Clamping

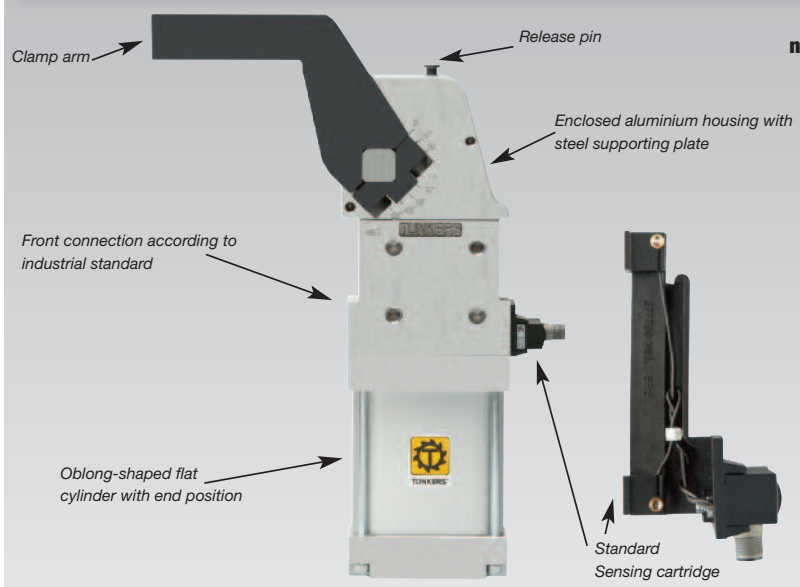
Clamping – an automation module of the Tünkers Group

TÜNKERS®
Ingenuity in series.

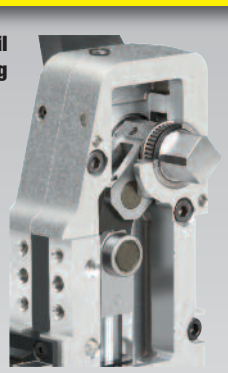
Clamping

The Tünkers clamping technology programme with its broadly diversified product range is unique. From mini clamps, cylinder diameter of 16 mm, standard toggle clamps, the special ALPHA clamp up to taylor-made solutions for underbody clamping – you will not find a broader portfolio of solutions for your challenges in the fixture.
It is not without good reason that we have this expertise. For decades Tünkers clamping technology has set the standard in car body manufacturing. From the introduction of the flat clamp, the sensing cartridge, the ALPHA clamp with curve mechanism up to the presentation of the universal clamp today and a comprehensive electrical product range - Tünkers sets standards in body-in-white automation.
The Tünkers company sees itself as a key innovation driver in equipment standardisation. This is also expressed by our company motto:
“A new idea every day, a new product every week!”
This prospectus gives you an overall view of the available product range.

Principle of a power clamp



Detail needle bearing



Pintle in needle bearing

Detail end position damping

Cylinder with end position damping

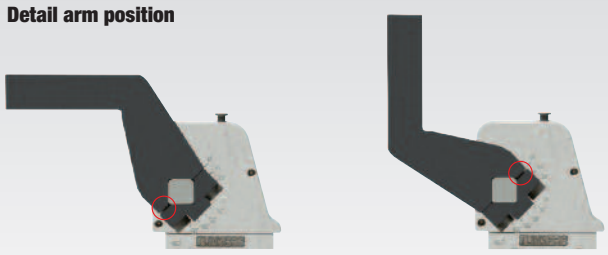
Detail opening angle

Housing with angular scale

Detail vario principle

The vario principle: Continuously adjustable opening angle with standard hew wrench

Detail arm position



Type 1
e. g. V 63.1 BR2

Type 1
e. g. V2 63.1 BR2

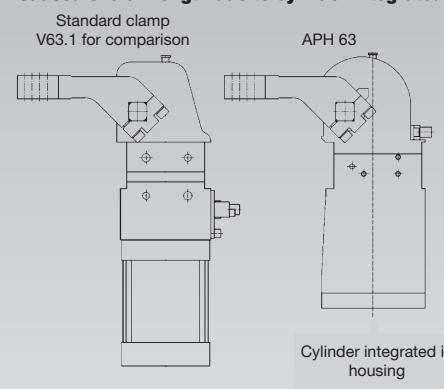
ALPHA clamp with curve-driven lever mechanism

Less installation space
– More work contents in the manufacturing cell due to flexible fixtures for different model variants, parallel processes such as forming, stamping, adhesive bonding and welding
– Restricted space in fixtures with unfavourable accessibility

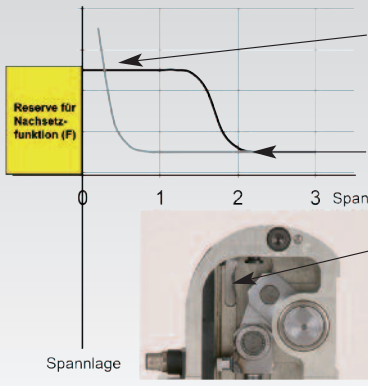
Higher Force
– Highly rigid metal sheets, multiple layer connections and wide, plane contour blocks require higher clamping force

Low energy consumption
– Call for energy saving concepts also in fixture construction

Reduced overall length due to cylinder integrated in clamp housing



Consequence of lower overall length:
- Lower weight
- Higher power density.
- Less space requirement in the plant



Beyond dead centre mechanism
Standard mechanism generates high forces in the end positon, danger of clamp arm ‘starving’ due to insufficient power reserves.

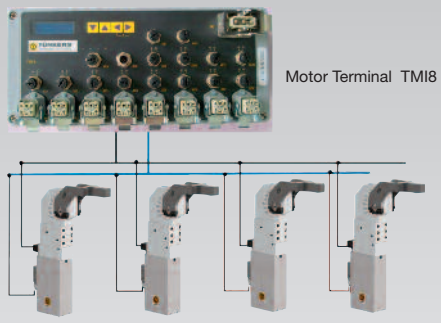
Curve-driven lever mechanism
Toggle-joint is curve-driven, result: previously, nearly constant force progression with adjusting function

Plate thickness compensation: Curve-driven lever mechanism (APH) instead of Beyond dead centre mechanism (V)

Electrical 24V DC Series

The electric clamp is the compatible alternative to the pneumatic clamp. Driven by the safety concepts in the factories, a conventional DC motor with safety extra-low voltage of 24 Volt is used as drive. The electric clamp with nearly unchanged dimensions, in combination with an extremely robust trapezoidal threaded spindle, is an extremely compact and at the same time robust equivalent of the previous compressed-air standard.

EK 63



Motor Terminal TMI8

For energy savings Electric Clamp

Basis: Clamp arm with throat depth: 100 mm, operating power: 6 bar, compressed-air hose: 3 m, inside Ø 10 mm

50-series; Opening angle 135°	Vario series	Electric Clamp
Energy consumption (at 6 bar)	[l]	[kWh]
Energy consumption (l or kWh (cycle)	1,71	0,00003
Energy consumption (cycle) Clamp position, compressed-air supply (3 m) × 1,8 l incl.	3,52	/
Energy consumption (0,13 kWh/m³)	[kWh]	[kWh]
per day (1.000 cycles / day)	0,46	0,03
per year (250 days)	114	7,50
Project duration (8 years)	915	60
CO2 emissions (600 g/kWh)	[kg]	[kg]
per day (1.000 cycles / day)	0,27	0,02
per year (250 days)	69	4,5
Project duration (8 years)	549	36
Betriebskosten (1,43 ct/m³ -11 ct/kWh)	[=€]	[=€]
per day (1.000 cycles / day)	0,050 ⇨	0,003 ⇨
per year (250 days)	12,58 ⇨	0,83 ⇨
Project duration (8 years)	100,66 ⇨	6,60 ⇨

The above table compares the energy consumption of a standard pneumatic clamp, cylinder diameter 50 mm, to its electric equivalent.
Basis: clamp arm, throat depth: 100 mm, operating power: 6 bar, compressed-air hose: 3 m, Ø 10 mm. Accordingly, the presented values of energy consumption, CO2 emissions are converted into operating costs, in each case for 1000 cycles/day, per year and projected over a project duration of 8 cycles.
The most astonishing thing is that the cost-savings amount to nearly 94 € for each clamp. This corresponds to factor 15!

Expertise in underbody clamp technology

– Hook clamp, UZ clamp or underbody clamp – many terms describe this special clamping technology, which is in particular used for clamping an entire underbody assembly group.

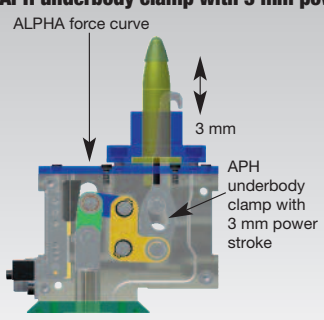
– For this purpose, normally four to eight underbody clamps are positioned by a centering pin, clamped on it by a hook and held securely during the process step.

– Over the years we have developed significant expertise. High-strength steels and aluminium automotive bodies require their own underbody clamping concept.
We would be pleased to advise and help you with the standardisation, even before the beginning of the classic design stage of the line.

Expertise in underbody clamp technology

– ALPHA curve-driven lever mechanism instead of toggle mechanism for adjusting function 3 mm.
– Retracting hook movement with slotted guide for an optimum motion profile e. g. for collar holes
– Flat cylinder for an all in all flat tool profile
– Locking solutions:
a. Mechanical break system for secure stop position of the clamped position
b. Pneumatic retention valve holding the air in the cylinder in the event of a pressure drop

APH underbody clamp with 3 mm power stroke



APH 60 FUZ B

APH 60 FUZ H
With pneumatic stop valve

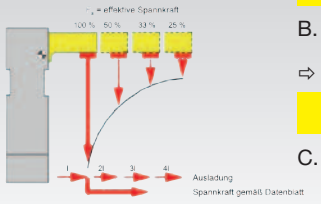
Dimensioning Aid

Available clamping force depends on clamp arm length

All clamps with clamp arm in swivelling bearings generate a defined torque (M) at the drive axle.

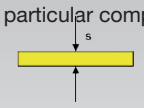
Due to the context $M = F_s \times l \Rightarrow Fs = \frac{M_{max}}{l}$
the actually effective clamping force
at the clamping point is being reduced in relation to clamp arm 1.

⇨ Double arm length = Half clamping force!



General procedure when choosing a clamp

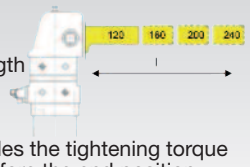
A. Definition of the required clamping force a the particular component points.



⇨ Metal sheet thickness (s)
⇨ Metal sheet quality (e. g. ST quality)

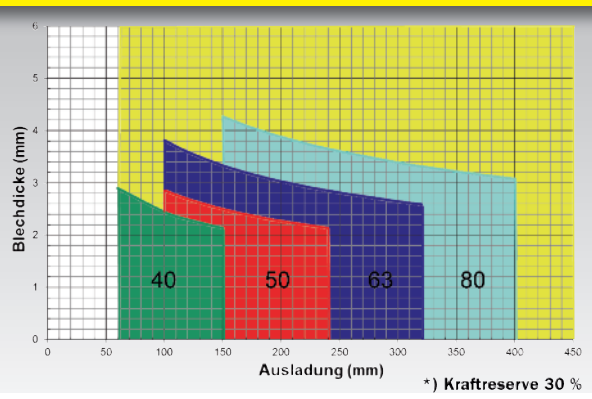
$F_s = 48 \times s^3$ = Force in Newton

B. Definition of the required tightening torque „Ms“
⇨ Throat depth component / clamp arm length



$M_s = F_s \times l$

C. Choice of the clamping tool, which provides the tightening torque with an assumed certainty (e.g. 1,5) 2° before the end position.



*) Kraftreserve 30 %

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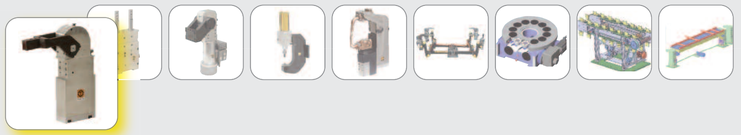


PKS 16-25.1

- Compact clamp with toggle mechanism
- Beyond dead centre lock
- Housing in mono-block design made of highly rigid aluminium material
- Prepared with magnetic piston for sensing

	PKS 16.1	PKS 20.1	PKS 25.1
Tightening torque at 5 bar (Nm)	8	15	25
Holding torque max. (Nm)	25	54	75
Operating pressure oil-free air (bar)	5	5	5
Max. pressure with oil-free air (bar)	6	6	6
Connection (G)	M5	G1/8	G1/8
Opening and closing time (approx. sec.)	1	1	1
Weight (kg)	0,3	0,5	0,8
Dimensions (l x b x t) [mm]	123 x 32 x 26	158 x 39 x 30	182 x 45 x 35

PKG 16-25

- Compact clamp with toggle mechanism for horizontal installation
- Housing in mono-block design made of highly rigid aluminium material

	PKG 16	PKG 20	PKG 25
Tightening torque at 5 bar (Nm)	8	15	25
Holding torque max. (Nm)	25	54	75
Operating pressure oil-free air (bar)	5	5	5
Max. pressure with oil-free air (bar)	6	6	6
Connection (G)	M5	G1/8	G1/8
Opening and closing time (approx. sec.)	1	1	1
Weight (kg)	0,3	0,5	0,8
Dimensions (l x b x t) [mm]	123 x 32 x 26	158 x 39 x 30	182 x 45 x 35

K 16-25.1

- Compact clamp with toggle mechanism
- Housing in mono-block design made of highly rigid aluminium material
- Fork-shaped clamp arm with mounting options for gripper jaws, contour blocks or set screws

	K 16.1	K 20.1	K 25.1
Tightening torque at 5 bar (Nm)	8	15	25
Holding torque max. (Nm)	25	54	75
Operating pressure oil-free air (bar)	5	5	5
Max. pressure with oil-free air (bar)	6	6	6
Connection (G)	M5	G1/8	G1/8
Opening and closing time (approx. sec.)	1	1	1
Weight (kg)	0,4	0,6	0,9
Dimensions (l x b x t) [mm]	126 x 38 x 40	159,5 x 45,5 x 45	185 x 52 x 52

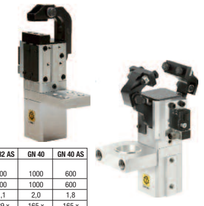
APG / APG... AS

- Compact pneumatic gripper
- Also available as double arm version
- Encapsulated design
- Toggle-locked end position

	APG 40.1 BR2	APG 40.1 BR2 AS
Tightening torque at 5 bar (Nm)	1200	600
Operating pressure oil-free air (bar)	5	5
Max. pressure with oil-free air (bar)	6	6
Connection (G)	M5	G1/8
Opening and closing time (approx. sec.)	1	1
Weight (kg)	1,6	2,0
Dimensions (l x b x t) [mm]	215 x 60 x 60	165 x 75 x 66

GN / GN... AS

- Compact pneumatic gripper with curve-driven lever mechanism
- Optionally with one or two movable gripper arms
- Different mounting e.g. for mounting to gripper tube



	GN 32	GN 32 AS	GN 40	GN 40 AS
Clamping force (N) at 5 bar	600	400	1000	600
Retention force (N)	600	400	1000	600
Weight (kg)	1,3	1,1	2,0	1,8
Dimensions (l x b x t) [mm]	139 x 50 x 50	139 x 50 x 50	165 x 55 x 55	165 x 55 x 55

U 63 / U 50

- New standard series
- Universal clamp with optimised toggle mechanism
- Consumption of compressed air is reduced when smaller tube diameters are used.
- Option: welding protection

	U 50	U 63
Shorter overall length (mm)	285	328
Slim design (mm)	48	48
Lower Weight (kg)	3,96	4.3
Reduced air consumption (cm³/bar)	200	380
Same clamping force (Nm)	160	380
Dimensions (l x b x t) [mm]	285 x 108 x 72	328 x 118 x 72

V/V2... .1 BR2 5-135°

- Vario clamp with toggle mechanism
- Beyond dead centre lock
- Enclosed housing in aluminium design
- Oblong-shaped flat cylinder in size 50, 63, 80
- Fork-shaped clamp arm with standard hole pattern for contour blocks
- Opening angle continuously adjustable to 5-135°

	V/V2 40 BR2	V/V2 50.1 BR2	V/V2 63.1 BR2	V/V2 80.1 BR2
Holding torque max. (Nm)	380	800	1000	2500
Tightening torque at 5 bar (Nm)	120	160	380	800
Corresponds to piston Ø (mm)	40	50	63	80
Weight – (kg)	2	3,9	4,8	14
Dimensions (l x b x t) [mm]	235,5 x 83 x 54	321 x 108 x 69	335 x 112,5 x 79	487 x 162 x 108

V/V2... .1 BR2 Z 5-120°

- Vario clamp with toggle mechanism and continuously adjustable opening angle
- Beyond dead centre lock
- Enclosed housing in aluminium design
- Oblong-shaped flat cylinder in sizes 50, 63, 80
- Fork-shaped clamp arm with standard hole pattern for mounting options of contour blocks
- Opening angle continuously adjustable
- Manual feed

	V/V2 40 Z	V/V2 50.1 BR2 Z	V/V2 63.1 BR2 Z	V/V2 80.1 BR2 Z
Holding torque max. (Nm)	200	800	1500	2500
Tightening torque at 5 bar (Nm)	120	160	380	800
Corresponds to piston Ø (mm)	40	50	63	80
Weight – (kg)	2	4,3	4,8	17
Dimensions (l x b x t) [mm]	275 x 83 x 54	321 x 108 x 68	361 x 112,5 x 78	488 x 162 x 108

APH 40-80

- Compact clamp with toggle mechanism for constant clamping force and adjusting function
- Enclosed mono-block housing made of aluminium material with integrated mechanics and flat cylinder of size 50/63/80
- Fork-shaped clamp arm with standard hole pattern for contour blocks
- Opening angle continuously adjustable from 5 - 135° 80 Ø T12 – 30 – 135° 80 Ø T60 – 60 – 135°
- Pneumatic end position damping
- Options:
- Intelligent component sensing and wear detection (T60)
- Integrated stop valve for maintained control (H)
- Mechanic support of end position (B)

	APH 40	APH 50	APH 63	APH 80
Holding torque max. (Nm)	380	800	1500	2500
Tightening torque at 5 bar (Nm)	120	160	400	800
Corresponds to piston Ø (mm)	40	50	63	80
Weight – (kg)	2	4,3	5,6	15
Dimensions (l x b x t) [mm]	260 x 83 x 54	285,9 x 112 x 69	298,5 x 124 x 79	439,85 x 168 x 108

Eco... .1

- Pneumatic clamp with integrated control technology for **reduced compressed air consumption**
- Continuously adjustable opening angle
- Beyond dead centre lock

	Eco/Eco 2 50.1	Eco/Eco 2 63.1	Eco/Eco 2 80.1
Holding torque max. (Nm)	800	1500	2500
Tightening torque at 5 bar (Nm)	160	380	800
Corresponds to piston Ø (mm)	50	63	80
Weight – (kg)	4,3	5,7	18
Dimensions (l x b x t) [mm]	360 x 117 x 68	370 x 124,5 x 78	526 x 182 x 108

EK...

- Electric clamp with 24V DC motor
- Opening angle continuously adjustable
- Robust trapezoidal threaded spindle
- Must: Tünkers in-house control

	EK 25	EK 40/40.5	EK 50	EK 63	EK 80
Holding torque (Nm)	75	200	800	1500	2500
Tightening torque (Nm)	25	120	160	380	800
Operating voltage (V)	24	24	24	24	24
Weight – (kg)	1,5	3,15	4,3	7,3	15
Dimensions (l x b x t) [mm]	212 x 52 x 70	306,9 x 95 x 54	328,5 x 111 x 68	370 x 118,5 x 78	485 x 110x 185

K... AS

- Compact clamp with toggle mechanism driving two clamp arms
- Beyond dead centre locked end position
- Opening angle max. 2 x 90°

	K 40 AS	K 63 AS
Clamping force at 6 bar (N)	550	1000
Corresponds to piston Ø (mm)	40	63
Weight – (kg)	3,5	5,8
Dimensions (l x b x t) [mm]	260 x 117 x 55	319 x 160 x 68

KN 40 UZ

- Compact underbody clamp for centering and clamping operations in workpiece openings
- Customer-specific cylindrical centering
- Retracting hook with slotted guide
- Option B: Blocking unit to lock the clamping positions open and closed
- Option D: Double hook

	KN 40 UZ
Corresponds to piston Ø (mm)	40
Tractive force at 5 bar (kN)	310
Weight – (kg)	2,2
Dimensions (l x b x t) [mm]	171 x 68 x 50

K... UZ

- Underbody clamp for centering and clamping operations in workpiece openings
- Adapted centering pin, at customer request: retracting hook drive via pneumatic cylinder by toggle mechanism

	K 32 UZ	K 60 UZ
Holding torque max. (Nm)	250	380
Tightening torque (Nm)	180	330
Corresponds to piston Ø (mm)	32	60
Weight – (kg)	2,4	5,2
Dimensions (l x b x t) [mm]	203 x 140 x 50	240 x 145 x 50

K 60 U

- Underbody clamp with completely retractable clamping hook for clamping operations in workpiece openings
- Retracting hook drive via pneumatic cylinder by toggle mechanism
- End position locked beyond dead centre

	K 60 U
Retention force (daN)	330
Clamping force bei 6 bar (daN)	330
Corresponds to piston Ø (mm)	60
Operating pressure	8 bar
Dimensions (l x b x t) [mm]	257 x 140 x 60

APH... FUZ

- Underbody clamp with adjustment function
- with 3 mm power stroke
- optionally with mechanic blocking (B) and pneumatic maintained control (H)

	APH 60 FUZ	APH 60 FUZB	APH 60 FUZH
Max. retention force (N)	2800	2800	2800
Clamping force bei 6 bar (N)	2800	2800	2800
Weight – (kg)	4,8	6,3	5,6
Dimensions (l x b x t) [mm]	235 x 145 x 50	283 x 145 x 50	243 x 145 x 50

SZ 50 UZ

- Underbody clamp with retractable hook and retractable locating pin function
- Full component release due to retractable pin.
- Toggle mechanics with maintained control
- Drive of retracting hook and centering pin with one cylinder each
  Option D: with double hook

	SZ 50 UZ
Weight – (kg)	7,5
Dimensions (l x b x t) [mm]	319,5 x 95 x 95

MK... UZ

- Manually operated underbody clamp
- Component centering and clamping by retracting hook
- Enclosed aluminium housing, maintained control, customer-specific adjustment of clamping set

	MK 32 UZ	MK 60 UZ
Clamping force bei 6 bar (daN)	180	330
Max. retention force (daN)	250	380
Weight – (kg)	4,0	5,2
Dimensions (l x b x t) [mm]	270 x 140 x 50	285 x 145 x 50

MK...

- Manual clamp with enclosed cast housing
- Maintained control
- Interchangeable with pneumatic clamp of vario series

	MK 40.1	MK 63.1
Tigthening torque (Nm)	160	380
Holding torque (Nm)	800	1500
Corresponds to piston Ø (mm)	50	63
Weight – (kg)	5,8	7,9
Dimensions (l x b x t) [mm]	218 x 107 x 68	245 x 112,5 x 78

HKU...

- Manual clamp in steel plate design
- Toggle mechanism with maintained control
- Mounting on front side

	HKU/ HKU2 32	HKU/ HKU2 63	HKU/ HKU2 70
Tigthening torque (Nm)	55	160	700
Holding torque (Nm)	110	320	1000
Weight – (kg)	1,25	3,2	11
Dimensions (l x b x t) [mm]	112 x 50 x 22,5	160 x 70 x 42	270 x 111,5 x 64

ML...

- Precision push rod clamp
- For traction/pressure function
- Guide arm for contour block mounting
- Option V: with locking on both sides

	ML 40-20	ML 40-50	ML 40-60
Clamping force (N)	1500	1500	1500
Stroke (mm)	20	50	60
Weight – (kg)	2,1	2,7	2,8
Dimensions (l x b x t) [mm]	166 x 37 x 48	196 x 37 x 48	206 x 37 x 48

T2-... U

- Various models of manual clamps available
- U-arm standard foot
- Options:
  Locking mechanism “A“
  available for T 2-07 U, 10 U
  Stainless "E“
  available for T2-01 U, 02 U, 07U

	T 2-01 U	T 2-02 U	T 2-07 U	T 2-10 U	T 2-47 U	T 2-67 U
Clamping force F1 (kN)	0,8	1,0	1,4	2,0	3,0	3,5
Clamping force F2 (kN)	1,1	1,2	2,5	3,0	5,0	5,5
Set screw	M 5x 30	M 6x 35	M 8x 45	M 8x 65	M12x 80	M12x110
Weight – (kg)	0,105	0,175	0,410	0,630	1,480	2,200
Dimensions (l x b x t) [mm]	107,5 x 60 x 33,9	147,5 x 78 x 44	187 x 113 x 45	240,2 x 140 x 64	300 x 195 x 70	332,5 x 230 x 100

SCT...

- Pneumatic swivel clamp
- 90° swivel radius
- Aluminium base body with integrated pneumatic cylinder and swivel mechanism
- Mounted by external thread
- Conical adapter for mounting the clamp arm

	SCT 25	SCT 32	SCT 40	SCT 50	SCT 63
Total stroke (mm)	28	30	29	28	30
Corresponds to piston Ø (mm)	25	32	40	50	63
Weight – (kg)	0,660	0,90	0,970	1,230	1,430
Force (F) (kN)	0,2	0,35	0,6	1,0	1,6
Dimensions (l x b x t) [mm]	118 x M40	132 x M50	135 x M55	145 x M65	152 x M80

SCB...

- Pneumatic swivel clamp in block design
- 90° swivel range
- Aluminium base body with integrated pneumatic cylinder and swivel mechanism
- Multilateral mounting options

	SCB 25	SCB 32	SCB 40	SCB 50	SCB 63
Total stroke (mm)	27	30	30	32	30
Corresponds to piston Ø (mm)	25	32	40	50	63
Weight – (kg)	0,825	1,066	1,216	1,462	1,662
Force (F) (kN)	0,2	0,35	0,6	1,0	1,6
Dimensions (l x b x t) [mm]	90 x 55 x 35	101 x 60 x 45	101 x 70 x 55	113 x 85 x 65	115 x 100 x 80

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