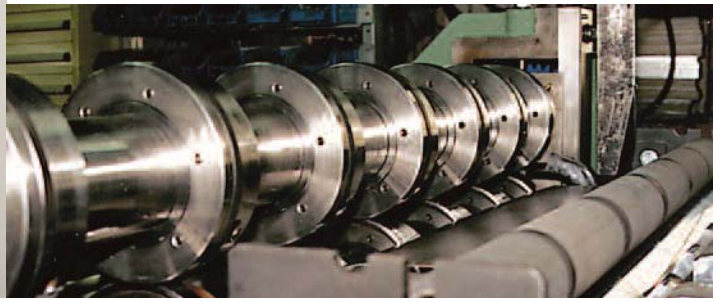
ETP Transmission AB

Technical Manual

ETP-KN (Knife holder)



Content

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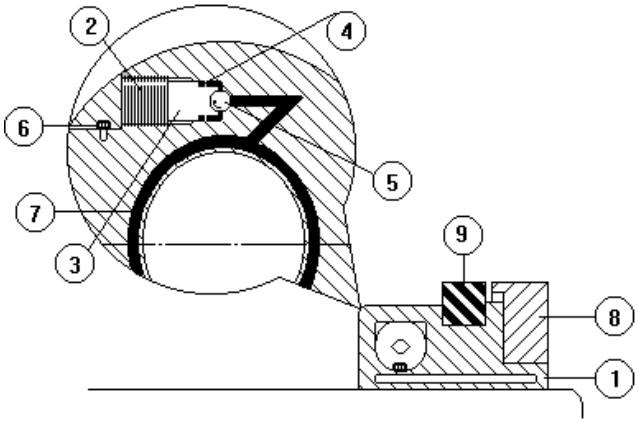
Technical parts description



This is a general drawing of ETP-KN. There are no standard types available. All are made according to the customers request. At the end of this chapter you find a form with questions we need you to inform us about, for getting a quotation.

1.	"Double-walled" hardened steel sleeve with the same characteristics as for ETP-TECHNO. Only the inner sleeve expands against the shaft. The "outer sleeve" will not expand, as it then could change the position of the knife The knife location surfaces are ground when ETP-KN is pressurized. This to compensate for any micro elastic deformation that might occur when the sleeve is pressurized.
	2, 3, 4, 5, 6, 7 See ETP-TECHNO
8.	Example of knife. The knife is fastened to ETP-KN, can be made in different ways, see other section. Knives are not supplied by us.
9.	Example of transport ring mounted onto ETP-KN. The transport ring is not supplied by us.

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Mounting instructions/advices & dismantling

See also under ETP-TECHNO, which in many points also is applicable for ETP-KN
ETP-KN is always designed by us according to the information we have got from you.

Here just some additional comments about working with ETP-KN:

Mounting instruction/tips

First mount the knife on ETP-KN

Then grind the knife with ETP-KN pressurized

Before putting ETP-KN on the shaft, clean ETP-KN in the bore and the surface of the shaft.

When tightening the screw, don't hold ETP-KN in such a way, that the centreline of ETP-KN is not in line with the centreline of the shaft. ETP-KN should be in contact with the shaft all the way on the "upper side" of the shaft.

There should be no impurities on the shaft, which could affect the runout.

Never tighten the screw when ETP-KN is not on the shaft.

Dismantling instruction/tips

When storing, clean the bore of ETP-KN and apply some oil to prevent from corrosion.

Design suggestions

Fastening of the knives

Based on the quotation information, see other section, we get from you, we will make a suggestion for a design of ETP-KN. We will try to prevent any changes in the machines or tooling.

There are two different options for the pressure setting mechanism, see other section.

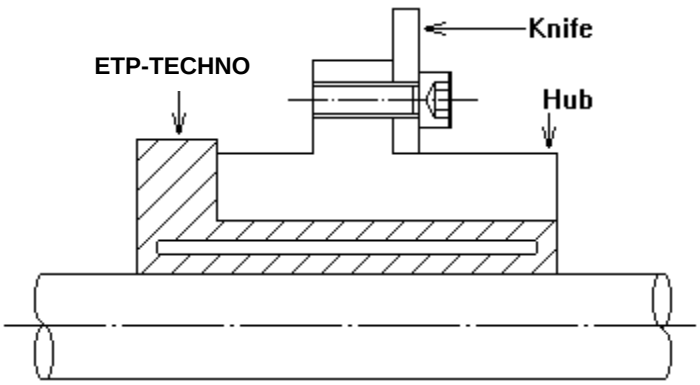
With a screw:
This is the way we suggest as it is more convenient for the customer.

With a grease pump:
See under accessories. Then a pressure setting nipple (with a built in back release valve) and a pressure release valve are built into the flange.

If you want any particular extra machining in ETP-KN done in order to fasten, for example a transportring, please advice us.

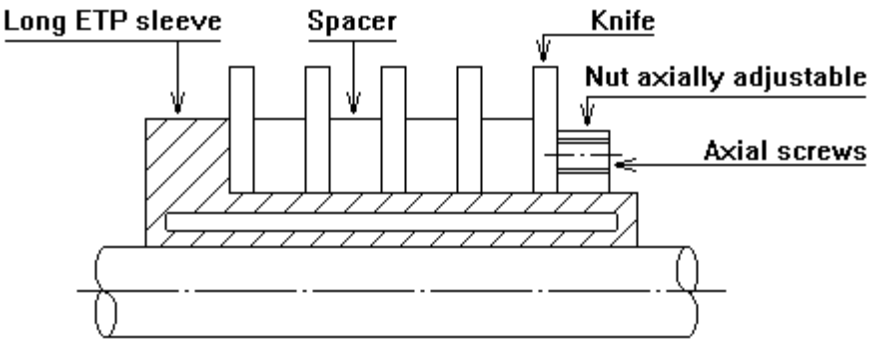
The knives can be fastened to ETP-KN in the way you prefer, usually the way they were fastened before. We then need a drawing with all main dimensions and tolerances to adapt our design to the knife. The best are drawings of the knife and present knife holder.

In some cases specially for smaller shafts (≤ 70 mm) a standard ETP-TECHNO can be used. The knife is then fastened to a hub, which is mounted on ETP-TECHNO. See pic.



If the maximum length is critical and the quantity reasonable (approx. > 50 pcs) a shorter ETP-TECHNO with the other dimensions the same, can usually be offered at a reasonable price.

For many knives, mounted close to each other with spacers in between, with good axial run out, a long hydraulic sleeve can be used. The knives are locked in between spacers to keep the correct distance between the knives. The axial force, to fix the knives, comes from tightening of the axial screws in the nut. The centering is done first with hydraulic.



If the sleeve is "long", then it might be necessary to work with a pressure setting nipple and grease pump, instead of a pressure setting screw to avoid a to big flange.

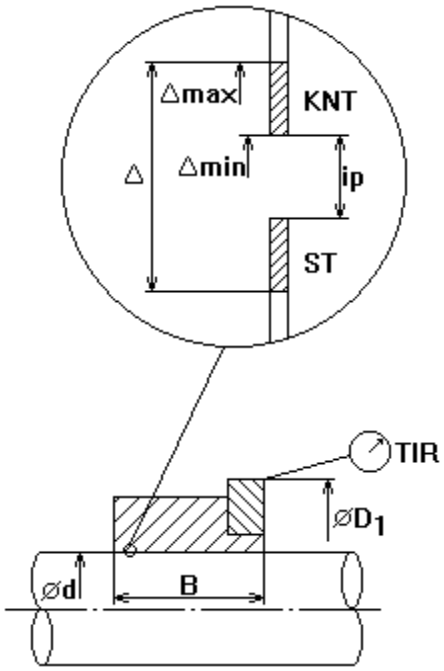
Technical data

Axial runout (TIR)

The axial runout depends on the following parameters:

the contact length between ETP-KN and the shaft.
the nominal clearance diametrically between the bore of ETP-KN and the shaft
the diameter (knife edge) where the run out is measured

We will now discuss the different parameters by looking at this picture.



Contact length:
A length which relates to the contact length is the total width, B, of ETP-KN. For shaft sizes > ∅ 80 mm we recommend a width, B, which is > 60% of the shaft diameter in order to get a good run out. For smaller shafts it should be more.

Nominal play:
This, Δ, is built up of the following factors:

KNT: the tolerance in the bore of the knifeholder.

ip: the initial play necessary to be able to mount ETP-KN on the shaft.

ST: the tolerance for the shaft

The maximum nominal play, Δ between shaft and bore of ETP-KN is the sum of the above tolerances:

Δ = KNT + ip + ST, or can also be calculated as Δ = KNT (upper tolerance limit) + ST (lower tolerance limit)

Calculation of axial runout

An important diameter is the knife edge diameter, D_1.

This is where it is important to have a low axial run out (TIR = total indicated run out), in order to get a low and even play between the knife edges that are working together, one from each side of the cuted material.

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Formula

The following formula is a good expression for the axial runout.

$$TIR \leq \frac{\Delta \cdot D_1}{B \cdot 6.5}$$

6.5 is a "performance factor" for ETP-KN, which has been verified through different tests. This means that TIR is reduced with 6.5 thanks to the hydraulic centering.

Example:	Shaftsize 100 mm (d) Minimum width of ETP-KN, 60 mm (B) Knife edge diameter, 120 mm (D_1) Shaft tolerance h5, 0 to -0.015 Tolerance in bore of ETP-KN +0.005 to +0.015 ST (lower tolerance limit) = 0.015 mm KNT (upper tolerance limit) = 0.015 mm Gives Δ = 0.015 + 0.015 = 0.030 mm Gives according to the formula: $TIR \leq \frac{0.030 \cdot 150}{60 \cdot 6.5} = 0.011$ mm Note: This is the worst case. When play Δ is as big as it is allowed to be.

From the formula you can see there is a linear relation between TIR and Δ, which means that if the play is made 50 % smaller the TIR will be 50 % smaller. The same is valid for the knife edge diameter, however, this could be more difficult to influence.

Recommendation: Shaft diameter with tolerance of the 5th degree (ST). We will choose a tolerance in the bore of ETP-KN (KNT) and an initial play (ip), which makes it easy to mount and together with the knife edge diameter (D_1) gives the requested axial runout (TIR).

Tests and calculations

Please find under this section some figures for the TIR that are based on tests we have done and the formula described above.

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Axial runout accuracy diagrams

You will find diagrams for the most common shaft sizes from 80 to 200 mm, where you can read the TIR for different contact lengths. We have made the diagrams according to the following:

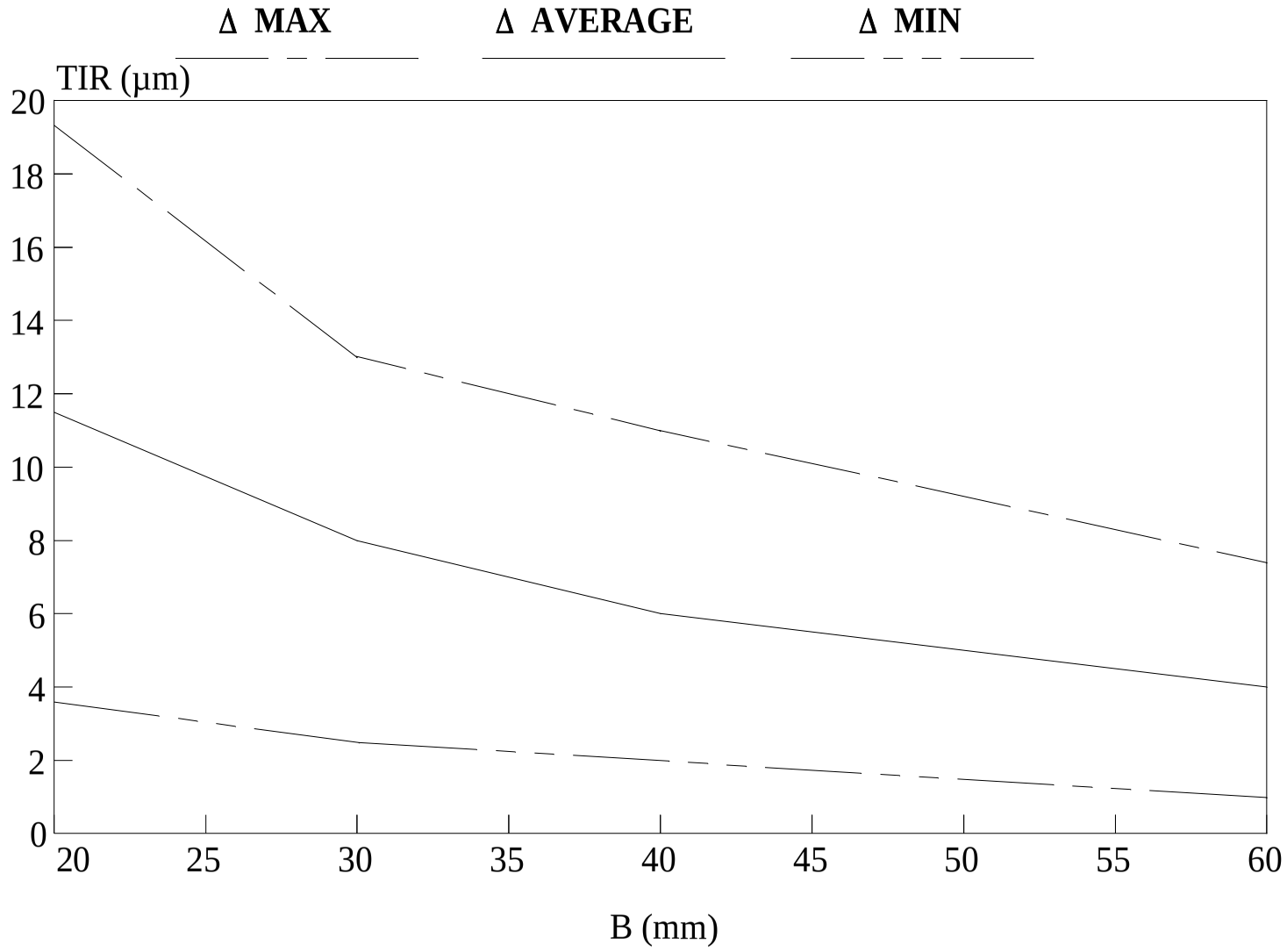
Fixed parameters:	Shaft tolerance h5 (except for size 105 mm). Then we have chosen an initial play and tolerance in the bore of ETP-KN, to make it easy to mount and to get a good run out. Knife edge diameter, D_1 = 1.5 x d (shaft diameter).

If you have another knife edge diameter or tolerance field, the relation is linear. between TIR and D_1 and Δ, which makes it easy to calculate.

In each diagram you will find two curves. The upper one (Δ max) shows the TIR when the play is as big as possible within the tolerance fields KNT and ST. The lower (Δ min) curve, when the play is as small as possible.

In the middle an average curve is given (Δ average), which indicates the most likely value.

ETP-KN shaft=60 mm, KNIFE D1=90 mm
Tolerances Bore +5 -+15µm, shaft h5



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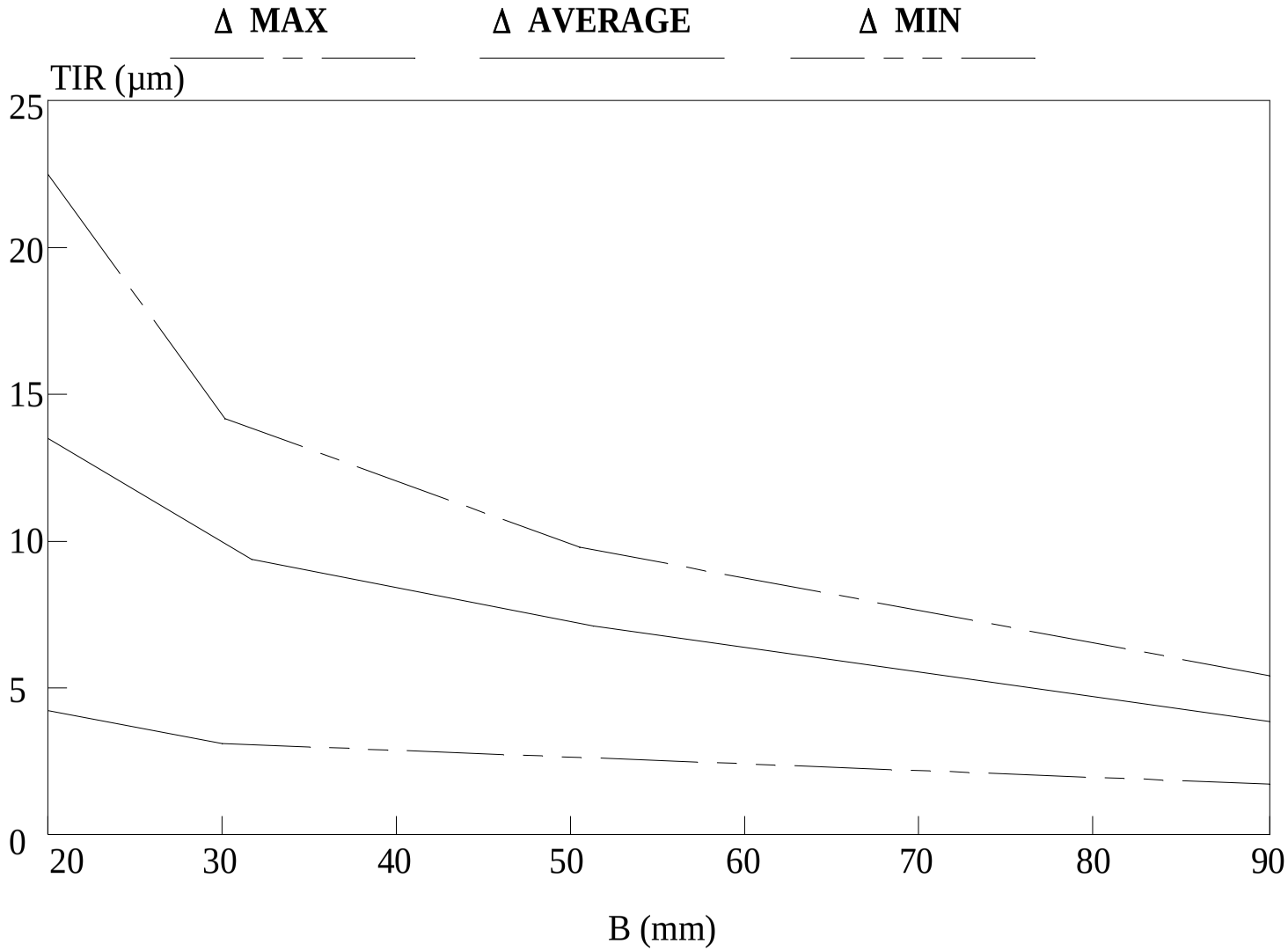
ETP-KN shaft=70 mm, KNIFE D1=105 mm
Tolerances Bore +5 -+15µm, shaft h5



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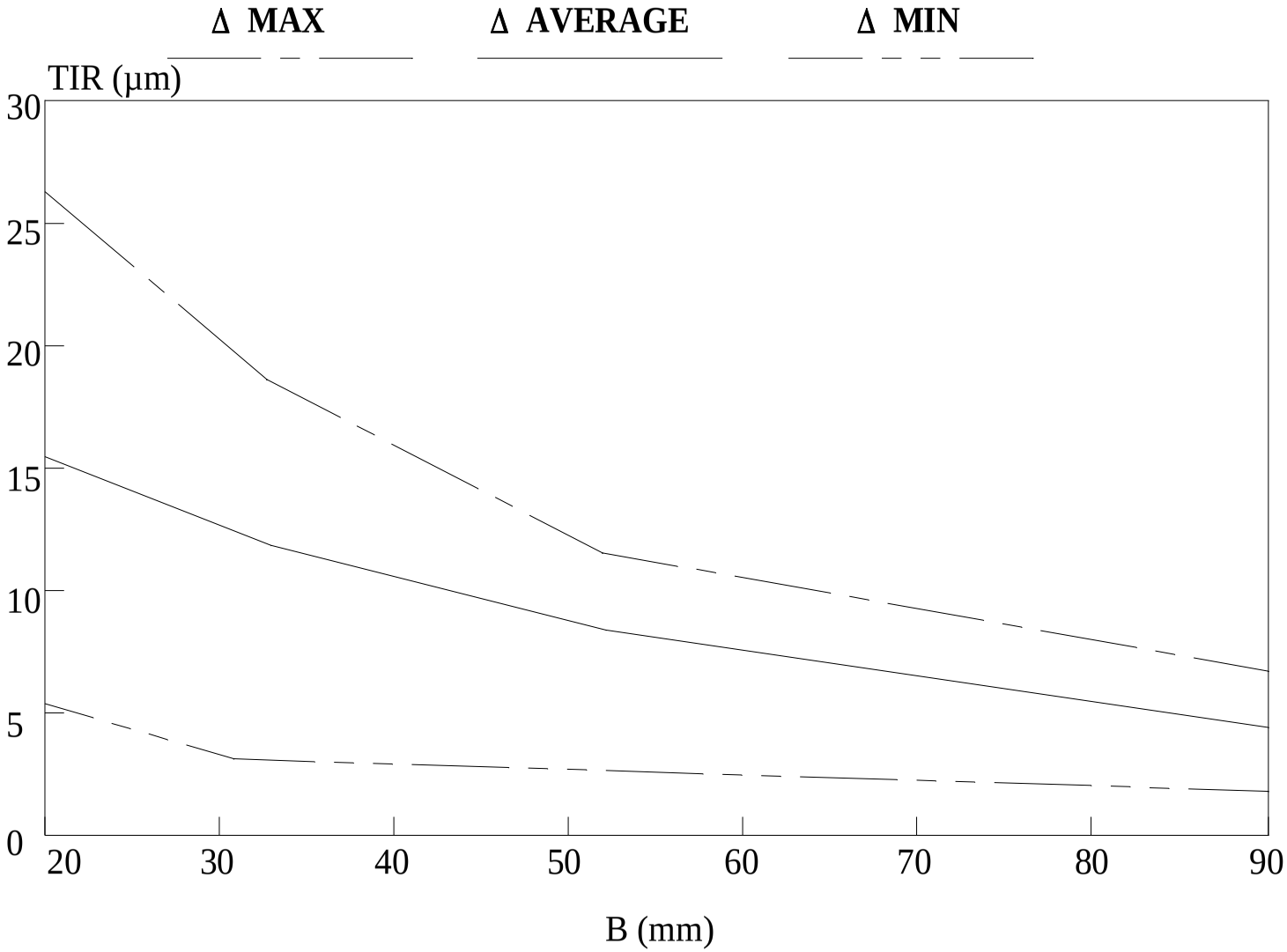
ETP-KN shaft=80 mm, KNIFE D1=120 mm
Tolerances Bore +5 -+15µm, shaft h5



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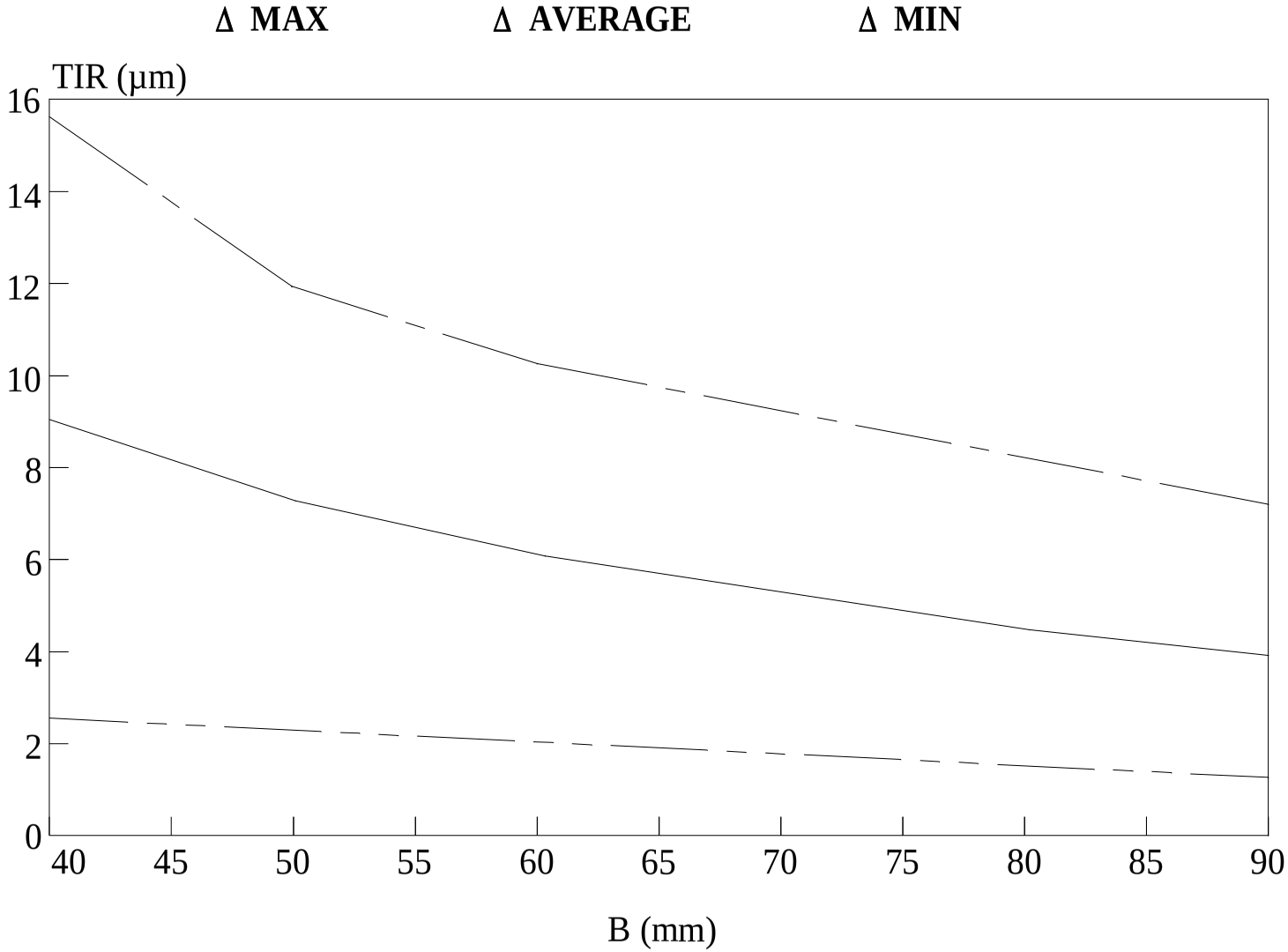
ETP-KN shaft=90 mm, KNIFE D1=135 mm
Tolerances Bore +5 -+15µm, shaft h5



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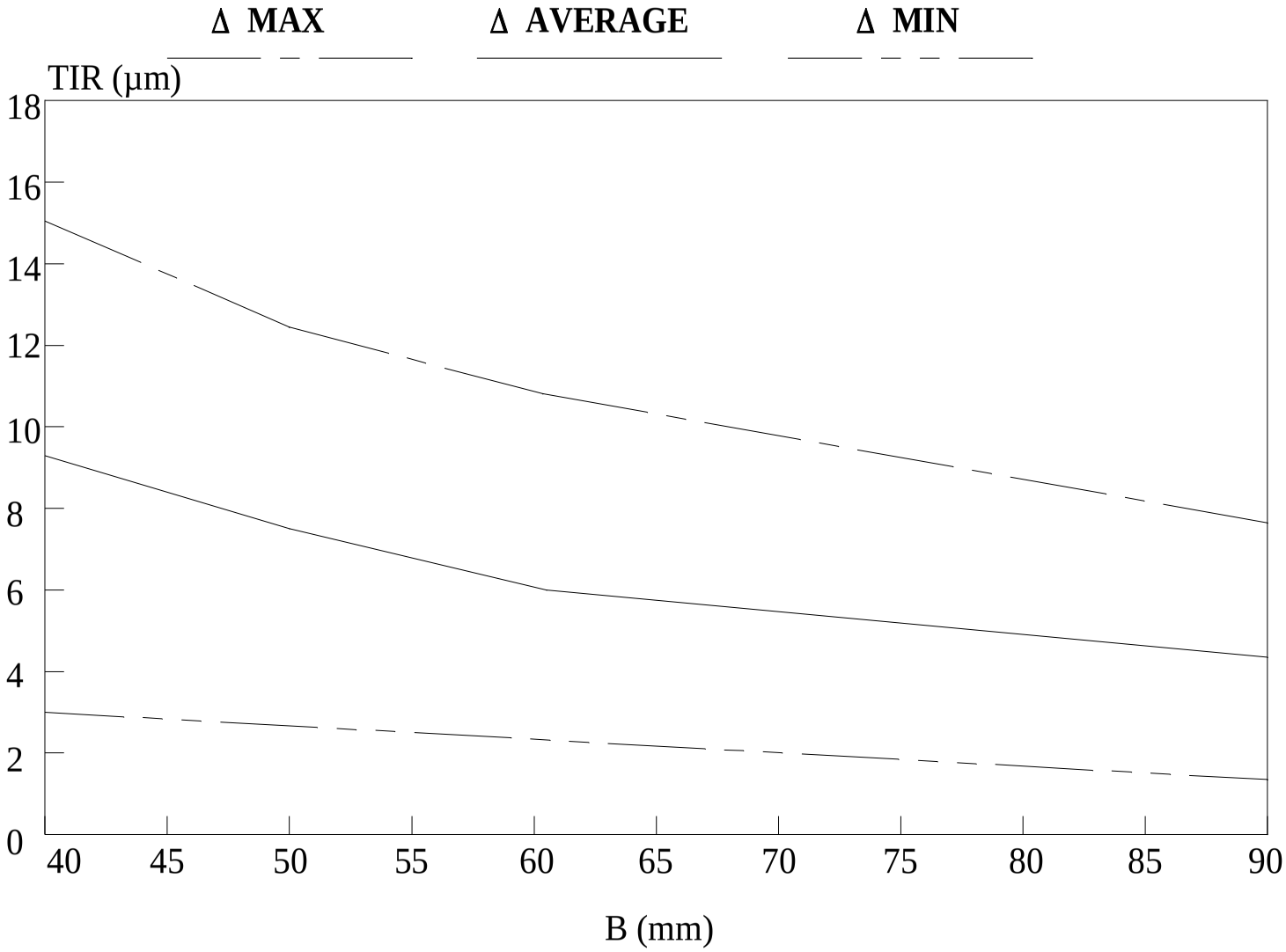
ETP-KN shaft=105 mm, KNIFE D1=152 mm
Tolerances Bore +5 -+15µm, shaft 0--10µm



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Axial runout accuracy tables

You will find some calculated max. and min. run out values (TIR in μm) in the table on the next page.

For every shaft, 6 different widths (B) of the knife holder are given. Each TIR value is calculated on a knife diameter, which is 1.5 x d (shaft diameter). The values are given as one min. value for the case when the play Δ is min. and as one max. value when the play Δ is max. The shaft tolerances are always h5 (not for size 105 mm).

Example

A customer wants a knife holder for shaft 100 mm. TIR should be 0.01 mm on D_1 = 150 mm.

The width B should be chosen as short as possible.
Table gives ∅ 100, B = 60 mm.
Max TIR is 11.5 μm
Min TIR is 1.9 μm
B = 60 mm can be chosen if the customer accepts that. In extreme cases he gets max. 11,5 μm. The average value is however (11.5 + 1.9)/2 = 6.7 μm. Otherwise the width B must be 70 mm.

Axial TIR in µm

Shaft Ø d (mm)	Δ min Δ max (µm)	B 40 (mm)	B 50 (mm)	B 60 (mm)	B 70 (mm)	B 80 (mm)	B 90 (mm)
Ø 70	5	2.0	1.6	1.3	1.1	1.0	0.9
	Average 28	11.3	9.0	7.5	6.5	5.6	5.0
Ø 80	5	2.3	1.8	1.5	1.3	1.2	1.0
	Average 28	12.9	10.3	8.6	7.4	6.5	5.7
Ø 90	5	2.6	2.1	1.7	1.5	1.3	1.2
	Average 30	15.6	12.5	10.4	8.9	7.8	6.9
Ø 100	5	2.9	2.3	1.9	1.6	1.4	1.3
	Average 30	17.3	13.8	11.5	9.9	8.6	7.7
Ø 105*	5	3.0	2.4	2.0	1.7	1.5	1.3
	Average 25	15.1	12.1	10.1	8.6	7.6	6.7
Ø 115	5	3.3	2.6	2.2	1.9	1.7	1.5
	Average 30	23	18.5	15.4	13.2	11.5	10.2

* shaft 0.000 to -0.010 (mm)
D1=dx1.5 (mm)

FAQ

See also under section ETP-TECHNO where applicable.

Do we need to make new shafts?

The tolerance in the bore of ETP-KN is selected to fit the shaft tolerance. If the tolerance width of the shaft is small (approx. 5th degree) and there are no keyway or any other machining done on the shaft, then existing shafts can be used with good result.

Do we need to make new knives?

ETP-KN is designed in order for you to be able to mount your existing knives, without having to get new ones or make any machining exept grinding the knives. This is not always possible but in most cases.

How high is the pressure in ETP-KN?

Compared to the other ETP-products it is low, approx. 200 bar (2.900 PSI). This is enough to transmit the rather low torque and axial force when cutting.

How often can ETP-KN be pressurized?

Tests have shown that nothing happens with the double-walled sleeve. If properly handled, it ought to be possible to pressurize at least 3 000 times, without damaging the pressure setting mechanism. We recommend that some grease is put on the threads for the screw, if it looks dry. If the screw gets damaged it is available as spare part.

What do we do if the screw is tightened and ETP-KN does not lock to the shaft?

When for some reason there is too little grease in ETP-KN, it has to be returned to us for repair and refilling. This cannot be done by you, because special equipment is necessary, to fill in the correct amount of grease without getting any air pockets in the grease. Also there must be some reason for the lack of grease, which has to be found and corrected.

Accessories

Accessories and spare parts

The pressure setting screw (2) and stop screw (6) in the earlier picture, are available as spare parts. If the piston with sealing rings is damaged, ETP-KN has to be sent to us for repair, because it also needs to be properly refilled with pressure medium.
For ETP-KN with nipples, the pressure setting nipple (A) and the pressure release valve (B) are available as spare parts.

Grease pump and grease

For ETP-KN with nipples, the grease pump is equipped with a chuck for the nipples. Also spare parts are available for the pump.

The grease pump is delivered with a grease cartridge, when more grease is needed it can be bought from us. You can also buy it locally, however, it is important to use the correct type..

Grease for ETP-KN

It is of great importance that grease of the right quality is used and that strict cleanliness is observed when handling it.

Recommendations:
The grease shall be delivered in cartridges (400 g)
Grease of class NLGI 2 or lower shall be used.
Lithium soap or a soap of inorganic type or even better no soap.

Blaser	Blasolube	301
SKF	Alfalub	LGMT2
“	”	LGEP2
”	”	LGEM2
”	”	LGLT2
EXXON	Unirex	N2
MOBIL	Mobilux	1,2
”	Mobilgrease	532
”	Mobilux	EP2
”	Mobiltemp	SHC 100
”	Mobilgrease	Special
”	Mobilgrease	77
SHELL	Retinax	A

”	”	AM
TEXACO	Marfalk all purpose	EP2
”	Molytex	F020
GULF	Gulflex	MP
”	Polyurea EP Grease 2	
”	Gullfex Moly	
FINA	Marson	EPL2
”	Marson super Moly/LM32	
”	Marson L, super	

Quotation information

Please see the following two pages.

In order for us to give the best possible suggestion for a knife holder we need you to give us as much valuable information as possible.

Most important to get is the shaft size with tolerance and a drawing of the knife. In order to give a quote we also need to know the number of pieces per delivery. In some cases 2 or 4 pcs might be needed first for tests. In order to offer a reasonable price per pce we need approx. 25 pcs per delivery.

We will send a drawing to you together with the quotation for final approval.

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ETP-KN

Required technical information//Technische Data/Teknisk information.

Type of machine/Typ von Machine/Typ av maskin:

.....

Shaft size with tolerance/Wellendurchmesser mit Toleranz/Axeldiameter med tolerans:

.....

Rpm/Upm/Varvtal per minut:

.....

Max width of ETP-KN/Max Breite von ETP-KN/Max bredd för ETP-KN:

.....

Type of fastening of the knife/Typ von Befestigung von Messer/Typ av fastsättning av kniv:

☐ a ☐ b ☐ c ☐ d

Other/Andere/Annat: .....

Type of pressurizing/Typ von Drucksetzung/Typ av trycksättning:

a. ☐ With grease pump/Mit Fettpresse/Med fettpump

b. ☐ With screw/Mit Schraube/Med skruv

Number/Stückzahl/Antal: .....

Enclosed/Anlage/Bilaga

- Drawing of knife/Zeichnung von Messer/Ritning av kniv
- Drawing of present fastening system/Zeichnung von bisherige Befestigungssystem/ Ritning på nuvarande fastsättningssystem

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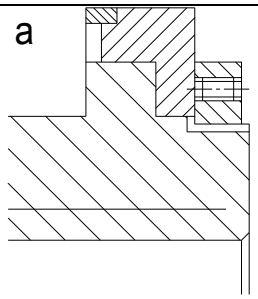
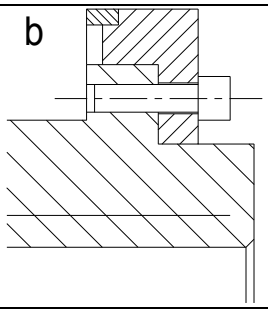
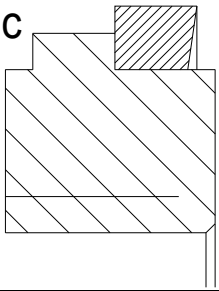
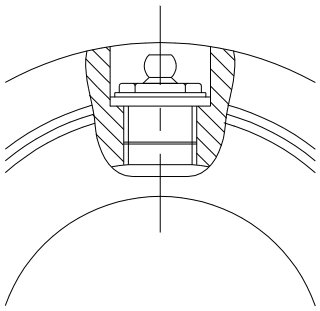
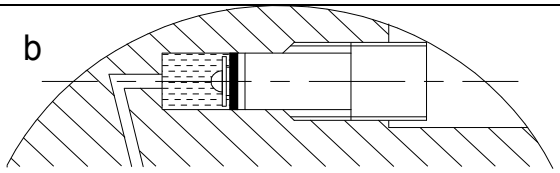
Fastening possibilities of the circular knife to ETP-KN
Befestigungsmöglichkeiten für das Kreismesser an ETP-KN
Fastsättningsmöjligheter för cirkelkniven mot ETP-KN

a 	b 
Nut with axial screws Mutter mit axielle Schrauben Mutter med axiella skruvar	Through going bolts Durchgehende Schrauben Genomgående skruvar
c 	d
Glue or press Kleben oder presspassung Limning eller pressning	Other Andere Annat
a 	b 
With grease pump Mit Fettpresse Med fettpump	With screw Mit schraube Med skruv