

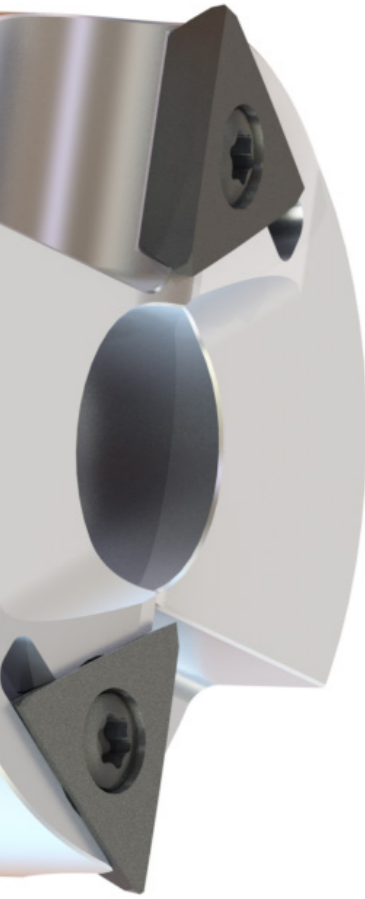


## MIRROWORX®

Milling instead of grinding – smooth surfaces  
with maximum economic efficiency

# Milling instead of grinding

Flat and smooth surfaces in one step



MIRROWORX® is a Face Milling Cutter, specially developed for the best face finish, simultaneously with highest economic efficiency. With MIRROWORX®, we enter into grinding domains. By using this Cutter, usual grinding operation can be eliminated completely, because the requested surface quality can be achieved on the milling machine. This new line is designed with only two Indexable Inserts and has a simple but effective adjustment opportunity in  $\mu$ -range by using two set-screws, eliminating axial run-out. This system allows processing optimum surface finish.

Furthermore this new tooling is impressive through its

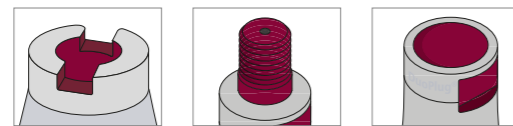
particular smooth running.

MIRROWORX® M-Milling Cutters achieve Feedrates up to 10.000 mm/min and produce up to 90.000 cm<sup>2</sup> (13.950 sq. n.) surface, causing bottom-line costs. This is possible through our successively advanced development of cutting materials and carbide grades.

### You benefit from following advantages:

- Surface Finish Rz = < 2.5  $\mu$ m : your usual grinding operation is eliminated; Under optimal conditions it's possible to achieve surface roughness Rz < 0.2 $\mu$ m
- Particular smooth running
- A fine adjusting regulation of axial runout in  $\mu$
- Very economic by using all 3 cutting edges from our Inserts

### Types of Connection



MIRROWORX® tools are available as screw-on type and shell type milling cutter bodies. The stand alone and patented DuoPlug®-system for highest concentricity and maximum rigidity completes the programme.

All cutters are manufactured with internal coolant supply for best process reliability.



### Practical-Video

MIRROWORX® in 1.2312

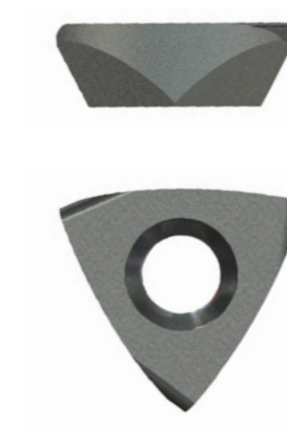
More Product-Videos available on:  
[youtube.com/pokolmknowhow](https://www.youtube.com/pokolmknowhow)



# MIRROWORX® in detail

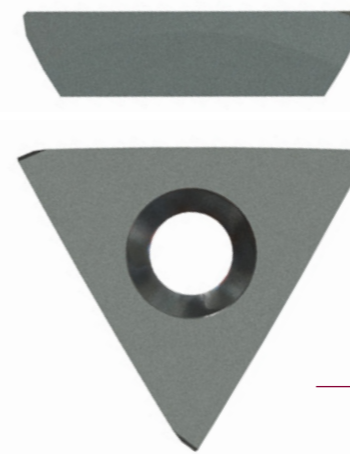
Flat and smooth surfaces in one step

### Size S



Original size

### Size M



Original size

- Completely grind inserts for high precision and stability
- Rake and clearance angle are exactly adapted to requirements
- Mirroworx S, 2 different coatings for machining of full range of material hardness
- Mirroworx S, optimal for small surfaces and surfaces bordered with walls (pockets, slots)
- Mirroworx S, especially suitable for extreme hardened materials (more than 58HRC)
- Mirroworx M, for medium and large surfaces without walls (open surfaces). By pockets and slots face accuracy can be achieved only up to 7,16mm from the wall
- 3 cutting edges thereby low cutting costs
- Special protective rounding on the cutting edge for long tool life
- Extremely strong carbide grade
- Optimal coating selection to process almost all metals
- High feedrates

MIRROWORX® indexable inserts - a solution for producing the highest surface qualities, which is unrivaled.

MIRROWORX® inserts are unique on the market. Due to the selection of carbide grade, geometry and coating, very high feed rates are possible while maintaining the highest surface quality.

MIRROWORX® can do everything on single machine and in one clamping - By using MIRROWORX® you eliminate the additional step of grinding.

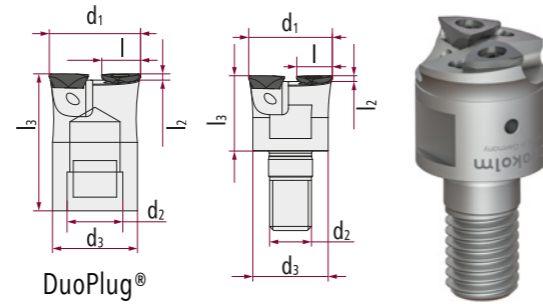
MIRROWORX® increases your competitiveness and reduce the cost of manufacturing.

Do you know a comparable product?

No? Then contact us, we will gladly show you the convincing results of our MIRROWORX® products.

# MIRROWORX® S

Ø 16 - 35 mm



	Catalogue no.	d <sub>1</sub>	l	r	l <sub>3</sub>	l <sub>2</sub>	l <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	z	Accessories	Features
DuoPlug®	1 16 283 SG	16	8,2	0,5	25	1	-	M 10	15	1	A, B, C, D, E, F	
	2 20 283 SG	20	8,2	0,5	27	1	-	M 12	18,6	2	A, B, C, D, E, F	
	2 25 283 SG	25	8,2	0,5	32	1	-	M 16	23,5	2	A, B, C, D, E, F	

	Catalogue no.	d <sub>1</sub>	l	r	l <sub>3</sub>	l <sub>2</sub>	l <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	z	Accessories	Features
Screw-in type	1 16 283	16	8,2	0,5	18	1	-	M 8	13,8	1	A, B, C, D, E, F	
	2 20 283	20	8,2	0,5	18	1	-	M 10	18	2	A, B, C, D, E, F	
	2 25 283	25	8,2	0,5	22,5	1	-	M 12	21	2	A, B, C, D, E, F	
	2 30 283	30	8,2	0,5	28	1	-	M 12	29	2	A, B, C, D, E, F	
	2 32 283	32	8,2	0,5	28	1	-	M 16	29	2	A, B, C, D, E, F	
	2 35 283	35	8,2	0,5	28	1	-	M 16	29	2	A, B, C, D, E, F	

Indexable inserts	Catalogue no.	DIN description	Carbide Grade	Coating	l	s	r	M
	03 83 835	TOHX 063005 ER	HSC 05	PVTi	8,2	3	0,5	M 2,5
	03 83 836	TOHX 063005 ER	HSC 05	PVTiH	8,2	3	0,5	M 2,5

Accessories	A	B	C	D	E

## Feed per tooth (fz) | d.o.c. (ap)

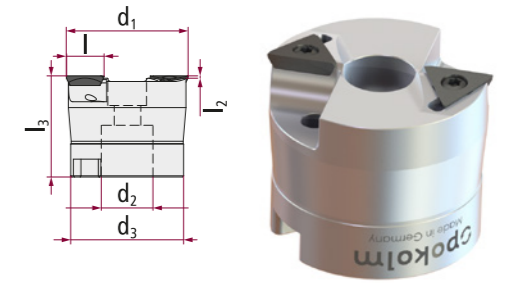
Carbide Grade Coating	Feed per tooth   d.o.c.	Steel	Stainless Steel	Cast iron	Non-ferrous materials	High-temperature alloys	hardened steel
HSC 05 PVTi	f <sub>z</sub> (mm) a <sub>p</sub> (mm)	0,2-1 0,02-0,1	0,1-0,8 0,02-0,1	0,2-1 0,02-0,1	0,1-1,5 0,02-0,2	0,1-0,7 0,02-0,1	0,1-1 0,02-0,1
HSC 05 PVTiH	f <sub>z</sub> (mm) a <sub>p</sub> (mm)	0,2-1 0,02-0,1	0,1-0,8 0,02-0,1	0,2-1 0,02-0,1	0,1-1,5 0,02-0,2	0,1-0,7 0,02-0,1	0,1-1 0,02-0,1

## Cutting speed (Vc in m/min)

Carbide Grade Coating	Application	Steel	Stainless Steel	Cast iron	Non-ferrous materials	High-temperature alloys	hardened steel
HSC 05 PVTi	Roughing Pre finishing Finishing	- ▽150 <b>375</b> 600	- ▽100 <b>250</b> 400	- ▽200 <b>275</b> 350	- ▽400 <b>800</b> 1200	- ▽40 <b>70</b> 100	- ▽100 <b>175</b> 250
HSC 05 PVTiH	Roughing Pre finishing Finishing	- ▽150 <b>375</b> 600	- ▽100 <b>250</b> 400	- ▽200 <b>275</b> 350	- ▽200 <b>500</b> 800	- ▽40 <b>70</b> 100	- ▽100 <b>175</b> 250

# MIRROWORX® M

Ø 42 - 100 mm



	Catalogue no.	d <sub>1</sub>	l	r	l <sub>3</sub>	l <sub>2</sub>	l <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	z	Accessories	Features
Shell type	2 42 384	42	14,32		43	1	-	16	35	2	A, B, C, D, E, F, G, H	
	2 52 384	52	14,32		43	1	-	22	48	2	A, B, D, E, F, G, H	
	2 66 384	66	14,32		53	1	-	27	60	2	A, B, D, E, F, G, H	
	2 80 384	80	14,32		53	1	-	27	60	2	A, B, D, E, F, G, H	
	2 100 384	100	14,32		53	1	-	32	70	2	A, B, D, E, F, G, H	

Indexable inserts	Catalogue no.	DIN-Specification	Carbide Grade	Coating	l	s	r	M
	04 84 835	TEHX 16T3 ZF	HSC 05	PVTi	14,32	4		M 3.5

Accessories	A	B	C	D	E

## Feed per tooth (fz) | d.o.c. (ap)

Carbide Grade Coating	Feed per tooth   d.o.c.	Steel	Stainless Steel	Cast iron	Non-ferrous materials	High-temperature alloys	hardened steel
HSC 05 PVTi	f <sub>z</sub> (mm) a <sub>p</sub> (mm)	0,5-2 0,03-0,1	0,5-1 0,03-0,1	0,5-2 0,03-0,2	0,5-2 0,03-0,25	0,2-1 0,03-0,1	0,2-1 0,03-0,1

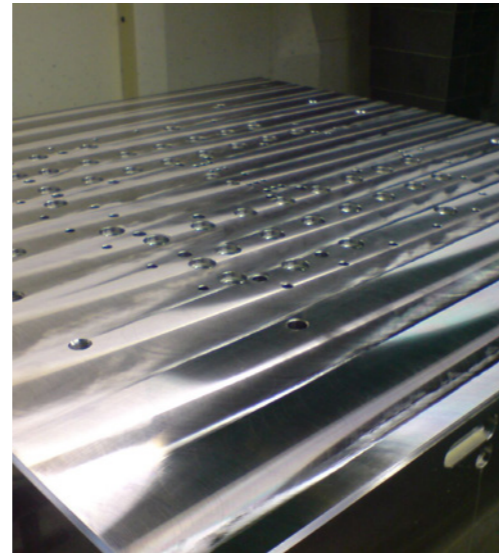
## Cutting speed (Vc in m/min)

Carbide Grade Coating	Application	Steel	Stainless Steel	Cast iron	Non-ferrous materials	High-temperature alloys	hardened steel
HSC 05 PVTi	Roughing Pre finishing Finishing	- ▽150 <b>375</b> 600	- ▽100 <b>250</b> 400	- ▽200 <b>275</b> 350	- ▽200 <b>700</b> 1200	- ▽40 <b>70</b> 100	- ▽60 <b>155</b> 250

## MIRROWORX® in field testing

Processing task in 1.2343 48 HRC, High-temperature alloys

Milling cutter body:	2 66 384
D <sub>c</sub> (nominal diameter):	66 mm
Arbor:::	50 27 710
Overhang:	100 mm
Cooling:	with air
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	211 m/min
n (revolutions):	1017 min-1
F <sub>z</sub> (feed per tooth):	0,65 mm
V <sub>f</sub> (feed rate):	1322 m/min
A <sub>p</sub> (depth of cut):	0,05-0,075 mm
A <sub>e</sub> (width of cut):	51,5 mm
R <sub>z</sub> :	2,74 μm



Processing task in Aluminum/Non-ferrous materials

Milling cutter body:	2 42 384
D <sub>c</sub> (nominal diameter):	42 mm
Arbor:::	50 16 710 Z
Overhang:	100 mm
Cooling:	with cooling lubricant
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	355 m/min
n (revolutions):	2700 min-1
F <sub>z</sub> (feed per tooth):	0,5 mm
V <sub>f</sub> (feed rate):	2700 m/min
A <sub>p</sub> (depth of cut):	0,03 mm
A <sub>e</sub> (width of cut):	27 mm
R <sub>a</sub> :	0,036 μm
R <sub>z</sub> :	0,213 μm



## MIRROWORX® in field testing

Processing task in Ni36 - 1.3912 - Alloy 36, High-temperature alloy

Milling cutter body:	2 42 384
D <sub>c</sub> (nominal diameter):	42 mm
Arbor:::	50 16 750 Z
Overhang:	100 mm
Cooling:	with air
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	124 m/min
n (revolutions):	884 min-1
F <sub>z</sub> (feed per tooth):	0,93 mm
V <sub>f</sub> (feed rate):	1652 m/min
A <sub>p</sub> (depth of cut):	0,05 mm
A <sub>e</sub> (width of cut):	27,5 mm
R <sub>z</sub> :	1,75 μm



Processing task in NC6 dh. 1.2063, cold work steel

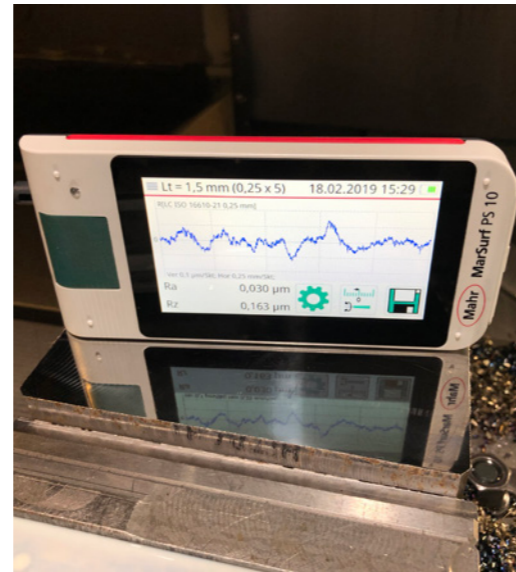
Milling cutter body:	2 100 384
D <sub>c</sub> (nominal diameter):	100 mm
Arbor:::	100 32 710
Overhang:	153 mm
Cooling:	with cooling lubricant
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	600 m/min
n (revolutions):	1910 min-1
F <sub>z</sub> (feed per tooth):	0,5 mm
V <sub>f</sub> (feed rate):	1515 m/min
A <sub>p</sub> (depth of cut):	0,05 mm
A <sub>e</sub> (width of cut):	80 bis 100 %
R <sub>a</sub> :	0,041 μm
R <sub>z</sub> :	0,25 μm



# MIRROWORX® im Praxistest

## Processing task in Toolox 44, Toolox 44

Milling cutter body:	2 80 384
D <sub>c</sub> (nominal diameter):	80 mm
Arbor::	50 27 710
Overhang:	100 mm
Cooling:	with cooling lubricant
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	250 m/min
n (revolutions):	1000 min-1
F <sub>z</sub> (feed per tooth):	1 mm
V <sub>f</sub> (feed rate):	2000 m/min
A <sub>p</sub> (depth of cut):	0,03 mm
A <sub>e</sub> (width of cut):	60 mm
R <sub>a</sub> :	0,03 μm
R <sub>z</sub> :	0,163 μm



## Processing task in 1.2379 60+2HRC, Hardened steel

Milling cutter body:	2 42 384
D <sub>c</sub> (nominal diameter):	42 mm
Arbor::	50 16 710 Z
Overhang:	100 mm
Cooling:	with air
Indexable insert:	04 84 835
V <sub>c</sub> (speed):	60 m/min
n (revolutions):	455 min-1
F <sub>z</sub> (feed per tooth):	0,5 mm
V <sub>f</sub> (feed rate):	455 m/min
A <sub>p</sub> (depth of cut):	0,03 mm
A <sub>e</sub> (width of cut):	16 mm
R <sub>a</sub> :	0,103 μm
R <sub>z</sub> :	0,559 μm



# Assembling instructions

## Set screw for MIRROWORX® M shell type milling cutter bodies Ø 40 bis 52 mm

In order to maintain optimum and safe use of these tools, you should pay attention to following notice if you assemble set screws GWSTPS81SK:

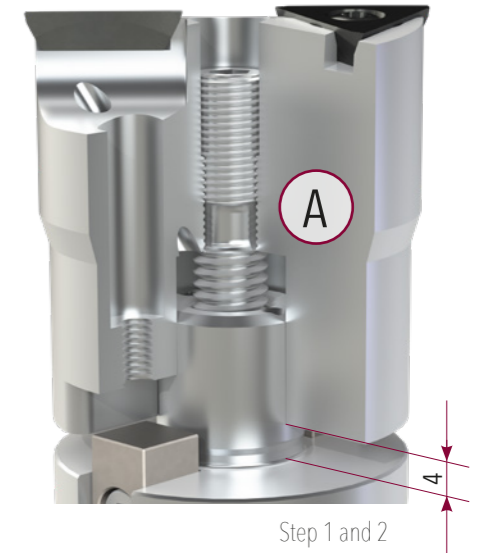
### Assembling set screw:

#### Step 1

Screw set is screwed into the cutter body up to the limit-stop contact. This is guaranteed for every tool in Pokolm's warehouse. In rare exceptional cases, this set screw can become unfastened during transport. In that case, the set screw has to be re-adjusted prior to usage.

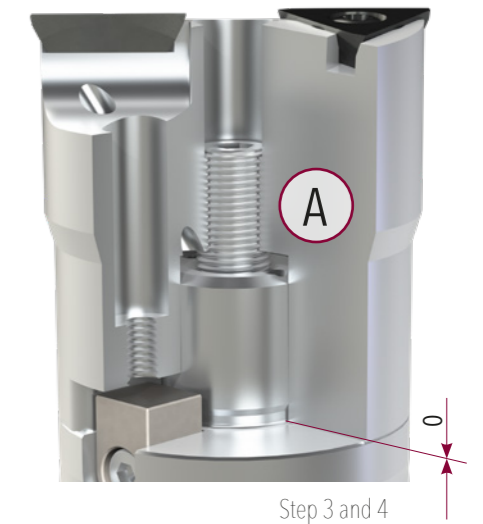
#### Step 2

For assembling, put milling cutter body on to arbor. Make sure, there is a remaining gap of 4 mm between milling cutter body and arbor. (this is guaranteed, when using genuine Pokolm-arbors).



#### Step 3

Now, please screw the set screw into the arbor uniformly, until there is no remaining gap between arbor and milling cutter body by using an Allen-key 4 mm opening.



#### Step 4

If, beyond expectations, a gap remains, please dismantle your cutter body from the arbor. Unscrew the set screw by ½ revolution. Continue with step 2.



**Please consider:**

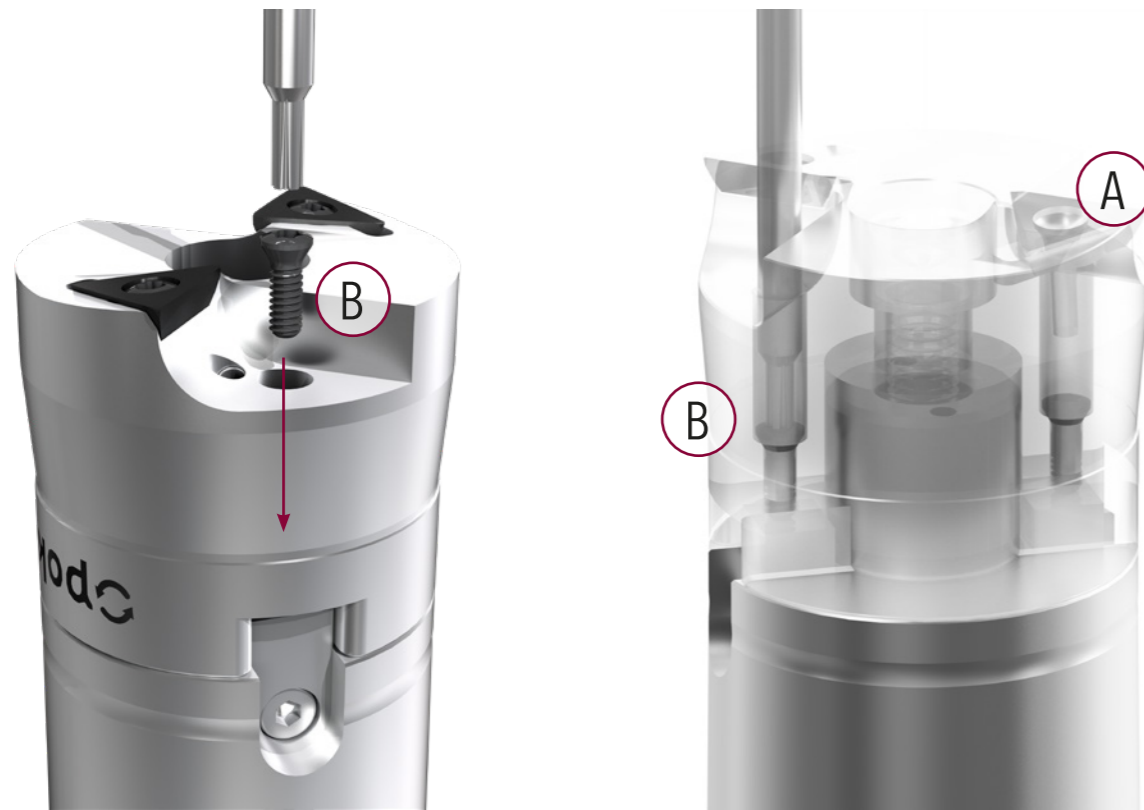
**Maximum torque = 10 Nm**

If you have any further question regarding milling systems with set screw please do not hesitate to contact us.

## Adjusting the axial runout.

If you wish the tool to be used with axial runout adjustment, you must install the adjustment screws. To this end:

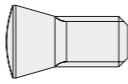






1. Mount the milling cutter with the indexable inserts (A) installed on the adaptor.
2. Tighten the axial runout adjustment screws (B) to preload.
3. Check the axial runout in the machine.
4. Use the axial runout adjustment screw to finely adjust the lower indexable insert.
5. Recheck the axial runout in the machine.
6. Adjustment < 0,01 mm



### Safety note:

It is imperative to preload the axial runout adjustment screws which are installed in every milling cutter while operating. Otherwise, it is possible that the screws will come loose during machining. Otherwise the screws can unscrew themselves and fall out from the holes, which can be dangerous for the operator, machine or the part. If you do not need the screws for fine adjustment, we recommend to remove them.

## Accessories

	Catalogue no.	Description				
<b>Torx® screws</b>						
	25 500	Torx®-screw M 2,5	M 2,5	L 5,0	T 7	0,9 Nm
	35 500 L	Torx®-screw M 3.5	M 3.5	L 11	T 15	2,4 Nm
	45 500 L	Torx®-screw M 4,5	M 4,5	L 14,5	T 20	4,3 Nm
<b>Powerscrew</b>						
	GWSTPS8ISK	Set screw with allen	M8x1,25	M8x0,75	Inbus 4	
<b>Torx® wrench</b>						
	07 500	Torx®-screwdriver T 7	T 7			
	15 500	Torx®-screwdriver T 15	T 15			
	20 500	Torx®-screwdrivers T 20	T 20			
<b>Torque screwdriver</b>						
	TV 2-8	Torque screwdriver Vario®-S	from 2,0 Nm	to 8,0 Nm	with scale, incl. Setter	
	TV 04-1	Torque screwdriver Vario®-S	from 0,4 Nm	to 1,0 Nm	with scale, incl. Setter	
<b>Setting tool for torque screwdrivers</b>						
	TV 500	Torque Vario® - SETTER adjusting tool				
<b>Torx® interchangeable blades, standard</b>						
	T7 500	Torx® interchangeable blade for Torque Vario®	T 7	L 175	max. 0,9 Nm	
	T15 500	Torx® interchangeable blade for Torque Vario®	T 15	L 175	max. 5,5 Nm	
<b>Torque screwdrivers and accessories   Torx® interchangeable blades with retaining spring</b>						
	T7 502	Torx® MagicSpring compatible bit f. Torque Vario®	T 7	L 175	max. 0,9 Nm	
	T15 502	Torx® MagicSpring compatible bit f. Torque Vario®	T 15	L 175	max. 5,5 Nm	

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