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Workholding Systems

MC

for 5-axis machining

07/2014

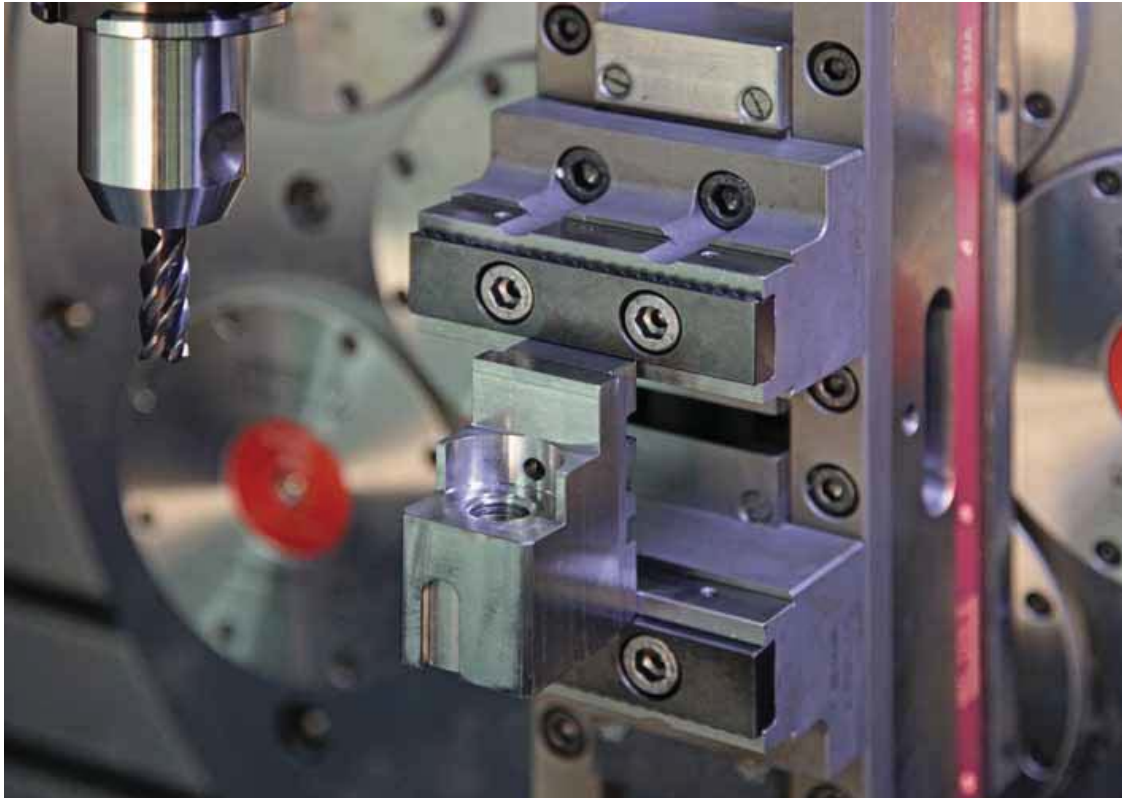
Products | for | productivity

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5-axis machining requires 5-axis clamping systems



Your benefits at a glance:

■ **Ideal for use on 5-axis machining centres and pallet systems**

The compact design enables machining of the workpiece from all sides and ensures collision-free tool paths. This fulfils the basic requirements for dependable 5-axis machining.

■ **Can be used for clamping both unmachined and machined parts**

Jaws with interchangeable jaw inserts manage every clamping task with minimum set-up effort. First and second clamping with a single clamping system – without having to change jaws.

■ **Concentric or clamping against the fixed jaw, mechanical or hydraulic**

The wide selection of systems in the MC series ensures you always have the perfect clamping system for your individual machining tasks.

The hydraulic systems are particularly suited to applications in automated production processes.

■ **Reduction of tool costs through the use of standard tools**

The compact design enables the use of standard tools which means that investment in this special clamping technology pays off quickly.

■ **Very good protection against swarf thanks to closed lead screw area**

Durability and low cleaning effort are further characteristics which distinguish HILMA's 5-axis clamping systems.

Designs and accessories

	Fixed jaw	mechanical	hydraulic	Concentric	mechanical	hydraulic	Page
MC 40	•	•		•	•		4
MC 60	•	•	•	•	•		5
MC 100	•	•		•	•	•	6
MC 125				•	•		7
Clamping jaws/jaw inserts							8 – 10
Rapid change block Quintus							11 – 13
Fixation and positioning, operation							14

Series MC Fixed jaw



Series MC Concentric



■ **Stability:**

Long inside guideways

■ **Durability:**

Lead screw area encapsulated

■ **Usability:**

Wide range of jaws

■ **Flexibility:**

Foundation for STARK zero point clamping systems from series MC60

■ **Precision:**

Steel base




■ **Accessibility:**

Compact design



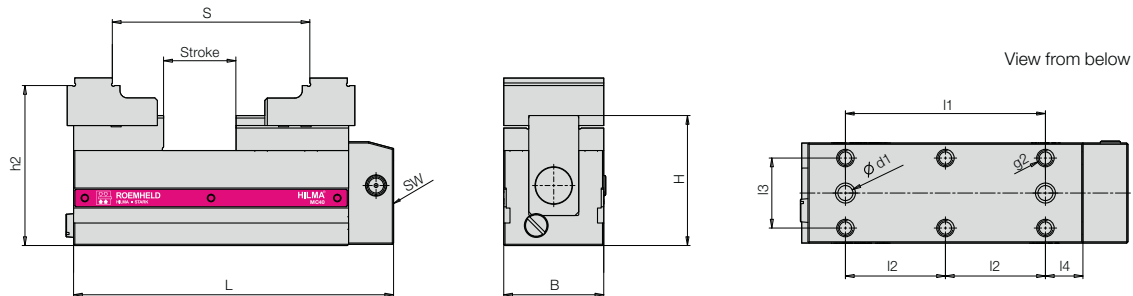
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Technical Data MC40

Design:	 Fixed jaw	 Concentric	Application: In micromachining and in pallet systems
Operation:	 mechanical		Features: Good protection against swarf and high stability, base made from steel, concentric clamping systems, clamping possible from outside to inside and from inside to outside.

Series MC 40

Fixed jaw (Figure 9.3581.1102 with clamping jaw 9.3581.6901)

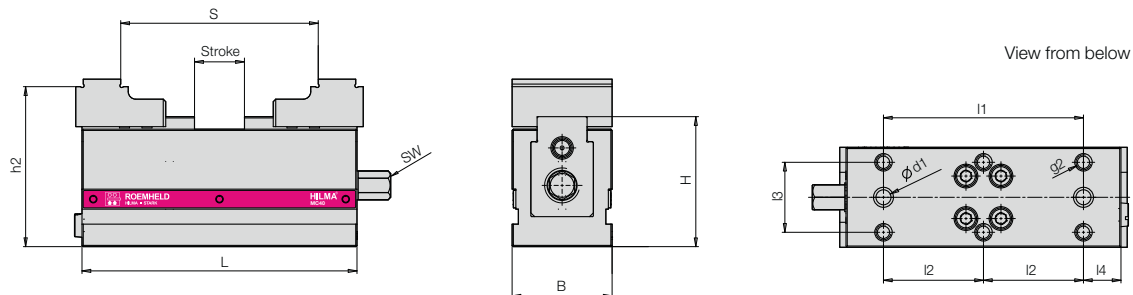


Type	Part no. without jaws	Part no. with jaws	Clamping force [kN/Nm]	Operation	Jaw opening S max. [mm]	Stroke [mm]	Weight without jaws [kg]					
MC40												
Fixed jaw	9.3581.0102	9.3581.1102	8/15	mechanical	6 – 79	29	1.8					
L [mm]	B [mm]	H [mm]	d1	g on both sides	g1	g2	h2 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
128	40	52**	6H7			M6x7	64**	80**	40	28	15	6

Tolerances: * ±0.01 mm ** ±0.02 mm

Series MC 40

Concentric (Figure 9.3581.1302 with clamping jaw 9.3581.6901)



Type	Part no. without jaws	Part no. with jaws	Clamping force [kN/Nm]	Operation	Jaw opening S max. [mm]	Stroke [mm]	Weight without jaws [kg]					
MC40												
Concentric	9.3581.0302	9.3581.1302	8/23	mechanical	6 – 79	20	1.4					
L [mm]	B [mm]	H [mm]	d1	g on both sides	g1	g2	h2 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
110	40	52**	6H7			M6x7	64**	80**	40	28	15	10

Tolerances: * ±0.01 mm ** ±0.02 mm

MC 60 Technical Data



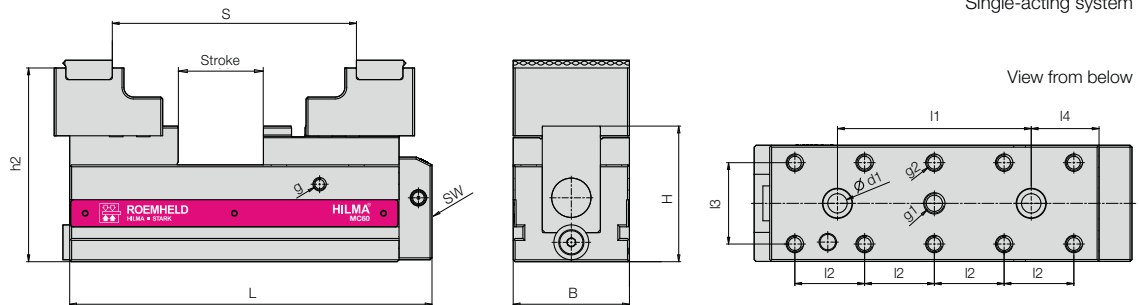
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Design:	Fixed jaw	Concentric	Application: In pallet systems and 5-axis machining centres with small working areas
Operation:	mechanical	hydraulic (only fixed jaw)	Features: Good protection against swarf and high stability, base made from steel, concentric clamping systems, clamping possible from outside to inside and from inside to outside.

Series MC 60

Fixed jaw (Figure 9.3583.1112 with clamping jaw 9.3583.6906)

Hydraulic ports:
1 x G ¼ at the side
1 x plug-type connector Ø 10 from below
Single-acting system



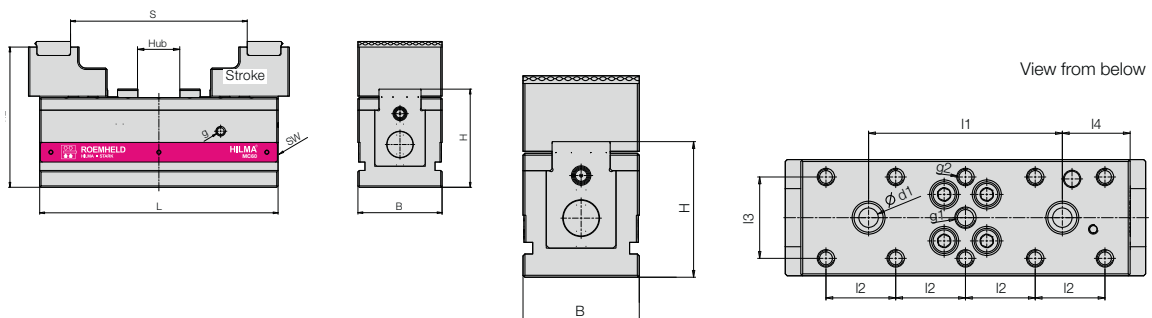
Type	Part no. without jaws	Part no. with jaws	Clamping force [kN]	Operation	Jaw opening S max. [mm]	Stroke [mm]	Weight without jaws [kg]
MC60							
Fixed jaw	9.3583.0112	9.3583.1112	15/25 Nm	mechanical	12 – 126	44	5.0
Fixed jaw	9.3583.0212	9.3583.1212	15/260 bar	hydraulic	12 – 126	4	5.0

L [mm]	B [mm]	H [mm]	d1	g on both sides	g1	g2	h2 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
187	60	70**	10F7	M6x10	M10x11	M8x12	100**	100**	36	42	35	8
204	60	70**	10F7	M6x10	M10x11	M8x12	100**	100**	36	42	35	8

Tolerances: *±0.01 mm ** ±0.02 mm

Series MC 60

Concentric (Figure 9.3583.1301 with clamping jaw 9.3583.6906)



Type	Part no. without jaws	Part no. with jaws	Clamping force [kN/Nm]	Operation	Jaw opening S max. [mm]	Stroke [mm]	Weight without jaws [kg]
MC60							
Concentric	9.3583.0301	9.3583.1301	15/50	mechanical	12 – 126	30	6.0

L [mm]	B [mm]	H [mm]	d1	g on both sides	g1	g2	h2 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
170	60	70**	10F7	M6x10	M10x11	M8x12	100**	100**	36	42	35	12

Tolerances: *±0.01 mm ** ±0.02 mm



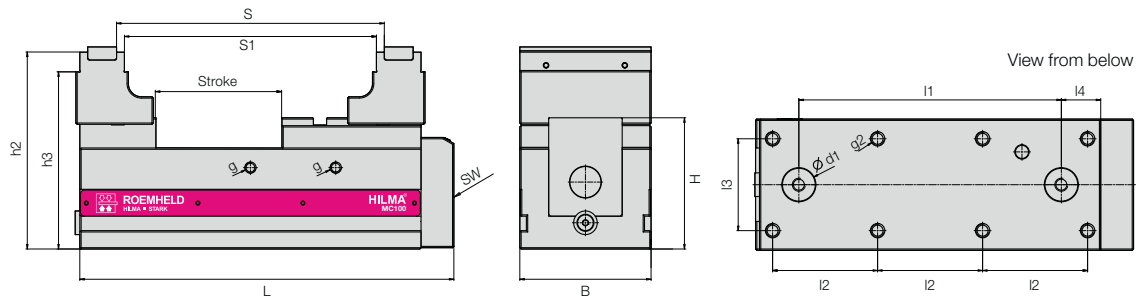
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Technical Data MC 100

Design:	Fixed jaw	Concentric	Application: In pallet systems and 5-axis machining centres
Actuation:	mechanical	hydraulic (only concentric)	Features: Good protection against swarf and high stability, base made from steel, concentric clamping systems, clamping possible from outside to inside and from inside to outside.

Series MC 100

Fixed jaw (Figure 9.3585.1113 with clamping jaw 9.3585.6910)



Type	Part no. without jaws	Part no. with jaws	Clamping force [kN]	Operation	Jaw opening S max. [mm]	S1 [mm]	Stroke [mm]	Weight without jaws [kg]
MC 100								
Fixed jaw	9.3585.0113	9.3585.1113	25/60 Nm	mechanical	15-204	6-192	96	20

L [mm]	B [mm]	H [mm]	d1	g on both sides	g2	h2 [mm]	h3 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
285	100	100**	25+0.01 x5 / M10x14	M8x11	M10x15	150**	135**	200**	80	70	30	12

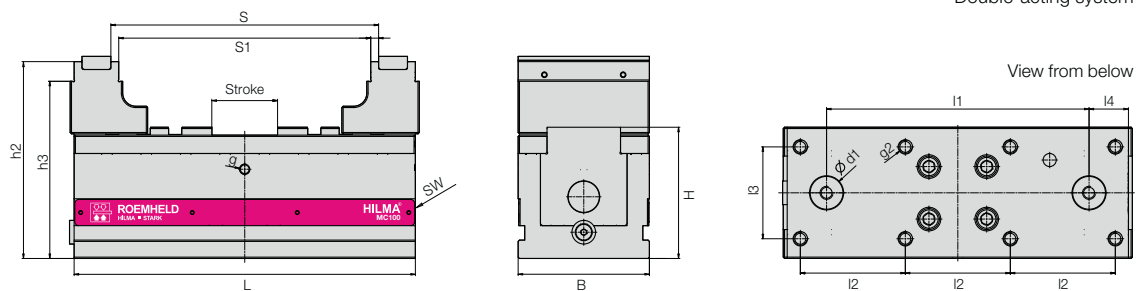
Tolerances: * ±0.01 mm ** ±0.02 mm

Series MC 100

Concentric (Figure 9.3585.1303 with clamping jaw 9.3585.6910)

Hydraulic ports:

2 x G $\frac{1}{4}$ at the side
2 x plug-type connector \varnothing 10 from below
Double-acting system





Type	Part no. without jaws	Part no. with jaws	Clamping force [kN]	Operation	Jaw opening S max. [mm]	S1 [mm]	Stroke [mm]	Weight without jaws [kg]
MC 100								
Concentric	9.3585.0303	9.3585.1303	25/80 Nm	mechanical	15-204	6-192	50	18
Concentric	9.3585.0413	9.3585.1413	20/200 bar	hydraulic	15-204	6-192	50	18

L [mm]	B [mm]	H [mm]	d1	g on both sides	g2	h2 [mm]	h3 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
260	100	100**	25+0.01 / M10x14	M8x11	M10x14	150**	135**	200**	80	70	30	14
291	100	100**	25+0.01 / M10x14	M8x11	M10x14	150**	135**	200**	80	70		

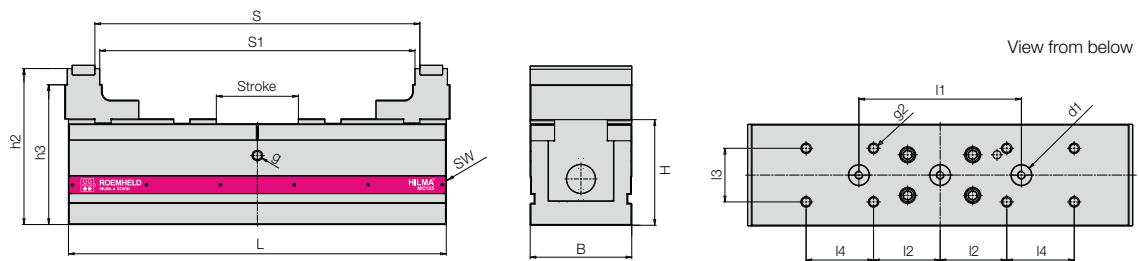
Tolerances: * ±0.01 mm ** ±0.02 mm

MC 125 Technical Data

Design:	 Concentric	Application: In pallet systems and 5-axis machining centres
Actuation:	 mechanical	Features: Good protection against swarf and high stability, base made from steel, concentric clamping systems, clamping possible from outside to inside. From inside to outside only 9.3586.0304 and 9.3586.1304

Series MC 125

Concentric (Figure 9.3586.1304 with clamping jaw 9.3586.6910)



Type	Part no. without jaws	Part no. with jaws	Clamping force [kN]	Operation	Jaw opening S max. [mm]	S1 [mm]	Stroke [mm]	Weight without jaws [kg]
MC 125								
Concentric	9.3586.0304	9.3586.1304	35/200 Nm	mechanical	15-400	6-388	100	50

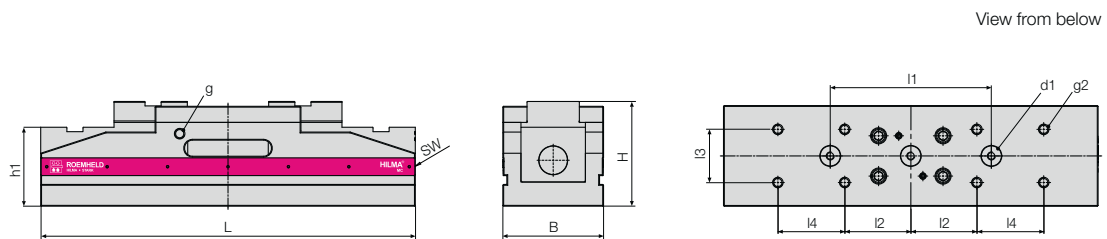
L [mm]	B [mm]	H [mm]	d1	g on both sides	g2	h1 [mm]	h2 [mm]	h3 [mm]	I1 [mm]	I2 [mm]	I3 [mm]	I4 [mm]	SW
465	125	130*	25+0.01/M10x14	M12x18	M12x16	98**	192**	172**	200**	82	66	83	19

Tolerances: * ±0.01 mm ** ±0.02 mm

Series MC 125

Concentric

Optional design with chamfered base (Part no. 9.3586.0303)



Customized base design for positioning and mounting on request.



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Clamping jaws/jaw inserts Accessories



The basis is formed by stable clamping systems with flexible base jaws to accommodate various jaw inserts. Unmachined and machined parts clamped in the same clamping system without additional set-up effort. The use of jaw inserts significantly reduces the required investment in clamping devices. In many applications, the additional "punching" operation is no longer required.

Jaw inserts with grip serrated



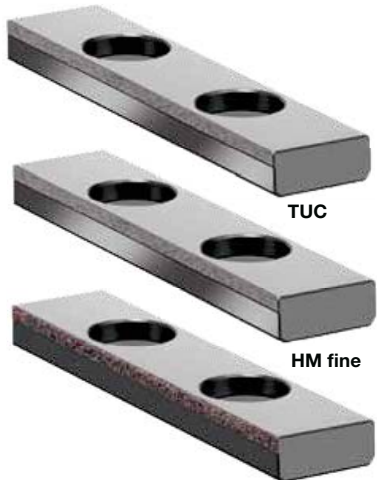
Grip

Particularly suited to first clamping of unmachined parts. Used on saw cuts or casting surfaces with major angular misalignments (0.3 mm)

The "round" jaw inserts are particularly suited to clamping non-cubic workpieces or forgings and castings.

In combination with pendulum jaws, angular misalignments of up to several millimetres can be rectified.

Jaw inserts with coating



TUC

HM fine

HM coarse

Suitable for first clamping of drawn materials or saw cuts with minor angular misalignments (0.1 mm). The type and coarseness of the coating enables a specific selection in accordance with the machining task and material. Retention forces can be increased by a factor of 2.

The inserts can also be used without any problems for clamping (2nd clamping) on machined surfaces. Coating can also be applied subsequently to contour jaws or the existing clamping jaws.

Jaw inserts with coating can also be used without hesitation on clamping systems with power amplifier.

Characteristics of jaw clamping areas

Insert	Workpiece	Damage on the workpiece surface	Rectification of angular misalignments/100 mm
TUC		very low (Ra10)	very low
HM fine		low (grain size of 0.1 mm)	0.1 mm
HM coarse		medium (grain size of 0.3 mm)	0.2 mm
Grip		high	0.5 mm

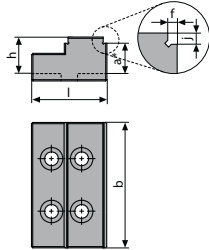
Increase of retention forces

Workpiece material	Workpiece surface	Workpiece surface				
		rolled / cast / forged	drawn	sawn	milled	ground
Steel, e.g. C45, 20MnCr5, 31 CrMo4V9		HM coarse, grip	HM fine, TUC	HM coarse, grip	HM fine, TUC	TUC
Heat-treated steel, e.g. C45 induction-hardened, 20 MnCr5 case-hardened, 31 CrMoV9 nitrided					HM fine, TUC	TUC
Cast e.g. GG, red bronze		HM coarse, grip			HM fine, TUC	TUC
Titanium		HM fine	HM fine, TUC	HM fine	HM fine, TUC	HM fine, TUC
Aluminium		HM coarse, grip		HM fine, grip	HM fine	TIC / TUC
NE metals				HM fine, grip	HM fine	TUC

Accessories **Clamping jaws/jaw inserts**



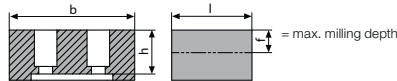
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Reversible step jaw with 2 steps, hardened

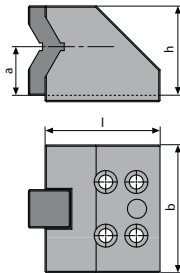
Type	Part no.	Dimensions [mm]									Clamping range min/max
		l	b	h	a	e	f	i	j	k	
MC40	9.3581.6901	36	40	15	12*		3		3		6-79
MC60	9.3583.6901	49	60	23	18*		3		5		6-150
MC100	9.3585.6901	60	100	30	25*		3		5		6-204
MC125	9.3586.6911	80	125	35	30*		5		5		10-400

* Tolerance ±0.01 mm



Block jaw, soft for milling machine of workpiece contours

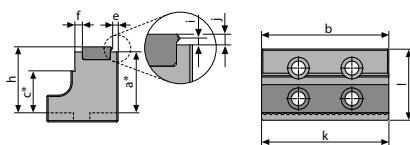
Type	Part no.	Dimensions [mm]									Clamping range min/max
		l	b	h	a	e	f	i	j	k	
MC40	9.3581.6902	36	40	21			6				
MC60	9.3583.6902	42	60	25			8				
MC100	9.3585.6902	64	100	35			18				
MC125	9.3586.6902	88	125	55			32				



Vee jaw with jaw inserts, hardened

Type	Part no.	Dimensions [mm]									Clamping range min/max
		l	b	h	a	e	f	i	j	k	
MC60	9.3583.6905	60	60	70	40						D 10-76 ⁽¹⁾
MC100	9.3585.6905	90	100	70	38						D 12-86 ⁽²⁾

⁽¹⁾ D 10-20 mm, D 20-58 mm, D 58-76 mm
⁽²⁾ D 12-26 mm, D 25-54 mm, D 53-86 mm



Step jaw with jaw insert, grip/smooth, hardened

Type	Part no.	Dimensions [mm]									Clamping range min/max	
		l	b	h	a	c	e	f	i	j		k
MC60	9.3583.6906	56	60	34	30*		4.5	6	2.5	4	60	12-126
Jaw insert	5.5050.0543											
MC100	9.3585.6906	56	100	54	50*	35*	4.5	6	2.5	4	100	15-204
Jaw insert	5.5050.0542											
MC125	9.3586.6906	88	125	66	62*	42*	4.5	6	2.5	4	125	15-400
Jaw insert	5.5050.0509											

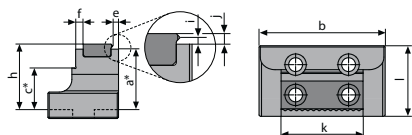
* Tolerance ±0.01 mm



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Clamping jaws/jaw inserts Accessories

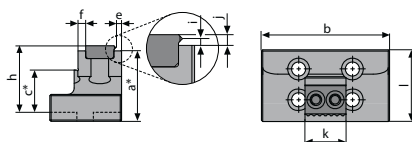
Step jaw with jaw insert, grip/smooth, hardened, various widths



Type	Part no.	Dimensions [mm]									Clamping range min/max	
		l	b	h	a	c	e	f	i	j		k
MC60	9.3583.6907	56	60	34	30*		4.5	6	2.5	4	35	12-126
Jaw insert	5.5050.0545											
MC100	9.3585.6907	56	100	54	50*	35*	4.5	6	2.5	4	65	15-204
Jaw insert	5.5050.0471											
MC125	9.3586.6907	88	125	66	62*	42*	4.5	6	2.5	4	80	15-400
Jaw insert	5.5050.0547											

* Tolerance ±0.01 mm

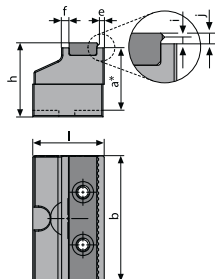
Step jaw with jaw insert, grip/smooth, hardened, various widths



Type	Part no.	Dimensions [mm]									Clamping range min/max	
		l	b	h	a	c	e	f	i	j		k
MC100	9.3585.6908	56	100	54	50*	35*	4.5	6	2.5	4	32	15-204
Jaw insert	5.5050.0470											

* Tolerance ±0.01 mm

Pendulum jaw with jaw insert, grip/smooth, hardened

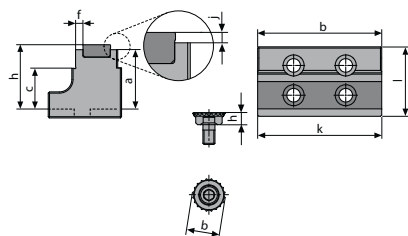


Type	Part no.	Dimensions [mm]									Clamping range min/max
		l	b	h	a	e	f	i	j	k	
MC100	9.3585.6904	56	100	54	50*	4.5	6	2.5	4		15-204
Jaw insert	5.5050.0542										
MC125	9.3586.6904	88	125	66	62*	4.5	6	2.5	4	125	15-400
Jaw insert	5.5050.0509										

* Tolerance ±0.01 mm

** Tolerance ±0.02 mm

Step jaw with jaw insert, HM coating coarse / smooth, hardened and 2 off insert round with grip



Type	Part no.	Dimensions [mm]									Clamping range min/max	
		l	b	h	a	c	e	f	i	j		k
MC100	9.3585.6910	59	100	54	50*	35*		6		4	100	6-192
Jaw insert	5.5050.0523											
Round insert	5.5050.0464		25	10								
MC125	9.3586.6910	91	125	66	62*	42*		6		4	125	18-400
Jaw insert	5.5050.0660											
Round insert	5.5050.0486		31	12								

* Tolerance ±0.01 mm

Accessories Quintus 1



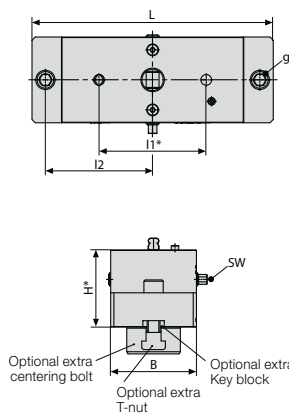
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Rapid change block Quintus 1 for MC 60

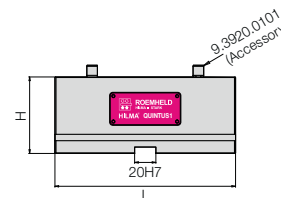
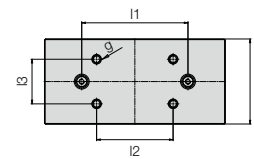
The QUINTUS rapid change block provides the optimum interface for your machine tool. A mechanical zero point clamping system allows rapid and precise changing of different clamping systems taking account of the zero point. This means that machining tasks can be prepared externally and can then be changed without long machine downtimes. Handling is made easier and set-up and production costs are reduced.

Figure with mechanical clamping lock 9.6153.0101

Figure without mechanical clamping lock 9.6153.0102



View from above



Type	Part no.	Dimensions [mm]							SW	Insertion force [kN/Nm]	Weight [kg]
Quintus 1		L	B	H	g	I1	I2	I3			
with mechanical clamping lock	9.6153.0101	225	80	72*	KM 12	100**	100		8	12/60	9
without mechanical clamping lock	9.6153.0102	170	80	72*	KM 8	100**	72	42			7.5

* Tolerance ±0.01 mm
** Tolerance ±0.02 mm

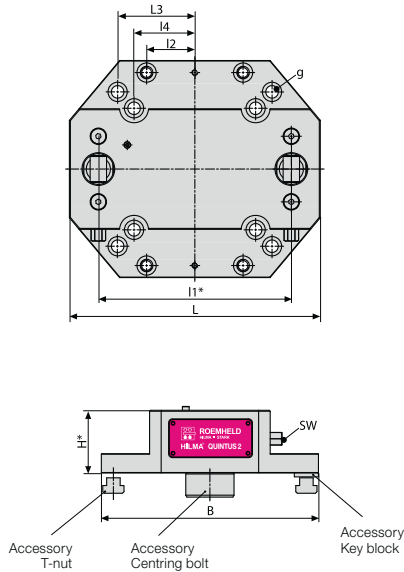


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Quintus 2 Accessories

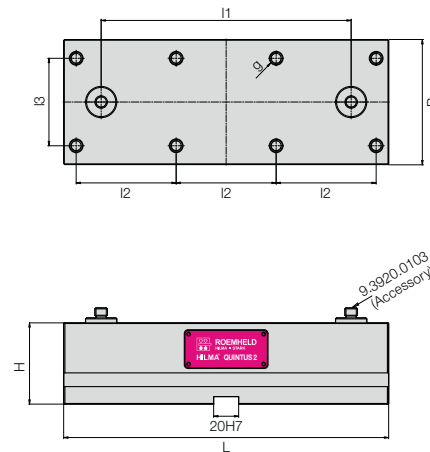
Rapid change block Quintus 2 for MC 100

Figure with mechanical clamping lock 9.6155.0102



View from above

Figure without mechanical clamping lock 9.6155.0103



Type	Part no.	Dimensions [mm]									Insertion force [kN/Nm]	Weight [kg]
		L	B	H	g	I1	I2	I3	I4	SW		
Quintus 2 with mechanical clamping lock	9.6155.0102	260	225	65*	KM12	200**	50	63	80	13	2x20/80	18
Quintus 2 without mechanical clamping lock	9.6155.0103	260	100	65*	KM10	200**	80	70				13

* Tolerance ±0.01 mm
** Tolerance ±0.02 mm

Accessories Quintus 3



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Rapid change block Quintus 3 for MC 125

Figure with mechanical clamping lock 9.6156.0102

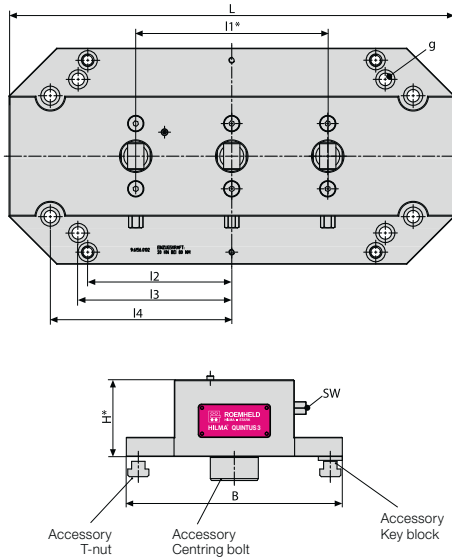
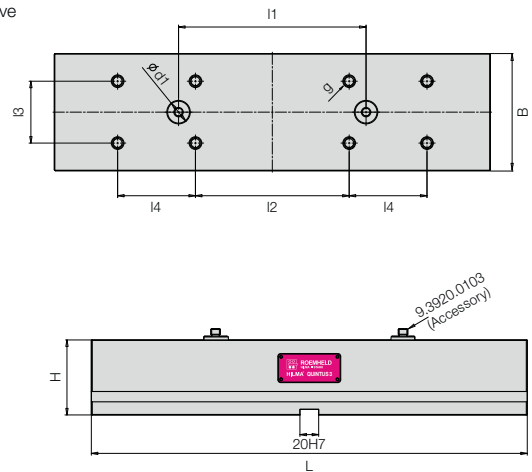


Figure without mechanical clamping lock 9.6156.0103

View from above



Type Quintus 3	Part no.	Dimensions [mm]								SW	Insertion force [kN/Nm]	Weight [kg]
		L	B	H	g	I1	I2	I3	I4			
with mechanical clamping lock	9.6156.0102	464	225	80*	KM 12	200**	150	160	189	13	3x20/80	42
without mechanical clamping lock	9.6156.0103	465	125	80*	KM 12	200**	164	66	83			35

* Tolerance ±0.01 mm
** Tolerance ±0.02 mm



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MC / Quintus Accessories

Fixation and positioning

Centring bolt for hub centring on machine table

Type	Part no.	Ø [mm]	L [mm]
Quintus 1/2/3	9.6153.5001	D30 g6	15/38
	9.6153.5002	D32 g6	15/38
	9.6153.5003	D50 g6	25/48
	9.6153.5009	D50 g6	18/41

Pull-in bolt, mounting on clamping system

Type	Part no.	Quantity
Quintus 1/ MC 60	9.3920.0201	1 off
Quintus 2/ MC 100	9.3920.0202	1 set = 2 off
Quintus 3/ MC 125	9.3920.0203	1 set = 3 off

Positioning pins, various diameters, for grid plate and Quintus, 1 set = 2 off

Type	Part no.	Ø [mm]
MC60	9.3920.0101	10/12
MC100 / MC125	9.3920.0103	25/12

Clamping claws, 1 set = 4 off, incl. screws

Type	Part no.	Thread
MC40	9.3581.7001	M 8
MC60	9.3583.7001	M10
MC60	9.3583.7002	M12
MC100	9.3585.7001	M12
MC125	9.3777.3011	M12
MC125	9.3777.3021	M16

Key block with screw for Quintus 1,2,3

Part no.	Slot [mm]
9.6153.5004	DIN 6322, 1 off 14

T-nut with screw for Quintus 1,2,3

Part no.	Slot [mm]
9.6153.5005	DIN 508, 4 off 14

Operation

Socket

Type	Part no.	SW
MC40 Fixed jaw	1.3124.0103	6
MC40 Concentric	1.3124.0025	10
MC60 Fixed jaw	1.3124.0104	8
MC60 Concentric	1.3124.0021	12
MC100 Fixed jaw	1.3124.0024	12
MC100 Concentric	1.3124.0020	14
MC125	1.3124.0019	19

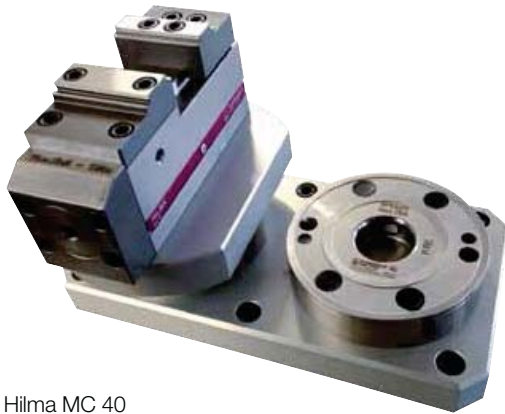
Torque wrench

Type	Part no.	Torque [Nm]
MC40 / 60	9.3583.7010	5– 60
MC100 Fixed jaw	9.3583.7010	5– 60
MC100 Concentric	9.3792.6610	20–120
MC125	9.3792.6620	40–200

MC Application examples



ROEMHELD
HILMA ■ STARK



Hilma MC 40
and STARK Easy Click zero point clamping system



Two clamping systems MC 60 H on reversible
clamping device. Use with special clamping jaws



MC 100 on the
STARK zero point clamping system



ROEMHELD
HILMA ■ STARK

Hilma MC 100 Z and STARK zero point clamping system – combined for maximum flexibility and precision

MC 100 with grip jaw



Three SCS 120 H as a specific set-up in a pallet station. The clamping pressure is controlled by the machine hydraulics.

Grip jaw with steps for first and second clamping