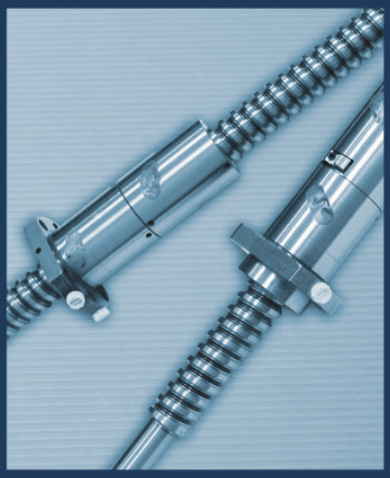
GYÁRTÁS

MANUFACTURING / HERSTELLUNG



TERVEZÉS

DESIGN / PLANUNG

POWER CHUCKS

SZIMIKRON®
PRECISION TECHNOLOGIES
HUNGARY

TAF... Type Hydraulic Power Chucks with Automatic Jaw Adjustment

The major advantages of the new automatic jaw adjustment chuck family:

Novelty: No such hydraulic chucking machine has appeared on the market yet up to now that could safely perform these duties without the significant modifacion of the machine.

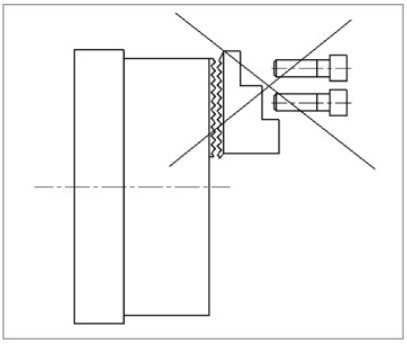
Automated: Changeover to different diameters requires no manual interaction.

Fast: The adjustment of the three jaws takes place at the same time, so the operation requires three times less time as a minimum related to any previously applied methods.

Universal: The chuck makes automatic changeover possible within its entire diameter range.

Interchangeable: It is simply installable into the place of other traditional hydraulic chucks, the necessary additive elements are provided together with the chuck.

Productive: The dynamically balanced chucks make high cutting speed possible.



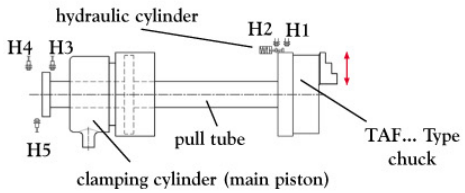
Comparison of economy:		
	Traditional chuck	TAF type chuck
Replacement of jaws	10 Min.	0,6 Min.
Lathe machining of jaws	20 Min.	0 Min.
Replacement of jaws/day	3	3
Working days/year	230	230
Costs of machines by hour (€)	40	40
Total costs/year (€)	13800	276
Saving/year (€)		13524

The two main solution alternatives of the automatic jaw adjustment are:

Type „A"

With the hydraulic working cylinder mounted on the machine

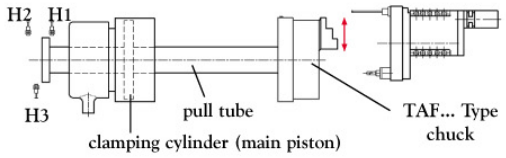
H1...H5: inductive sensor



Type „B"

From the tool-turret, or with the actuating rod mounted on carriage respectively

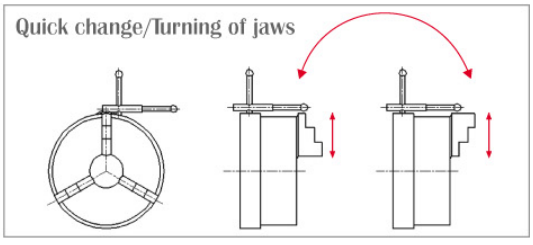
H1...H3: inductive sensor



The construction of several types of the chucks allows manual operation mode for quick changing of the jaws. The specific tool being created for this purpose is releasing the connection – secured by teeth – between the basic jaws and chuck jaws. At this time the chuck jaws can be pulled out and pushed back in opposite position, or replaced with another one.

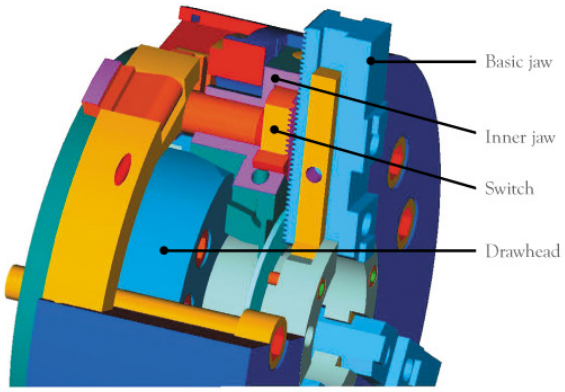
Our chucks are balanced by a PC-controlled dynamic balancing equipment.

Quality grade of balancing: according to the standard No. G 6,3 ISO 1940/1

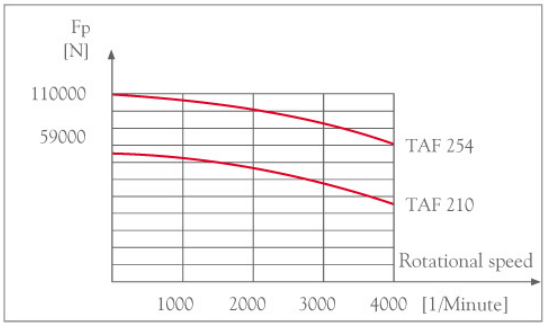


The design solution of TAF... type power chucks

Design of chuck



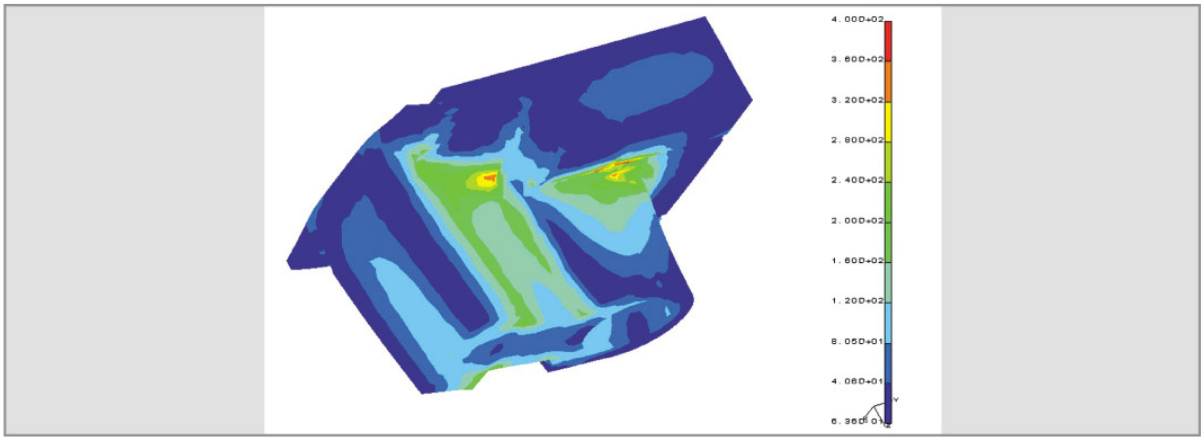
Gripping force – R.p.m. chart



At increasing rotational speed there is an existing danger that the clamping force may decrease, due to this the workpiece may slip in the chuck, maybe even fly out. The clamping force is depending in a high measure on the lubrication status, on the quality of the lubricating grease, on the height of chuck jaws and on other factors.

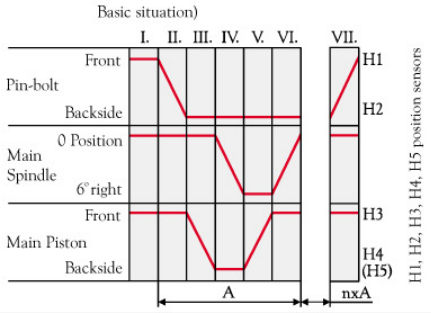
According to the rules of practical experience, the dynamic clamping force is not allowed to decrease to the one-third part of the static clamping force.

The strength calculation of the main components has been made by the finite element method, the finite element analysis for one of the parts is shown on the following figure.

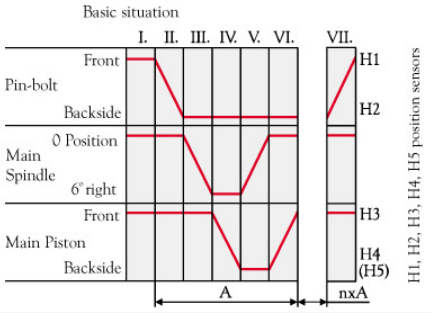


The connection figures below demonstrate the steps of automatic adjustment of the chuck diameter range to be impacted. (Type „A")

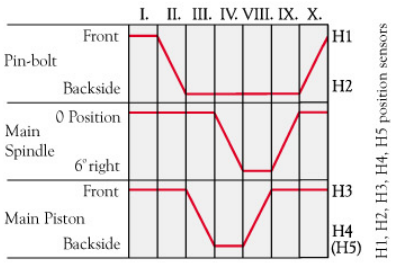
Stepping inside



Stepping outside



Run to basic position



The diagrams demonstrate well that the adjustment of the chuck jaws are performed by the cyclical, well-adjusted actuation of the three elements (the pin-bolt switch elements, the turning of the lathe machine main spindle by 10° from the „0" position, and the move of the hydraulic cylinder that is actuating the chuck), realising by this the principle of function-pooling as well.

The individual phases of motion are:

I. Initial basic situation:
The operating piston is in right side front position; the H3 position switch located behind the main spindle is sensing it; The main spindle is in 0 position; The pin-bolt switch in right side position, the H1 inductive position switch is sensing it.

II. The pin-bolt switch moves, the H2 position switch is sensing it. (By this it pulls the pin-bolt, at the same time, the ring blocked to fixed housing of the servomechanism).

III. The central drawhead is pulled to the left direction by the main piston. The H4 position switch is sensing it. (By this, each jaw will step onto a 5 mm shorter radius).

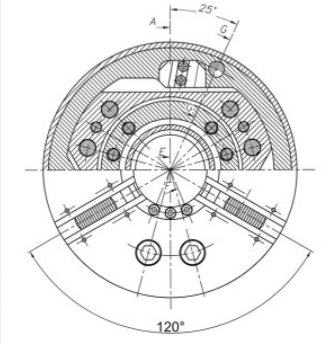
IV. The main spindle turns 10° to the right direction. (By this, the switches move to the left direction, so the rack-bar connection will cease between the inner jaws and the basic jaws).

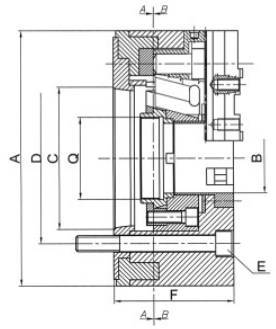
V. The central drawhead returns to its right side position. The H3 position switch is sensing it. (By this, the inner jaws move „idly" 5 mm outwards to radius direction; the basic jaws are not taken together as they are not in contact, and the spring-strained pins keep the basic jaws on their places by friction).

VI. The main spindle turns to the left direction by 6°, that is to say, into 0 position (by this the switches move to the right direction and establish again a rack-bar connection between the inner jaws and the basic bearers). The cycle consisting of the elements III, IV, V, VI can be repeated more times, at each repeating the collet capacity will decrease by a 10 mm diameter range

VII. Provided the basic jaws get to the expected diameter range (this is a question of program composition and the 10 mm change of range makes easy mental arithmetic, control possible), this position has to be blocked: the pin-bolt switch moves to the right direction, the pin-bolt is released back to its basic position, this is, the right side valve part will block the housing with the ring, by this, it makes the switch-off of the coupling head impossible even at fast main spindle rotation as well.

Sizes and technical data of TAF... type power chucks





TECHNICAL DATA		TAF 210	TAF 254
O. D. (mm)	A	Ø 210	Ø 254
Through-hole diameter (mm)	B	45	70
Width (mm)	F	124	120
Main spindle DIN 55026	C	A6	A8
P.C.D. of mounting bolts (mm)	D	133,4	171,4
Mounting bolt size	E	M12	M16
Jaw travel-clamping stroke (mm)		5	
Draw tube thread	Q	M55×1,5	M80×2
Dia. changing by one-shot automatic jaw position (mm)		10	
Max. gripping force (kN)		59	110
Static gripping force (kN)		27,5	41,2
Max. operating pressure (kgf/cm^2)		16,5	24
Max. speed (1/min.)		5000	4000
Weight (kg)		20	43
Moment of inertia (kgm^2)		0,12	0,39
Max. diameter to be gripped (mm)		210	254
Min. diameter to be gripped (mm)		10	10

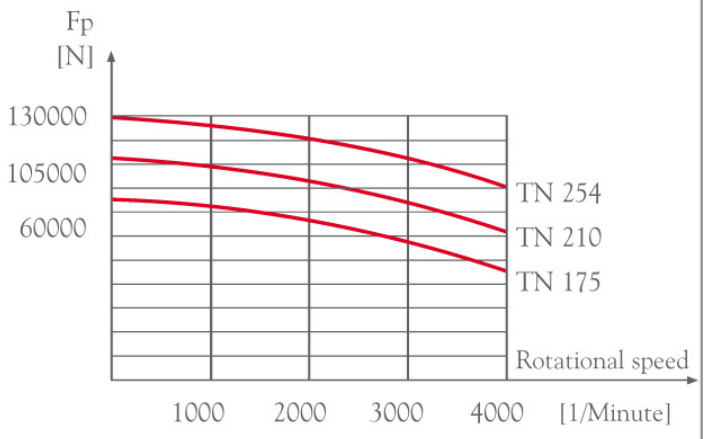
TN... type normal hydraulic power chucks

The structure of the TN… type normal hydraulic chuck in its main characteristics is identical to the design of the tractive spacer power-operated chucks.

The piston of the hydraulic pinch roll fastened to the end of the main spindle moves the central drawhead of the chuck through the tube being lead across the main spindle bore, the central nut and disc, forcing the inner jaws to a radial move through the key-ways. The chuck jaws can be fixed in a radially adjustable way on the teeth located on the front surface of the inner bearers that can be of hardened or soft jaw designs.

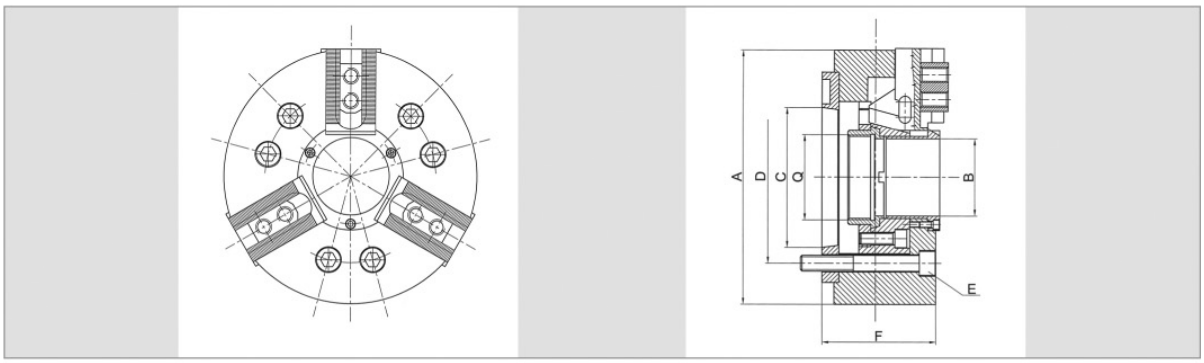
Characteristic properties:
• high accuracy
• high through-hole
• high rotational speed
• long operation life
• rigid, vibrationless chucking
• simple mountability
• level-headedness
• resistance to abrasion

The change of the clamping force is in the function of rotational speed.

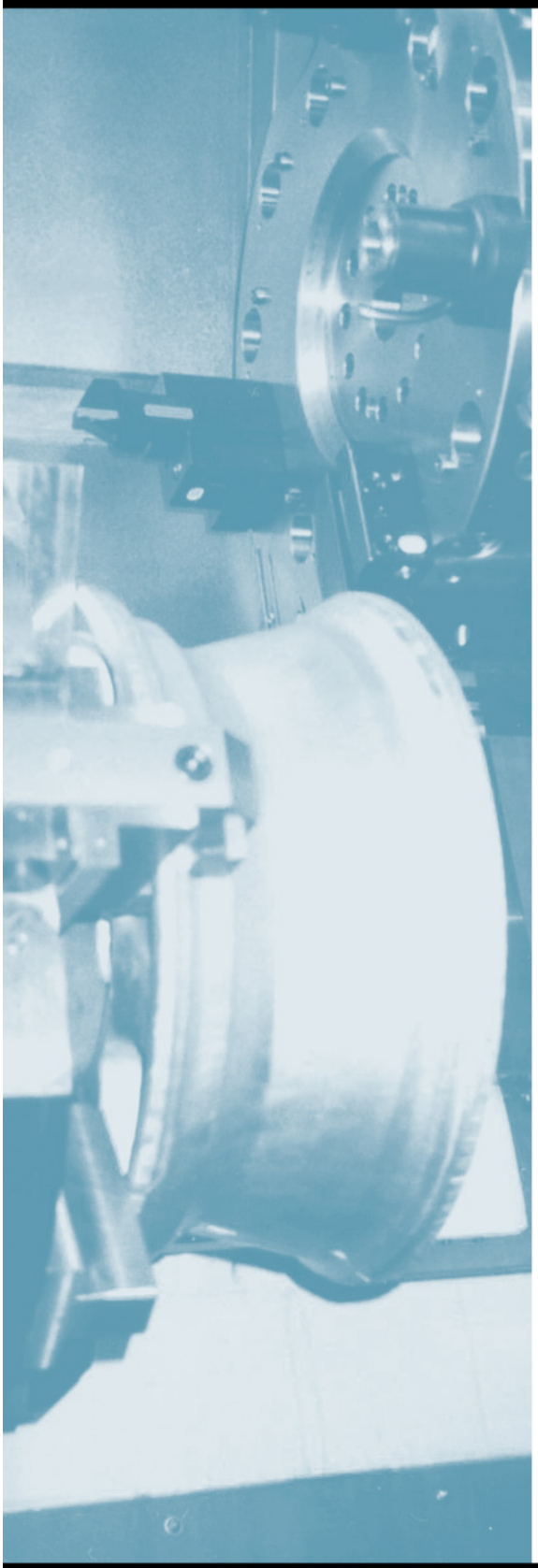


Comment:
Standard chucks, unlike automatic jaw adjusment chucks, have no special CNC turningmachine requirements, that is you can use your old controllers and hydraulic clampings. Automatic jaw adjusment chucks require the main spindle to be positionable and managed by a proper controller.

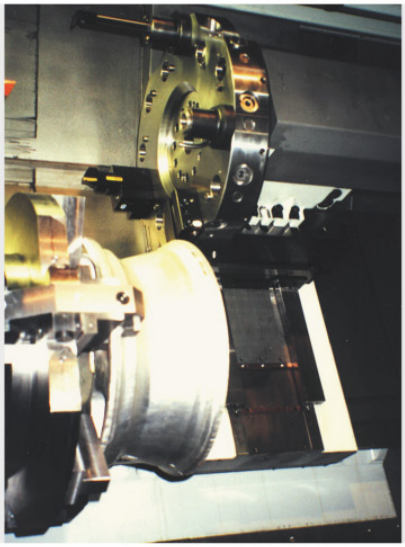
Sizes and technical data of TN... type power chucks



TECHNICAL DATA		TN 175	TN 210	TN 254
O.D. (mm)	A	175	210	254
Through-hole diam. (mm)	B	56	52	77
Width (mm)	F	91	104	113
Main spindle DIN 55026	C	A6		A8
P.C.D. of mounting bolts (mm)	D	133,4		171,4
Mounting bolt size	E	M12		M16
Jaw travel-clamping stroke (mm)		4		
Pitch of serrations for jaw mounting		1/16"×90°		
Draw tube thread	Q	M62×1,5	M58×1,5	M85×1,5
Max. gripping force (kN)		60	105	130
Static gripping force (kN)		30	43	65
Max. operating pressure (kgf/cm^2)		21,2	22,6	24
Max. speed (1/min.)		6000	5000	4000
Weight (kg)		14	20	30
Moment of inertia (kgm^2)		0,1	0,13	0,2
Max. diameter to be gripped (mm)		175	210	250
Min. diameter to be gripped (mm)		10	10	10



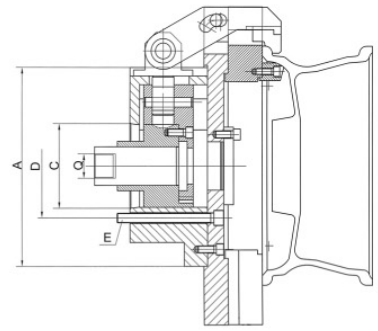
The TU... type wheel chucks



The wheel or finger-type (TU...) chucks are designed to grip the wheels for cars or motor-bikes, that have to be clamped on a frontal plate, do not require radial clamping, better saying, due to the deformation of the workpiece, this is not allowed. The position of the workpiece related to the main spindle axle shaft is generally secured by a centralising or position-determining element.

The wheels cannot be radially pressed as after release there will be concentricity problems („polygonisation") arising. This is why the centring adjustment is to be performed on a cone or fitted shaft, while the fixation takes place on the inner side of the edge of the wheel by clamping it onto the frontal surface of the disk. The frontal surface is to be laid on the seats, and the clamping is resolved by the shackles bridle being fastened to the ending of the arms. For the sake of the exact bearing, the entire surface being in contact with the workpiece is spindled together in the status of being mounted on the machine. The shackle bridle has to press the workpiece axially, at the same time, at opening they have to move radially, too, to make the workpiece removable. The clamping strength is transmitted by the piston of the main hydraulic cylinders being fastened to the ending of the main spindle via intermediate links. A 7 mm long part of the upper section of the guiding tracks being formed in the arms is parallel to the main spindle axle shaft, that is to say, parallel with the motion direction of the pin connecting to the lower bore-hole of the arm. Via this parallel leading, in the backside 7 mm motion range of the arm, each point of the arm makes a parallel motion with the main spindle, and by this, the shackles bridles are pressing the workpiece only in axial direction, so there are no radial direction deformations arising on the workpiece.

Sizes and technical data of TU... type chucks



TECHNICAL DATA		TU 330
O.D. (mm)	A	330
Main spindle DIN 55023	C	B 8
P.C.D. of clamping (mm)	D	171,4
Mounting bolt size	E	M16
Jaw travel (mm)		30
Linear travel of jaw (mm)		7
Draw tube thread	Q	M41×1,5
Gripping force/ Jaw (kN)		6,5
Main cylinder force (kN)		21
Max. operating pressure (kgf/cm^2)		32,3
Max. speed (1/min.)		2200
Wieght (kg)		112
Moment of inertia (kgm^2)		0,105
Gripping adators		3×3
Wheel diameter to be gripped I.		14"-15"
Wheel diameter to be gripped II.		16"-17"
Wheel diameter to be gripped III.		18"-19"

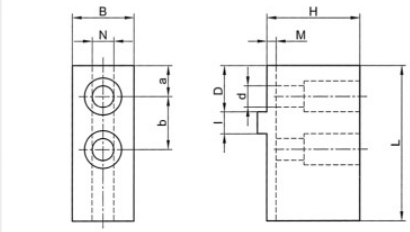
Hydraulic power chuck with centrifugal force compensation

Under development.

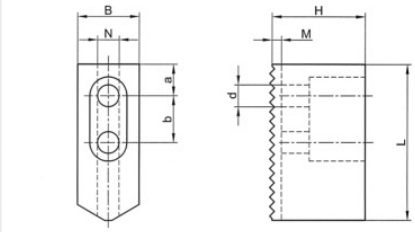
Accessories to the power chucks

Chuck type	Soft jaw		Hard jaw	
	SZIMIKRON Id.-Nr.	Signalling other manufacturers	SZIMIKRON Id.-Nr.	Signalling other manufacturers
TAF 210	670-0021	–	670-0025	–
TAF 254	682-0005	RÖHM DURO NC AB 002-30	980-4018	RÖHM DURO NC UB 003-30
TN 175	670-0009	–	670-0022	SMW M+B-D 160
TN 210	682-0004	RÖHM KFD-HS AB 538-04	670-0023	RÖHM KFD-HS UB 538-04
TN 254	980-4028	RÖHM KFD-HS AB 538-06	670-0024	RÖHM KFD-HS UB 538-05

Soft jaws

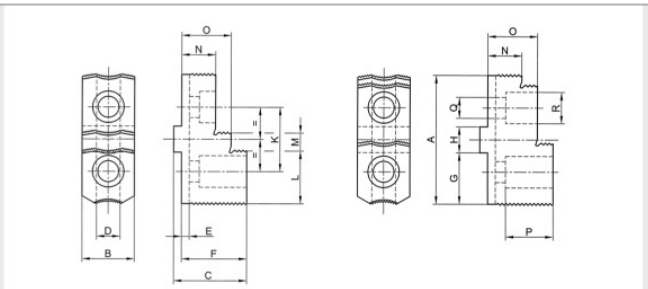


Id.-Nr.	B	H	L	N	M	a	b	d	D	I
670-0021	30	50	100	10	3,5	20	40	Ø13	20	20
682-0005	30	85	110	12	3,5	20	40	Ø13	30	20

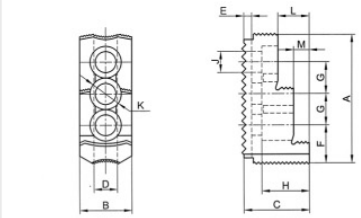


Id.-Nr.	B	H	L	N	M	a	b	d	Serration
670-0009	39	40	80	14	5	21	16,5	Ø 11	1/16"×90°
682-0004	38	53	80	17	5	26	19	Ø 13	1/16"×90°
980-4028	50	80	120	21	5	28	25	Ø 17	1/16"×90°

Hard jaws



Id.-Nr.	B	C	A	D	E	F	G	H	K	L	M	N	O	P	Q	R
670-0025	24,4	43	70	10	3,5	40	20	20	40	28	14	18	28	29	13	20
980-4018	34,4	55	92	12	3,5	50	30	20	40	41	40,5	22	36	39	14	20



Id.-Nr.	B	C	A	D	E	F	G	H	K	J	L	M
670-0022	26	26	52	14	5	15	16,5	29	18	11	20	10
670-0023	36	49	75	17	5	21,5	19	37,5	19	13	24	12
670-0024	50	58	103,5	21	5	33,5	25	45	25	17	28	14

Hydraulic clamping cylinders

Chuck type	Recommended clamping cylinders			
	Manufacturer	Type	Manufacturer	Type
TAF 210	SMW Autoblok	VNK 130-52	RÖHM	SZS 559-50 46/146
TAF 254	SMW Autoblok	VNK 150-67	RÖHM	SZS 559-50 65/157
TN 175	SMW Autoblok	VNK 102-46	RÖHM	SZS 559-50 37/103
TN 210	SMW Autoblok	VNK 130-52	RÖHM	SZS 559-50 46/146
TN 254	SMW Autoblok	VNK 150-67	RÖHM	SZS 559-50 65/157

Safety instructions

Lubrication

In certain periods the chuck has to be maintained, lubricated at determined points. In case of insufficient lubrication, operation disorder will arise at low hydraulic pressure, decreased clamping pressure, that is influencing the clamping accuracy, but causing scoring besides this.

The place of lubrication

For lubrication, use lubricating press, by the help of which the lubrication can be performed at each lubricating nipple located at the edges of basic jaws.

The types of lubricant greases to be applied are: KLÜBER ALTEMP Q NB 50; AUTOL TOP2000

Lubricating cycle

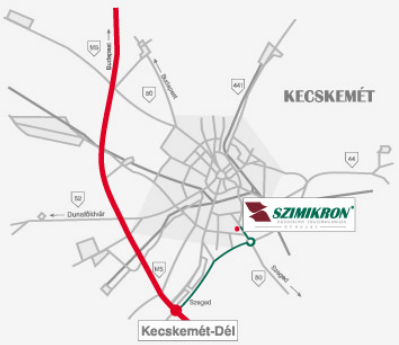
The general lubricating cycle is one occasion daily. Provided the chuck operates at high revolution number, or being touched by large quantity of water, more frequent lubrication is necessary as required. More lubrication is necessary in that case as well, if the chuck is in a strongly worn condition and by this, the operating surfaces are worn-out and ragged.

Cleaning

After working process, clean the chuck body and guide-ways by air-pistol. Use anticorrosion cooling-medium, not to let the rust decrease the clamping strength. During cleaning, use protective gloves and safety goggles.

Inspection/controlling mounting

The chuck has to be disassembled and cleaned at least in each 6 months or after each 100000th usage (it has to be checked in each second months). If the machinery parts get worn or damaged, take measures for their proper replacement. After disassembling the elements are to be cleaned carefully with kerosene, benzine, etc. and dry them. Move the parts, the spacers and basic jaws in the inside of the chuck thoroughly, then apply lubrication grease on them.



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