.0	8.5	0.6
80	—120 cv				120	94		13		94	1.3	10.4	0.7
81	—150 cv				150	124				124	1.5	11.7	1.1
82	—180 cv				180	154				154	1.6	12.8	1.8
83	—210 cv				210	184				184		1.6	14.0
84	—SLSB16— 90 cv	16	21	2.5	90	64	53	17	32	62	1.1	10.5	0.6
85	—120 cv				120	94				92	1.5	12.4	0.8
86	—150 cv				150	124				122	1.6	13.5	1.5
87	—180 cv				180	154				152	1.9	15.4	1.9
88	—210 cv				210	184				182	2.1	16.5	3.0
89	—240 cv				240	214				212	2.4	18.4	3.7
90	—270 cv				270	244				242	2.2	20.3	4.6
91	—SLSB20— 90 cv	20	26	3	90	64	51	21	40	62	1.2	10.7	0.5
92	—120 cv				120	94	53			92	1.5	12.8	0.8
93	—150 cv				150	124	53			122	1.7	14.1	1.3
94	—180 cv				180	154				152	2.0	16.2	1.8
95	—210 cv				210	184				182	2.4	18.2	2.3
96	—240 cv				240	214				212	2.7	20.2	3.0
97	—270 cv				270	244				242	2.5	22.8	3.4

For SLIMLINE MONO CURVE customers.

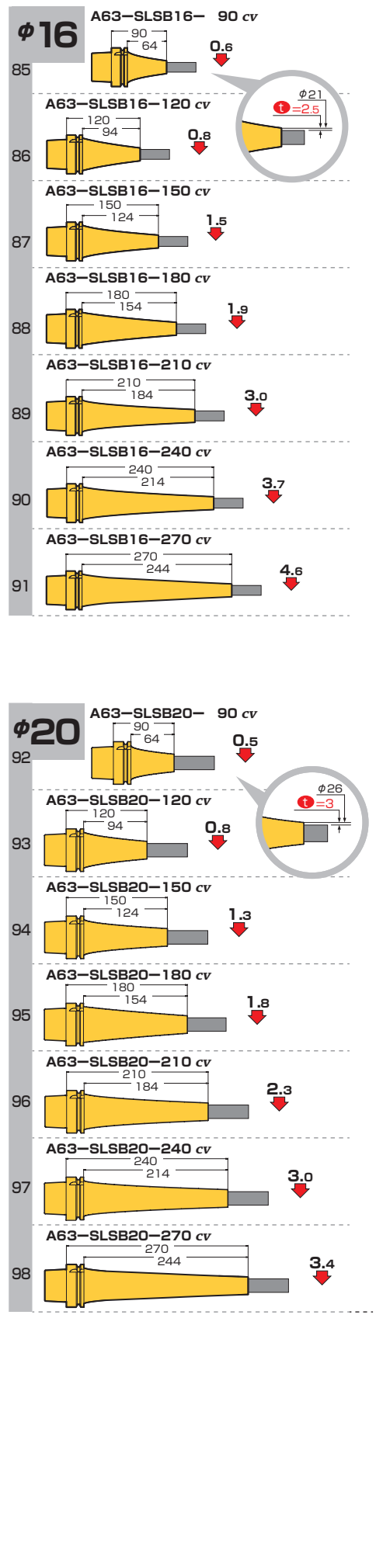
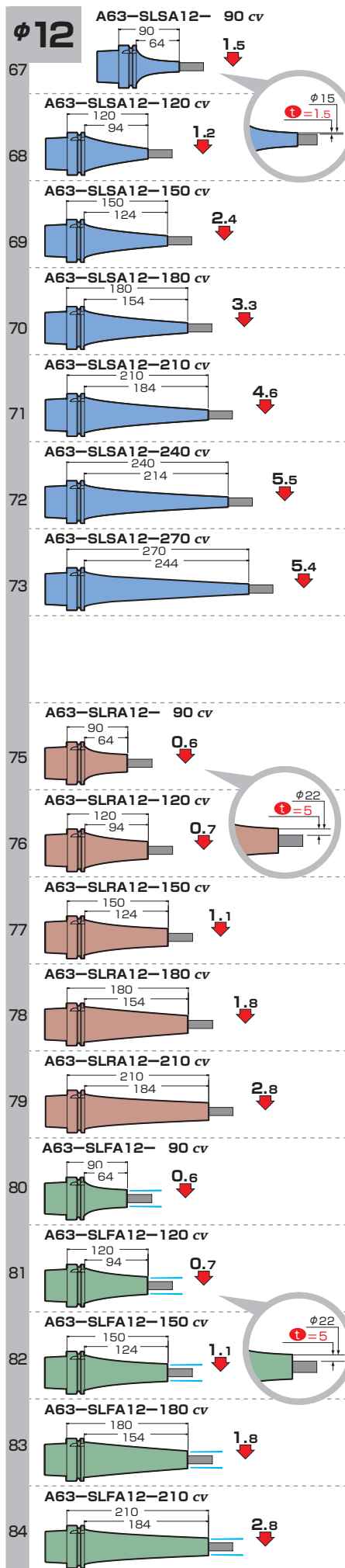
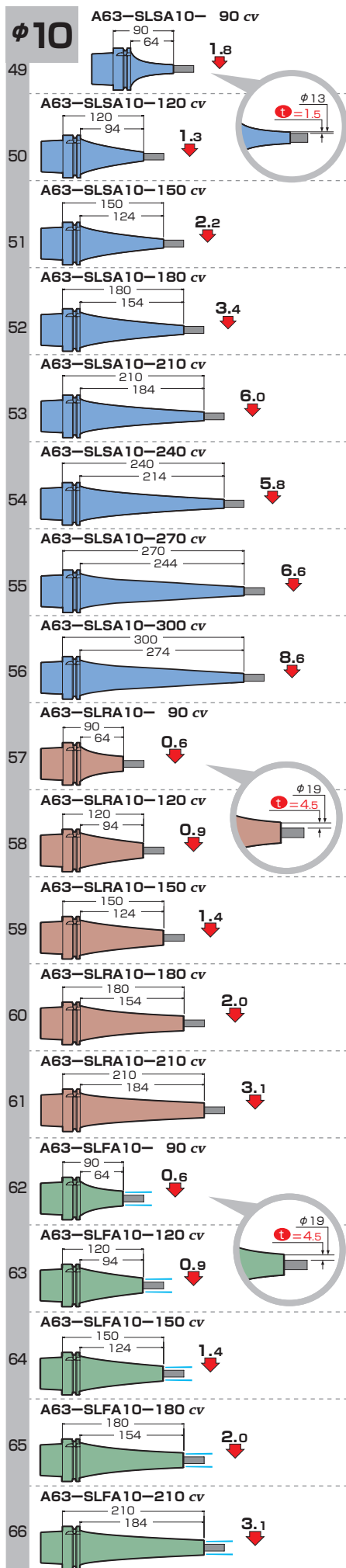
Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

Example; Previous model no. : **A63-SLSC6-120**

New model no. : **A63-SLSA6-120 CV**



A63

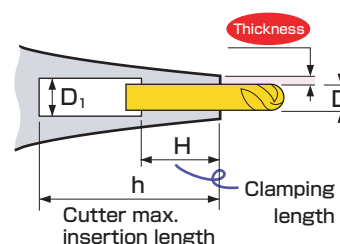
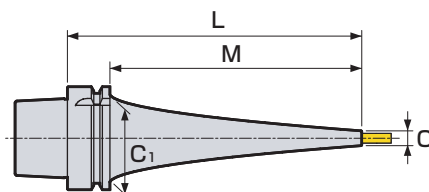


Dimensions A100

Deflection value
($\mu\text{m/kgf}$)



A100-SLSB16-165 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	A100-SLSA 4-165 cv	4	7	1.5	165	136	85	5	12	133	3.4	29.0	2.5
2	-195 cv				195	166				163	3.7	30.6	3.3
3	-225 cv				225	196				196	4.3	33.0	3.8
4	-255 cv				255	226				226	4.4	34.1	5.6
5	-285 cv				285	256				256	4.6	35.5	7.6
6	-315 cv				315	286				286	4.9	37.1	9.8
7	-345 cv				345	316				316	5.2	38.8	12.4
8	-SLSA 6-165 cv	6	9	1.5	165	136	85	7	18	136	3.3	28.8	2.1
9	-195 cv				195	166				166	4.0	32.0	2.3
10	-225 cv				225	196				196	4.1	32.4	3.6
11	-255 cv				255	226				226	4.8	35.9	3.9
12	-285 cv				285	256				256	5.0	37.4	5.2
13	-315 cv				315	286				286	5.3	38.9	6.8
14	-345 cv				345	316				316	5.6	40.3	8.7
15	-SLSA 8-165 cv	8	11	1.5	165	136	85	9	24	136	3.7	30.7	1.4
16	-195 cv				195	166				166		31.0	2.3
17	-225 cv				225	196				196	4.6	35.3	
18	-255 cv				255	226				226		35.9	3.6
19	-285 cv				285	256				256	4.9	37.4	4.8
20	-315 cv				315	286				286	5.7	41.9	5.0
21	-345 cv				345	316				311	6.1	45.1	6.0
22	-SLRA 8-195 cv	8	16	4	195	166	85	9	24	166	3.7	28.5	1.4
23	-225 cv				225	196				196	4.4	32.3	1.6
24	-255 cv				255	226				226	4.6	33.6	2.2
25	-285 cv				285	256				256	4.8	34.8	3.0
26	-SLFA 8-195 cv	8	16	4	195	166	85	9	24	166	3.7	28.5	1.4
27	-225 cv				225	196				196	4.4	32.3	1.6
28	-255 cv				255	226				226	4.6	33.6	2.2
29	-285 cv				285	256				256	4.8	34.8	3.0
30	-SLSA10-165 cv	10	13	1.5	165	136	85	11	30	136	3.5	29.4	1.4
31	-195 cv				195	166				166	4.3	33.6	1.5
32	-225 cv				225	196				196	4.2	33.4	2.4
33	-255 cv				255	226				226	4.5	34.3	3.5
34	-285 cv				285	256				251	5.1	38.3	3.6
35	-315 cv				315	286				286		39.9	4.8
36	-345 cv				345	316				311	5.9	42.7	5.5
37	-SLRA10-165 cv	10	19	4.5	165	136	85	11	30	136	3.5	27.6	1.0
38	-195 cv				195	166				166	4.0	30.1	1.1
39	-225 cv				225	196				196	4.1	31.1	1.6
40	-255 cv				255	226				226	4.9	35.3	1.7
41	-285 cv				285	256				256	5.0	36.2	2.4
42	-SLFA10-165 cv	10	19	4.5	165	136	85	11	30	136	3.5	27.6	1.0
43	-195 cv				195	166				166	4.0	30.1	1.1
44	-225 cv				225	196				196	4.1	31.1	1.6
45	-255 cv				255	226				226	4.9	35.3	1.7
46	-285 cv				285	256				256	5.0	36.2	2.4

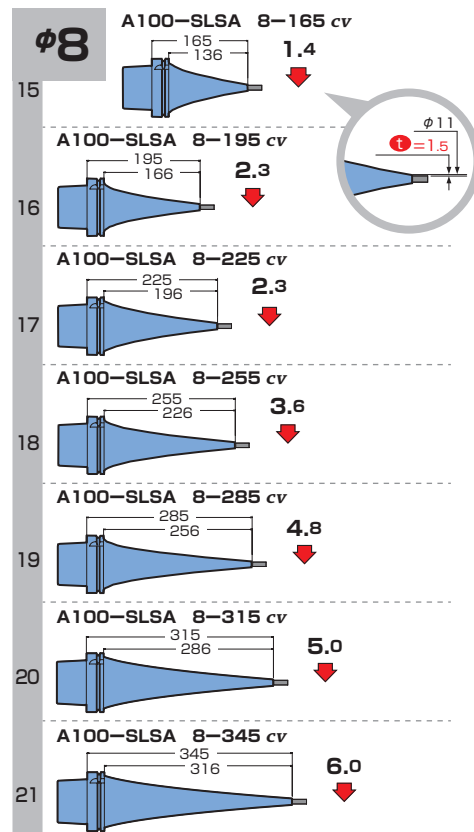
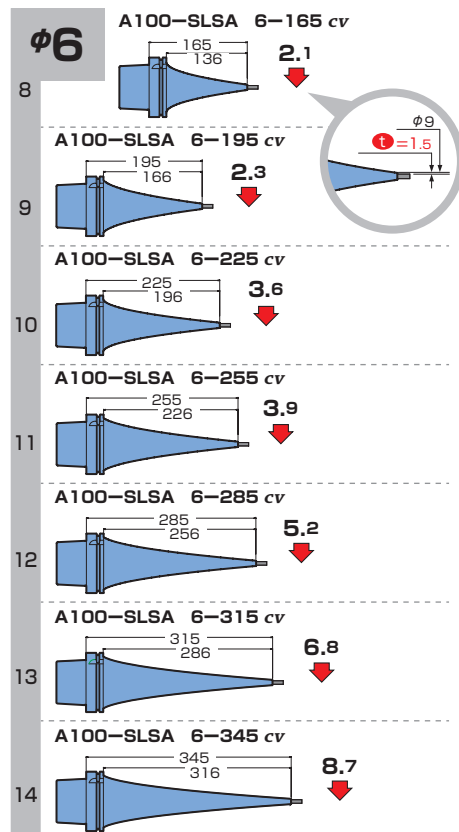
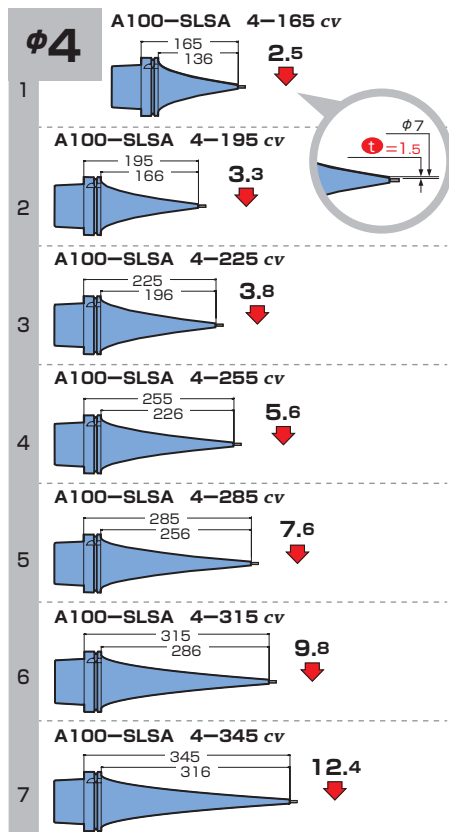
Scale model	CODE	ϕD	ϕC	Thick- ness	L	M	ϕC_1	ϕD_1	H	h			
47	A100-SLSA12-165 CV	12	15	1.5	165	136	85	13	30	133	4.2	34.1	1.2
48	-195 CV				195	166				163	4.1	33.6	
49	-225 CV				225	196				175	4.8	38.3	1.8
50	-255 CV				255	226				190		37.8	2.6
51	-285 CV				285	256				251	5.5	42.5	3.5
52	-315 CV				315	286				281	5.9	44.6	4.3
53	-345 CV				345	316				311	6.2	46.7	5.3
54	-SLRA12-165 CV	12	22	5	165	136	85	13	30	133	3.6	27.9	0.8
55	-195 CV				195	166		14		163	4.4	32.2	
56	-225 CV				225	196		13		159		32.7	1.3
57	-255 CV				255	226				221	4.6	36.1	1.6
58	-285 CV				285	256				251	5.0	38.5	2.1
59	-SLFA12-165 CV				165	136		13		133	3.6	27.9	0.8
60	-195 CV	12	22	5	195	166	85	14	30	163	4.4	32.2	
61	-225 CV				225	196		13		159		32.7	1.3
62	-255 CV				255	226				221	4.6	36.1	1.6
63	-285 CV				285	256				251	5.0	38.5	2.1
64	-SLSB16-165 CV	16	21	2.5	165	136	85	17	32	131	4.2	34.2	0.6
65	-195 CV				195	166				161	4.0	33.7	1.1
66	-225 CV				225	196				191	4.8	38.4	1.2
67	-255 CV				255	226				221	4.7	38.0	2.0
68	-285 CV				285	256				251	5.5	42.6	
69	-315 CV				315	286				281	5.9	44.8	2.6
70	-345 CV				345	316				311	6.2	46.9	3.3
71	-SLSB20-165 CV	20	26	3	165	136	85	21	40	132	4.0	33.6	0.6
72	-195 CV				195	166				161	4.9	38.1	0.7
73	-225 CV				225	196				191	4.6	37.4	1.2
74	-255 CV				255	226				221	5.5	42.1	1.3
75	-285 CV				285	256				251	5.2	41.2	2.1
76	-315 CV				315	286				281	6.1	46.0	2.3
77	-345 CV				345	316				311	6.4	47.9	2.9

For SLIMLINE MONO CURVE customers.

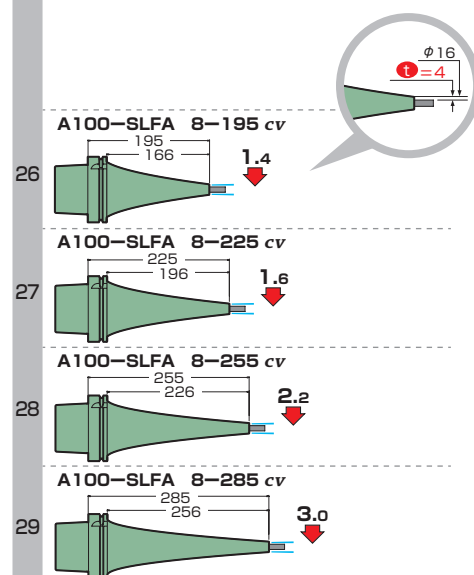
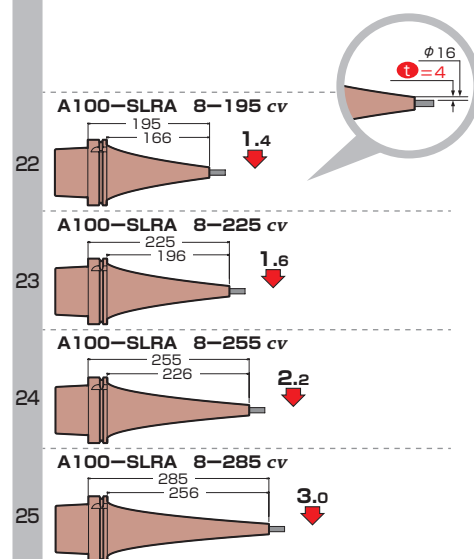
Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

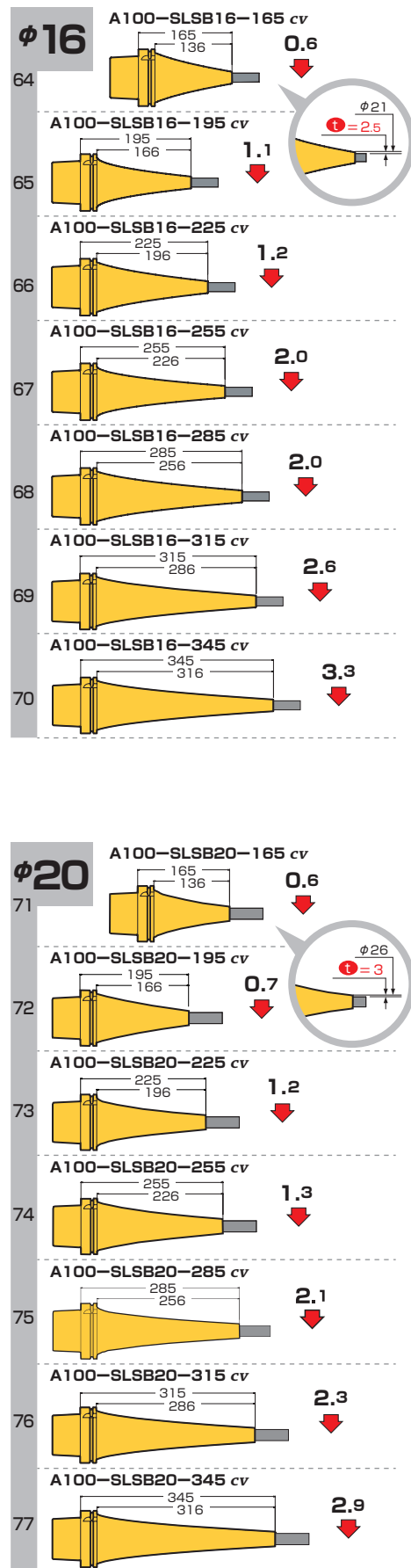
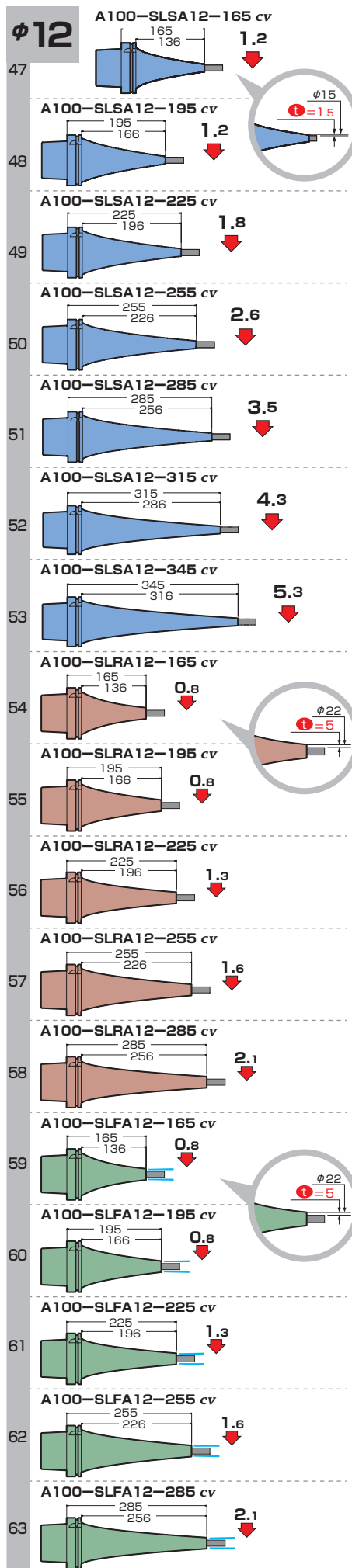
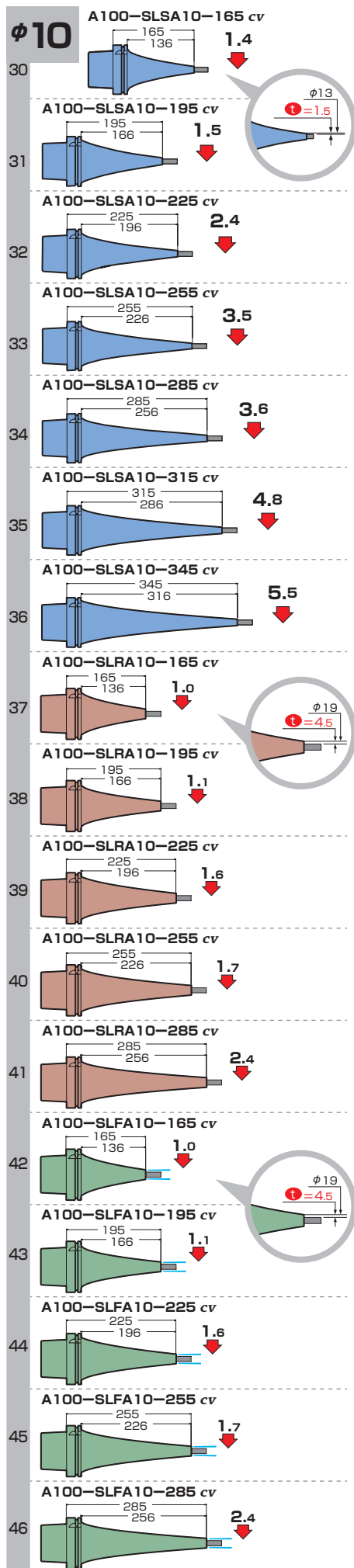
Example; Previous model no. : **A63-SLSC6-120**

New model no. : **A63-SLSA6-120 CV**



A100



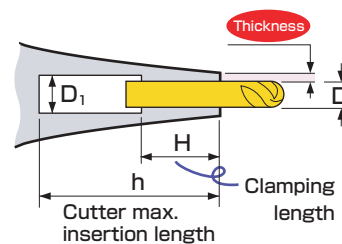
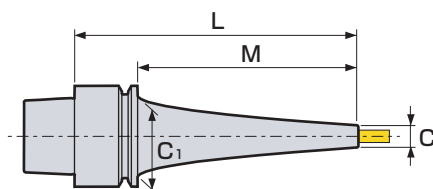


Dimensions
E32

Deflection value
($\mu\text{m/kgf}$)

90

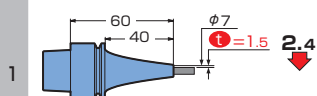
E32-SLSA6-120 cv



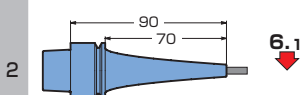
Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	E32-SLSA 4- 60 cv	4	7	1.5	60	40	26	5	12	43	0.2	0.6	2.4
2	- 90 cv				90	70				73			6.1
3	-SLSA 6- 60 cv	6	9	1.5	60	40	26	7	18	43	0.2	0.7	1.9
4	- 90 cv				90	70				73			4.9
5	-SLSA 8- 60 cv	8	11	1.5	60	40	26	8.6	24	38	0.2	0.7	1.6
6	- 90 cv				90	70							4.0
7	-SLSA10- 60 cv	10	13	1.5	60	40	26	10.6	30	48	0.2	0.8	1.4
8	- 90 cv				90	70				60			3.5

$\phi 4$

E32-SLSA 4-60 cv

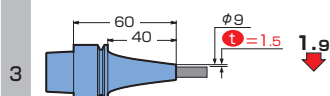


E32-SLSA 4-90 cv

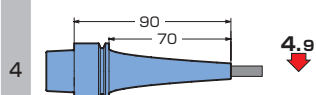


$\phi 6$

E32-SLSA 6-60 cv

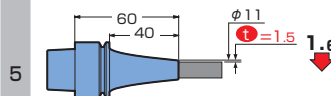


E32-SLSA 6-90 cv

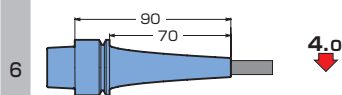


$\phi 8$

E32-SLSA 8-60 cv

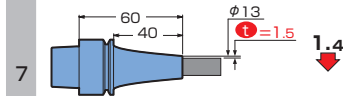


E32-SLSA 8-90 cv

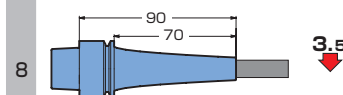


$\phi 10$

E32-SLSA10-60 cv



E32-SLSA10-90 cv



For SLIMLINE MONO CURVE customers.

Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

Example; Previous model no. : A63-SLSC6-120

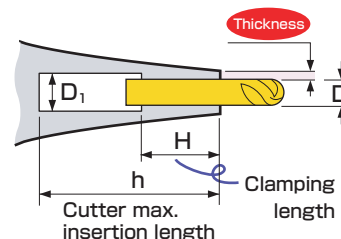
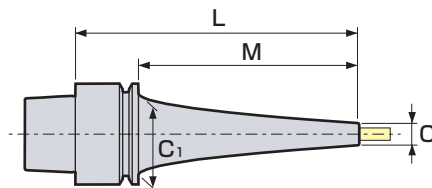
New model no. : A63-SLSA6-120 CV

Dimensions E40

Deflection value
($\mu\text{m/kgf}$)



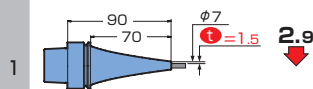
E40-SLSA8-150 cv



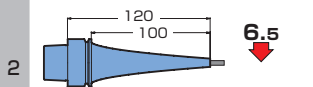
Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	E40-SLSA 4- 90 cv	4	7	1.5	90	70	34	5	12	74	0.3	1.5	2.9
2	-120 cv				120	100				104	0.4	1.8	6.5
3	-150 cv				150	130				134	0.5	2.4	8.6
4	-SLRA 4- 90 cv	4	10	3	90	70	34	5	12	81	0.4	1.6	2.0
5	-120 cv				120	100				111		1.9	4.2
6	-SLSA 6- 90 cv	6	9	1.5	90	70	34	7	18	74	0.3	1.6	2.5
7	-120 cv				120	100				104	0.4	1.9	5.6
8	-150 cv				150	130				134	0.5	2.5	7.7
9	-SLRA 6- 90 cv	6	13	3.5	90	70	34	7	18	74	0.4	1.7	1.7
10	-120 cv				120	100				104	0.5	2.4	2.6
11	-SLSA 8- 90 cv	8	11	1.5	90	70	34	9	24	74	0.3	1.7	2.2
12	-120 cv				120	100				104	0.4	2.0	3.4
13	-150 cv				150	130				134	0.5	3.0	5.1
14	-SLRA 8- 90 cv	8	16	4	90	70	34	9	24	74	0.4	1.8	1.6
15	-120 cv				120	100				104	0.5	2.5	2.4
16	-SLSA10- 90 cv	10	13	1.5	90	70	34	11	30	74	0.3	1.7	2.0
17	-120 cv				120	100				104	0.4	2.4	3.2
18	-150 cv				150	130				134	0.5	3.1	5.0
19	-SLRA10- 90 cv	10	19	4.5	90	70	34	11	30	74	0.4	2.1	1.1
20	-120 cv				120	100				104	0.5	2.9	2.0

$\phi 4$

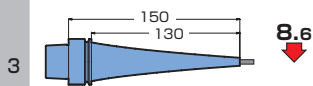
E40-SLSA 4- 90 cv



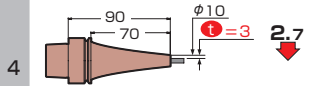
E40-SLSA 4-120 cv



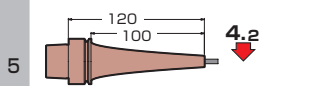
E40-SLSA 4-150 cv



E40-SLRA 4- 90 cv

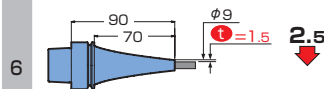


E40-SLRA 4-120 cv

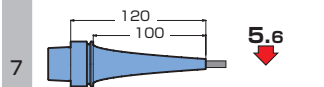


$\phi 6$

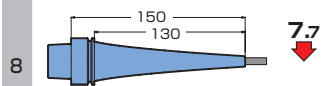
E40-SLSA 6- 90 cv



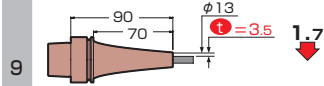
E40-SLSA 6-120 cv



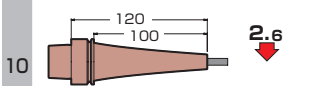
E40-SLSA 6-150 cv



E40-SLRA 6- 90 cv

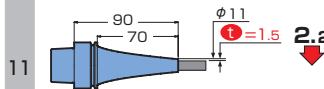


E40-SLRA 6-120 cv

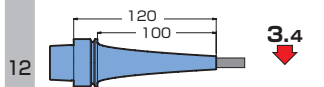


$\phi 8$

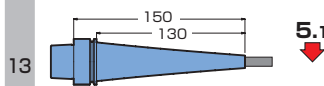
E40-SLSA 8- 90 cv



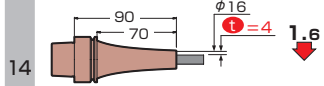
E40-SLSA 8-120 cv



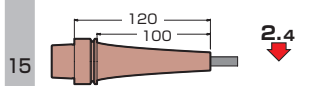
E40-SLSA 8-150 cv



E40-SLRA 8- 90 cv

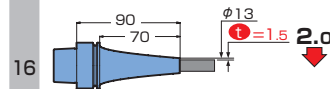


E40-SLRA 8-120 cv

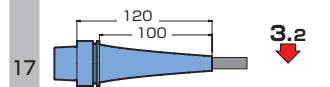


$\phi 10$

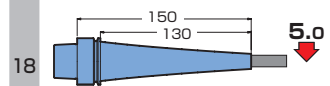
E40-SLSA10- 90 cv



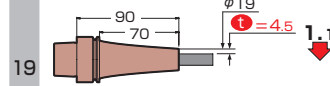
E40-SLSA10-120 cv



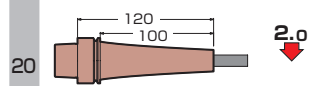
E40-SLSA10-150 cv



E40-SLRA10- 90 cv



E40-SLRA10-120 cv

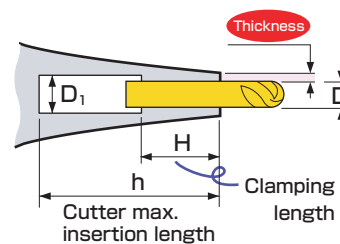
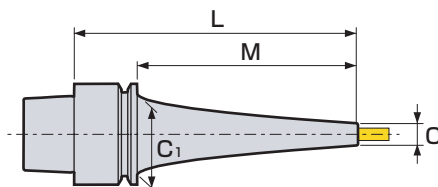


Dimensions
E50

Deflection value
($\mu\text{m/kgf}$)



E50-SLSA6-120 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	E50-SLSA 4- 90 cv	4	7	1.5	90	64	42	5	12	74	0.6	2.2	1.8
2	-120 cv				120	94				104		2.6	4.2
3	-150 cv				150	124				134	0.7	3.3	6.0
4	-180 cv				180	154				164	0.8	3.5	12.0
5	-SLRA 4-120 cv	4	10	3	120	94	42	5	12	104	0.7	2.8	2.7
6	-150 cv				150	124				134	0.8	3.4	4.1
7	-SLSA 6- 90 cv	6	9	1.5	90	64	42	7	18	74	0.6	2.3	1.6
8	-120 cv				120	94				104		2.7	3.5
9	-150 cv				150	124				134	0.7	3.4	5.4
10	-180 cv				180	154				164	0.9	4.2	7.6
11	-SLRA 6-120 cv	6	13	3.5	120	94	42	7	18	104	0.8	3.3	1.8
12	-150 cv				150	124				132	0.9	4.0	2.7
13	-SLSA 8- 90 cv	8	11	1.5	90	64	42	9	24	74	0.6	2.5	1.4
14	-120 cv				120	94				104	0.7	3.2	2.2
15	-150 cv				150	124				134		3.5	4.9
16	-180 cv				180	154				164	0.8	4.2	7.1
17	-SLRA 8-120 cv	8	16	4	120	94	42	9	24	102		3.8	1.3
18	-150 cv				150	124				132	0.9	4.0	2.7
19	-SLSA10- 90 cv	10	13	1.5	90	64	42	11	30	74	0.6	2.5	1.3
20	-120 cv				120	94				104	0.7	3.3	2.1
21	-150 cv				150	124				134	0.8	4.1	3.4
22	-180 cv				180	154				164		4.3	6.9
23	-SLRA10-150 cv	10	19	4.5	150	124	42	11	30	132	0.9	4.4	2.2

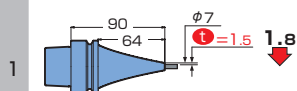
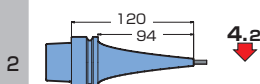
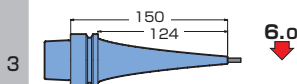
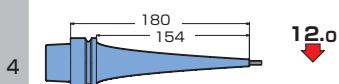
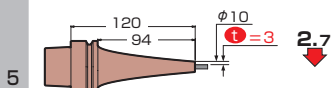
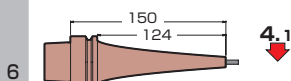
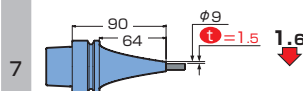
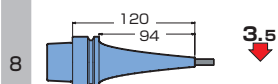
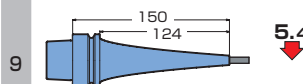
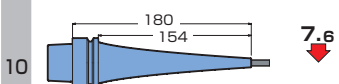
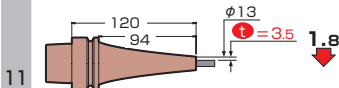
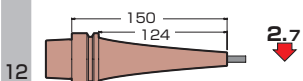
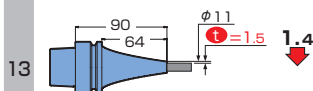
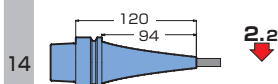
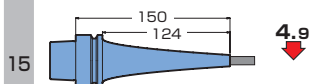
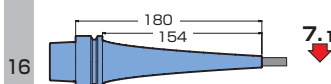
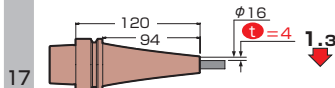
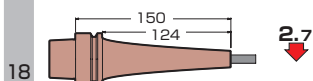
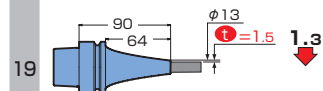
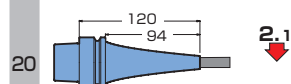
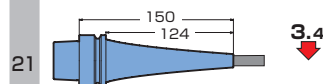
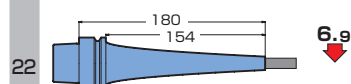
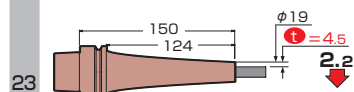
For SLIMLINE MONO CURVE customers.

Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

Example; Previous model no. : **A63-SLSC6-120**



New model no. : **A63-SLSA6-120 CV**

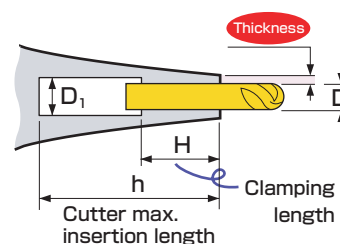
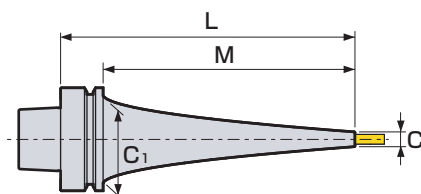
φ4**E50-SLSA 4- 90 cv****E50-SLSA 4-120 cv****E50-SLSA 4-150 cv****E50-SLSA 4-180 cv****E50-SLRA 4-120 cv****E50-SLRA 4-150 cv****φ6****E50-SLSA 6- 90 cv****E50-SLSA 6-120 cv****E50-SLSA 6-150 cv****E50-SLSA 6-180 cv****E50-SLRA 6-120 cv****E50-SLRA 6-150 cv****φ8****E50-SLSA 8- 90 cv****E50-SLSA 8-120 cv****E50-SLSA 8-150 cv****E50-SLSA 8-180 cv****E50-SLRA 8-120 cv****E50-SLRA 8-150 cv****φ10****E50-SLSA10- 90 cv****E50-SLSA10-120 cv****E50-SLSA10-150 cv****E50-SLSA10-180 cv****E50-SLRA10-150 cv**

Dimensions F63

Deflection value
($\mu\text{m/kgf}$)



F63-SLSA6-90 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	F63-SLSA 4- 90 cv	4	7	1.5	90	64	53	5	12	65	0.9	2.7	1.8
2	-120 cv				120	94				95	1.0	3.6	2.7
3	-150 cv				150	124				125	1.2	4.4	4.0
4	-180 cv				180	154				154	1.3	5.0	6.6
5	-210 cv				210	184				185		5.3	11.6
6	-240 cv				240	214				214	1.6	6.5	14.0
7	-270 cv				270	244				245	1.9	8.8	11.9
8	-300 cv				300	274				275	2.0	9.7	15.9
9	-SLRA 4-120 cv	4	10	3	120	94	53	5	12	95	1.0	3.6	1.9
10	-150 cv				150	124				125	1.1	4.4	2.9
11	-180 cv				180	154				155	1.4	6.0	3.3
12	-210 cv				210	184				185	1.5	6.2	5.6
13	-SLSA 6- 90 cv	6	9	1.5	90	64	53	7	18	65	0.9	2.8	1.6
14	-120 cv				120	94				95	1.0	3.6	2.3
15	-150 cv				150	124				125	1.2	4.4	3.6
16	-180 cv				180	154				154	1.3	5.2	5.7
17	-210 cv				210	184				184	1.5	6.4	7.3
18	-240 cv				240	214				214	1.6	6.7	12.0
19	-270 cv				270	244				245	2.0	9.7	8.5
20	-300 cv				300	274				275	2.2	10.6	11.7
21	-SLRA 6- 90 cv	6	13	3.5	90	64	53	7	18	65	1.0	3.4	0.8
22	-120 cv				120	94				95	1.2	4.3	1.2
23	-150 cv				150	124				125	1.3	5.2	1.9
24	-180 cv				180	154				155	1.4	6.1	2.8
25	-210 cv				210	184				185	1.5	6.6	4.8
26	-SLFA 6- 90 cv	6	13	3.5	90	64	53	7	18	65	1.0	3.4	0.8
27	-120 cv				120	94				95	1.2	4.3	1.2
28	-150 cv				150	124				125	1.3	5.2	1.9
29	-180 cv				180	154				155	1.4	6.1	2.8
30	-210 cv				210	184				185	1.5	6.6	4.8
31	-SLSA 8- 90 cv	8	11	1.5	90	64	53	9	24	65	0.9	2.9	1.4
32	-120 cv				120	94				94	1.1	3.8	2.0
33	-150 cv				150	124				124	1.3	5.0	2.7
34	-180 cv				180	154				155		5.2	5.0
35	-210 cv				210	184				184	1.5	6.6	6.6
36	-240 cv				240	214				214	1.8	7.8	8.3
37	-270 cv				270	244				244	2.1	10.7	6.9
38	-300 cv				300	274				274	2.3	11.9	8.9
39	-SLRA 8- 90 cv	8	16	4	90	64	53	9	24	65	1.0	3.4	0.7
40	-120 cv				120	94				95	1.2	4.6	1.0
41	-150 cv				150	124				125	1.4	5.9	1.4
42	-180 cv				180	154				155	1.6	7.0	2.0
43	-210 cv				210	184				185		7.6	3.5
44	-SLFA 8- 90 cv	8	16	4	90	64	53	9	24	65	1.0	3.4	0.7
45	-120 cv				120	94				95	1.2	4.6	1.0
46	-150 cv				150	124				125	1.4	5.9	1.4
47	-180 cv				180	154				155	1.6	7.0	2.0
48	-210 cv				210	184				185		7.6	3.5

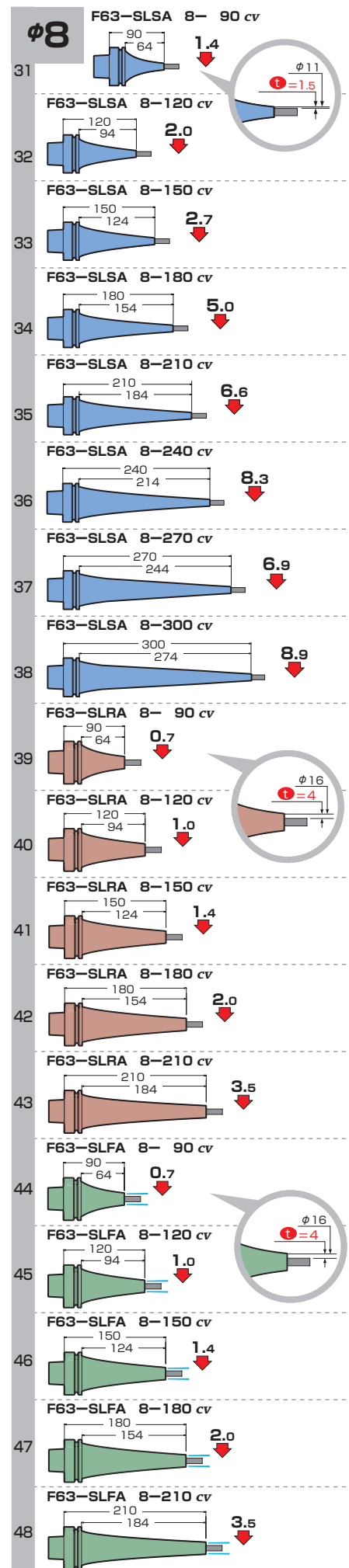
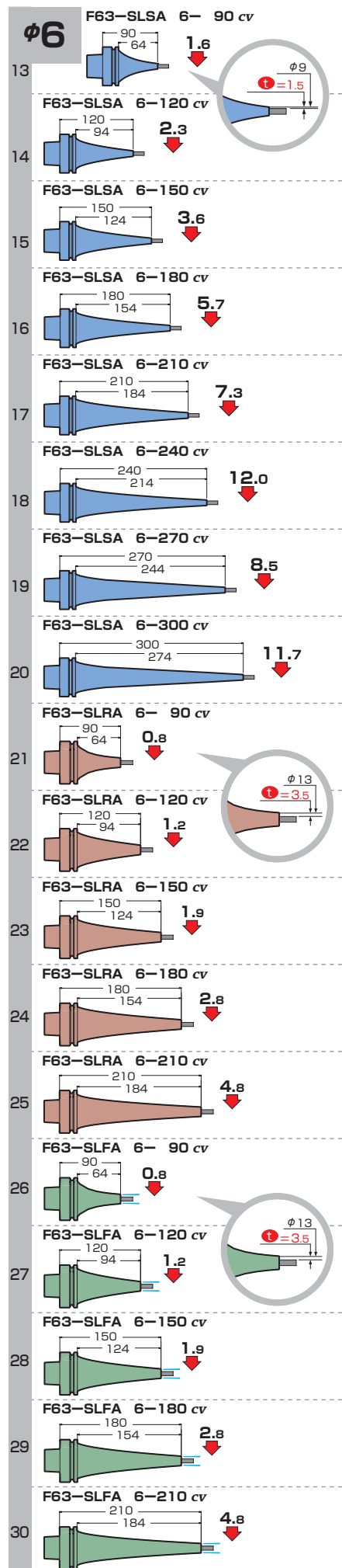
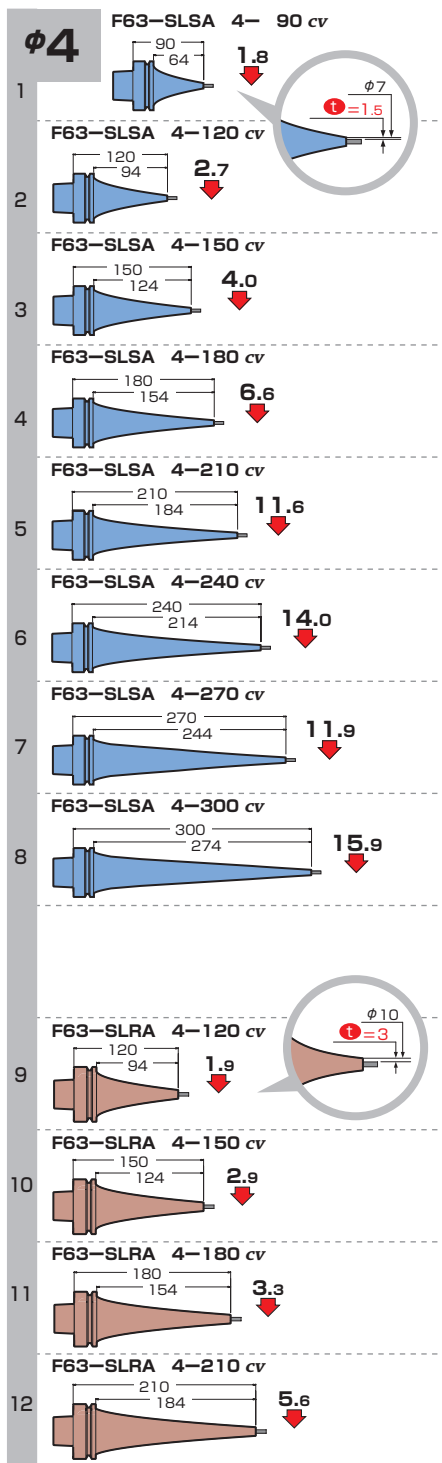
Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
49	F63-SLSA10- 90 cv	10	13	1.5	90	64	53	11	30	65	0.9	2.9	1.8
50	-120 cv				120	94				95	1.2	4.4	1.3
51	-150 cv				150	124				125	1.3	5.2	2.2
52	-180 cv				180	154				154	1.5	6.3	3.4
53	-210 cv				210	184				184	1.6	6.8	6.0
54	-240 cv				240	214				212	2.0	9.4	5.8
55	-270 cv				270	244				244	2.1	10.9	6.6
56	-300 cv				300	274				274	2.3	12.2	8.5
57	-SLRA10- 90 cv	10	19	4.5	90	64	53	11	30	65	1.0	3.5	0.6
58	-120 cv				120	94				95	1.2	4.6	0.9
59	-150 cv				150	124				125	1.4	5.8	1.4
60	-180 cv				180	154				155	1.6	7.2	2.0
61	-210 cv				210	184				185		8.0	3.1
62	-SLFA10- 90 cv	10	19	4.5	90	64	53	11	30	65	1.0	3.5	0.6
63	-120 cv				120	94				95	1.2	4.6	0.9
64	-150 cv				150	124				125	1.4	5.8	1.4
65	-180 cv				180	154				155	1.6	7.2	2.0
66	-210 cv				210	184				185		8.0	3.1
67	-SLSA12- 90 cv	12	15	1.5	90	64	53	14	30	64	1.0	3.4	1.5
68	-120 cv				120	94				94	1.2	4.7	1.2
69	-150 cv				150	124				124	1.3	5.2	2.4
70	-180 cv				180	154				154	1.5	6.5	3.3
71	-210 cv				210	184				184	1.7	7.7	4.6
72	-240 cv				240	214				212	2.0	9.6	5.5
73	-270 cv				270	244				244	2.2	11.8	5.4
74	-SLRA12- 90 cv	12	22	5	90	64	53	14	30	64	1.0	3.6	0.6
75	-120 cv				120	94				94	1.3	5.5	0.7
76	-150 cv				150	124				124	1.5	6.7	1.1
77	-180 cv				180	154				154	1.6	7.5	1.8
78	-210 cv				210	184				184	1.7	8.5	2.8
79	-SLFA12- 90 cv	12	22	5	90	64	53	14	30	64	1.0	3.6	0.6
80	-120 cv				120	94				94	1.3	5.5	0.7
81	-150 cv				150	124				124	1.5	6.7	1.1
82	-180 cv				180	154				154	1.6	7.5	1.8
83	-210 cv				210	184				184	1.7	8.5	2.8
84	-SLSB16- 90 cv	16	21	2.5	90	64	53	17	32	62	1.1	3.9	0.6
85	-120 cv				120	94				92	1.4	5.8	0.8
86	-150 cv				150	124				122	1.5	6.9	1.5
87	-180 cv				180	154				152	1.9	8.8	1.9
88	-210 cv				210	184				182	2.0	9.9	3.0
89	-240 cv				240	214				212	2.3	11.8	3.7
90	-270 cv				270	244				242	2.2	13.7	4.6
91	-SLSB20- 90 cv	20	26	3	90	64	51	21	40	62	1.1	4.2	0.5
92	-120 cv				120	94	53			92	1.4	6.2	0.8
93	-150 cv				150	124				122	1.6	7.6	1.3
94	-180 cv				180	154				152	2.0	9.6	1.8
95	-210 cv				210	184				182	2.3	11.6	2.3
96	-240 cv				240	214				212	2.6	13.7	3.0
97	-270 cv				270	244				242	2.4	16.3	3.4

For SLIMLINE MONO CURVE customers.

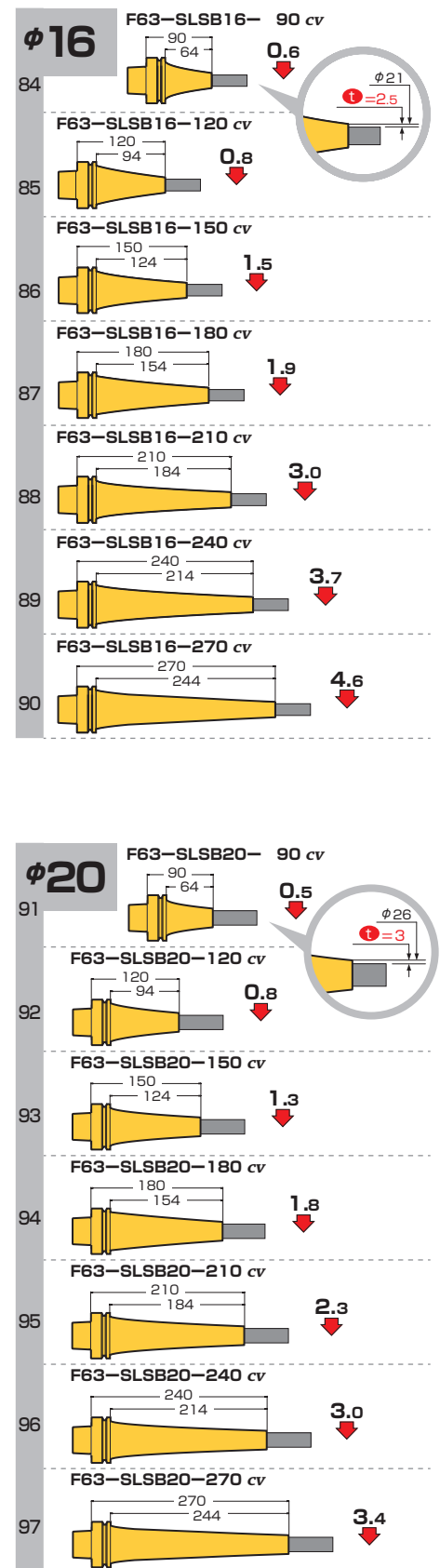
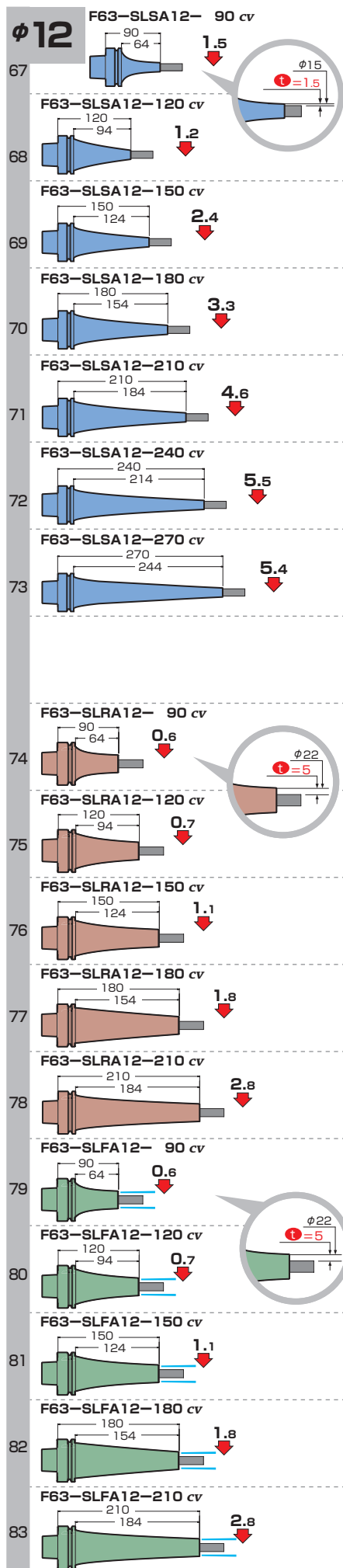
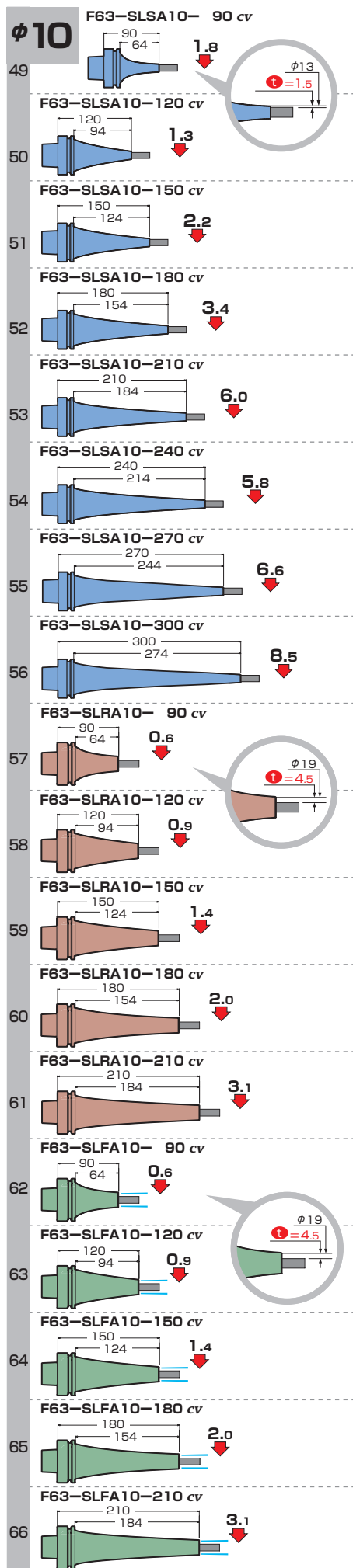
Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

Example; Previous model no. : **A63-SLSC6-120**

New model no. : **A63-SLSA6-120 CV**



F63



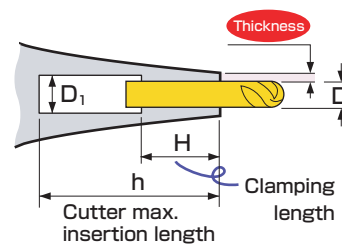
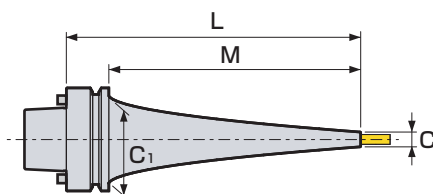
Dimensions F80PD For Makino

Deflection value
($\mu\text{m/kgf}$)

60

Pin

F80PD-SLRB16-75 cv



Scale model	CODE	ϕD	ϕC	Thick-ness	L	M	ϕC_1	ϕD_1	H	h	Kg	N	S
1	F80PD-SLRB12- 75 cv	12	26	7	75	49	67	13	30	48	1.4	4.8	0.4
2	- 90 cv				90	64				63		5.3	0.5
3	-120 cv				120	94				93	1.9	8.5	
4	-180 cv				180	154				153	2.5	12.8	0.9
5	-240 cv				240	214				213	2.9	15.7	1.8
6	F80PD-SLRB16- 75 cv	16	32	8	75	49	67	17	32	48	1.5	5.4	0.3
7	- 90 cv				90	64				63	1.6	6.7	
8	-120 cv				120	94				93	2.1	9.9	0.4
9	-180 cv				180	154				153	2.7	14.1	0.8
10	-240 cv				240	214				213	3.4	19.5	1.3
11	F80PD-SLRB20- 75 cv	20	38	9	75	49	67	21	40	48	1.5	5.8	0.3
12	- 90 cv				90	64				63	1.7	7.2	0.2
13	-120 cv				120	94				93	2.1	10.5	0.4
14	-180 cv				180	154				153	2.8	15.8	0.7
15	-240 cv				240	214				213	3.7	22.1	1.1
16	F80PD-SLRB25- 75 cv	25	45	10	75	49	67	26	42	48	1.6	6.6	0.2
17	- 90 cv				90	64			45	63	1.9	8.6	
18	-120 cv				120	94				93	2.3	11.9	0.3
19	-180 cv				180	154				153	3.1	18.6	0.6
20	-240 cv				240	214				213	4.1	25.2	1.0

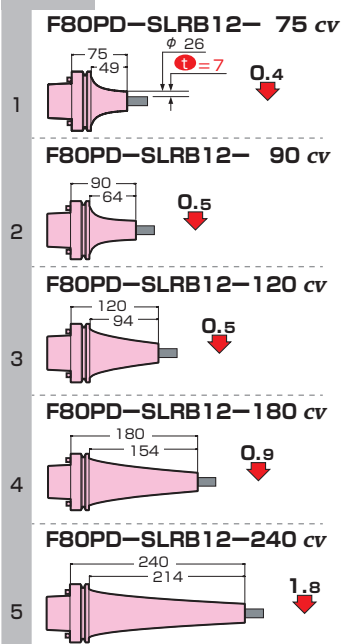
For SLIMLINE MONO CURVE customers.

Please note that we changed model number for SLIMLINE MONO CURVE due to additional model lineup.

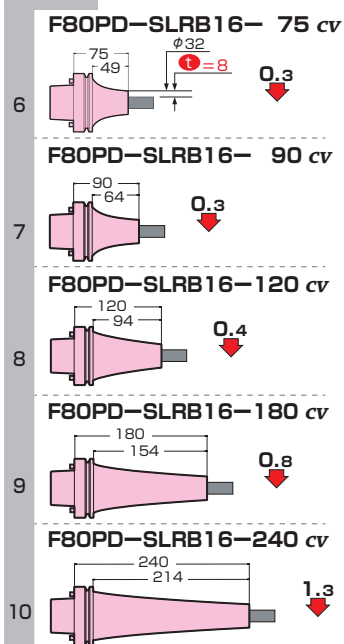
Example; Previous model no. : A63-SLSC6-120

New model no. : A63-SLSA6-120 CV

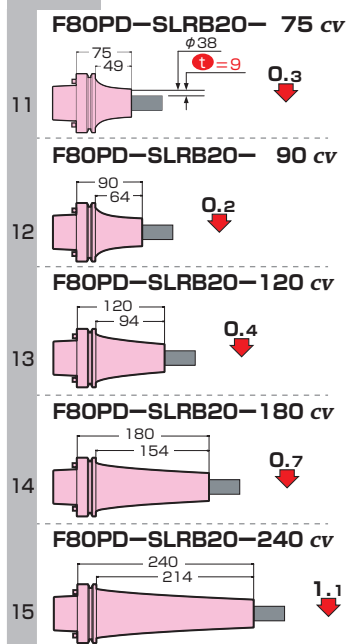
φ12



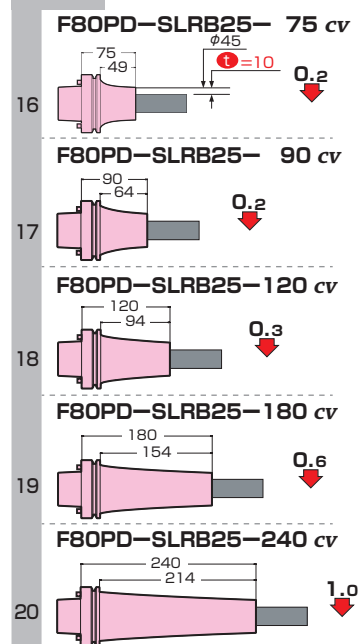
φ16



φ20



φ25



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