

PI 36.3 e – Product Information

Disk-type tool turret

without tool drive

Series 0.5.680.1xx

with tool drive

***Series 0.5.673.2xx/0.5.676.2xx
0.5.675.1xx***

**Disk-type tool turret series 0.5.680.1xx
without tool drive**

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**Disk-type tool turret 0.5.673.2xx/0.5.676.2xx
with axial tool drive**

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**Disk-type tool turret 0.5.675.1xx
with radial tool drive**

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Request the following if needed: **Planning instructions PA 36.3 e**

NOTE:

The information given in this product information is based on the details available at the time of printing. We explicitly reserve the right to make changes arising out of the continuous further development of the product.

Disk-type turret 0.5.680.1xx

These turrets are suitable for use on turning machines for forward as well as reverse machining. Their exclusive hydraulic action means they are highly suitable for heavy-duty use in series manufacture.

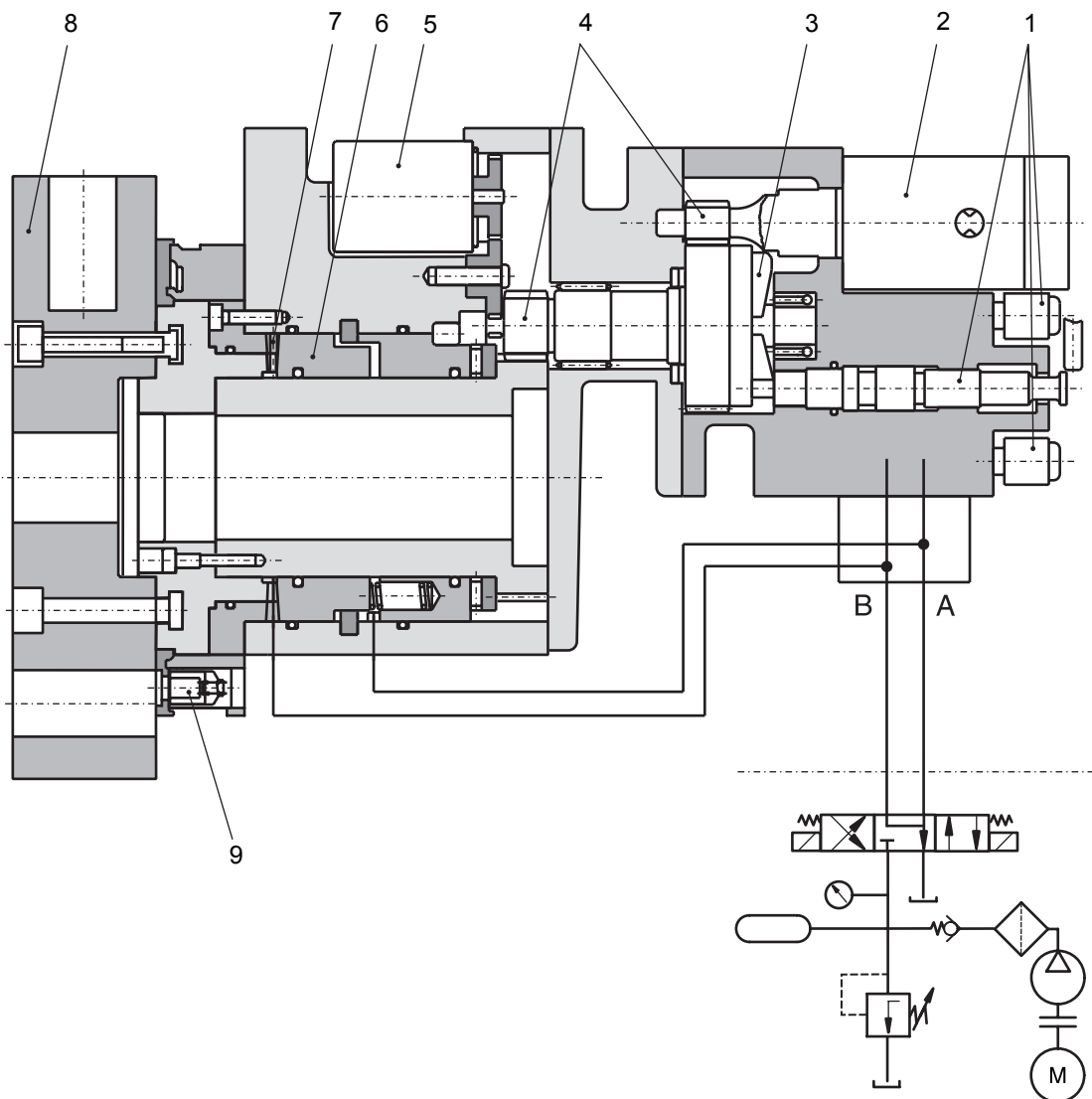
Turret series	without tool drive	– 0.5.680.1xx
	with axial tool drive	– 0.5.673.xxx – 0.5.676.xxx
	with radial tool drive	– 0.5.675.xxx

Features:

- Drive with hydraulic positioning motor for fast bidirectional positioning
- High degree of stability due to high locking forces
- Hydraulically activated locking with triple Hirth serration
- Simple hydraulic supply
- Absolute positioning control – does not require moving to reference point
- Not affected by collisions due to the low kinetic energy of the drive and fastening snap ring groove for the tool disk
- Directly controllable with machine controller or with SAUTER control unit EK 501
- Connection with centralised lubricating system to ensure extremely high service and usage life
- Can be installed in any position

Options:

- Block-shaped housing or with flange fitting form for especially high degree of rigidity
- Attachment of plate coolers when especially high thermal stability requirements demand water cooling
- Central rotary feed-through for fluid-actuated tools and a high-pressure cooling lubricating device
- Attachment of transfer elements for switching sensors in tool disk
- Attachment of sensors to monitor cutting force
- **Turret with y-axis slide feed unit**
- and many more features



- 1 Control vaves
- 2 Hydraulic drive motor
- 3 Radial cam
- 4 Spur wheel gear
- 5 Electrical position transmitter
- 6 Locking piston
- 7 Hirth serration
- 8 Tool disk
- 9 Cooling lubricant valve

Series	
Disk-type turret 0.5.680.1xx	
Number of switching positons	
Admissible tangential load (locked turret)	kNm
<ul style="list-style-type: none"> Admissible mass moment of inertia of tooling (tool disk and holder) 	Standard load stage High load load stage
Admissible unbalanced mass due to tooling	Nm
Indexing times ^{1.)}	
Rotating tool disk	
<ul style="list-style-type: none"> Incl. accelerating and braking per partial step 45°/30°/22.5° 	Standard load stage High load load stage
<ul style="list-style-type: none"> Without accelerating and braking per additional partial step 45°/30°/22.5° 	Standard load stage High load load stage
Turret unlocked or locked	s
Adm. Indexing frequency (median switching angle $\varphi_m=90^\circ$)	min ⁻¹
Operating pressure	
Hydraulics ± 10 %	bar
Cooling lubricant	
<ul style="list-style-type: none"> With medium pressure valve^{2.)} With central high pressure lubricant device 	bar bar
Fluid absorption volume	
<ul style="list-style-type: none"> Rotating tool disk per partial step 45°/30°/22.5° 	Standard load stage High load load stage
Turret unlocked or locked	cm ³ cm ³ cm ³
Mass	
Turret (incl. drive motor)	m kg
Tool disk and tooling	m _{adm.} kg
Adm. ambient temperature	
	°C

1.) Conditions: Fluid supply has to be sufficiently dimensioned.
 Please comply with notes in PA 36.3!
 Turret has to be at operating temperature.
 With max. unbalanced tooling, the rotation times are changed by max. ± 15%.
 See planning instructions PA 36.3 for notes on determining the total switching time.

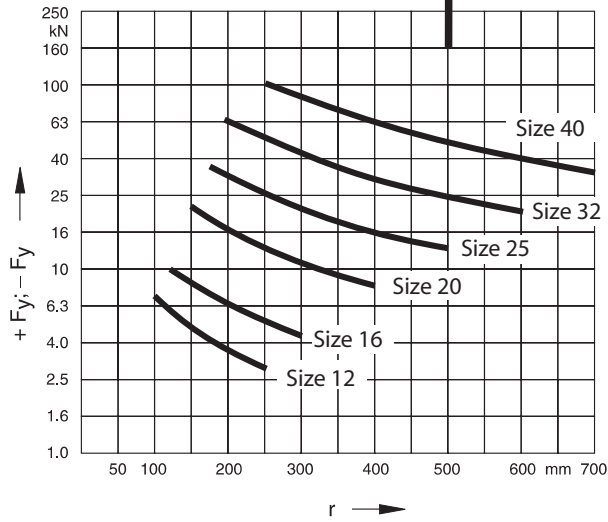
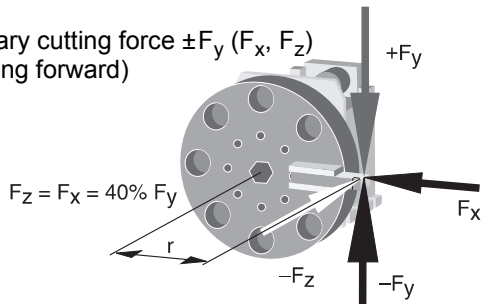
2.) Also suitable for min. cooling lubricant volumes when using special valve.

Size																	
12			16			20			25			32			40		
8	12	16	8	12	16	8	12	16	8	12	16	8 ^{3.)}	12 ^{3.)}	16	8 ^{3.)}	12 ^{3.)}	16
0.7			1.3			3.2			6.3			12.5			25		
1.2			2.5			5.0			12.5			25			140		
2.5			5.0			10			32			63					
16			32			63			125			200			320		
0.21	0.16	–	0.26	0.20	–	0.30	0.24	–	0.46	0.36	0.26	0.52	0.38	0.31	1.0	0.72	0.58
0.26	0.19	0.16	0.30	0.22	0.18	0.38	0.29	0.22	0.57	0.43	0.30	0.92	0.68	0.55			
0.16	0.11	–	0.19	0.13	–	0.21	0.15	–	0.33	0.22	0.17	0.46	0.31	0.23	0.83	0.56	0.42
0.24	0.17	0.12	0.28	0.19	0.14	0.31	0.21	0.16	0.46	0.31	0.23	0.82	0.55	0.42			
0.11			0.14			0.20			0.30			0.50			0.80		
no limitations																	
50																	
5 .. 25									Filtering ≤ 100 µm ^{4.)}								
100									Filtering ≤ 25 µm ^{4.)}								
46	31	–	46	31	–	50	34	–	81	54	40	100	68	50	254	170	127
75	50	37	75	50	37	80	55	40	127	85	63	160	110	80			
12			28			42			65			114			165		
38			50			70			110			190			380		
40			80			160			250			400			630		
10 ... 40																	

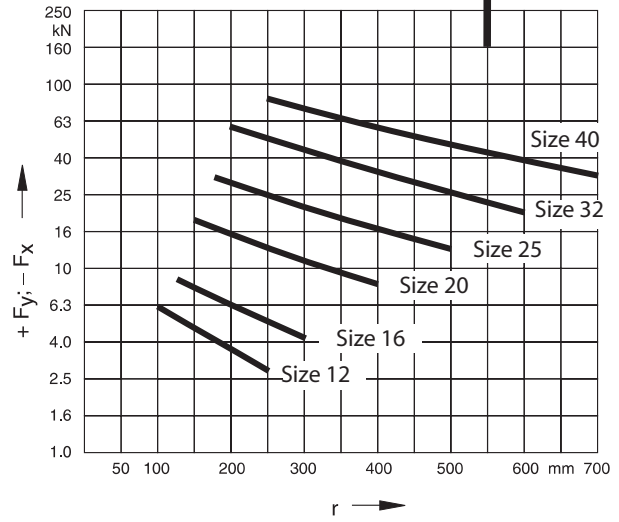
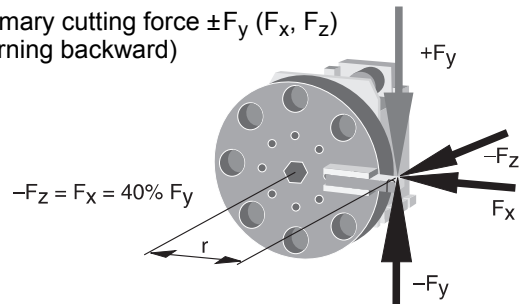
3.) Delivered with 24 switching positions.

4.) Comply with the fineness of the filter required for the utilised tools, e.g. spindle heads with internal cooling lubricant supply.

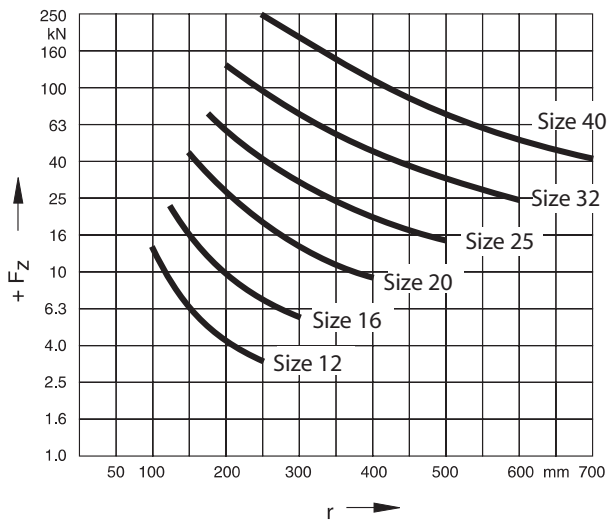
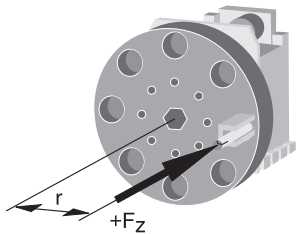
Primary cutting force $\pm F_y$ (F_x, F_z)
(turning forward)



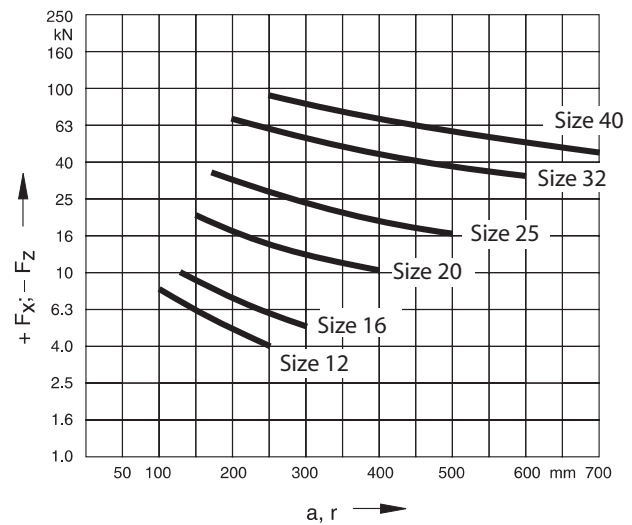
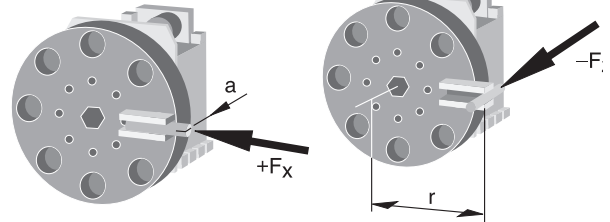
Primary cutting force $\pm F_y$ (F_x, F_z)
(turning backward)



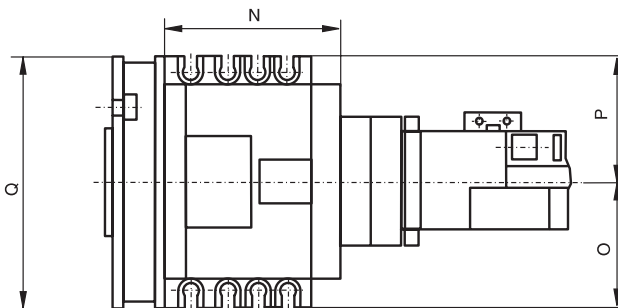
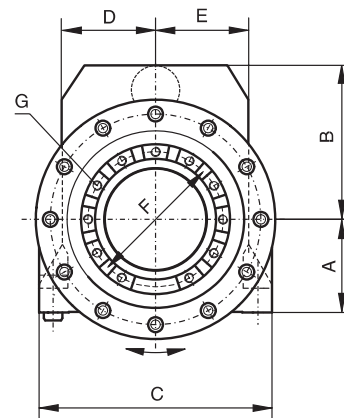
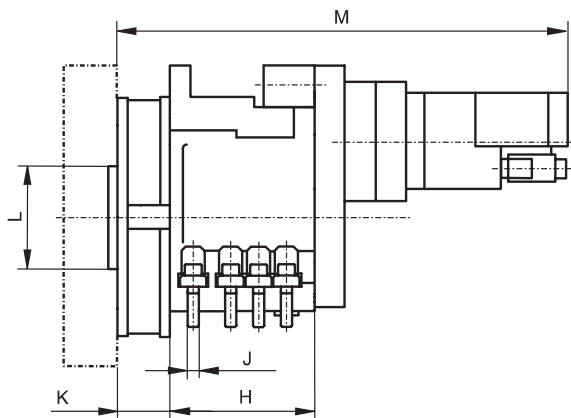
Feed force $+F_z$
(drilling forward)



Feed force $-F_z$
Transverse force $+F_x$



Note: The diagrams apply to static loads.
Significantly lower values have to be used with shock loads (discontinuous cutting).

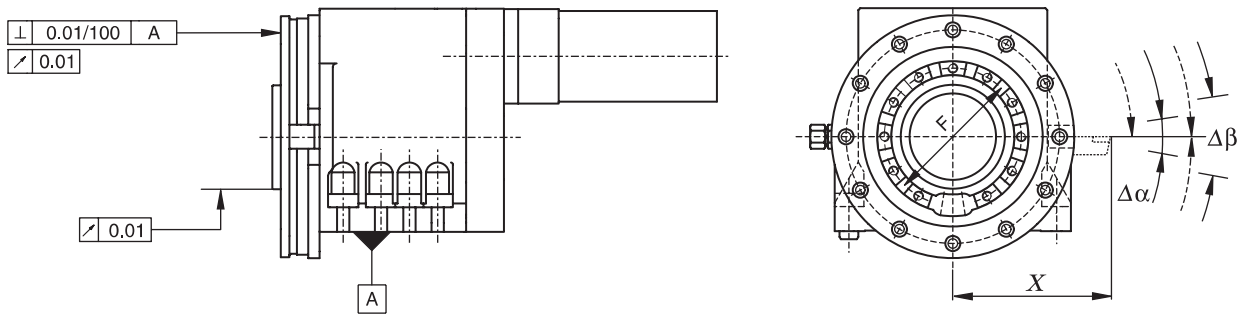


Turret geometry with
block form or fitted flange housing upon
request

Series	Size						
Disk-type tool turret 0.5.680.1xx	12		16	20	25	32	40
	right	left					
A	63		80	100	125	160	200
B	120		133	138T	153	182	226
C	175		215	255	318	396	470
D	80	65	85	100	125	160	200
E	65	80	85	100	125	160	200
Ø F	90		120	145	182	220	300
G	8 x M8		8 x M8	11 x M10	11 x M12	15 x M12	22 x M12
H	128		138	155	190	220	341
I	M8		M10	M12	M16	M20	M24
K	32		40	41	52	62	70
Ø L	70		90	110	120	150	200
M	385		428	460	508	550	670
N	192		192	210	262	312	442
O	85	100	106	125	158	198	245
P	100	85	106	125	158	198	245
Ø Q	175		215	255	318	396	470

Dimensions in mm

Precision



Repeating accuracy

(Multiple move to a switching position from the same direction)

$$\Delta\alpha = \pm 1,6'' \pm 0,8 \cdot \frac{X[mm]}{100[mm]} [\mu m]$$

Indexing precision

(Multiple move to a switching position from different direction)

$$\Delta\beta = \pm 4'' \pm 2 \cdot \frac{X[mm]}{100[mm]} [\mu m]$$

Fluid rotary feed-through

All turrets are deliverable with central fluid rotary feed-through:

- “Uncontrolled” variation – fluid supply in **all** switching positions,
e.g. for sealing air, for gripper activation, and similar actions
- “Controlled” variation – fluid supply to **one** switching position,
e.g. for KSS, autom. tool changes, and other functions

A maximum of three supply lines are routed through the centre of the turret.

Operating pressure $P_{adm.} = 100$ bar (standard)

Disk-type tool turret 0.5.673.xxx/0.5.676.xxx with axial tool drive

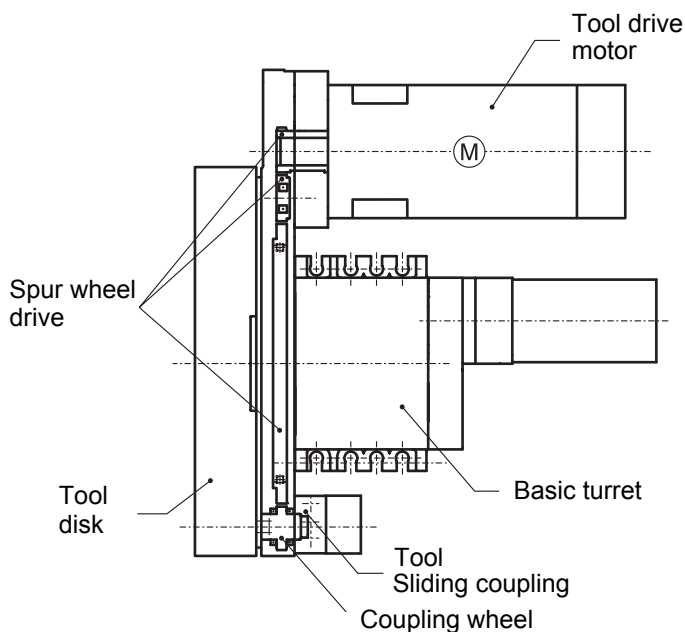
These turrets feature a modular construction and consist of the following:

- Basic turret series 0.5.680.1xx and
- decentralised **tool drive** for individually switchable **axial** tools for **forward** machining.

The tool coupling can alternatively be supplied for spindle heads with or without the patented spindle locking system. This means that the tools are either connected after positioning the drive spindle or after searching.

- When conducting search run with small – positioning with controls is not required
number of revolutions per minute electromagnetically activated coupling
- or
- after positioning the drive spindle – shortest switching time
Hydraulically activated coupling

Coupling process with	turret series	Suitable spindle heads	
		Spindle locking system	SAUTER spindle head type
Small number of revolutions	0.5.673.2xx	no	0.5.921.xxx
Spindle positioning	0.5.676.2xx	yes	0.5.941.xxx



The tool drive motor drives the coupling wheel via the spur wheel gear incorporated in the gearbox casing. The drive motor can be located at the side of the turret opposite the working position or above the turret casing, depending on the application.

Performance data for the tool coupling

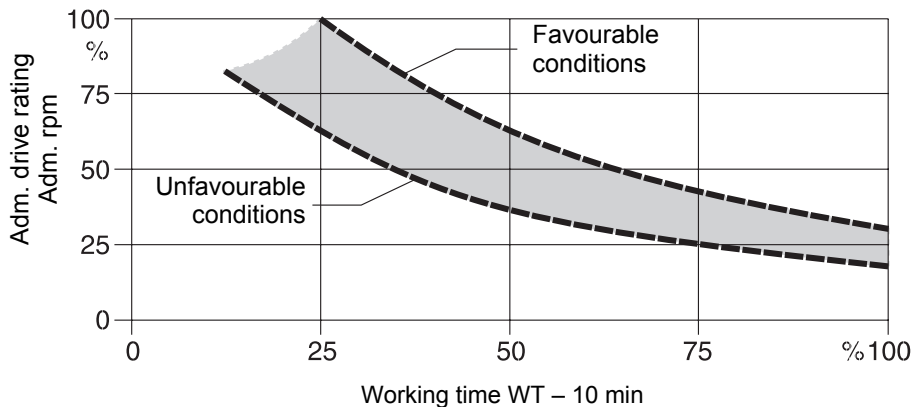
The gearbox is designed for the performance data given below for the tool coupling. The actually available performance data depend on the utilised drive motor (see below).

Series		
Disk-type tool turret 0.5.673.xxx/676.xxx		
Gearbox performance data Adm. drive rating ^{1.)} Adm. torque ^{2.)} Adm. rpm ^{1.) 3.)}	$P_{adm.}$ $M_{adm.}$ $n_{adm.}$	kW Nm min^{-1}
Gear ratio ^{7.)}		i
Recommended drive motors		
Siemens servomotor, Type 1 FT 6.. Max. torque ^{6.)} Max. rpm ^{6.)}		Nm min^{-1}
Indramat servomotor, Type MKD.. ^{4.)} Max. torque ^{6.)} Max. rpm ^{6.)}		Nm min^{-1}
Fanuc spindle motor, Type Alpha.. Max. torque ^{6.)} Max. rpm ^{6.)}		Nm min^{-1}

- 1.) The values are reference values for short-term operation. Higher rpms generate more heat and noise.
- 2.) Torque limitation at motor converter required!
The listed torque values apply to smooth machining (such as thread-cutting).
In the case of machining with severe shock loads (e.g. face milling and similar operations), it is necessary to reduce the motor drive torque by 50% or more.
- 3.) Higher rpms upon request.
- 4.) With absolute value encoder for turret series 0.5.676.xxx
- 5.) Spindle motor
- 6.) At tool coupling 40% WT – 10 min
- 7.) i = 1.5 only with turret series 0.5.676.xxx

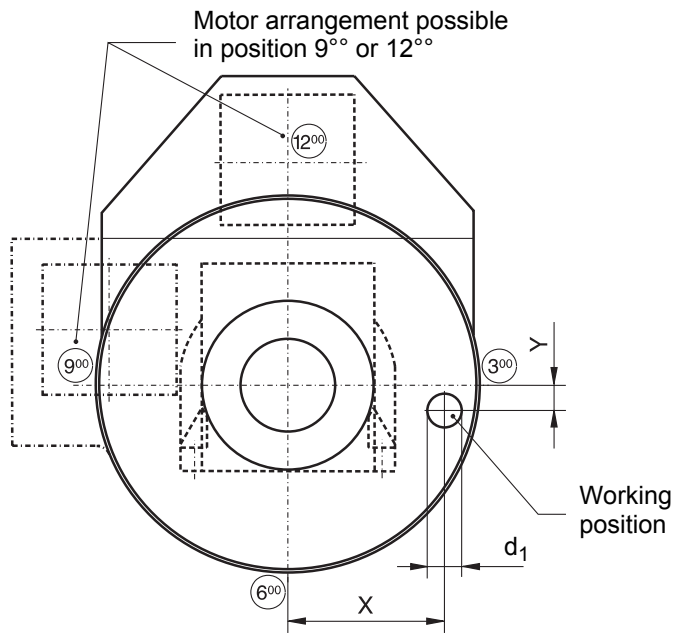
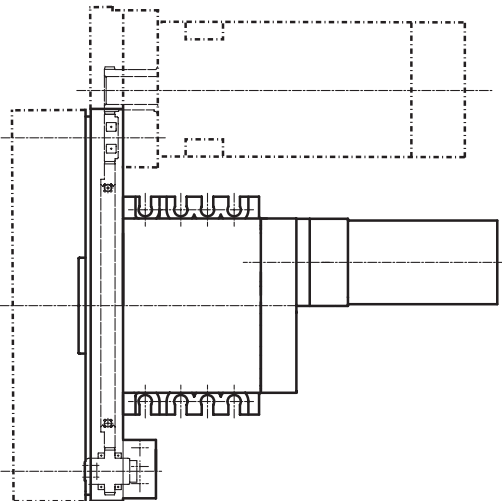
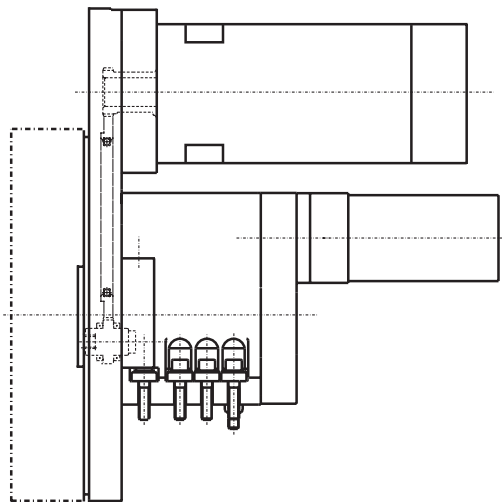
Size											
12		16		20		25		32		40	
6 20 6000		8 32 5000		10 63 4000		12.5 100 4000		16 160 3200		16 160 3200	
~1.5	1.0	1.0		~1.5	1.0	~1.5	1.0	~1.5	1.0	~1.5	1.0
..062 -AK..	..064 -AK..	..084 -AK..		..86 - AH..		..102 -AH..	..105 -AF	1PH7 ^{5.)} -107..	..105 -AF	1PH7 ^{5.)} -107..	..105 -AF..
12.5 4500	14 6000	28 5000		58 3000	40 4000	58 3200	68 4000	125 3200	68 3200	125 3200	68 3200
..071 B		..090 B		..112 B		2AD ^{5.)} 100 C	..112C	2AD 100D.. ^{5.)}		2AD 100D.. ^{5.)}	
15 4000	14 6000	22 5000		60 2600	42 4000	78 4000	68 4000	108 3200	72 3200	108 3200	72 3200
	α 1.5	α 2		α 3		α 6		α 8		α 8	
	11 6000	25 5000		55 4000	40 4000	56 4000		120 3200		120 3200	

Adm. relative working time – Reference values for gears –



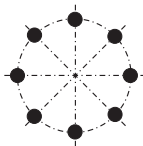
Example for size 20:

- Tool coupling = 3000 min⁻¹
- n_{adm.} = 4000 min⁻¹
- ⇒ n_{Tool coupling} = 75% n_{adm.}
- ⇒ Working time ≤ 40% - 10 min (max. 4 min ON – min. 6 min OFF)

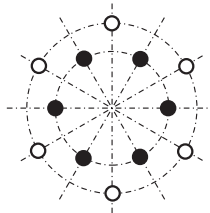


(Depicted turret arrangement "right")

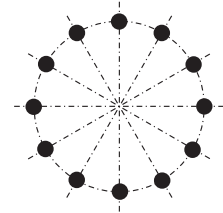
Tool arrangement:



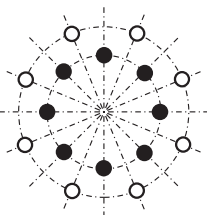
8 pos. – 1 graduated circle



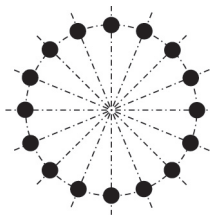
12 pos. – 2 graduated circles



12 pos. – 1 graduated circle



16 pos. – 2 graduated circles



16 pos. – 1 graduated circle

- Position with tool drive
- Position w/o tool drive

Alternate configurations

Turret Size	Working position X / Y	Motor position	Coupling profile		Tool holder Receptacle Ø DIN 69880 d ₁	Possible tool arrangement see page 13
			Turret series			
			0.5.673.2xx	0.5.676.2xx		
12	+98.54 / -17 +100 / 0 +142.5 / 0	9°° 9°° 9°°	DIN 5480- W10x0.8	DIN 5480- W11x0.8	20 20 20	12-2 12-2 16-1
	+100/0	9°°	-	DIN 5480- W14x0.8	25	12-2
16	+117.4 / -25	9°°	DIN 5482- 15x12	DIN 5480- W16x0.8	30	12-2
	+125 / -25	9°°			30	12-2
	+135 / 0	12°°			30	12-1
	+150 / 0 +150 / 0	9°° 12°°			30 30	12-1 12-1
20	+155 / 0	9°°	DIN 5482- 17x14	DIN 5480- W20x0.8	40	12-2
	+170 / 0	9°°			40	12-2
	+185 / 0	9°°			40	12-1
25	+198 / -70	9°°	DIN 5482- 20x17	DIN 5480- W24x1.25	50	12-2
	+200 / 0	9°°			50	12-2
	+200 / -20	12°°			50	12-2
	+235 / -70	9°°			50	12-1
32	+265 / -80	12°°	DIN 5482- 25x22	-	60	12-1
40	+387.8 / -125	9°°			60	12-1

Bold print indicates quickest delivery!

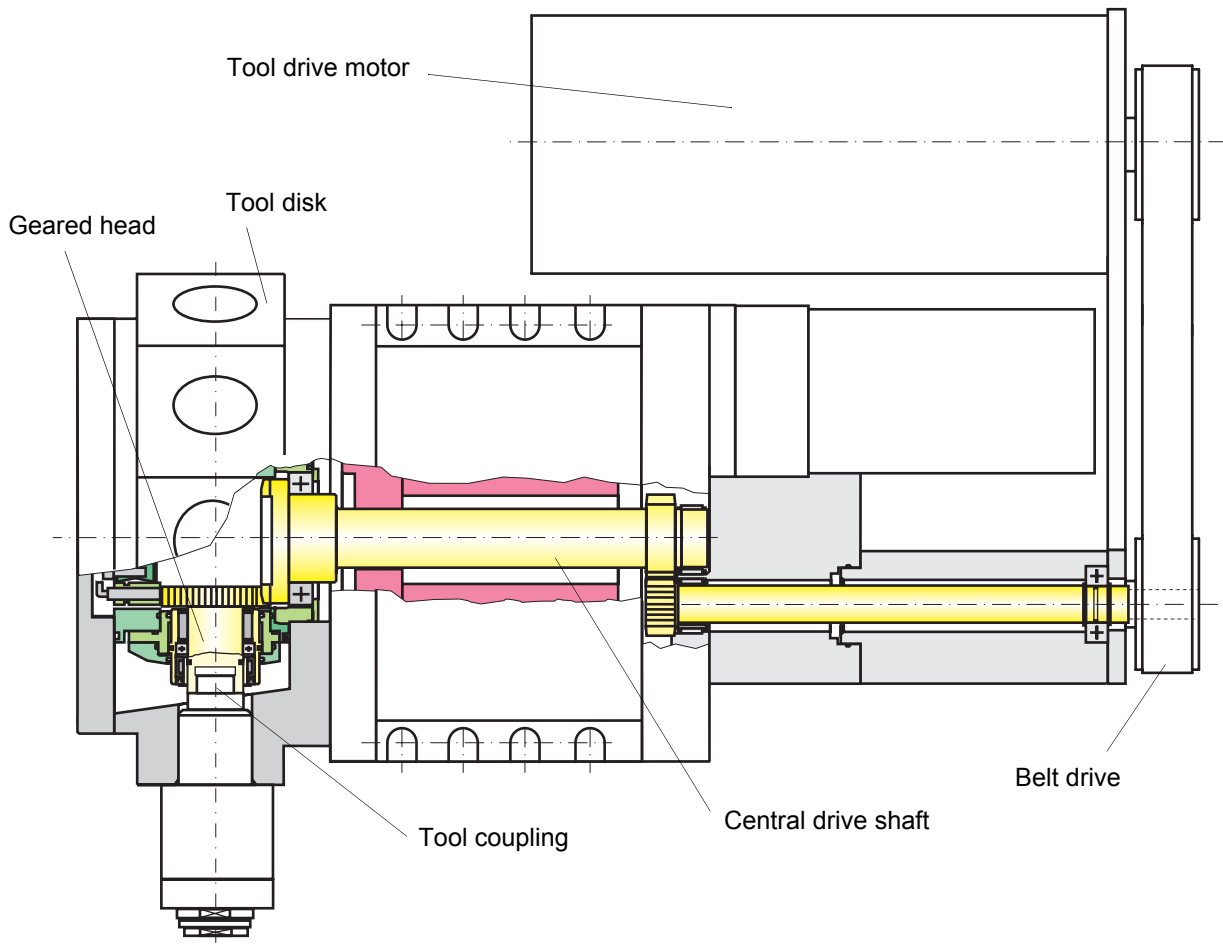
Additional variations – e.g. variation “left” upon request.

Disk-type tool turret 0.5.675.1xx with radial tool drive

These turrets consists of the following:

- Basic turret series 0.5.680.1xx and
- tool drive **central**
for individually switchable **radial** tools
for **forward** and **backward** machining.

The tool drive is intended for the spindle positioning. This requires spindle heads with spindle locking system – Sauter spindle heads series 0.5.941.xx .



The tool drive motor drives the drive shaft, which is located centrally within the turret in a hollow shaft. The relevant tool is switched into the working position by means of a bevel gear and a fluid-switched coupling in the gearbox head at the front.

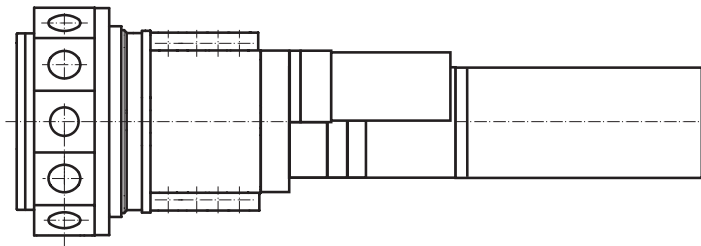
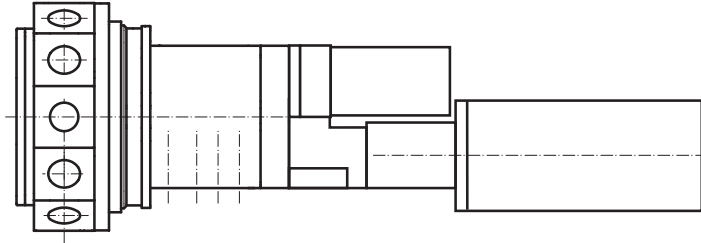
Coupling and decoupling of the spindle head located in the working position is executed after each positioning of the drive spindle – not tooth-on-tooth situation, shortest switching time!

The tool disk is an integrated part of the turret with these turret systems.

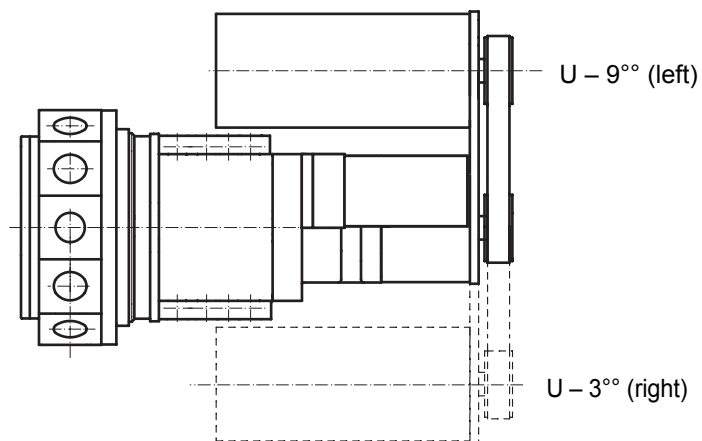
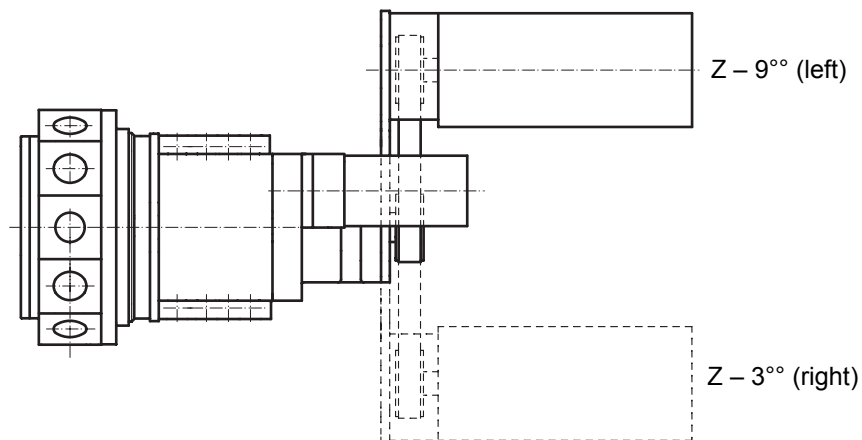
Motor arrangement

The tool drive motor can be installed directly on the turret or with a belt drive, depending on the application specifications.

- Direct motor installation



- Motor installation with belt drive



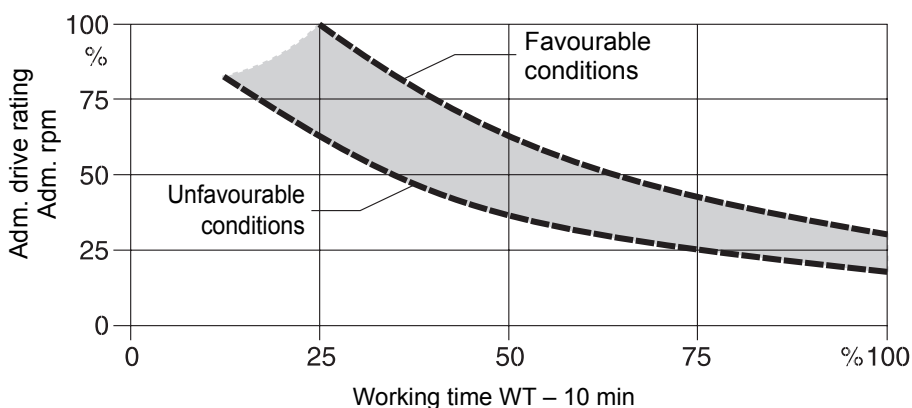
Performance data for the tool coupling

The gearbox is designed for the performance data given below for the tool coupling.
The actually available performance data depend on the utilised drive motor (see below).

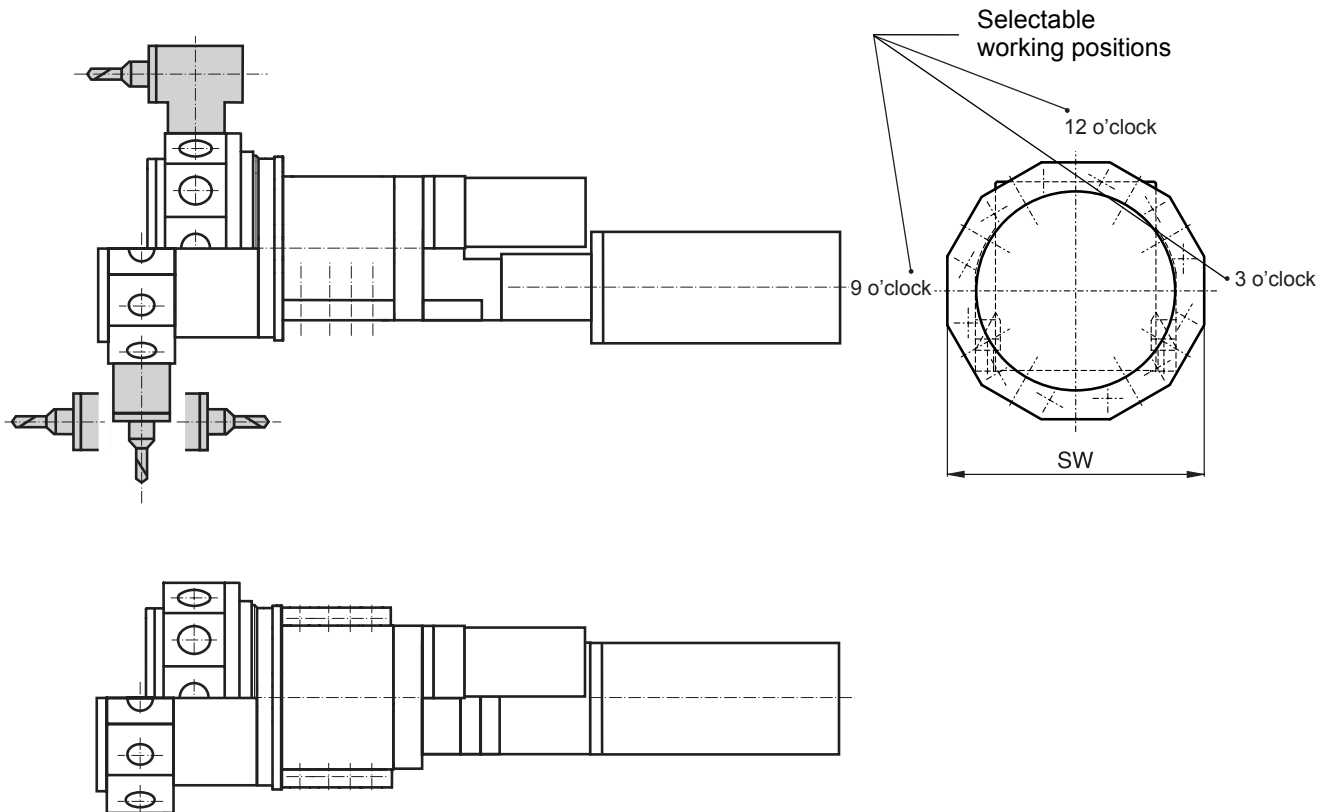
Series		Size			
Disk-type tool turret 0.5.675.1xx		12	16	20	25
Gearbox performance data					
Adm. drive rating ^{1.)}	$P_{Adm.}$ kW	6	8	10	12.5
Adm. torque ^{2.)}	$M_{Adm.}$ Nm	20	32	63	100
Adm. rpm ^{1.) 3.)}	$n_{Adm.}$ min ⁻¹	6000	5000	4000	4000
Gear ratio $i = n_1/n_2$		1.0	1.0	1.0	1.0
Recommended drive motors					
Siemens servomotor, Type 1 FT 6..		..064-.AK.	.0.084-.AK.	..086-.AH.	..105-.AF..
Max. torque ^{5.)}	Nm	14	28	40	68
Max. torque ^{5.)}	min ⁻¹	6000	5000	4000	4000
Indramat servomotor, Type MKD.. ^{4.)}		..071B	.0.090B	.0.112B	..112C
Max. torque ^{5.)}	Nm	14	22	48	68
Max. torque ^{5.)}	min ⁻¹	6000	5000	4000	4000
Fanuc spindle motor, Type Alpha..		α 1.5	α 2	α 3	α 6
Max. torque ^{5.)}	Nm	15	25	40	56
Max. torque ^{5.)}	min ⁻¹	6000	5000	4000	4000

- 1.) The values are reference values for short-term operation. Higher rpms generate more heat and noise, especially when the belt drive is used!
- 2.) Torque limitation at motor converter required!
The listed torque values apply to smooth machining (such as thread-cutting). In the case of machining with severe shock loads (e.g. face milling and similar operations), it is necessary to reduce the motor drive torque by 50% or more.
- 3.) Higher rpms upon request.
- 4.) With absolute value encoder.
- 5.) At tool coupling 40% WT – 10 min

Adm. relative working time – Reference values for gears –



Example for size 20:
 Tool coupling = 3000 min⁻¹
 $n_{adm.}$ = 4000 min⁻¹
 $\Rightarrow n_{Tool\ coupling} = 75\% n_{adm.}$
 \Rightarrow Working time $\leq 40\% - 10\ min$
 (max. 4 min ON – min. 6 min OFF)



Series	Size			
Disk-type tool turret 0.5.675.1xx	12	16	20	25
Coupling profile DIN 5480	14 x 0.8	16 x 0.8	20 x 0.8	24 x 1.25
Distance dimension				
A ₁ (standard)	–	55	80	100
A ₂ (upon request)	80	96	159	198
K	32	40	41	52
Tool holder receptacle system Cylinder shaft DIN 69880 ^{1.)}				
d ₁	25	30	40	50
SW ₁ standard	220	270	320	380
SW ₂	240		360	410
SW ₃	300	340	380	
Tool system Coromant Capto ^{2.)}				
NG	C3	C4	C5	
SW	280	340	380	

1.) Use SAUTER spindle heads Type 0.5.941.xxx (product information PI 29.3)

2.) Use SAUTER spindle heads Type 0.5.934.xxx (product information PI 45)

Additional tool systems – e.g. HSK available upon request.

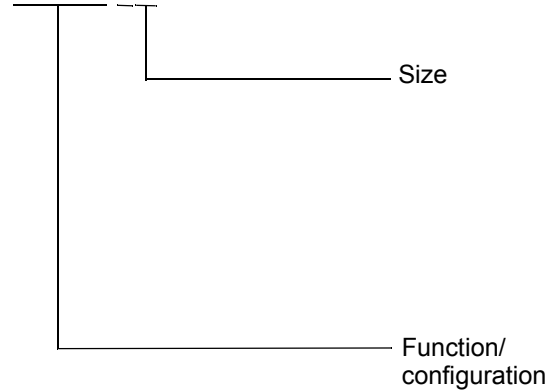
Dimensions in mm

Type key

Turret series 0.5.680.xxx and 0.5.675.xxx

Example:

0.5.675.1xx

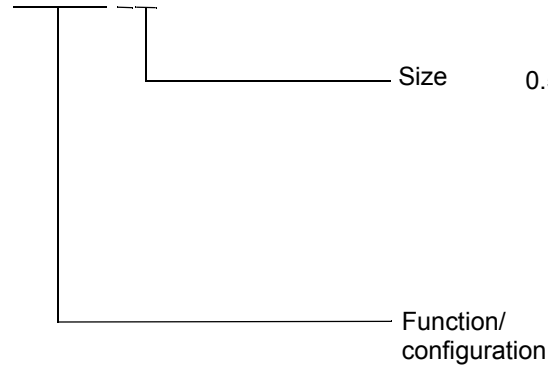


	12	12
	16	16
0.5.680.1	20	0.5.675.1
	25	25
	32	
	40	
0.5.675.1	Hydraulically operated disk-type turret with single radial tool drive Tool coupling with spindle positioning	
0.5.680.1	Hydraulically operated disk-type turret without tool drive	

Turret series 0.5.673.xxx and 0.5.676.xxx

Example:

0.5.676.2xx



	12	12
	16	16
0.5.673.2	20	0.5.676.2
	25	25
	32	
	40	
0.5.673.2	Hydraulically operated disk-type turret with single axial tool drive Tool coupling with small number of revolutions per minute Electromagnetically activated tool coupling	
0.5.676.2	Hydraulically operated disk-type turret with single axial tool drive Tool coupling with spindle positioning Hydraulically activated tool coupling	

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 D-72545 Metzingen
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Street: _____

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Name: _____

Phone: _____

Fax: _____

SAUTER Disk-Type Tool Turret 0.5.680.1xx / 0.5.673.2xx / 0.5.676.2xx / 0.5.675.1xx		
Ordering details	Alternate configurations	Your selection
Basic turret Size Number of switching positions Load stage Housing shape/form Installation position Fluid rotary feed-through	12 / 16 / 20 / 25 / 32 / 40 8 / 12 / 16 Standard / high load Standard / Block/flange design	
Axial tool drive Working position X / Y Motor position Intended drive motor Gear ratio Coupling profile	see page 14/15 3° / 9° / 12° see page 11/12 1.0 / ~1.5 see page 14/15	
Radial tool drive Working position Tool disk SW Neck length A Tool receptacle system Drive motor arrangement Intended drive motor	3° / 9° / 12° SW ₁ / SW ₂ / SW ₃ A ₁ / A ₂ DIN 69880 / Sandvik Capto direct – U/Z – right / left see page 18	
Electronic control unit	EK 501	
Special requirements/requests: 