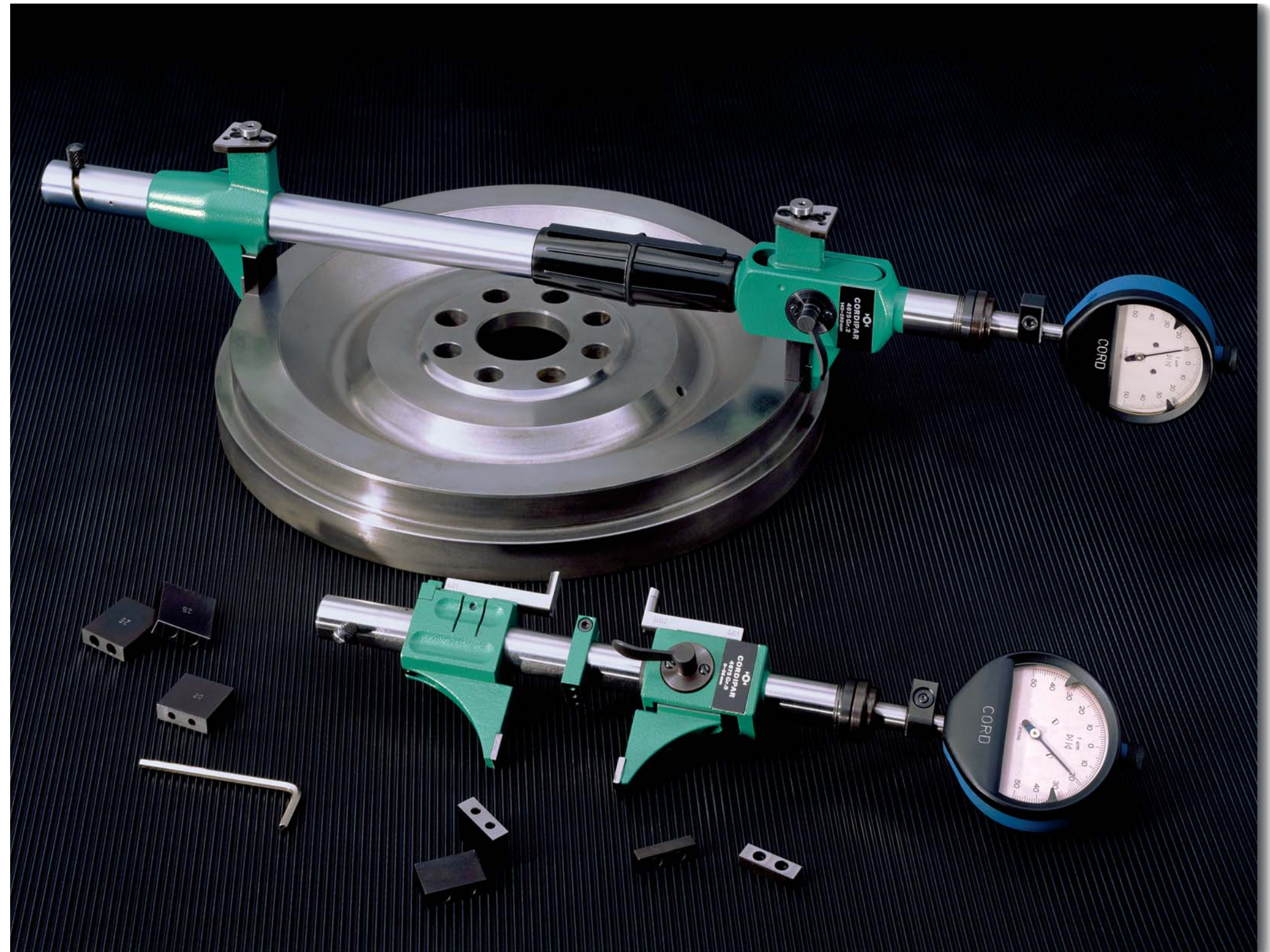


## From our range

External Thread Measuring Gauges	from 2 - 996 mm nominal diameter
Internal Thread Measuring Gauges	from 3 - 1026 mm nominal diameter
Thread Depth Gauges	to check thread depth of bores
Thread Setting Standards	for measuring instruments
Thread Run-out and Concentricity Gauges	measurement of run-out and concentricity to the thread axis of components with external and internal threads
Plug Gauges for Thread Go Rings	for the measurement of pitch diameters of thread Go ring gauges
Thread Plugs and Rings Thread Snap Gauges Thread Setting Plugs	inclusive of checking gauge also available as adjustable gauges for thread snap gauges
Thread Checking Machines	semi-automatic, hand and table models, as well as fully automated modules for automatic measuring machines
Precision Comparators	high accuracy gauges
Internal Measuring Gauges	also for deep bores and grooves
Universal Length Measuring Gauges	for checking external and internal dimensions up to 3500 mm as well as matching
Thickness Gauges	range of models also for soft materials
Go / NoGo Gauges Go / NoGo Plugs	also for recesses also for square and hexagon workpieces
Multi-purpose Gauges Run-out and Concentricity Gauges	for measurement of diameters, parallelism, runout and concentricity, clearance, internal and external threads, partially in modular construction
Standard Elements	for building of fixtures
Multi-gauging Fixtures and Automated Checking Machines	special design gauges for length, diameter, Runout as well as thread, SPC capability
Electronic Measurement Statistical Systems	for measurement and statistical analysis of measured values, SPC capability, products from KORDT, COMPAC etc.
Screw Measuring Stations	for checking all important dimensions of screws
Measuring Equipment	for cross slots "H" to ISO 4757 resp. DIN 7962
Dial Gauges and Accessories	from KORDT and COMPAC, etc.
Software	for calculation of threads to meet most standards
KKS	KORDT-Calibration-Service



KORDT GmbH & Co. KG  
Preyerstraße 24-26  
D-52249 Eschweiler / GERMANY

Phone: +49/ 2403/ 7005-0  
Fax: +49/ 2403/ 7005-26  
<http://www.kordt.de>

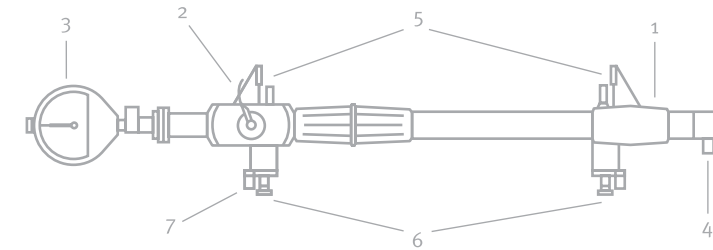


**CORDIPAR**  
Universal Length Measuring Instruments

## Contents

Page 3	General Description
Page 4-5	Accessories for CORDIPAR size 0
Page 6-9	Accessories for CORDIPAR size 1-5
Page 10-11	Accessories for CORDIPAR size 6-10
Page 12-13	Basic Adjustment of the Instruments
Page 14-15	External, Internal and Mating Measurements
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Page 18	Bore Centre Distance Measurement
Page 18	Gear Measurement
Page 19	Technical Data

## CORDIPAR Universal Instruments 4675 for Linear Measurement



An adjustable slide (1) and a measuring carriage (2) support one measuring element each for the external and internal measurement on a common column. To set a nominal size, the adjustable slide (1) must be positioned on that measure. The measuring carriage in ball bearings (2) directly transmits the movement to the dial indicator (3). A reversing device (4) at the lower end of the column serves to change the direction of the measuring force. By simply operating this device, a change from external to internal measurement or vice versa is carried out. A recalibration is not required.

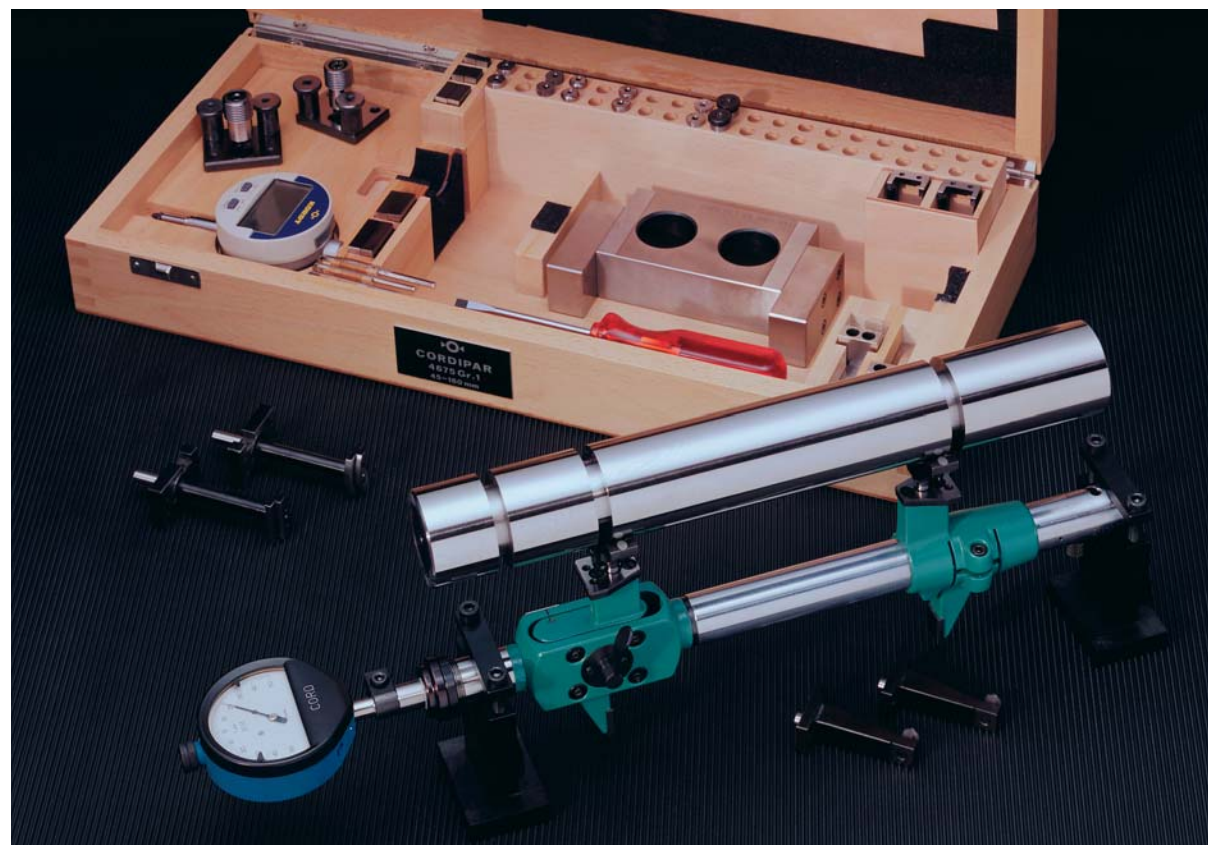
Plain parallel tungsten carbide measuring surfaces (5) are used for the external measurement. For internal measurement, interchangeable measuring elements (6) are used and offered in different forms or lengths; for 4675.0 corresponding measuring jaws for internal measurements are available. To ensure a solid location for accurate measurement a range of interchangeable backstops (7) is available. The distance of the measuring elements for the internal measurement can be adjusted to correspond exactly with the distance between the measuring surfaces for the external measurement. The adjustment is made under the influence of the measuring force; in this way any bending of the column or the measuring elements during the measurement is eliminated.

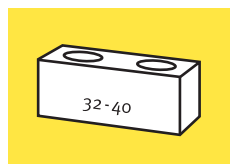
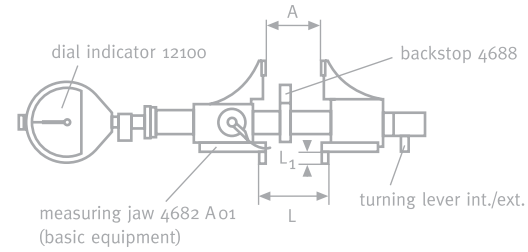
The CORDIPAR instruments are adjusted for the same external and internal measure on delivery. To set the instrument for a bore measurement, for example, no special setting ring is required; the setting is made simply and securely by means of slip gauges or similar setting pieces between the tungsten carbide measuring surfaces. Where a differential measurement is to be made, one workpiece can be used for the setting to measure the difference of the two workpieces.

CORDIPAR Universal Instruments 4675 for linear measurement to measure external and internal dimensions, to measure the difference between external and internal dimensions (differential measurement), to measure bore and groove distances and to measure the flank diameter of large threads. 11 sizes with measuring ranges up to 3500 mm are available.

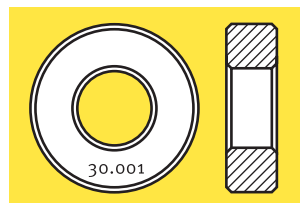
### CORDIPAR convinces with:

- High accuracy by a measuring carriage in ball bearings, also at permanent use
- Low measuring force hysteresis
- Rapid changeover from external to internal measurement
- Lifting lever for external and internal measurement without recalibration
- Large setting range
- Dial indicator in rotary bearings allows easy reading in any use position without loss of accuracy
- Many general purpose applications possible due to large range of accessories
- Easy changeover of measuring elements for internal measurement
- Thread measurement possible using thread measuring rollers 5086
- Also available with inductive or incremental transducers for transmission of the measuring data to EDP

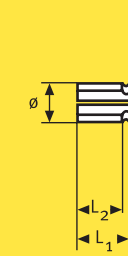
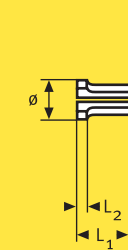
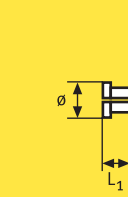
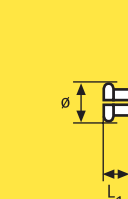
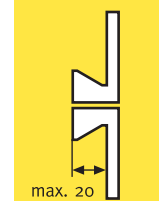
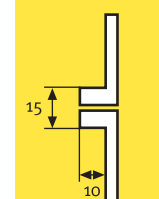


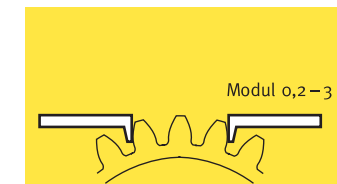
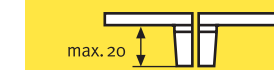
**CORDIPAR size o**

**Backstops 4688**

for external measurements over diameters, set of 5 pieces graded for the diameter ranges 8-16, 16-24, 24-32, 32-40 and 40-48 mm.


**Adjusting Ring 4684**

ø 30 mm for the basic adjustment between external and internal measurement

**Measuring Jaws 4682**
**Type A**

**Type B**

**Type C**  
for plain recesses

**Type D**  
for round recesses

**Type E**  
for dovetail guides

**Type F**  
for internal measurement with plain parallel surfaces

**Measuring Jaws 4682**  
(continued)

**Type G**  
for base tangent length

**Type H**  
for taper measurement


Dimensions for Measuring Jaws of type C, D, E and H are manufactured on request.

size of Measuring Jaws	nominal diameter ø	L1	L2	L3
1	10 - 56	3	2	-
2	10 - 56	10	9	3
3	15 - 56	20	18	3
4*	20 - 56	40	37	3

\* size 4 is preferred using the CORD dial gauge 12022

**Examples for ordering**

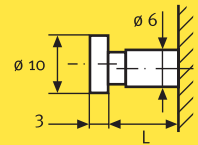
**4682 A 3** Measuring jaws 4682 type A size 3

**4682 G** Measuring jaws 4682 type G

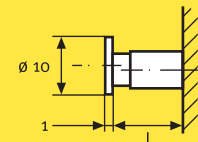
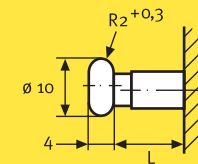
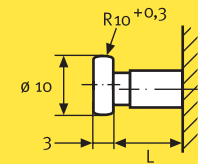
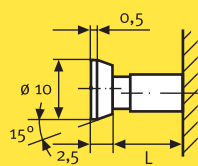
Special types upon request.

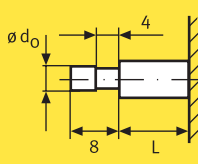
**Storage Box 127**

for 4675.0, five pairs of measuring jaws 4682, one set of backstops 4688, adjusting ring 4684, dial indicator 12022 and 12100.

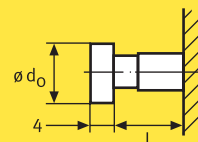
**CORDIPAR size 1-5**
**Measuring Anvils 4681**
**Type A**

**Type B**

tungsten carbide

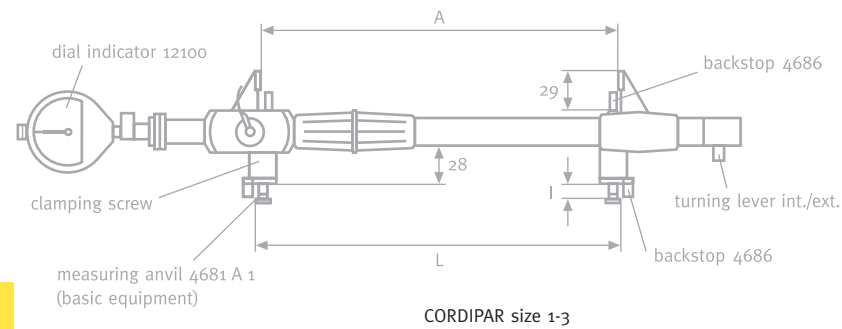
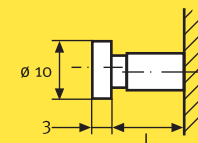

**Type C**

**Type D**

**Type E**

**Type F**

 for gear wheel measurement  $d_o$  from 3 to 6mm, diameter on request

**Type G**

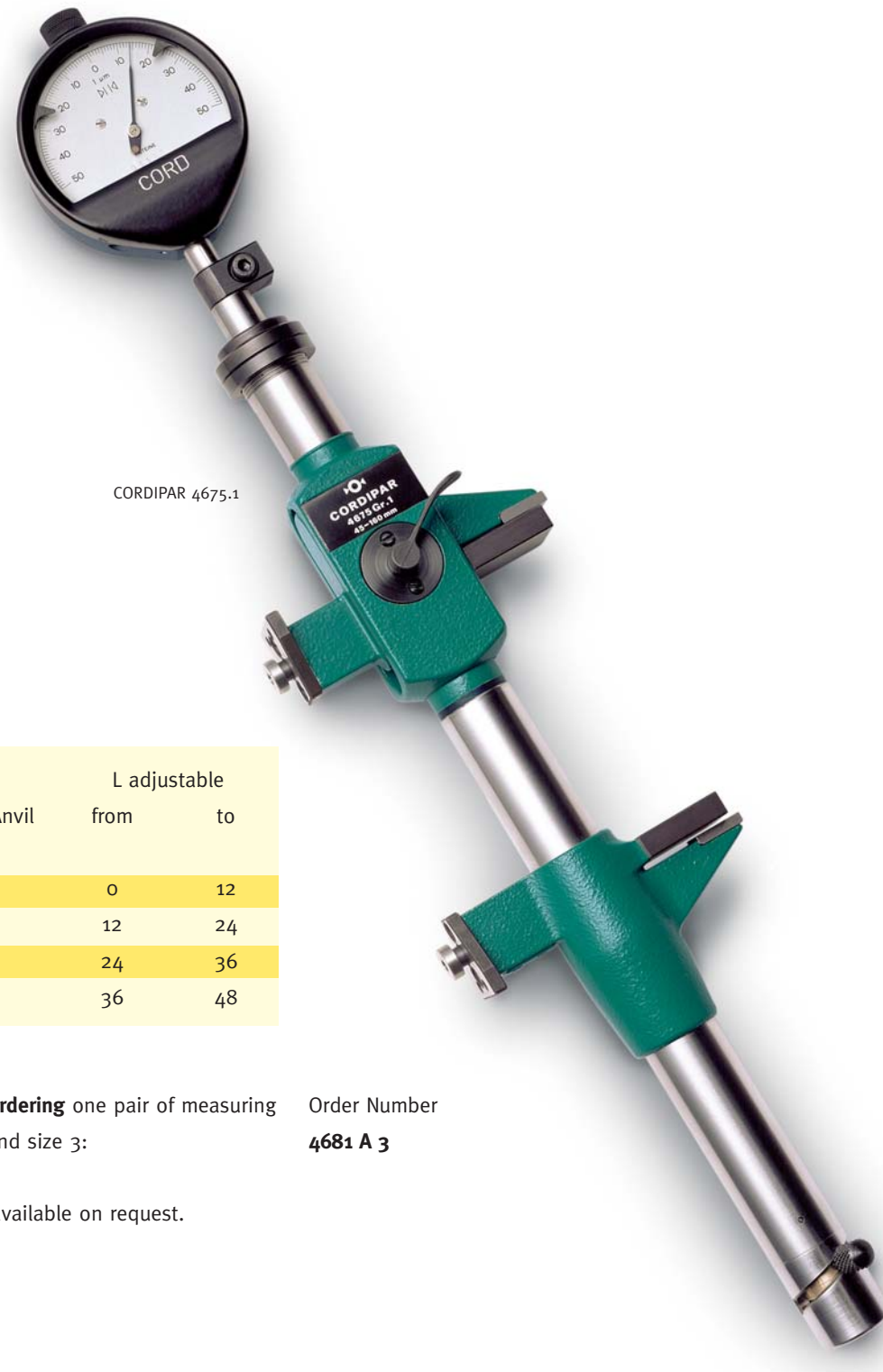
for gear wheel measurement GI-2 above 6 mm, diameter on request.


**Type H**

tungsten carbide



CORDIPAR size 1-3



CORDIPAR 4675.1

size of Measuring Anvil	L adjustable	
	from	to
1	0	12
2	12	24
3	24	36
4	36	48

**Examples for ordering** one pair of measuring anvils type A and size 3: Order Number **4681 A 3**

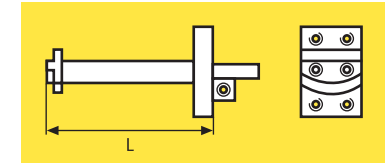
Special types available on request.

**Measuring Anvils 4696**

for external and internal measurements with deeper insertion length (pair), see page 15.

**4696.1:** L = 63 mm

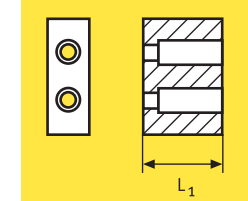
**4696.2:** L = 83 mm


**Backstops 4686**

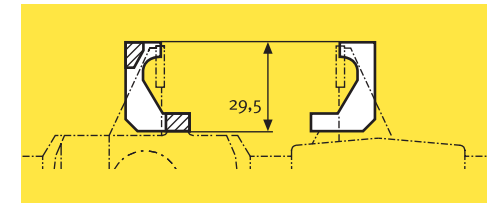
for external and internal measurements, set consisting of 5 pairs of backstops with

$L_1 = 5, 10, 15, 20$  and  $25$  mm.

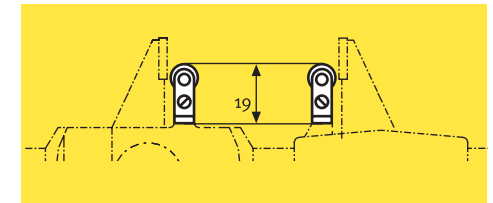
(Special length on request)


**Backstops 4690**

for external measurements locating off the dimension to be measured (pair), see page 14 and 15.


**Roller Support 4672**

for friction free positioning of the CORDIPAR used in the horizontal position, being a special advantage for the larger instruments (pair), see page 15.


**Adjusting Blocks 4689**

for basic adjustment between external and internal anvils ( $A = L$ ), see page 12, with storage box.

Order Number

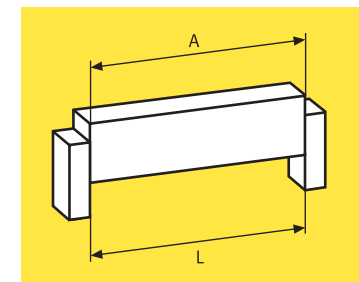
**4689.1** for CORDIPAR 4675.1

**4689.2** for CORDIPAR 4675.2

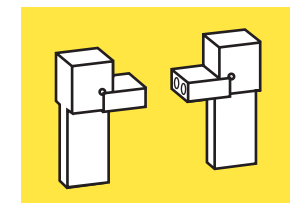
**4689.3** for CORDIPAR 4675.3

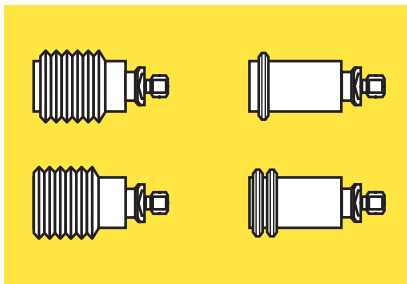
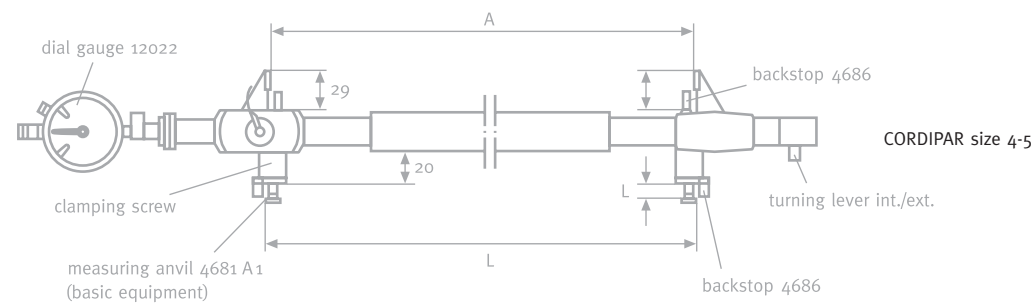
**4689.4** for CORDIPAR 4675.4

**4689.5** for CORDIPAR 4675.5


**Special Slip Gauge Anvils 5088**

for setting at internal measurements, internal threads and for basic adjustment (pair), see page 13.



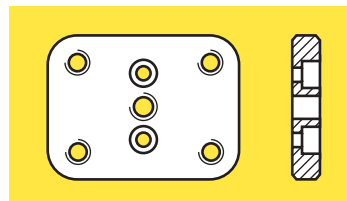


Order Number  
**5086 N + NA**  
**5086 O + N**  
**5086 K + K**  
**5086 NA + O**  
**5086 O + D**

### Thread Measuring Rollers 5086

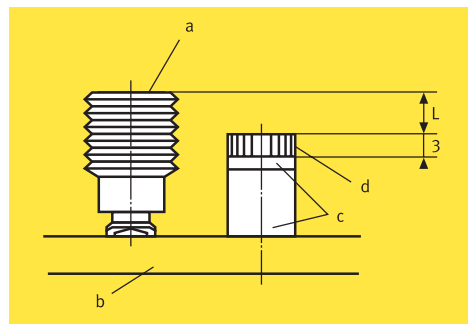
to measure external and internal threads (pair). For detailed information see page 16 to 17.

Profile form  
 N+NA  
 O+N  
 K+K  
 NA+O  
 O+D



### Roller Support 4685

for the thread measuring rollers. These are mounted in place of the backstop plates (pair).



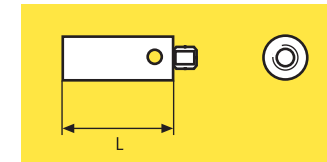
thread measuring roller - a  
 roller holder - b  
 intermediate piece - c  
 knurled nut - d

### Intermediate Rings 5092

When measuring with thread measuring rollers 5086, it is useful to put the CORDIPAR against the flat face of the workpiece. The intermediate rings are screwed onto the roller supports and serve to compensate the different penetration depths. One set has four knurled nuts, intermediate rings of the lengths 1, 2, 4, 8 and 16 mm complete with stud screws. Penetration depths L from 1 to 27 mm in steps of 1 mm can be selected.



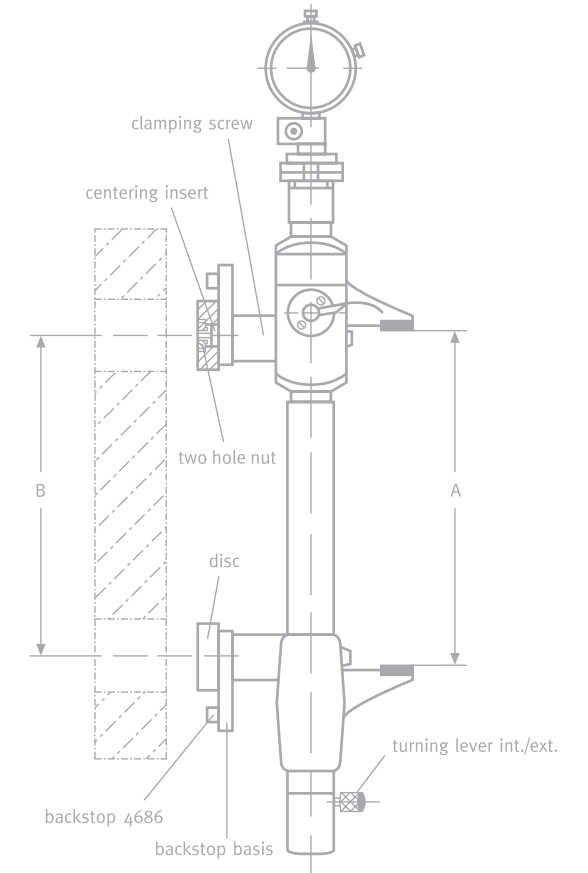
**Axial Extensions 5064**  
 to increase the penetration depth of the thread measuring rollers 5086.  
**5064.0:** L = 12 mm  
**5064.1:** L = 25 mm  
**5064.2:** L = 50 mm



**Measuring Discs 4693**  
 to measure the bore centre distance, for bore diameters from 16 to 50 mm. For each bore one measuring disc is required.

**Centering Anvils 4692**  
 with round nuts and special wrench to receive the measuring discs 4693 (pair).

**Backstop Plates 4694**  
 to support the measuring discs 4693 and the backstops 4686 (pair).



### Storage Box for CORDIPAR

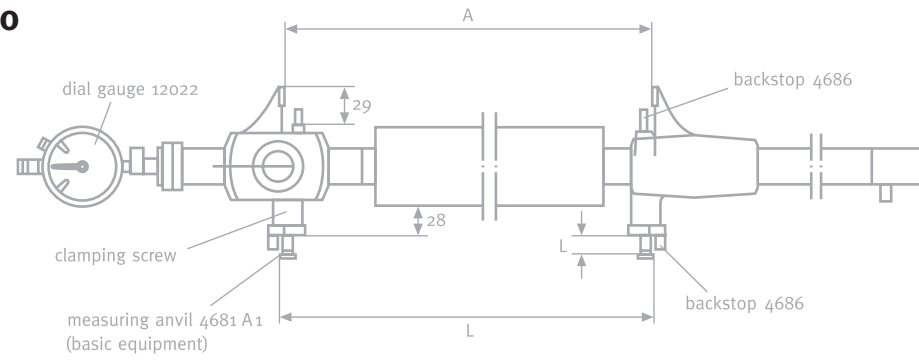
These boxes receive the instrument, one set of backstops 4686, one pair of backstops 4690, one pair of special slip gauge anvils 5088, 20 pairs of measuring anvils 4681, the dial indicators 12022 and 12100.

Order Number  
**109** for CORDIPAR 4675.1  
**110** for CORDIPAR 4675.2  
**111** for CORDIPAR 4675.3  
**112** for CORDIPAR 4675.4  
**113** for CORDIPAR 4675.5

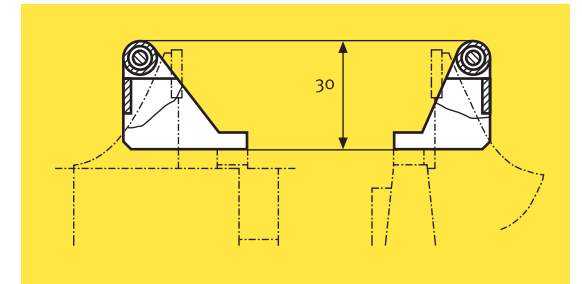
### Storage Box for Thread Measurements

The box receives 5 pairs of thread measuring rollers 5086, 1 pair of roller supports 4685, one pair of axial extensions 5064.0 and one set of intermediate rings 5092.

### CORDIPAR size 6-10

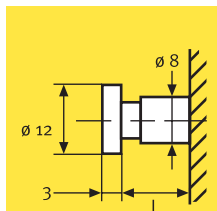


**Roller Support 4673**  
for friction free positioning of the CORDIPAR used in the horizontal position, being an advantage for these large instruments (pair).



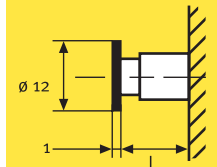
### Measuring Anvils 4683

**Type A**

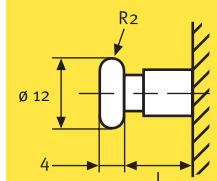


**Type B**

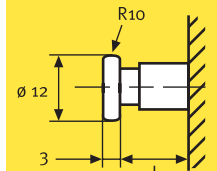
tungsten carbide



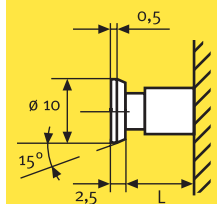
**Type C**



**Type D**



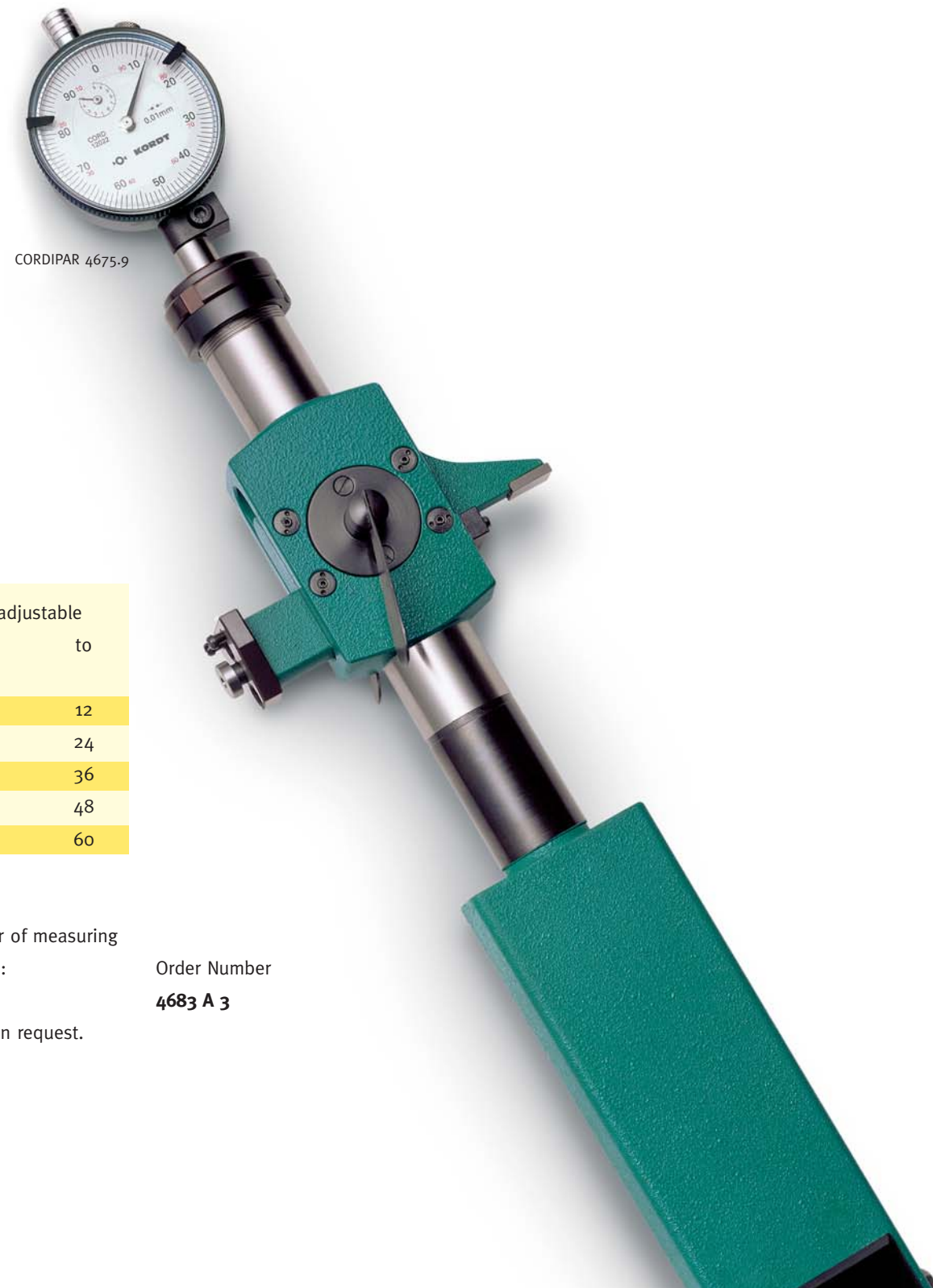
**Type E**



size of Measuring Anvils	L adjustable	
	from	to
1	0	12
2	12	24
3	24	36
4	36	48
5	48	60

**Example for ordering** one pair of measuring anvils 4683 type A and size 3:

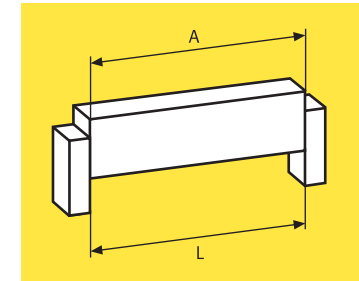
Special types manufactured on request.



Order Number  
**4683 A 3**

### Adjusting Blocks 4689

between external and L), with storage box, CORDIPAR 4675 size 6.



The following accessories for CORDIPAR size 1 to 5 can be used for the sizes 6 to 10:

**Backstops 4686**

**Roller Support 4672**

**Special Slip Gauge Anvils 5088**

### Storage Box

These boxes receive the instrument, one set of backstops 4686, one pair of special slip gauge anvils 5088, 20 pairs of measuring anvils 4683 and the dial indicators 12022 and 12100.

Order Number

**114** for CORDIPAR 4675.6

**142** for CORDIPAR 4675.7

**143** for CORDIPAR 4675.8

**186** for CORDIPAR 4675.9

**187** for CORDIPAR 4675.10

## Basic Adjustment of the CORDIPAR Universal Instruments for Linear Measurement

### CORDIPAR 4675 size 0

Requirements for the basic adjustment are: setting ring 4684 ( $\varnothing$  30 mm) and a slip gauge 30 mm. At first the instrument is set to 30 mm nominal size with the slip gauge.

After having changed the direction of the measuring force, the setting for the internal measurement is made by using the setting ring. By the movement of one measuring jaw using an adjusting screw, the nominal diameter is adjusted to the external nominal diameter.

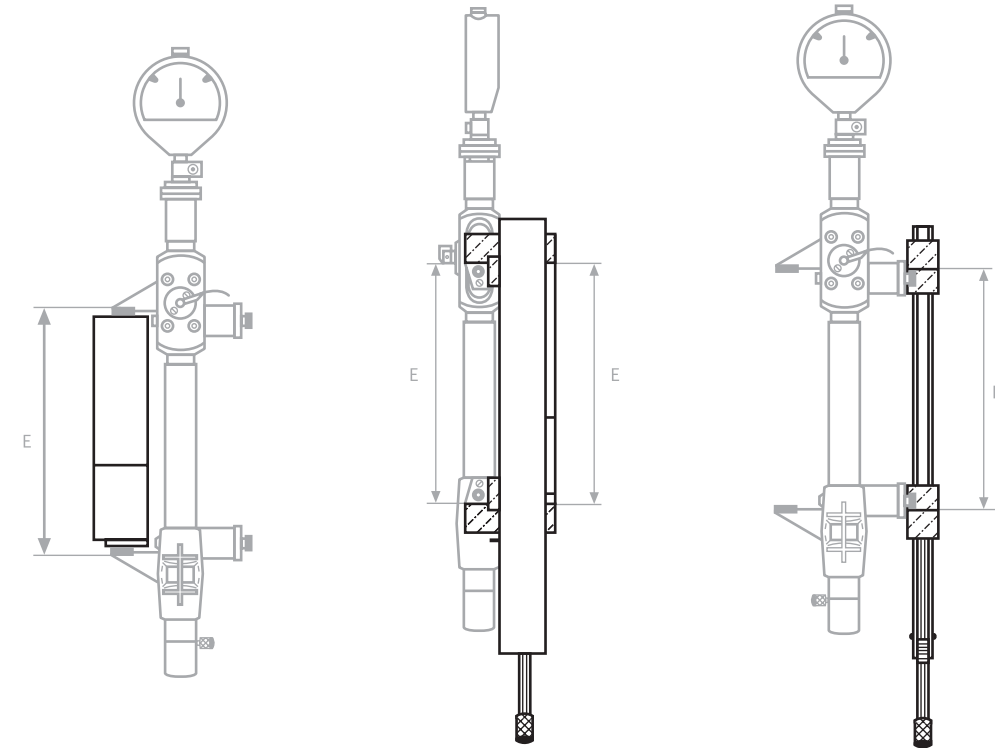
### CORDIPAR 4675 size 1 to 10

Requirements for the basic adjustment are:

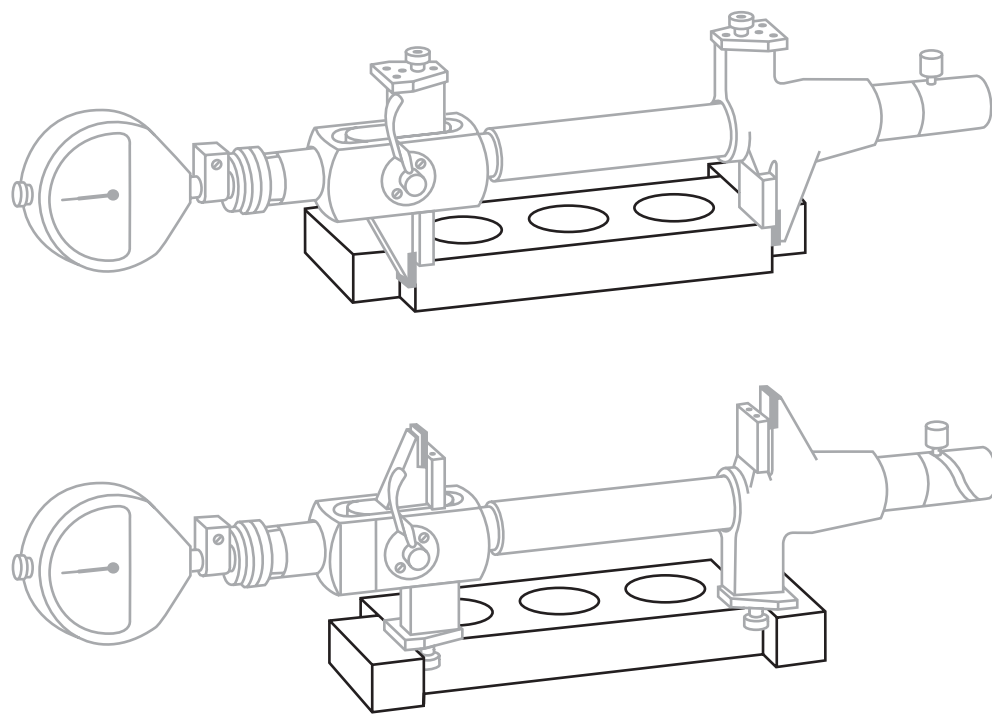
Adjusting block 4689 of appropriate size or special slip gauge anvils 5088 with slip gauges and holder. The simplest and most precise way is the adjustment by using the adjusting block 4689. From size 7 the adjustment is made in the horizontal position by means of the special slip gauge anvils 5088 in combination with appropriate slip gauges as adjusting blocks are not available for these sizes due to their weight. Of course, the basic adjustment is also possible by means of a setting ring in connection with a slip gauge combination according to this setting ring.

For these large instruments it is recommended to use the roller supports 4673 during the basic adjustment in the horizontal position. Due to the basic adjustment the external and internal anvils represent the same value. Therefore any future setting for internal dimensions can be made by the setting of the external jaws using slip gauges. No special setting of the internal anvils is necessary.

## Basic Adjustments with Special Slip Gauge Anvils 5088, Slip Gauges and Holder



## Basic Adjustment with Adjusting Block 4689



## Reference Diameter Measurement on Gearwheel with CORDIPAR



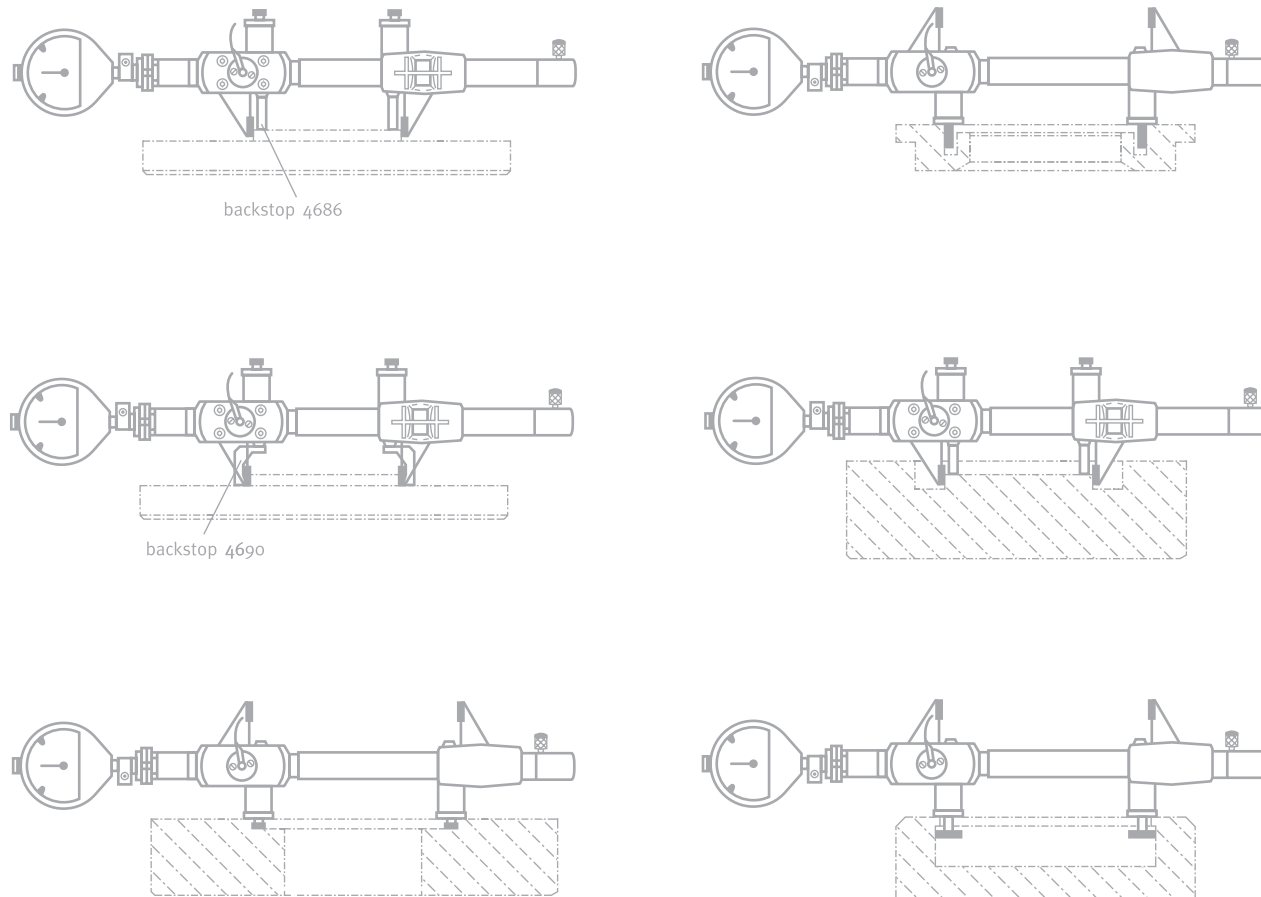
## External, Internal and Mating Measurements

External and internal measurements are made with the CORDIPAR as a comparative measurement. Due to the fact that the difference in distance dimensions between the internal and external anvils is known and generally zero (basic adjustment), a special setting of the internal anvils to determine the size of an internal dimension is not necessary. This means the internal anvils are set when the instrument is adjusted for the external measurement by means of slip gauges or a setting piece.

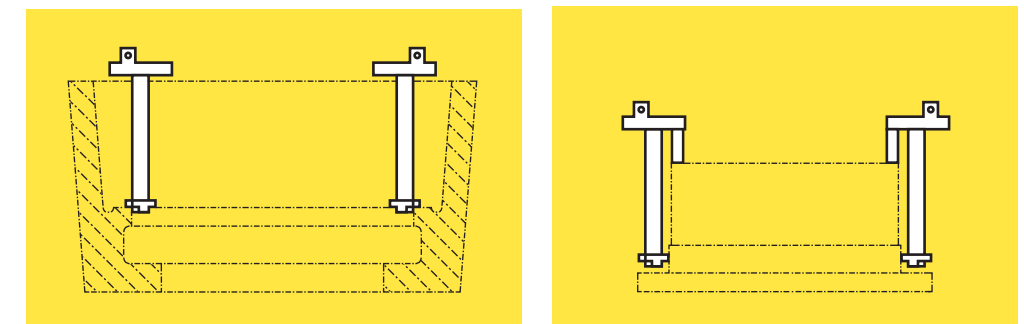
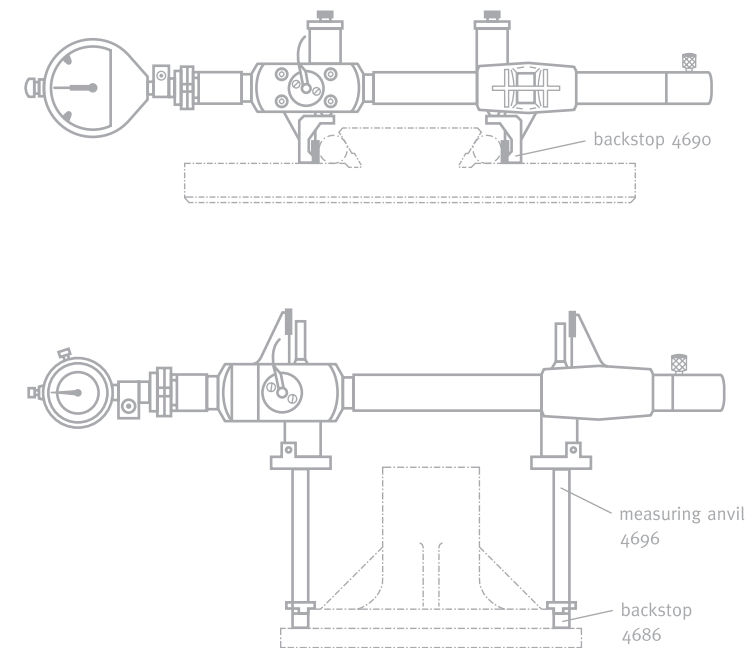
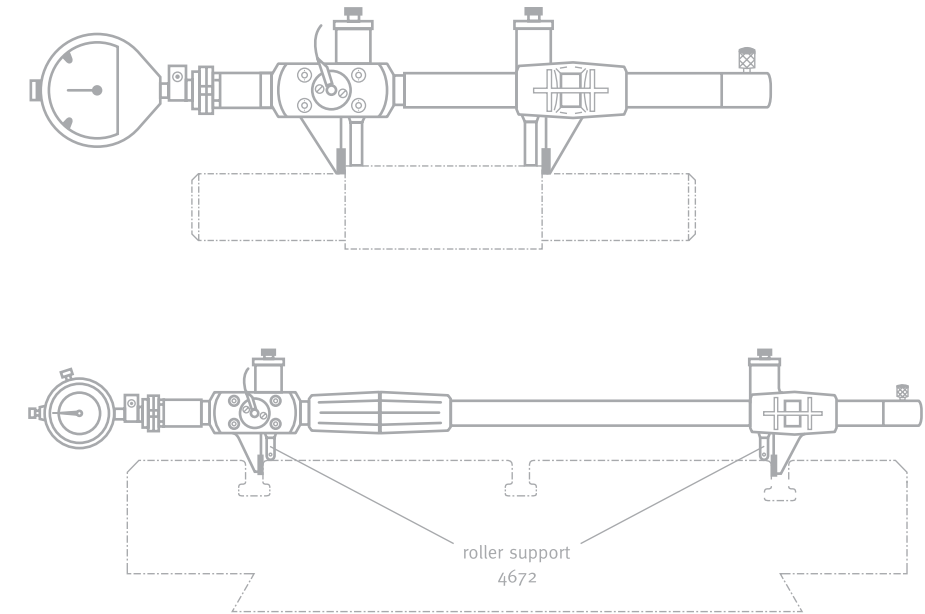
With CORDIPAR size 0 a backstop 4688 for diameter measurement should be selected; with size 1 the backstops 4686 according to the workpiece to be measured should be selected. The use of these backstops greatly simplifies the measurement.

In the case of mating measurement the absolute size of the two workpieces is not important. As the setting of CORDIPAR is done on one workpiece, the differential value of the second workpiece is directly indicated.

### Application Examples



### Application Examples





## Thread Measurement with CORDIPAR

Using thread measuring rollers 5086 used also in the CORDITEST Measuring Instruments external and internal threads can be measured with CORDIPAR sizes 1 to 5. At first, CORDIPAR has to be fitted with the roller holders 4685 designed to support the thread measuring rollers 5086.

### Thread Measuring Rollers 5086

The thread measuring rollers 5086, having annular thread grooves, can rotate and float axially mounted on ball bearings. At workpieces having the same pitch (or flank lead in the case of multi-start thread)

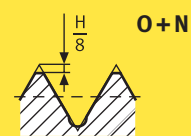

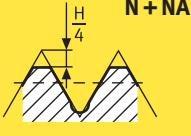
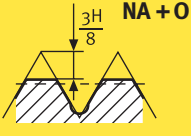
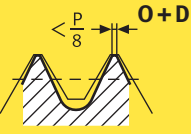
these rollers can be used throughout the whole range of the respective measuring instrument.

Contact between the annular grooves of the rollers and the workpiece thread helix causes an error: in most cases for Metric ISO and Unified Threads this error is unimportant but should be considered when setting without a thread setting master.

For setting without a thread setting master a value is engraved in brackets on the thread measuring rollers showing the dimension (major diameter minus pitch diameter). The other engraving shows the profile form for measuring external and internal threads. The first indication is valid for the external thread, the second for the internal thread. „o“ means: not applicable. For illustration and description of the different profile forms see table below and page 17.

### Profile Forms of the Thread Measuring Rollers

Thread measuring roller 5086 to measure Metric ISO Threads according to DIN 13 and UST Threads according to ASME B1.1

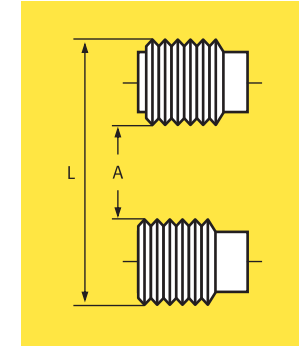
Profile form	... to measure external threads ...	... to measure internal threads ...
 <b>O+N</b>	not applicable	with full thread profile and multiple annular threads
 <b>K+K</b>	with large truncated thread profile and only one annular thread ridge or thread groove	with large truncated thread profile and only one annular thread ridge or thread groove
 <b>N+NA</b>	with full thread profile and multiple annular threads	with H/8 truncated thread profile and multiple annular threads
 <b>NA+O</b>	with H/8 truncated thread profile and multiple annular threads	not applicable
 <b>O+D</b>	not applicable	with relieved thread flanks and only one or two annular thread ridges

(The thread measuring rollers are engraved with type of thread, pitch, profile form and the setting dimension.)

### Setting without thread setting master

The normal setting of CORDIPAR to the desired pitch diameter is made by use of a thread setting ring 5385 (according to DIN 2241).

It is also possible to set the instrument by means of the major diameter of the thread measuring rollers in cases where thread setting rings are not available. Calculation of the setting dimensions to adjust CORDIPAR to the pitch diameter by means of the external diameter of the thread measuring rollers 5086.



### External threads:

$A = \text{nominal pitch diameter} - [\text{dimension in brackets (of roller 1)} + \text{dimension in brackets (of roller 2)}] + A'$

$A'$  = lifting of the thread measuring rollers with annular thread grooves in the external thread of the workpiece

### Internal threads:

$L = \text{nominal pitch diameter} + [\text{dimension in brackets (of roller 1)} + \text{dimension in brackets (of roller 2)}] - A''$

$A''$  = lifting of the thread measuring rollers with annular thread grooves in the

### Explanations for using and selecting of the different profile forms for the thread measuring elements

**Form N:** During the pitch diameter measurement the measuring elements form N detect also deviations of flank angle and pitch. In addition, the root diameter of the external thread is checked with regard to exceeding the maximum size. The major diameter of the internal thread is checked with regard to exceeding the minimum size. The measurement gives approximately the virtual pitch diameter, including the deviations in the axial section only.

But it is not always guaranteed whether the flanks of the measuring elements contact the workpiece flanks or not.

**Form K:** Measuring elements form K measure the effective pitch diameter, i.e. the diameter of two opposite flank points. The contact in the flank centre of the workpiece is obtained by the fact that the measuring elements have only one thread groove with truncated thread flanks. So the influence of the pitch and the flank angle on the measurement is almost excluded. The combination of one measurement with form K and one with form N gives a true statement about the deviation values in the axial section.\* In case of large deviations an additional measurement should be made by using measuring elements form NA or D in order to ensure that there is no minor or major diameter contact when measuring with form N.

**Form NA:** Measuring elements form NA measure, as form N, the virtual pitch diameter of the axial section but have slightly more flank truncation at the external diameter. With this touching of the measuring elements touching the workpiece at the minor or major diameter is avoided. Therefore a flank contact is always achieved.

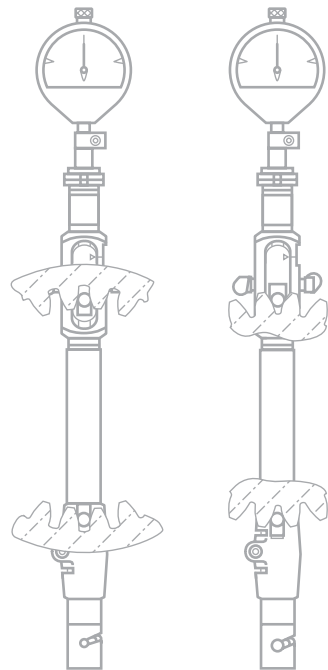
An additional minor or major diameter measurement, however, should not be omitted. Otherwise there is no assurance that the minor diameter of the external thread does not exceed its allowable maximum size or that the major diameter of the internal thread does not fall below its permissible minimum size. With measuring elements form N resp. form D this can be checked.

**Form D:** The major diameter of the internal thread is measured by using measuring elements form D. The thread flanks are relieved so that the major diameter contact is always made.

\*See also: Müller, P.: „Differential-Meßverfahren zur wirtschaftlicheren Gewindefertigung“ Werkstattstechnik 55 book 5 (1965) pages 240-243. The article can be sent upon request.

## Measurement of Gear Teeth

Measurement of gear teeth widths with module 0.2 to 3 can be made with CORDIPAR size 0 with measuring jaws 4682 G. All gear teeth width measurements according to the measuring method over two wires or two balls can be made by use of CORDIPAR sizes 1 to 5 with measuring anvils 4681 F and 4681 G.



## Bore Center Distance Measurement

CORDIPAR 4675 size 1 to 5 can also be used for bore centre distance measurements (see page 14).

After disassembly of the internal measuring anvils and the standard backstop plates, the backstop plates 4694 and the centering anvils 4692 must be mounted. In the case of very small bores measuring pins 4695 are available (not illustrated). Then the appropriate measuring discs 4693 for the bore diameter have to be attached. If necessary, the backstops 4686 can also be used.

The measuring pins 4695 or the measuring discs 4693 are manufactured slightly smaller than the bore diameters.

The bore centre distance is measured in two stages: Firstly CORDIPAR is set by the reversal lever to the external mode, inserted into the bores and the absolute value is recorded. Then CORDIPAR must be changed into the internal mode and this measuring value also recorded. The desired result is the average value of the measured two ones.

The instrument should be set by use of a setting piece with the required centre distance or by use of slip gauges.

## Dial Indicators for CORDIPAR size 1-10

All dial indicators with clamping shank  $\varnothing$  8h 6 can be used. We recommend:

### CORD Dial Indicator 12100

Scale calibration 0.001 mm, measuring force 1N, ball bearing supported spindle, scale diameter 61 mm, measuring range +/- 0.05 mm, maximum travel 3 mm, fine adjustment, deviation max. 0.5  $\mu$ m. (delivered up to size 3)

### CORD Dial Indicator 12022

Scale calibration 0.01 mm, measuring force 1.2 N, locking bezel, measuring range +/- 5 mm, accuracy according to DIN 878. (delivered up to size 3)

### CORD Dial Indicator 12026

Same as 12022 but with holder to receive an inductive or incremental transducer for electronic evaluation and data processing.

### CORD Digital Dial Indicator 12300.12,5

Scale calibration 0.01 / 0.001 mm adjustable, measuring range 12.5 mm, scale diameter 60 mm, changeable metric/inch.



## CORDIPAR Technical Data

tool sizes 4675		0	1	2	3	4	5	6	7	8	9	10
		1)							2)	2)	2)	2)
measuring range A and L	mm	0 56	45 160	140 280	270 450	430 740	710 1020	1000 1500	1500 2000	2000 2500	2500 3000	3000 3500
measuring range external thread 3)	mm	-	21 136	116 256	246 426	406 716	686 996	-	-	-	-	-
measuring range internal thread 3)	mm	-	54 166	149 286	279 456	439 746	719 1026	-	-	-	-	-
max. travel, external	mm	1.0	1.5	1.5	1.5	1.5	1.5	3.0	3.0	3.0	3.0	3.0
max. travel, internal	mm	4.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0
measuring range	mm	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5	$\pm$ 0.5
measuring force 4)	N	10	12	12	12	16	16	16	16	16	16	16
standard deviation 3S	$\mu$ m	< 0.5	< 0.5	< 1	< 2	< 3	< 3.5	< 5	< 8	< 10	< 10	< 10
hysteresis	$\mu$ m	< 1	< 1	< 1.5	< 2	< 2.5	< 3	< 6	< 8	< 10	< 12	< 15
maximum indication error by dial indicator rotation	$\mu$ m	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 2	< 2	< 2	< 2
measuring elements for internal measurement		4682	4681	4681	4681	4681	4681	4683	4683	4683	4683	4683
measuring elements for ext. and int. measurement		-	4696	4696	4696	4696	4696	-	-	-	-	-

- 1) The smallest diameter for the internal measurement depends upon the measuring jaws which are used.
- 2) From size 7 the basic adjustment of the instruments and the measuring have to be made in the horizontal position.
- 3) These values are valid for Metric ISO Thread and Unified Thread with a pitch from 0.4 to 4 mm for profile form N, a pitch from 0.5 to 6 mm for profile form K and for Trapezoidal Thread with a pitch from 1 to 6 mm for profile form K only.
- 4) With a lower measuring force upon request.