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NEIDLEIN
SPANNZEUGE GmbH

Tools for Clamping between Centers

process oriented for turning, hard turning, grinding and milling

Process oriented clamping solutions

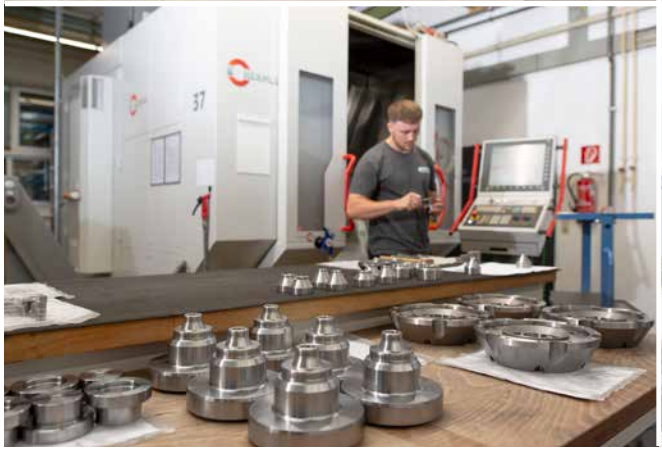
with maximum torque transmission and supreme accuracy

NEIDLEIN-
SPANNZEUGE GmbH

The company NEIDLEIN is a leading international manufacturer of clamping tools in the metalworking industry. All over the world our products help to optimize production processes and to realize high quality requirements. The customer workpieces to be machined are clamped between centers by our tools, this means that the entire outer contour of the workpieces can be machined efficiently and with high precision. Our clamping tools are used in hard turning, cylindrical grinding, milling and mill-turning processes.

With our dedicated team, we develop and manufacture an extensive portfolio that includes both standard products and customized special solutions. We are certified according to ISO9001 and ISO14001 standards.

A high level of customer satisfaction, employee loyalty and sustainability in all areas are very important to us.



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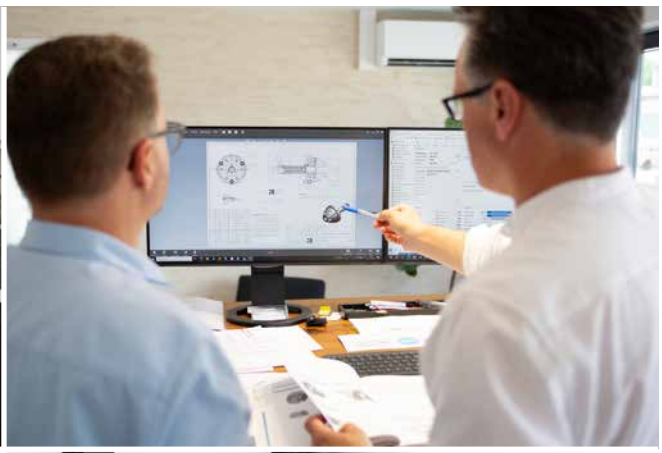
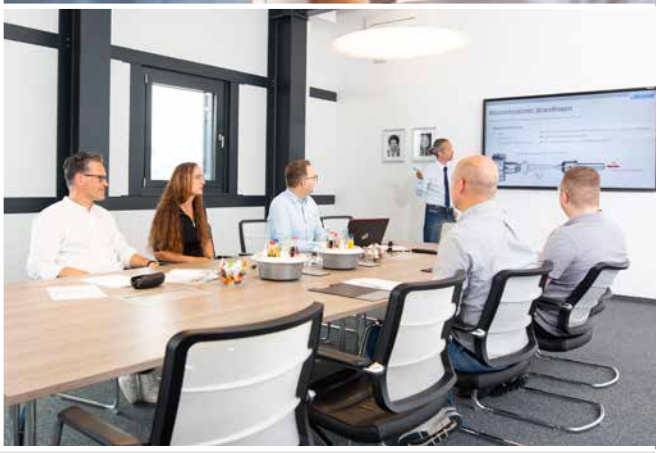




A leading edge based on direct dialogue

One of the cornerstones of our policy has always been to provide consistent project-based support – you generally have the same contact partner from the initial enquiry right through to conception, design and delivery.

Close networking between design, production and sales means we make decisions fast. This means short delivery times and a high level of service quality – giving you the competitive advantage and leading edge needed for success.

flange adapter ZFE

dead center FNA and changeable center cone

face driver FSB

live center RN

face driver FFBR

carbide center pin DIN 807

face driver FSP

live center RNCS with carbide tip

mandrel ISD

Content

FSB

FFB

FSP

FOR TURNING AND HARD TURNING
WITH DRIVE PINS

FOR TURNING, TURN-MILLING AND GRINDING
WITH DRIVE DISKS

Face Drivers

with appropriate changable parts and accessories

FFBR

FDNC

FOR GRINDING
WITH DRIVE PINS

FOR MILLING
WITH DRIVE HEADS

Face Drivers FSB / SB

with drive pins and movable center pin

The entire surface of the workpiece can be tooled and finished by clamping with a maximum of torque transmission. NEIDLEIN face drivers are mechanical clamping systems which are suited **for turning as well as hard turning**.

Face drivers of type FSB / SB are power-operated by the thrust of the tailstock. Workpieces are clamped centrically using a movable center pin. This way different centerings can be adjusted, thus ensuring a constant datum-point at the end face of the workpieces.

Type FSB with flange retainer

Type FSB is mounted onto the machine spindle nose using a flange adapter.

Type SB with MK- or cylindrical retainer

Type SB with taper shank and extracting nut for fast mounting into the machine spindle.

NEIDLEIN face drivers FSB / SB with movable center pins ensure:

- a maximum of torque transmission, thus achieving high metal removing rates
- datum-point at the end face of the workpiece stable datum-point in case of different centerings
- extended tool-life of driving devices and cutting tools due to vibration-free running
- run-out deviation in the process 0.015 - 0.02 mm
- clamping force is triggered by tailstock
- fixed center pin/fixed datum-point in clamped state
- compensating driving devices/ideal clamping of the workpiece
- simple handling

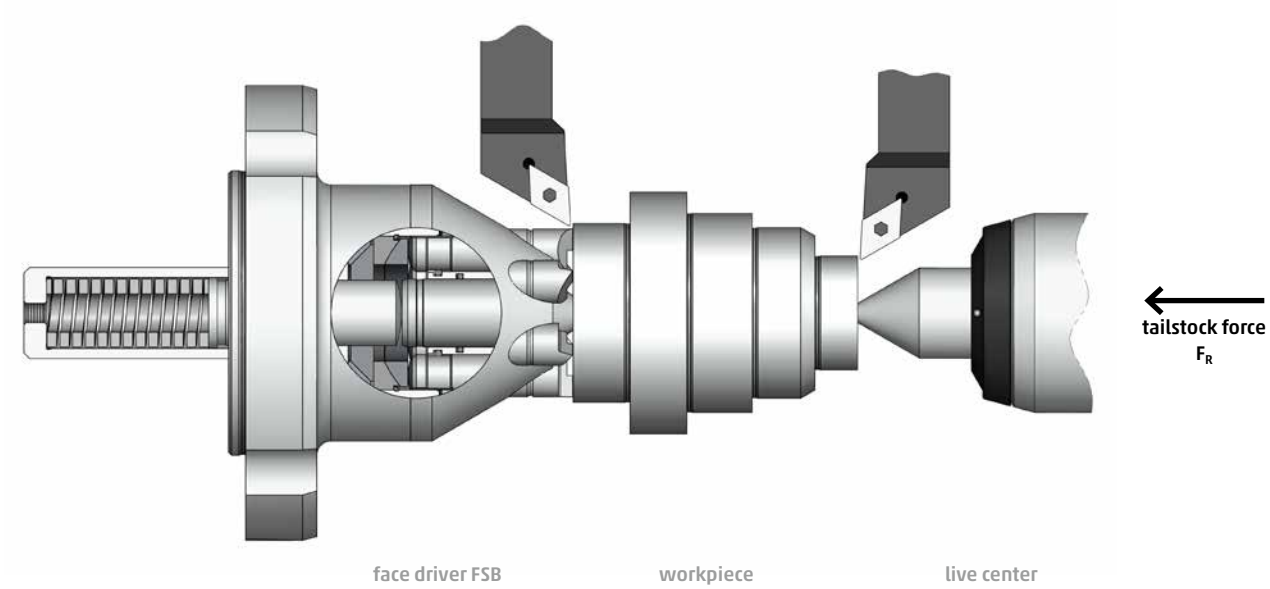
Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the movable center pin of the face driver. The center pin will draw back until the surface of the workpiece bears against the drive pins. In this state the clamping bolt is clamped over the power flow in order to ensure a fixed datum-point during the entire tooling process.

The drive pins are "floatingly", thus compensating for variations in workpiece, squareness and surface finish. The entire surface of the workpiece can now be finished in one single clamping. Please check page 15 - 16 for metal removing rates to be obtained as well as for the tailstock forces required. Compatible standard drive pins and center pins are listed on page 24 - 31.

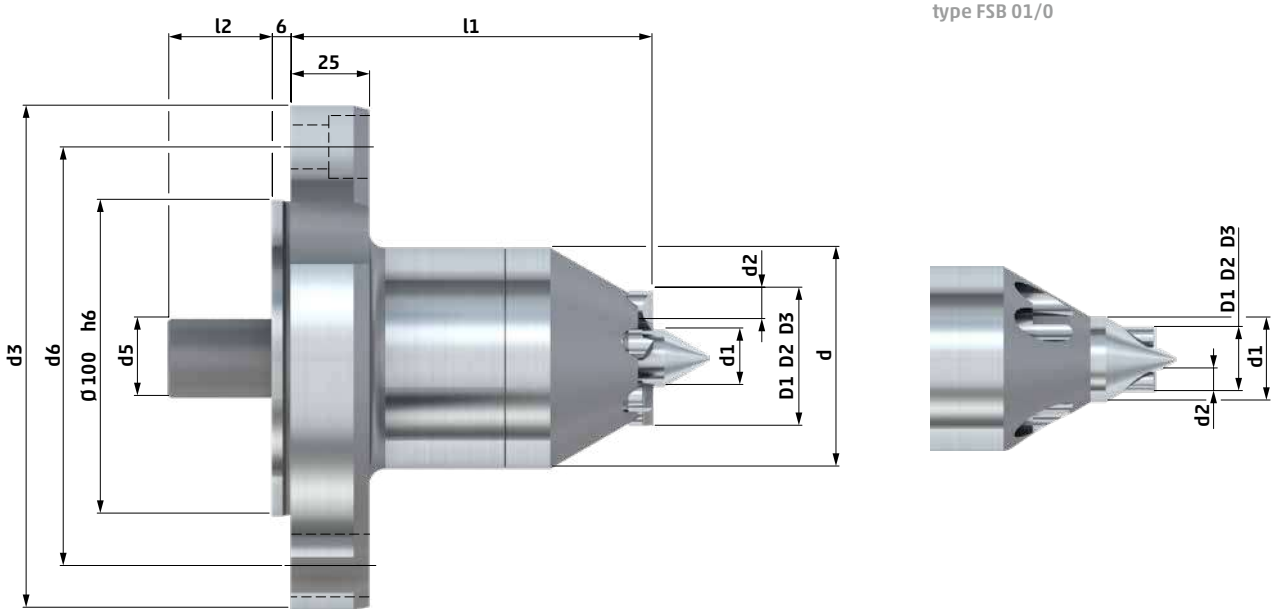
We will be glad to design clamping devices suitable for your workpieces.

Type FSB with flange retainer



Technical data – type FSB face driver

type FSB 01/0



type FSB	d	d1	center Ø	d2	d3	d5	d6	l1	l2	drive pin	fixing screws type	fixing screws pcs	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
01	48	22	0 - 5	6	160	25	133.4	115	28	3	M12	3	8	11	17	6	**730 12**
0	48	22	0 - 3	8	160	25	133.4	115	28	3	M12	3	6	11	19	8	**730 01**
11	42	6	0 - 6	6	160	25	133.4	115	28	3	M12	3	11	14	20	12	**730 11**
1	48	8	0 - 8	8	160	25	133.4	115	28	3	M12	3	13	18	26	25	**730 02**
2	70	14	2 - 14	10	160	25	133.4	115	23	6	M12	3	26	31	36	50	**730 03**
3	70	18	2 - 18	10	160	25	133.4	115	33	6	M12	3	34	39	44	90	**730 04**
35	80	14	2 - 14	15	160	25	133.4	115	33	6	M12	3	29	39	49	130	**730 09**
4	90	24	3 - 24	15	160	32	133.4	115	72	6	M12	3	39	49	59	250	**730 05**
45	100	28	3 - 28	15	160	32	133.4	115	72	6	M12	3	49	59	69	350	**730 10**
5	132	35	6 - 35	20	160	45	133.4	115	164	6	M12	3	69	84	99	700	**730 06**
55	182	35	6 - 35	20	220	45	171.4	115	165	6	M16	3	110	125	140	1500	**730 08**
6	212	35	6 - 35	20	250	45	210	115	165	6	M20	3	140	155	170	2100	**730 07**
7	255	50	25 - 48	20	290	50	250	132	165	6	M20	6	180	195	210	3300	**730 13**
75	302	50	25 - 48	20	348	50	310	132	165	6	M20	6	230	245	260	5000	**730 14**
8	360	80	30 - 76	30	440	78	394	190	262	6	M20	6	270	290	310	7000	**730 16**
85	410	80	30 - 76	30	490	78	444	190	262	6	M20	6	320	340	360	10000	**730 15**

*** The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7**

- All face drivers are supplied without drive pins. (drive pins see page 24 - 29)
- Types FSB 01 / 0 are supplied with center body, all other types without center pin. (center pins see page 30 - 31)
- Mounting elements for face drivers see page 104 - 109.
- For vertical use of the face driver the center pin and drive pins must be secured against falling out. (Special design)

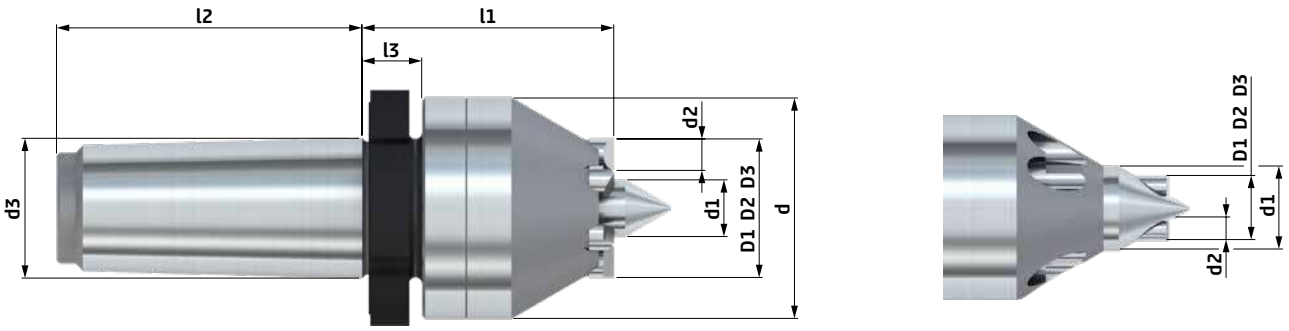
It is the purpose of a flange-adapter to provide stable connection to the machine spindle. We supply these flange adapters for various sizes of spindle noses either in standard size (DIN ISO 702-1 / DIN 55028) or for spindle noses specific to manufacturer of machine-tools. Thus face drivers of type FSB can be used on different machines. Driving devices and center pins can be exchanged front view on the machine without any effort.

Upon request and depending on the tooling direction of the machine the face driver can be equipped optionally with drive pins for counter-clockwise tooling (SR / tooling direction M3), for clockwise tooling (SL / tooling direction M4) or for both tooling directions (NV = bi-directional).

Apart from the clamping diameters listed in the table under D1, D2, D3 we can also supply intermediate dimensions upon request. We can as well make extra-large center pins or mushroom centers appropriate to oversized centerings in workpieces.

Technical data – type SB face driver

type SB 01/0



type SB	MK	d	d1	center Ø	d2	d3	l1	l2	l3	drive pin	clamping Ø D1	D2	D3	max. workpiece weight [kg] *	cat. no.
01	3	48	22	0 - 5	6	M28 x 1.5	87	61	14	3	8	11	17	6	**720 16**
	4	48	22	0 - 5	6	M35 x 1.5	87	74	16	3	8	11	17	6	**720 17**
	5	48	22	0 - 5	6	M48 x 1.5	87	97	19	3	8	11	17	6	**720 18**
0	3	48	22	0 - 3	8	M28 x 1.5	87	61	14	3	6	11	19	8	**720 01**
	4	48	22	0 - 3	8	M35 x 1.5	87	74	16	3	6	11	19	8	**720 02**
	5	48	22	0 - 3	8	M48 x 1.5	87	97	19	3	6	11	19	8	**720 03**
11	3	42	6	0 - 6	6	M28 x 1.5	80	61	14	3	11	14	20	12	**720 19**
	4	42	6	0 - 6	6	M35 x 1.5	80	74	16	3	11	14	20	12	**720 20**
	5	42	6	0 - 6	6	M48 x 1.5	80	97	19	3	11	14	20	12	**720 21**
1	3	48	8	0 - 8	8	M28 x 1.5	80	61	14	3	13	18	26	25	**720 04**
	4	48	8	0 - 8	8	M35 x 1.5	80	74	16	3	13	18	26	25	**720 05**
	5	48	8	0 - 8	8	M48 x 1.5	80	97	19	3	13	18	26	25	**720 06**
2	4	70	14	2 - 14	10	M35 x 1.5	80	74	16	6	26	31	36	50	**720 07**
	5	70	14	2 - 14	10	M48 x 1.5	80	97	19	6	26	31	36	50	**720 08**
3	4	70	18	2 - 18	10	M35 x 1.5	80	74	16	6	34	39	44	90	**720 09**
	5	70	18	2 - 18	10	M48 x 1.5	80	97	19	6	34	39	44	90	**720 10**
4	5	90	24	3 - 24	15	M48 x 1.5	104	97	19	6	39	49	59	250	**720 11**
	6	90	24	3 - 24	15	M70 x 1.5	104	134	20	6	39	49	59	250	**720 12**
5	6	132	35	6 - 35	20	M70 x 1.5	135	134	20	6	69	84	99	700	**720 13**
55	6	182	35	6 - 35	20	M70 x 1.5	140	134	20	6	110	125	140	1200	**720 15**
6	6	212	35	6 - 35	20	M70 x 1.5	140	134	20	6	140	155	170	1600	**720 14**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are supplied without drive pins. (drive pins see page 24 - 29)
- Types SB 01/0 are supplied with center body, all other types without center pin. (center pins see page 30 - 31)
- Reducing sleeves for face drivers see page 112 - 113.

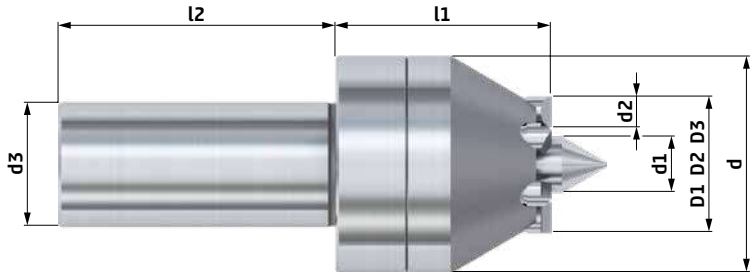
Type series SB with MK retainer is embedded directly in the machine spindle and removed by means of an extracting nut. Driving devices and center pins can be exchanged front view on the machine without any effort.

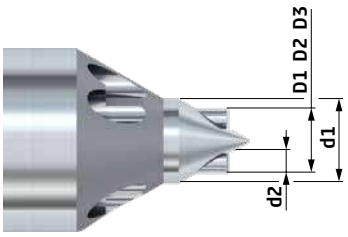
If necessary and depending on the tooling direction of the machine the face driver can be equipped optionally with drive pins for counter-clockwise tooling (SR/tooling direction M3), for clockwise tooling (SL/tooling direction M4) or for both tooling directions (NV = bi-directional).

Apart from the clamping diameters listed in the table under D1, D2, D3 we also supply intermediate dimensions upon request. We also make extra-large center pins or mushroom centers appropriate to oversized centerings in workpieces.

Technical data – type SB face driver with cylindrical shank

Type SB 01/0





type SB	cyl.	d	d1	center Ø	d2	d3	l1	l2	drive pin	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
01	**25**	48	22	0 - 5	6	25	71	90	3	8	11	17	6	**725 01**
0	**25**	48	22	0 - 3	8	25	71	90	3	6	11	19	8	**725 02**
11	**25**	42	6	0 - 6	6	25	70	90	3	11	14	20	12	**725 03**
1	**32**	48	8	0 - 8	8	32	70	90	3	13	18	26	25	**725 05**
2	**32**	70	14	2 - 14	10	32	70	90	6	26	31	36	50	**725 06**
3	**32**	70	18	2 - 18	10	32	70	90	6	34	39	44	90	**725 07**
	40	70	18	2 - 18	10	40	70	90	6	34	39	44	90	**725 08**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are supplied without drive pins. (drive pins see page 24 - 29)
- Types SB 01/0 are supplied with center body, all other types without center pin. (center pins see page 30 - 31)

Type series SB with cylindrical shank for clamping in a collet or in a chuck. Driving devices and center pins can be exchanged front view on the machine without any effort.

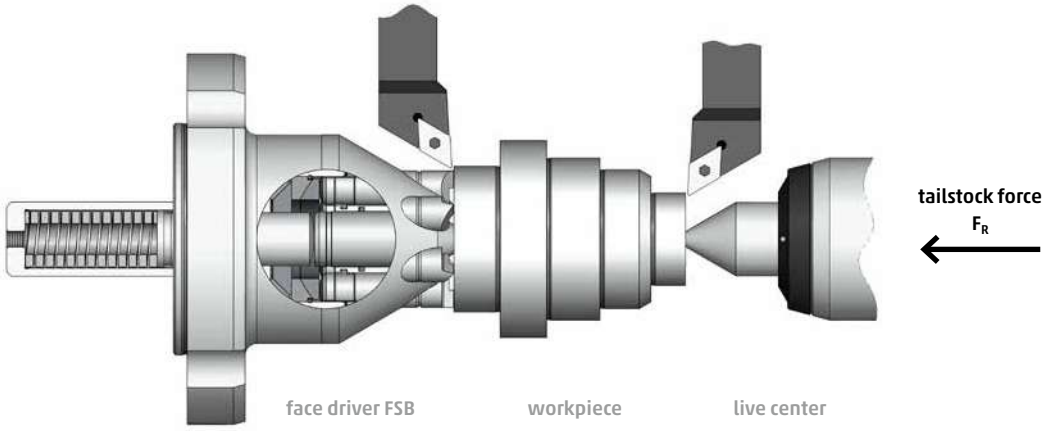
If necessary and depending on the tooling direction of the machine the face driver can be equipped optionally with drive pins for counter-clockwise tooling (SR/tooling direction M3), for clockwise tooling (SL/tooling direction M4) or for both tooling directions (NV = bi-directional).

Apart from the clamping diameters listed in the table under D1, D2, D3 we also supply intermediate dimensions upon request. We also make extra-large center pins or mushroom centers appropriate to oversized centerings in workpieces.

Face Drivers FSB / SB · Calculations

tailstock force / maximum chip cross section of metal removing

PRINCIPLE: The tailstock force pushes the workpiece agianst the movable center pin of the face driver. The center pin will draw back until the surface of the workpiece bears against the drive pins.



■ **tailstock force F_R:**
The force onto the face driver required for metal removing is calculated on the basis of the empirical formula:

$$F_R = [(q_{max} \times 1000 \times \frac{D}{d}) + 1000] \times m$$

F_R	[N]	tailstock force
q_{max}	[mm²]	maximum of chip cross section for metal removing
D	[mm]	cutting diameter
d	[mm]	clamping diameter
m	[-]	material factor (see adjustment-chart below)

■ **maximum chip cross section q_{max}:**
At a given tailstock force, maximum chip cross section is calculated as follows:

$$q_{max} = \frac{\frac{F_R}{m} - 1000}{1000 \times \frac{D}{d}}$$

EXPLANATORY NOTES: The calculations refer to tooling against the face driver. In case of tooling against tailstock the calculated chip cross section is reduced by approx. 40 %. The first chip, however, should always be machined toward the face driver, in order to achieve an ideal penetration of the drive pins. The ratio D / d should not exceed 2, otherwise it would work inefficiently.

Material factor m adjustment chart:

material factor m	**1.4**	**1.2**	**1.1**	**1.0**	**0.8**
Rm [N / mm²]	1000	800	700	600	400
examples	42CrMo4	16MnCr5	C 15E (Ck 15)	S355J0	S235J0
		25CrMo4	C 45E (Ck 45)	35S20	

Chisel load of drive pins

Keep the chisel load within the following range:
250 - 350 N per mm chisel length

- **the chisel load is calculated as follows:**

$$BS = \frac{F_R}{n \times s}$$

BS	[N / mm]	chisel load
F_R	[N]	tailstock force
n	[-]	number of drive pins
s	[mm]	chisel length

EXEMPLIFICATION: turning with FSB 3 face driver, 6 drive pins, respective length of chisel 4 mm, tailstock force 7200 N

$$BS = \frac{7200\ N}{6 \times 4\ mm} = 300\ \frac{N}{mm}$$

CALCULATION EXAMPLE for type FSB / SB

Specific data of machine and workpiece:
maximum tailstock force: 10000 N
material of the workpiece: C15E
diameter of the workpiece,
side of face driver: Ø 48 mm
turning diameter: Ø 90 mm

Selection of face driver:
face driver FSB 3 / clamping Ø 44 mm
6 drive pins each 4 mm chisel length

- **tailstock force F_R:**
  In order to ensure sufficient entrainment (see chisel load of drive pins) a tailstock force of approx. 7200 N has to be supplied.

$$BS = \frac{F_R}{n \times s}$$

$$F_R = 300\ \frac{N}{mm} \times 6 \times 4\ mm = 7200\ N$$

Determination of material factor m:
as per adjustment chart material factor: m (C15E) = 1.1

- **maximum chip cross section q_{max}:**
  The maximum chip cross section (at the ultimate turning-Ø) is calculated as follows:

$$q_{max} = \frac{\frac{7200\ N}{1.1} - 1000}{1000 \times \frac{90\ mm}{44\ mm}} = 2.71\ mm^2$$

EXPLANATORY NOTES: This calculation refers to tooling against the face driver. The calculated chip cross section refers to the ultimate turning diameter. In case of further tooling towards the axis of rotation of the workpiece, even larger chip cross sections can be achieved (» formula), commensurate with turning diameter.

Face Drivers FFB / FFBH

with drive pins and fixed center pin for high true run accuracy

The entire surface of the workpiece can be completely machined with one single clamping and with a maximum of torque transmission. NEIDLEIN face drivers are mechanical clamping systems, suitable **for turning and hard turning** likewise.

Face drivers of type FFB / FFBH are power-operated on the side of the machine spindle as well as the side of the tailstock. The workpieces are clamped centrically by the fixed center pin. This operation results in high true run-out accuracy.

Drive pins of type FFBH are hydraulically activated and compensated, thus achieving excellent true run-out accuracy.

Type FFB with flange retainer

Type FFB is mounted onto the machine spindle nose using flange-adapter, adjustable for true run-out.

Type FFBH with flange retainer

Type FFBH is mounted onto the machine spindle nose using flange-adapter adjustable for true run-out.

NEIDLEIN face drivers FFB / FFBH with fixed center pin ensure:

- maximum of torque transmission, thus achieving a high rate of metal removing
- datum-point location in the center of the workpiece ensures constant measures of length
- extended service life of drive pins and cutting tools due to vibration-free running
- run-out deviation in the process
  - type FFB: 0.005 - 0.01 mm
  - type FFBH: 0.002 - 0.005 mm
- fixed clamping location
- compensating driving devices/ideal clamping of the workpiece
- easy handling

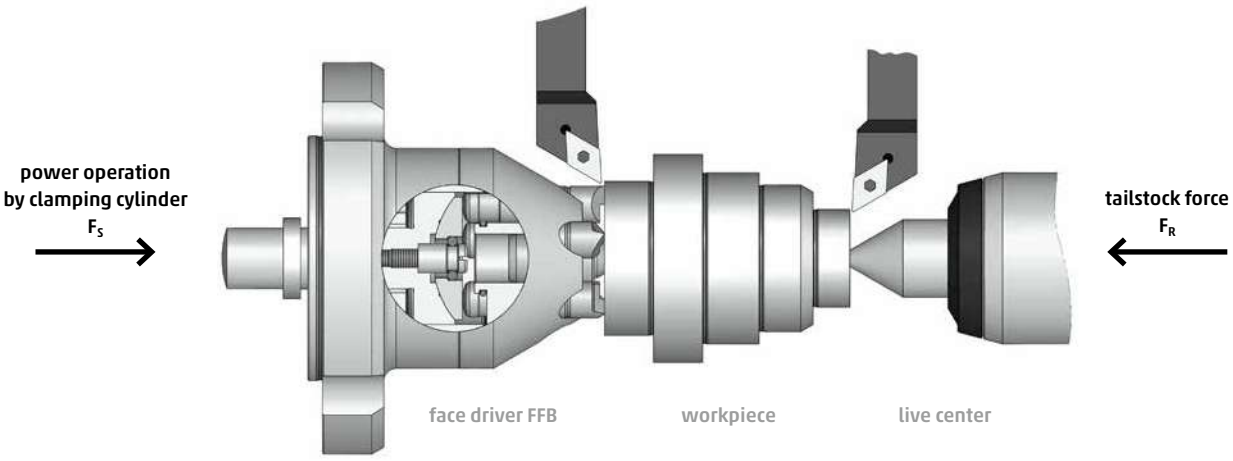
Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the fixed center pin of the face driver. The motion of the drive pins against the surface of the workpiece is initiated by the clamping cylinder mounted into the machine. The drive pins are "floatingly" suspended, thus compensating irregularities with regard to possible unevenness of the surface of workpieces. The datum-point of workpieces on the machines is determined by the size of the center hole. The entire surface of the workpiece can now be tooled in one single clamping.

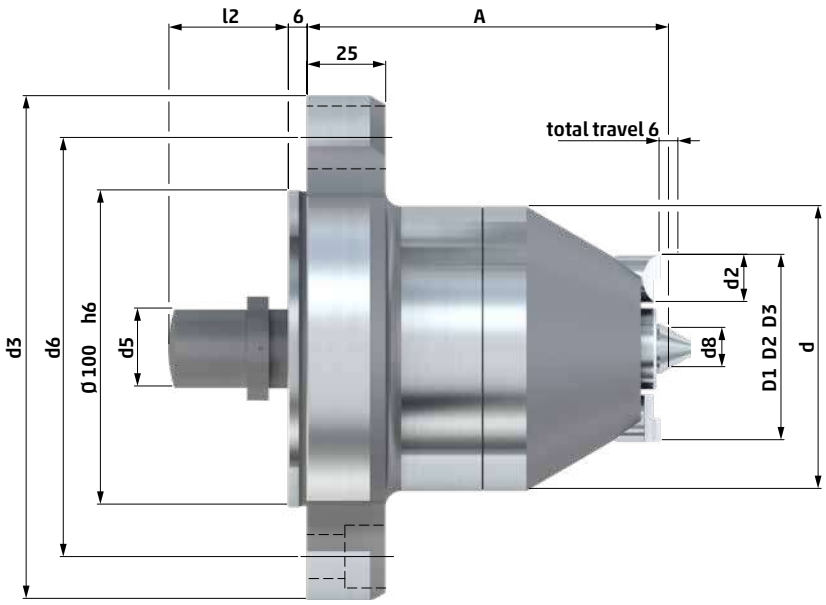
See page 22 - 23 with data for achievable removal of material and the thrust requested. The appropriate standard drive pins and center pins can be found on page 24 - 31.

We will be glad to design clamping devices suitable for your workpieces.

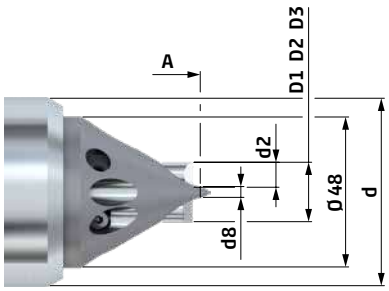
Type FFB / FFBH with flange retainer



Technical data – type FFB face drivers



type FFB 01/0



type FFB	d	center Ø	d2	d3	d5	d6	d8	A	l2	drive pin	fixing screw type	fixing screw pcs	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
01	60	1 - 5	6	160	18	133.4	3.5	115	38	3	M12	3	8	11	17	6	**731 01**
0	60	1 - 3	8	160	18	133.4	3	115	38	3	M12	3	6	11	19	8	**731 12**
11	42	2 - 6.5	6	160	12	133.4	4.25	115	38	3	M12	3	11	14	20	12	**731 11**
1	48	4 - 8.5	8	160	18	133.4	6.25	115	38	3	M12	3	13	18	26	25	**731 02**
2	70	4 - 9	10	160	22	133.4	6.5	115	38	3	M12	3	26	31	36	50	**731 03**
3	70	6 - 11	10	160	22	133.4	8.5	115	38	3	M12	3	34	39	44	90	**731 04**
35	80	4 - 9	15	160	22	133.4	6.5	115	38	3	M12	3	29	39	49	130	**731 13**
4	90	10 - 15	15	160	25	133.4	12.5	115	38	5	M12	3	39	49	59	250	**731 05**
45	100	10 - 15	15	160	25	133.4	12.5	115	54	5	M12	3	49	59	69	400	**731 06**
5	132	10 - 15	20	160	25	133.4	12.5	115	54	5	M12	3	69	84	99	1000	**731 07**
55	182	10 - 15	20	220	40	171.4	12.5	155	54	5	M16	3	110	125	140	1600	**731 08**
6	220	10 - 15	20	250	40	210	12.5	171	54	5	M20	3	140	155	170	2500	**731 09**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

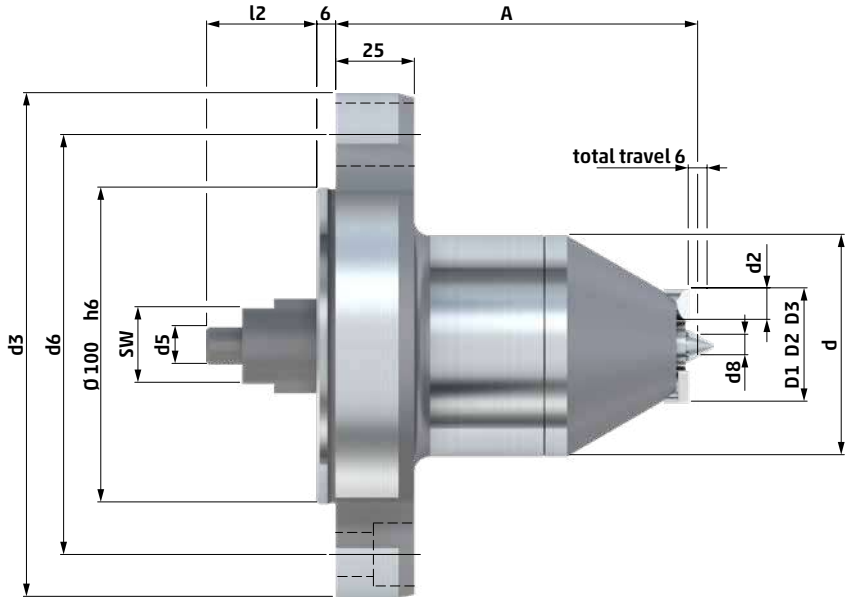
- All face drivers are supplied without drive pins. (drive pins see page 24 - 29)
- Types FFB 01/0 are supplied with center body, all other types without center pin. (center pin see page 30 - 31)
- The diamteter d8 refers to the standard center pins. (see page 30 - 31)
- Further center pins for other center holes upon request.
- Mounting elements for face drivers see page 104 - 109.
- For vertical use of the face driver the center pin and drive pins must be secured against falling out. (Special design)

It is the purpose of an adjustable flange-adapter to provide stable connection to the machine spindel. We supply these flange adapters for various sizes of spindle noses in standard size (DIN ISO 702-1 / DIN 55028) or for spindle noses specific to machine-tool manufacturer. Thus face drivers of type FFB can be used all-purpose on different machines. Driving devices and center pins can be exchanged front view on the machine without any effort.

Upon request and depending on the tooling direction of the machine, the face driver can be equipped optionally with drive pins for counter-clockwise tooling (SR / tooling direction M3), for clockwise tooling (SL / tooling direction M4) or for both tooling directions (NV = bi-directional).

Apart from the clamping diameters enlisted in the table under D1, D2, D3 we can also supply intermediate dimensions upon request. We can as well make extra-large center pins or mushroom centers appropriate to oversized centerings in workpieces.

Technical data – type FFBH face drivers

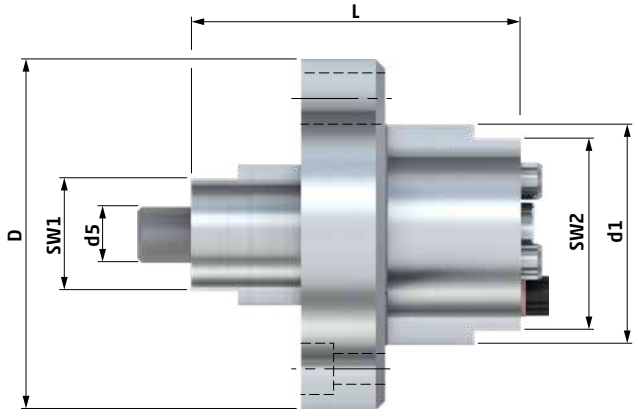


type FFBH	d	center Ø	d2	d3	SW	d5	d6	d8	A	l2	drive pin	fixing screw type	fixing screw pcs	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
1	70	4 - 8.5	8	160	24	12	133.4	6.25	115	35	3	M12	3	13	18	26	25	**631 02**
2	70	4 - 9	10	160	24	12	133.4	6.5	115	35	3	M12	3	26	31	36	50	**631 03**
3	70	6 - 11	10	160	24	12	133.4	8.5	115	35	3	M12	3	34	39	44	90	**631 04**
4	90	10 - 15	15	160	34	12	133.4	12.5	132	35	5	M12	3	39	49	59	250	**631 06**
45	100	10 - 15	15	160	34	12	133.4	12.5	132	35	5	M12	3	49	59	69	400	**631 07**
5	132	10 - 15	20	160	34	12	133.4	12.5	149	35	5	M12	3	69	84	99	1000	**631 08**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are supplied without drive pins and without center pins. (changeable parts see page 24 - 31)
- The diamteter d8 refers to the standard center pins. (see page 30 - 31)
- Further center pins for other center holes upon request.
- Mounting elements for face drivers see page 104 - 109.
- For vertical use of the face driver the center pin and drive pins must be secured against falling out. (Special design)

Technical data – type FFBH hydraulic unit



type FFBH	SW1	d5	L	d1	SW2	D	cat. no.
1	24	12	70.5	47	41	75	
2	24	12	70.5	47	41	75	**631 02 HE**
3	24	12	70.5	47	41	75	
4	34	12	70.5	65	59	93	**631 06 HE**
45	34	12	70.5	65	59	93	
5	34	12	70.5	87	81	131	**631 08 HE**

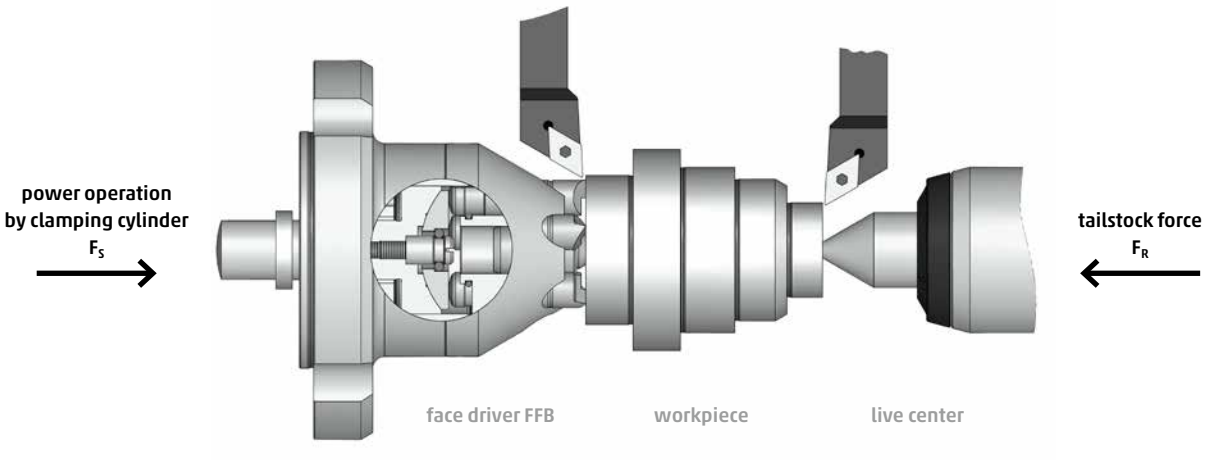
The general explanatory notes for this face driver FFBH can be obtained from the sheet "technical data – type FFB". For safe and smooth operation of face driver we recommend exchange of hydraulic unit after 1500 operating hours.

Furthermore, we offer the option for professional maintenance of the exchanged hydraulic units in our production plant.

Face Drivers FFB / FFBH · Calculations

force of clamping cylinder / maximum chip cross section

PRINCIPLE: The tailstock force pushes the workpiece against the fixed center pin of the face driver. The drive pins are activated by the clamping cylinder mounted into the machine.



- **force of clamping cylinder F_S:**
  The force onto the face driver required for metal removing is calculated on the basis of the empirical formula:

$$F_S = [(q_{max} \times 1100 \times \frac{D}{d}) + 1300] \times m$$

- **maximum chip cross section q_{max}:**
  At a given force of clamping cylinder, the maximum chip cross section is calculated as follows:

$$q_{max} = \frac{\frac{F_S}{m} - 1300}{1100 \times \frac{D}{d}}$$

F_R	[N]	tailstock force
q_{max}	[mm²]	maximum of chip cross section for metal removing
D	[mm]	cutting diameter
d	[mm]	clamping diameter
m	[-]	material factor (see adjustment-chart below)

- **tailstock force F_R:**
  In case of tooling against the face driver the tailstock force has to be approx. 20 % more than the force of the clamping cylinder F_S.
  In case of tooling against the tailstock, the tailstock should be approx. 40 - 50 % higher than the force of the clamping cylinder, if not, then the chip cross section should be reduced by approx. 30 %. (as there is an addition of force of clamping cylinder and cutting force).

EXPLANATORY NOTES: The first chip, however, should always be machined toward the face driver, in order to achieve an ideal penetration of the drive pins. The ratio D / d should not exceed 2, otherwise it would work inefficiently.

Material factor m adjustment chart:

material factor m	**1.4**	**1.2**	**1.1**	**1.0**	**0.8**
Rm [N / mm²]	1000	800	700	600	400
examples	42CrMo4	16MnCr5	C 15E (Ck 15)	S355J0	S235J0
		25CrMo4	C 45E (Ck 45)	35S20	

Chisel load of drive pins

Keep the chisel load within the following range:
250 - 350 N per mm chisel length

■ **the chisel load is calculated as follows:**

$$BS = \frac{F_S}{n \times s}$$

BS	[N / mm]	chisel load
F_S	[N]	force of clamping cylinder
n	[-]	number of drive pins
s	[mm]	chisel length

EXEMPLIFICATION: turning with FFB 3 face driver, 3 drive pins respective length of chisel 7 mm, force of clamping cylinder 6300 N

$$BS = \frac{4500\ N}{3 \times 5\ mm} = 300\ \frac{N}{mm}$$

CALCULATION EXAMPLE for type FFB / FFBH

Specific data of machine and workpiece:

maximum force of clamping cylinder:	12000 N
material of the workpiece:	16MnCr5
diameter of the workpiece, side of face driver:	Ø 62 mm
tooling diameter:	Ø 120 mm

Selection of face driver:
face driver FFB 4 / clamping Ø 59 mm
5 drive pins each 7.5 mm chisel length

■ **force of clamping cylinder F_S:**
In order to ensure sufficient entrainment (see chisel load of drive pins), a clamping cylinder force of approx. 11250 N is needed.

$$BS = \frac{F_S}{n \times s}$$

$$F_S = 300\ \frac{N}{mm} \times 5 \times 7.5\ mm = 11250\ N$$

Calculation of material factor m:
as per adjustment chart material factor: m (16MnCr5) = 1.2

■ **maximum chip cross section q_{max}:**
The maximum chip cross section (at OD-Ø) is calculated as follows:

$$q_{max} = \frac{\frac{11250\ N}{1.2} - 1300}{1100 \times \frac{120\ mm}{59\ mm}} = 3.61\ mm^2$$

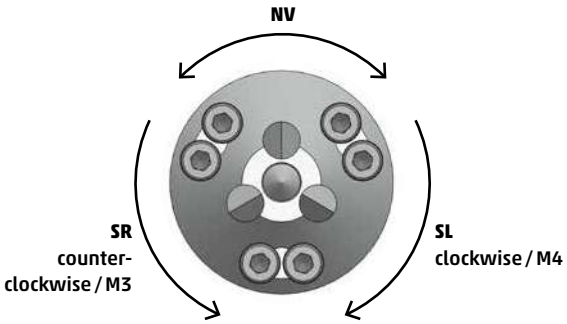
EXPLANATORY NOTES: The calculated chip cross section refers to the extreme outer tooling diameter. In case of further tooling towards the axis of rotation of the workpiece, even larger chip cross sections can be achieved (» formula), commensurate with turning diameter.

Drive Pins FSB / SB / FFB(H) · Chisel SL / SR / NV

for torque transmission onto the workpiece
for soft / green tooling

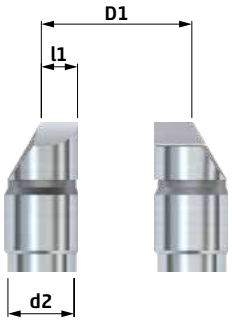
Type FSB / SB / FFB(H) · chisel SL / SR / NV

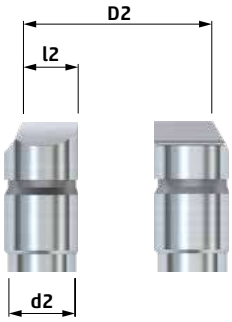
view from tailstock onto the face driver

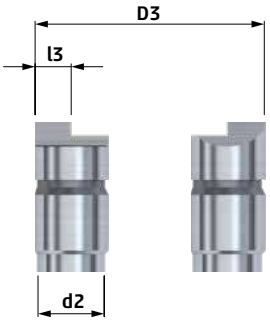


Technical data – type FSB / SB / FFB(H) · chisel SL / SR / NV

types 01, 11, 8 and 85 with chisel SL and SR are double chiselled







TYPE CHISEL SL
for tooling
direction M4

TYPE CHISEL SR
for tooling
direction M3

TYPE CHISEL NV
for tooling
direction M4 and M3

for type FSB / SB / FFB(H)	d2	clamping Ø D1	clamping Ø D2	clamping Ø D3	chisel length l1	chisel length l2	chisel length l3	cat. no.	cat. no.	cat. no.
01	6	8			1.5			**736 104**	**736 101**	**736 107**
	6		11			3		**736 105**	**736 102**	**736 108**
	6			17			6	**736 106**	**736 103**	**736 109**
	6			17			3	**736 106S**	**736 103S**	**736 109S**
0	8	6			1.5			**736 04**	**736 01**	**736 07**
	8		11			4		**736 05**	**736 02**	**736 08**
	8			19			8	**736 06**	**736 03**	**736 09**
	8			19			4	**736 06S**	**736 03S**	**736 09S**
1	8	13			1.5			**736 13**	**736 10**	**736 16**
	8		18			4		**736 14**	**736 11**	**736 17**
	8			26			8	**736 15**	**736 12**	**736 18**
	8			26			4	**736 15S**	**736 12S**	**736 18S**

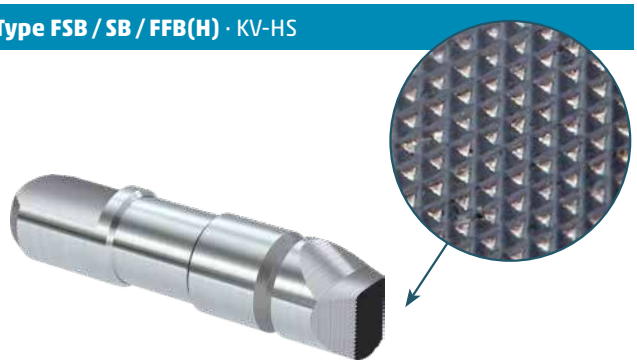
for type FSB / SB/ FFB(H)	d2	clamping Ø D1	D2	D3	chisel length l1	l2	l3	**TYPE CHISEL SL** for tooling direction M4 cat. no.	**TYPE CHISEL SR** for tooling direction M3 cat. no.	**TYPE CHISEL NV** for tooling direction M4 and M3 cat. no.
11	6	11			1.5			**736 76**	**736 73**	**736 79**
	6		14			3		**736 77**	**736 74**	**736 80**
	6			20			6	**736 78**	**736 75**	**736 81**
	6			20			3	**736 78S**	**736 75S**	**736 81S**
2	10	26			5			**736 22**	**736 19**	**736 25**
	10		31			7.5		**736 23**	**736 20**	**736 26**
	10			36			10	**736 24**	**736 21**	**736 27**
	10			36			5	**736 24S**	**736 21S**	**736 27S**
3	10	34			5			**736 31**	**736 28**	**736 34**
	10		39			7.5		**736 32**	**736 29**	**736 35**
	10			44			10	**736 33**	**736 30**	**736 36**
	10			44			5	**736 33S**	**736 30S**	**736 36S**
35	15	29			5			**736 85**	**736 82**	**736 88**
	15		39			5		**736 86**	**736 83**	**736 89**
	15			49			5	**736 87**	**736 84**	**736 90**
	15			49			7.5	**736 87S**	**736 84S**	**736 90S**
4	15	39			5			**736 40**	**736 37**	**736 43**
	15		49			7.5		**736 41**	**736 38**	**736 44**
	15			59			7.5	**736 42**	**736 39**	**736 45**
	15			59			5	**736 42S**	**736 39S**	**736 45S**
45	15	49			5			**736 94**	**736 91**	**736 97**
	15		59			7.5		**736 95**	**736 92**	**736 98**
	15			69			7.5	**736 96**	**736 93**	**736 99**
	15			69			5	**736 96S**	**736 93S**	**736 99S**
5	20	69			5			**736 49**	**736 46**	**736 52**
	20		84			10		**736 50**	**736 47**	**736 53**
	20			99			10	**736 51**	**736 48**	**736 54**
	20			99			7.5	**736 51S**	**736 48S**	**736 54S**
55	20	110			5			**736 58**	**736 55**	**736 61**
	20		125			10		**736 59**	**736 56**	**736 62**
	20			140			10	**736 60**	**736 57**	**736 63**
	20			140			7.5	**736 60S**	**736 57S**	**736 63S**
6	20	140			5			**736 67**	**736 64**	**736 70**
	20		155			10		**736 68**	**736 65**	**736 71**
	20			170			10	**736 69**	**736 66**	**736 72**
	20			170			7.5	**736 69S**	**736 66S**	**736 72S**
7	20	180			5			**736 114**	**736 111**	**736 117**
	20		195			15		**736 115**	**736 112**	**736 118**
	20			210			20	**736 116**	**736 113**	**736 119**
75	20	230			5			**736 344**	**736 341**	**736 347**
	20		245			15		**736 345**	**736 342**	**736 348**
	20			260			20	**736 346**	**736 343**	**736 349**
8	20	270			10			**736 373**	**736 370**	**736 376**
	20		290			20		**736 374**	**736 371**	**736 377**
	20			310			30	**736 375**	**736 372**	**736 378**
85	30	320			10			**736 364**	**736 361**	**736 367**
	30		340			20		**736 365**	**736 362**	**736 368**
	30			360			30	**736 366**	**736 363**	**736 369**

■ Further clamping Ø of drive pins upon request.

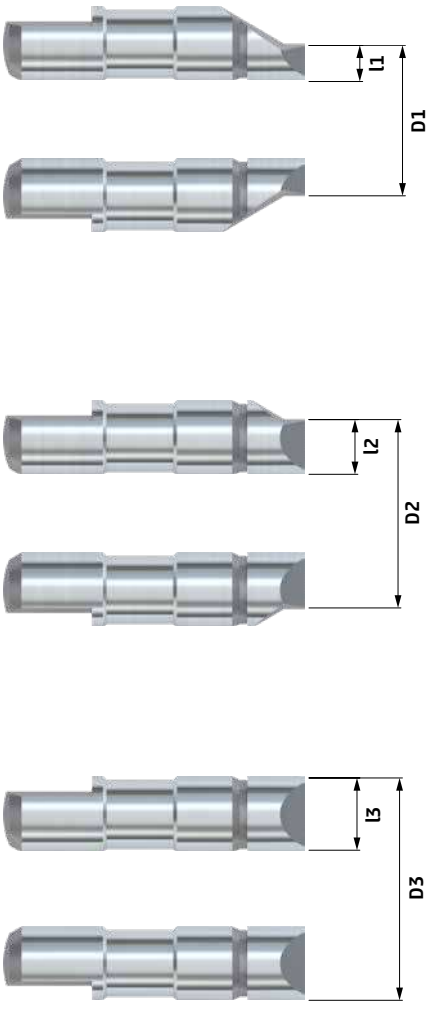
Drive Pins FSB / SB / FFB(H) · KV-HS

cross serrated and coated for hard turning operation
for torque transmission onto the workpiece
for hard tooling

Type FSB / SB / FFB(H) · KV-HS



Technical data – type FSB / SB / FFB(H) · KV-HS



for type FSB / SB / FFB(H)	clamping Ø D1	D2	D3	chisel length l1	l2	l3	cat. no.
	8			1.5			**736 200**
01		11			3		**736 201**
			17			6	**736 202**
	6			1.5			**736 203**
0		11			4		**736 204**
			19			8	**736 205**
	13			1.5			**736 209**
1		18			4		**736 210**
			26			8	**736 211**
	11			1.5			**736 206**
11		14			3		**736 207**
			20			6	**736 208**
	26			5			**736 212**
2		31			7.5		**736 213**
			36			10	**736 214**
	34			5			**736 215**
3		39			7.5		**736 216**
			44			10	**736 217**
	29			5			**736 218**
35		39			10		**736 219**
			49			15	**736 220**
	39			5			**736 221**
4		49			10		**736 222**
			59			15	**736 223**
	49			5			**736 224**
45		59			10		**736 225**
			69			15	**736 226**
	69			5			**736 227**
5		84			12.5		**736 228**
			99			20	**736 229**
	110			5			**736 230**
55		125			12.5		**736 231**
			140			20	**736 232**
	140			5			**736 233**
6		155			12.5		**736 234**
			170			20	**736 235**

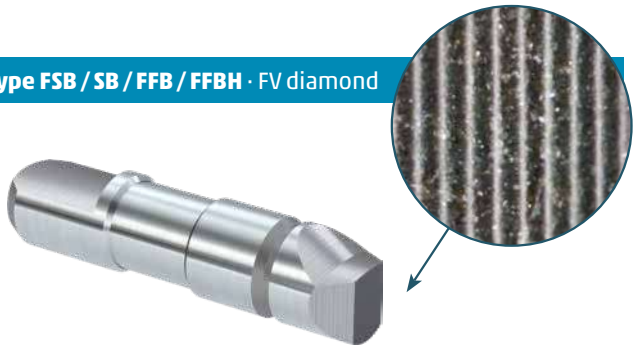
■ Further clamping Ø of drive pins upon request.

Drive Pins FSB / SB / FFB(H) · FV Diamond

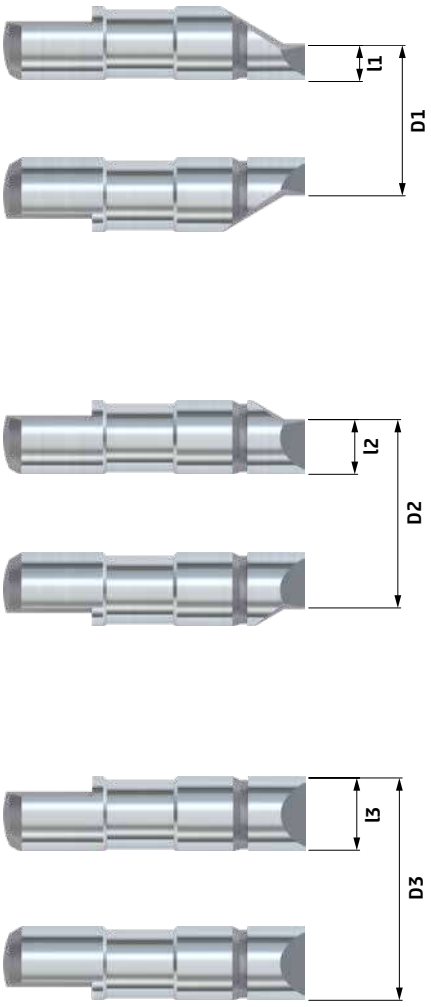
serrated and diamond embedded
for torque transmission onto the workpiece for hard tooling

for higher friction coefficient and higher tool life of drive pin

Type FSB / SB / FFB / FFBH · FV diamond



Technical data – type FSB / SB / FFB / FFBH · FV diamond



for type	clamping Ø			chisel length			cat. no.
FSB / SB / FFB(H)	D1	D2	D3	l1	l2	l3	
	8			1.5			**736 400**
01		11			3		**736 401**
			17			6	**736 402**
	6			1.5			**736 403**
0		11			4		**736 404**
			19			8	**736 405**
	13			1.5			**736 409**
1		18			4		**736 410**
			26			8	**736 411**
	11			1.5			**736 406**
11		14			3		**736 407**
			20			6	**736 408**
	26			5			**736 412**
2		31			7.5		**736 413**
			36			10	**736 414**
	34			5			**736 415**
3		39			7.5		**736 416**
			44			10	**736 417**
	29			5			**736 418**
35		39			10		**736 419**
			49			15	**736 420**
	39			5			**736 421**
4		49			10		**736 422**
			59			15	**736 423**
	49			5			**736 424**
45		59			10		**736 425**
			69			15	**736 426**
	69			5			**736 427**
5		84			12.5		**736 428**
			99			20	**736 429**
	110			5			**736 430**
55		125			12.5		**736 431**
			140			20	**736 432**
	140			5			**736 433**
6		155			12.5		**736 434**
			170			20	**736 435**

■ Further clamping Ø of drive pins upon request.

Drive Pins FSB / SB / FFB(H) · Chisel Carbide

full carbide / carbide inserts
for torque transmission onto the workpiece
for tooling of high-tensile-strength materials

Type FSB / SB / FFB(H) · chisel carbide

model B / SR

MODEL A

SL SR NV

MODEL B

SL SR

Technical data – type FSB / SB / FFB(H) · chisel carbide

type 01 - 3 made of full carbide, model A

type 35 - 6 with carbide inserts, model B

MODEL A

for type FSB / SB / FFB(H)	clamping Ø D3	length l3	**TYPE CHISEL SL** for tooling direction M4 cat. no.	**TYPE CHISEL SR** for tooling direction M3 cat. no.	**TYPE CHISEL NV** for tooling direction M4 and M3 cat. no.
01	17	6	**736 500**	**736 518**	**736 536**
0	19	8	**736 501**	**736 519**	**736 537**
1	26	8	**736 502**	**736 520**	**736 538**
11	20	6	**736 503**	**736 521**	**736 539**
2	36	10	**736 504**	**736 522**	**736 540**
3	44	10	**736 505**	**736 523**	**736 541**

MODEL B

for type FSB / SB / FFB(H)	clamping Ø D1	clamping Ø D3	length l3	cat. no.	cat. no.
35	34		6	**736 506**	**736 524**
		46	6	**736 507**	**736 525**
4	44		6	**736 508**	**736 526**
		56	6	**736 509**	**736 527**
45	54		6	**736 510**	**736 528**
		66	6	**736 511**	**736 529**
5	75		6	**736 512**	**736 530**
		95	6	**736 513**	**736 531**
55	116		6	**736 514**	**736 532**
		136	6	**736 515**	**736 533**
6	146		6	**736 516**	**736 534**
		166	6	**736 517**	**736 535**

- Drive Pins are supplied with carbide insert.
- Further clamping-Ø of drive pins upon request.

Changeable inserts for type 35 - 6, model B

changeable parts	cat. no.
carbide insert	**736 550**
set screw for fastening of carbide insert	**736 551**

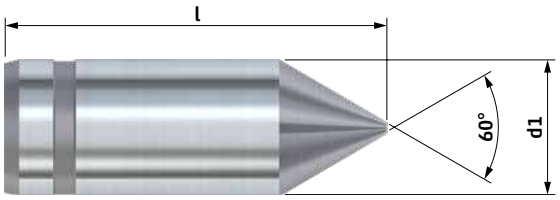
Center Pins FSB / SB

for face drivers FSB / SB with movable center pin

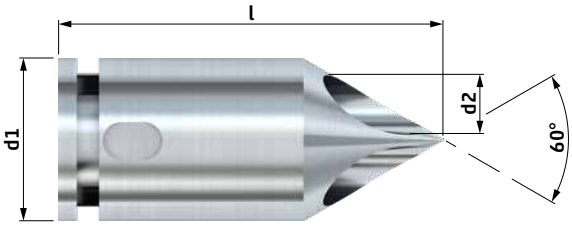
Type FSB / SB · center pin

center body type FSB / SB 01 / 0

Technical data – type FSB / SB · center pin



center body type FSB / SB 01 / 0



for type FSB / SB	d1	center Ø	d2	l	cat. no.
01	22	0 - 5	6	52	**735 101**
0	22	0 - 3	8	52	**735 01**
11	6	0 - 6	-	53	**735 11**
1	8	0 - 8	-	53	**735 02**
2	14	2 - 14	-	47	**735 03**
3	18	2 - 18	-	51	**735 04**
35	14	2 - 14	-	47	**735 09**
4	24	3 - 24	-	70	**735 05**
45	28	3 - 28	-	74	**735 10**
5	35	6 - 35	-	96	**735 06**
55	35	6 - 35	-	96	**735 08**
6	35	6 - 35	-	96	**735 07**
7	50	25 - 48	-	100	**735 301**
75	50	25 - 48	-	100	**735 401**
8	80	30 - 76	-	135	**735 601**
85	80	30 - 76	-	135	**735 501**

■ Further center pins for other center holes upon request.

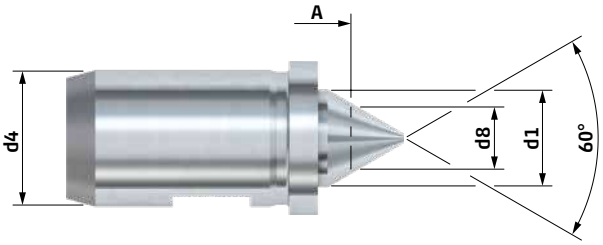
Center Pins FFB / FFBH

for face drivers FFB / FFBH with fixed center pin

Type FFB / FFBH · tool steel or carbide

HM with carbide insert

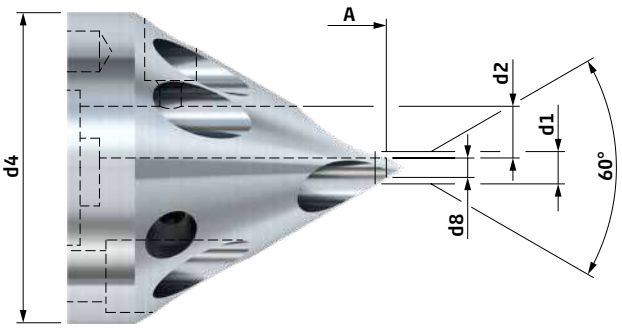
Technical data – type FFB / FFBH · tool steel or carbide



A overhang dimension of face driver to centre d8 (see page 20 - 21)

center body type FFB / FFBH 01 / 0

center body type FFB / FFBH 01 / 0



						TYPE TOOL STEEL	HM TYPE CARBIDE
for type FFB / FFBH	**d1**	**d2**	**d4**	**center Ø**	**d8**	**cat. no.**	**cat. no.**
01	5	6	48	1 - 5	3.5	**734 01**	**734 43**
0	3	8	48	1 - 3	3	**734 101**	**734 44**
11	7.8	-	6	2 - 6.5	4.25	**734 11**	**734 33**
1	9.8	-	8	4 - 8.5	6.25	**734 02**	**734 34**
2	10	-	14	4 - 9	6.5	**734 03**	**734 35**
3	12	-	18	6 - 11	8.5	**734 04**	**734 36**
35	10	-	14	4 - 9	6.5	**734 12**	**734 37**
4	16	-	20	10 - 15	12.5	**734 05**	**734 38**
45	16	-	28	10 - 15	12.5	**734 06**	**734 39**
5	16	-	35	10 - 15	12.5	**734 07**	**734 40**
55	16	-	35	10 - 15	12.5	**734 08**	**734 41**
6	16	-	35	10 - 15	12.5	**734 09**	**734 42**

■ Further center pins for other center holes upon request.

Face driver FSBR / SBR

with drive pins and movable center body for soft workpieces with high true running accuracy

The entire surface of the workpiece can be tooled and finished by clamping with a maximum of torque transmission. NEIDLEIN face drivers of type FSBR / SBR are mechanical clamping systems which are suited **for turning (for grinding operation upon request).**

Face drivers of type FSBR / SBR are power-operated by the thrust of the tailstock. Workpieces are clamped centrically using a movable center body. This way different centerings can be adjusted thus ensuring a constant datum-point at the end face of the workpieces.

Type FSBR with flange retainer

Type FSBR is mounted onto the machine spindle nose using a flange adapter.

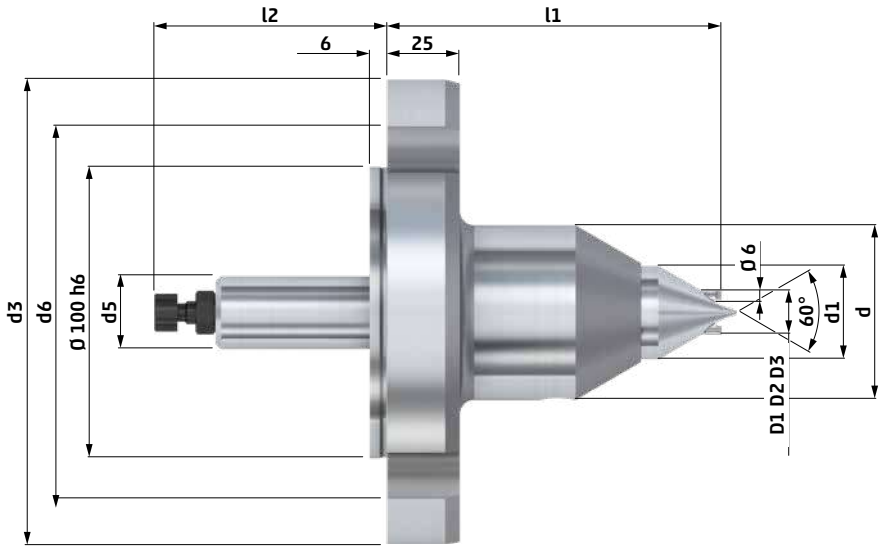
Type SBR with MK- or cylindrical retainer

Type SBR with taper shank and extracting nut for fast mounting into the machine spindle.

NEIDLEIN face drivers FSBR / SBR with movable center body ensure:

- run-out deviation in the process 0.01-0.015 mm
- high process reliability at small workpieces
- datum-point at the end face of the workpiece stable datum-point in case of different centerings
- secured drive pins and center body
- clamping force is triggered by tailstock
- fixed center pin / fixed datum-point in clamped state
- compensating driving devices / ideal clamping of the workpiece
- simple handling

Technical data – type FSBR face driver

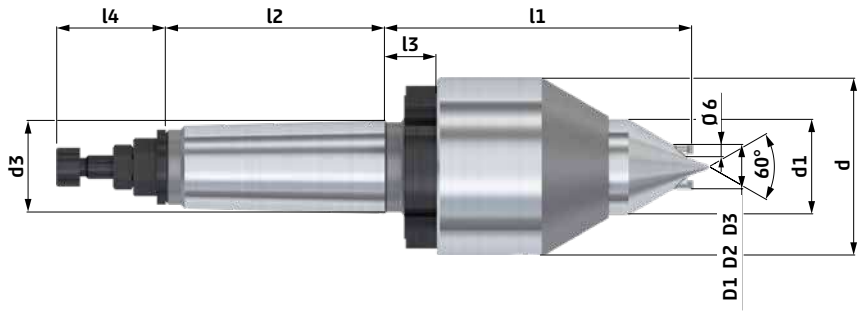


type FSBR	d	d1	center Ø	d3	d5	d6	l1	l2	drive pin	fixing screw type	fixing screw pcs	clamping-Ø D1	clamping-Ø D2	clamping-Ø D3	max. workpiece weight [kg] *	cat. no.
01	60	32	0 - 5	160	25	133.4	115	80	3	M12	3	7	11	17	8	**730 30**
0	60	32	0 - 3	160	25	133.4	115	80	3	M12	3	5	9	15	10	**730 31**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are supplied without drive pins. (drive pins see page 34)
- The center body is already installed.
- Mounting elements for face drivers see page 104 - 109.

Technical data – type SBR face driver



type SBR	MK	d	d1	center Ø	d3	l1	l2	l3	l4	drive pin	clamping-Ø D1	clamping-Ø D2	clamping-Ø D3	max. workpiece weight [kg] *	cat. no.
	3	60	32	0 - 5	M28 x 1.5	113	61	16	35	3	7	11	17	8	**720 30**
01	4	60	32	0 - 5	M35 x 1.5	104	74	17.5	37	3	7	11	17	8	**720 31**
	5	60	32	0 - 5	M48 x 1.5	104	97	19.5	37	3	7	11	17	8	**720 32**
	3	60	32	0 - 3	M28 x 1.5	113	61	16	35	3	5	9	15	10	**720 35**
0	4	60	32	0 - 3	M35 x 1.5	104	74	17.5	37	3	5	9	15	10	**720 36**
	5	60	32	0 - 3	M48 x 1.5	104	97	19.5	37	3	5	9	15	10	**720 37**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

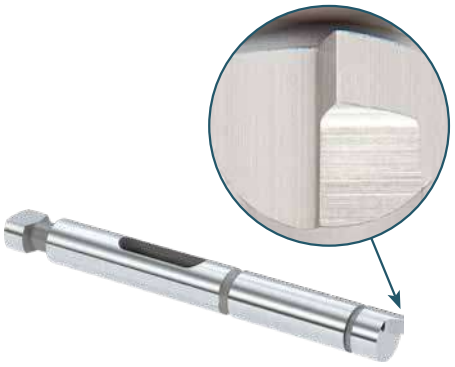
- Face driver with cylindrical shaft upon request.
- All face drivers are supplied without drive pins. (drive pins see page 34)
- The center body is already installed.
- Reducing sleeves for face drivers see page 112 - 113.

Drive Pins FSBR / SBR · Chisel SL / SR

for torque transmission onto the workpiece for soft / green tooling

For soft workpieces we apply drive pins made of hardened HSS comprising a chisel.
They are characterized by high wear-resistance as well as maximum torque transmission.

Type FSBR / SBR Chisel SL/SR



SL SR

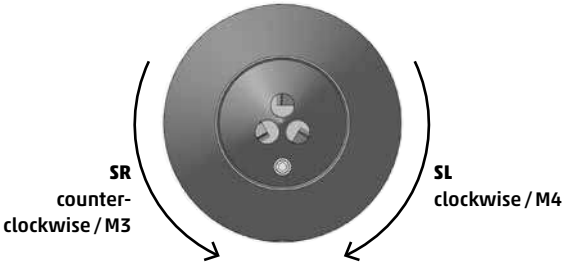
Technical data – type FSBR / SBR drive pins

Form A

Form B

Form C

view from tailstock onto the face driver



				TYPE CHISEL SL DIRECTION M4	TYPE CHISEL SR DIRECTION M3
for type	**for clamping**	**model**	**l**	**cat. no.**	**cat. no.**
FSBR / **SBR**	D3	A	2	**736 662**	**736 665**
FSBR / **SBR**	D2	B	2	**736 661**	**736 664**
FSBR / **SBR**	D1	C	2	**736 660**	**736 663**

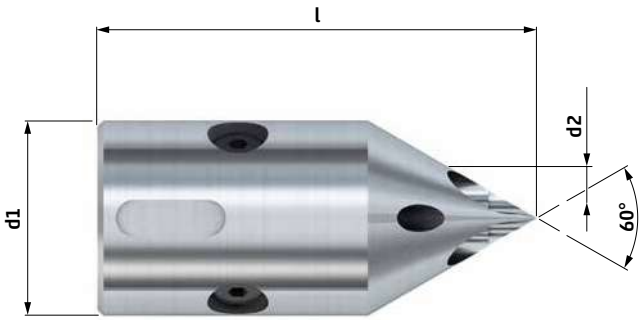
- Clamping diameter D1, D2, D3 see page 33.
- Further clamping Ø of drive pins upon request.

Center body FSBR / SBR

for face drivers FSBR / SBR with movable center pin

Type FSBR / SBR

Technical data – type FSBR / SBR center body



for type FSBR / SBR	d1	center ⌀	d2	l	cat. no.
01	32	0 - 5	6	72	**735 20**
0	32	0 - 3	6	72	**735 21**

Face Drivers FSP / FSPB / SP

with drive disk and movable center pin

The entire surface of the workpiece can be tooled and finished by clamping with a maximum of torque transmission.

NEIDLEIN face drivers of type FSP / FSPB / SP with drive disks are mechanical clamping systems which are suited **for soft / green as well as heavy tooling**. In application, they feature maximum flexibility and high robustness.

These face drivers are power-operated by the thrust of the tailstock. Workpieces are clamped centrically using a movable center pin. This way different centerings can be adjusted, thus ensuring a constant datum-point at the face end of the workpiece.

Type FSP with flange retainer for screw connection

Type FSP is mounted onto the machine spindle nose using a flange adapter.

Type FSPB with flange retainer for jaw clamping

Type FSPB is directly clamped with the chuck using soft jaws.

Type SP with MK retainer

Type SP with taper shank and extracting nut for fast mounting into the machine spindle.

NEIDLEIN face drivers FSP / FSPB / SP ensure:

- a maximum of torque transmission, thus achieving high metal removing rates
- datum-point at the face end of the workpiece, stable datum-point in case of different centerings
- compensating drive disk for uneven face sides
- high flexibility in the application, wide range of clamping diameters
- fixed center pin in clamped condition » fixed clamping point
- run-out deviation in the process 0.015 - 0.02 mm
- adjustable spring force (depending on the weight of the workpiece)
- low setup costs due to fast change of drive disks and center pins
- cost efficient exchange of parts that are in contact with the workpiece (changeable carbide inserts)

Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the movable center pin of the face driver. The center pin will draw back until the surface of the workpiece bears against the drive disk.

In this state the clamping bolt is clamped over the the power flow, in order to ensure a fixed datum-point throughout the entire tooling process.

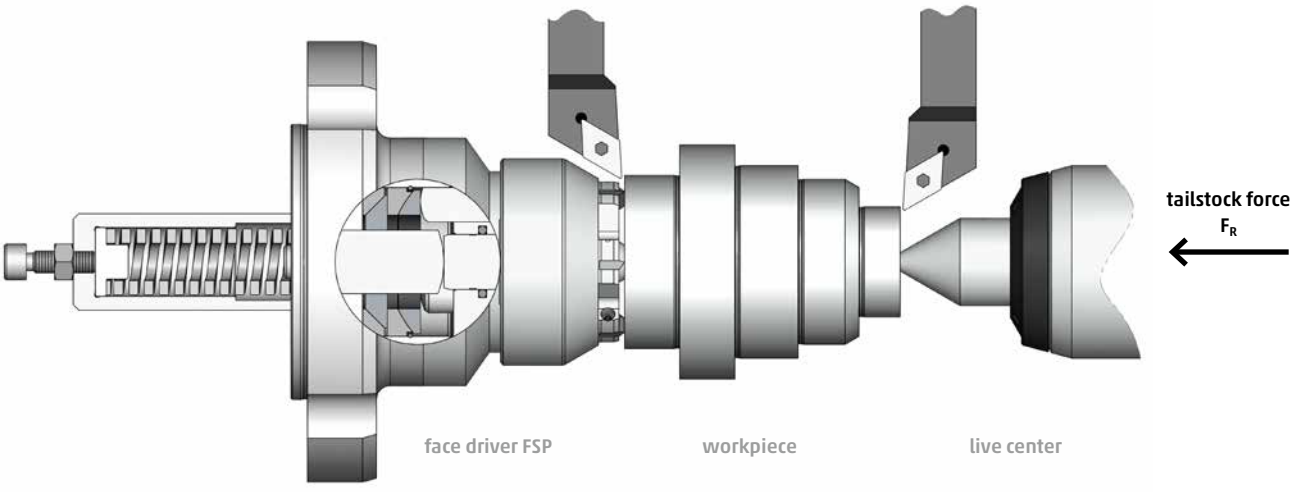
The drive disk is "floatingly" suspended, thus balancing out possible planarity defects of the contact surface of the workpiece.

The entire surface of the workpiece can now be tooled in one single clamping. See page 40 for data of achievable removal of material and the tailstock thrust requested.

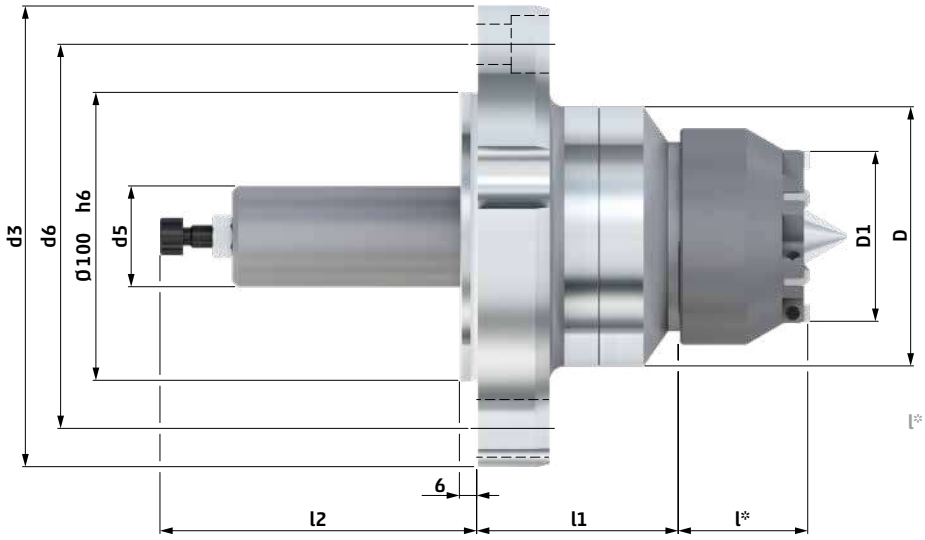
You will find various sizes of face drivers with appropriate standard drive disks and center pins on the following pages.

In case you need special dimensions, we will be glad to design clamping devices suitable for your workpieces.

Type FSP with flange retainer



Technical data – type FSP face driver · for screw connection



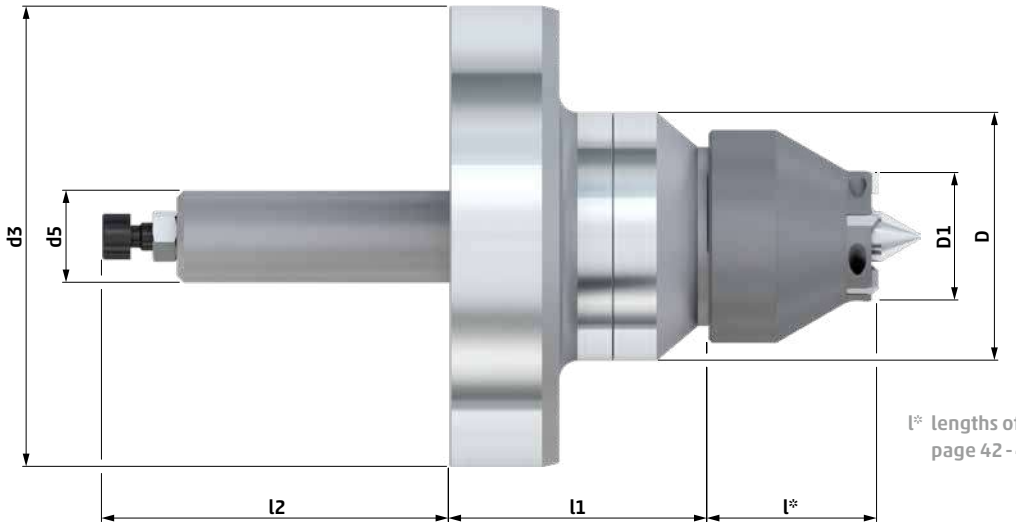
l* lengths of drive disk see page 42 - 43

type FSP	D	D1	d3	d5	d6	l1	l2	fixing screws type	fixing screws pcs	max. workpiece weight [kg] *	cat. no.
1	56	9 - 31	160	26	133.4	67	83	M12	3	25	**631 99**
3	70	14 - 59	160	26	133.4	67	104	M12	3	90	**632 01**
4	90	31 - 125	160	35	133.4	70	110	M12	3	250	**632 03**
55	182	84 - 290	220	45	171.4	76	170	M16	3	1500	**632 05**

- All face drivers are provided without drive disk and without center pin. (changeable parts see page 42 - 45)
- Mounting elements for face drivers see page 104 - 97.

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

Technical data – type FSPB face driver · for jaw clamping



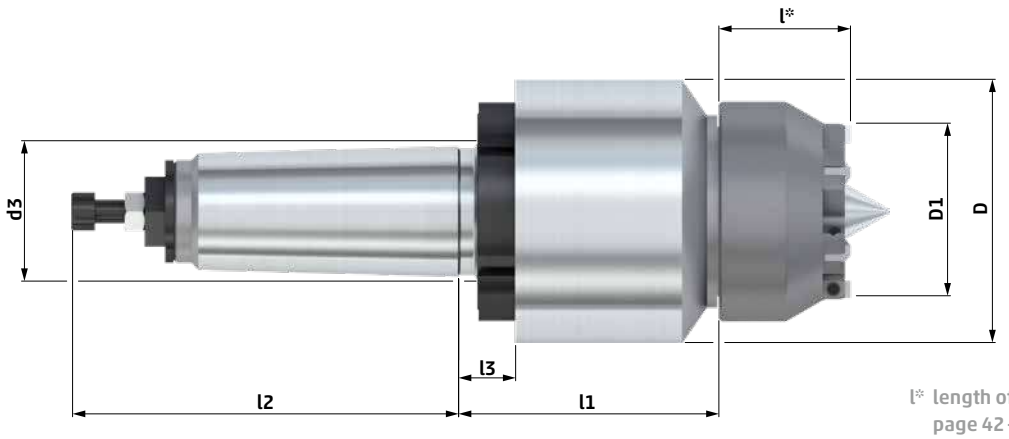
l* lengths of drive disk see page 42 - 43

type FSPB	D	D1	d3	d5	l1	l2	max. workpiece weight [kg] *	cat. no.
1	56	9 - 31	130	26	73	77	25	**632 00**
3	70	14 - 59	130	26	73	98	90	**632 02**
4	90	31 - 125	130	35	76	104	250	**632 04**

- All face drivers are provided without drive disk and without center pin. (changeable parts see page 42 - 45)

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

Technical data – type SP face driver



l* length of drive disk see page 42 - 43

type SP	MK	D	D1	d3	l1	l2	l3	max. workpiece weight [kg] *	cat. no.
1	3	56	9 - 31	M28 x 1.5	60	56	16	25	**632 57**
	4	56	9 - 31	M35 x 1.5	61	74	18	25	**632 58**
	5	56	9 - 31	M48 x 1.5	63	97	20	25	**632 59**
3	4	70	14 - 59	M35 x 1.5	78	74	17.5	90	**632 60**
	5	70	14 - 59	M48 x 1.5	78	97	19.5	90	**632 61**
4	5	90	31 - 125	M48 x 1.5	89	97	19.5	250	**632 62**
	6	90	31 - 125	M70 x 1.5	87	134	22	250	**632 63**

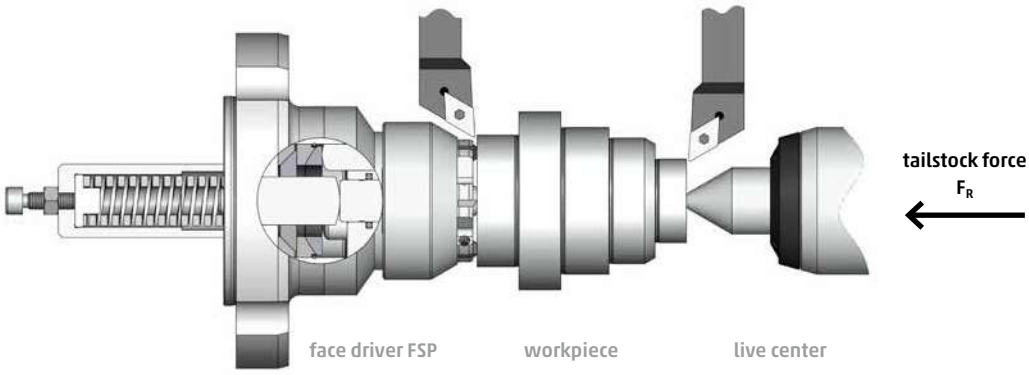
* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are provided without drive disk and without center pin. (changeable parts see page 42 - 45)
- Reducing sleeves for face drivers see page 112 - 113.
- Face driver with cylindrical shank upon request.

Face Drivers FSP / FSPB / SP · Calculations

max. chip cross section of metal removing

PRINCIPLE: The tailstock force pushes the workpiece against the movable center pin of the face driver. The center pin will draw back until the surface of the workpiece bears against the drive dik.



- **tailstock force F_R:**
  The force onto the face driver required for metal removing is calculated on the basis of the empirical formula:

$$F_R = [(q_{max} \times 1000 \times \frac{D}{d}) + 1000] \times m$$

F_R	[N]	tailstock force
q_{max}	[mm²]	maximum of chip cross section for matal removing
D	[mm]	cutting diameter
d	[mm]	clamping diameter
m	[-]	material factor (see adjustment-chart below)
a	[mm]	depth of cut
f	[mm/1]	feed rate

- **maximum chip cross section q_{max}:**
  At a given tailstock force, maximum chip cross section is calculated as follows:

$$q_{max} = \frac{\frac{F_R}{m} - 1000}{1000 \times \frac{D}{d}}$$

- **depth of cut a:**

$$a = \frac{q_{max}}{f}$$

NOTE FSPV / FSPBV / SPV:
When using the face driver type SPV/FSPV/FSPBV, the calculated machining chip cross section qmax must be reduced by 20%.

EXPLANATORY NOTES: The calculations refer to tooling against the face driver. In case of tooling against tailstock the calculated chip cross section is reduced by approx. 40 %. The first chip, however, should always be machined toward the face driver, in order to achieve an ideal penatration of the carbide inserts. The ratio D / d should not exceed 2, otherwise it would work inefficiently.

Material factor m adjustment chart:

material factor m	**1.4**	**1.2**	**1.1**	**1.0**	**0.8**
Rm [N / mm²]	1000	800	700	600	400
examples	42CrMo4	16MnCr5	C 15E (Ck 15)	S355J0	S235J0
		25CrMo4	C 45E (Ck 45)	35S20	

Chisel load of the carbide inserts

Keep the chisel load within the following range:
250 - 350 N per mm chisel length

- **the chisel load is calculated as follows:**

$$BS = \frac{F_R}{n \times s}$$

BS	[N / mm]	chisel load
F_R	[N]	tailstock force
n	[-]	number of carbide inserts
s	[mm]	chisel length

EXEMPLIFICATION: turning with FSP 3 facé driver, 5 carbide inserts, respective length of chisel 4 mm, tailstock force 6000 N

$$BS = \frac{6000\ N}{5 \times 4\ mm} = 300\ \frac{N}{mm}$$

CALCULATION EXAMPLE for type FSP / FSPB / SP

Specific data of machine and workpiece:
maximum tailstock force: 6000 N
material of the workpiece: 16MnCr5
diameter of the workpiece,
side of face driver: Ø 30 mm
turning diameter: Ø 50 mm

Selection of face driver:
face driver FSP 3 / clamping Ø 26 mm
5 carbide inserts, respective length of chisel 4 mm

- **tailstock force F_R:**
  In order to ensure sufficient entrainment (see chisel load of carbide inserts) a tailstock force of approx. 6000 N has to be supplied.

$$BS = \frac{F_S}{n \times s}$$

$$F_R = 300\ \frac{N}{mm} \times 5 \times 4\ mm = 6000\ N$$

Determination of material factor m:
as per adjustment chart material factor: m (16MnCr5) = 1.2

- **maximum chip cross section q_{max}:**
  The maximum chip cross section (at the ultimate turning-Ø) is calculated as follows:

$$q_{max} = \frac{\frac{6000\ N}{1.2} - 1000}{1000 \times \frac{50\ mm}{26\ mm}} = 2.08\ mm^2$$

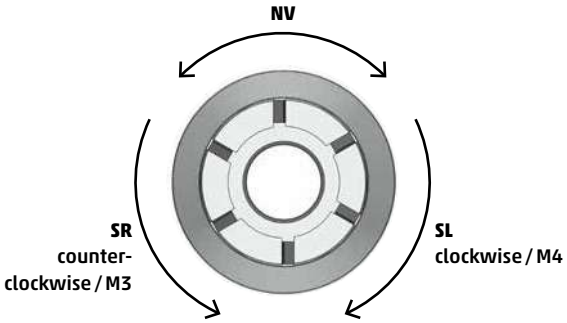
EXPLANATORY NOTES: This calculation refers to tooling against the face driver. The calculated chip cross section refers to the ultimate turning diameter. In case of further tooling towards the axis of rotation of the workpiece, even larger chip cross sections can be achieved (» formula), commensurate with turning diameter.

Drive Disks FSP / FSPB / SP · Chisel NV / SL / SR

with changeable carbide inserts or made of tool steel for torque transmission onto the workpiece for the purpose of soft/green tooling

Type FSP / FSPB / SP · chisel NV / SL / SR

view from tailstock onto the face driver

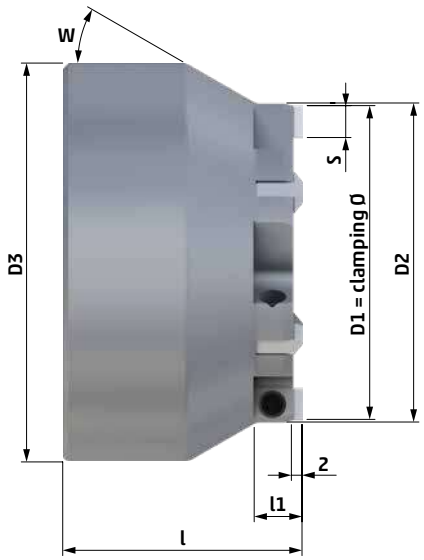


SL (carbide)

NV (tool steel)

SR (carbide)

Technical data – type FSP / FSPB / SP · chisel NV / SL / SR



TYPE CHISEL NV
for tooling
direction M4 and M3

for type FSP / FSPB / SP	D1	D2	D3	l	l1	W	number of chisels	S	F_R (N)	cat. no.
	9	9	42	32	5	45°	4 (tool steel)	1.5	1800	**738 15**
	11	11	42	32	5	45°	4 (tool steel)	2.0	2400	**738 16**
	14	14	42	32	5	35°	4 (tool steel)	2.0	2400	**738 17**
1	18	18	42	32	5	35°	3 (tool steel)	3.0	2700	**738 18**
	22	22	42	29	5	30°	3 (tool steel)	3.5	3200	**738 19**
	26	26	42	29	5	30°	3 (tool steel)	4.0	3600	**738 20**
	31	31	42	29	5	30°	3 (tool steel)	5.0	4500	**738 21**
3	14	14	60	57	5	35°	6 (tool steel)	2.5	4500	**738 02**
	18	18	60	57	5	30°	6 (tool steel)	3	5400	**738 03**

TYPE CHISEL SL
for tooling
direction M4

TYPE CHISEL SR
for tooling
direction M3

for type FSP / FSPB / SP	D1	D2	D3	l	l1	W	number of chisels	S	F_R (N)	cat. no.	cat. no.
	22	24	60	57	9	30°	5 (carbide)	4	6000	**738 04**	**738 24**
	26	28	60	53	9	30°	5 (carbide)	4	6000	**738 05**	**738 25**
	31	33	60	48	9	30°	6 (carbide)	4	7200	**738 06**	**738 26**
3	36	37	60	48	9	30°	5 (carbide)	6	9000	**738 07**	**738 27**
	39	40	60	48	9	30°	5 (carbide)	6	9000	**738 08**	**738 28**
	44	45	60	48	9	30°	6 (carbide)	6	10800	**738 09**	**738 29**
	49	50	60	48	9	30°	6 (carbide)	6	10800	**738 10**	**738 30**
	59	60	60	48			6 (carbide)	6	10800	**738 11**	**738 31**
	31	33	75	50	9	45°	6 (carbide)	4	7200	**738 40**	**738 60**
	36	38	75	50	9	38°	6 (carbide)	4	7200	**738 41**	**738 61**
	39	41	75	45	9	45°	6 (carbide)	4	7200	**738 42**	**738 62**
	44	45	75	45	9	38°	6 (carbide)	6	10800	**738 43**	**738 63**
	49	50	75	45	9	30°	6 (carbide)	6	10800	**738 44**	**738 64**
4	59	60	75	45	9	30°	6 (carbide)	6	10800	**738 45**	**738 65**
	69	70	75	45	9	30°	6 (carbide)	6	10800	**738 46**	**738 66**
	84	85	75	45	-	-	6 (carbide)	6	10800	**738 47**	**738 67**
	99	100	75	45	-	-	6 (carbide)	6	10800	**738 48**	**738 68**
	110	111	75	45	-	-	7 (carbide)	6	12600	**738 49**	**738 69**
	125	126	75	45	-	-	7 (carbide)	6	12600	**738 50**	**738 70**
	84	85	160	69	9	45°	6 (carbide)	6	10800	**738 80**	**739 00**
	99	100	160	69	9	38°	6 (carbide)	6	10800	**738 81**	**739 01**
	110	111	160	69	9	30°	7 (carbide)	6	12600	**738 82**	**739 02**
	125	126	160	69	9	30°	7 (carbide)	6	12600	**738 83**	**739 03**
	140	141	160	69	9	30°	8 (carbide)	6	14400	**738 84**	**739 04**
55	155	156	160	69	9	30°	8 (carbide)	6	14400	**738 85**	**739 05**
	170	171	160	69	-	-	8 (carbide)	6	14400	**738 86**	**739 06**
	195	196	160	69	-	-	8 (carbide)	6	14400	**738 87**	**739 07**
	230	231	160	69	-	-	7 (carbide)	10	21000	**738 88**	**739 08**
	260	261	160	69	-	-	8 (carbide)	10	24000	**738 89**	**739 09**
	290	291	160	69	-	-	8 (carbide)	10	24000	**738 90**	**739 10**

- All drive disks of type carbide will be provided with the respective carbide inserts.
- Additional clamping diameters of drive disks upon request.

Changeable inserts for drive disks FSP / FSPB / SP

Technical data – changeable inserts · drive disks FSP / FSPB / SP

CARBIDE INSERTS

for type FSP / FSPB / SP	machining direction	S	cat. no.
3	SL / SR	4	736 548
4			
3	SL / SR	6	736 550
4			
55			
55	SL / SR	10	736 552

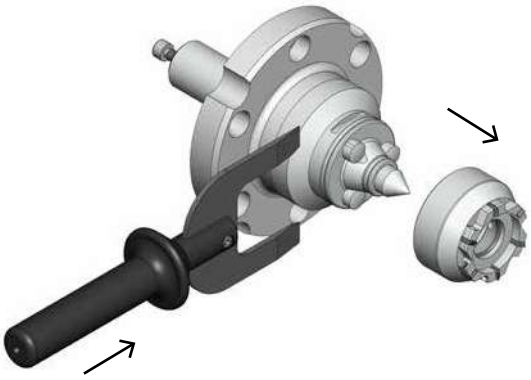
SET SCREW

for fixing carbide inserts

for carbide inserts with S =	thread	cat. no.
4	M4	736 549
6	M5	736 551
10	M5	

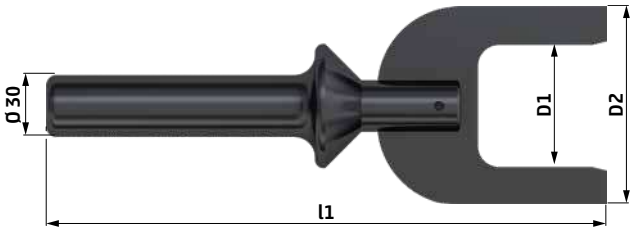
Removal lever for drive disks FSP / FSPB / SP

In order to easily and quickly change the drive disks, the removal lever shown at right may be used.



The removal lever is placed laterally and easily inserted. Thus the drive disk can be loosened through a tilting movement.

Technical data – removal lever



for type FSP / FSPB / SP	D1	D2	l1	cat. no.
1	33	60	260	632 19
3	44.5	80	262	632 20
4	58.5	96	272	632 21
55	130.5	190	310	632 22

INFORMATION FOR CHANGING THE DRIVE DISKS

In order to exclude the risk of injury, we recommend to use suitable gloves for changing drive disks. We can provide a mounting aid upon request.

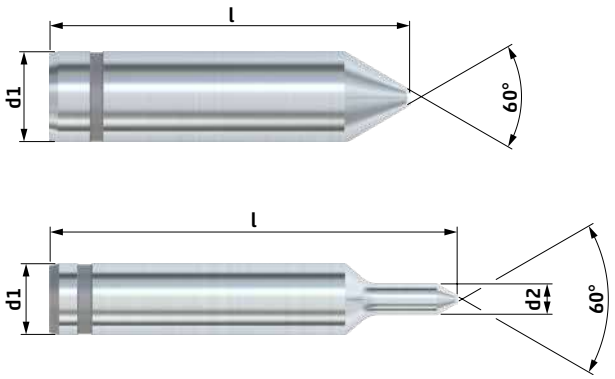
The drive disks can be pulled off head side. We recommend the use of a removal lever in order to reduce the force required and provide increased safety.

Center Pins FSP / FSPB / SP

for face drivers FSP / FSPB / SP with movable center pin

Type FSP / FSPB / SP · center pin

Technical data – type FSP / FSPB / SP · center pin



for type FSP / FSPB / SP	d1	center Ø	clamping Ø	d2	l	cat. no.
1	8	2 - 4.5	9	4.5	44.5	**735 25**
		2 - 5.5	11	5.5	44.5	**735 26**
		3 - 8	14 - 18	-	49	**735 27**
		3 - 8	22 - 31	-	46	**735 28**
3	14	3 - 7	14	7	81.5	**735 52**
		3 - 10	18	10	84.5	**735 53**
		3 - 11	22	11	85.5	**735 54**
		3 - 10	26	-	81	**735 55**
		3 - 10	31 - 59	-	76	**735 56**
		7 - 14	31 - 59	-	78.5	**735 57**
4	20	3 - 13	31 - 36	-	80.5	**735 70**
		3 - 13	39 - 125	-	75.5	**735 71**
		10 - 20	39 - 125	-	80	**735 72**
55	35	10 - 20	84 - 290	28	113	**735 80**
		18 - 28	84 - 290	-	118	**735 81**
		25 - 35	84 - 290	-	123	**735 82**

■ Further center pins for other center holes upon request.

Changeable Parts OX for Tensile Samples OBXS / OBX / OCX

in combination with the face driver types FSP1 / FSPB1 / SP1 (page 36 - 41)

In combination with the face driver types FSP1 / FSPB1 / SP1, the machining of tensile samples can be realized in one clamping operation, by simply mounting an OX retainer, an OX drive disk and an OX center pin.

With different changeable OX retainers, the robust OX drive disks of sizes OBXS, OBX and OCX can be used.

These face drivers are power-operated by the thrust of the tailstock. Workpieces are clamped centrically using a movable center pin.

This way different centerings can be adjusted, thus ensuring a constant datum-point at the face end of the workpiece.

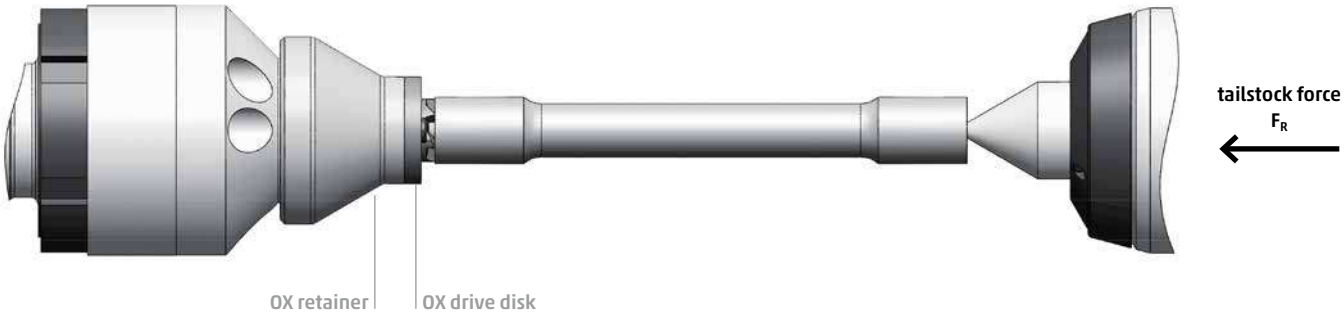
OX · retainer

OX · drive disk

NEIDLEIN face drivers FSP1 / FSPB1 / SP1 combined with OX changeable parts ensure:

- robust and changeable OX drive disks
- high cutting performance even with low tailstock force
- compensating OX retainer for uneven face sides on the tensile samples
- easy setup of the OX retainer
- easy setup of the OBXS / OBX / OCX drive disks
- wide range of clamping diameters
- run-out deviation in the process 0.02 - 0.1 mm

Type OBXS / OBX / OCX · tensile samples manufacturing

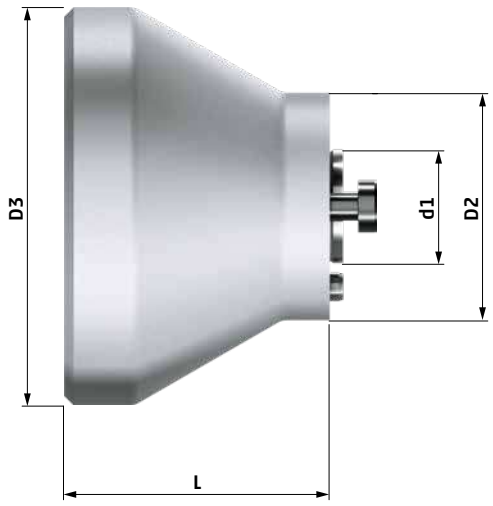


face driver SP 1 | tensile samples | live center

OX retainer

for retaining the drive disks OBX / OBXS / OCX

Technical data – type OBXS / OBX / OCX · retainer

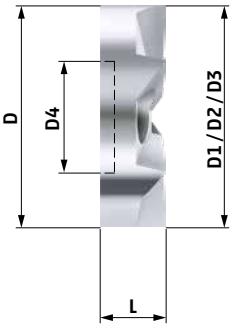


type	d1	D2	D3	L	cat. no.
OBXS / OBX	12	24	42	28	**738 22**
OCX	19	34	42	21	**738 23**

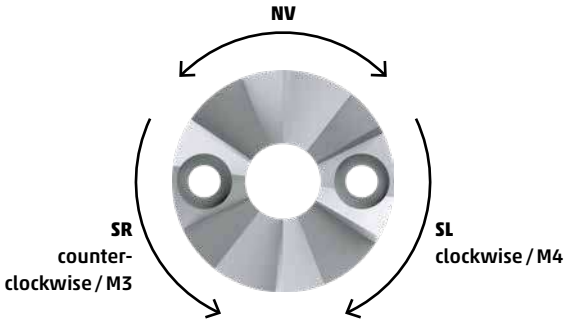
Drive Disks OBXS / OBX / OCX

for torque transmission onto the workpiece when preparing tensile samples

Technical data – type OBXS / OBX / OCX · drive disks



view from tailstock onto the face driver

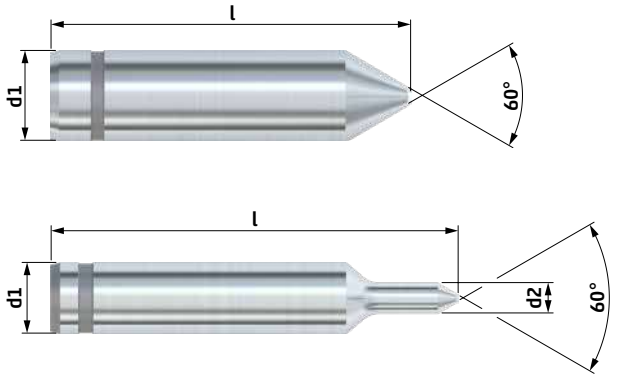


type	machining direction	D	D4	D1	D2	D3	L	cat. no.
		24	12	9			7	**717 01**
	SR	24	12		14		7	**717 02**
		24	12			19	7	**717 03**
		24	12	9			7	**717 04**
OBXS	SL	24	12		14		7	**717 05**
		24	12			19	7	**717 06**
		24	12	9			7	**717 07**
	NV	24	12		14		7	**717 08**
		24	12			19	7	**717 09**
		24	12	14			7	**717 10**
	SR	24	12		19		7	**717 11**
		24	12			24	7	**717 12**
		24	12	14			7	**717 13**
OBX	SL	24	12		19		7	**717 14**
		24	12			24	7	**717 15**
		24	12	14			7	**717 16**
	NV	24	12		19		7	**717 17**
		24	12			24	7	**717 18**
		34	19	19			9	**717 19**
	SR	34	19		27		9	**717 20**
		34	19			34	9	**717 21**
		34	19	19			9	**717 22**
OCX	SL	34	19		27		9	**717 23**
		34	19			34	9	**717 24**
		34	19	19			9	**717 25**
	NV	34	19		27		9	**717 26**
		34	19			34	9	**717 27**

Center Pins OX

Type OX · center pin

Technical data – type OX · center pin



type	d1	center Ø	d2	l	cat. no.
OBXS	8	2 - 5	5	48	**735 30**
OBX	8	2 - 6	6	49	**735 29**
OCX	8	2 - 8	-	46	**735 28**

Face Drivers FSPV / FSPBV / SPV

with drive disk and movable center pin

The entire sur face of the workpiece can be tooled and finished by clamping with a maximum of torque transmission.

NEIDLEIN face drivers of t ype FSPV / FSPBV / SPV with drive disks are mechanical clamping systems for **turn-milling processes**, which are suited for soft / green as well as heavy tooling. In application, they feature maximum flexibilit y and high robustness.

These face drivers are power-operated by the thrus t of the tailstock. Workpieces are clamped centrically using a movable center pin. This way different centerings can be adjusted, thus ensuring a constant datum-point at the face end of the workpiece.

Type FSPV with flange retainer

Type FSPV is mounted onto the machine spindle nose using a fl ange adapter.

Type FSPBV with flange retainer for jaw clamping

Type FSPBV is directly clamped with the chuck using soft using soft jaws soft jaws.

Type SPV with taper shank

Type SPV with taper shank and extracting nut for fast mounting into the machine spindle.

NEIDLEIN face drivers FSPV / FSPBV / SPV ensure:

- radial, almost backlash-free driving
- datum-point at the face end of the workpiece, stable datum-point in case of different centerings
- compensating drive disk for uneven face sides
- high flexibility in the application, wide range of clamping diameters
- run-out deviation in the process 0.015 - 0.02 mm
- adjustable spring force (depending on the weight of the workpiece)
- low setup costs due to fast change of drive disks and center pins
- cost efficient exchange of parts that are in contact with the workpiece (changeable carbide inserts)
- fixed center pin in clamped condition » fixed clamping point

Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the movable center pin of the face driver. The center pin will draw back until the surface of the workpiece bears against the drive disk.

In this state the clamping bolt is clamped over the power flow, in order to ensure a fixed datum-point throughout the entire tooling process.

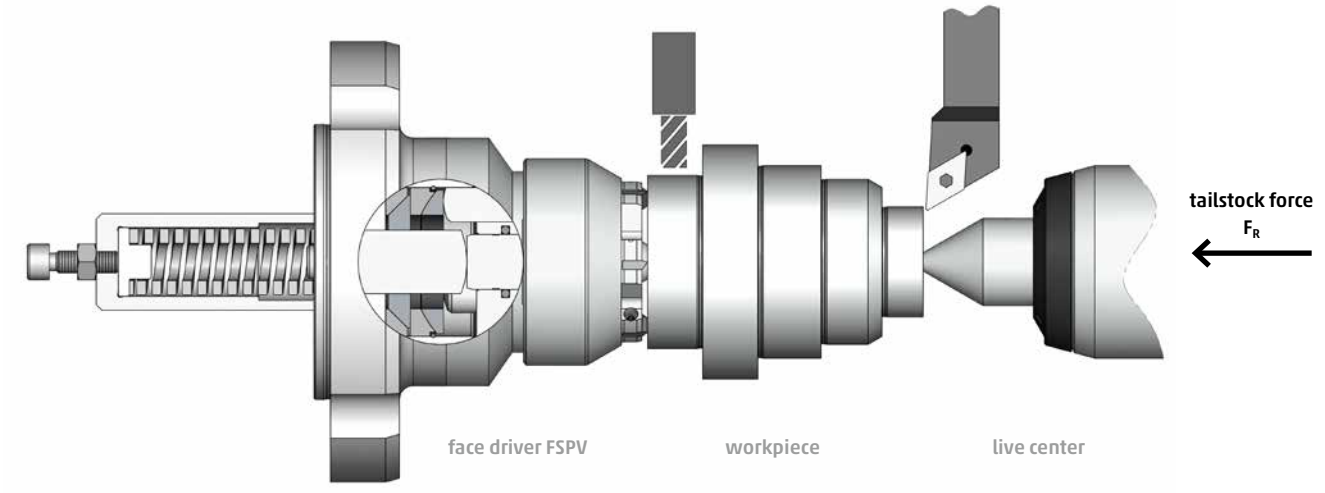
The drive disk is "floatingly" suspended, thus balancing out possible planarity defects of the contact surface of the workpiece.

The entire surface of the workpiece can now be tooled in one single clamping. See page 41 for data of achievable removal of material and the tailstock thrust requested.

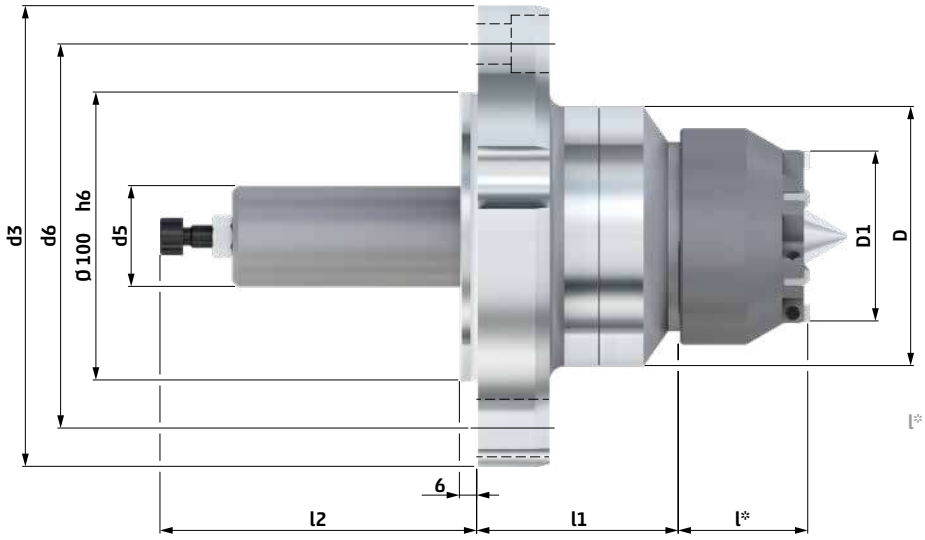
You will find various sizes of face drivers with appropriate standard drive disks and center pins on the following pages.

In case you need special dimensions, we will be glad to design clamping devices suitable for your workpieces.

Type FSPV with flange retainer



Technical data – type FSPV face driver · for screw connection



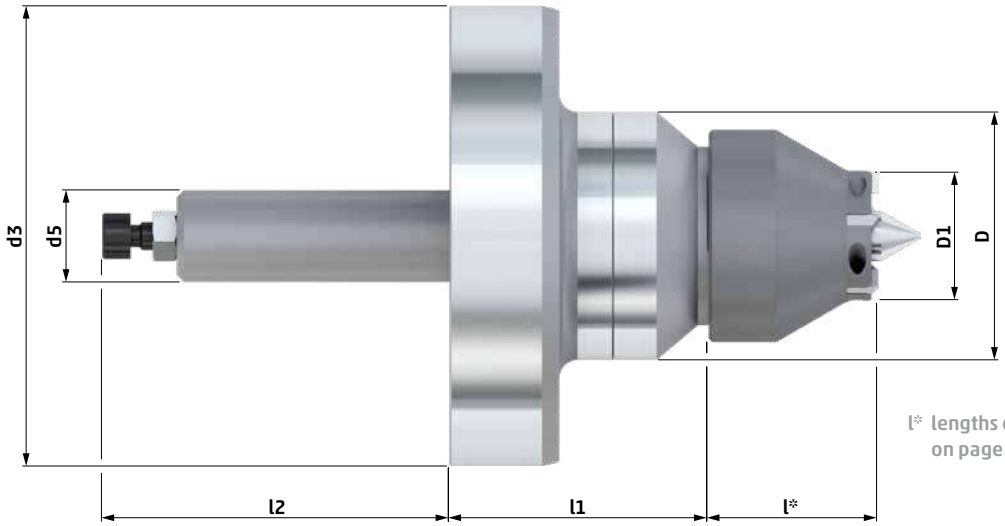
l* lengths of drive disk see on page 54 - 55

type FSPV	D	D1	d3	d5	d6	l1	l2	fixing screws type	fixing screws pcs	max. workpiece weight [kg] *	cat. no.
1	56	9 - 31	160	26	133.4	67	83	M12	3	25	**632 09**
3	70	14 - 59	160	26	133.4	67	104	M12	3	90	**632 11**
4	90	31 - 125	160	35	133.4	70	110	M12	3	250	**632 13**
55	182	84 - 290	220	45	171.4	76	170	M16	3	1500	**632 15**

- All face drivers are provided without drive disk and without center pin. (drive disks at page 54 - 55, center pins see page 57)

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

Technical data – type FSPBV face driver · for jaw clamping



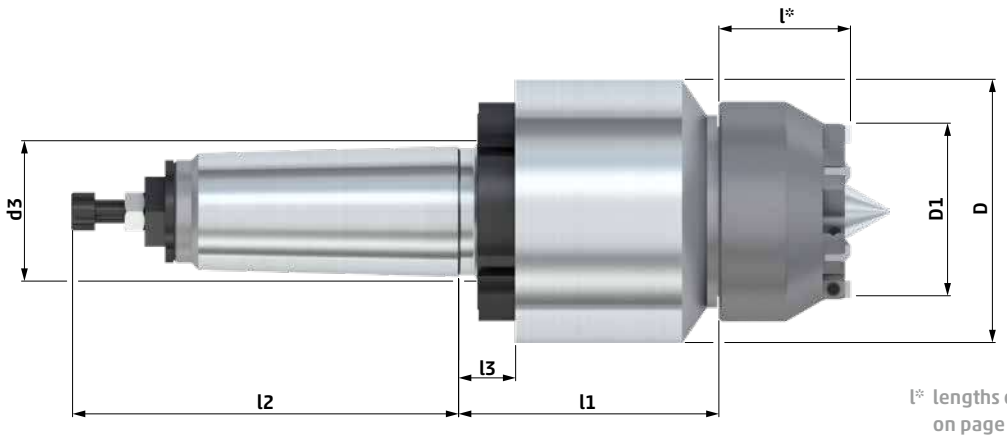
l* lengths of drive disk see on page 54 - 55

type FSPBV	D	D1	d3	d5	l1	l2	max. workpiece weight [kg] *	cat. no.
1	56	9 - 31	130	26	73	77	25	**632 10**
3	70	14 - 59	130	26	73	98	90	**632 12**
4	90	31 - 125	130	35	76	104	250	**632 14**

- All face drivers are provided without drive disk and without center pin. (drive disks at page 54 - 55, center pins see page 57)

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

Technical data – type SPV face driver



l* lengths of drive disk see on page 54 - 55

type SPV	MK	D	D1	d3	l1	l2	l3	max. workpiece weight [kg] *	cat. no.
1	3	56	9 - 31	M28 x 1.5	60	56	16	25	**632 70**
	4	56	9 - 31	M35 x 1.5	61	74	18	25	**632 71**
	5	56	9 - 31	M48 x 1.5	63	97	20	25	**632 72**
3	4	70	14 - 59	M35 x 1.5	125	106	17.5	90	**632 65**
	5	70	14 - 59	M48 x 1.5	125	129	19.5	90	**632 66**
4	5	90	31 - 125	M48 x 1.5	134	132	19.5	250	**632 67**
	6	90	31 - 125	M70 x 1.5	134	169	22	250	**632 68**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

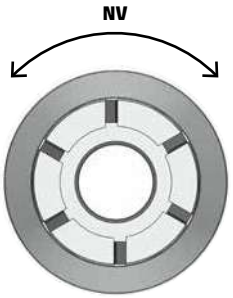
- All face drivers are provided without drive disk and without center pin. (drive disks on page 54 - 55, center pins see page 57)
- Reducing sleeves for face drivers see page 112 - 113.

Drive disks FSPV / FSPBV / SPV · Chisel NV

with changeable carbide inserts or made of tool steel
for torque transmission onto the workpiece
for the purpose of soft / green tooling

Type FSPV / FSPBV / SPV · Chisel NV

view from tailstock onto the face driver

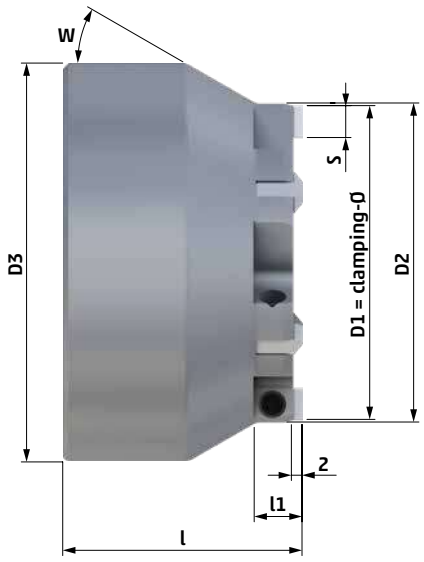


NV (tool steel)

D1 = 9 - 31 · type 1
D1 = 14 - 18 · type 3

NV (carbide)

Technical data – type FSPV / FSPBV / SPV · chisel NV



TYPE CHISEL NV
for tooling direction M4 and M3
(tool steel)

for type FSPV / FSPBV / SPV	D1	D2	D3	l	l1	W	number of chisels	S	F_R (N)	cat. no.
	9	9	42	32	5	45°	4 (tool steel)	1.5	1800	**739 80**
	11	11	42	32	5	45°	4 (tool steel)	2.0	2400	**739 81**
	14	14	42	32	5	35°	4 (tool steel)	2.0	2400	**739 82**
1	18	18	42	32	5	35°	3 (tool steel)	3.0	2700	**739 83**
	22	22	42	29	5	30°	3 (tool steel)	3.5	3200	**739 84**
	26	26	42	29	5	30°	3 (tool steel)	4.0	3600	**739 85**
	31	31	42	29	5	30°	3 (tool steel)	5.0	4500	**739 86**
3	14	14	60	57	5	35°	6 (tool steel)	2.5	4500	**739 22**
	18	18	60	57	5	30°	6 (tool steel)	3	5400	**739 23**

TYPE CHISEL NV
for tooling direction M4 and M3
(carbide)

for type FSPV / FSPBV / SPV	D1	D2	D3	l	l1	W	number of chisels	S	F_R (N)	cat. no.
	22	24	60	57	9	30°	5 (carbide)	4	6000	**739 24**
	26	28	60	53	9	30°	5 (carbide)	4	6000	**739 25**
	31	33	60	48	9	30°	6 (carbide)	4	7200	**739 26**
	36	37	60	48	9	30°	5 (carbide)	6	9000	**739 27**
3	39	40	60	48	9	30°	5 (carbide)	6	9000	**739 28**
	44	45	60	48	9	30°	6 (carbide)	6	10800	**739 29**
	49	50	60	48	9	30°	6 (carbide)	6	10800	**739 30**
	59	60	60	48	-	-	6 (carbide)	6	10800	**739 31**
	31	33	75	50	9	45°	6 (carbide)	4	7200	**739 40**
	36	38	75	50	9	38°	6 (carbide)	4	7200	**739 41**
	39	41	75	45	9	45°	6 (carbide)	4	7200	**739 42**
	44	45	75	45	9	38°	6 (carbide)	6	10800	**739 43**
	49	50	75	45	9	30°	6 (carbide)	6	10800	**739 44**
4	59	60	75	45	9	30°	6 (carbide)	6	10800	**739 45**
	69	70	75	45	9	30°	6 (carbide)	6	10800	**739 46**
	84	85	75	45	-	-	6 (carbide)	6	10800	**739 47**
	99	100	75	45	-	-	6 (carbide)	6	10800	**739 48**
	110	111	75	45	-	-	7 (carbide)	6	12600	**739 49**
	125	126	75	45	-	-	7 (carbide)	6	12600	**739 50**
	84	85	160	69	9	45°	6 (carbide)	6	10800	**739 60**
	99	100	160	69	9	38°	6 (carbide)	6	10800	**739 61**
	110	111	160	69	9	30°	7 (carbide)	6	12600	**739 62**
	125	126	160	69	9	30°	7 (carbide)	6	12600	**739 63**
	140	141	160	69	9	30°	8 (carbide)	6	14400	**739 64**
55	155	156	160	69	9	30°	8 (carbide)	6	14400	**739 65**
	170	171	160	69	-	-	8 (carbide)	6	14400	**739 66**
	195	196	160	69	-	-	8 (carbide)	6	14400	**739 67**
	230	231	160	69	-	-	7 (carbide)	10	21000	**739 68**
	260	261	160	69	-	-	8 (carbide)	10	24000	**739 69**
	290	291	160	69	-	-	8 (carbide)	10	24000	**739 70**

■ Additional clamping diameters of drive disks upon request.

Changeable inserts for drive disks FSP(V) / FSPB(V) / SP(V)

Technical data – changeable inserts · drive disks FSPV / FSPBV / SPV

CARBIDE INSERTS

for type FSPV / FSPBV / SPV	machining direction	S	cat. no.
3	NV	4	736 558
4			
3	NV	6	736 560
4			
55			
55	NV	10	736 562

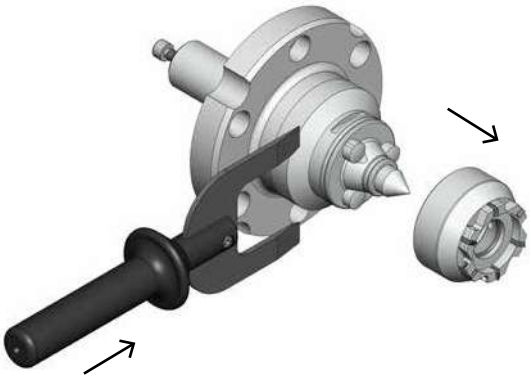
SET SCREW

for fixing carbide inserts

for carbide inserts with S =	thread	cat. no.
4	M4	736 549
6	M5	736 551
10	M5	

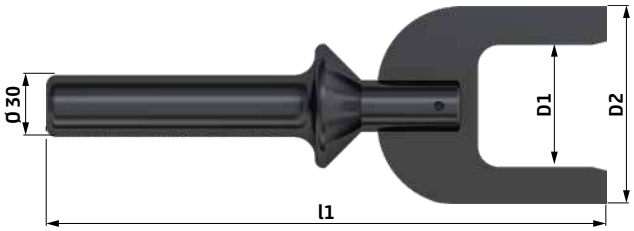
Removal lever for drive disks FSP(V) / FSPB(V) / SP(V)

In order to easily and quickly change the drive disks, the removal lever shown at right may be used.



The removal lever is placed laterally and easily inserted. Thus the drive disk can be loosened through a tilting movement.

Technical data – removal lever



for type FSPV / FSPBV / SPV	D1	D2	l1	cat. no.
1	33	60	260	632 19
3	44.5	80	262	632 20
4	58.5	96	272	632 21
55	130.5	190	310	632 22

INFORMATION FOR CHANGING THE DRIVE DISKS

In order to exclude the risk of injury, we recommend to use suitable gloves for changing drive disks. We can provide a mounting aid upon request.

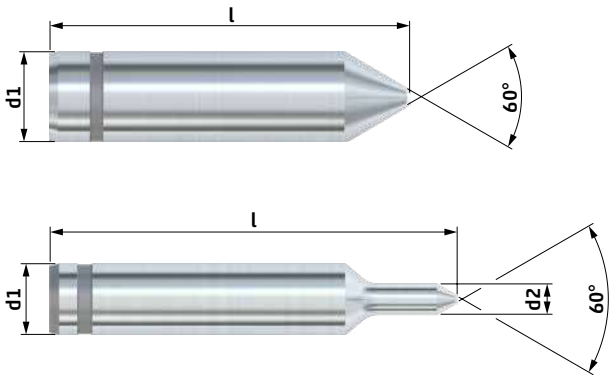
The drive disks can be pulled off head side. We recommend the use of a removal lever in order to reduce the force required and provide increased safety.

Center Pins FSP(V) / FSPB(V) / SP(V)

for face drivers FSP(V) / FSPB(V) / SP(V) with movable center pin

Type FSP(V) /FSPB(V) / SP(V) · center pin

Technical data – type FSP(V) /FSPB(V) / SP(V) · center pin



for type FSP(V) / FSPB(V) / SP(V)	d1	center Ø	clamping Ø	d2	l	cat. no.
1	8	2 - 4.5	9	4.5	44.5	**735 25**
		2 - 5.5	11	5.5	44.5	**735 26**
		3 - 8	14 - 18	-	49	**735 27**
		3 - 8	22 - 31	-	46	**735 28**
3	14	3 - 7	14	7	81.5	**735 52**
		3 - 10	18	10	84.5	**735 53**
		3 - 11	22	11	85.5	**735 54**
		3 - 10	26	-	81	**735 55**
		3 - 10	31 - 59	-	76	**735 56**
		7 - 14	31 - 59	-	78.5	**735 57**
4	20	3 - 13	31 - 36	-	80.5	**735 70**
		3 - 13	39 - 125	-	75.5	**735 71**
		10 - 20	39 - 125	-	80	**735 72**
55	35	10 - 20	84 - 290	28	113	**735 80**
		18 - 28	84 - 290	-	118	**735 81**
		25 - 35	84 - 290	-	123	**735 82**

■ Further center pins for other center holes upon request.

Face Drivers FFP

with drive disk and fixed center pin for high true run accuracy

The entire surface of the workpiece can be tooled and finished by clamping with a maximum of torque transmission.

NEIDLEIN face drivers of type FFP with drive disks are mechanical clamping systems which are suited **for turning as well as for hard turning operations and can also be used for grinding operations.**

Face drivers of the type FFP are power operated on the side of the machine spindle as well as the side of the tailstock. The workpieces are clamped centrically by the fixed center pin. This operation results in high true run accuracy.

Type FFP with flange retainer for screw connection

The face driver FFP is designed for a direct mounting onto a spindle nose. **DIN 702-1 (55028)**

NEIDLEIN face drivers FFP ensure:

- a maximum of torque transmission, thus achieving a high cutting performance
- datum-point location in the center of the workpiece ensures constant measures of length
- compensating drive disk for uneven face sides
- high flexibility in the application, wide range of clamping diameters
- run-out deviation in the process 0.005 - 0.015 mm
- low setup costs due to fast change of drive disks and center pins
- cost efficient exchange of parts that are in contact with the workpiece (changeable carbide inserts)
- suitable changeable parts depending on the hardness of the workpiece

Clamping principle

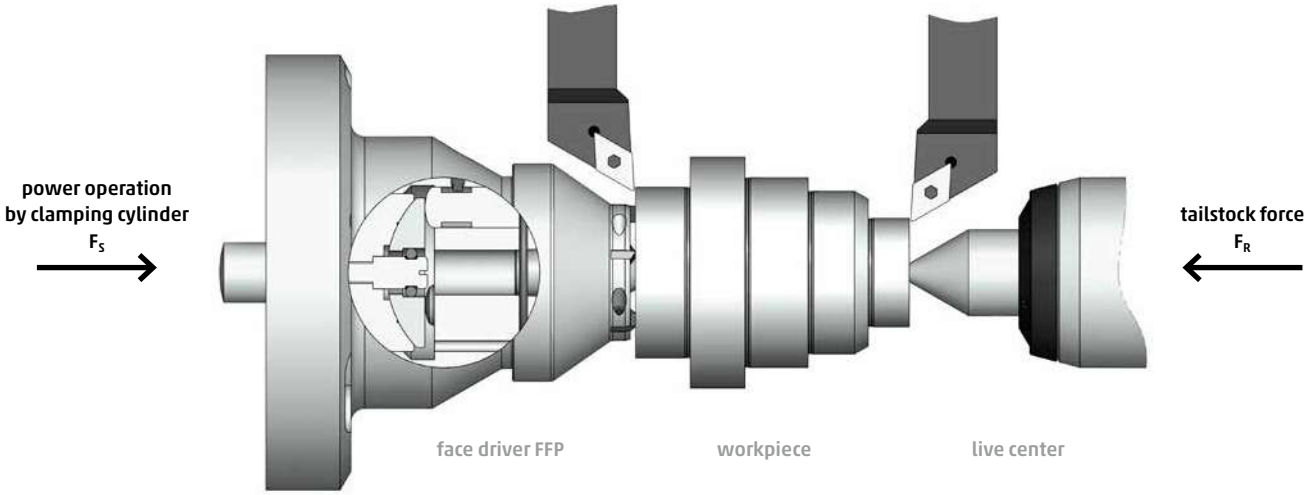
The center pin located on the side of the tailstock pushes the workpiece against the fixed center pin of the face driver. The motion of the drive disk against the workpiece face side is initiated by the clamping cylinder mounted into the machine. The drive disk is "floatingly" suspended, thus balancing out possible planarity defects of the contact surface of the workpiece. The datum-point of workpieces on the machine is determined by the size of the center hole.

The entire surface of the workpiece can now be tooled in one single clamping. See page 61 for data of cutting performance and the clamping forces requested.

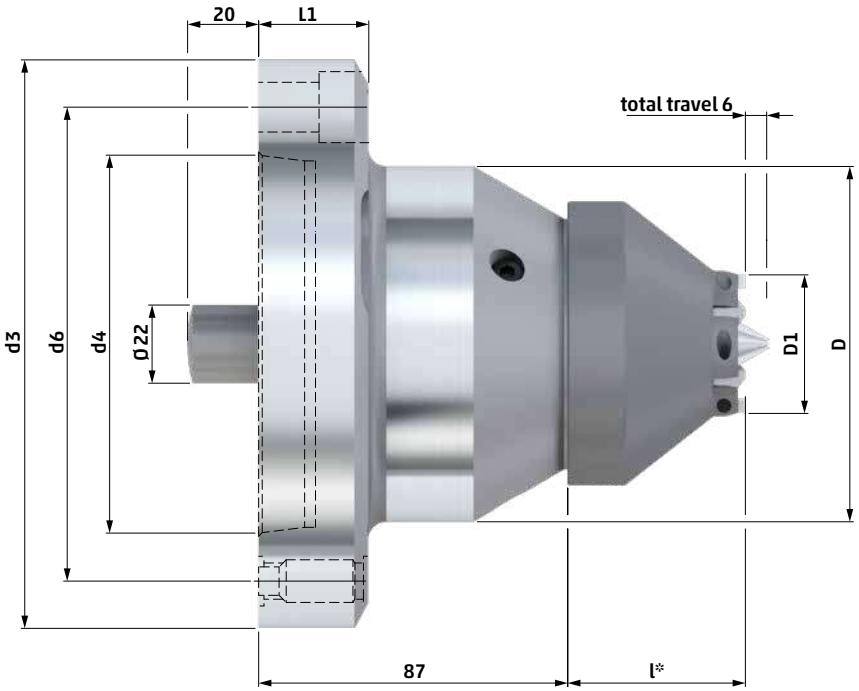
You will find various sizes of face drivers with appropriate standard drive disks and center pins on the following pages.

In case you need special dimensions, we will be glad to design clamping devices suitable for your workpiece.

Type FFP with flange retainer



Technical data – type FFP face driver · for screw connection



l* lengths of drive disk see page 62 - 63, 65

type FFP	D	D1	d3	d4	d6	L1	fixing screws type	fixing screws pcs	short taper size	max. workpiece weight [kg] *	cat. no.
3	80	14 - 59	130	82.563	104.8	31	M12	3	5	90	**632 30**
	90	14 - 59	160	106.375	133.4	31	M12	3	6	90	**632 31**
4	90	31 - 125	160	106.375	133.4	31	M12	3	6	250	**632 32**
	100	31 - 125	220	139.719	171.4	39	M16	3	8	250	**632 33**

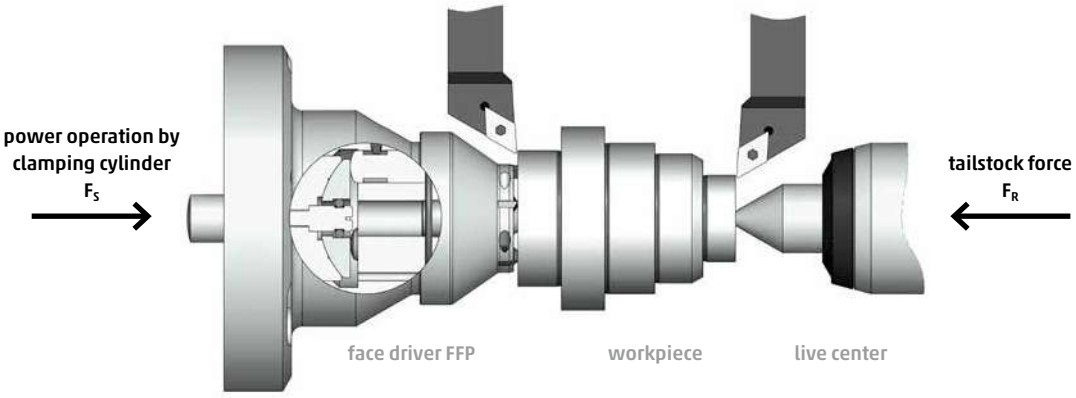
* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

■ All face drivers are provided without drive disk and without center pin. (changeable parts see page 62 - 67)

Face Drivers FFP · Calculations

max. chip cross section of metal removing

PRINCIPLE: The tailstock force pushes the workpiece against the fixed center pin of the face driver. The drive disk is actuated by the clamping cylinder mounted into the machine.



- **maximum chip cross section q_{max}:**
  At a given force of clamping cylinder, the maximum chip cross section is calculated as follows:

$$q_{max} = \frac{\frac{F_S}{m} - 1300}{1100 \times \frac{D}{d}}$$

- **depth of cut a:**

$$a = \frac{q_{max}}{f}$$

F_S	[N]	force of clamping cylinder
q_{max}	[mm²]	maximum of chip cross section for matal removing
D	[mm]	cutting diameter
d	[mm]	clamping diameter
m	[-]	material factor (see adjustment-chart below)
a	[mm]	depth of cut
f	[mm/1]	feed rate

- **tailstock force F_R:**
  In case of tooling against the face driver the tailstock force hast to be approx. 20 % higher than the force of the clamping cylinder F_S.
  In case of tooling against the tailstock, the tailstock should be approx. 40 - 50 % higher than the force of the clamping cylinder, if not, then the chip cross section should be reduced by approx. 30 %. (as there is an additionof force of clamping cylinder and cutting force)

EXPLANATORY NOTES: The first chip, however should always be machined towards the face driver, in order to achieve an ideal penetration of the carbide inserts. The ratio D / d should not exceed 2, otherwise it would work inefficiently.

Material factor m adjustment chart:

material factor m	1.4	1.2	1.1	1.0	0.8
Rm [N / mm²]	1000	800	700	600	400
examples	42CrMo4	16MnCr5	C 15E (Ck 15)	S355J0	S235J0
		25CrMo4	C 45E (Ck 45)	35S20	

Chisel load of carbide inserts

Keep the chisel load within the following range: 250 - 350 N per mm chisel length

- **the chisel load is calculated as follows:**

$$BS = \frac{F_S}{n \times s}$$

BS	[N / mm]	chisel load
F_S	[N]	clamping cylinder force
n	[-]	number of carbide inserts
s	[mm]	chisel length

EXEMPLIFICATION: turning with FFP 3 face driver, 5 carbide inserts respective length of chisel 4 mm, clamping cylinder force 6000 N

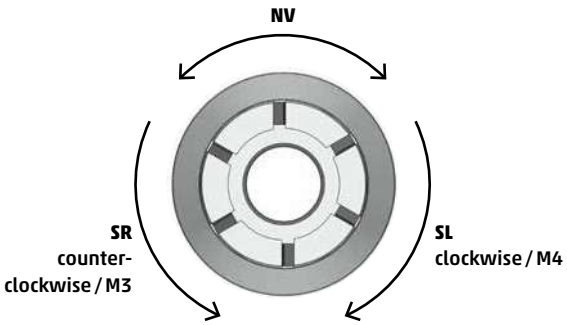
$$BS = \frac{6000\ N}{5 \times 4\ mm} = 300\ \frac{N}{mm}$$

Drive Disks FFP · Chisel NV / SL / SR

with changeable carbide inserts or made of tool steel for torque transmission onto the workpiece for the purpose of soft / green tooling

Type FFP · chisel NV / SL / SR

view from tailstock onto the face driver

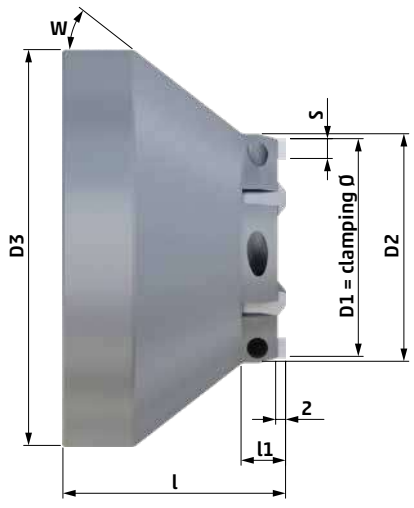


SL (carbide)

NV (tool steel)

SR (carbide)

Technical data – type FFP · chisel NV / SL / SR



TYPE CHISEL NV
for tooling
direction M4 and M3

for type FFP	D1	D2	D3	l	l1	W	number of chisels	S	F_S (N)	cat. no.
3	14	14	60	59	5	35°	6 (tool steel)	2.5	4500	**740 02**
	18	18	60	59	5	30°	6 (tool steel)	2.5	4500	**740 03**

TYPE CHISEL SL
for tooling
direction M4

TYPE CHISEL SR
for tooling
direction M3

for type FFP	D1	D2	D3	l	l1	W	number of chisels	S	F_S (N)	cat. no.	cat. no.
3	22	24	60	59	9	30°	4 carbide	4	4800	**740 04**	**740 20**
	26	28	60	53	9	30°	4 carbide	4	4800	**740 05**	**740 21**
	31	33	60	53	9	30°	5 carbide	4	6000	**740 06**	**740 22**
	36	37	60	45	9	30°	4 carbide	6	7200	**740 07**	**740 23**
	39	40	60	45	9	30°	4 carbide	6	7200	**740 08**	**740 24**
	44	45	60	45	9	30°	4 carbide	6	7200	**740 09**	**740 25**
	49	50	60	45	9	30°	5 carbide	6	9000	**740 10**	**740 26**
	59	60	60	45	-	-	5 carbide	6	9000	**740 11**	**740 27**
4	31	33	80	57	9	38°	5 carbide	4	6000	**740 40**	**740 60**
	36	38	80	57	9	35°	5 carbide	4	6000	**740 41**	**740 61**
	39	41	80	50	9	38°	6 carbide	4	7200	**740 42**	**740 62**
	44	45	80	45	9	38°	6 carbide	4	7200	**740 43**	**740 63**
	49	50	80	45	9	35°	5 carbide	6	9000	**740 44**	**740 64**
	59	60	80	45	9	30°	5 carbide	6	9000	**740 45**	**740 65**
	69	70	80	45	9	30°	6 carbide	6	10800	**740 46**	**740 66**
	84	85	80	45	9	-	6 carbide	6	10800	**740 47**	**740 67**
	99	100	80	45	-	-	6 carbide	6	10800	**740 48**	**740 68**
	110	111	80	45	-	-	7 carbide	6	12600	**740 49**	**740 69**
	125	126	80	45	-	-	7 carbide	6	12600	**740 50**	**740 70**

- All drive disks of type carbide will be provided with the respective carbide inserts.
- Additional clamping diameters of drive disks upon request.

Changeable inserts for drive disks FFP

Technical data – changeable inserts · drive disks FFP

CARBIDE INSERTS

for type FFP	machining direction	S	cat. no.
3 4	SL / SR	4	736 548
3 4	SL / SR	6	736 550

SET SCREW

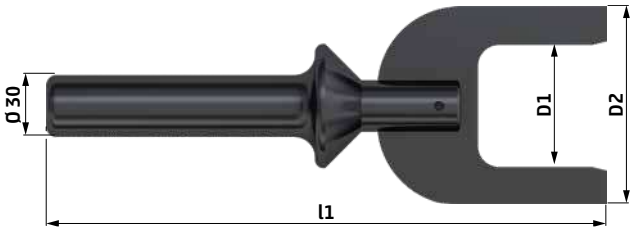
for fixing carbide inserts

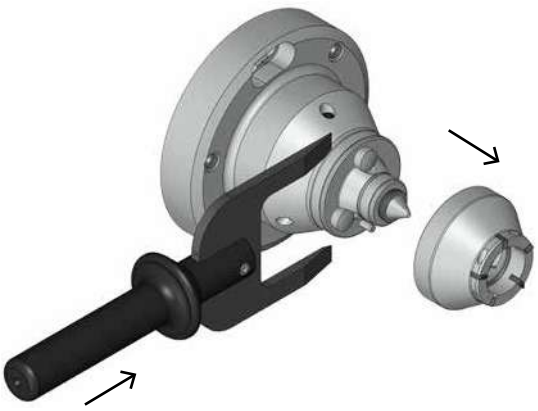
for carbide inserts with S =	thread	cat. no.
4	M4	736 549
6	M5	736 551

Removal lever for drive disks FFP

In order to easily and quickly change the drive disks, the removal lever shown at right may be used.

Technical data – removal lever





The removal lever is placed laterally inserted.
By a tilting movement the drive disk can be loosened.

for type FFP	D1	D2	l1	cat. no.
3	51	80	275	632 40
4	71	100	285	632 41

INFORMATION FOR CHANGING THE DRIVE DISKS

In order to exclude the risk of injury, we recommend to use suitable gloves for changing drive disks. We can provide a mounting aid upon request.

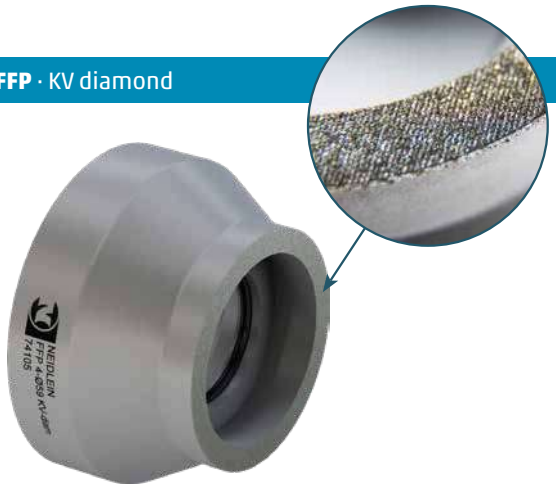
The drive disks can be pulled off head side. We recommend the use of a removal lever in order to reduce the force required and provide increased safety.

Drive Disks FFP · KV Diamond

cross serrated and diamond embedded
for torque transmission onto the workpiece at hard turning and grinding operations

This drive disks have a very high friction coefficient and can be used for both directions of rotation.

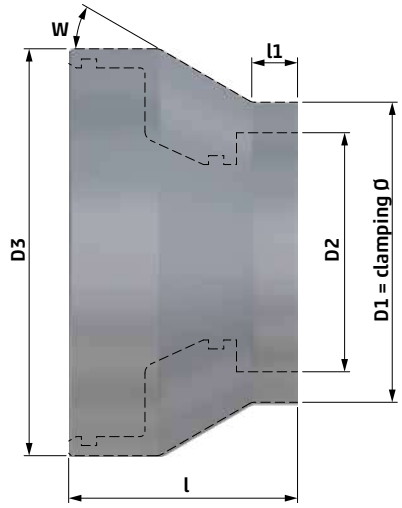
Type FFP · KV diamond



for type FFP	D1	D2	D3	l	l1	W	A [mm²]	cat. no.
3	14	9	60	59	5	35°	90	**740 82**
	18	13	60	59	5	30°	120	**740 83**
	22	13	60	59	9	30°	250	**740 84**
	26	17	60	53	9	30°	300	**740 85**
	31	22	60	53	9	30°	370	**740 86**
	36	24	60	45	9	30°	450	**740 87**
	39	30	60	45	9	30°	490	**740 88**
	44	35	60	45	9	30°	560	**740 89**
	49	39	60	45	9	30°	690	**740 90**
	59	47	60	45	9		1000	**740 91**
4	31	22	80	57	9	38°	370	**741 00**
	36	27	80	57	9	35°	450	**741 01**
	39	30	80	50	9	38°	490	**741 02**
	44	35	80	45	9	38°	560	**741 03**
	49	39	80	45	9	35°	690	**741 04**
	59	47	80	45	9	30°	1000	**741 05**
	69	57	80	45	9	30°	1190	**741 06**
	84	72	80	45	9	-	1470	**741 07**
	99	87	80	45	-	-	1750	**741 08**
	110	98	80	45	-	-	1960	**741 09**
	125	113	80	45	-	-	2240	**741 10**

■ Additional clamping diameters of drive disks upon request.

Technical data – type FFP · KV diamond



■ A [mm²]

■ **F_S – clamping cylinder force:**
The clamping cylinder force F_S is dependent on the the diamond coated surface (A) of the drive disks.

PLEASE NOTE: surface load max. 150 N / mm²

EXAMPLE: If A = 55 mm², the max. clamping cylinder force is F_S = 8250 N

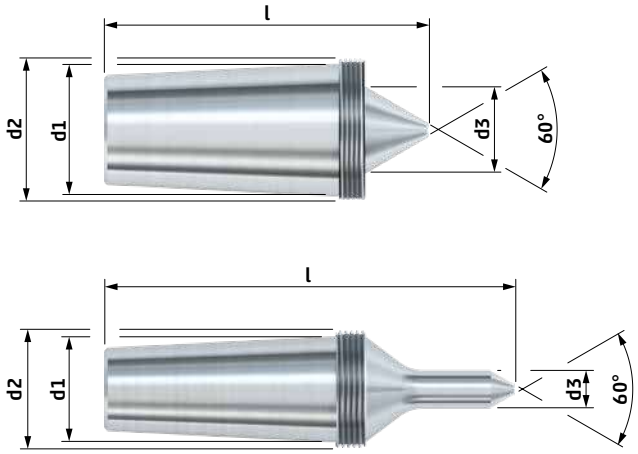
Center Pins FFP

for face drivers FFP with taper shank dead center

Type FFP · tool steel or carbide

HM with carbide insert

Technical data – type FFP · tool steel or carbide



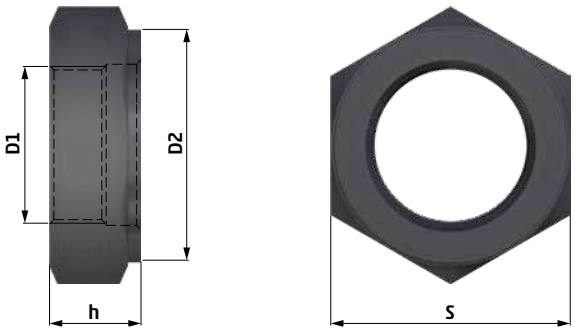
for type FFP	d1	d2	center Ø	clamping Ø	d3	l	TYPE TOOL STEEL cat. no.	HM TYPE CARBIDE cat. no.
3	14	M16 x 1.5	3.35	14	7	55	**734 52**	**734 62**
	14	M16 x 1.5	4.25	18 - 22	11	56	**734 53**	**734 63**
	14	M16 x 1.5	5.3	26 - 31	14	50.5	**734 54**	**734 64**
	14	M16 x 1.5	6.7	36 - 59	11.3	44	**734 55**	**734 65**
	14	M16 x 1.5	8.5	36 - 59	13.2	45	**734 56**	**734 66**
	14	M16 x 1.5	10.6	36 - 59	14	46	**734 57**	**734 67**
4	20	M22 x 1.5	5.3	31 - 36	20	59	**734 70**	**734 80**
	20	M22 x 1.5	6.7	39	17.1	53	**734 71**	**734 81**
	20	M22 x 1.5	8.5	44 - 125	13.2	50	**734 72**	**734 82**
	20	M22 x 1.5	10.6	44 - 125	15.2	51	**734 73**	**734 83**
	20	M22 x 1.5	13.2	44 - 125	17.8	53	**734 74**	**734 84**

■ Further center pins for other center holes upon request.

Extracting nuts for center pin FFP

Type FFP · extracting nuts

Technical data – type FFP · extracting nuts



for type FFP	d2	d1	s	h	cat. no.
3	M16 x 1.5	20	22	10	**930 05**
4	M22 x 1.5	30	30	10	**930 06**

Face Drivers FFPV

with drive disk and fixed center pin for high true run accuracy

The entire surface of the workpiece can be tooled and finished by clamping with a maximum of torque transmission.

NEIDLEIN face drivers of type FFPV with drive disks are mechanical clamping systems which are suited for **turn- milling** as well as for hard turn- milling processes.

Face drivers of the type FFPV are power operated on the side of the machine spindle as well as the side of the tailstock. The workpieces are clamped centrically by the fixed center pin. This operation results in high true run accuracy.

Type FFPV with flange retainer for screw connection

The face driver FFPV is designed for a direct mounting onto a spindle nose. DIN 702-1 (55028)

NEIDLEIN face drivers FFPV ensure:

- radial, almost backlash-free driving
- datum-point location in the center of the workpiece ensures constant measures of length
- compensating drive disk for uneven face sides
- high flexibility in the application, wide range of clamping diameters
- run-out deviation in the process 0.005 - 0.015 mm
- low setup costs due to fast change of drive disks and center pins
- cost efficient exchange of parts that are in contact with the workpiece (changeable carbide inserts)
- suitable changeable parts depending on the hardness of the workpiece

Clamping principle

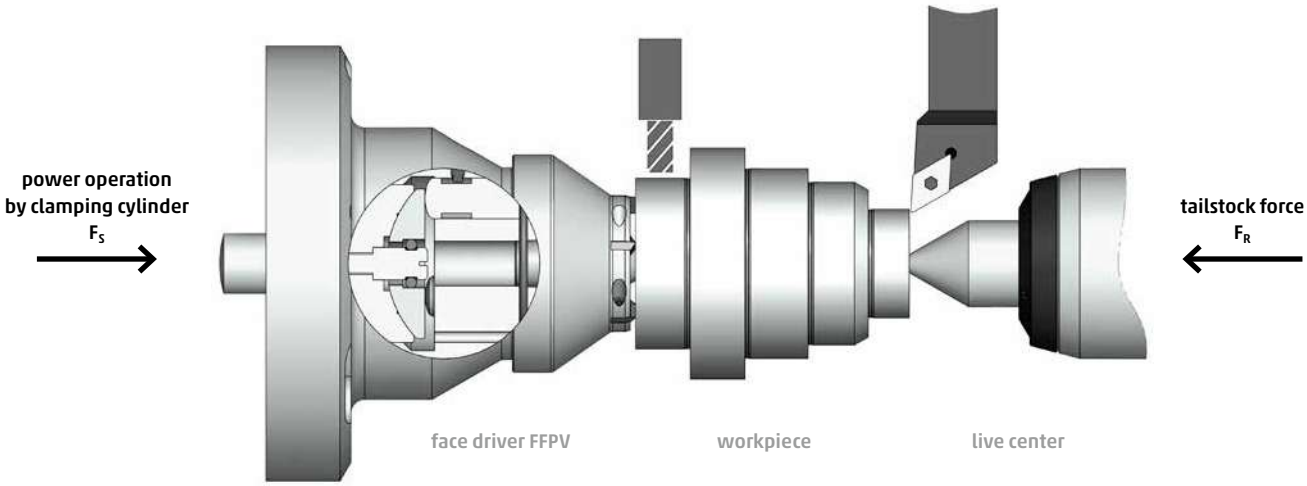
The center pin located on the side of the tailstock pushes the workpiece against the fixed center pin of the face driver. The motion of the drive disk against the workpiece face side is initiated by the clamping cylinder mounted into the machine. The drive disk is "floatingly" suspended, thus balancing out possible planarity defects of the contact surface of the workpiece. The datum-point of workpieces on the machine is determined by the size of the center hole.

The entire surface of the workpiece can now be tooled in one single clamping. See page 71 for data of cutting performance and the clamping forces requested.

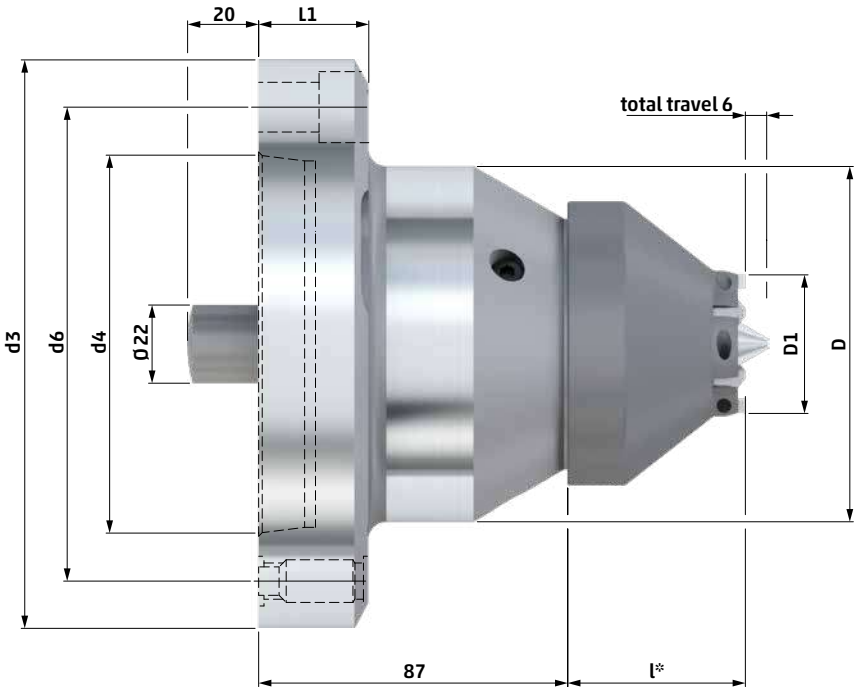
You will find various sizes of face drivers with appropriate standard drive disks and center pins on the following pages.

In case you need special dimensions, we will be glad to design clamping devices suitable for your workpiece.

Type FFPV with flange retainer



Technical data – type FFPV face driver · for screw connection



l* length of drive disks at page 72 - 73

type FFPV	D	D1	d3	d4	d6	L1	fixing screws type	fixing screws pcs	short taper size	max. workpiece weight [kg] *	cat. no.
3	80	14 - 59	130	82.563	104.8	31	M12	3	5	90	**632 50**
	90	14 - 59	160	106.375	133.4	31	M12	3	6	90	**632 51**
4	90	31 - 125	160	106.375	133.4	31	M12	3	6	250	**632 52**
	100	31 - 125	220	139.719	171.4	39	M16	3	8	250	**632 53**

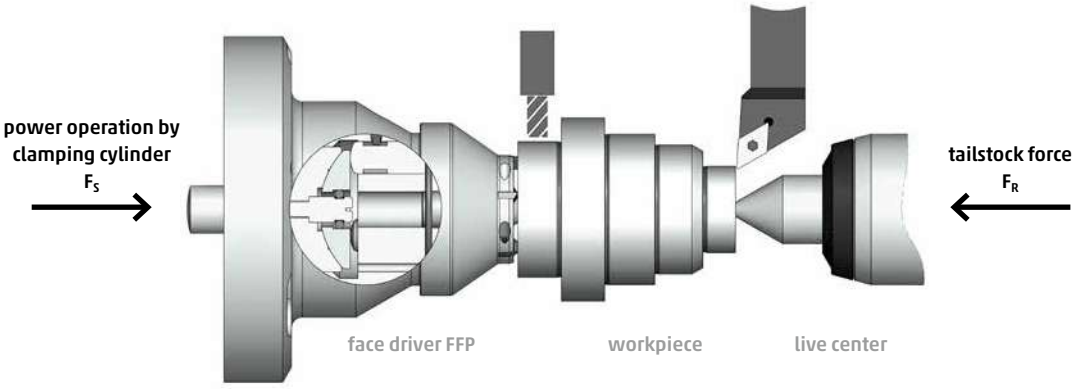
* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are provided without drive disk and without center pin. (changable parts see page 72 - 76)

Face Drivers FFPV · Calculations

max. chip cross section of metal removing

PRINCIPLE: The tailstock force pushes the workpiece against the fixed center pin of the face driver. The drive disk is actuated by the clamping cylinder mounted into the machine.



- **maximum chip cross section q_{max}:**
  At a given force of clamping cylinder, the maximum chip cross section is calculated as follows:

$$q_{max} = \frac{\frac{F_S}{m} - 1300}{1100 \times \frac{D}{d}}$$

- **depth of cut a:**

$$a = \frac{q_{max}}{f}$$

F_S	[N]	force of clamping cylinder
q_{max}	[mm²]	maximum of chip cross section for matal removing
D	[mm]	cutting diameter
d	[mm]	clamping diameter
m	[-]	material factor (see adjustment-chart below)
a	[mm]	depth of cut
f	[mm/1]	feed rate

NOTE FFPV:
When using the face driver type FFPV, the calculated machining chip cross section q_{max} must be reduced by 20%.

- **tailstock force F_R:**
  In case of tooling against the face driver the tailstock force hast to be approx. 20 % higher than the force of the clamping cylinder F_S. In case of tooling against the tailstock, the tailstock should be approx. 40 - 50 % higher than the force of the clamping cylinder, if not, then the chip cross section should be reduced by approx. 30 %. (as there is an additionof force of clamping cylinder and cutting force)

EXPLANATORY NOTES: The first chip, however should always be machined towards the face driver, in order to achieve an ideal penetration of the carbide inserts. The ratio D / d should not exceed 2, otherwise it would work inefficiently.

Material factor m adjustment chart:

material factor m	1.4	1.2	1.1	1.0	0.8
Rm [N / mm²]	1000	800	700	600	400
examples	42CrMo4	16MnCr5	C 15E (Ck 15)	S355J0	S235J0
		25CrMo4	C 45E (Ck 45)	35S20	

Chisel load of carbide inserts

Keep the chisel load within the following range: 250 - 350 N per mm chisel length

- **the chisel load is calculated as follows:**

$$BS = \frac{F_S}{n \times s}$$

EXEMPLIFICATION: turning with FFPV 3 face driver, 5 carbide inserts respective length of chisel 4 mm, clamping cylinder force 6000 N

$$BS = \frac{6000\ N}{5 \times 4\ mm} = 300\ \frac{N}{mm}$$

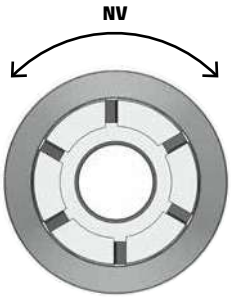
BS	[N / mm]	chisel load	n	[-]	number of carbide inserts
F_S	[N]	clamping cylinder force	s	[mm]	chisel length

Drive disks FFPV · Chisel NV

with changeable carbide inserts or made of tool steel for torque transmission onto the workpiece for the purpose of soft / green tooling

Type FFPV · chisel NV

view from tailstock onto the face driver

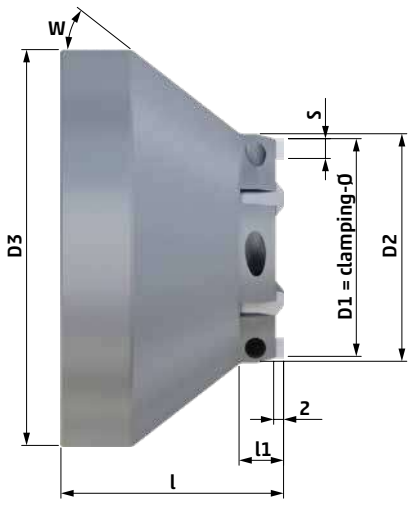


NV (tool steel)

D1 = 14 - 18 · type 3

NV (carbide)

Technical data – type FFPV · chisel NV



TYPE CHISEL NV
for tooling direction M4 and M3
(tool steel)

for type FFPV	D1	D2	D3	l	l1	W	number of chisels	S	F_S (N)	cat. no.
3	14	14	60	59	5	35°	6 (tool steel)	2.5	4500	**741 22**
	18	18	60	59	5	30°	6 (tool steel)	2.5	4500	**741 23**

TYPE CHISEL NV
for tooling direction M4 and M3
(carbide)

for type FFPV	D1	D2	D3	l	l1	W	number of chisels	S	F_S (N)	cat. no.
3	22	24	60	59	9	30°	4 (carbide)	4	4800	**741 24**
	26	28	60	53	9	30°	4 (carbide)	4	4800	**741 25**
	31	33	60	53	9	30°	5 (carbide)	4	6000	**741 26**
	36	37	60	45	9	30°	4 (carbide)	6	7200	**741 27**
	39	40	60	45	9	30°	4 (carbide)	6	7200	**741 28**
	44	45	60	45	9	30°	4 (carbide)	6	7200	**741 29**
	49	50	60	45	9	30°	5 (carbide)	6	9000	**741 30**
	59	60	60	45	-	-	5 (carbide)	6	9000	**741 31**
4	31	33	80	57	9	38°	5 (carbide)	4	6000	**741 40**
	36	38	80	57	9	35°	5 (carbide)	4	6000	**741 41**
	39	41	80	50	9	38°	6 (carbide)	4	7200	**741 42**
	44	45	80	45	9	38°	6 (carbide)	4	7200	**741 43**
	49	50	80	45	9	35°	5 (carbide)	6	9000	**741 44**
	59	60	80	45	9	30°	5 (carbide)	6	9000	**741 45**
	69	70	80	45	9	30°	6 (carbide)	6	10800	**741 46**
	84	85	80	45	9	-	6 (carbide)	6	10800	**741 47**
	99	100	80	45	-	-	6 (carbide)	6	10800	**741 48**
	110	111	80	45	-	-	7 (carbide)	6	12600	**741 49**
	125	126	80	45	-	-	7 (carbide)	6	12600	**741 50**

■ Additional clamping diameters of drive disks upon request.

Changeable inserts for drive disks FFP / FFP(V)

Technical data – changeable inserts · drive disks FFPV

CARBIDE INSERTS

for type FFP / FFPV	machining direction	S	cat. no.
3	NV	4	736 558
4			
3	NV	6	736 560
4			

SET SCREW

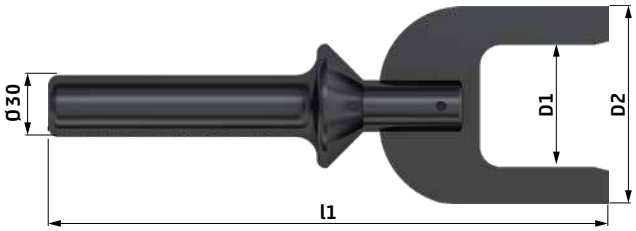
for fixing carbide inserts

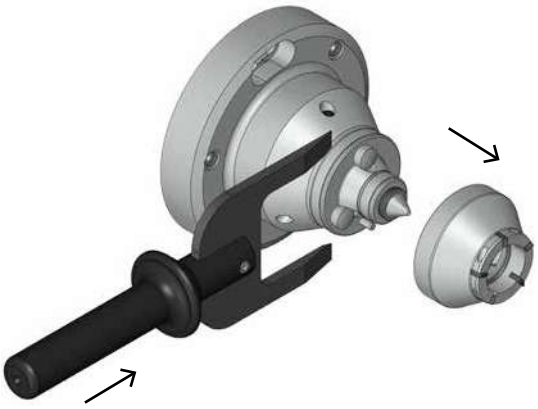
for carbide inserts with S =	thread	cat. no.
4	M4	736 549
6	M5	736 551

Removal lever for drive disks FFP(V)

In order to easily and quickly change the drive disks, the removal lever shown at right may be used.

Technical data – removal lever





The removal lever is placed laterally inserted.
By a tilting movement the drive disk can be loosened.

for type FFP / FFPV	D1	D2	l1	cat. no.
3	51	80	275	632 40
4	71	100	285	632 41

INFORMATION FOR CHANGING THE DRIVE DISKS

In order to exclude the risk of injury, we recommend to use suitable gloves for changing drive disks. We can provide a mounting aid upon request.

The drive disks can be pulled off head side. We recommend the use of a removal lever in order to reduce the force required and provide increased safety.

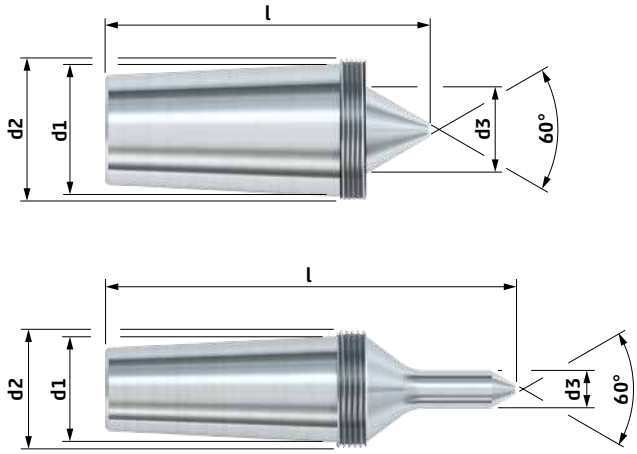
Center Pins FFP / FFP(V)

for face drivers FFP / FFP(V) with taper shank dead center

Type FFP / FFP(V) · tool steel or carbide

HM with carbide insert

Technical data – type FFP / FFP(V) · tool steel or carbide



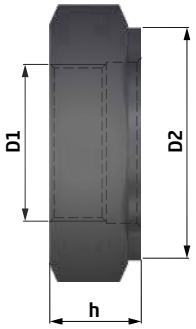
for type FFP / FFP(V)	d1	d2	center Ø	clamping Ø	d3	l	TYPE TOOL STEEL cat. no.	HM TYPE CARBIDE cat. no.
3	14	M16 x 1.5	3.35	14	7	55	**734 52**	**734 62**
	14	M16 x 1.5	4.25	18 - 22	11	56	**734 53**	**734 63**
	14	M16 x 1.5	5.3	26 - 31	14	50.5	**734 54**	**734 64**
	14	M16 x 1.5	6.7	36 - 59	11.3	44	**734 55**	**734 65**
	14	M16 x 1.5	8.5	36 - 59	13.2	45	**734 56**	**734 66**
	14	M16 x 1.5	10.6	36 - 59	14	46	**734 57**	**734 67**
4	20	M22 x 1.5	5.3	31 - 36	20	59	**734 70**	**734 80**
	20	M22 x 1.5	6.7	39	17.1	53	**734 71**	**734 81**
	20	M22 x 1.5	8.5	44 - 125	13.2	50	**734 72**	**734 82**
	20	M22 x 1.5	10.6	44 - 125	15.2	51	**734 73**	**734 83**
	20	M22 x 1.5	13.2	44 - 125	17.8	53	**734 74**	**734 84**

■ Further center pins for other center holes upon request.

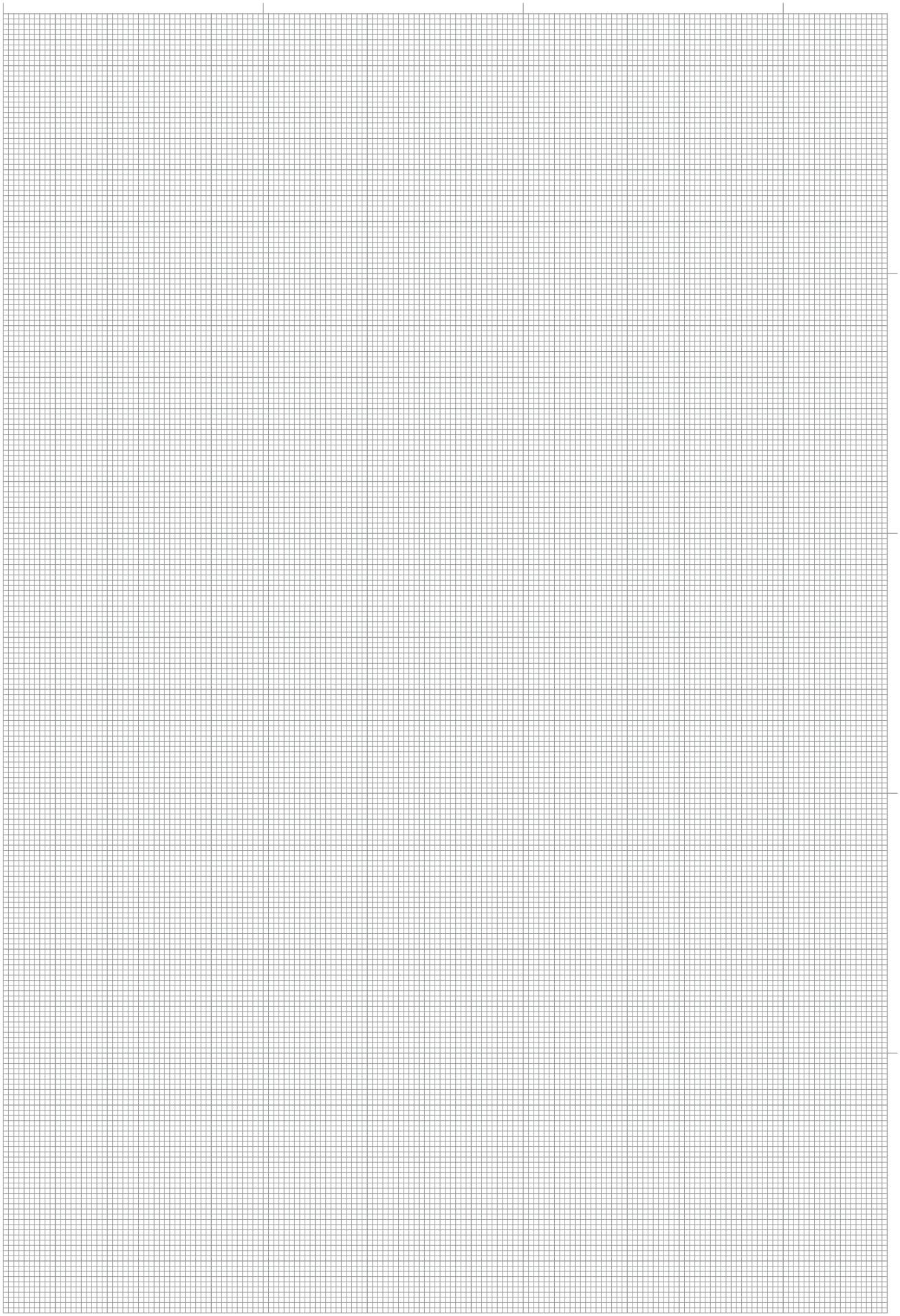
Extracting nuts for center pin FFP / FFPV

Type FFP / FFPV · extracting nuts

Technical data – type FFP / FFPV · extracting nuts



for type FFP / FFPV	d2	d1	s	h	cat. no.
3	M16 x 1.5	20	22	10	**930 05**
4	M22 x 1.5	30	30	10	**930 06**



Face Drivers FFBR / FBSR

with drive pins and fixed center pin

The complete surface of both, hardened and soft workpieces, can be finish-ground with one single clamping.

Face drivers types FFBR/FBSR are power-operated on the side of the spindle. The workpieces are clamped centrically using a dead center pin, this way a high true running accuracy is achieved.

Type FFBR with flange retainer

There are two retainer designs for adapting the face drivers onto the machine spindle – either for adaption onto a flange adapter with 140 in diameter or for direct mounting onto a spinde nose DIN 702-1 size 6 (DIN 55026/28).

Type FBSR with morse taper retainer

Like face driver FFBR, but including morse taper shank and extracting nut. Adjustment true by using set screws inside shank for highest true running accuracy.

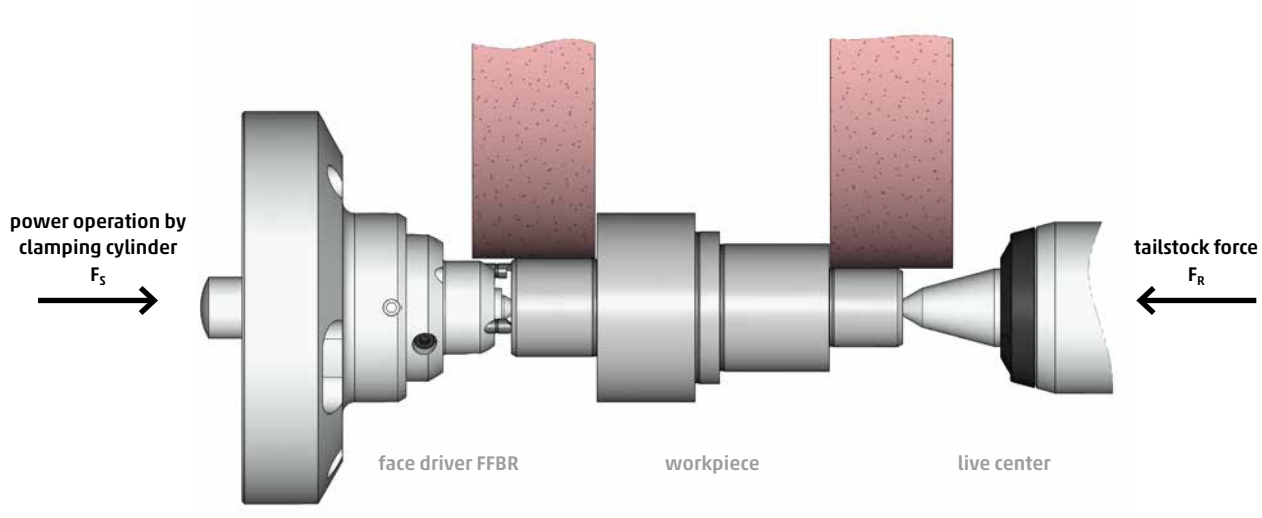
NEIDLEIN face drivers FFBR / FBSR ensure:

- datum-point located in the center of the workpiece
- run-out deviation in the process 0.002 - 0.005 mm
- compensating drive components
- retractable drive pins for secure loading and unloading of the workpiece
- adjustment true at face drivers for highest run-out requirements
- **Attention:** Not suitable for profile grinding of gears. For generating gear grinding, please contact our technical sales department.

Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the fixed center pin of the face driver. The motion of the drive pins against the surface of the workpiece is initiated by the clamping cylinder mounted into the machine. The drive pins are "floatingly" suspended, thus compensating irregularities with regard to possible unevenness of the surface of workpieces. The datum-point of workpieces on the machines is determined by the size of the center hole. The entire surface of workpiece can now be tooled in one single clamping.

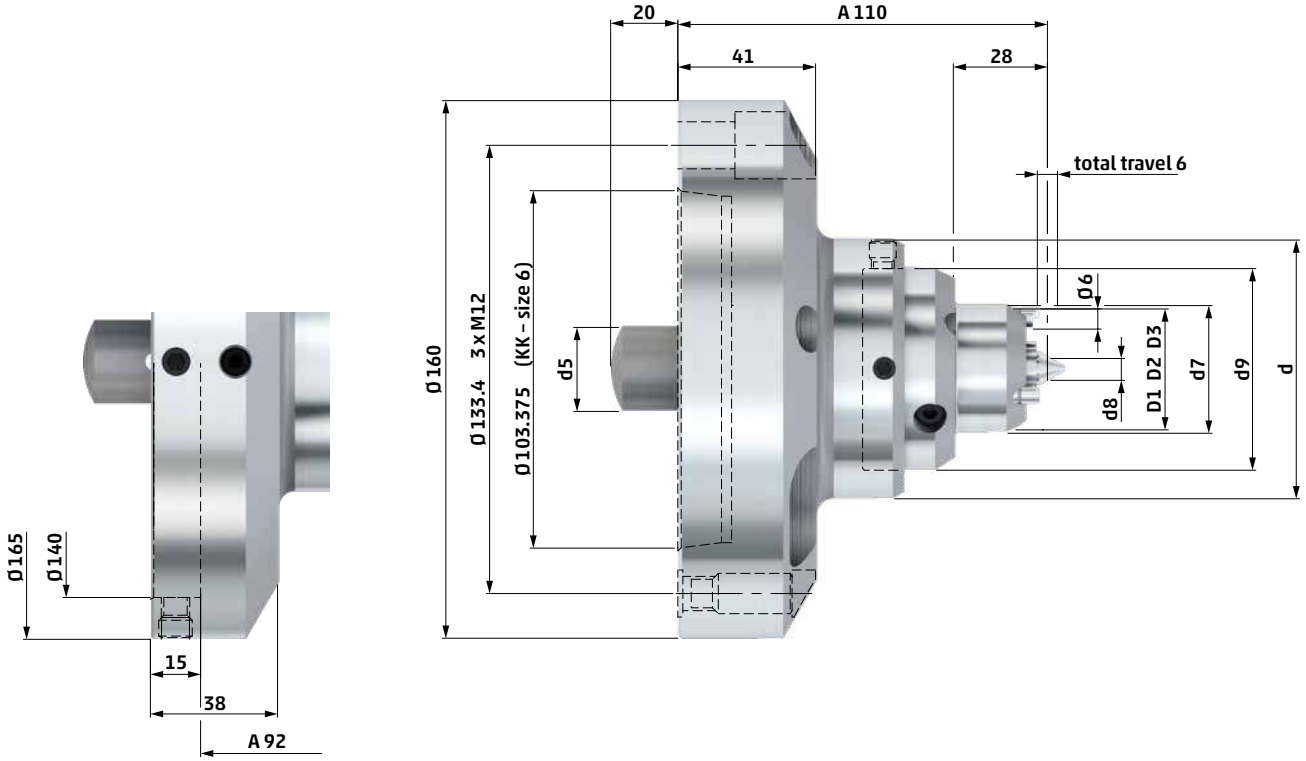
Typ FFBR with flange retainer



Technical data – type FFBR face driver

type cylindrical retainer Ø 140 mm
on flange adapter

type short taper retainer DIN 702-1 size 6
directly onto the machine spindle

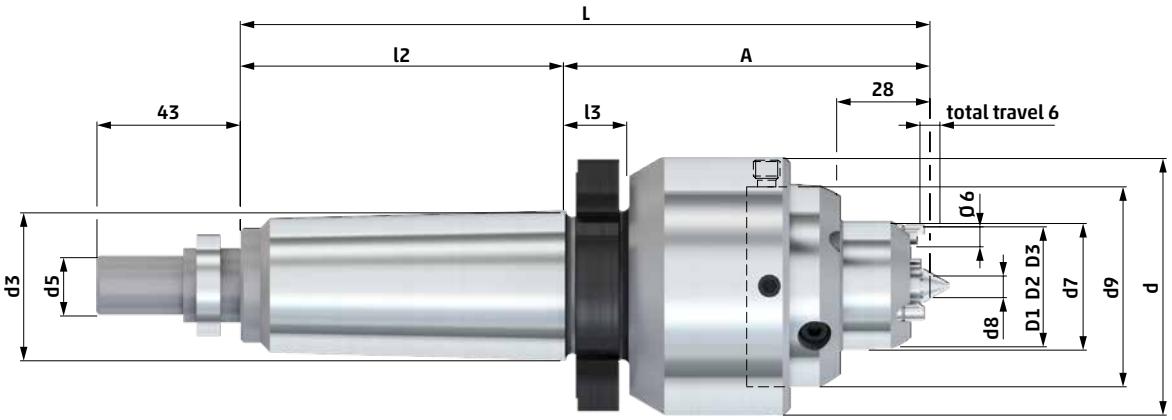


type FFBR	d	center Ø	d5	d7	d8	d9	clamping Ø D1	D2	D3	max. workpiece weight [kg] *	cat. no. TYPE CYLINDRICAL RETAINER Ø 140 mm	cat. no. TYPE SHORT TAPER RETAINER SIZE 6
0	65	1 - 3	18	16	1.5	48	6	9	15	8	**726 31**	**726 01**
01	65	1 - 5	18	18	3	48	8	11	17	6	**726 32**	**726 02**
11	65	2 - 6.5	18	21	4.25	48	11	14	20	12	**726 33**	**726 03**
1	65	4 - 8.5	18	25	6.25	48	15	18	24	25	**726 34**	**726 04**
2	77	4 - 9	25	38	6.5	60	27	30	36	50	**726 35**	**726 05**
3	85	6 - 11	25	46	8.5	68	35	38	44	80	**726 36**	**726 06**
4	110	10 - 15	25	62	12.5	83	50	53	59	150	**726 37**	**726 07**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- Face drivers without changeable parts (types 0 / 01 include center body). Center pins, center bodies and drive pins see page 82 - 83.
- All face drivers for grinding are designed for 3 drive pins only.
- Diameter d8 refers to standard center pins. (see page 83)
- Further center pins for other center holes upon request.

Technical data – type FBSR face driver



type FBSR	MK	d	A	center Ø	d3	d5	d7	d8	d9	L	l2	l3	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
0	**4**	65	110	1 - 3	M35 x 1.5	11.5	16	1.5	48	183	73	16	6	9	15	8	**726 51**
01	**4**	65	110	1 - 5	M35 x 1.5	11.5	18	3	48	183	73	16	8	11	17	6	**726 52**
11	**4**	65	110	2 - 6.5	M35 x 1.5	11.5	21	4.25	48	183	73	16	11	14	20	12	**726 53**
1	**4**	65	110	4 - 8.5	M35 x 1.5	11.5	25	6.25	48	183	73	16	15	18	24	25	**726 54**
	5	65	110	4 - 8.5	M48 x 1.5	17.5	25	6.25	48	207	97	19	15	18	24	25	**726 55**
2	**4**	77	110	4 - 9	M35 x 1.5	11.5	38	6.5	60	183	73	16	27	30	36	50	**726 56**
	5	77	110	4 - 9	M48 x 1.5	17.5	38	6.5	60	207	97	19	27	30	36	50	**726 57**
3	**4**	85	110	6 - 11	M35 x 1.5	11.5	46	8.5	68	183	73	16	35	38	44	80	**726 58**
	5	85	110	6 - 11	M48 x 1.5	17.5	46	8.5	68	207	97	19	35	38	44	80	**726 59**
4	**4**	100	120	10 - 15	M35 x 1.5	11.5	62	12.5	83	193	73	16	50	53	59	150	**726 60**
	5	100	120	10 - 15	M48 x 1.5	17.5	62	12.5	83	207	97	19	50	53	59	150	**726 61**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- Face drivers without changeable parts (types 0 / 01 include center body). Center pins, center bodies and drive pins see page 82 - 83.
- All face drivers for grinding are designed for 3 drive pins only.
- Diameter d8 refers to standard center pins. (see page 83)
- Further center pins for other center holes upon request.

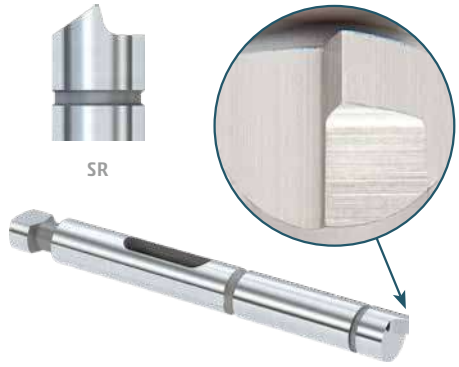
Drive Pins FFBR / FBSR · Chisel SR · Diamond

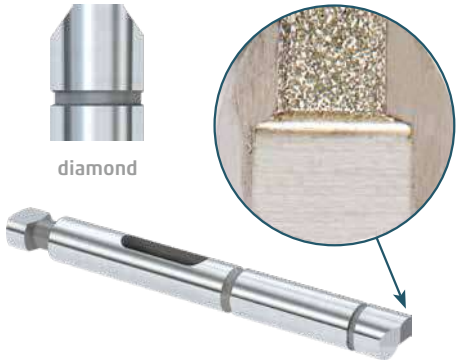
for torque transmission onto the workpiece by grinding soft and hardened workpieces

For soft workpieces we apply drive pins made of hardened HSS comprising a chisel. They are characterized by high wear-resistance as well as maximum torque transmission.

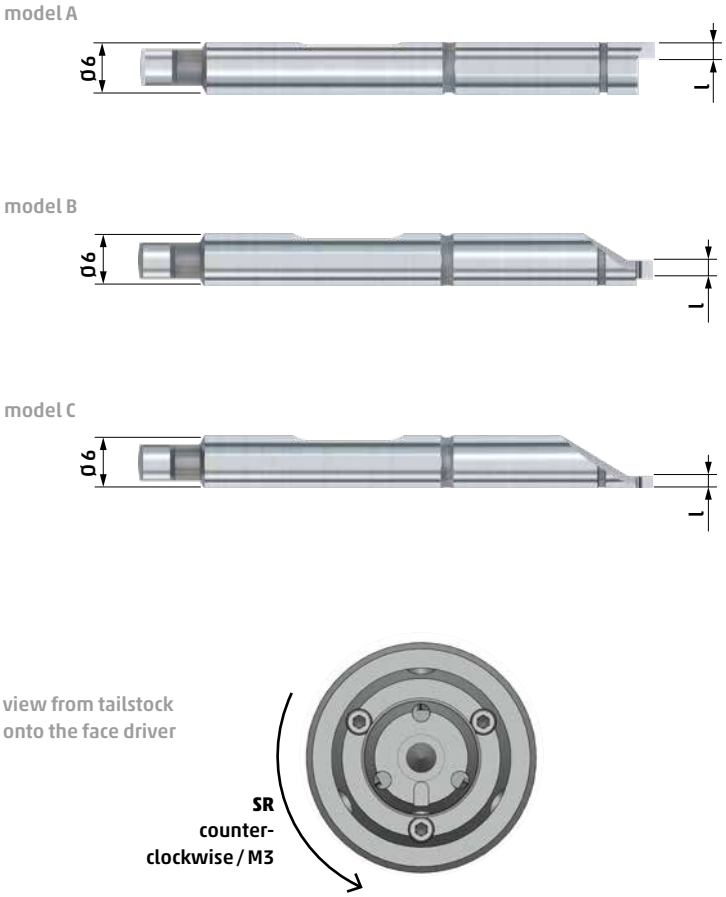
For hardened workpieces we apply drive pins that are diamond coated. They are characterized by a high friction-coefficient.

Type FFBR / FBSR · chisel SR · diamond





Technical data – type FFBR / FBSR · chisel SR · diamond



for type	for clamping	model	l	cat. no.
TYPE CHISEL SR				
FFBR FBSR	D1	C	1.5	**736 651**
FFBR FBSR	D2	B	2	**736 652**
FFBR FBSR	D3	A	2	**736 653**

l	cat. no.
TYPE DIAMOND COATING	
1.5	**736 654**
3	**736 655**
3	**736 656**

- Clamping diameter D1, D2, D3 see pages 80 - 81.
- Further clamping Ø of drive pins upon request.

Center Pins FFBR / FBSR

for face drivers FFBR / FBSR with fixed center pin

For maximum stability and run-out requirements the center pins are produced with narrow tolerances and are fixed safely via set screw and plane surface inside the face driver.

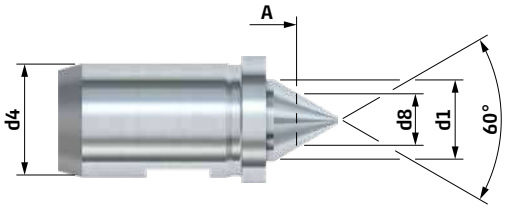
For a large batch of hardened workpieces we recommend the construction comprising carbide insert. Center heads of type 0 / 01 consist of 60°-taper tip that are carbide coated.

Due to the accurate assembly between center pin and head of face driver we ensure highly accurate replacement.

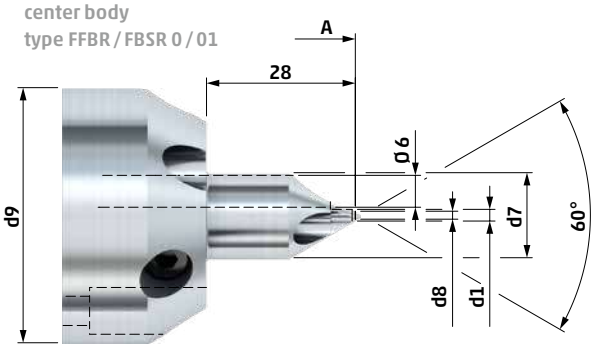
Type FFBR / FBSR · tool steel or carbide

HM with carbide insert

Technical data – type FFBR / FBSR · tool steel or carbide



center body
type FFBR / FBSR 0 / 01



A overhang dimension of face driver to centre d8 (see page 80 - 81)

for type FFBR / FBSR	d1	d4	center Ø	d7	d8	d9	TYPE TOOL STEEL cat. no.	HM TYPE CARBIDE cat. no.
0	3	-	1 - 3	16	1.5	48	**734 15**	**734 31**
01	5	-	1 - 5	18	3	48	**734 16**	**734 32**
11	7.8	6	2 - 6.5	-	4.25	-	**734 11**	**734 33**
1	9.8	8	4 - 8.5	-	6.25	-	**734 02**	**734 34**
2	10	14	4 - 9	-	6.5	-	**734 03**	**734 35**
3	12	18	6 - 11	-	8.5	-	**734 04**	**734 36**
4	16	20	10 - 15	-	12.5	-	**734 05**	**734 38**

- Further center pins for other center holes upon request.
- At type FFBR/FSBR 0/01 (type carbide) the 60° tip is carbide coated.

Face Drivers FFB / FFBH

with drive pins and fixed center pin

The entire surface of the workpiece can be finished with one single clamping and with a maximum of torque transmission. NEIDLEIN face drivers are clamping systems, which are equally suitable **for grinding soft and hard workpieces**.

Face drivers of types FFB / FFBH are power-operated on the side of the spindle.

Originally conceived for turning, face drivers of type FFB / FFBH provide a multitude of possible applications for grinding. Without retraction of drive pins and with NEIDLEIN retainer Ø 100 type FFB / FFBH provides an alternative to face drivers of type FFBR/FBSR, especially when machining large-size workpieces.

When FFBH is used, the compensation of drive pins is implemented hydraulically, thus achieving excellent true runout results.

Type FFB with flange retainer

Type FFB is adapted onto the machine spindle using an adjustable flange adapter.

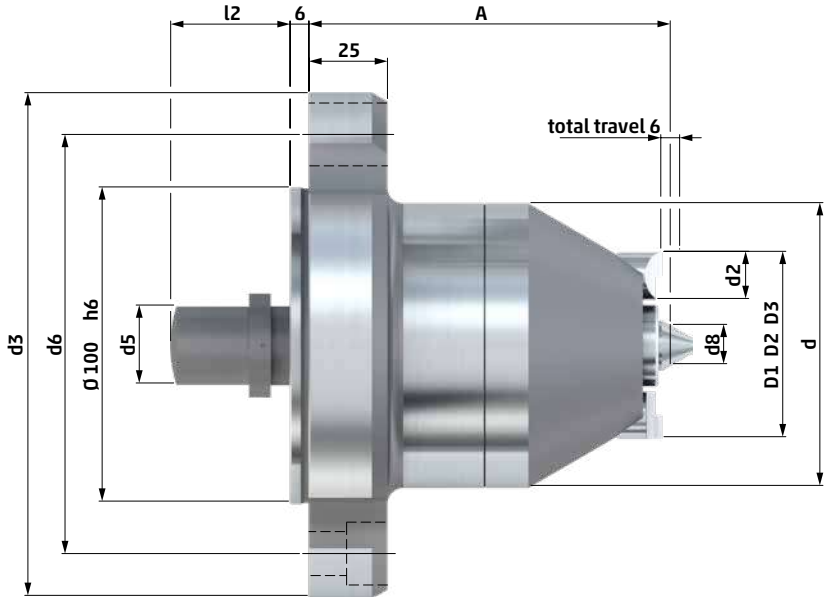
Type FFBH with flange retainer

Type FFBH is adapted onto the machine spindle using an adjustable flange adapter.

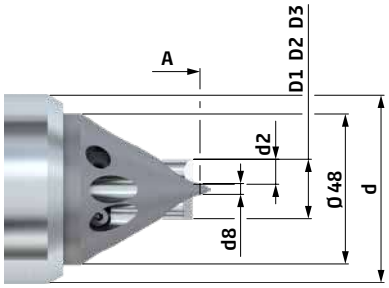
NEIDLEIN face drivers FFB / FFBH ensure:

- datum-point located in the center of the workpiece
- run-out deviation in the process
  - type FFB: 0.005 - 0.01 mm
  - type FFBH: 0.002 - 0.005 mm
- adjustment true via adjustable flange adapter for highest run-out requirements
- easy handling
- compensating drive components / optimal clamping of the workpiece
- face driver type FFBH comprises a hydraulic unit which is exchangeable as a cartridge
- **Attention:** Not suitable for profile grinding of gears. For generating gear grinding, please contact our technical sales department.

Technical data – type FFB face driver



type FFB 01/0



type FFB	d	center Ø	d2	d3	d5	d6	d8	A	l2	drive pins	fixing screws type	fixing screws pcs	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
01	60	1 - 5	6	160	18	133.4	3.5	115	38	3	M12	3	8	11	17	6	**731 01**
0	60	1 - 3	8	160	18	133.4	3	115	38	3	M12	3	6	11	19	8	**731 12**
11	42	2 - 6.5	6	160	12	133.4	4.25	115	38	3	M12	3	11	14	20	12	**731 11**
1	48	4 - 8.5	8	160	18	133.4	6.25	115	38	3	M12	3	13	18	26	25	**731 02**
2	70	4 - 9	10	160	22	133.4	6.5	115	38	3	M12	3	26	31	36	50	**731 03**
3	70	6 - 11	10	160	22	133.4	8.5	115	38	3	M12	3	34	39	44	90	**731 04**
35	80	4 - 9	15	160	22	133.4	6.5	115	38	3	M12	3	29	39	49	130	**731 13**
4	90	10 - 15	15	160	25	133.4	12.5	115	38	5	M12	3	39	49	59	250	**731 05**
45	100	10 - 15	15	160	25	133.4	12.5	115	54	5	M12	3	49	59	69	400	**731 06**
5	132	10 - 15	20	160	25	133.4	12.5	115	54	5	M12	3	69	84	99	1000	**731 07**
55	182	10 - 15	20	220	40	171.4	12.5	155	54	5	M16	3	110	125	140	1600	**731 08**
6	220	10 - 15	20	250	40	210	12.5	171	54	5	M20	3	140	155	170	2500	**731 09**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

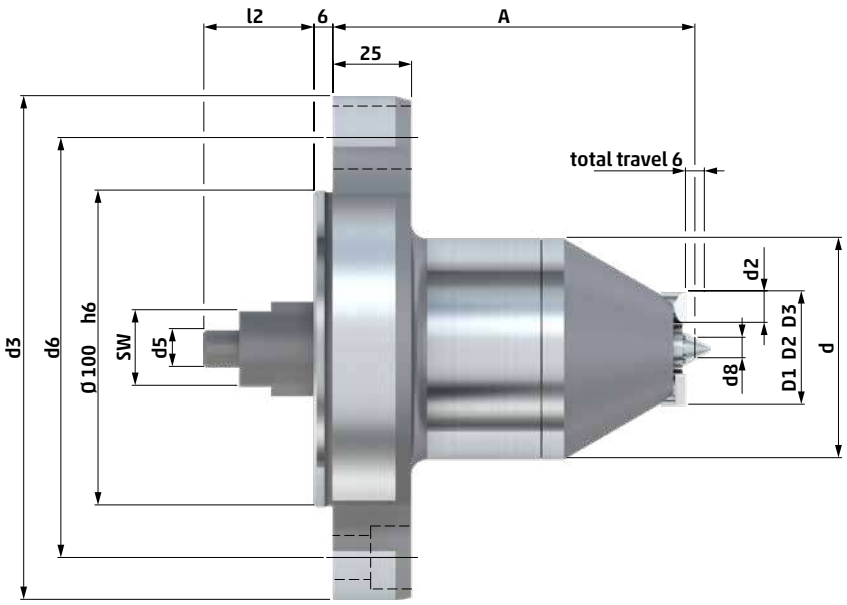
- All face drivers are supplied without drive pins. (drive pins see page 88 - 89)
- Types FFB 01 / 0 are supplied with center body, all other types without center pin. (center pin see page 87)
- Diameter d8 refers to standard center pins. (see page 87)
- Further center pins for other center holes upon request.
- Mounting elements for face drivers see page 104 - 109.

A stable assembly on the machine spindle is implemented using an adjustable flange adapter. We supply these flange adapters for various sizes of spindle heads in standardized size (DIN ISO 702-1 / DIN 55028) or for vendor-specific spindle heads in particular. Thus face drivers of range FFB can be assembled universally on various machines. Driving components and center pin are easily exchanged from the front part of the machine.

As required, the face driver can be equipped with either drive pins comprising a chisel for machining soft workpieces, or with diamond coated drive pins for machining hardened workpieces.

Apart from the clamping diameters listed above D1, D2, D3, we can also provide alternative sizes upon request. We are also able to manufacture larger center pins or mushroom centers for oversize centering.

Technical data – type FFBH face driver

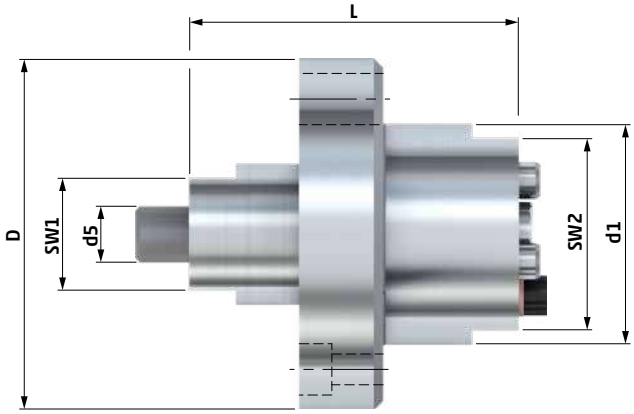


type FFBH	d	center Ø	d2	d3	SW	d5	d6	d8	A	l2	drive pins	fixing screws type	fixing screws pcs	clamping Ø D1	clamping Ø D2	clamping Ø D3	max. workpiece weight [kg] *	cat. no.
1	70	4 - 8.5	8	160	24	12	133.4	6.25	115	35	3	M12	3	13	18	26	25	**631 02**
2	70	4 - 9	10	160	24	12	133.4	6.5	115	35	3	M12	3	26	31	36	50	**631 03**
3	70	6 - 11	10	160	24	12	133.4	8.5	115	35	3	M12	3	34	39	44	90	**631 04**
4	90	10 - 15	15	160	34	12	133.4	12.5	132	35	5	M12	3	39	49	59	250	**631 06**
45	100	10 - 15	15	160	34	12	133.4	12.5	132	35	5	M12	3	49	59	69	400	**631 07**
5	132	10 - 15	20	160	34	12	133.4	12.5	149	35	5	M12	3	69	84	99	1000	**631 08**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

- All face drivers are supplied without drive pins and without center pins. (changeable parts see page 87 - 89)
- The diamteter d8 refers to the standard center pins. (see page 87)
- Further center pins for other center holes upon request.
- Mounting elements for face drivers see page 104 - 109.

Technical data – type FFBH hydraulic unit



type FFBH	SW1	d5	L	d1	SW2	D	cat. no.
1	24	12	70.5	47	41	75	
2	24	12	70.5	47	41	75	**631 02 HE**
3	24	12	70.5	47	41	75	
4	34	12	70.5	65	59	93	**631 06 HE**
45	34	12	70.5	65	59	93	
5	34	12	70.5	87	81	131	**631 08 HE**

The general explanatory notes for this face driver FFBH can be obtained from the sheet "technical data – type FFB". For safe and smooth operation of face driver we recommend exchange of hydraulic unit after 1500 operating hours.

Furthermore, we offer the option for professional maintenance of the exchanged hydraulic units in our production plant.

Center Pins FFB / FFBH

for face drivers FFB / FFBH with fixed center pin

For maximum stability and run-out requirements the center pins are produced with narrow tolerances and are fixed safely via set screw and plane surface inside the face driver.

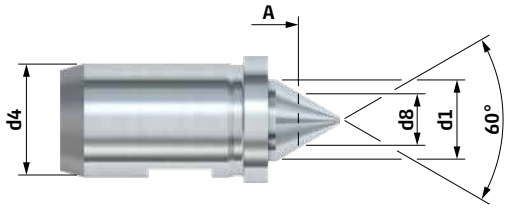
For a large batch of hardened workpieces we recommend the construction comprising carbide insert. Center heads of type 0 / 01 consist of 60°-taper tip that are carbide coated.

Due to the accurate assembly between center pin and head of face driver we ensure highly accurate replacement.

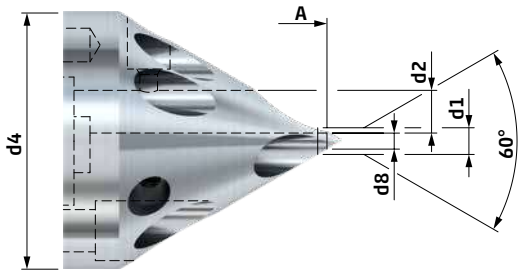
Type FFB / FFBH · tool steel or carbide

HM with carbide insert

Technical data – type FFB / FFBH · tool steel or carbide



center body type FFB / FFBH 01 / 0



A overhang dimension of face driver to centre d8 (see page 85 - 86)

						TYPE TOOL STEEL	HM TYPE CARBIDE
for type FFB / FFBH	**d1**	**d2**	**d4**	**center Ø**	**d8**	**cat. no.**	**cat. no.**
01	5	6	48	1 - 5	3.5	**734 01**	**734 43**
0	3	8	48	1 - 3	3	**734 101**	**734 44**
11	7.8	-	6	2 - 6.5	4.25	**734 11**	**734 33**
1	9.8	-	8	4 - 8.5	6.25	**734 02**	**734 34**
2	10	-	14	4 - 9	6.5	**734 03**	**734 35**
3	12	-	18	6 - 11	8.5	**734 04**	**734 36**
35	10	-	14	4 - 9	6.5	**734 12**	**734 37**
4	16	-	20	10 - 15	12.5	**734 05**	**734 38**
45	16	-	28	10 - 15	12.5	**734 06**	**734 39**
5	16	-	35	10 - 15	12.5	**734 07**	**734 40**
55	16	-	35	10 - 15	12.5	**734 08**	**734 41**
6	16	-	35	10 - 15	12.5	**734 09**	**734 42**

■ Further center pins for other center holes upon request.

Drive Pins FFB / FFBH · Chisel SR · Diamond

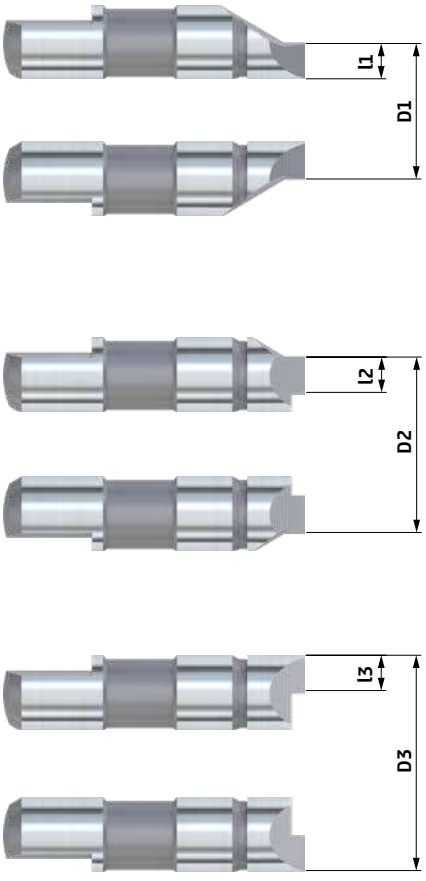
for torque transmission onto the workpiece when grinding soft and hardened workpieces

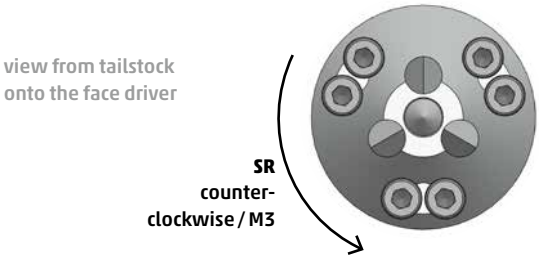
Drive pins made of hardened HSS with chisel are used **for grinding soft workpieces**. These are characterized by a high resistance to wear and tear and a maximum torque transmission.

Diamond coated drive pins are applied **for grinding hardened workpieces**. These are characterized by a high resistance to wear and tear, a maximum of torque transmission and by a high friction-coefficient.

Type FFB / FFBH · chisel SR · diamond

Technical data – type FFB / FFBH · chisel SR · diamond





TYPE CHISEL SR

for type FFB / FFBH	d	clamping Ø D1	clamping Ø D2	clamping Ø D3	chisel length l1	chisel length l2	chisel length l3	cat. no.
	6	8			1.5			**736 600**
01	6		11			2		**736 601**
	6			17			2	**736 602**
	8	6			1.5			**736 603**
0	8		11			2		**736 604**
	8			19			2	**736 605**
	6	11			1.5			**736 606**
11	6		14			2		**736 607**
	6			20			2	**736 608**
	8	13			1.5			**736 609**
1	8		18			2		**736 610**
	8			26			2	**736 611**
	10	26			3			**736 612**
2	10		31			3		**736 613**
	10			36			3	**736 614**
	10	34			3			**736 615**
3	10		39			3		**736 616**
	10			44			3	**736 617**
	15	29			3			**736 618**
35	15		39			3		**736 619**
	15			49			3	**736 620**
	15	39			3			**736 621**
4	15		49			3		**736 622**
	15			59			3	**736 623**
	15	49			3			**736 624**
45	15		59			3		**736 625**
	15			69			3	**736 626**
	20	69			4			**736 627**
5	20		84			4		**736 628**
	20			99			4	**736 629**
	20	110			4			**736 630**
55	20		125			4		**736 631**
	20			140			4	**736 632**
	20	140			4			**736 633**
6	20		155			4		**736 634**
	20			170			4	**736 635**

TYPE DIAMOND COATING

chisel length l1	chisel length l2	chisel length l3	cat. no.
1.5			**736 300**
	3		**736 301**
		3	**736 302**
1.5			**736 303**
	4		**736 304**
		4	**736 305**
1.5			**736 306**
	3		**736 307**
		3	**736 308**
1.5			**736 309**
	4		**736 310**
		4	**736 311**
5			**736 312**
	5		**736 313**
		5	**736 314**
5			**736 315**
	5		**736 316**
		5	**736 317**
5			**736 318**
	5		**736 319**
		5	**736 320**
5			**736 321**
	5		**736 322**
		5	**736 323**
5			**736 324**
	5		**736 325**
		5	**736 326**
5			**736 327**
	7.5		**736 328**
		7.5	**736 329**
5			**736 330**
	7.5		**736 331**
		7.5	**736 332**
5			**736 333**
	7.5		**736 334**
		7.5	**736 335**

■ Further clamping Ø of drive pins upon request.

Face Drivers FDNC

with drive heads and movable center pin

Face drivers for clamping workpieces **for milling** free from backlash for gear hobbing, keyway milling and other surfaces.

Type FDNC with flange retainer

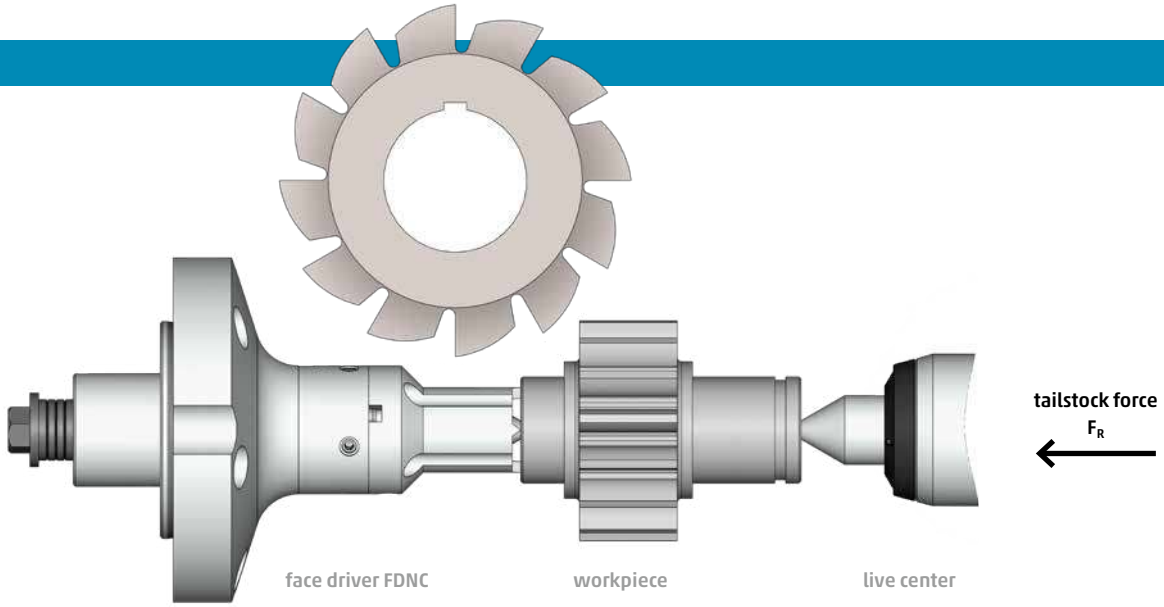
Type FDNC is mounted onto the machine spindle nose using a flange adapter.

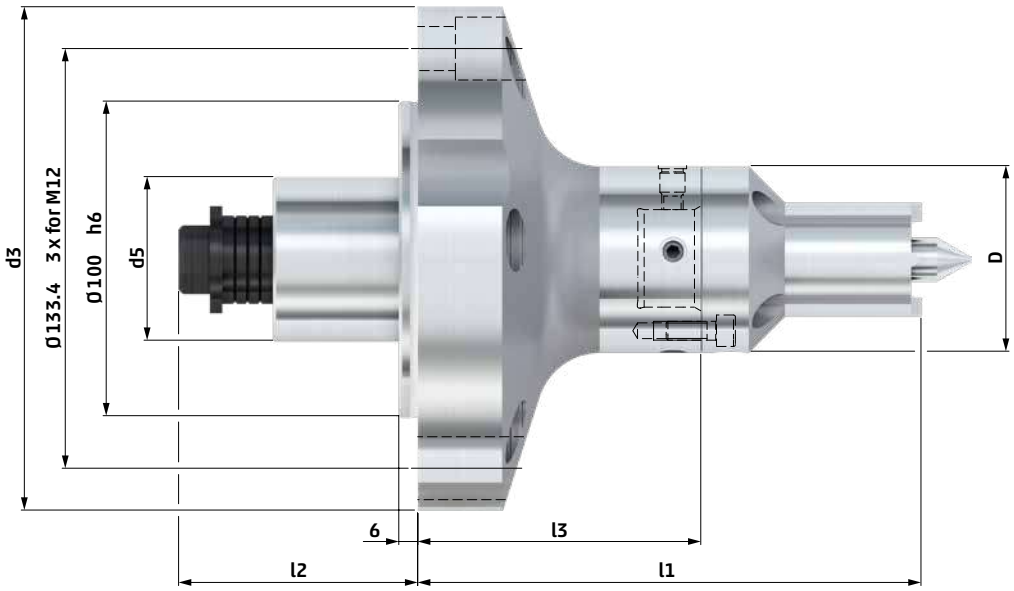
NEIDLEIN face drivers FDNC ensure:

- machining free from backlash due to fixed driving elements
- stability and mounting of high transverse thrust using adjustable, spring-loaded center pins
- constant datum point on the end face of the workpiece
- run-out deviation in the process 0.015 - 0.02 mm (a machined and rectangular face side of the workpiece is required)
- adjustment of dissimilar bore holes
- adjustment true at drive head for high true running accuracy
- tapered design for optimum tool path

Clamping principle

The workpiece is pushed by the tailstock force against the moving center pin, which moves back until the workpiece face side is in contact with the drive head.





type FDNC	D	d3	d5	L1	l2	l3	cat. no.
11-4	59	160	52	160	77	90	**732 01**

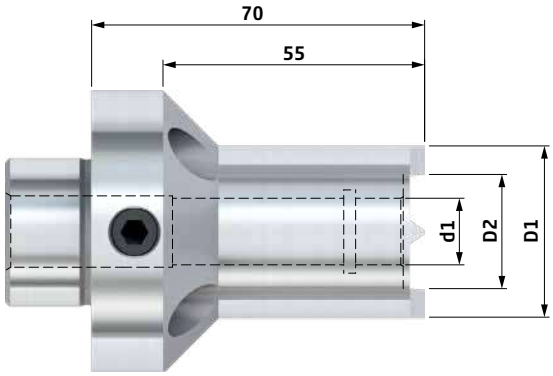
- All face drivers are supplied without drive heads and without center pins. (changeable parts see page 92 - 93)
- Mounting elements for face drivers see page 104 - 109.

Drive Heads FDNC

changeable drive heads for basic body FDNC

Type FDNC · drive head

Technical data – type FDNC · drive head



for type FDNC	D1	D2	d1	max. workpiece weight [kg] *	cat. no.
11.11	11	7	6	12	**737 01**
11.14	14	9	6	12	**737 02**
11.18	18	12	6	12	**737 03**
1.22	22	14	8	20	**737 04**
1.26	26	18	8	20	**737 05**
2.30	30	20	14	40	**737 06**
2.36	36	24	14	40	**737 07**
3.39	39	29	18	60	**737 08**
3.44	44	34	18	60	**737 09**
4.49	49	39	24	100	**737 10**
4.59	59	49	24	100	**737 11**

* The max. workpiece weight also depends on the size of the workpiece center hole / DIN332 part 7

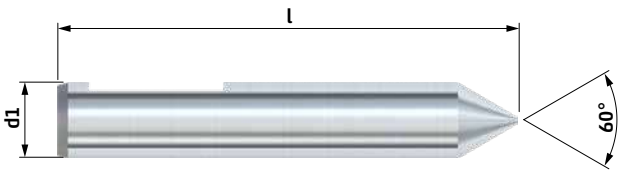
■ Additional dimensions for drive heads upon request.

Center Pins FDNC

changeable center pins for basic body and drive heads FDNC

Type FDNC · center pin

Technical data – type FDNC · center pin



for type FDNC	d1	l	center Ø	cat. no.
11	6	78	1 - 6	**733 01**
1	8	80	1 - 8	**733 02**
2	14	86	1 - 14	**733 03**
3	18	89	3 - 18	**733 04**
4.1	24	89	3 - 18	**733 05**
4.2	24	96	16 - 24	**733 06**

■ Further center pins for other center holes upon request.

Pipe Drivers & Drive Dog

NDG

DH

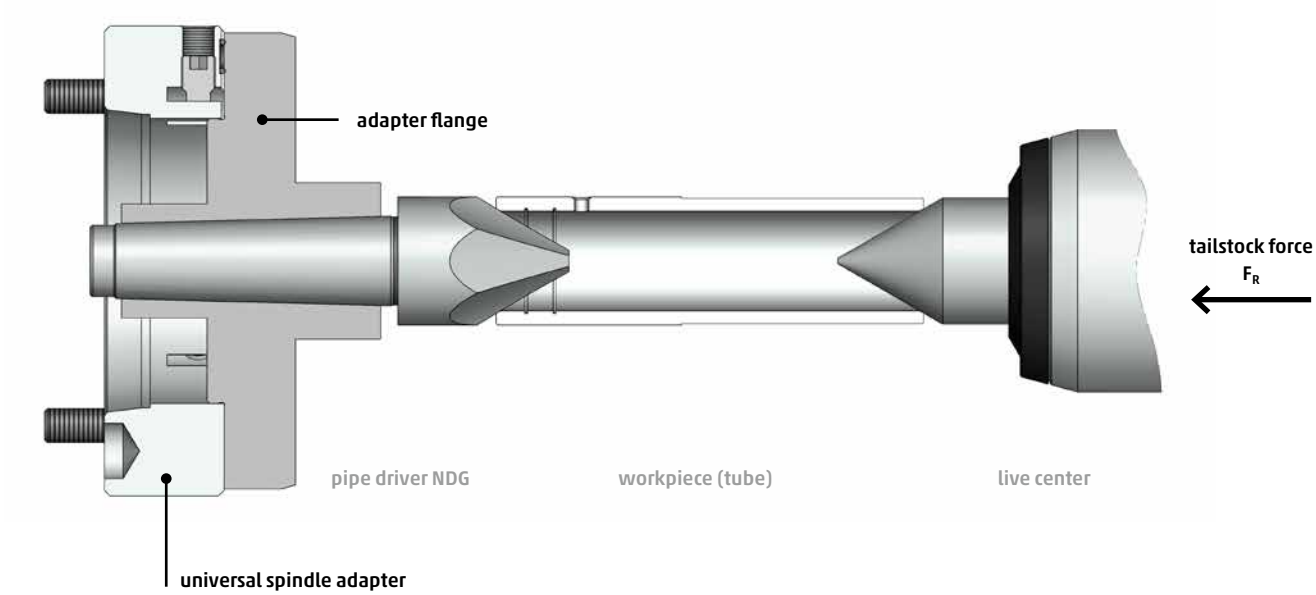
Pipe Drivers NDG / AND

The entire outside surface of a tubular workpiece can be tooled with one single clamping and high torque transmission.

By means of a pipe driver, large clamping areas can be covered.

Type NDG pipe driver

Clamping principle

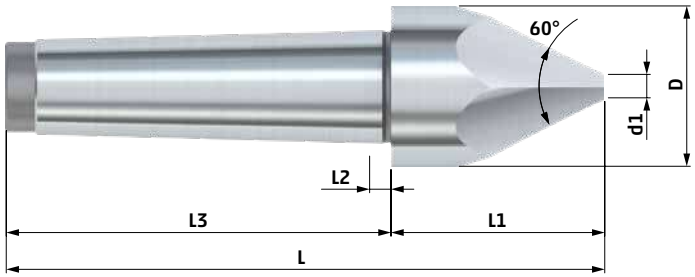


NEIDLEIN pipe drivers NDG and AND ensure:

- high torque transmission, thus achieving a high rate of metal removing
- extended service life of driving chisels
- a large clamping area of tubular workpieces 2 - 155 mm bore-diameter
- finishing of outer surface by clamping » saving of time
- easy handling

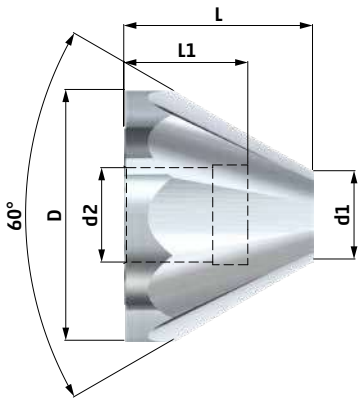
Technical data – type NDG pipe driver

type NDG	morse taper	D	d1	L	L1	L2	L3	a	chisel pcs	for bore-Ø from	for bore-Ø to	cat. no.
0/15	2	18	0	100	31	4	68	60°	6	2	17	**750 01**
0/30	3	31	0	135	50	5	85	60°	6	2	30	**750 02**
10/40	3	45	8	145	60	5	85	60°	6	9	43	**750 03**
20/60	3	63	18	147	62	5	85	60°	8	19	60	**750 04**
10/40	4	45	8	168	60	6	108	60°	6	9	43	**750 05**
20/60	4	63	18	170	62	6	108	60°	8	19	60	**750 06**



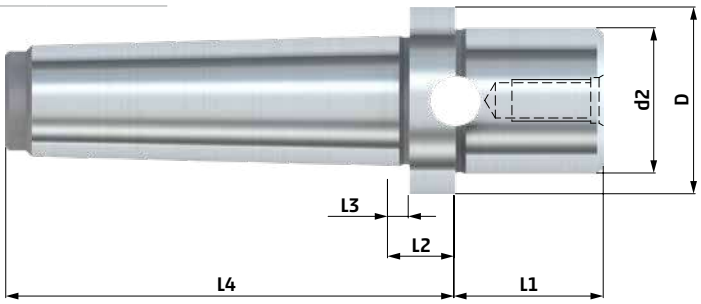
Technical data – type NDG drive cone exchangeable

type NDG	D	d1	d2	L	L1	a	chisel pcs	for bore-Ø from	for bore-Ø to	cat. no.
35/90	93	32.8	35	70	46	60°	10	33	90	**751 01**
90/155	158	88	35	75	46	60°	10	88	155	**751 02**



Technical data – type AND arbor

type AND	morse taper	D	d2	L1	L2	L3	L4	cat. no.
35/4	4	46	35	36	16	5	108	**752 01**
35/5	5	44.5	35	36	16	5	130	**752 02**
35/6	6	64	35	36	16	5	144	**752 03**



Drive Dog DH

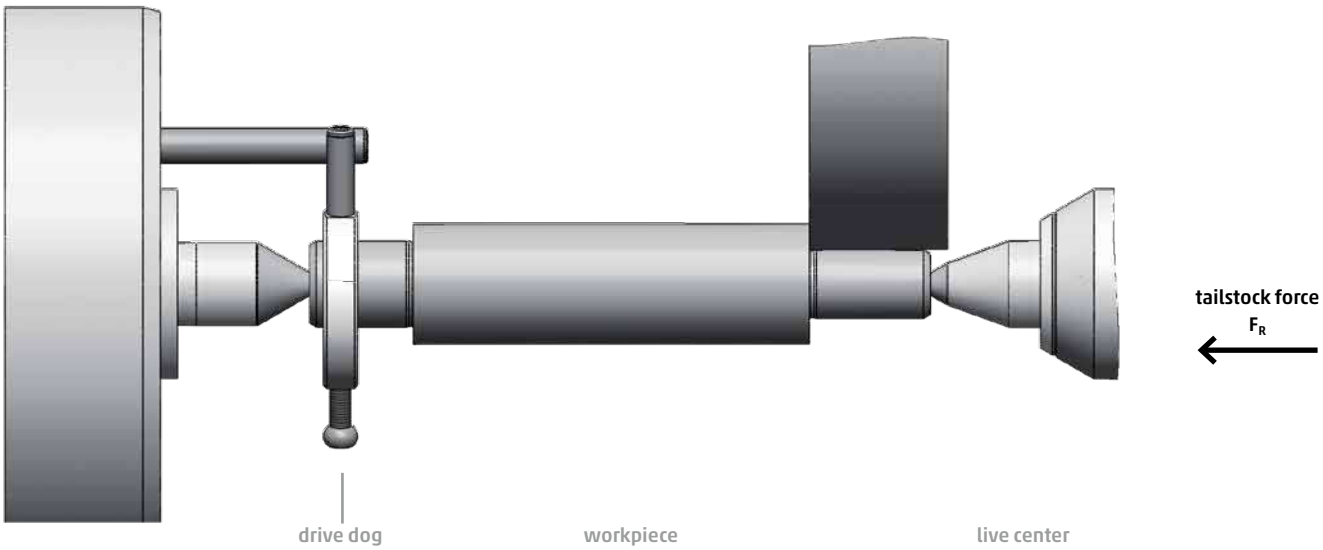
driver for turning and grinding operations

NEIDLEIN drive dogs are used as a driver for turning and grinding operations. The drive dog´s special design and the overlapping clamping ranges ensure a save and reliable driving of all your workpieces. With 8 different sizes, you are able to clamp and drive shafts from Ø 5 mm to Ø 100 mm.

Attention: Only use the drive dogs in machines with guard doors!

Type DH drive dog

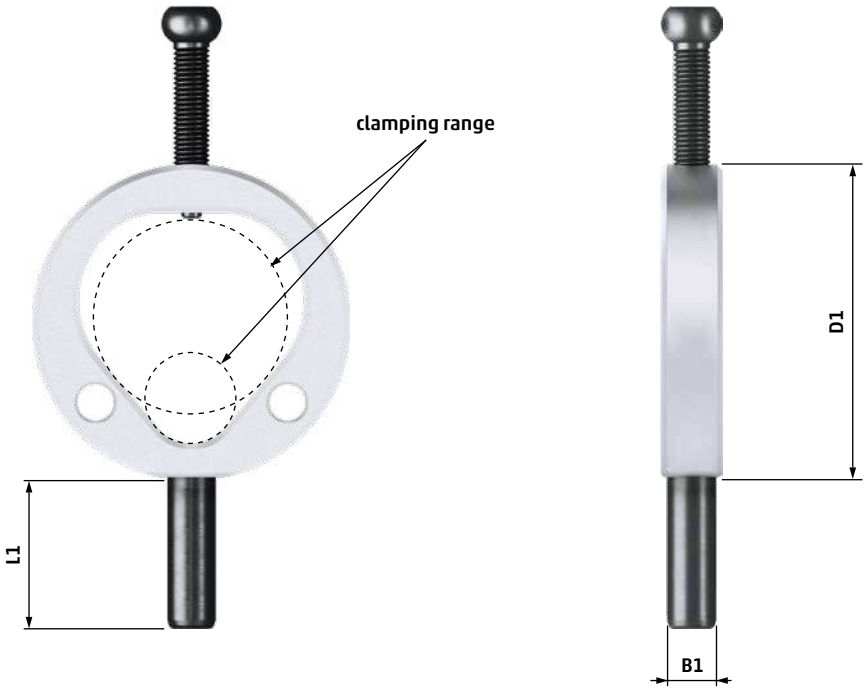
Clamping principle



Consisting of the following features:

- high strength aluminium body
- clamping screw made of unhardened steel
- interchangeable drive pin made of hardened steel

Technical data – type DH drive dog



type DH	clamping range Ø	D1	B1	L1	cat.-no.
12	5 - 12	26	5	15	**710 00**
20.5	10 - 20	36	5	20	**710 01**
20	10 - 20	36	10	20	**710 02**
32	18 - 32	52	10	25	**710 03**
46	30 - 46	72	10	30	**710 04**
62	44 - 62	95	10	35	**710 05**
82	60 - 82	122	14	40	**710 06**
100	80 - 100	150	14	45	**710 07**
set	5 - 100	complete assortment			**710 10**

Mandrels

GSD

ISD

Mandrels GSD / ISD

with fixed centering and floating clamping elements

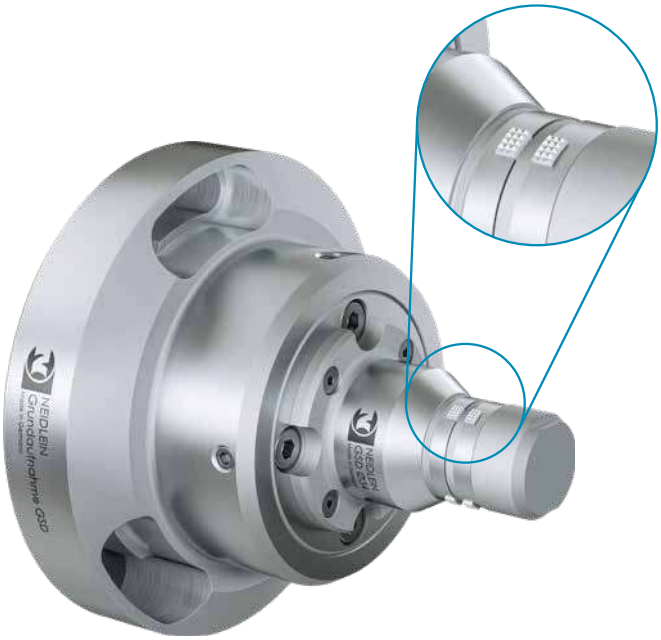
Mandrels of type GSD and ISD

The entire surface of the workpiece can be completely machined with one single clamping and with a maximum of torque transmission. NEIDLEIN mandrels are mechanical clamping systems, suitable for turning, hard turning and grinding operations likewise.

Mandrels of type GSD and ISD are power-operated on the side of the machine spindle as well as the side of the tailstock. The workpieces are clamped centrically by the fixed centering. This operation results in high true run-out accuracy.

Type GSD sliding jaw mandrel

Type GSD is mounted onto the machine spindle nose using flange-adapter, adjustable for true run-out.



Type ISD internal clamping mandrel

Type ISD is mounted onto the machine spindle nose using flange-adapter, adjustable for true run-out.

NEIDLEIN mandrels GSD / ISD with fixed centering ensure:

- maximum of torque transmission, thus achieving a high cutting performance
- datum-point location in the center of the workpiece ensures constant measures of length
- run-out deviation in the process 0.005 - 0.01mm
- fixed clamping location
- floating clamping elements » compensating internal clamping
- sliding jaw mandrels GSD available for bore hole diameters starting from Ø 18 mm
- internal clamping mandrel ISD available for bore hole diameters starting from Ø 10 mm
- changeable centering unit

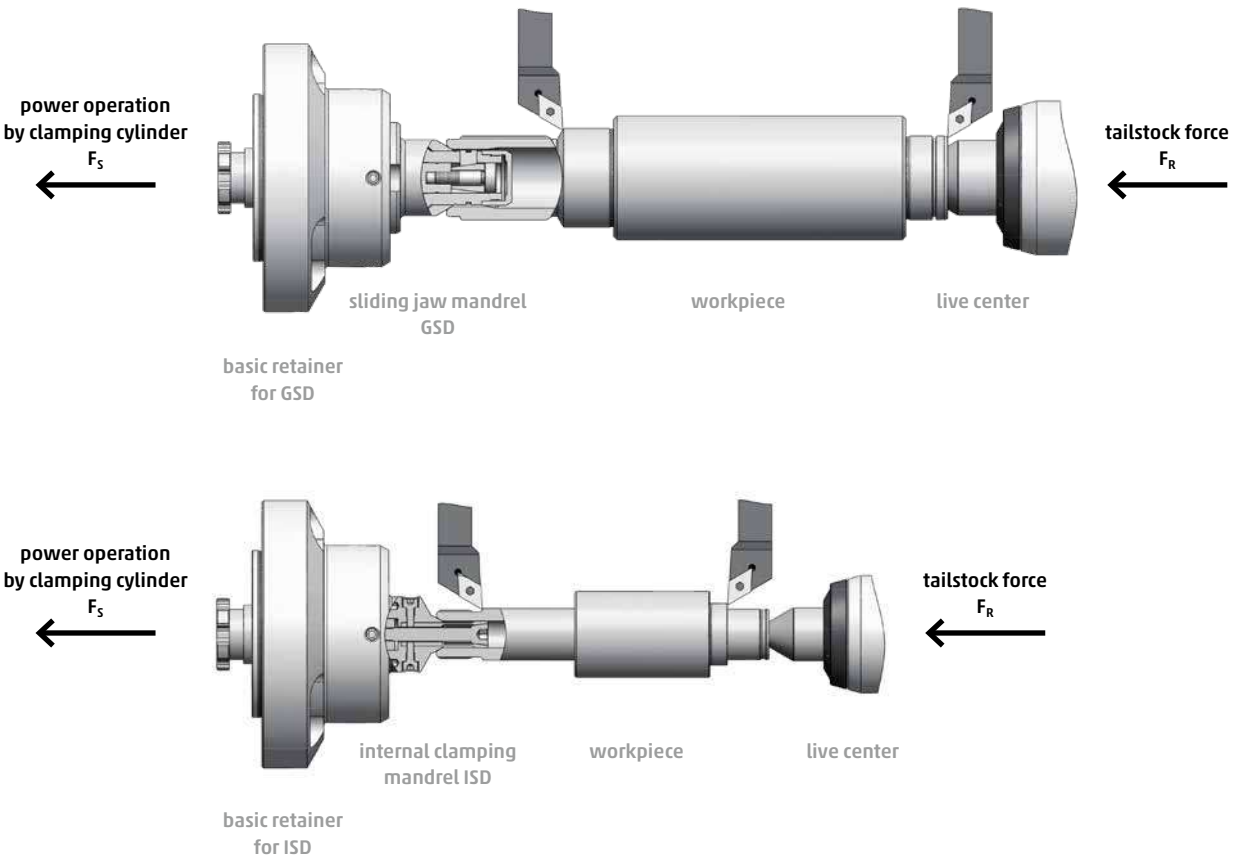
Clamping principle

The center pin located on the side of the tailstock pushes the workpiece against the fixed centering of the mandrel. The actuation of the sliding jaws / clamping sleeve against the surface of the workpiece bore hole is initiated by the clamping cylinder mounted into the machine. The sliding jaws / clamping sleeve are "floatingly" suspended, thus compensating irregularities with regard to possible eccentricity of the workpiece bore hole. The datum-point of workpieces on the machines is determined by the size of the centering. The entire surface of the workpiece can now be tooled in one single clamping.

The data for achievable cutting performance and the thrust requested, you can find in the provided documentation or upon request from our technical sales department.

We will be glad to design clamping devices suitable for your workpieces.

Type GSD / ISD



Sizes and prices of the mandrels and basic retainer upon request

ZF

Mounting Elements

with appropriate accessories for mounting of clamping tools on machine tools

ZFE

RF

RH

Flange Adapters ZF

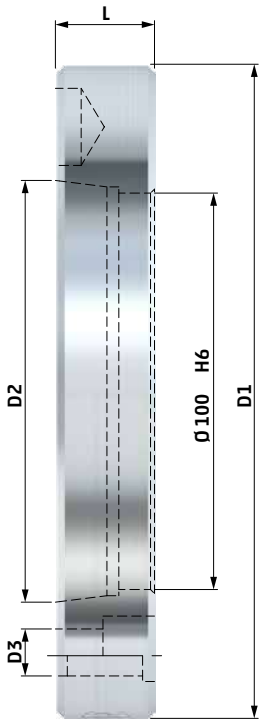
according to DIN ISO 702-1 (DIN 55028)
for mounting of face drivers type FSB / FSBR / FSP / FDNC

The flange adapter is used for direct mounting of **face drivers with movable center pin** on machine tool spindle noses DIN ISO 702-1 (DIN 55026).

Our flange adapters are made of non-hardened steel. This helps to protect the spindle nose and serves for a better damping property.

Type ZF with short taper

Technical data – type ZF with short taper



type ZF	spindle size	D1	D2	D3 for	L	for face drivers FSB / FSBR / FSP / FDNC	cat. no.
5	5	160	82.563	M10	25	01 - 5	**742 02**
6	6	165	106.375	M12	25	01 - 5	**742 04**
8	8	220	139.719	M16	60	01 - 55	**742 062**
11	11	280	196.869	M20	60	01 - 6	**742 082**

- Adapters are supplied with mounting screws to suit the machine tool spindle nose.
- Other sizes and special adapters are available upon request.
- Hardened flange adapters are available upon request.

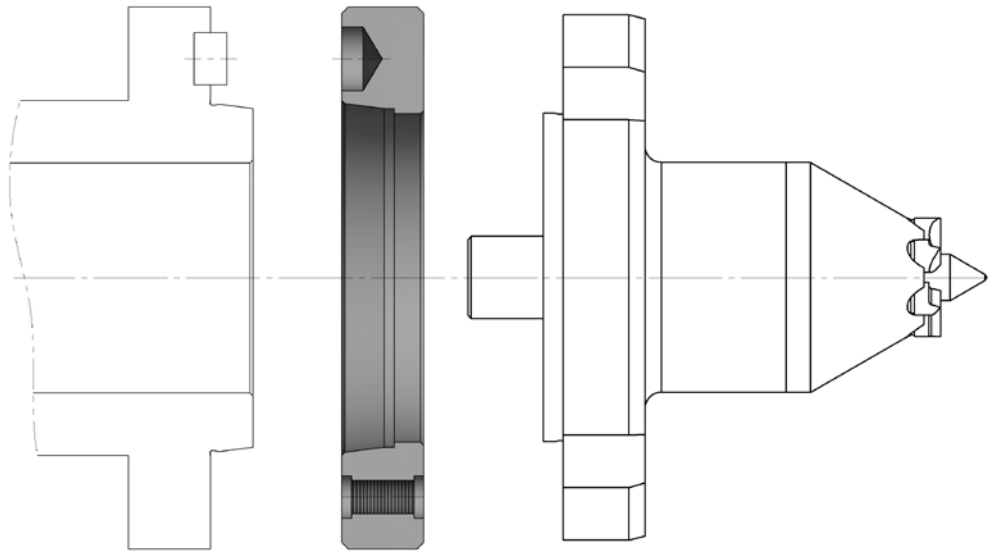
Clamping principle

Face drivers with movable center pin and all other face drivers with retainer Ø 100 are mounted onto the machine tool spindle via flange adapter ZF.

Because of the exactly fitting of the mounting diameter Ø 100 it is possible to adapt the face driver without adjusting the run out.

For increased run out requirements the face driver should be adjusted in the flange adapter.

Type ZF with short taper



spindle
DIN ISO 702-1

flange adapter ZF

face driver FSB

Flange Adapters ZFE (adjustable)

according to DIN ISO 702-1 (DIN 55028)
for mounting face drivers type FFB / FFBH und reducing sleeves type RF

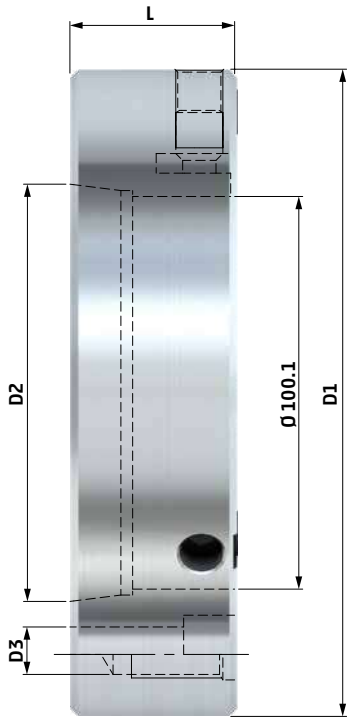
The flange adapter is used for direct mounting of **face drivers type FFB and FFBH** with adjustment true. Adaption on machine tool spindle noses DIN ISO 702-1 (DIN 55026).

Our flange adapters are made of non-hardened steel. This helps to protect the spindle nose and serves for a better damping property.

Type ZFE with short taper

for adjustment at high run out requirements

Technical data – type ZFE with short taper



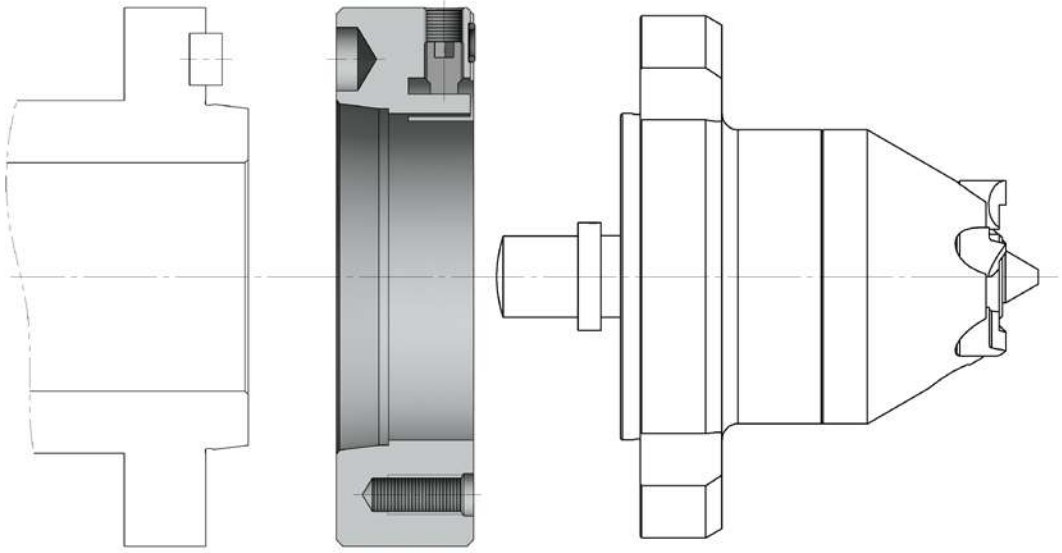
type ZFE	spindle size	D1	D2	D3 for	L	for face drivers FFB / FFBH	cat. no.
5	5	160	82.563	M10	40	01 - 5	**742 12**
6	6	165	106.375	M12	42	01 - 5	**742 14**
8	8	220	139.719	M16	42	01 - 55	**742 16**
11	11	280	196.869	M20	60	01 - 6	**742 18**

- Adapters are supplied with mounting screws to suit the machine tool spindle nose.
- Other sizes and special adapters are available upon request.
- Hardened flange adapters are available upon request.

Clamping principle

Face drivers of the type FFB / FFBH and all other face drivers with retainer Ø 100 which need a very precise run out adjustment are mounted onto the machine tool spindle via flange adapter ZFE.

Type ZFE with short taper



spindle
DIN ISO 702-1

flange adapter ZFE
(adjustable)

face driver FFB

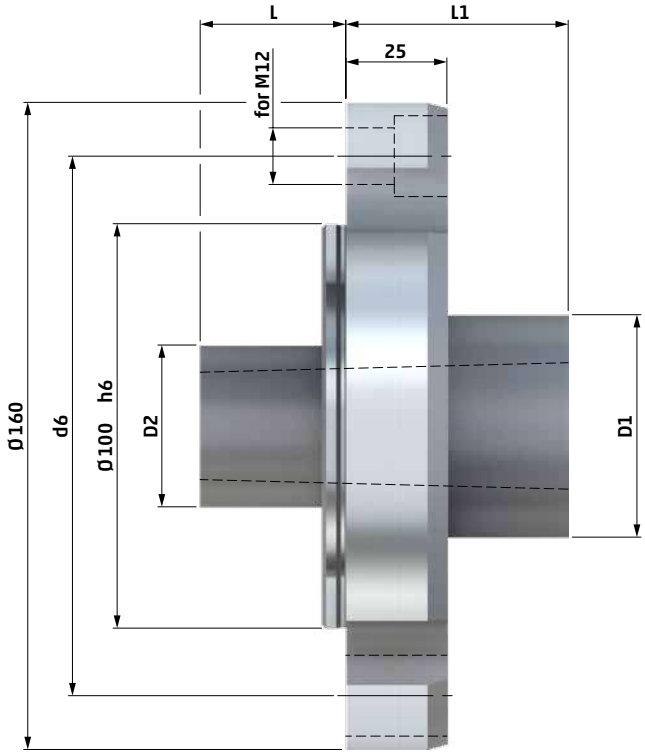
Reducing Adapters RF

for mounting clamping tools with morse taper shank

The reducing adapter is used for direct mounting of **face driver type SB, pipe driver type NDG or of various center pins with morse taper shank.**

Type RF with morse taper

Technical data – type RF with morse taper



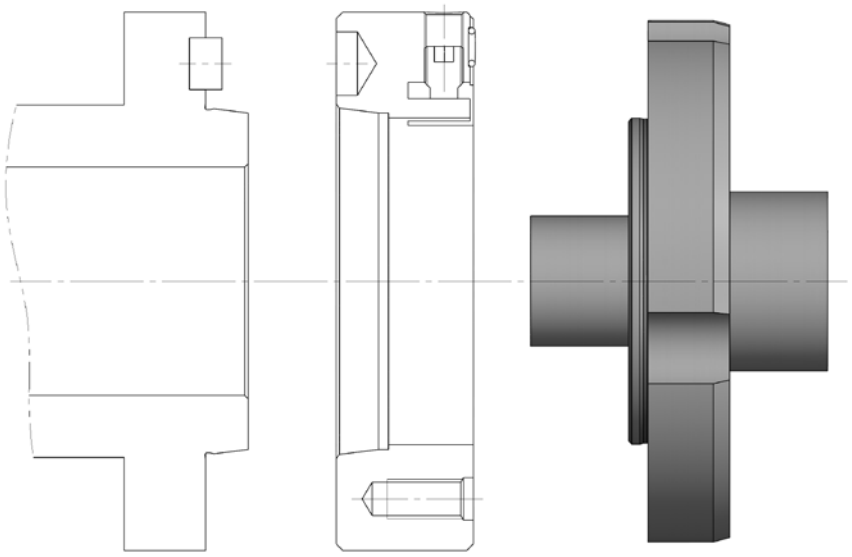
type RF	MK	D1	D2	L	L1	d6	cat. no.
3	**3**	42	36	15	55	133.4	**743 01**
4	**4**	55	40	36	55	133.4	**743 02**
5	**5**	68	55	63	55	133.4	**743 03**
6	**6**	90	80	75	70	133.4	**743 04**

- Adapters are supplied with mounting screws to suit the machine tool spindle nose.
- Other sizes and special adapters are available upon request.

Clamping principle

For mounting a clamping tool with morse taper shank onto a machine tool spindle DIN ISO 702-1, a reducing flange RF is used by mounting it onto the machine tool spindle via flange adapter ZFE (e. g. at a double spindle CNC lathe).

Type RF with morse taper



spindle
DIN ISO 702-1

flange adapter ZFE
(adjustable)

reducing adapter RF

Reducing Sleeves RH / RHZ

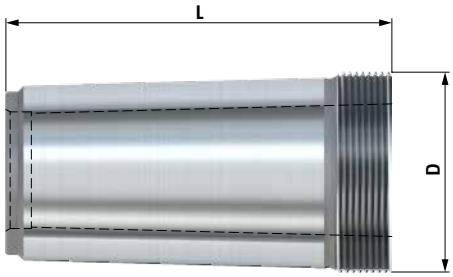
for reducing of morse cone retainers

The reducing sleeve is used for mounting of face driver type SB, pipe driver type NDG or of various center pins with morse taper shank.

Type RH with morse taper

Type RHZ with cyl. retainer

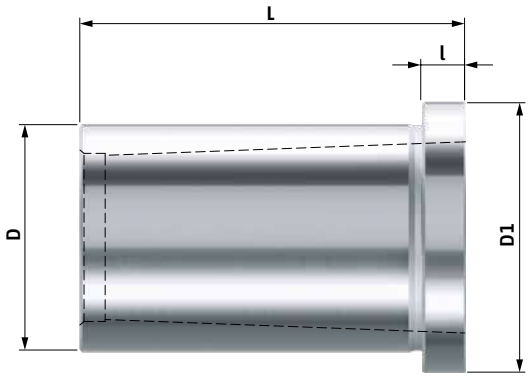
Technical data – type RH with morse taper



type RF	MK outside	MK inside	D screw thread	L	cat. no.
4 / 3	**4**	**3**	M35 x 1.5	82	**932 09**
5 / 3	**5**	**3**	M48 x 1.5	91	**932 10**
5 / 4	**5**	**4**	M48 x 1.5	91	**932 11**
6 / 3	**6**	**3**	M70 x 1.5	128	**932 12**
6 / 4	**6**	**4**	M70 x 1.5	128	**932 13**
6 / 5	**6**	**5**	M70 x 1.5	128	**932 14**

■ Other sizes and special sleeves are available upon request.

Technical data – type RHZ with cyl. retainer



type RHZ	cyl. Ø D	MK inside	D1 collar	L	l	cat. no.
35 / 3	35	3	44	65	8	**932 20**
41 / 4	41	4	49	70	8	**932 21**
61 / 5	61	5	72	80	10	**932 22**
85 / 6	85	6	96	85	10	**932 23**

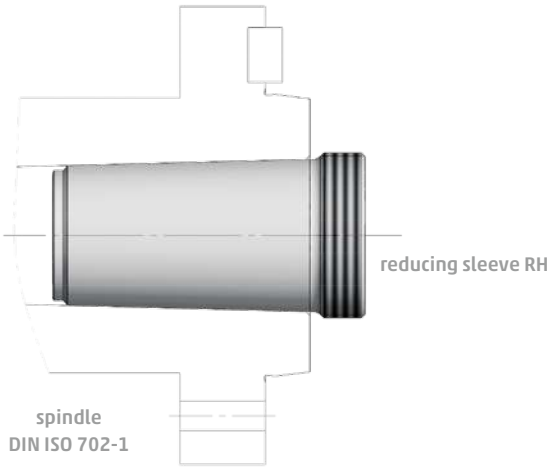
■ Other sizes and special sleeves are available upon request.

Clamping principle

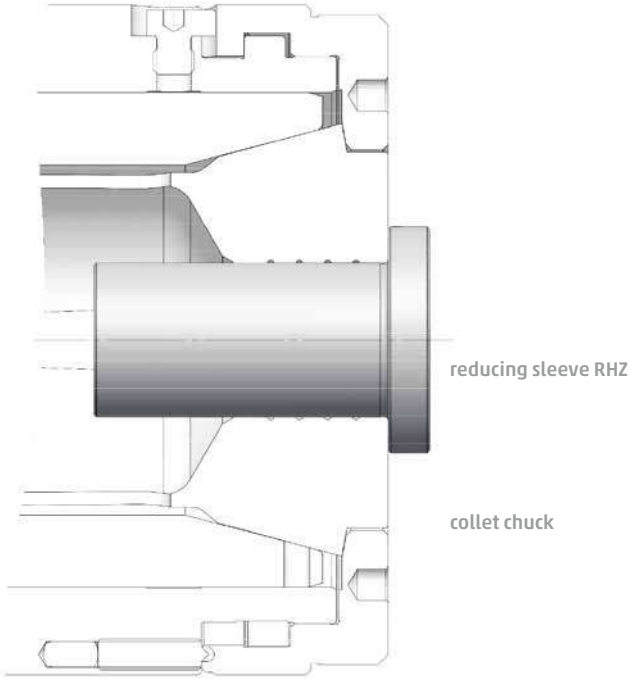
Reducing sleeve RH – For retaining a morse cone shank which is smaller than the available tailstock quill or machine tool spindle, a reducing sleeve with matching size is adapted.

Reducing sleeve RHZ – For retaining a morse cone shank in a collet chuck or a 3 jaw chuck, a reducing sleeve RHZ with cylindrical retainer is adapted.

Type RH with morse taper



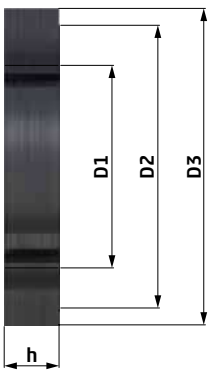
Type RHZ with cyl. retainer



Extracting nut DIN 1804 h · for reducing sleeve RH

Type DIN 1804 h

Technical data – type DIN 1804 h



D1	D2	D3	h	cat. no.
M35 x 1.5	47	55	11	**830 41**
M48 x 1.5	67	75	13	**830 43**
M70 x 1.5	90	100	14	**830 44**

RN

RNW and changeable inserts

RNCS with carbide tip

LIVE CENTERS
FOR TURNING AND GRINDING

LIVE CENTERS
ESPECIALLY FOR GRINDING

Live Centers & Dead Centers

with appropriate accessories

RNF VDI

carbide dead center DIN 807

FNA and changeable center cone

Ultra Live Centers RN / RNC / RNZ

for general use

NEIDLEIN ultra live centers are designed for employment **in turning, grinding and other production machine tools**.

Owing to the application of bearing and the stable design high axial and radial load can be absorbed accurately. Therefore our live centers are outstanding for any application, especially for tooling with face drivers.

Type RN with morse taper

0.005

0.003

HM with full carbide tip

HM with half carbide tip

NEIDLEIN revolving ultra live centers type RN / RNC ensure:

- application of live centers in case of high thrust and loading
- run-out deviation max.
  0.005 mm · type turning
  0.003 mm · type grinding
- enhanced true running accuracy HQ upon request
- maintenance-free, due to gasket system and life-time lubrication of bearings; gasket system comprising variable seal and steel protection cover
- excellent demounting by means of extracting nut and extracting disk, which ensures safe and easy removal of the live center from the tailstock spindle sleeve

Type RNC with morse taper

» extended tooling clearance
for better access of machining tools

0.005
0.003

HM with carbide tip

Type RNZ with morse taper

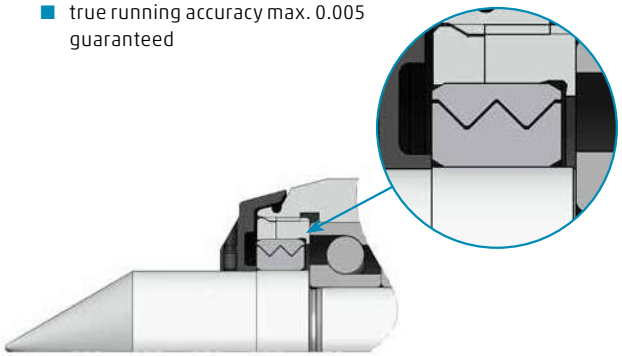
» extended tooling clearance
extended version for more tool clearance

0.005
0.003

LIVE CENTERS & DEAD CENTERS

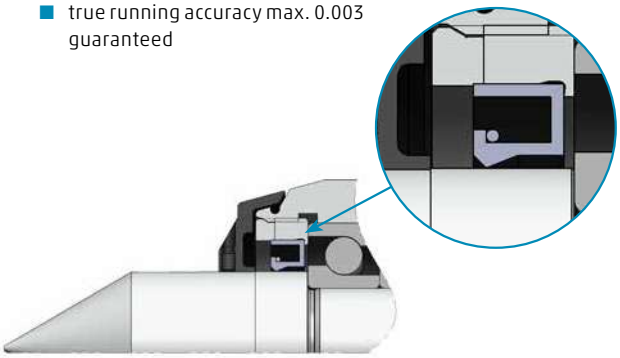
TYPE TURNING

- with contact-free labyrinth seal
- true running accuracy max. 0.005 guaranteed



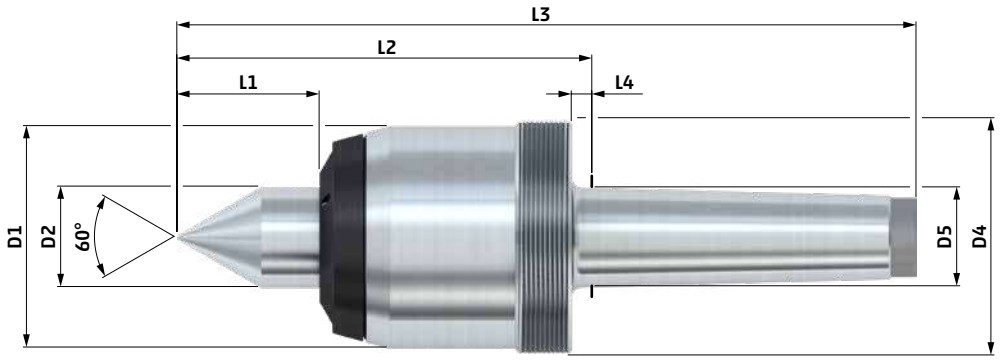
TYPE GRINDING

- with contact spindle seal
- true running accuracy max. 0.003 guaranteed



Technical data – type RN with morse taper

type tool steel tip



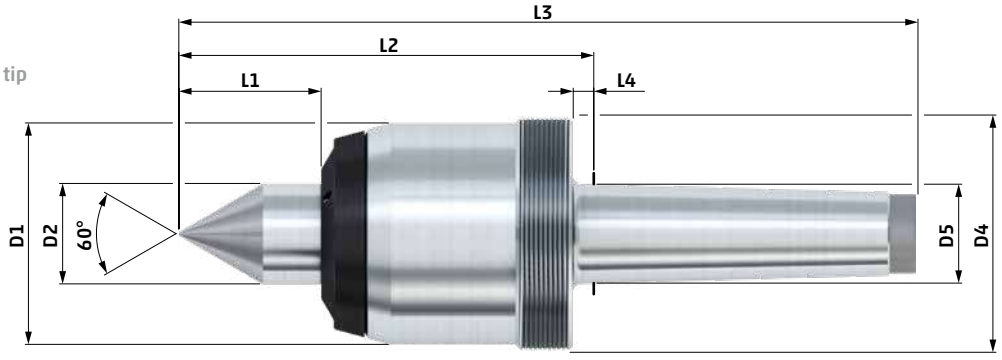
WITH TOOL STEEL TIP

TYPE TURNING TYPE GRINDING

type RN	MK	D1	D2	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	3	55	22	M58 x 1.5	23.83	26	102	183	5	6000	**812 01**	**812 0102**
	4	55	22	M58 x 1.5	31.27	26	103.5	206	6.5	6000	**812 02**	**812 0202**
	5	55	22	M58 x 1.5	44.4	26	103.5	233	6.5	6000	**812 03**	**812 0302**
4	4	70	32	M75 x 1.5	31.27	45	131.2	233.7	6.5	5000	**812 04**	**812 0402**
	5	70	32	M75 x 1.5	44.4	45	131.2	260.7	6.5	5000	**812 05**	**812 0502**
5	5	92	45	M95 x 2	44.4	60	156.2	285.7	6.5	4000	**812 06**	**812 0602**
	6	92	45	M95 x 2	63.35	60	157.7	339.7	8	4000	**812 07**	**812 0702**
6	6	107	55	M110 x 2	63.35	60	169.7	351.7	8	3000	**812 08**	**812 0802**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 140.

HM type full carbide tip



WITH FULL CARBIDE TIP

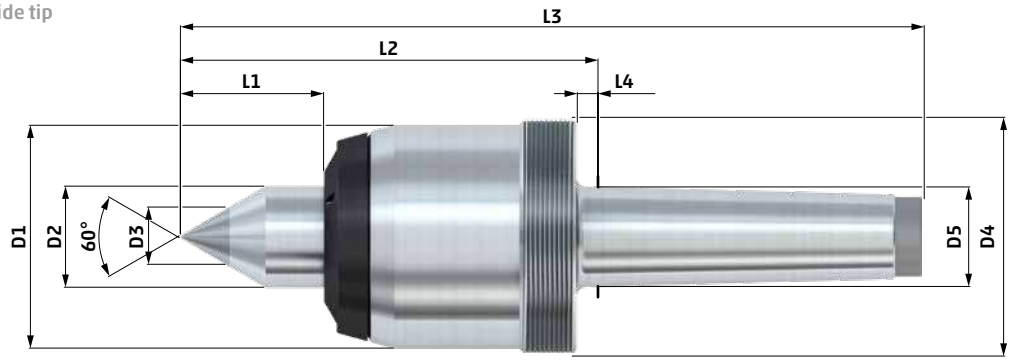
TYPE TURNING TYPE GRINDING

type RN	MK	D1	D2	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	3	55	22	M58 x 1.5	23.83	26	102	183	5	6000	**812 0104**	**812 0106**
	4	55	22	M58 x 1.5	31.27	26	103.5	206	6.5	6000	**812 0204**	**812 0206**
	5	55	22	M58 x 1.5	44.4	26	103.5	233	6.5	6000	**812 0304**	**812 0306**
4	4	70	32	M75 x 1.5	31.27	45	131.2	233.7	6.5	5000	**812 0404**	**812 0406**
	5	70	32	M75 x 1.5	44.4	45	131.2	260.7	6.5	5000	**812 0504**	**812 0506**
5	5	92	45	M95 x 2	44.4	60	156.2	285.7	6.5	4000	**812 0604**	**812 0606**
	6	92	45	M95 x 2	63.35	60	157.7	339.7	8	4000	**812 0704**	**812 0706**
6	6	107	55	M110 x 2	63.35	60	169.7	351.7	8	3000	**812 0804**	**812 0806**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 140.

Technical data – type RN with morse taper

HM type half carbide tip



TYPE TURNING

TYPE GRINDING

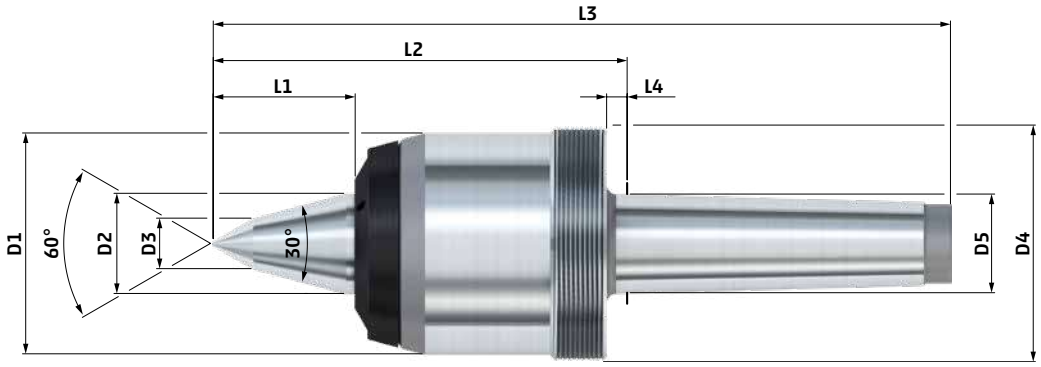
WITH HALF CARBIDE TIP

type RN	MK	D1	D2	D3	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat.no
3	**3**	55	22	11	M58 x 1.5	23.83	26	102	183	5	6000	**812 0103**	**812 0105**
	4	55	22	11	M58 x 1.5	31.27	26	103.5	206	6.5	6000	**812 0203**	**812 0205**
	5	55	22	11	M58 x 1.5	44.4	26	103.5	233	6.5	6000	**812 0303**	**812 0305**
4	**4**	70	32	14	M75 x 1.5	31.27	45	131.2	233.7	6.5	5000	**812 0403**	**812 0405**
	5	70	32	14	M75 x 1.5	44.4	45	131.2	260.7	6.5	5000	**812 0503**	**812 0505**
5	**5**	92	45	22	M95 x 2	44.4	60	156.2	285.7	6.5	4000	**812 0603**	**812 0605**
	6	92	45	22	M95 x 2	63.35	60	157.7	339.7	8	4000	**812 0703**	**812 0705**
6	**6**	107	55	28	M110 x 2	63.35	60	169.7	351.7	8	3000	**812 0803**	**812 0805**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 140.

Technical data – type RNC with morse taper

type tool steel tip



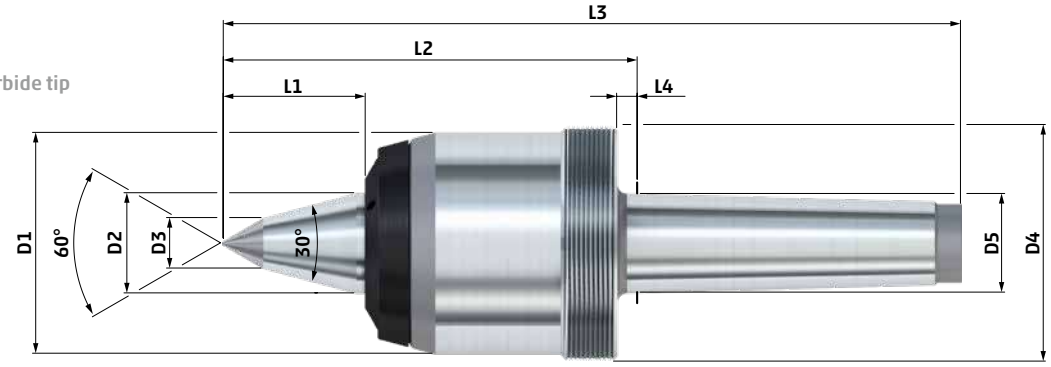
WITH TOOL STEEL TIP

TYPE TURNING TYPE GRINDING

type RNC	MK	D1	D2	D3	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	3	55	22	10	M58 x 1.5	23.83	32	108	189	5	6000	**813 01**	**813 0102**
	4	55	22	10	M58 x 1.5	31.27	32	109.5	212	6.5	6000	**813 02**	**813 0202**
	5	55	22	10	M58 x 1.5	44.4	32	109.5	239	6.5	6000	**813 03**	**813 0302**
4	4	70	32	16	M75 x 1.5	31.27	45	131.2	233.7	6.5	5000	**813 04**	**813 0402**
	5	70	32	16	M75 x 1.5	44.4	45	131.2	260.7	6.5	5000	**813 05**	**813 0502**
5	5	92	45	22	M95 x 2	44.4	62	158.2	287.7	6.5	4000	**813 06**	**813 0602**
	6	92	45	22	M95 x 2	63.35	62	159.7	341.7	8	4000	**813 07**	**813 0702**
6	6	107	55	28	M110 x 2	63.35	72	181.7	363.7	8	3000	**813 08**	**813 0802**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 140.

HM type full carbide tip



WITH CARBIDE TIP

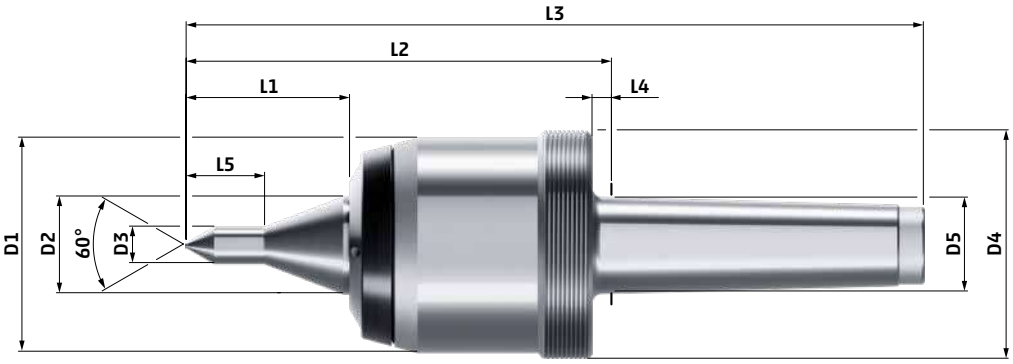
TYPE TURNING TYPE GRINDING

type RNC	MK	D1	D2	D3	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	3	55	22	10	M58 x 1.5	23.83	32	108	189	5	6000	**813 0104**	**813 0106**
	4	55	22	10	M58 x 1.5	31.27	32	109.5	212	6.5	6000	**813 0204**	**813 0206**
	5	55	22	10	M58 x 1.5	44.4	32	109.5	239	6.5	6000	**813 0304**	**813 0306**
4	4	70	32	16	M75 x 1.5	31.27	45	131.2	233.7	6.5	5000	**813 0404**	**813 0406**
	5	70	32	16	M75 x 1.5	44.4	45	131.2	260.7	6.5	5000	**813 0504**	**813 0506**
5	5	92	45	22	M95 x 2	44.4	62	158.2	287.7	6.5	4000	**813 0604**	**813 0606**
	6	92	45	22	M95 x 2	63.35	62	159.7	341.7	8	4000	**813 0704**	**813 0706**
6	6	107	55	28	M110 x 2	63.35	72	181.7	363.7	8	3000	**813 0804**	**813 0806**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 140.

Technical data – type RNZ with morse taper

type tool steel tip



TYPE TURNING

TYPE GRINDING

type RNZ	MK	D1	D2	D3	L5	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	**3**	55	22	10	21	M58 x 1.5	23.83	48	124	205	5.0	6000	**812 51**	**812 5102**
	4	55	22	10	21	M58 x 1.5	31.27	48	125.5	228	6.5	6000	**812 52**	**812 5202**
4	**4**	70	32	12	26	M75 x 1.5	31.27	54	140.2	242.7	6.5	5000	**812 54**	**812 5402**
	5	70	32	12	26	M75 x 1.5	44.4	54	140.2	269.7	6.5	5000	**812 55**	**812 5502**
5	**5**	92	45	14	31	M95 x 1.5	44.4	65	161.2	290.7	6.5	4000	**812 56**	**812 5602**
	6	92	45	14	31	M95 x 1.5	63.35	65	162.7	344.7	8.0	4000	**812 57**	**812 5702**

- Run-out deviation max.: type turning 0.005 mm · type grinding 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 141.

Ultra Live Centers RNA

high flexibility at large workpiece center holes

NEIDLEIN ultra live centers type RNA are designed for employment **in turning, grinding and other production machines**.

Type RNA with morse taper

high degree of flexibility for clamping of workpieces with large centers

0.01
incl. center cone

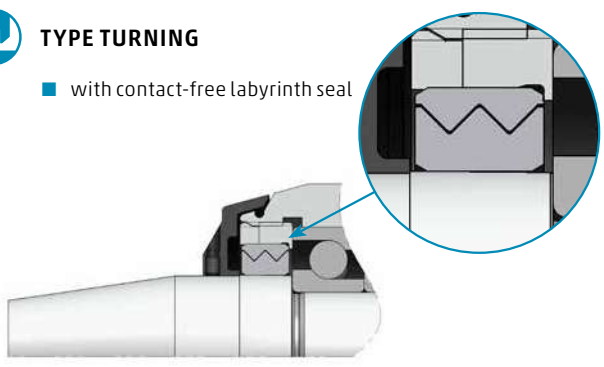
changeable center cone
see page 158

NEIDLEIN revolving ultra live centers type RNA ensure:

- application of live centers in case of high thrust and loading
- run-out deviation max.: 0.01 mm incl. center cone
- easy exchange of center cones using SK30 short taper interface and cylinder screw
- maintenance-free, due to gasket system and life-time lubrication of bearings; gasket system comprising variable seal and steel comprehensive protection cover
- excellent demounting by means of extracting nut and extracting disk, which ensures safe and easy removal of the live center from the tailstock spindle sleeve

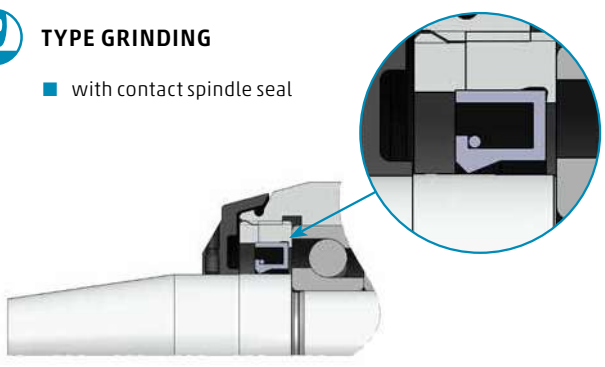
TYPE TURNING

- with contact-free labyrinth seal

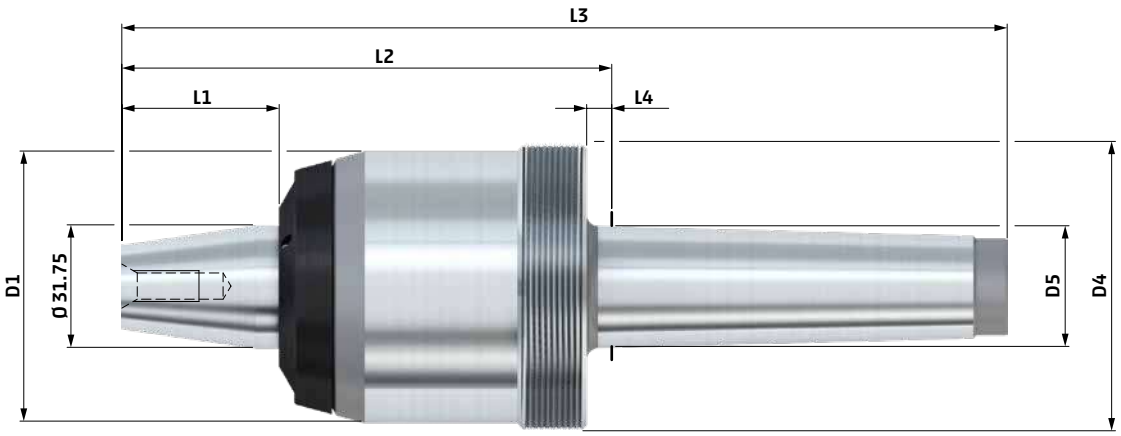


TYPE GRINDING

- with contact spindle seal



Technical data – type RNA with morse taper



TYPE TURNING

TYPE GRINDING

type RNA	MK	D1	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
4	**4**	70	M75 x 1.5	31.27	41	127	229.5	6.5	6000	**814 04**	**814 0402**
	5	70	M75 x 1.5	44.4	41	127	256.5	6.5	6000	**814 05**	**814 0502**
5	**5**	92	M95 x 2	44.4	41	137.2	266.7	6.5	5000	**814 06**	**814 0602**
	6	92	M95 x 2	63.35	41	138.7	320.7	8	5000	**814 07**	**814 0702**
6	**6**	107	M110 x 2	63.35	41	151.7	333.7	8	3000	**814 08**	**814 0802**

- Run-out deviation max.: 0.01 mm incl. center cone.
- Variety of center cones ranging from Ø 25 to Ø 315, see page 158.
- Special cones up to Ø 400 available upon customer's request.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Speed-dependent load see page 140.

Bullnose ultra live centers RK

for work pieces with large center holes

NEIDLEIN bullnose ultra live centers type RK are characterized by a large clamping range and therefore they can cover large work piece center holes.

The clamping system allows for a high degree of flexibility. It enables clamping of work pieces with center hole sizes from Ø 6 to Ø 340. Due to the heavy duty bearing system, work pieces up to 5000 kg can be clamped.

Type RK with morse taper

0.005
type RK3 + RK4

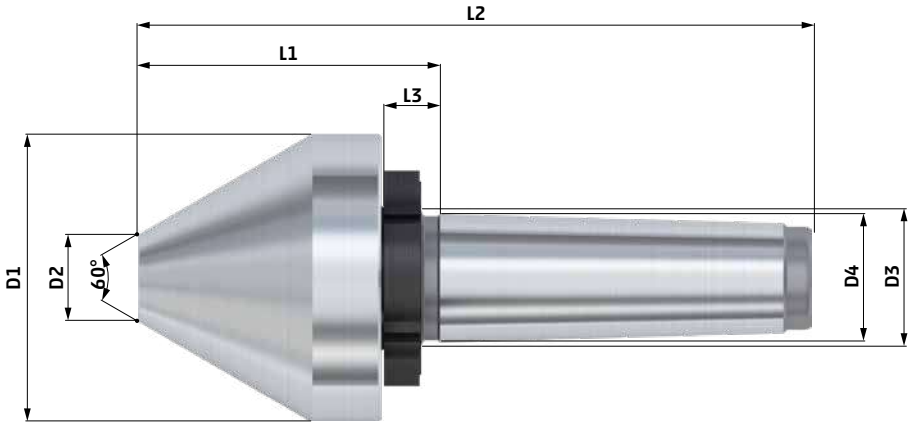
0.007
type RK5

0.01 - 0.02
type RK6

NEIDLEIN bullnose ultra live centers type RK ensure:

- high flexibility due to the large diameter range
- run-out deviation max.: 0.005 - 0.02 (depending onto type)
- high true run accuracy even when using low axial forces
- use in case of high thrust and loads
- maintenance free due to gasket system and life-time lubrication of the bearings; gasket system by use of a shaft seal ring
- excellent demounting by means of extracting nut, which ensures safe and easy removal of the bull nose live center from the tailstock spindle sleeve

Technical data – type RK with morse taper



type RK	MK	D1	D2	D3	D4	L1	L2	L3	rpm. max (1/min.)	cat. no.
3	2	70	2	M22 x 1.5	17.78	93	157	15.5	3000	**820 00**
	3	70	2	M28 x 1.5	23.83	93.5	174.5	16	3000	**820 01**
	4	70	2	M35 x 1.5	31.27	95	197.5	17.5	3000	**820 02**
4	4	100	30	M35 x 1.5	31.27	103	205.5	17.5	2500	**820 03**
	5	100	30	M48 x 1.5	44.4	105	234.5	19.5	2500	**820 04**
5	4	160	90	M35 x 1.5	31.27	135.5	238	17.5	2000	**820 05**
	5	160	90	M48 x 1.5	44.4	137.5	267	19.5	2000	**820 06**
	6	160	90	M70 x 1.5	63.35	140	322	22	2000	**820 07**
6	5	220	150	M48 x 1.5	44.4	157.5	287	19.5	1500	**820 08**
	6	220	150	M70 x 1.5	63.35	160	342	22	1500	**820 09**
	6	280	210	M70 x 1.5	63.35	160	342	22	1500	**820 10**

- load chart see page 141.
- At speeds lower than 500 rpm and high loads, upon request it´s possible to use a heavy duty grease for lubrication of the bearings
- The extraction nut is included.

Bullnose ultra live centers RKA

for heavy workpieces with large centers

NEIDLEIN bullnose ultra live centers type RKA are designed for heavy workpieces with large centers.

The modular clamping system allows for a high degree of flexibility. It enables clamping of workpieces with centers from Ø 50 to Ø 460.

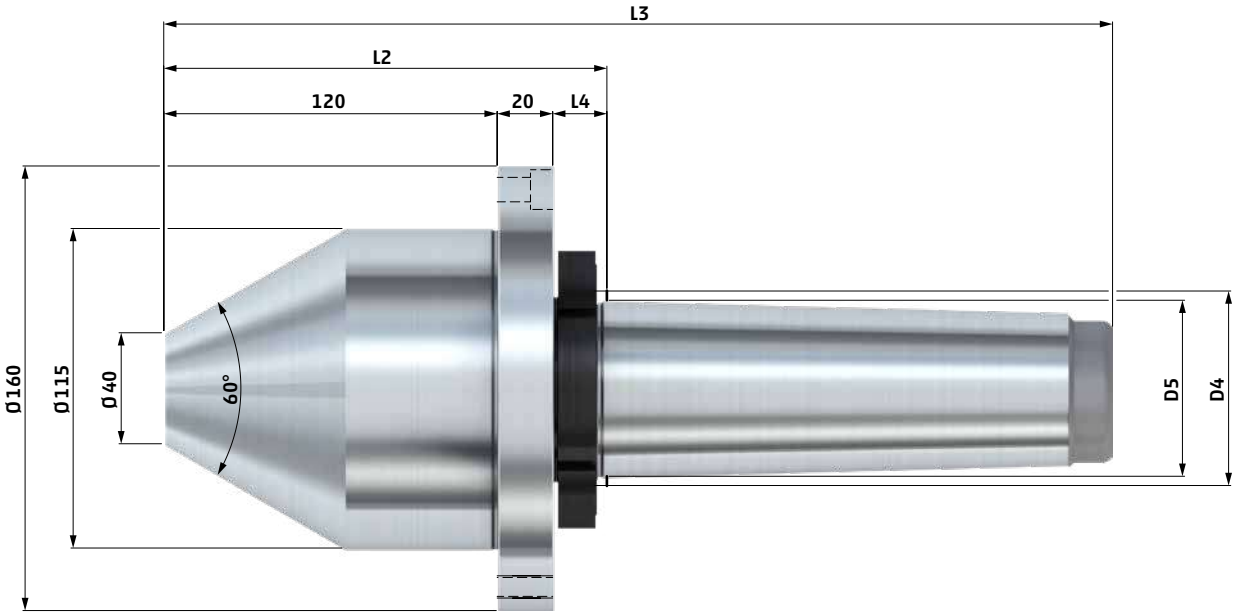
Type RKA basic retainer with morse taper

0.005
without center cone

0.02
incl. center cone

changeable center cones
see page 159

Technical data – type RKA basic retainer with morse taper



type RKA	MK	D4	D5	L2	L3	L4	rpm max. [1 / min]	cat. no.
6	**5**	M48 x 1.5	44.4	159.5	289	19.5	2500	**814 09**
	6	M70 x 1.5	63.35	162.5	344.5	22	2500	**814 10**

- Run-out deviation max.: 0.005 mm without center cone · 0.02 mm incl. center cone.
- Workpieces with centers between Ø 50 and Ø 115 can be clamped using the basic retainer. In this case the max. radial loads (see page 142) must be reduced by 50%.
- Special basic retainer available upon customer's request.
- Basic retainer including extraction nut.
- Accessories on page 159.
- Load chart see page 142.

Ultra Live Centers RNW

high flexibility by using different changable inserts

NEIDLEIN ultra live centers type RNW are designed for employment **in turning, grinding and other production machines**.

Type RNW with morse taper

the adaptation of various changeable inserts ensures a high degree of flexibility and saving of costs

0.01
incl. insert

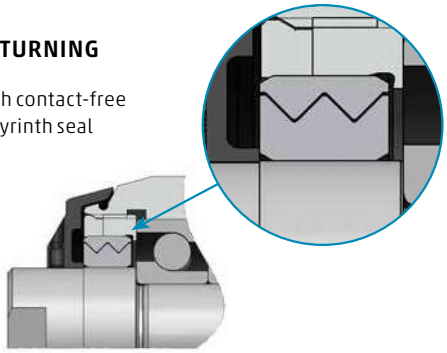
changeable inserts
see page 160 - 161

NEIDLEIN revolving ultra live centers type RNW ensure:

- application of live centers in case of high thrust and loading
- run-out deviation max.: 0.01 mm incl. insert
- easy exchange of changeable inserts using spanner flat and open-end wrench or Tommy bar
- maintenance-free, due to gasket system and life-time lubrication of bearings; gasket system comprising variable seal and steel comprehensive protection cover
- excellent demounting by means of extracting nut and extracting disk, which ensures safe and easy removal of the live center from the tailstock spindle sleeve

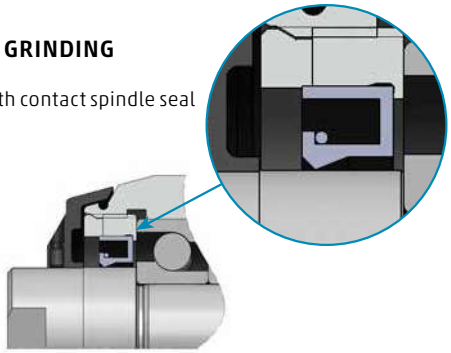
TYPE TURNING

- with contact-free labyrinth seal

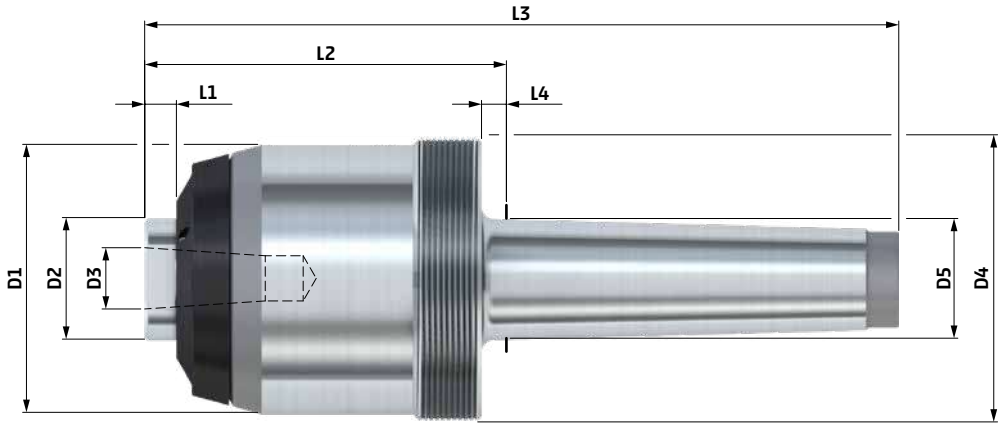


TYPE GRINDING

- with contact spindle seal



Technical data – type RNW with morse taper



TYPE TURNING

TYPE GRINDING

type RNW	MK	D1	D2	D3	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.	cat. no.
3	3	55	22	16	M58 x 1.5	23.83	6.3	82	163	5	6000	**815 01**	**815 0102**
	4	55	22	16	M58 x 1.5	31.27	6.3	83.5	186	6.5	6000	**815 02**	**815 0202**
	5	55	22	16	M58 x 1.5	44.4	6.3	83.5	213	6.5	6000	**815 03**	**815 0302**
4	4	70	32	16	M75 x 1.5	31.27	8.3	94.5	197	6.5	5000	**815 04**	**815 0402**
	5	70	32	16	M75 x 1.5	44.4	8.3	94.5	224	6.5	5000	**815 05**	**815 0502**
5	5	92	45	22	M95 x 2	44.4	10.3	106.5	236	6.5	4000	**815 06**	**815 0602**
	6	92	45	22	M95 x 2	63.35	10.3	108	290	8	4000	**815 07**	**815 0702**
6	6	107	55	22	M110 x 2	63.35	10.3	120	302	8	3000	**815 08**	**815 0802**

- Run-out deviation max.: 0.01 mm incl. insert.
- Various changeable inserts of different designs, see page 160 - 161.
- Special inserts available upon customer's request.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Speed-dependent load see page 142.

Ultra Live Centers RNF / RNCF

spring loaded live center

NEIDLEIN ultra live centers type RNF are especially suitable for **employment in turrets, in manual tailstocks and in case of linear thermal extension of workpieces**.

The spring loaded, moving spindle and the engraved scale rings enable the adjustment and/or programming of various axial forces.

Type RNF with morse taper

0.003

Type RNCF with morse taper

» extended tooling clearance
for better access of machining tools

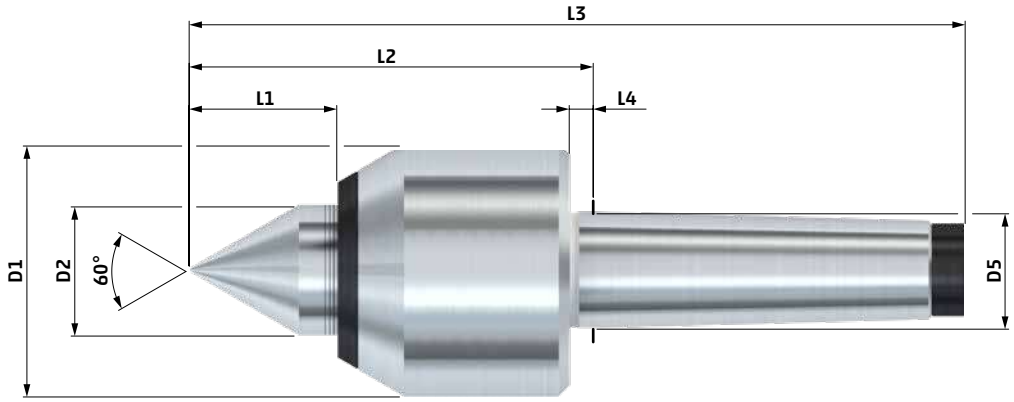
0.003

NEIDLEIN ultra live centers type RNF / RNCF ensure:

- employment of live centers in turrets and manual tailstocks when hydraulic systems cannot guarantee any repositioning
- compensation if there is a linear thermal extension of workpieces or if the extension is caused by the process of machining
- run-out deviation max.: 0.003 mm
- maintenance free, due to the gasket system and the lifetime lubrication filling of the bearing
- obtaining of the axial forces applied via scale rings as well as clarification of the force ranges on the outside of the housing

Example type RNF 4 MK4

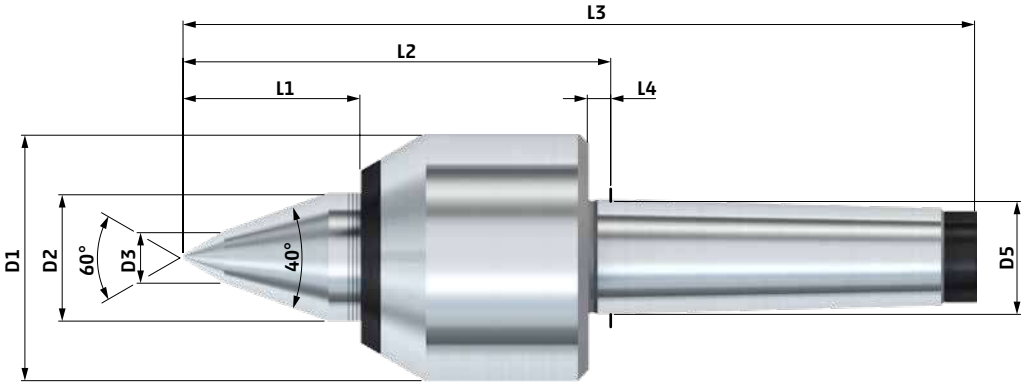
Technical data – type RNF with morse taper



type RNF	MK	D1	D2	D3	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.
3	3	55	25	-	23.83	28.5	84.5	165	5	4500	**817 01**
	4	55	25	-	31.27	28.5	86	185.5	6.5	4500	**817 02**
	5	55	25	-	44.4	28.5	86	215.5	6.5	4500	**817 03**
4	4	68	35	-	31.27	40	109.5	210.3	6.5	4000	**817 04**
	5	68	35	-	44.4	40	109.5	239	6.5	4000	**817 05**
5	5	92	50	-	44.4	53	138.5	268	6.5	3500	**817 09**

- Run-out deviation max.: 0.003 mm.
- Models with extraction thread or with special spindles are available upon customer's request.
- Load chart see page 143.

Technical data – type RNCF with morse taper



type RNCF	MK	D1	D2	D3	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.
3	3	55	25	12	23.83	37	93	173.5	5	4500	**818 01**
	4	55	25	12	31.27	37	94.5	194	6.5	4500	**818 02**
	5	55	25	12	44.4	37	94.5	224	6.5	4500	**818 03**
4	4	68	35	14	31.27	49	118.5	219.3	6.5	4000	**818 04**
	5	68	35	14	44.4	49	118.5	248	6.5	4000	**818 05**
5	5	92	50	22	44.4	65	150.5	280	6.5	3500	**818 09**

- Run-out deviation max.: 0.003 mm.
- Models with extraction thread or with special spindles are available upon customer's request.
- Load chart see page 143.

Ultra Live Centers RNF / RNCF VDI

spring loaded live center with VDI retainer

NEIDLEIN ultra live centers type RNF/RNCF VDI are adapted in the tool turret and are **especially suited for CNC machines without tailstock or with sub spindle**.

The spring loaded, moving spindle and the engraved scale rings enable the adjustment and/or programming of various axial forces.

Type RNF with VDI retainer

0.003

Type RNCF with VDI retainer

» extended tooling clearance
for better access of machining tools

0.003

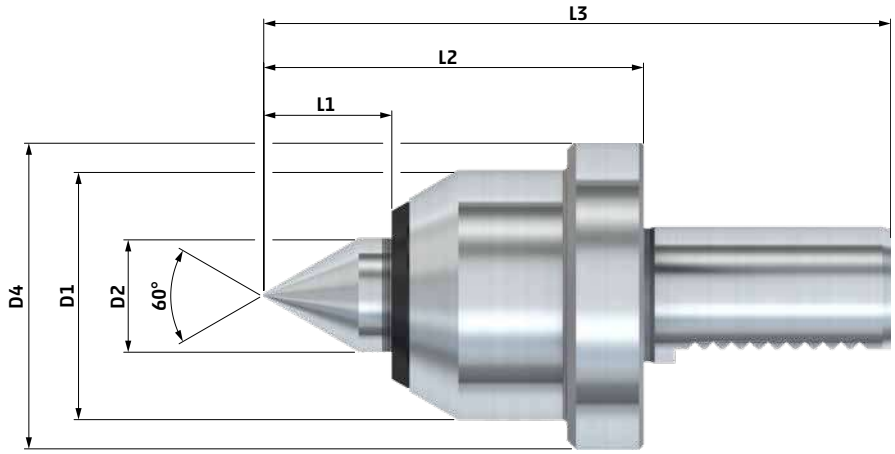
NEIDLEIN ultra live centers type RNF / RNCF VDI ensure:

- employment of live centers in turrets when hydraulic systems cannot guarantee any repositioning
- compensation if there is a linear thermal extension of workpieces or if the extension is caused by the process of machining
- run-out deviation max.: 0.003 mm
- maintenance free, due to the gasket system and the lifetime lubrication filling of the bearing
- obtaining of the axial forces applied via scale rings as well as clarification of the force ranges on the outside of the housing

Example type RNF 4 VDI 40

Technical data – type RNF with VDI retainer

DIN ISO 10889-1

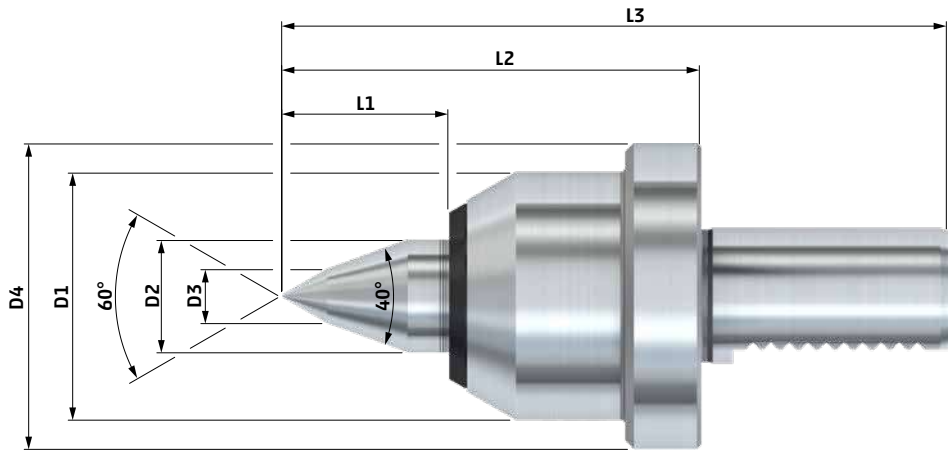


type RNF	VDI	D1	D2	D3	D4	L1	L2	L3	rpm max. [1 / min]	cat. no.
3	**30**	55	25	-	68	28.5	84.5	139.5	4500	**817 06**
	40	55	25	-	83	28.5	84.5	147.5	4500	**817 07**
4	**40**	68	35	-	83	40	108	171	4000	**817 08**

- Run-out deviation max.: 0.003 mm.
- Load chart see page 143.

Technical data – type RNCF with VDI retainer

DIN ISO 10889-1



type RNCF	VDI	D1	D2	D3	D4	L1	L2	L3	rpm max. [1 / min]	cat. no.
3	**30**	55	25	12	68	37	93	148	4500	**818 06**
	40	55	25	12	83	37	93	156	4500	**818 07**
4	**40**	68	35	14	83	49	117	180	4000	**818 08**

- Run-out deviation max.: 0.003 mm.
- Load chart see page 143.

Ultra Live Centers RNWF MK + VDI

spring loaded live center with morse taper and VDI retainer

NEIDLEIN ultra live centers type RNWF are especially suitable for **employment in turrets, in manual tailstocks and in case of linear thermal extension of workpieces**.

The spring loaded, moving spindle and the engraved scale rings enable the adjustment and/or programming of various axial forces.

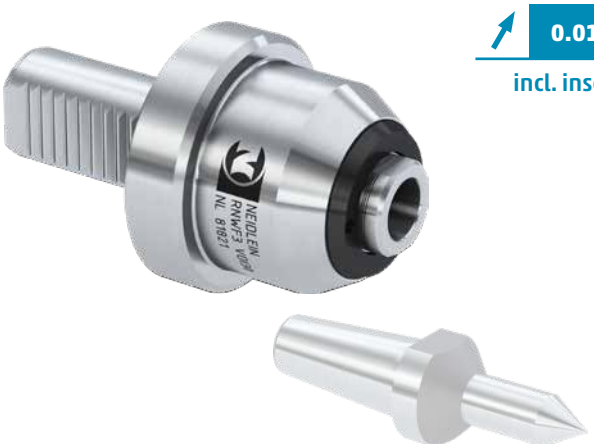
Type RNWF with morse taper

the adaptation of various changeable inserts ensures a high degree of flexibility and saving of costs

0.01 incl. insert

Type RNWF with VDI retainer

0.01 incl. insert



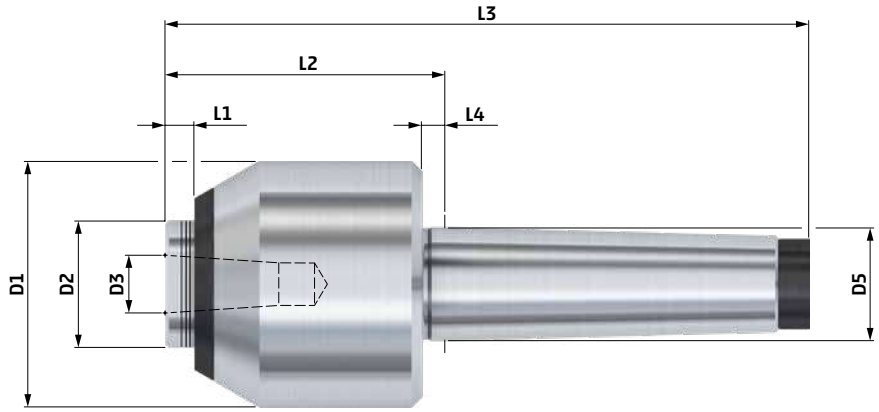
changeable inserts
see page 160-161

NEIDLEIN ultra live centers type RNWF ensure:

- employment of live centers in turrets and manual tailstocks when hydraulic systems cannot guarantee any repositioning
- compensation if there is a linear thermal extension of workpieces or if the extension is caused by the process of machining
- run-out deviation max.: 0.01 mm incl. insert
- easy exchange of changeable inserts using spanner flat and open-end wrench or Tommy bar
- maintenance free, due to the gasket system and the lifetime lubrication filling of the bearing
- obtaining of the axial forces applied via scale rings as well as clarification of the force ranges on the outside of the housing

Example
RNWF 4 MK4

Technical data – type RNWF with morse taper

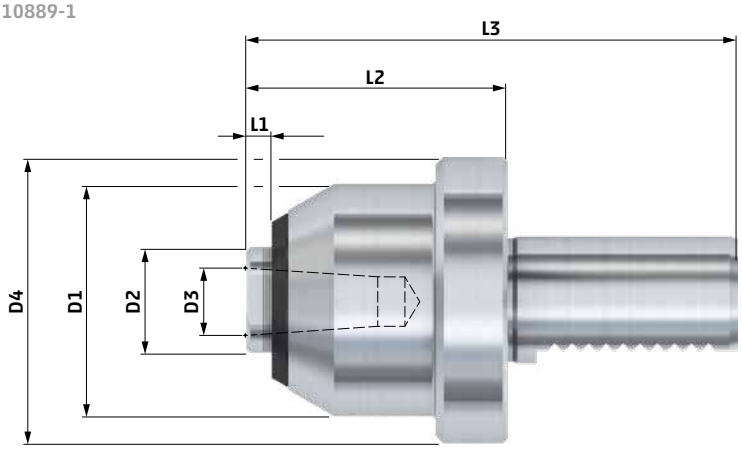


type RNWF	MK	D1	D2	D3	D5	L1	L2	L3	L4	rpm max. [1 / min]	cat. no.
3	3	55	25	16	23.83	6	62	142.5	5	4500	**818 15**
	4	55	25	16	31.27	6	63.5	163	6.5	4500	**818 16**
	5	55	25	16	44.4	6	63	193	6.5	4500	**818 17**
4	4	68	35	16	31.27	8	77.5	178.3	6.5	4000	**818 18**
	5	68	35	16	44.4	8	77.5	207	6.5	4000	**818 19**
5	5	92	50	22	44.4	10	95.5	225	6.5	3500	**818 20**

- Run-out deviation max.: 0.01 mm with insert.
- Models with extraction thread or with special spindles are available upon customer's request.
- Load chart see page 143.
- Various changeable inserts of different designs, see page 160 - 161.

Technical data – type RNWF with VDI retainer

DIN ISO 10889-1



type RNWF	VDI	D1	D2	D3	D4	L1	L2	L3	rpm max. [1 / min]	cat. no.
3	30	55	25	16	68	6	62	117	4500	**818 21**
	40	55	25	16	83	6	62	125	4500	**818 22**
4	40	68	35	16	83	8	76	139	4000	**818 23**

- Run-out deviation max.: 0.01 mm with insert.
- Load chart see page 143.
- Various changeable inserts of different designs, see page 160 - 161.

Ultre Live Centers RNS / RNCS

especially for grinding operations

NEIDLEIN ultra live centers type RNS / RNCS are **especially suited for the use in grinding and other production machine tools**.

By the specific arrangement of the bearings, the design of the live centers is very short and also the live centers can be used for precise clamping of heavy workpieces with high axial forces. Therefore they are ideal for every use, especially in combination with face drivers.

Type RNS with morse taper

0.003

HM with carbide tip for hardened workpieces and high production quantities

NEIDLEIN ultra live centers RNS / RNCS ensure:

- short projection length
- run-out deviation max.: 0.003 mm
- high true run accuracy even when using low axial forces
- application of live centers in case of high axial and radial loads
- maintenance free, due to the gasket system and the lifetime lubrication of the bearings
- easy and safe removal by means of extracting nut and extracting disk

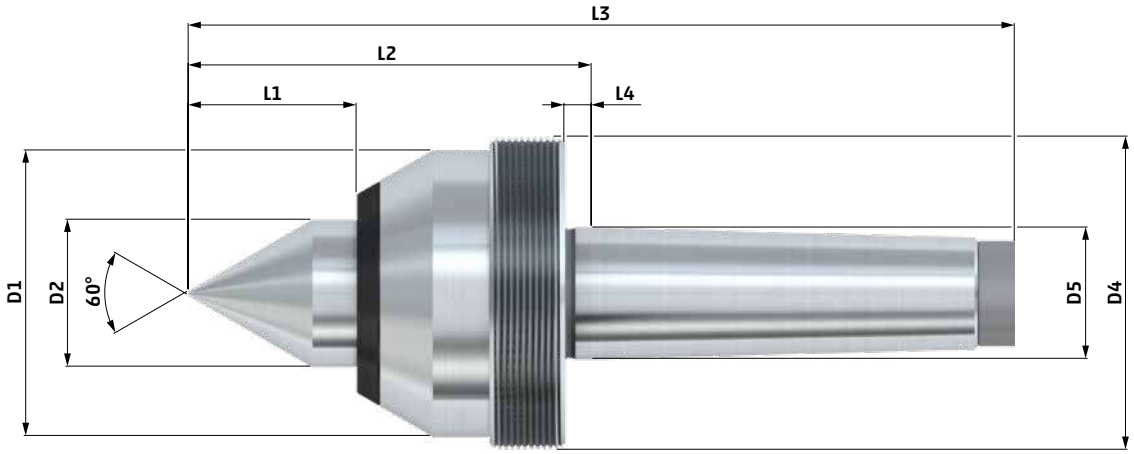
Type RNCS with morse taper

» extended tooling clearance
for better access of machining tools

0.003

HM with carbide tip
for hardened workpieces
and high production quantities

Technical data – type RNS with morse taper

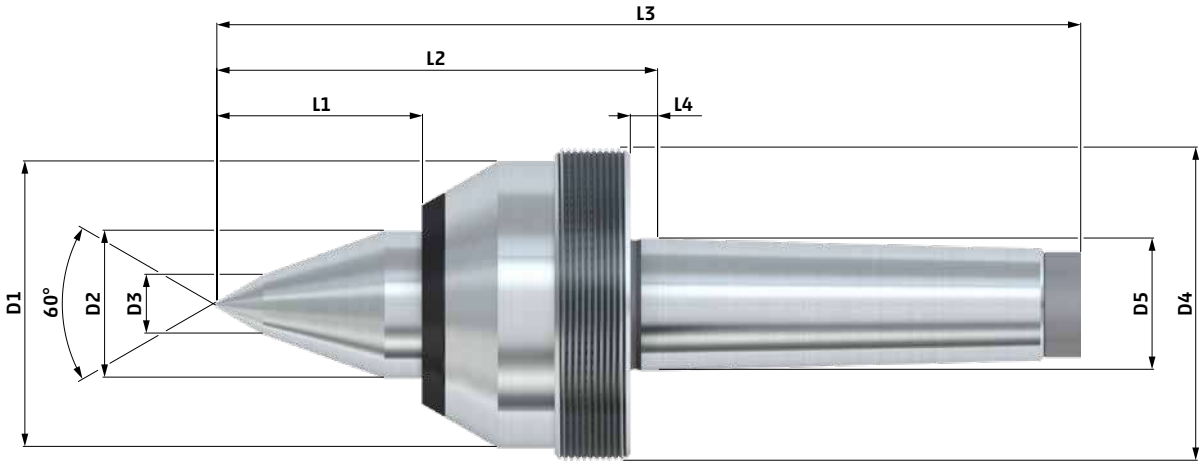


HM type caride tip

type RNS	MK	D1	D2	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	TYPE TOOL STEEL cat. no.	TYPE CARBIDE cat. no.
1	**2**	34	18	M36 x 1.5	17.78	20	61	125	5	6000	**818 97**	**818 9706**
	3	34	18	M36 x 1.5	23.83	20	61	142	5	6000	**818 98**	**818 9806**
2	**3**	42	22	M48 x 1.5	23.83	25	72	152.5	5	5500	**818 99**	**818 9906**
	4	42	22	M48 x 1.5	31.27	25	73.5	173	6.5	5500	**819 00**	**819 0006**
3	**3**	55	25	M58 x 1.5	23.83	28	74.5	155	5	4500	**819 01**	**819 0106**
	4	55	25	M58 x 1.5	31.27	28	76	175.5	6.5	4500	**819 02**	**819 0206**
	5	55	25	M58 x 1.5	44.4	28	76	205.5	6.5	4500	**819 03**	**819 0306**
4	**4**	68	35	M75 x 1.5	31.27	40	96	197	6.5	4000	**819 04**	**819 0406**
	5	68	35	M75 x 1.5	44.4	40	96	225.5	6.5	4000	**819 05**	**819 0506**
5	**5**	92	50	M95 x 2	44.4	53	119	248.5	6.5	3600	**819 06**	**819 0606**

- Run-out deviation max.: 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 144.

Technical data – type RNCS with morse taper



HM type caride tip

type RNCS	MK	D1	D2	D3	D4	D5	L1	L2	L3	L4	rpm max. [1 / min]	TYPE TOOL STEEL cat. no.	HM TYPE CARBIDE cat. no.
1	**2**	34	18	6	M36 x 1.5	17.78	26	67	131	5	6000	**819 17**	**819 1706**
	3	34	18	6	M36 x 1.5	23.83	26	67	148	5	6000	**819 18**	**819 1806**
2	**3**	42	22	10	M48 x 1.5	23.83	29	76	156.5	5	5000	**819 19**	**819 1906**
	4	42	22	10	M48 x 1.5	31.27	29	77.5	177	6.5	5000	**819 20**	**819 2006**
3	**3**	55	25	12	M58 x 1.5	23.83	37	83.5	164	5	4500	**819 21**	**819 2106**
	4	55	25	12	M58 x 1.5	31.27	37	85	186.5	6.5	4500	**819 22**	**819 2206**
	5	55	25	12	M58 x 1.5	44.4	37	85	214.5	6.5	4500	**819 23**	**819 2306**
4	**4**	68	35	14	M75 x 1.5	31.27	49	105.5	206	6.5	4000	**819 24**	**819 2406**
	5	68	35	14	M75 x 1.5	44.4	49	105	234.5	6.5	4000	**819 25**	**819 2506**
5	**5**	92	50	22	M95 x 2	44.4	65	131	260.5	6.5	3600	**819 26**	**819 2606**

- Run-out deviation max.: 0.003 mm.
- Extracting nuts and extracting disks see page 172 - 173 for accessories.
- Load chart see page 144.

Load Charts for Live Centers

TYPE RN tool steel and with full carbide tip
TYPE RNC / RNZ / RNA tool steel

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	110	110	220
	500		90		
	1000		70		
	2000		50		
	4000		30		
	6000		10		
	250	axial	600	600	
	500		600		
	1000		600		
	2000		500		
	4000		400		
	6000		350		
4	250	radial	250	250	500
	500		210		
	1000		170		
	2000		120		
	3500		70		
	5000		20		
	250	axial	900	900	
	500		900		
	1000		700		
	2000		600		
	3500		500		
	5000		500		
5	250	radial	600	600	1200
	500		520		
	1000		420		
	2000		310		
	3000		200		
	4000		50		
	250	axial	1500	1500	
	500		1400		
	1000		1300		
	2000		1100		
	3000		900		
	4000		700		
6	250	radial	750	750	1500
	500		650		
	1000		520		
	2000		360		
	3000		200		
	250	axial	2000	2000	
	500		2000		
	1000		1600		
	2000		1400		
	3000		1200		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RN with half carbide tip
TYPE RNC with carbide tip

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	75	75	150
	500		65		
	1000		55		
	2000		40		
	4000		25		
	6000		10		
	250	axial	600	600	
	500		600		
	1000		600		
	2000		500		
	4000		400		
	6000		350		
4	250	radial	150	150	300
	500		130		
	1000		110		
	2000		85		
	3500		60		
	5000		20		
	250	axial	900	900	
	500		900		
	1000		700		
	2000		600		
	3500		500		
	5000		500		
5	250	radial	300	300	600
	500		250		
	1000		200		
	2000		150		
	3000		100		
	4000		40		
	250	axial	1500	1500	
	500		1400		
	1000		1300		
	2000		1100		
	3000		900		
	4000		700		
6	250	radial	450	450	900
	500		380		
	1000		300		
	2000		220		
	3000		120		
	250	axial	2000	2000	
	500		2000		
	1000		1600		
	2000		1400		
	3000		1200		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RNZ tool steel

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	30	30	60
	500		25		
	1000		20		
	2000		15		
	4000		10		
	6000		5		
	250	axial	500	500	
	500		500		
	1000		450		
	2000		400		
	4000		350		
	6000		300		
4	250	radial	45	45	90
	500		40		
	1000		35		
	2000		30		
	3500		20		
	5000		10		
	250	axial	700	700	
	500		700		
	1000		650		
	2000		600		
	3500		500		
	5000		450		
5	250	radial	75	75	150
	500		70		
	1000		60		
	2000		50		
	3000		40		
	4000		25		
	250	axial	1200	1200	
	500		1200		
	1000		1200		
	2000		1100		
	3000		900		
	4000		700		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RK

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	500	radial	150	150	300
	1000		110		
	2000		70		
	3000		30		
	500	axial	600	600	
	1000		550		
	2000		400		
	3000		300		
4	500	radial	400	400	800
	1000		300		
	1800		200		
	2500		100		
	500	axial	1000	1000	
	1000		800		
	1800		700		
	2500		600		
5	250	radial	1500*	1500*	3000*
	500		1000*		
	1000		600*		
	1500		300		
	250	axial	2500	2500	
	500		2500		
	1000		2000		
	1500		1500		
6	250	radial	2500**	2500**	5000**
	500		2000**		
	800		1500**		
	1200		1000		
	250	axial	3500	3500	
	500		3000		
	800		2500		
	1200		2000		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.
- * In version MK4 the max. radial load is 400daN (=work piece weight 800daN) and in version MK5 the max. radial load is 1000daN (=work piece weight 2000daN)
- ** in version MK5 the max. radial load is 1000daN (=work piece weight 2000daN)

Load Charts for Live Centers

TYPE RKA

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
6 MK5	250	radial	1000*	1000	2000
	500		850*		
	1000		700*		
	1500		500*		
	2000		300*		
	250	axial	2000	2000	
	500		2000		
	1000		1600		
	1500		1400		
	2000		1000		
6 MK6	250	radial	1250*	1250	2500
	500		1100*		
	1000		900*		
	1500		650*		
	2000		350*		
	250	axial	2000	2000	
	500		2000		
	1000		1600		
	1500		1400		
	2000		1000		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.
- * When just using the basic retainer for work piece clamping (up to ø 115) the declared loads must be reduced by 50%.

TYPE RNW tool steel

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	110	110	220
	500		90		
	1000		70		
	2000		50		
	4000		30		
	6000		10		
	250	axial	600	600	
	500		600		
	1000		600		
	2000		500		
	4000		400		
	6000		350		
4	250	radial	150	150	300
	500		130		
	1000		110		
	2000		90		
	3500		70		
	5000		20		
	250	axial	900	900	
	500		900		
	1000		700		
	2000		600		
	3500		500		
	5000		500		
5	250	radial	325	325	650
	500		280		
	1000		250		
	2000		200		
	3000		160		
	4000		50		
	250	axial	1200	1200	
	500		1200		
	1000		1200		
	2000		1100		
	3000		900		
	4000		700		
6	250	radial	325	325	650
	500		280		
	1000		250		
	2000		200		
	3000		160		
	250	axial	1200	1200	
	500		1200		
	1000		1200		
	2000		1200		
	3000		1200		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RNF / RNCF

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	150	150	300
	500		130		
	1000		105		
	1800		80		
	3000		50		
	4500		15		
	250	axial	650	650	
	500		550		
	1000		450		
	1800		400		
	3000		330		
	4500		250		
4	250	radial	350	350	700
	500		300		
	1000		250		
	1800		190		
	2800		110		
	4000		40		
	250	axial	800	800	
	500		700		
	1000		600		
	1800		500		
	2800		400		
	4000		300		
5	250	radial	650	650	1300
	500		540		
	900		420		
	1600		290		
	2400		160		
	3500		60		
	250	axial	1350	1350	
	500		1200		
	900		1000		
	1600		800		
	2400		700		
	3500		600		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RNWF

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
3	250	radial	75	75	150
	500		65		
	1000		50		
	1800		40		
	3000		30		
	4500		15		
	250	axial	650	650	
	500		550		
	1000		450		
	1800		400		
	3000		330		
	4500		250		
4	250	radial	175	175	350
	500		150		
	1000		130		
	1800		110		
	2800		85		
	4000		40		
	250	axial	800	800	
	500		700		
	1000		600		
	1800		500		
	2800		400		
	4000		300		
5	250	radial	325	325	650
	500		280		
	900		250		
	1600		200		
	2400		160		
	3500		60		
	250	axial	1350	1350	
	500		1200		
	900		1000		
	1600		800		
	2400		700		
	3500		600		

- The max. load is based on a bearing service life of min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RNS tool steel and with carbide tip
TYPE RNCS tool steel

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
1	250	radial	50	50	100
	500		40		
	1000		30		
	2000		20		
	3900		10		
	6000		5		
	250	axial	250	250	
	500		200		
	1000		180		
	2000		160		
	3900		130		
	6000		120		
2	250	radial	125	125	250
	500		105		
	1000		85		
	2000		60		
	3500		35		
	5500		10		
	250	axial	380	380	
	500		320		
	1000		280		
	2000		260		
	3500		190		
	5500		100		
3	250	radial	150	150	300
	500		130		
	1000		105		
	2000		80		
	3200		50		
	4500		15		
	250	axial	550	550	
	500		450		
	1000		400		
	2000		330		
	3200		250		
	4500		200		
4	250	radial	350	350	700
	500		300		
	1000		250		
	1800		190		
	2800		110		
	4000		40		
	250	axial	800	800	
	500		700		
	1000		600		
	1800		500		
	2800		400		
	4000		300		
5	250	radial	650	650	1300
	500		540		
	1000		420		
	1700		290		
	2500		160		
	3600		60		
	250	axial	1400	1400	
	500		1350		
	1000		1100		
	1700		900		
	2500		700		
	3600		600		

- The max. load is based on a bearing service life of Min. 2000 operating hours.
- Higher loads are possible for short periods.

TYPE RNCS with carbide tip

type	rpm [1/min]	typ of load	load [daN]	max. load [daN]	max. workpiece weight [daN]
1	250	radial	25	25	50
	500		22		
	1000		18		
	2000		15		
	3900		10		
	6000		5		
	250	axial	250	250	
	500		200		
	1000		180		
	2000		160		
	3900		130		
	6000		120		
2	250	radial	50	50	100
	500		45		
	1000		40		
	2000		30		
	3900		20		
	6000		8		
	250	axial	380	380	
	500		320		
	1000		280		
	2000		260		
	3500		190		
	5500		100		
3	250	radial	100	100	200
	500		90		
	1000		75		
	2000		60		
	3200		40		
	4500		12		
	250	axial	550	550	
	500		450		
	1000		400		
	2000		330		
	3200		250		
	4500		200		
4	250	radial	150	150	300
	500		130		
	1000		110		
	1800		80		
	2800		50		
	4000		15		
	250	axial	800	800	
	500		700		
	1000		600		
	1800		500		
	2800		400		
	4000		300		
5	250	radial	300	300	600
	500		260		
	1000		210		
	1700		150		
	2500		90		
	3600		30		
	250	axial	1500	1500	
	500		1350		
	1000		1100		
	1700		900		
	2500		700		
	3600		600		

- The max. load is based on a bearing service life of Min. 2000 operating hours.
- Higher loads are possible for short periods.

Dead Centers FN / FNC / FNZ

for general use

For rotating and fixed tailstock spindle sleeve. Designed for employment **in turning, grinding and other production machines**.

Type FN with morse taper

» can be reground

0.002

- Run-out deviation max.: 0.002 mm.
- Made of fully hardened tool-steel.
- All types with extracting thread to prevent spindle ball bearings or solid spindle sleeves from damage.
- Extracting nuts DIN 807, see page 173.
- Max. load of the dead centers upon request.
- Special design upon request.

Type FNC with morse taper

» extended tooling clearance
for better access of machining tools

0.002

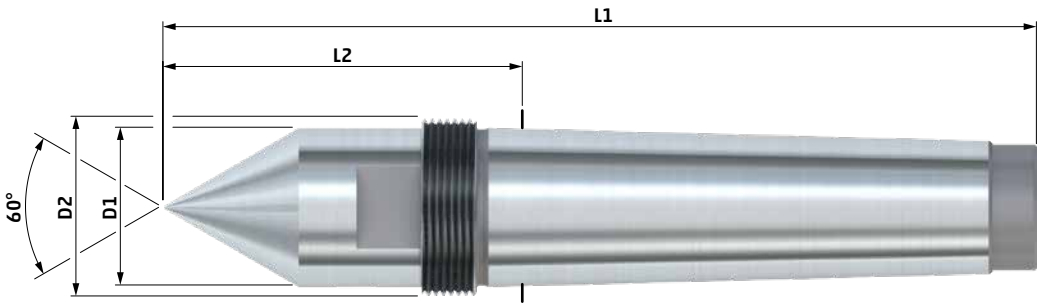
Type FNZ with morse taper

» can be reground
for general use with extended length for better tool clearance

0.002

- Run-out deviation max.: 0.002 mm.
- Made of fully hardened tool-steel.
- With cylindrical set down and extended length for better tool clearance
- All types with extracting thread to prevent spindle ball bearings or solid spindle sleeves from damage.
- Extracting nuts DIN 807, see page 173.
- Max. load of the dead centers upon request.
- Special design upon request.

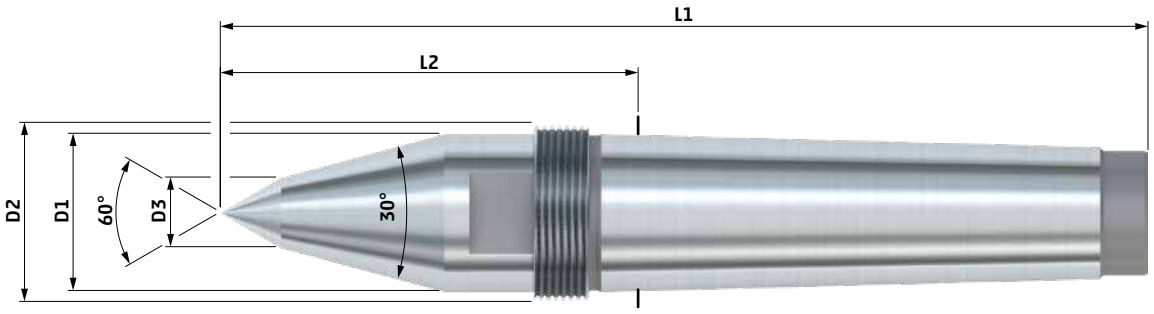
Technical data – type FN with morse taper



TYPE FN

MK	D1	D2	D3	L1	L2	cat. no.
3	24	M27 x 1.5	-	138	57	**920 01**
4	31.6	M36 x 1.5	-	175	72	**920 02**
5	44.7	M48 x 1.5	-	217	87	**920 03**
6	63.8	M68 x 1.5	-	290	108	**920 04**

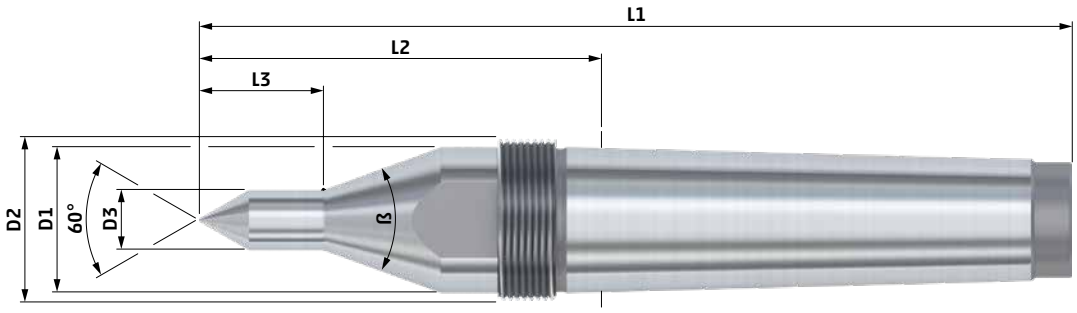
Technical data – type FNC with morse taper



TYPE FNC

MK	D1	D2	D3	L1	L2	cat. no.
3	24	M27 x 1.5	10	148	67	**921 01**
4	31.6	M36 x 1.5	14	187	84	**921 02**
5	44.7	M48 x 1.5	16	242	112	**921 03**
6	63.8	M68 x 1.5	20	330	148	**921 04**

Technical data – type FNZ with morse taper



TYPE FNZ

MK	D1	D2	D3	L1	L2	L3	ß	cat. no.
2	18	M22x1.5	9	120	56	17	40	**921 10**
	18	M22x1.5	11	120	56	21	40	**921 11**
3	24	M27x1.5	9	150	69	17	40	**921 12**
	24	M27x1.5	13	150	69	25	40	**921 13**
4	31.6	M36x1.5	9	190	87.5	17	40	**921 14**
	31.6	M36x1.5	13	190	87.5	27	40	**921 15**
	31.6	M36x1.5	19	190	87.5	53	90	**921 16**
5	44.7	M48x1.5	19	245	115	53	40	**921 17**
	44.7	M48x1.5	28	245	115	65	60	**921 18**

Dead Center Shanks FNA / FNW

high flexibility at different workpiece center holes

Type FNA with morse taper

» for large workpiece centers
high degree of flexibility for clamping of workpieces with large centers

0.01
incl. center cone

changeable center cones
see page 158

- Run-out deviation max.: 0.01 mm incl. center cone.
- Different types of center cones from Ø 25 to Ø 315, see page 158.
- Special center cones up to Ø 400 available upon customer's request.
- Extracting nuts DIN 807, see page 173.
- Max. load of the dead centers upon request.

Type FNW with morse taper

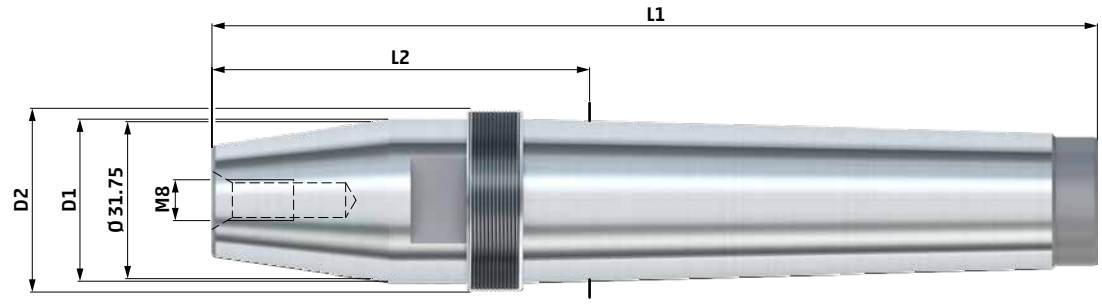
» maximum flexibility
the adaptation of various changeable inserts ensures a high degree of flexibility and saving of costs

0.01
incl. insert

changeable inserts
see page 160 - 161

- Run-out deviation max.: 0.01 mm incl. insert.
- Various changeable inserts of different designs, see page 160 - 161.
- Special inserts available upon customer's request.
- Extracting nuts, see page 173 for accessories.
- Max. load of the dead centers upon request.

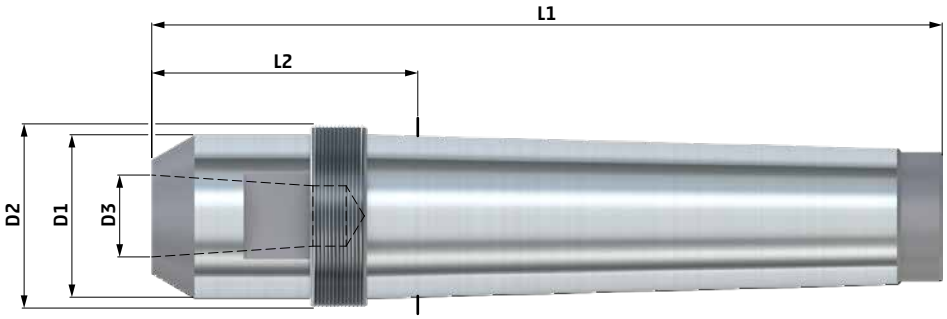
Technical data – type FNA with morse taper



TYPE FNA

MK	D1	D2	D3	L1	L2	cat. no.
3	32	M27 x 1.5	-	149	68	**922 01**
4	32	M36 x 1.5	-	173.5	71	**922 02**
5	45	M48 x 1.5	-	202.5	73	**922 03**
6	64	M68 x 1.5	-	263.5	81.5	**922 04**

Technical data – type FNW with morse taper



TYPE FNW

MK	D1	D2	D3	L1	L2	cat. no.
3	24	M27 x 1.5	16	121	40	**923 01**
4	32	M36 x 1.5	16	154.5	52	**923 02**
5	45	M48 x 1.5	22	190	60	**923 03**
6	64	M68 x 1.5	22	252	70	**923 04**

Carbide Dead Centers DIN 806

for hardened workpieces

To be applied with hardened workpieces. For headstocks and fixed tailstock spindle sleeves. Designed for employment in grinding and other production machines.

Type DIN 806 · model E

HM with full carbide tip

0.002

HM with half carbide tip

Type DIN 806 · model HE

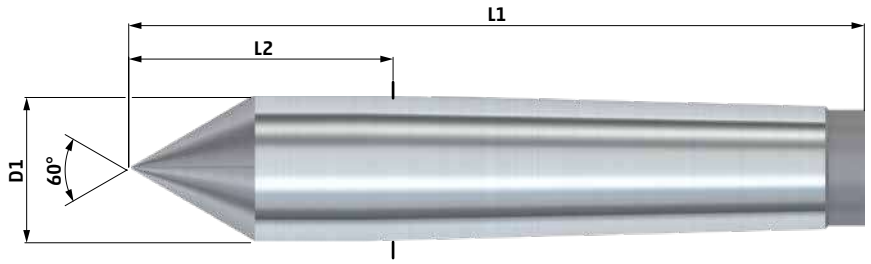
HM flattened with half carbide tip

0.002

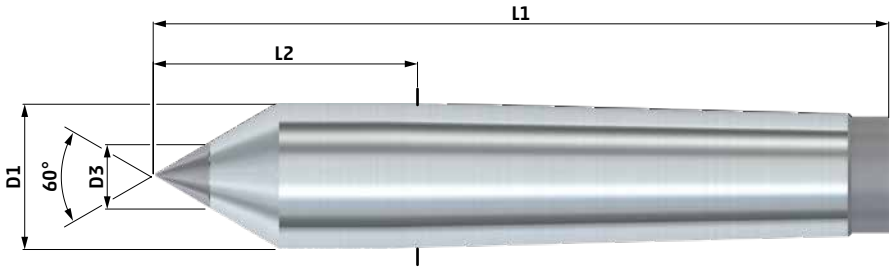
- Run-out deviation max.: 0.002 mm.
- With carbide insert.
- Max. load of the dead centers upon request.
- Special design upon request.

Technical data – type DIN 806 · model E / HE

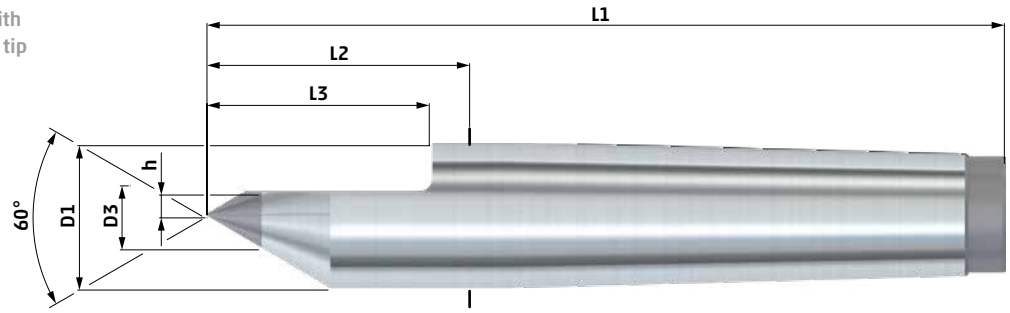
HM similar to DIN 806 · model E
with full carbide tip



HM model E
with half carbide tip



HM model HE
flattened with
half carbide tip



MK	D1	L1	L2	MODEL E cat. no.
1	12.2	80	26.5	**910 02**
2	18	100	36	**910 05**
3	24.1	125	44	**910 08**
4	31.6	160	57.5	**910 11**
5	44.7	200	70.5	**910 14**
6	63.8	270	88	**910 18**

D3	MODEL E cat. no.
7	**910 01**
7	**910 03**
11	**910 06**
14	**910 09**
18	**910 12**
18	**910 15**

D3	h	L3	MODEL HE cat. no.
7	1.5	22	**911 01**
7	2	30	**911 02**
11	3	38	**911 04**
14	5	50	**911 06**
18	7	63	**911 08**
18	10	79	**911 10**

Carbide Dead Centers DIN 807

type with extraction screw thread for hardened workpieces

With extraction screw thread
Dead centers according to DIN 807 are designed with an extraction thread. This serves to protect the spindle bearings and is necessary for use in non-drilled sleeves.

Type DIN 807 · model E

HM with full carbide tip — 0.002

HM with half carbide tip

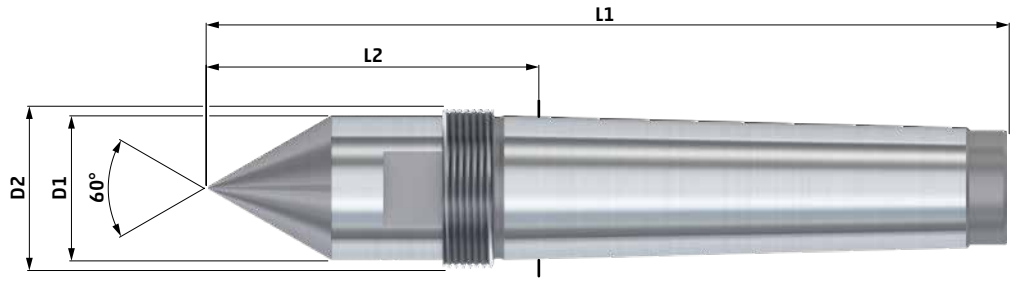
Type DIN 807 · model HE

HM flattened with half carbide tip — 0.002

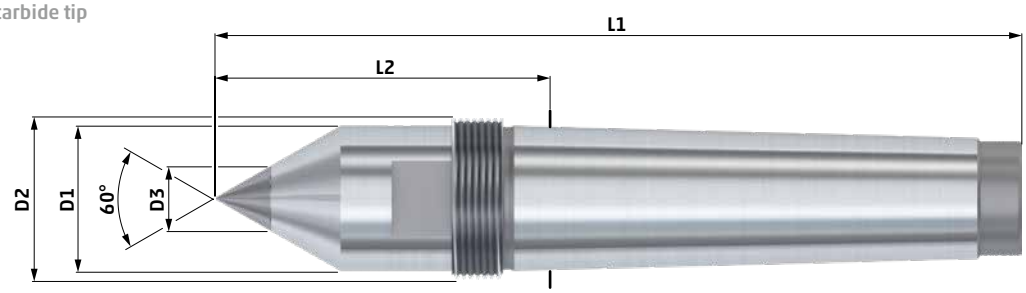
- Run-out deviation max.: 0.002 mm.
- With carbide insert.
- Max. load of the dead centers upon request.
- Special design upon request.
- For demounting and for preventing the spindle bearing from damage of for spindle sleeves which have no through bore the center pins come with an extracting screw thread.
- Extracting nuts DIN 807, see page 173.

Technical data – type DIN 807 · model E / HE

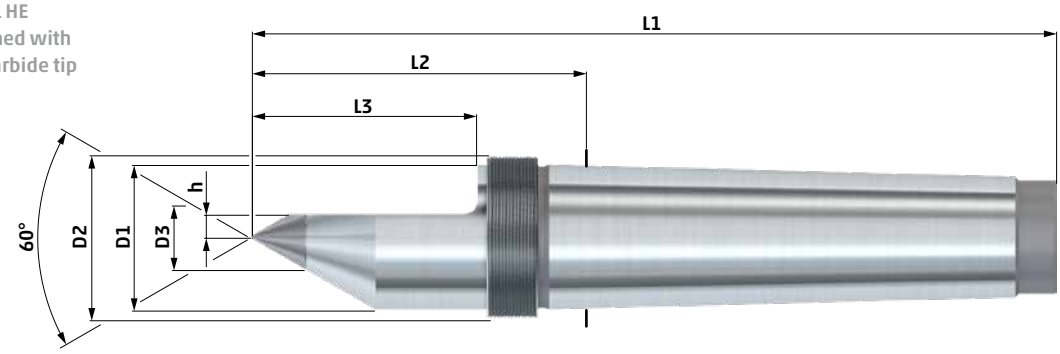
HM similar to DIN 807 · model E
with full carbide tip



HM model E
with half carbide tip



HM model HE
flattened with
half carbide tip



MODEL E

MK	D1	D2	L1	L2	cat. no.
1	12.2	M16 x 1.5	90	36.5	**912 02**
2	18	M22 x 1.5	112	48	**912 05**
3	24.1	M27 x 1.5	138	57	**912 08**
4	31.6	M36 x 1.5	175	72.5	**912 11**
5	44.7	M48 x 1.5	217	87.5	**912 14**
6	63.8	M68 x 1.5	290	108	**912 18**

D3	cat. no.
7	**912 01**
7	**912 03**
11	**912 06**
14	**912 09**
18	**912 12**
18	**912 15**

MODEL HE

D3	h	L3	cat. no.
7	1.5	22	**913 01**
7	2	30	**913 03**
11	3	38	**913 06**
14	5	50	**913 09**
18	7	63	**913 12**
18	10	79	**913 15**

Dead centers FE / FEC

Type taper 1:7.5 / Ø 28.33

For use in **EMAG turning-, grinding- and other production machines**

Type FE taper 1:7.5

» can be reground

0.002

- Run- out deviation max.: 0.002mm
- Made of through hardened tool steel
- All types with extracting thread to prevent spindle bearings and solid spindle sleeves from damage
- Extracting nuts see page 173 for accessories
- Max. load of the dead centers upon request
- Special design upon request

Type FEC taper 1:7.5

» extending tool clearance
for better access of the machining tool

0.002

Type FE carbide taper 1:7.5

0.002

HM with full catrbide tip

- Run- out deviation max.: 0.002mm
- With carbide insert
- Max. load of the dead centers upon request
- Special design upon request
- All types with extracting thread to prevent spindle bearings and solid spindle sleeves from damage
- Extracting nuts see page 173 for accessories

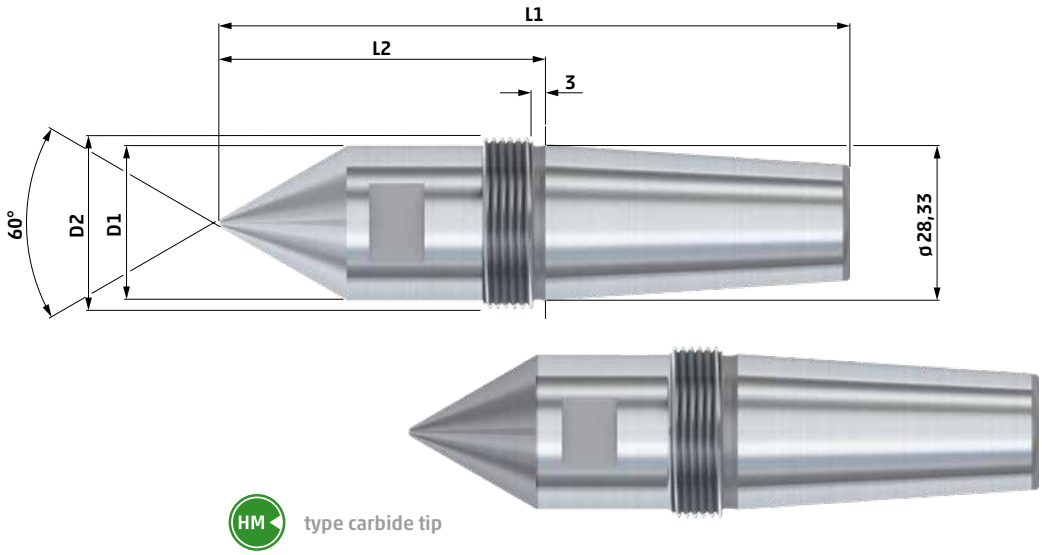
Type FEC carbide taper 1:7.5

» extending tooling clearance
for better access of machining tool

0.002

HM with half catrbide tip

Technical data – type FE / FE HM taper 1:7.5

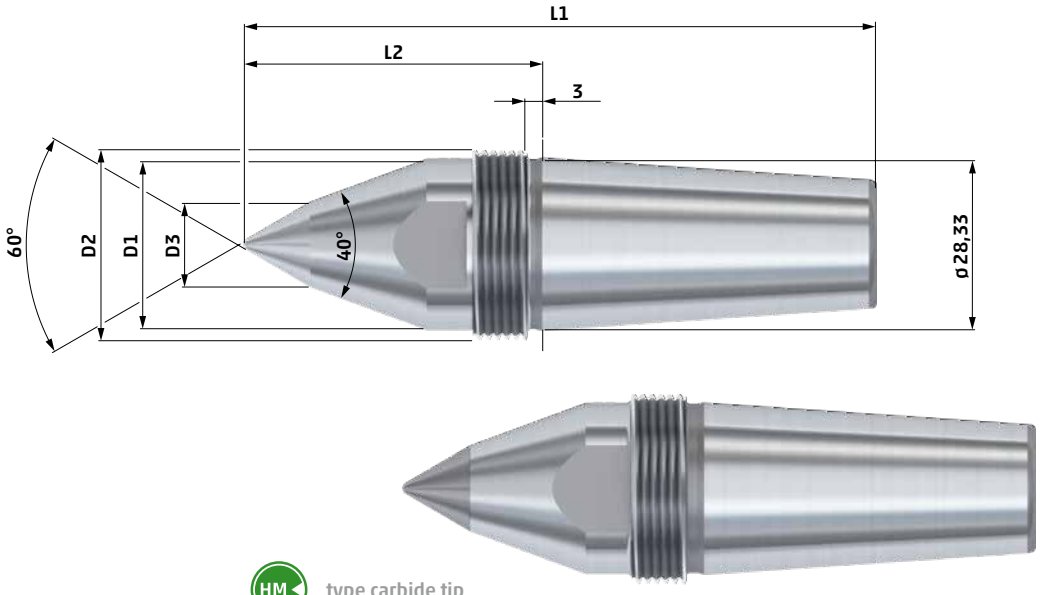


HM type carbide tip

type FE	D1	D2	D3	L1	L2	cat. no.
FE	28	M32x1.5	-	115	60	**914 03**

type FE carbide	cat. no.
FE carbide	**914 13**

Technische Daten – type FEC / FEC HM taper 1:7.5



HM type carbide tip

type FE	D1	D2	D3	L1	L2	cat. no.
FEC	28	M32x1.5	8	105	50	**914 01**
FEC	28	M32x1.5	14	105	50	**914 02**

type FE carbide	cat. no.
FEC carbide	**914 11**
FEC carbide	**914 12**

Carbide Bull Nose Cones FNK

for hardened workpieces

Our carbide bull nose cones FNK are made for hardened workpieces, with big center holes, for grinding and other manufacturing machines. For headstocks and fixed tailstock spindle sleeves.

Type FNK

HM mushroom carbide bull nose

0.002

- Run-out deviation max.: 0.002mm.
- With carbide insert.

Upon request:
- Max. load of the bull nose cone.
- Special designs.

with extraction screw thread for hardened workpieces

FNK bull nose cones are made with extraction screw thread. This serves to protect the spindle bearings and is used for sleeves that are non-drilled.

Type FNK with extraction screw thread

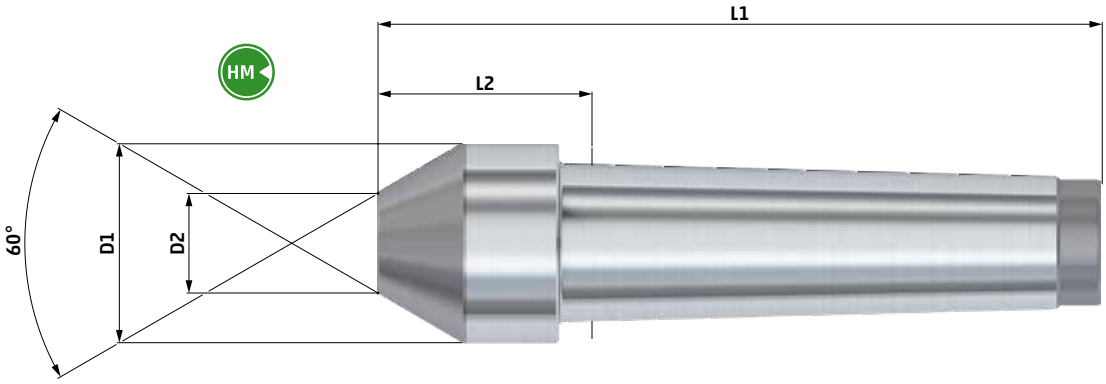
HM mushroom carbide bull nose

0.002

- Run-out deviation max.: 0.002mm.
- With carbide insert.
- With spanner flat.
- All types with extraction screw threads for protecting the spindle bearings or for non-drilled sleeves .
- Extracting nuts see page 173 for accessories.

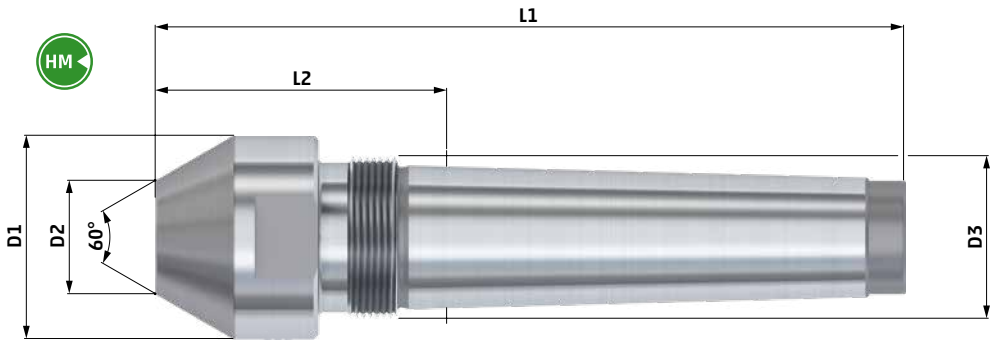
Upon request:
- Max. load of the bull nose cone.
- Special design.

Technical data – type FNK



MK	D1	D2	D3	L1	L2	cat. no.
2	30	10	-	100.5	36.5	**915 01**
2	40	20	-	103.5	39.5	**915 03**
2	50	30	-	108.5	44.5	**915 05**
3	30	10	-	118.5	37.5	**915 06**
3	35	15	-	121.5	40.5	**915 07**
3	40	20	-	121.5	40.5	**915 08**
3	45	25	-	121.5	40.5	**915 09**
3	55	35	-	126.5	45.5	**915 11**
3	70	50	-	131.5	49.5	**915 13**
4	40	20	-	145.5	43	**915 17**
4	50	30	-	150.5	48	**915 19**
4	60	40	-	155.5	53	**915 21**
4	70	50	-	155.5	53	**915 22**
4	80	60	-	155.5	53	**915 23**
5	55	35	-	175	48	**915 29**
5	60	40	-	180	53	**915 30**
5	70	50	-	180	53	**915 31**
5	80	60	-	180	53	**915 32**

Technical data – type FNK with extraction screw thread



MK	D1	D2	D3	L1	L2	cat. no.
3	35	15	M27 x 1.5	134.5	57	**915 071**
3	50	30	M27 x 1.5	138.5	61	**915 101**
4	45	25	M36 x 1.5	167	64.5	**915 181**
4	60	40	M36 x 1.5	168	65.5	**915 211**
5	55	35	M48 x 1.5	197	67.5	**915 291**
5	70	50	M48 x 1.5	199	69.5	**915 311**

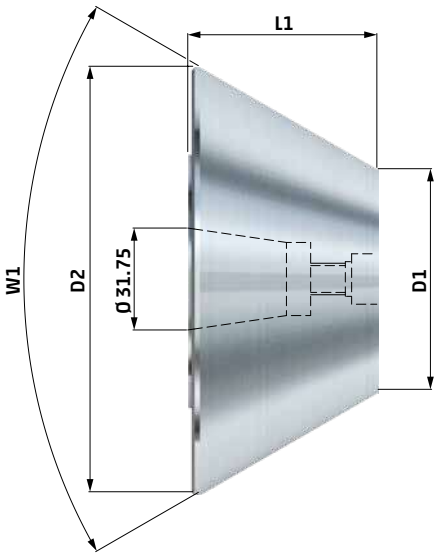
Changeable Center Cones for type RNA / FNA

center cones for large workpiece centers

High degree of flexibility for clamping of workpieces with large centers.

For type RNA / FNA with SK30 interface

Technical data – for type RNA / FNA with SK30 interface



- Suitable for live centers type RNA on page 122 - 123 and for dead centers type FNA on page 148 - 149.
- Special cones up to Ø 400 available upon customer's request.
- The center cones are fastened with a screw M8 DIN 912 onto the base body.
- The center cones can be drawn off with a screw M10.

FOR TYPE RNA / FNA

W1	D1	D2	L	cat. no.
60	20	85	60	**814 50**
60	70	135	60	**814 51**
60	120	185	60	**814 52**
60	170	235	60	**814 53**
60	220	285	60	**814 54**
75	20	105	60	**814 55**
75	90	175	60	**814 56**
75	160	245	60	**814 57**
75	230	315	60	**814 58**
90	20	130	60	**814 59**
90	100	210	60	**814 60**
90	180	290	60	**814 61**

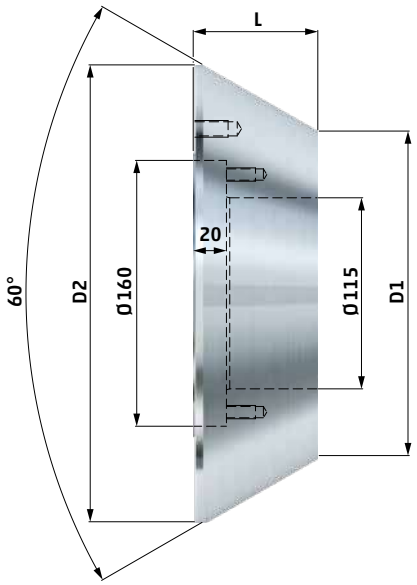
Changeable Center Cones for type RKA

center cones for large workpiece centers

Workpieces with large center holes from Ø 120 to Ø 460 are clamped with a basic retainer and a changeable center cone.

for type RKA · centering taper

Technical data – for type RKA · centering taper



- Suitable for live center type RKA on page 126 - 127.
- Special changeable center cones (90°/75°/various diameters) available upon customer's request.
- True run-out accuracy max 0.02 at changeable center cone is guaranteed.

FOR TYPE RKA

D1	D2	L	cat. no.
113	220	98.5	**814 80**
195	275	75	**814 81**
270	350	75	**814 82**
345	425	75	**814 83**
380	460	75	**814 84**

Changeable Inserts for type RNW / FNW

Changeable inserts for a maximum of flexibility
The adaptation of various changeable inserts ensures a high degree of flexibility and saving of costs.

For type RNW / FNW with taper interface

model B

model G

- Suitable for live centers type RNW on page 128 - 129, for the live centers type RNWF on page 134 - 135 and for the dead centers type FNW on page 148 - 149.
- Special inserts available upon customer's request.
- For quick demounting all changeable inserts come with spanner flat or cross hole.

FOR TYPE RNW3 / 4
FNW MK3 / MK4

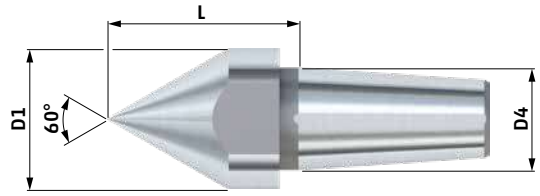
model	D1	D2	D3	D4	L	cat. no.
A	22	-	-	16	30	**815 50**
B	22	10	-	16	40	**815 51**
C	22	7	10	16	30	**815 52**
D	22	11	-	16	30	**815 53**
E	55	21	-	16	35	**815 54**
F	55	50	16	16	30	**815 55**
G	22	10	-	16	40	**815 56**

FOR TYPE RNW5 / 6
FNW MK5 / MK6

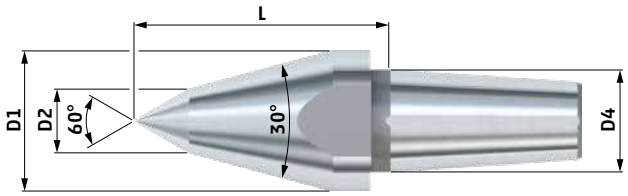
model	D1	D2	D3	D4	L	cat. no.
A	34	-	-	22	35	**815 60**
B	34	16	-	22	54	**815 61**
C	34	7	10	22	29	**815 62**
D	34	18	-	22	35	**815 63**
E	70	33	-	22	38	**815 64**
F	70	64	24	22	34	**815 65**
G	34	16	-	22	54	**815 66**

Technical data – for type RNW / FNW with taper interface

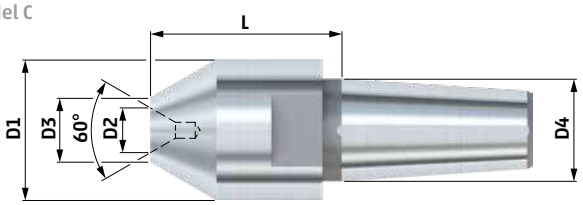
model A



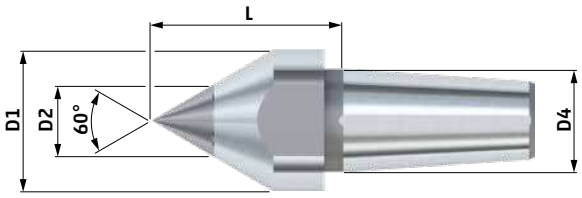
model B



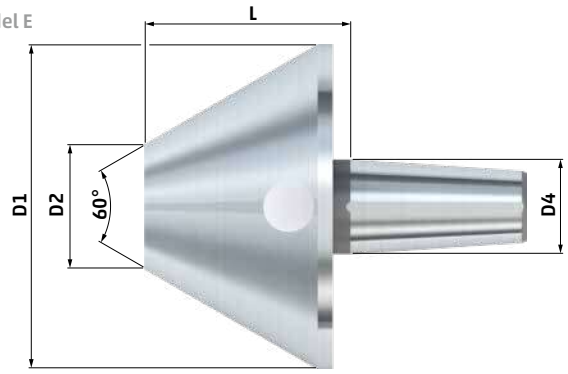
model C



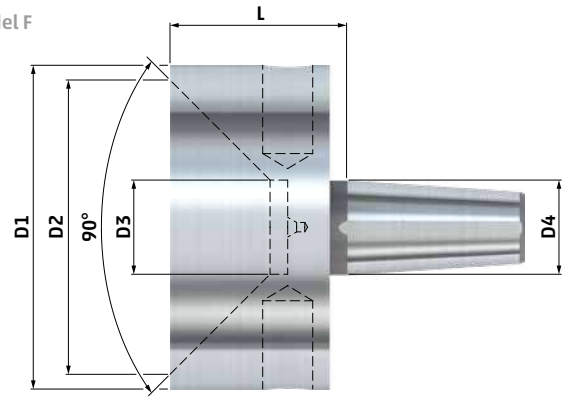
HM model D
with carbide insert



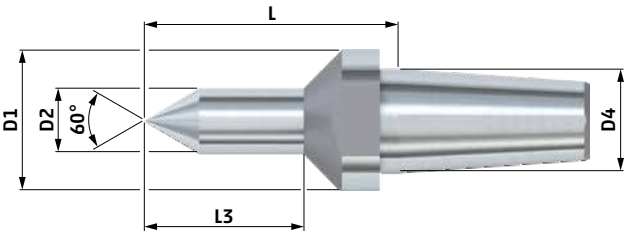
model E



model F



model G



positive driver

In addition to our standard portfolio, we manufacture a large number of special applications according to customer requirements.

Based on your processes, specifications and drawings we will prepare an appropriate offer for you. Our aim is to develop a suitable clamping tool for you and to manufacture it to the highest quality standards.

From your inquiry to the practical use of the new clamping tool directly on site, we guarantee expert advice and seamless support.

Developing new clamping tools or improving existing processes is part of our daily business and we look forward to supporting you, on your way to finding the clamping tool that is suitable for you.

Special Applications

dead center with carbide ball

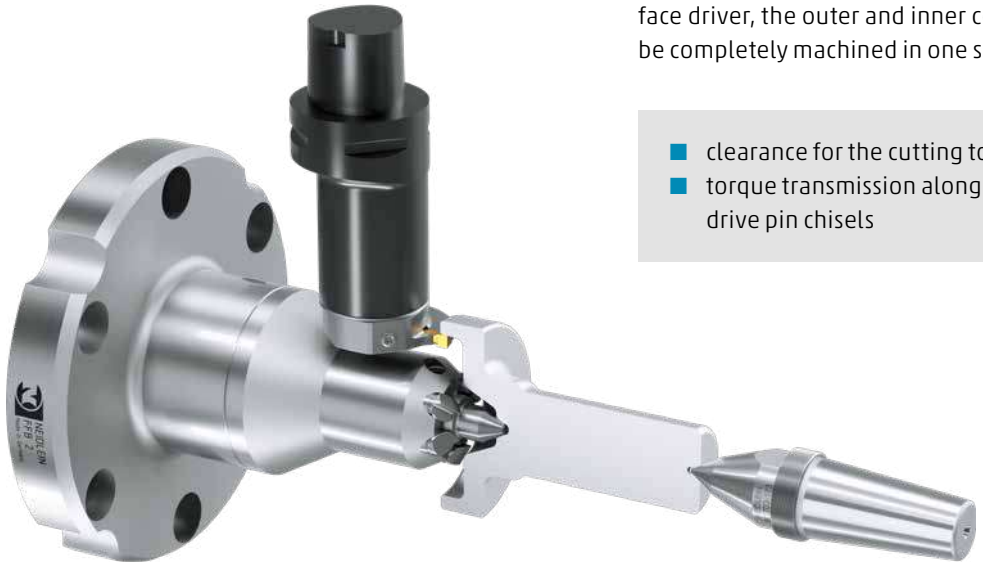
RNS with air purge

friction taper

Face Driver FFB

cylindrical set down and extended in length

Type FFB · special design



Thanks to the cylindrical set down and extended design of the face driver, the outer and inner contours of the workpiece can be completely machined in one single clamping.

- clearance for the cutting tool
- torque transmission along a radius by using angled drive pin chisels

Positive Driver

with changeable drive head

Type positive driver · special design

Torque transmission by special adapted drive heads, according to the work piece shape.

- changeable drive heads
- robust torque transmission by positive driving

Face Driver FSB

with big centering and internal clamping diameter

Type FSB · special design

The reduced weight by cylindrical set down of the short taper flange and the special mushroom type center pin with recesses for the drive pins, are the features of this face driver.

- extended deflection
- special center pin with recesses

Face Driver FDNC

with customer specific retainer

Type FDNC · special design

FDNC face driver with customized retainer, for direct mounting in a gear hobbing machine.

- customized quick change retainer

Live Center RNS with speed monitoring

integrated speed monitoring sensor with plug-in connection

Type RNS · special design

HM with carbide tip

Used to monitor the workpiece rotation during the manufacturing process. If the workpiece rotation is stopped by a collision, the speed monitoring sensor of the live center detects this and stops the machine spindle immediately.

- integrated speed monitoring sensor
- minimizing the damage caused by a collision
- easy integration to the machine control

Live Center RN adjustable

eccentric adjustable center pin

Type RN · special design

This live center was designed to adjust the center pin radially. On the one hand, eccentric workpieces can be adjusted to ±1 mm from the center and on the other hand, the center pin can be adjusted to approx. 1 µ run out accuracy.

- radial adjustable center pin

Live Center RNS with air purge

air purge connection and flange retainer

Type RNS · special design

HM with carbide tip

This live center was designed according to customer specifications and is characterized by an air purge connection, flange mount and speed monitoring using a wrench flat.

- air purge connector
- flange retainer
- half carbide tip
- spindle for speed monitoring

Live Center RN with 3-spot contact

3-spot contact made of carbide

Type RN · special design

HM with carbide tip

This live center is characterized by a special manufactured, mushroom type spindle with carbide tip, which ensures a 3-spot contact of the workpieces.

- segmented 3-spot contact made of carbide
- for rough work piece center holes

Dead Center with carbide ball

Special design

HM with carbide ball

For grinding operations with fixed tailstock spindle sleeves or alternatively for hard turning orpartion with live tailstock sleeves. When used with fixed tailstocks, the spherical shape reduces friction in the center hole.

- morse taper size 4 retainer
- with carbide ball Ø 18
- extracting thread M30 x 1.5

Female Dead Center flattened

Special design

HM with carbide insert

For grinding operations with fixed tailstock spindle sleeves. The flattening of the centering area provides celarance for the grinding wheel.

- morse taper size 2 retainer
- with carbide insert Ø 15
- female centering Ø 12 / 90°
- flattened h = 6.9 mm

Dead Center with HSK-C50 retainer

Special design

HM with carbide tip

For use in grinding and milling machines.

- HSK-C50 retainer
- with carbide insert Ø 40

Dead Center with carbide bars

Special design

HM with carbide bars

The 3-spot contact is used for grinding and other hard manufacturing operations with not perfectly round center holes.

- flange retainer
- with carbide bars

Dead Center with flange retainer

Special design

HM with carbide tip

For use in manufacturing machines, like grinding and other hard manufacturing operations.

- flange retainer Ø 100
- with carbide tip Ø 55

Friction Taper with carbide ring

Special design

HM with carbide insert

For use in manufacturing machines, like grinding and other hard manufacturing operations. Torque transmission to the work piece via high-precission female taper, by using axial force.

- friction taper
- with carbide ring Ø 40.6 x 14°
- retainer Ø 50

General accessories

Extracting nut DIN 1804 h

thrust indicator KMD

GENERAL ACCESSORIES

Service & Training

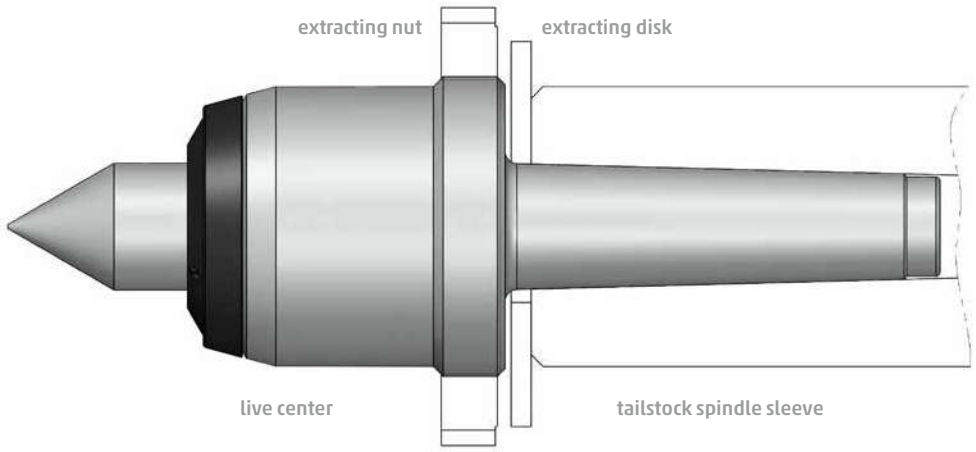
Repair service

Training

SERVICE & TRAINING

Extracting Disks and Extracting Nuts

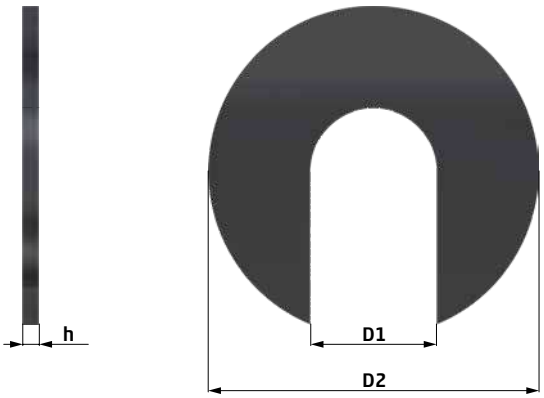
Accessories for demounting
Accessories for safe and quick demounting of our ultra live centers, dead centers, center pins and face drivers.



Extracting disk

Extracting disk

Technical data – extracting disk



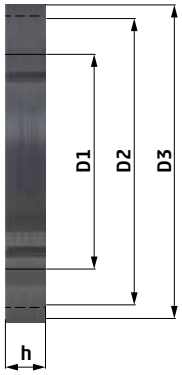
for ultra live centers **type RN / RNC / RNA / RNW / RNS**

for type	MK	D1	D2	h	cat. no.
1	**2**	22	60	4	**830 30**
3	**3**	28	80	4	**830 31**
	4	38	80	5	**830 32**
	5	49	80	5	**830 33**
4	**4**	38	100	5	**830 34**
	5	49	100	5	**830 35**
5	**5**	49	120	5	**830 36**
	6	70	120	6	**830 37**
6	**6**	70	140	6	**830 38**

Extracting nut DIN 1804 h

Type DIN 1804 h

Technical data – type DIN 1804 h



for ultra live centers, center pins and face drivers

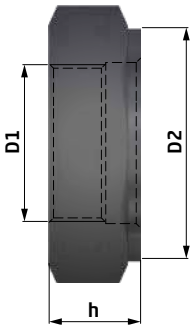
D1	D2	D3	h	cat. no.
M28 x 1.5	43	50	10	**830 39**
M32 x 1.5	45	52	11	**830 40**
M35 x 1.5	47	55	11	**830 41**
M36 x 1.5	48	55	11	**830 42**
M48 x 1.5	67	75	13	**830 43**

D1	D2	D3	h	cat. no.
M58 x 1.5	80	90	13	**830 22**
M70 x 1.5	90	100	14	**830 44**
M75 x 1.5	100	110	14	**830 23**
M95 x 2	120	135	16	**830 24**
M110 x 2	140	155	16	**830 25**

Extracting nut DIN 807

Type DIN 807

Technical data – type DIN 807



for dead centers and center pins

MK	D1	D2	h	s	cat. no.
1	M16 x 1.5	23	12	24	**929 99**
2	M22 x 1.5	30	15.5	32	**930 00**
3	M27 x 1.5	39	17.5	41	**930 01**
4	M36 x 1.5	53	21	55	**930 02**
5	M48 x 1.5	67	23	75	**930 03**
6	M68 x 1.5	90	25.5	100	**930 04**

Hook Wrench and Open-End Wrench

Hook Wrench DIN 1810 A

Hook wrench DIN 1810 A

for extracting nut DIN 1804 h

	cat. no.
M28 x 1.5	830 50
M32 x 1.5	830 51
M35 x 1.5	830 51
M36 x 1.5	830 51
M48 x 1.5	830 52
M58 x 1.5	830 53
M70 x 1.5	830 54
M75 x 1.5	830 55
M95 x 1.5	830 56
M110 x 1.5	830 57

Open-End Wrench DIN 894

Open-end wrench DIN 894

for extracting nut DIN 807

SW		cat. no.
24	M16 x 1.5	830 70
32	M22 x 1.5	830 71
41	M27 x 1.5	830 72
55	M36 x 1.5	830 73
75	M48 x 1.5	830 74
100	M68 x 1.5	830 75

Puller Set

complete with case

Puller set with slide hammer in plastic case
Stable extractor (galvanised) with ergonomically shaped slide hammer.

In conjunction with the appropriate adapter, the centre pin is removed by means of vigorous strikes with the slide hammer.

Use:
For removing centre pins with internal thread

Puller set with slide hammer in plastic case

Pin extractor in plastic case (275 x 230 x 80 mm)
with thread inserts (M3 - M12)

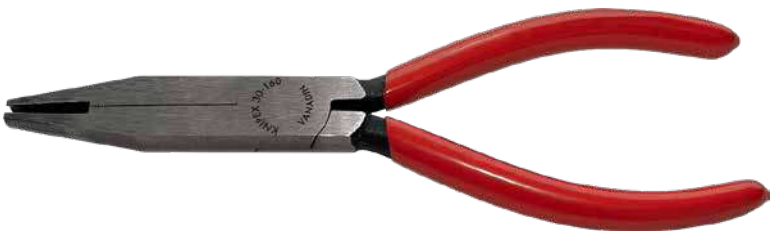
type	cat. no.
M3 - M12	500 20

Pliers

Use:
For gripping and dismounting drive pins Ø 6 - 10 mm

Pliers

type	cat. no.
46 -10	500 50



Thrust Measuring System

Hydraulic measuring of clamping thrust for face drivers and live centers for measuring the ideal clamping thrust on machine tools

For setting up and checking the clamping thrust required, it is necessary to have a thrust indicator. A pressure gauge on the machine without tabulation or conversion is insufficient.

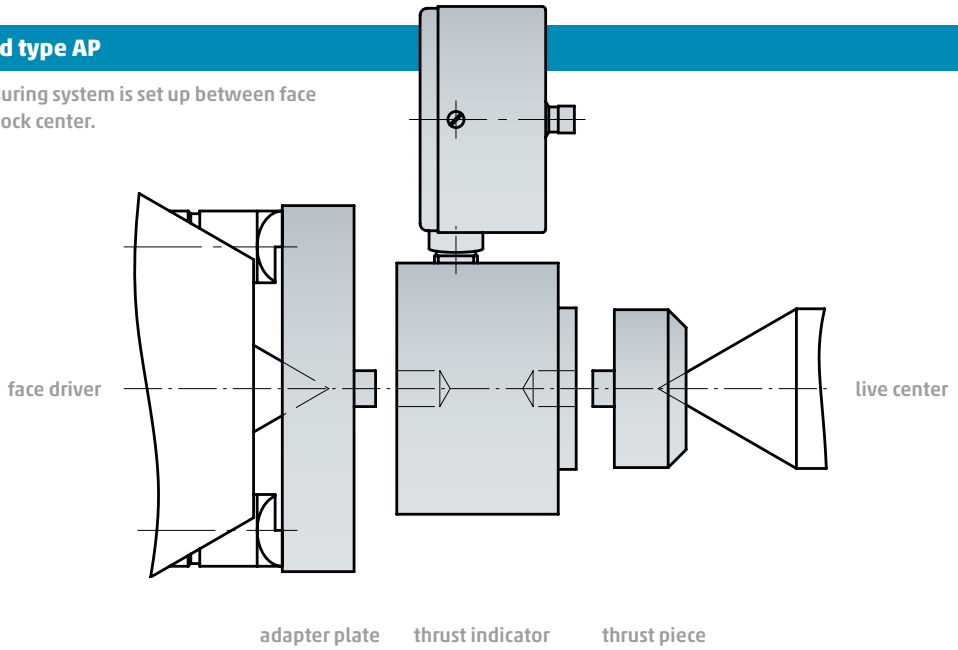
The hydraulic thrust measuring system is perfectly suitable for safe adjusting and checking of the clamping thrust within the machine.

Type KMD · thrust indicator including centered tailstock piece and case

Clamping principle

Type KMD and type AP

The thrust measuring system is set up between face driver and tailstock center.

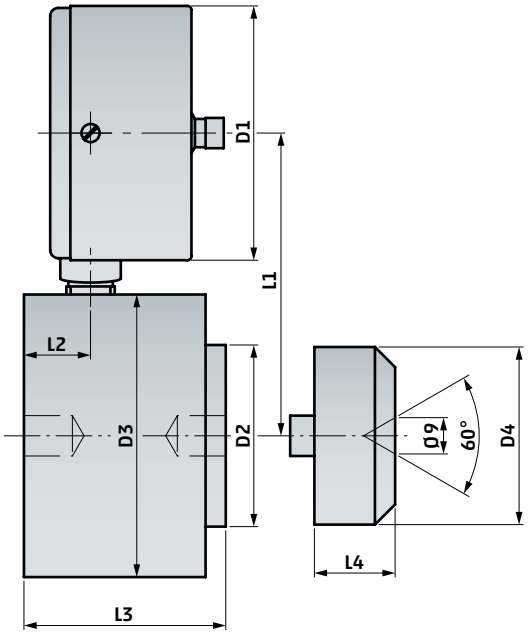


Thrust indicator
Device for measuring clamping thrust in machine tools

All thrust indicators are equipped with a differential thrust indicator as well as a centered tailstock piece.

In order to ensure a perfect torque transmission of the face drivers onto the work piece, it is essential to determine the chisel load of the drive pins accurately.

Technical data – type KMD

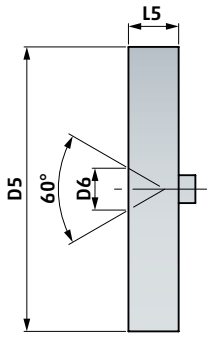


type KMD	D1	D2	D3	L1	L2	L3	D4	L4	measuring range [KN]	measuring range [daN]	scale division [KN]	application	cat. no.
250	63	45	70	75	16	50	44	20	0 - 2.5	0 - 250	0.1	grinding	**500 01**
1600	63	45	70	75	16	50	44	20	0 - 16	0 - 1600	0.5	turning	**500 02**
2500	63	45	70	75	16	50	44	20	0 - 25	0 - 2500	1	turning	**500 03**

Thrust piece
interim plate on face driver

In order to measure the impact of thrust onto the face driver, it is essential to have an adapter plate for parallel and even contact of the drive pins.

Technical data – type AP

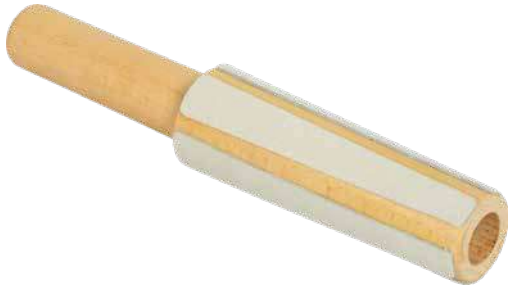


type AP	D5	D6	L5	for face driver sizes	cat. no.
50	50	5	12	0 - 35	**500 10**
102	102	15	18	4 - 5	**500 11**
175	175	20	28	55 - 6	**500 12**

Taper Cleaner / Cone Wiper

for cleaning an inner Morse taper
(e. g. work spindle or tailstock)

Taper cleaner / cone wiper



MK	cat. no.
1	500 31
2	500 32
3	500 33
4	500 34
5	500 35
6	500 36

Installation / Removal Paste

Universal use as installation paste and for preventing fretting corrosion

Castrol Optimol Paste White T is ideal for all installation work as well as for base-film and thin-film lubrication. The paste prevents fretting rust as well as facilitating installation and removal of our clamping tools.

It is resilient to hot and cold water and provides anti-corrosion protection.

Installation- / removal paste

white, virtually colourless when applied as a thin film

cat. no.
500 40

Repair Service

Our service for sustainable machining

Our clamping tools boast a long service life. After continuous use over lengthy periods of time or if damage occurs during production, we get the tools back into perfect shape with the necessary maintenance or repair. This investment is generally worthwhile since you then have a tool that is fully functional and virtually as good as new.

We will pleased, to compile a cost estimate for repair and maintenance, including delivery period.

Training

We provide free product training so as to enable you to put our products to effective use in line with requirements.

Whether on our premises or yours, we give you an overview of our product range and as well a detailed specialist knowledge in terms of cost efficiency, quality and safety.

Training is provided in German and English.

If you wish to take advantage of our training programmes, please get in touch with our Technical Sales department and our staff will take care of everything else.

www.neidlein.de
» Contact » Contact person » technical sales

You will find our GTB at

www.neidlein.de

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