

More than 80 years of expertise
in mechanical engineering



HAGEN & GOEBEL

Tapping machines

for tap cutting and tap forming



Hagen & Goebel Werkzeugmaschinen GmbH

www.hagengoebel.de - info@hagengoebel.de - +49 (0)2921/590160

Construction characteristics of types HG-6 and HG-10



Type HG-6, bench mounted machine



Type HG-6, bench mounted machine with adjustable two spindle head and Halogen machine light

Double friction clutch

The reversal of the tapping spindle from clockwise to counter-clockwise rotation is supported by our well proven double friction clutch, meaning:

1. only the rotation of the tapping spindle with the forward and reverse cones is switched to clockwise and counter-clockwise rotation
2. the reversal therefore is extremely smooth and without shock, due to the low inertia of the masses involved,
3. the tap life is increased appreciably by the smooth reversal.

Feed

The feed motion of the tapping spindle is initiated by pressing the hand lever. Tapping can be carried out with or without a lead screw. All our types HG-6, HG-10 machines have a provision for fitting lead screws.

Tapping without lead screw

For tapping without lead screw, the counter-clockwise rotating spindle is brought quickly into contact with the workpiece by means of the hand lever. As soon as the tap hits the workpiece, the contact pressure changes the double friction clutch over to clockwise rotation of the spindle. This direction of rotation is maintained as long as pressure is applied to the hand lever and until the preset depth of thread is reached.

When pressure on the hand lever is released, the double friction clutch immediately reverses the direction of rotation and the tap is unscrewed, the spindle returns to its top initial position by spring force.

This feature permits sensitive tapping of even difficult materials, in intervals if necessary

Tapping with lead screw

The use of a lead screw is particularly recommended if soft materials are tapped, where otherwise the thread could be spoiled by excessive force on the hand lever.

The lead screw and nut provide a positive spindle feed. As the lead of the lead screw is identical to that of the tap, the threads cannot be tapped incorrectly. The hardened and ground lead screws with individually fitted, adjustable nuts have an extremely long service life and ensure threads true to gauge.

Good accessibility permits a quick change of the lead screw.

A lead screw and nut is required for every pitch.

Pedal operation

For awkward workpieces or mass production it is very important that the operator has both hands free for changing the workpiece. In such cases it is convenient to have pedal operation of the tapping machine.

Pedal operation is part of the standard equipment on the type HG-10 pillar machine. The type HG-6 machine can be supplied with pedal operation as optional equipment.

Drive

On HG-6 machines, the double friction clutch is driven by an adequately sized three-phase motor via a V-belt drive with three step cone pulley. In the case of the HG-10 machine the double friction clutch is driven by gears.

Safety devices to guarantee against tap breakage

The double friction clutch also acts as an overload protection. This largely eliminates tap breakage. As soon as the torque is increased by a blunt tap or the tap strikes the bottom of a blind hole, the clutch slips and the tapping spindle is stopped immediately.

Tap chucks

The types HG-6 and HG-10 machines are each equipped with tap chucks with short DIN 238 taper, which hold the tap securely. On request, types HG-6 and HG-10 can also be equipped with spindles having a Morse taper.

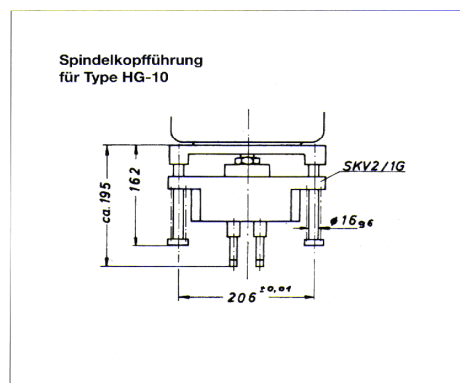
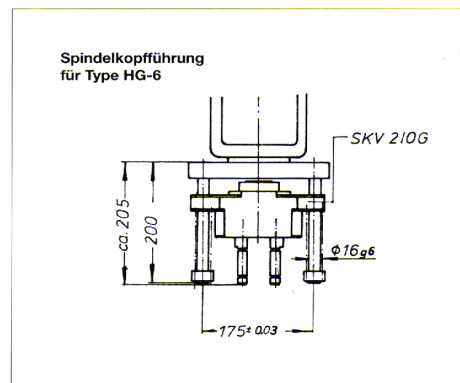
Multi-spindle heads

For simultaneous tapping of several threads with tapping machines HG-6 and HG-10, multi-spindle heads with a fixed or adjustable drilling pattern can be applied.

Multi-spindle heads with a fixed drilling pattern have to be manufactured in special construction. For adjustable 2-spindle tapping heads, various standard designs are at stock (see page 10).



Type HG-10, bench mounted design



Construction characteristics of types HG-8 E to HG-42 E



Type HG-8E, bench mounted design with additional fan-motor for short strokes and highest production quantity

Feed

The types HG-8 to HG-42 E tapping machines are designed to operate with automatic lead screw control, as well as manually controlled feeds.

Automatic lead screw controlled feed

All machines in the HG-8 to HG-42 E series have a provision for fitting lead screws. A lead screw and nut is required for every different pitch. Good accessibility permits an instant change of the lead screw. The lead screw and nut provide a positive spindle feed. As the lead screw has a lead identical to that of the tap, the threads cannot be tapped incorrectly.

The hardened and ground lead screws with individually fitted, adjustable nuts have an

extremely long service life and ensure threads true to gauge. The tap life is improved considerably as the feed is accurately matched to the head.

Lead screws for machines HG-16 and HG-22 E are interchangeable and also fit for HG-10 machines.

The lead screws of types HG-36 and HG-42 E are also interchangeable.

Single cycle or continuous operation

When working with lead screws, the machine can be set to single or continuous cycling by means of selector switch.

In the „single-cycle“ position, clockwise spindle rotation of the machine is started by operation of the “On” push button. When the preset depth of thread is reached, the spindle rotation is reversed. The spindle is stopped immediately when it has returned to its initial position. In the “continuous cycling” position, the spindle continuously reciprocates between the set limits. Continuous cycling is particular advantage for tapping holes in mass production, additionally it is necessary to feed the workpieces automatically or manually to the machine.

Safety devices to guard against tap breakage

The machines are provided with an over-run safety device and a safety chuck. The combination of these two safety devices enables even blind holes to be tapped to their full depth without risk. Tap breakage is also practically eliminated, even if the tap hits solid material.

Over-run protection

If the tap hits solid material, then further rotation of the spindle lifts the lead screw mounting against a preset axial spring force. This actuates a limit switch which immediately reverses the spindle rotation. The motor is stopped as soon as the spindle has returned to its initial position, irrespective of whether single or cycle or continuous cycling has been selected.

The trouble free operation of the over-run protection can be relied on when lead screw controlled feed is in operation, even when the smallest permissible tap for the particular type of machine is used.

Safety chuck

A tap chuck with an adjustable slipping clutch is fitted as standard equipment for types HG-8 E to HG-42 E. The use of a high grade clutch plate results in extremely low wear. The clutch slips immediately if an overload of the tap occurs, either due to a blunt tool or a core hole with a diameter too small. The tap is stopped immediately and the axial force produced by continuous spindle rotation immediately initiates the over-run protection, so that the spindle returns to its initial position with counter-clockwise rotation. The maximum torque setting of the overload clutch is adjusted manually with the aid of a scale to suite the tap used.

Stroke adjustment

The depth of the stroke is adjusted with the aid of a graduated scale. The motor brake operates so consistently, that a repetitive accuracy of approx. $\pm 0.1 \text{ mm}$ ($\pm 0.004''$) is obtained, depending on spindle speed. A four-way depth stop is available as optional equipment, which enables up to four different depths of thread to be preset and used in any sequence by means of a selector switch. This equipment is of particular advantage for workpieces where several threads have to be tapped to different depths.

For special requirements (e.g. trapezoidal threads), the type HG-22 E can be supplied with an extended stroke of 160 mm, and the type HG-36 E and HG-42 E machines can be supplied with an extended stroke of 300 or 450 mm (11.8" or 17.7").

Tap chucks

The types HG-8 E to HG-42 E machines are each equipped with tap chucks with short DIN 238 taper which hold the tap securely. The tap chucks machines are equipped with the previously described overload clutch.

On request, all machines can also be equipped with spindles having a Morse taper.

External threads

Short external threads can also be cut by using our die-holders instead of a tap holder.

The die-holders are designed to accept dies to DIN standards. The available sizes of die-holders are listed in our special "Die-holders" catalogue sheet.

Left hand thread

All tapping machines can also be used for cutting left hand threads by fitting an additional reversing switch. Left hand leaders and nuts are of course required.



Type HG-8E in box base design, with additional fan-motor for short strokes and highest production capacity, central lubrication system for leadscrew and Halogen machine light

Drive

The drive of the electrically controlled tapping machines is provided by brake motors of adequate size, which reverse the spindle rotation with precision even at the maximum permitted frequency of operation.

The motor drives the spindle via easily changeable V-belt pulleys and gears. The transmission gears are hardened and ground and run in an oil bath. Each machine can be matched to the intended application by selecting one of four or five available spindle speed ranges. The spindle speed range is determined by the gear ratio and can only be changed subsequently by rebuilding the gearbox. The standard equipment of each machine includes a set of V belt change pulleys. The nine different spindle speeds of the spindle speed range are obtained by selecting appropriate pairs of pulleys to suit the cutting speed required. The spindle speeds are arranged in geometric progressions with a common ratio of 1:1.25.



Type HG-16E in bench mounted design including housing of spindle- and tool area, protected by magnetic switch regarding safety regulations. (special design for social works factories in Germany)

The motor windings are provided with special insulation, which permits extremely high frequency of operation (see technical data). In extreme cases, where even higher frequencies of operation (=threads/hour) are required, thermal motor overload protection can be fitted which protects the motor from overload completely.

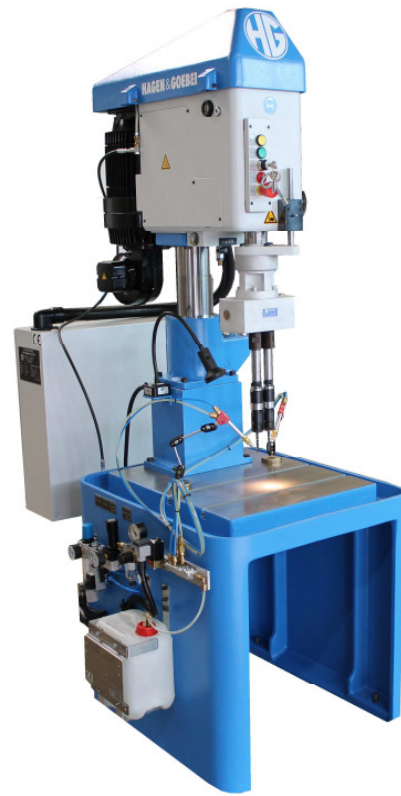
Electric control

The electric control gear is contained in a separate switchgear cabinet. The compartment for the electrical equipment is separate from the gearbox. The electrical installation complies with the VDE (Association of German Electrical Engineers) standards. All operator controls are conveniently arranged at the front of the machine on a common control unit. This includes the "Emergency stop" button.

Further performances:

Double return speed

This feature can be reached with the use of a pole-changing motor with 750/1500 rpm.



Type HG-22E in box base design with multi-spindle head, two-hand-activating (regarding safety regulations) and minimal coolant system

Rapid traverse mechanism

This consists of a rapid traverse motor with belt drive on the ball-bearing-mounted leader. The rapid traverse control can be applied to the following sequence of operations:

- a) rapid traverse – feed – feed reverse – rapid traverse reverse*
- b) rapid traverse – feed – rapid traverse reverse*
- c) feed – rapid traverse reverse*

*only in connection with a four-way depth adjustment, 2 rapid traverse distances and 2 feed distances can be adjusted.

If required the correct performance has to be chosen; on the other hand the option exists to choose one of these programs with the selector switch.

Machine designs of type HG-8 E to HG-42 E

A wide range of different versions of the types HG-8 E to HG-42 E tapping machines is available to enable any specific requirement to be met in an optimum manner and from standard equipment. The most important variations are shown in the adjacent outline drawings.

Bench mounted machines HG-8 E to HG-22 E

These machines are particularly suitable for handling small workpieces. The head of the HG-8 E machine can be adjusted vertically on the pillar to suit the workpiece height. On the types HG-16 E and HG-22 E machines both the pillar and the head are adjusted vertically together.

Greater vertical adjustment for the distance between table and tap holder can also be obtained by fitting longer pillars.

Pillar machines

Pillar machines are particularly suitable for high and bulky workpieces. The table is not only vertically adjustable, but can also be swivelled around the pillar. All machines in this series with exception to the type HG-8 E are available as pillar machines.

Box base machine

This design is particularly suitable for machining larger workpieces, for fitting large jigs and for using rotary indexing tables

Gang type machines

These machines are of advantage for mass production of workpieces with treads of different sizes are being produced. Several tapping heads of the same type or of different types are mounted in a fix or adjustable position on a common base. Individual tapping machine heads can, of course, be used to enlarge an existing gang type machine.

Multi-spindle heads

All tapping machines can be equipped with multi-spindle heads with fixed or adjustable spindle centres. For this purpose the machines have to be equipped with an additional flanged quill and counterbalance. Multi-spindle heads with fixed centres have to be ordered specially. Various standard designs of twin spindle adjustable centre tapping heads are at stock (see page 10)

In-process-monitoring while tapping

To secure the tap-cutting or tap-forming processes will become more and more a main theme. Especially the automobile industries and the bender of them ask always for solutions.

Higher accuracies on the workpieces can only be guaranteed by checking every part. Caused on shorter cycle times there is no time to check.

Additionally the human error must be eliminated.

This can be only guaranteed by a special in-process-monitoring system.

Directly on the tool this system will check the torque while the process happened. By this system we have no errors and check every tool it selves.

On that way following paramters can be checked:

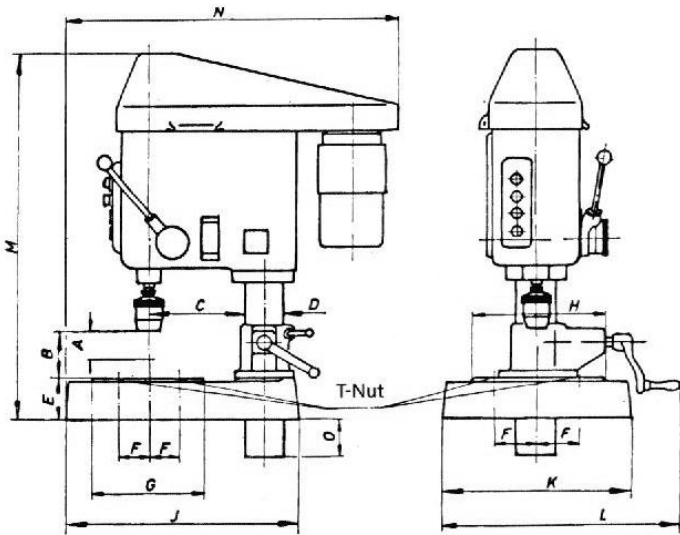
- Tool broken
- Tool life on end
- Missing tool or part
- To big or small hole inside the part
- Tap not ok concerning error on workpiece or tool
- Tap-cutting deepness not ok

All cutting data can be saved and documented so that the quality regarding DIN EN ISO 9000ff can be guaranteed. By this way the tap producer is able to realise zero error on his tap production. This system as stand alone or special machine solution can be delivered by us.

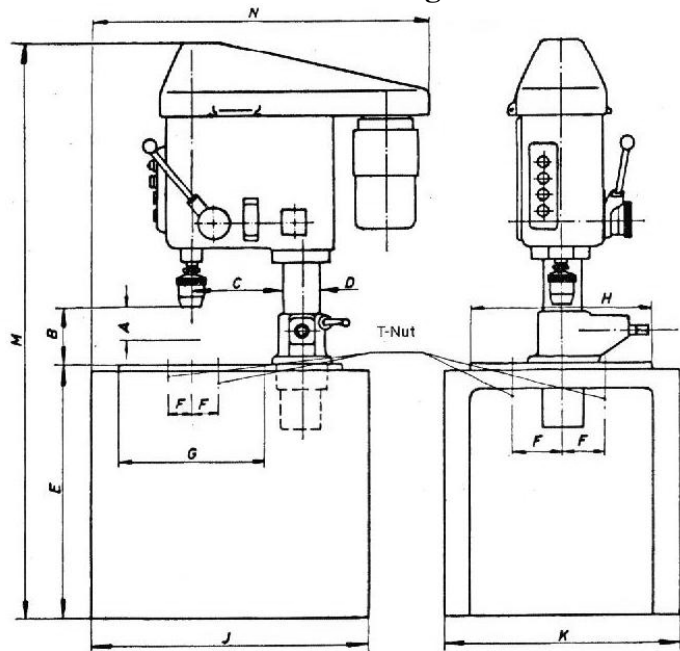


Type HG-22 Servo with motor power 22KW (60% ED) in box base design, multi-spindle head and additional options.

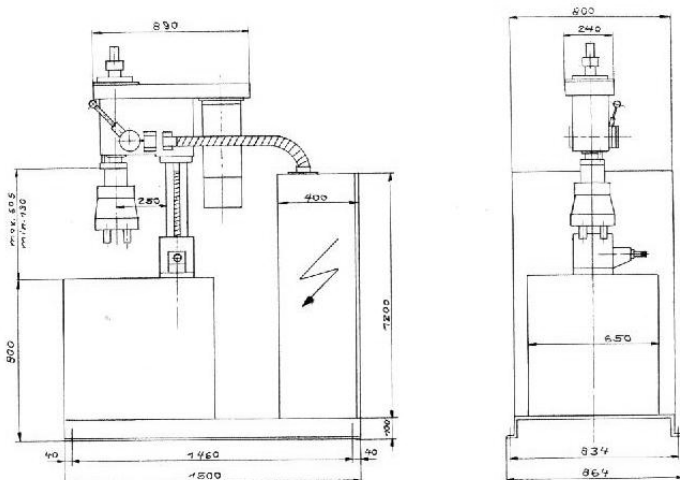
Bench mounted design



Box base design



Servo machine without gearbox



Machine application		HG 6 GE 6
smallest thread to be cut		M 1 / 1/16"
largest thread to be cut into		metric/whitworth threads
steel		M 6 / 1/4"
cast iron		M 8 / 5/16"
light alloy and brass		M 10 / 3/8"
rated power	kW	0,37
chuck capacity ²⁾	mm	on request
max. spindle stroke	mm	32
allowable operating frequency approx. (=amounts of threads/hour)		-
chuck taper on spindle according to DIN 238		B 12
alternative: Morse cone according to DIN 228		MT 1
spindle speed ranges	rpm	3000 (A) 1500/3000 (B)
speed range		
	A	710-1120-1800
		355-560-710
	B	900-1120-1800
	C	-
	D	-
	E	-

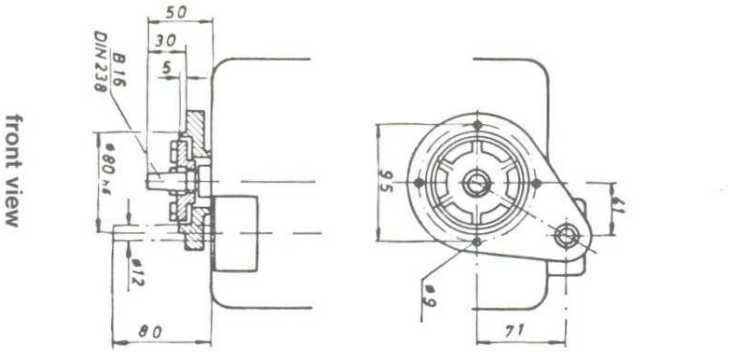
Measurements		
		HG-6
machine type		bench
spindle stroke	A	32
distance between work table and chuck	B max.	200
	B min.	55
throat	C	125
pillar diameter	D	55
height of work-table surface	E	75
distance between T-slots	F	80
working surface of table	G	160
	H	240
floor space	J	330
	K	330
overall width	L	-
overall height	M max.	676
	M min.	531
overall depth	N	
projection of pillar	O	-
T-slots	width	14
	amount	2
weight in Kg	net	60
(on pallet)	gross	70
Packing dimensions	length	600
	width	350
	height	600

Machine application	HG 10	HG 8 E GE 8	HG 16 E GE 16	HG 22 E / (HG-22 Servo) GE 22	HG 42 E GE 42
smallest thread	M 3 / 1/8"	M 3 / 1/8"	M 4 / 1/4"	M 6 / 1/4"	M 8 / 3/16"
type of thread	metric/whitworth	metric/whitworth	metric/whitworth	metric/whitworth	metric/whitworth
steel	M 10 / 3/8"	M 8 / 3/16"	M 16 / 5/8"	M 22 / 7/8"	M 42 / 1,5"
cast iron	M 16 / 5/8"	M 10 / 3/8"	M 20 / 3/4"	M 27 / 1"	M 48 / 1,75"
light alloy and brass	M 18 / 3/4"	M 12 / 1/2"	M 22 / 7/8"	M 33 / 1,25"	M 60 / 2"
rated power	0,6/1,2	0,5/0,95/1,55	2,2	3,0/4,0/6,3 (Servo 15)	4,0
max.spindle stroke	80	60	80/(110+160)	80/(110+160)	120/(180+300)
max. operation frequency	-	2000	1600	1200	800
chuck taper	B 16	B 16	B 18	B 22	B 24
option taper	MT 2	MT 2	MT 3	MT 3	MT 4
motor rpm	750/1500	1000	1000	1000 (Servo 3000)	1500 (1000)
speed range	120-180-240 A 300-360-600	710-900-1120-1400-1800 2240-2800-3550-4500	450-560-710-900-1120 140-1800-2240-2800	112-140-180-224-280 355-450-560-710	56-71-90-112-140 180-224-280-355
B	200-300-400 500-600-1000	450-560-710-900-1120 1400-1800-2240-2800	280-355-450-560-710 900-1120-1400-1800	180-224-280-355-450 560-710-900-1120	28-35,5-45-56-71 90-112-140-180
C	backwards 1,5 times faster	280-355-450-560-710 900-1120-1400-1800	180-224-280-355-450 560-710-900-1120	280-355-450-560-710 900-1120-1400-1800	112-140-180-224-280 335-450-560-710
D	-	180-224-280-355-450 560-710-900-1120	112-140-180-224-280 355-450-560-710	56-71-90-112-140 180-225-280-355	18-22,4-28-35,5-45 56-71-90-112
E		112-140-180-224-280 355-450-560-710	56-71-90-112-140 180-224-280-355	(Servo step less up to 1800)	

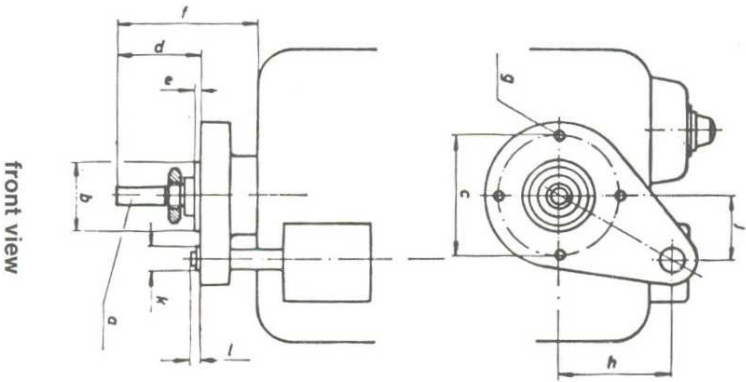
Maschine type	HG-6	HG-8E	HG-8 E	HG-10	HG-10	HG-16 E HG-22 E /Servo	HG-36 E HG-42 E	
	bench/increased depth	bench	box base	bench	box base	box base	box base	
A	32	60	60	80	80	80	120	
B max.	425	360	360	370	370	315 ¹⁾	800	1) 280 for HG-22 E
B min.	75	110	110	65	65	15	140	2) 320 for HG-22 E
C	220	200	200	250	250	250	370	3) 1005 for HG-22 E
D	85	85	85	100	100	100	180	4) 255 for HG-22 E
E	90	90	800	110	700	700	800	5) 370 for HG-22 E
F	125	125	125	80	80	80	150	6) 290 for HG-22 E
G	290	290	290	290	400	400	575	7) 400 for HG-22 E
H	350	350	350	350	500	500	800	8) 530 for HG-22 E
J	500	500	720	610	770	770	1046	9) 560 for HG-22 E
K	500	500	500	500	660	660	1116	10) Position of T-slots see picture page 4 – 9
L	500	500	500	585	-	-	-	special construction upon request
M max.	920	960	1160	1165	1755	1745	2585	
M min.	570	710	1410	860	1450	1430	1925	
N		730	730	830	930	930	1221	
O			-	255	-	-	-	
width	14	18	18	18	14	14	14	
quantity	2	2	2	2	2	2	2	modifications are subject to change
weight in Kg	85	150 180	200 230	180 210	470 500	490 ⁸⁾ 520 ⁹⁾	1250 1300	
length	-	900	900	1050	2100	1150	1300	
width	-	700	700	750	900	900	1370	
height	-	1200	1900	1550	1300	2000	2175	

Spindle heads

Type HG-8 E
multi-spindle connection



Type HG - 12 E - 42 E
multi-spindle connection

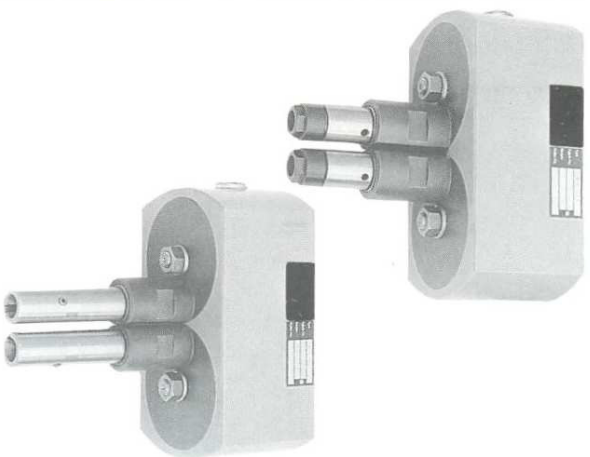


Multi-spindle heads in special construction upon request.

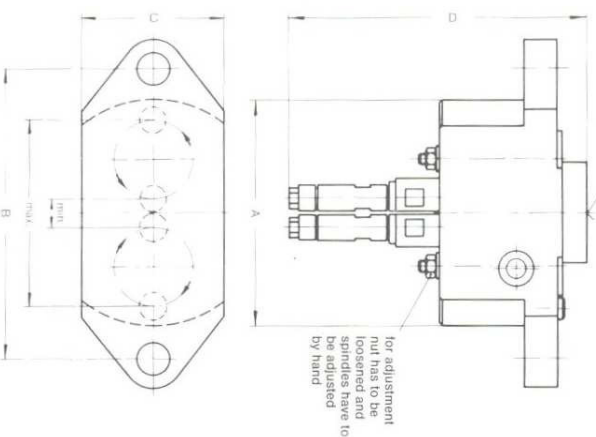
Dimensions chart for multi-spindle head mounting all measurements in mm

Type	a	b	c	d	e	f	g	h	i	j	k
HG-12E	B 18	Ø55 _{h6}	Ø90	63	5	105	Ø9	84,86	49	Ø22	9
HG-16E	DIN 238										
HG-22E	B 22	Ø55 _{h6}	Ø90	87	5	129	Ø9	84,86	49	Ø22	9
	DIN 238										
HG-36E	B 24	Ø80 _{h6}	Ø102	29	5	100	Ø11,5	63,63	63,63	-	-
HG-42E	DIN 238										

simple adjustable



design and mounting dimension according to application



Performance and dimension chart

Type	SKV 2/00G	SKV 2/0G	SKV 2/1 G	SKV 2/2	SKV 2/3	SKV 2/4
cutting performance in steel	M 4	M 5	M 6	M 10	M 16	M 22
range of adjustment min.	14	17	21	30	51	60
range of adjustment max.	88	113	133	156	219	264
rpm n max.	4000	4000	4000	2500	1500	1500
tool holder	collet	collet	collet	collet- adaptor sleeves	adaptor sleeve Ø16 + 20	adaptor sleeve Ø28

transmission ratio	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1
weight approx. in kg	2	4	5	7/8	24	45
measurement A	120	140	170	200		
measurement B	175	175	206	230		
measurement C	65	85	95	115		
measurement D	135	175	165	200		

HAGEN&GOEBEL special machine solutions **for your tap production**

CNC-controlled boring and tapping machine with 3 spindle units

each equipped with multi-spindle head
4 station rotary table and controller type
Siemens 840 D



**Highspeed tap-forming machine
equipped with 2 tapping machines type
HG-22 Servo, In-Process-Monitoring-
System on all 8 spindles, rotary table
Ø 810mm, automatic pickup system and
automatic remove of error parts.**



Horizontal tap cutting / forming machine for inside and outside taps

with highspeed tapping unit type GE22,
pneumatic central vice, workpiece length stop,
fast retract system and machine housing
concerning CE und UVV regulations.

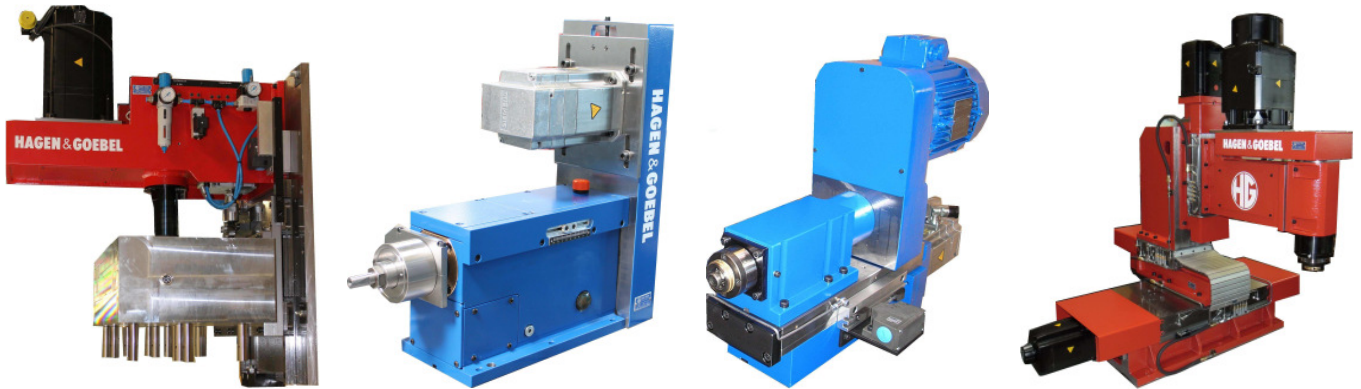




HAGEN & GOEBEL

More than 80 years of expertise
in mechanical engineering

High performance boring, milling and sawing units in standard and special design

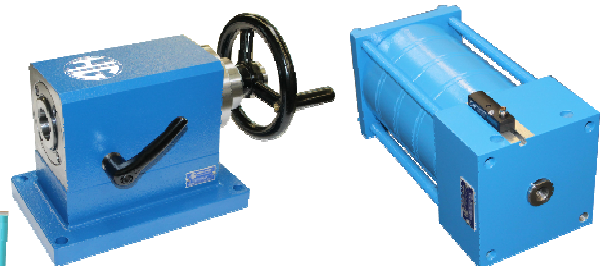


High Performance machines for endmaching and in special design

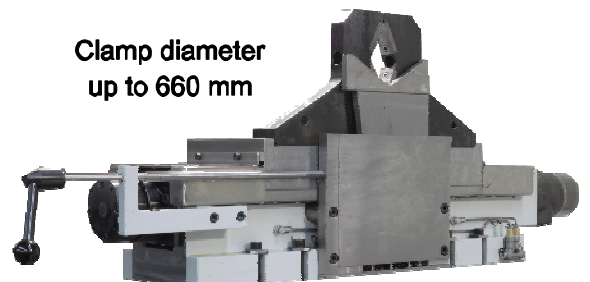


High Performance tapping machines

other Hagen & Goebel products



Clamp diameter
up to 660 mm



Hagen & Goebel Werkzeugmaschinen GmbH
D-59494 Soest, Saelzerweg 3 Tel.: +49 (0)2921/59016-0
www.hagengoebel.de contact@hagengoebel.de