NEIDLEIN
SPANNZEUGE GmbH

Face Driver

Standard-Face Driver for soft/green and hard tooling

- FSB
- SB
- FFB
- FFBH
- Pipe Driver

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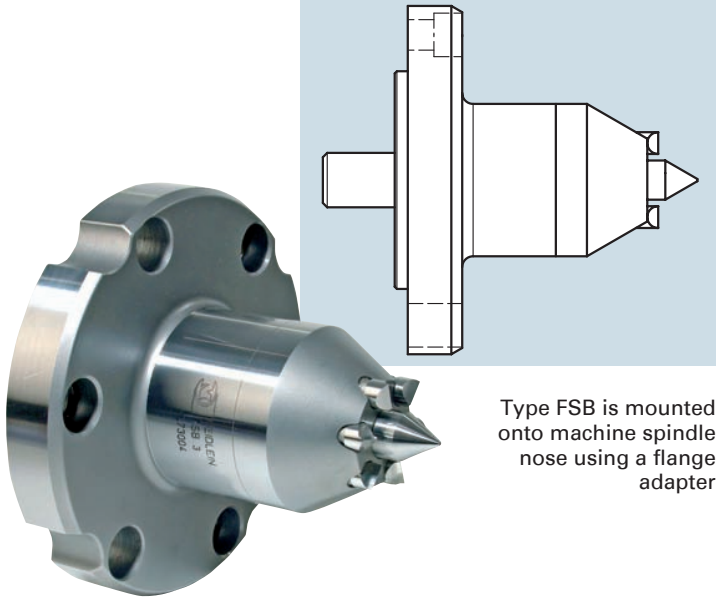
Face Driver FSB/SB

Clamping tools for tooling between centers

The entire surface of the work piece can be tooled and finished by clamping with a maximum of torque transmission. NEIDLEIN Face Drivers are mechanical clamping systems which are suited for soft/green as well as hard tooling.

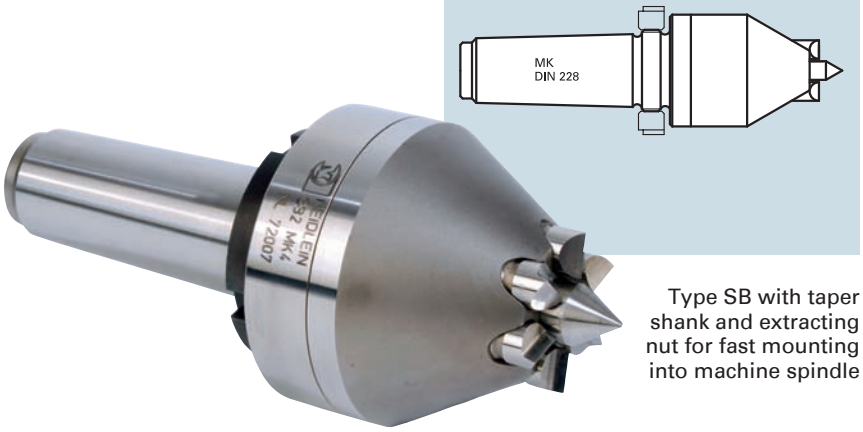
Face drivers of type FSB/SB are power-operated by the thrust of the tailstock. Work pieces are clamped centrically using a movable center pin. This way different centerings can be adjusted, thus ensuring a constant datum-point at the end face of work piece.

Type FSB with flange-retainer



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

Type SB with MK- or cylindrical retainer

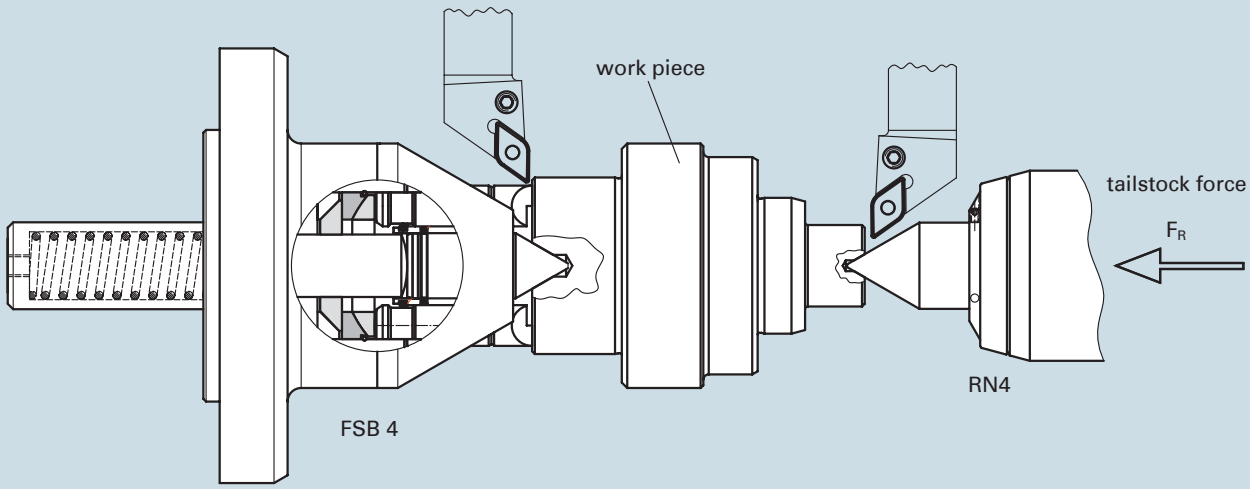


Type SB with taper shank and extracting nut for fast mounting into machine spindle

NEIDLEIN Face Drivers Type 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 work piece. Stable datum-point in case of different centerings
- extended tool-life of driving devices and cutting tools due to vibration-free running
- true run-out accuracy up to 0,02 mm maximum
- clamping force is triggered by tailstock
- fixed center pin/fixed datum-point in clamped state
- compensating driving devices/ ideal clamping of work piece
- simple handling

Type FSB with flange-retainer



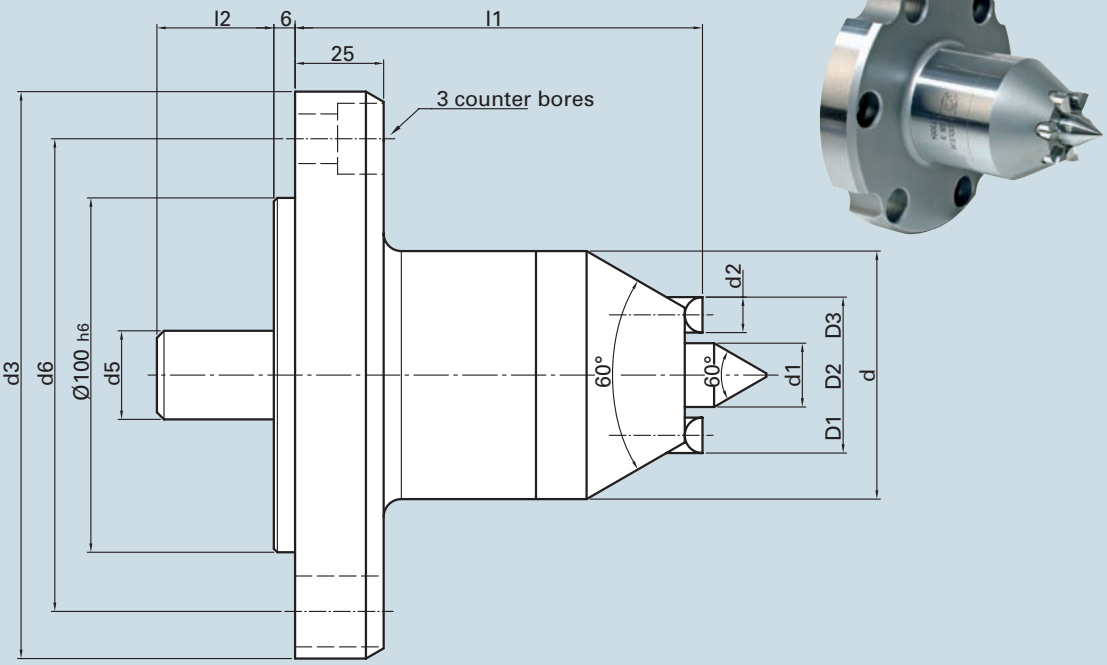
Clamping principle

The center pin located on the side of the tailstock pushes the work piece against the movable center pin of the face driver. The center pin will draw back until the surface of the work piece 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 work piece, squareness and surface finish. The entire surface of the workpiece can now be finished in one single clamping.

Please check page 6 and 7 for metal removing rates to be obtained as well as for the tailstock forces required. Compatible standard drive pins and center pins are listed in our brochure 1.2. We will be glad to design clamping devices suitable for your work pieces.

Technical data – Type FSB face driver



catalogue no.	Type	d	d1	center Ø	d2	d3	d5	d6	l1	l2	drive pin	fastening screw type	fastening screw pc	clamping diameter D1	clamping diameter D2	clamping diameter D3
73012	**FSB 01**	48	5	0 – 5	6	160	25	133.4	115	28	3	M12	3	8	11	17
73001	**FSB 0**	48	3	0 – 3	8	160	25	133.4	115	28	3	M12	3	6	11	19
73011	**FSB 11**	42	6	0 – 6	6	160	25	133.4	115	28	3	M12	3	11	14	20
73002	**FSB 1**	48	8	0 – 8	8	160	25	133.4	115	28	3	M12	3	13	18	26
73003	**FSB 2**	70	14	2 – 14	10	160	25	133.4	115	23	6	M12	3	26	31	36
73004	**FSB 3**	70	18	2 – 18	10	160	25	133.4	115	33	6	M12	3	34	39	44
73009	**FSB 35**	80	14	2 – 14	15	160	25	133.4	115	33	6	M12	3	29	39	49
73005	**FSB 4**	90	24	3 – 24	15	160	32	133.4	115	72	6	M12	3	39	49	59
73010	**FSB 45**	100	28	3 – 28	15	160	32	133.4	115	72	6	M12	3	49	59	69
73006	**FSB 5**	132	35	3 – 35	20	160	40	133.4	115	74	6	M12	3	69	84	99
73008	**FSB 55**	182	35	3 – 35	20	220	45	171.4	115	165	6	M16	3	110	125	140
73007	**FSB 6**	212	35	3 – 35	20	250	45	210	115	165	6	M20	3	140	155	170
73013	**FSB 7**	255	50	25 – 48	20	290	50	250	132	165	6	M20	6	180	195	210
73014	**FSB 75**	302	50	25 – 48	20	348	50	310	132	165	6	M20	6	230	245	260
73016	**FSB 8**	360	80	30 – 76	30	440	78	394	190	262	6	M20	6	270	290	310
73015	**FSB 85**	410	80	30 – 76	30	490	78	444	190	262	6	M20	6	320	340	360

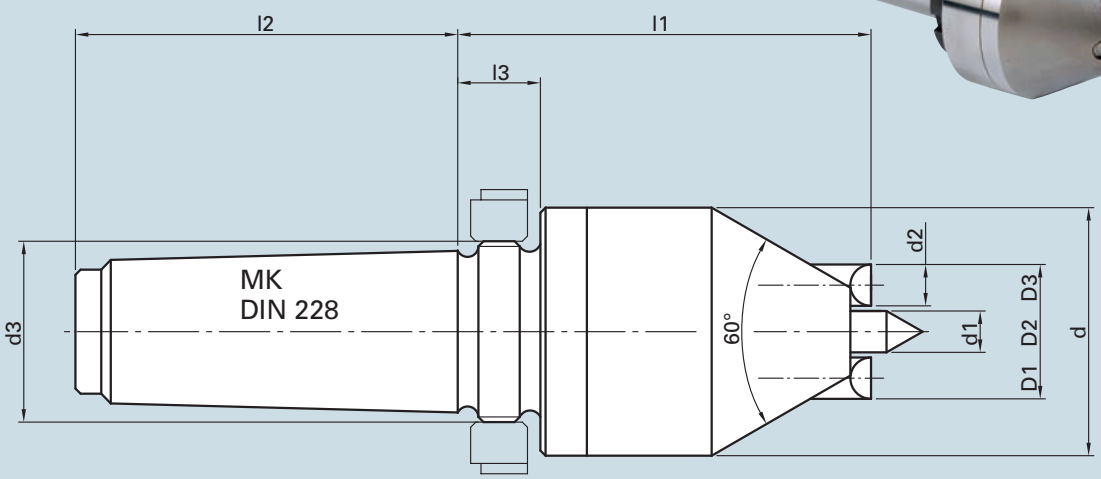
- All face drivers are supplied without drive pins.
- Types FSB 01/0 are supplied with center body, all other types without center pin.

It is the purpose of a flange-adapter to provide stable junction to the spindle machine. We supply these flange adapters for various sizes of spindle noses either in standard size (DIN 55028) or for spindle noses specific to manufacturer of machine-tools. Thus face drivers of range 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 work pieces

Technical data – Type SB face driver



catalogue no.	Type	MK	d	d1	center Ø	d2	d3	l1	l2	l3	drive pin	clamping diameter D1	D2	D3
72016	**SB 01**	3	48	5	0 – 5	6	M28 x 1.5	87	61	14	3	8	11	17
72017	**SB 01**	4	48	5	0 – 5	6	M35 x 1.5	87	74	16	3	8	11	17
72018	**SB 01**	5	48	5	0 – 5	6	M48 x 1.5	87	97	19	3	8	11	17
72001	**SB 0**	3	48	3	0 – 3	8	M28 x 1.5	87	61	14	3	6	11	19
72002	**SB 0**	4	48	3	0 – 3	8	M35 x 1.5	87	74	16	3	6	11	19
72003	**SB 0**	5	48	3	0 – 3	8	M48 x 1.5	87	97	19	3	6	11	19
72019	**SB 11**	3	42	6	0 – 6	6	M28 x 1.5	80	61	14	3	11	14	20
72020	**SB 11**	4	42	6	0 – 6	6	M35 x 1.5	80	74	16	3	11	14	20
72021	**SB 11**	5	42	6	0 – 6	6	M48 x 1.5	80	97	19	3	11	14	20
72004	**SB 1**	3	48	8	0 – 8	8	M28 x 1.5	80	61	14	3	13	18	26
72005	**SB 1**	4	48	8	0 – 8	8	M35 x 1.5	80	74	16	3	13	18	26
72006	**SB 1**	5	48	8	0 – 8	8	M48 x 1.5	80	97	19	3	13	18	26
72007	**SB 2**	4	70	14	2 – 14	10	M35 x 1.5	80	74	16	6	26	31	36
72008	**SB 2**	5	70	14	2 – 14	10	M48 x 1.5	80	97	19	6	26	31	36
72009	**SB 3**	4	70	18	2 – 18	10	M35 x 1.5	80	74	16	6	34	39	44
72010	**SB 3**	5	70	18	2 – 18	10	M48 x 1.5	80	97	19	6	34	39	44
72011	**SB 4**	5	90	24	3 – 24	15	M48 x 1.5	104	97	19	6	39	49	59
72012	**SB 4**	6	90	24	3 – 24	15	M70 x 1.5	104	134	20	6	39	49	59
72013	**SB 5**	6	132	35	3 – 35	20	M70 x 1.5	135	134	20	6	69	84	99
72015	**SB 55**	6	182	35	3 – 35	20	M70 x 1.5	135	134	20	6	110	125	140
72014	**SB 6**	6	212	35	3 – 35	20	M70 x 1.5	135	134	20	6	140	155	170

- face driver with cylindrical shank upon request.
- All face drivers are supplied without drive pins.
- Types SB 01/0 are supplied with center body, all other types without center pin.

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.

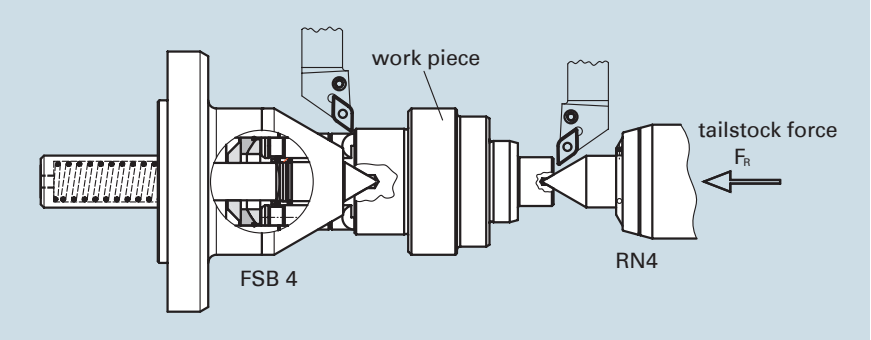
If necessary and depending on the tooling direction of the machine the face driver can be equipped optionally with drive pins for counter-clockwise tooling (SR/ tooling direction M3), for clockwise tooling (SL/tooling direction M4) or for both tooling directions (NV=bi-directional).

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 work pieces.

FSB/SB-Face Drivers: calculations

Tailstock force/ maximum chip cross section of metal removing

Principle: the tailstock force pushes the work piece agianst the movable center pin of the face driver. The center pin will draw back until the surface of the work piece 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. 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	

Applied Chisel Load of Drive Pins

Keep the chisel load within the following range/scale: 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 4mm, tailstock force 7200N

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

FSB/SB-calculation example

Specified data of machine and work piece:

maximum tailstock force: 10000 N
material of work piece: C15E
diameter of work piece on front-side of face driver,
diameter of face driver: Ø 48 mm
Turning diameter: Ø 90 mm

Selection of face driver:

Face driver type FSB 3 / clamping diameter 44mm
6 drive pins: chisel length 4mm each

- **tailstock force F_R:**

In order to ensure sufficient pull-in power (see chisel load of drive pins) a tailstock force of approx. 7200 N has to be supplied.

$$BS = \frac{F_R}{n \times s} \Longrightarrow F_R = 300\,\frac{N}{mm} \times 6 \times 4mm = 7200\,N$$

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:

$$q\,\max = \frac{\frac{7200N}{1,1} - 1000}{1000 \times \frac{90mm}{44mm}} = 2,71mm^2$$

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 toward pivot of work piece, Even larger chip cross sections can be achieved (> formula), commensurate with turning diameter

Face Driver FFB/FFBH

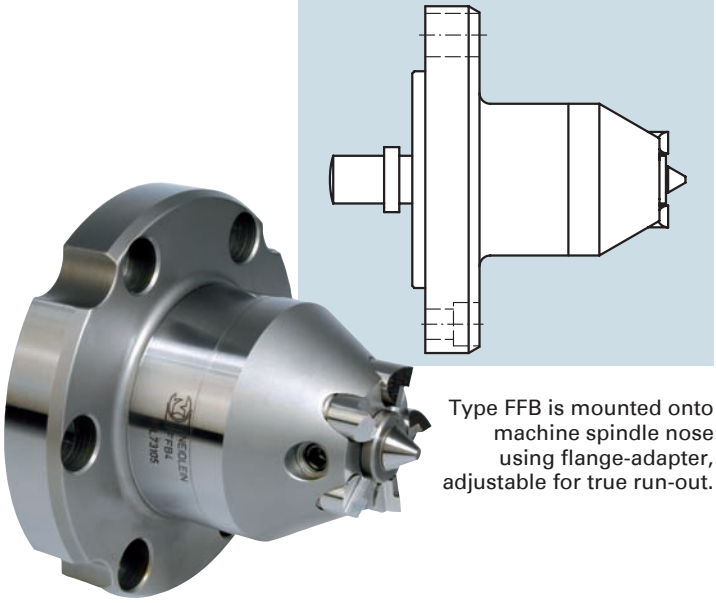
Clamping tools for tooling between center pins

the entire surface of work piece can be completely machined with one single clamping and with a maximum of torque transmission. NEIDLEIN face drivers are mechanical clamping systems, suitable for soft/green tooling 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 work pieces are clamped centrically by the fixed center pin. This operation results in high true run-out accuracy.

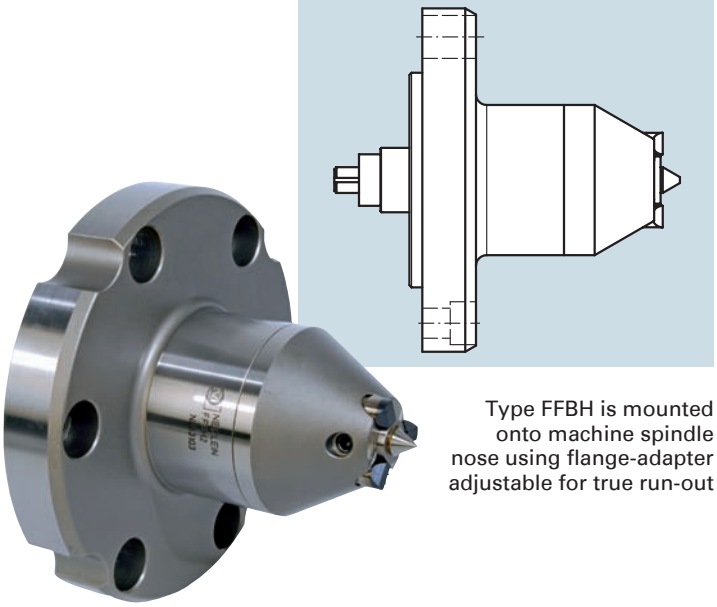
Drive pins of type FFBH are hydraulically activated and compensated, thus achieving excellent true run-out accuracy.

Type FFB with flange-mount



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

Type FFBH with flange-mount

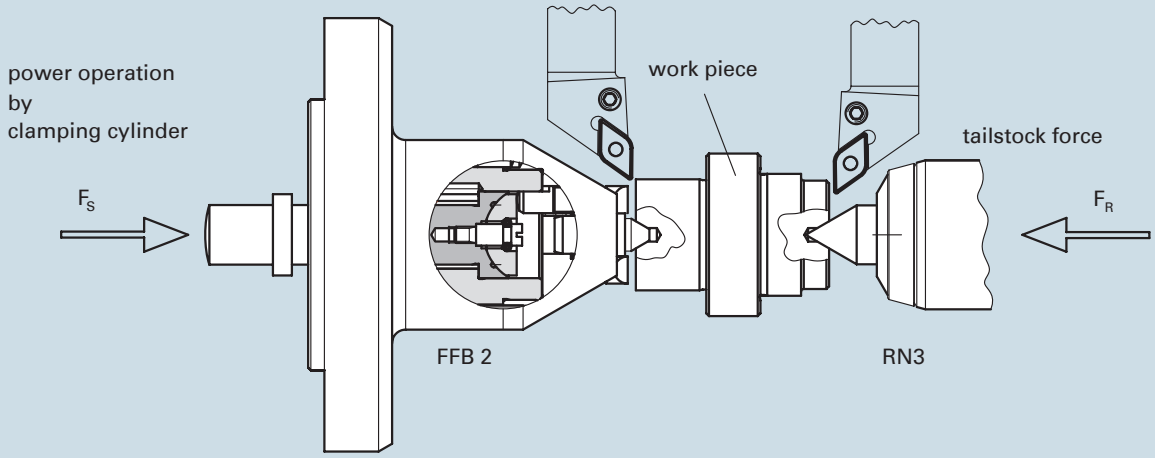


Type FFBH is mounted onto machine spindle nose using flange-adapter adjustable for true run-out

NEIDLEIN Face Driver type FFB / FFBH with fixed center pin ensure:

- maximum of torque transmission, thus achieving a high rate of metal removing
- datum-point location in center of workpiece ensures constant measures of length
- true run-out accuracy up to 0,005 mm maximum.
- extended service life of drive pins and cutting tools due to vibration-free running
- fixed clamping location
- compensating driving devices/ ideal clamping of work piece
- easy handling

Type FFB / FFBH with flange-mount



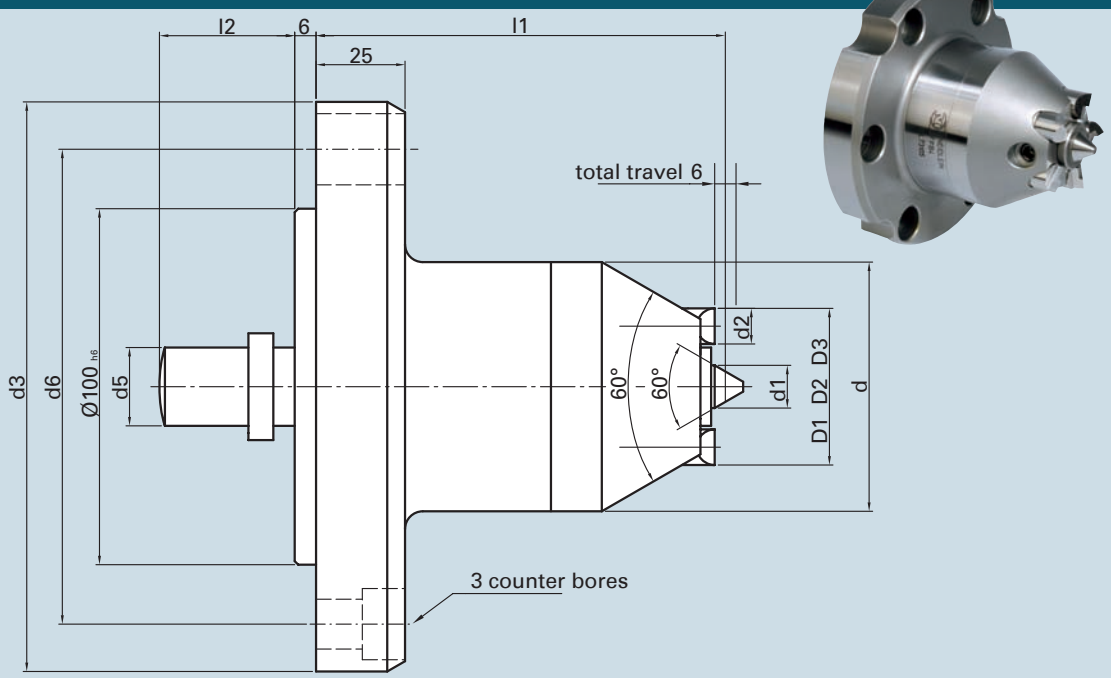
Clamping principle

The center pin located on the side of the tailstock pushes the work piece against the fixed center pin of the face driver. The motion of the drive pins against the surface of the work piece 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 work pieces. The datum-point of work pieces on the machines is determined by the size of the center hole. The entire surface of work piece can now be tooled in one single clamping.

See page 12 and 13 with data for achievable removal of material and the thrust requested. The appropriate standard drive pins and center pins can be found in brochure 1.2.

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

Technical Data – Type FFB Face Driver



catalogue no.	Type	d	d1	center Ø	d2	d3	d5	d6	l1	l2	drive pin	fastening screw type	fastening screw pcs	clamping diameter D1	clamping diameter D2	clamping diameter D3
73101	**FFB 01**	60	5	1 – 5	6	160	18	133.4	115	38	3	M12	3	8	11	17
73112	**FFB 0**	60	3	1 – 3	8	160	18	133.4	115	38	3	M12	3	6	11	19
73111	**FFB 11**	42	7,8	2 – 6,5	6	160	12	133.4	115	38	3	M12	3	11	14	20
73102	**FFB 1**	48	9,8	4 – 8,5	8	160	18	133.4	115	38	3	M12	3	13	18	26
73103	**FFB 2**	70	10	4 – 9	10	160	22	133.4	115	38	3	M12	3	26	31	36
73104	**FFB 3**	70	12	6 – 11	10	160	22	133.4	115	38	3	M12	3	34	39	44
73113	**FFB 35**	80	10	4 – 9	15	160	22	133.4	115	38	3	M12	3	29	39	49
73105	**FFB 4**	90	16	10 – 15	15	160	25	133.4	115	38	5	M12	3	39	49	59
73106	**FFB 45**	100	16	10 – 15	15	160	25	133.4	115	54	5	M12	3	49	59	69
73107	**FFB 5**	132	16	10 – 15	15	160	25	133.4	115	54	5	M12	3	69	84	99
73108	**FFB 55**	182	16	10 – 15	15	220	40	171.4	155	54	5	M16	3	110	125	140
73109	**FFB 6**	220	16	10 – 15	15	250	40	210	171	54	5	M20	3	140	155	170

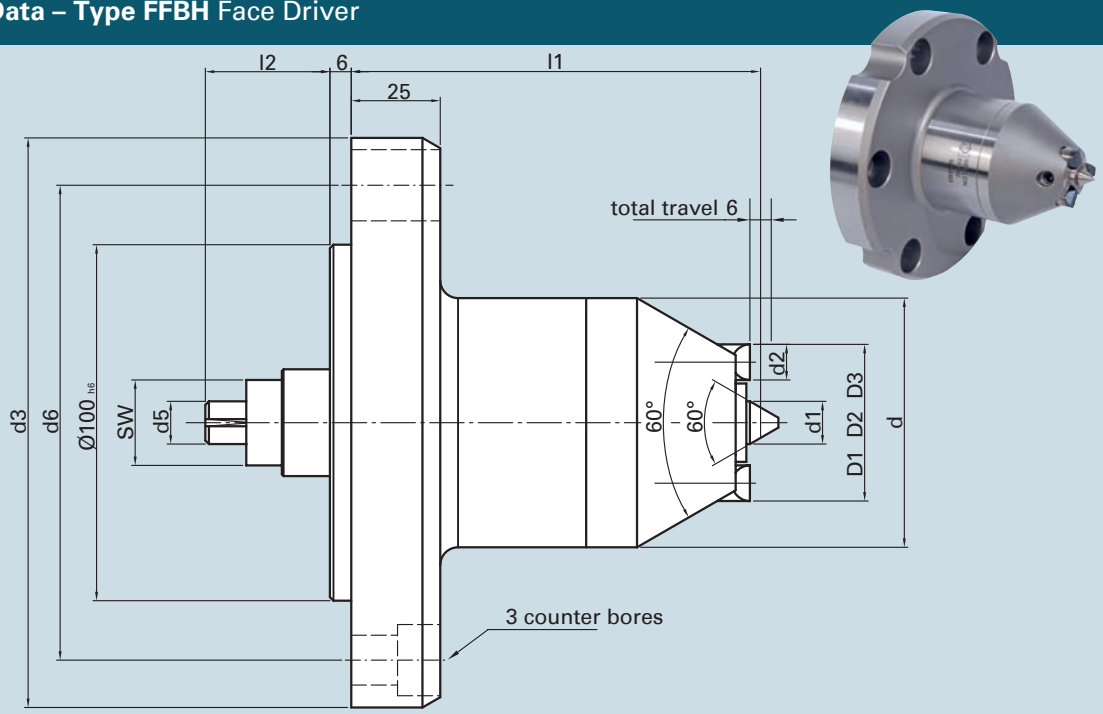
- All face drivers are supplied without drive pins.
- Types FFB 01/0 are supplied with center body, all other types without center pin.

It is the purpose of an adjustable flange-adapter to provide stable junction to the spindel machine. We supply these flange adapters for various sizes of spindle noses in standard size (DIN 55028) or for spindle noses specific to machine-tool manufacturer. Thus face drivers of range 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 work pieces

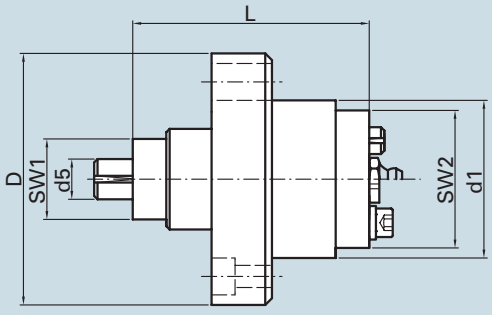
Technical Data – Type FFBH Face Driver



catalogue no.	Type	d	d1	center Ø	d2	d3	SW	d5	d6	l1	l2	drive pin	fastening screw type	fastening screw pcs	clamping diameter D1	clamping diameter D2	clamping diameter D3
63102	**FFBH 1**	70	9,8	4 – 8,5	8	160	24	12	133.4	115	35	3	M12	3	13	18	26
63103	**FFBH 2**	70	10	4 – 9	10	160	24	12	133.4	115	35	3	M12	3	26	31	36
63104	**FFBH 3**	70	12	6 – 11	10	160	24	12	133.4	115	35	3	M12	3	34	39	44
63106	**FFBH 4**	90	16	10 – 15	15	160	34	12	133.4	132	35	5	M12	3	39	49	59
63107	**FFBH 45**	100	16	10 – 15	15	160	34	12	133.4	132	35	5	M12	3	49	59	69
63108	**FFBH 5**	132	16	10 – 15	20	160	34	12	133.4	149	35	5	M12	3	69	84	99

● All face drivers are supplied without drive pins and without center pins.

Technical Data – Type FFBH Hydraulic Unit



catalogue no.	Type	SW	d5	L	d1	SW2	D
63102HE	**FFBH 1**	24	12	70.5	47	41	75
63102HE	**FFBH 2**	24	12	70.5	47	41	75
63102HE	**FFBH 3**	24	12	70.5	47	41	75
63106HE	**FFBH 4**	34	12	70.5	65	59	93
63106HE	**FFBH 45**	34	12	70.5	65	59	93
63108HE	**FFBH 5**	34	12	70.5	87	81	131

The general explanatory notes for this face driver type FFBH can be obtained from the sheet “Technical Data-Type FFB“.

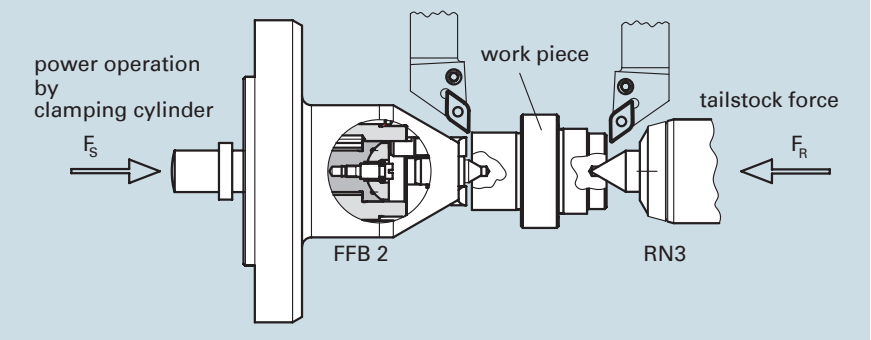
For safe and smooth operation of face driver we recommend exchange of hydraulic unit after 1.500 operating hours.

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

FFB/FFBH-Face Drivers: Calculations

Force of clamping cylinder/ Maximum chip cross section.

Principle: the tailstock force pushes the work piece 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:

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

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

- **maximum chip cross section q_{max}:**

At a given force of clamping cylinder, the maximum chip cross section is calculated as follows:

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

- **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. 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
Fs	[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

$$\textit{chisel load} = \frac{6300N}{3 \times 7mm} = 300\frac{N}{mm}$$

FFB/FFBH-calculation EXAMPLE

Specific data of machine and work piece:

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

Selection of face driver:

Face driver type FFB 4 / clamping diameter Ø59 mm
5 drive pins each 7,5 mm chisel length

- **Force of clamping cylinder Fs:**

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

$$BS = \frac{F_S}{n \times s} \Longrightarrow F_S = 300\ \frac{N}{mm} \times 5 \times 7{,}5mm = 11250\ N$$

Calculation of material factor m:
As per adjustment chart material factor: m (16MnCr5) = 1,2

- **maximum chip cross section q_{max}:**

maximum chip cross section (at OD-Ø) is calculated as follows:

$$q\,\max = \frac{\frac{11250N}{1{,}2} - 1300}{1100 \times \frac{120mm}{59mm}} = 3{,}61mm^2$$

Explanatory notes:

The calculated clamping diameter refers to the extreme outer tooling diameter. In case of further tooling toward pivot of work piece, Even larger chip cross sections can be achieved (>formula), commensurate with turning diameter.

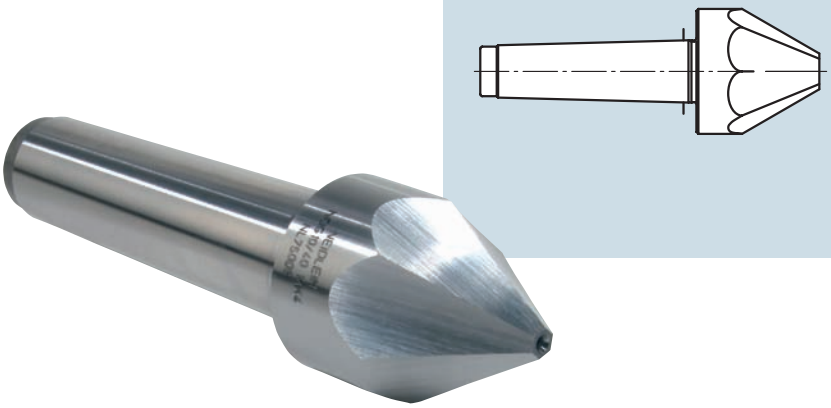
Pipe Driver NDG/AND

Clamping tools for tooling between center pins

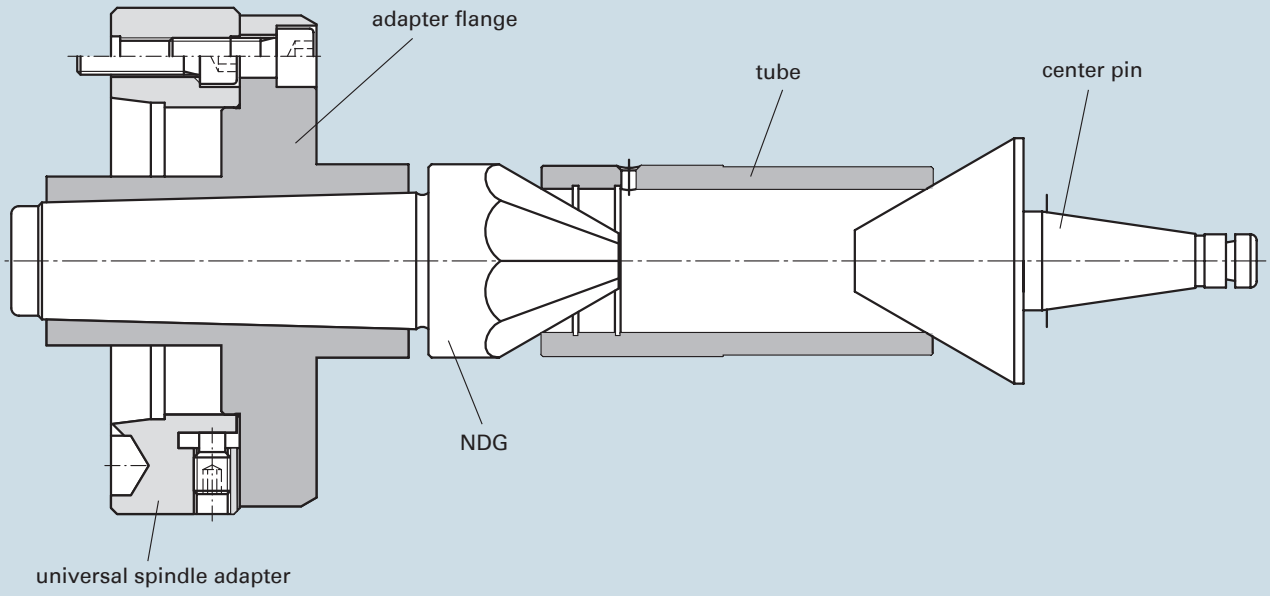
The entire outside surface of a tubular work piece can be tooled with one single clamping and high torque transmission.

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

Type NDG Pipe Driver



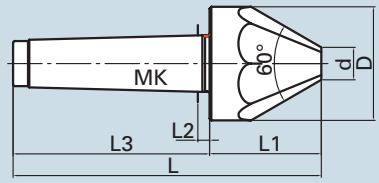
Clamping principle



NEIDLEIN pipe driver NDG and AND ensure:

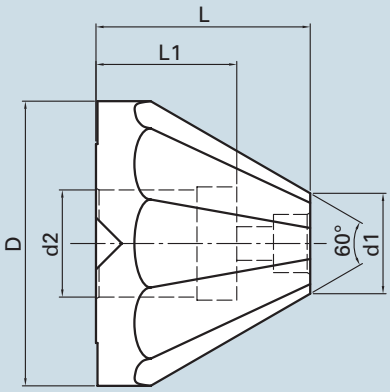
- high torque transmission, thus achieving a high rate of metal removing
- extended service life of driving chisels
- large clamping area of tubular work pieces 2 – 155 mm bore-diameter
- finishing of outer surface by clamping ⟹ saving of time
- easy handling

Technical data – Type NDG pipe driver



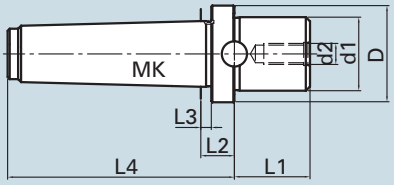
catalogue no.	Type	morse taper	D	d	L	L1	L2	L3	a	chisel pcs	for Bore-Ø from	to
75001	**NDG 0/15**	2	18	0	100	32	4	68	60°	6	2	17
75002	**NDG 0/30**	3	31	0	135	50	5	85	60°	6	2	30
75003	**NDG 10/40**	3	45	8	145	60	5	85	60°	6	9	43
75004	**NDG 20/60**	3	63	18	147	62	5	85	60°	8	19	60
75005	**NDG 10/40**	4	45	8	168	60	6	108	60°	6	9	43
75006	**NDG 20/60**	4	63	18	170	62	6	108	60°	8	19	60

Technical data – Type NDG drive cone exchangeable



catalogue no.	Type	D	d	d2	L	L1	a	chisel pcs	for Bore-Ø from	to
75101	**NDG 35/90**	93	32.8	35	70	46	60°	10	33	90
75102	**NDG 90/155**	158	88	35	75	46	60°	10	88	155

Technical data – Type AND arbor



catalogue no.	Type	morse taper	D	d1	L1	L2	L3	L4
75201	**AND 35/4**	4	46	35	M10	36	16	108
75202	**AND 35/5**	5	44.5	35	M10	36	16	130
75203	**AND 35/6**	6	64	35	M10	36	16	144

Data sheet for requesting an offer:

Name of company:

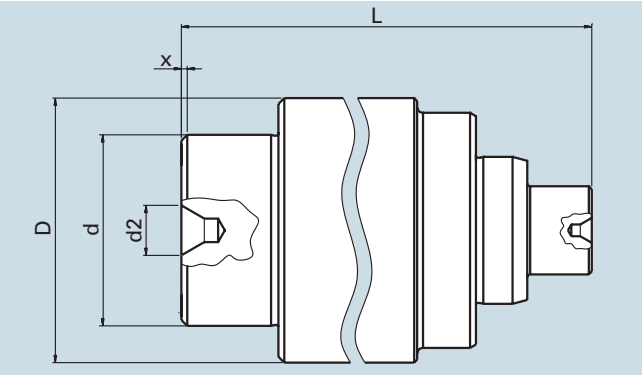
Mr. / Ms:

phone.:

fax:

Email:

Data of work piece:



- material
  = _____
- work piece soft – carbide
  = _____
- largest tooling-Ø D and length L
  = _____
- tooling-Ø d and chamfer x
  = _____
- size of center-Ø d2 [mm] and shape
  = _____
- drawing of work piece enclosed
  ☐ yes ☐ No

Our representative:

data of machine:

- size of spindle
  = _____
- possibly size of taper in spindle
  = _____
- maximum force of clamping cylinder F_S [N]
  = _____
- tooling direction of spindle M3 ☐
- tooling direction of spindle M4 ☐
- size of taper in tailstock
  = _____
- maximum tailstock force F_R [N]
  = _____
- tailstock center sleeve live ☐
- tailstock center sleeve fixed ☐

face driver / drive pins:

face driver types:

- SB / FSB – movable center pin ☐
  datum-point surface workpiece
- FFB – fixed center pin ☐
  datum-point center size
- tooling direction SR(M3) ☐
- tooling direction SL(M4) ☐
- bi-directional NV ☐
- diamond tipped ☐
- FV diamond embedded ☐
- KV hard coated ☐

live center:

- type RN/RNC/RNA/RNW
  = _____

dead center:

- type FN/FNC/FNA/FNW
  = _____