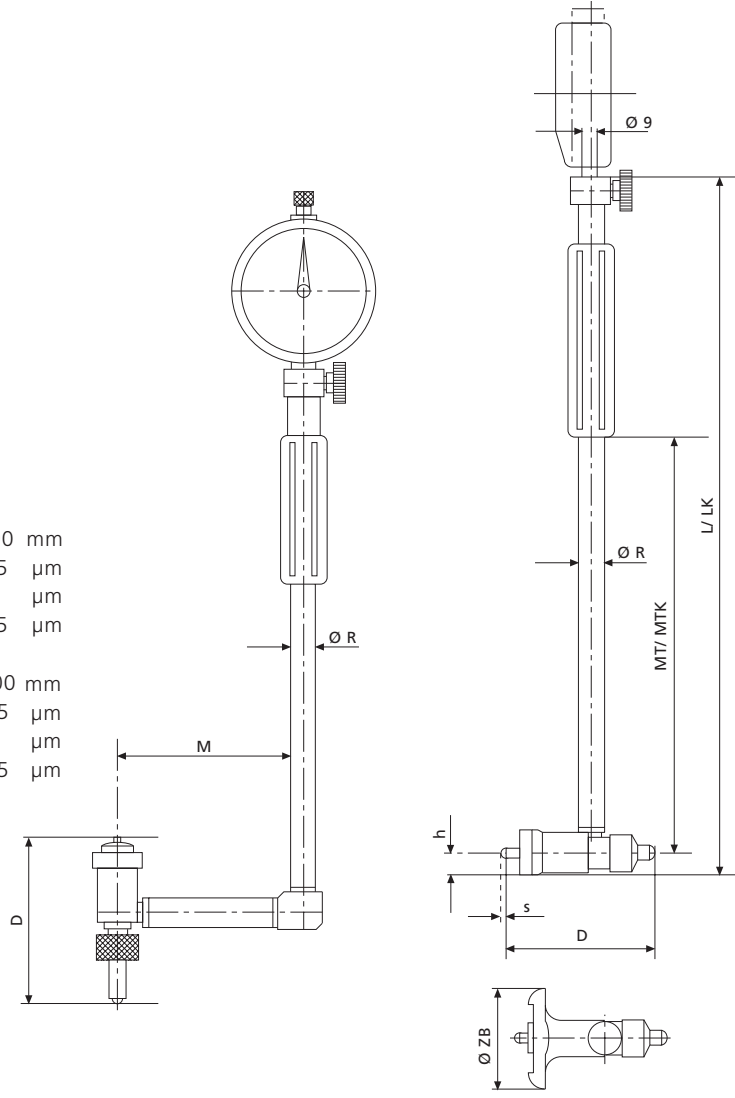


**technical data SU/ SK**

range of application 4,5 - 290 mm  
 repeatability  $f_w < 0,5 \mu\text{m}$   
 max. deviation  $f_e < 2 \mu\text{m}$   
 hysteresis  $f_u < 2,5 \mu\text{m}$

range of application 280 - 800 mm  
 repeatability  $f_w < 1,5 \mu\text{m}$   
 max. deviation  $f_e < 3 \mu\text{m}$   
 hysteresis  $f_u < 3,5 \mu\text{m}$



Technical changes reserved 09/1997

**Selection criteria for SUBITO SU/SK/SW**

range of application D	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
from	4,5	6	8	12	18	35	50	100	160	280	500
up to	6	8	12	20	35	60	100(150)	160(230)	290(360)	410(510)	800
travel s	0,35	0,5	0,7	0,9	1,3	1,3	1,4	1,6	1,6	2,6	2,6
measuring depth MT	80	100	100	110	110	138	177	234	234	400	700
measuring depth MTK	24	24	24	21	21	23	24	30	29,5	55	-
angle meas. depth M	30	30	30	50	50	60	60	70	70	80	-
total length L	147	165	166	204	206	243	295	365	365	550	855
total length LK	90	90	90	114	116	126	141	161	161	208	-
tube Ø R	4	5	5	8	8	10	12	18	18	24	24
centr. plate width ZB	4	5,2	6,5	9	14,8	28	45	75	120	156	300
front distance h	2	2,6	3,25	4,5	5,4	7	8,5	11,5	11,5	16	17,5
no. of measuring pins	9	7	9	9	9	7	11	7	7	7	11
no. of increment washers	-	-	-	1	2	2	3	4	4	4	4
extensions	-	-	-	-	-	-	(1)/ 50	(1)/ 70	1(2)/ 70 (70)	1(2)/ 70 (100)	(2)/ 100
weight in wooden box (kg)	0,45	0,45	0,45	1,0	0,9	0,9	1,2	2,3	3,8	6	10,5



- SUBITO SU
- SUBITO holder
- SUBITO SW angled
- SUBITO SMT special measuring depth
- SUBITO Vario SV
- SUBITO Vario system SVS
- SUBITO setting device ESU
- SUBITO KT for internal profiles
- SCA Vario plug gauge
- SUBITO SS for blind holes
- SUBITO blind hole vario SSV
- SUBITO ST for pillow block bores
- SUBITO SN for grooves and recesses
- SUBITO SL for boring bar left in the workpiece
- SUBITO SBO/SBU with ring bow

# SUBITO

and variants

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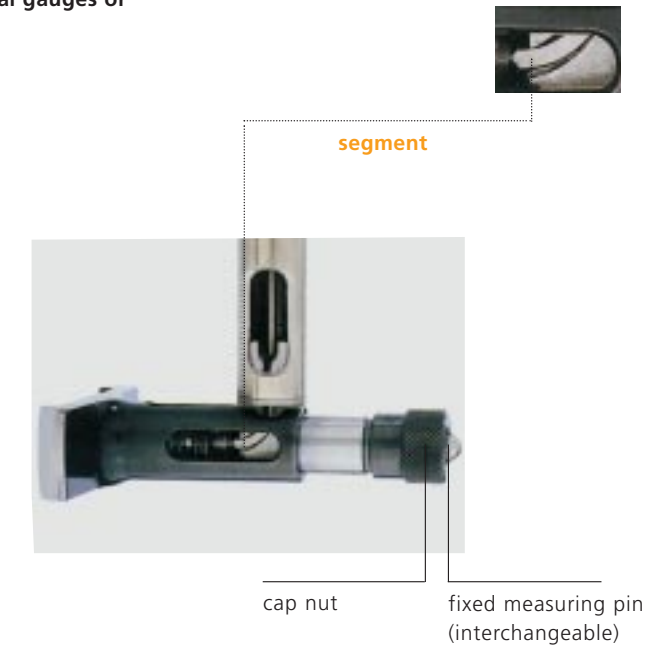


The SUBITO is an internal precision measuring instrument, which is based on a construction principle well-established since over 75 years. Its quality and reliability have convinced experts all over the world.

The SUBITO comparator gauge serves for the measurement of cylindrical bores with a diameter from 4,5 up to 800 mm (standard) as well as their deviations in form. For the indication of the measuring value precision indicators, mechanical and electrical dial gauges or electronic probes can be used.

**The segment**

This patented high-precision deviation element, developed by SCHWENK decades ago, is the core piece of the SUBITO. This segment ensures a transmission free of backlash of the contact pin travel to the connecting rod in the tube of the gauge and therefore on the measuring value indication. This element allows an individual adjustment of each gauge, so that excellent values for the repeatability and the linearity can be guaranteed.



SUBITO segment

Page 3 to 7 **Basic information**

- SUBITO segment
- application possibilities
- bore measurement
- advantages
- accessories/ special performance

Page 8 to 9

- SUBITO holder
- SUBITO SW angled
- SUBITO SMT special measuring depth
- SUBITO Vario SV
- SUBITO Vario system SVS

Page 10 to 11

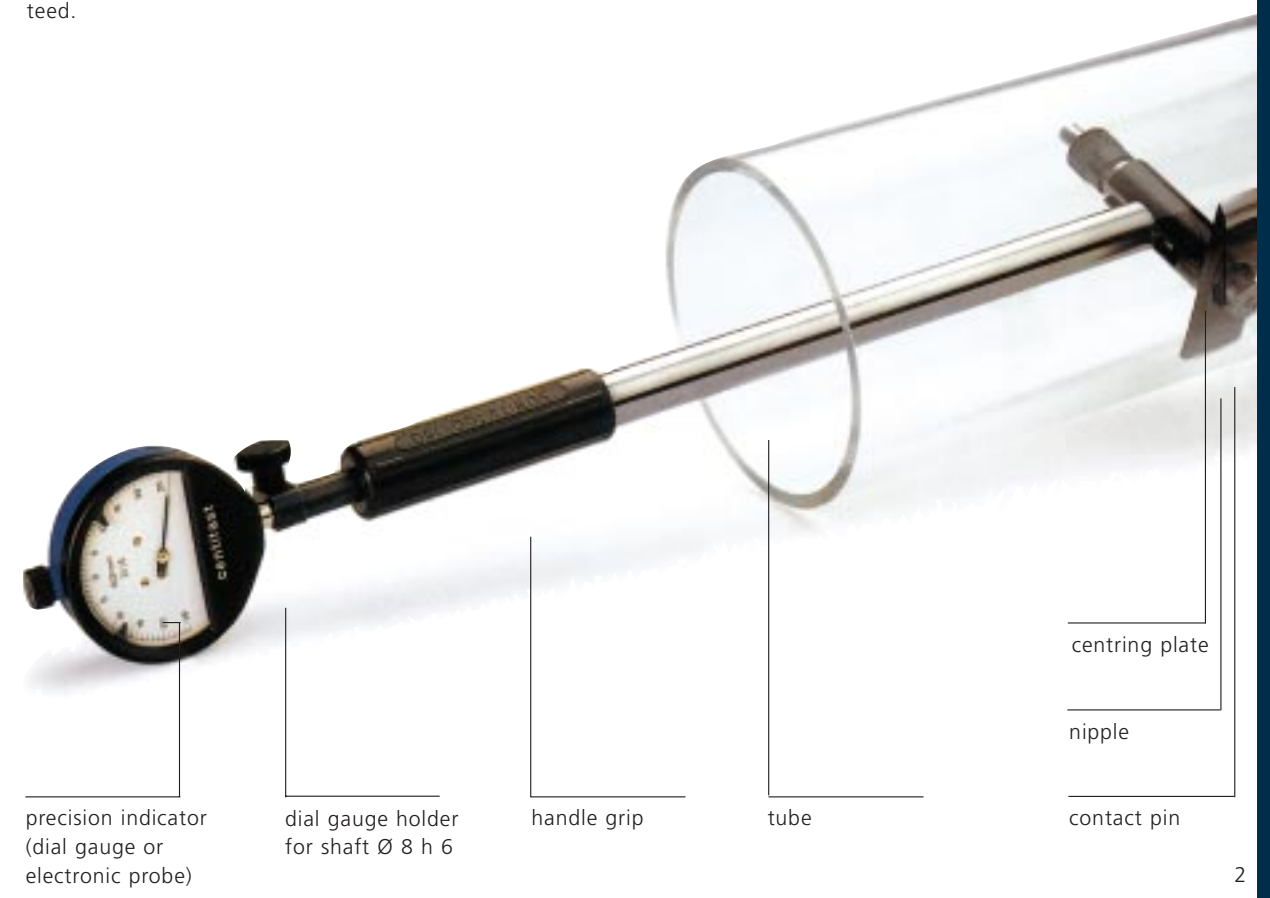
- SUBITO setting device ESU
- SUBITO KT for internal profiles
- Vario plug gauge SCA

Page 12 to 13

- SUBITO SS for blind holes
- SUBITO blind hole vario SSV
- SUBITO ST for pillow block bores, grooves and recesses
- SUBITO SN for grooves and recesses

Page 14 to 15

- SUBITO SL for the measurement of bores with boring bar left in the workpiece
- SUBITO SBO/SBU with ring bow

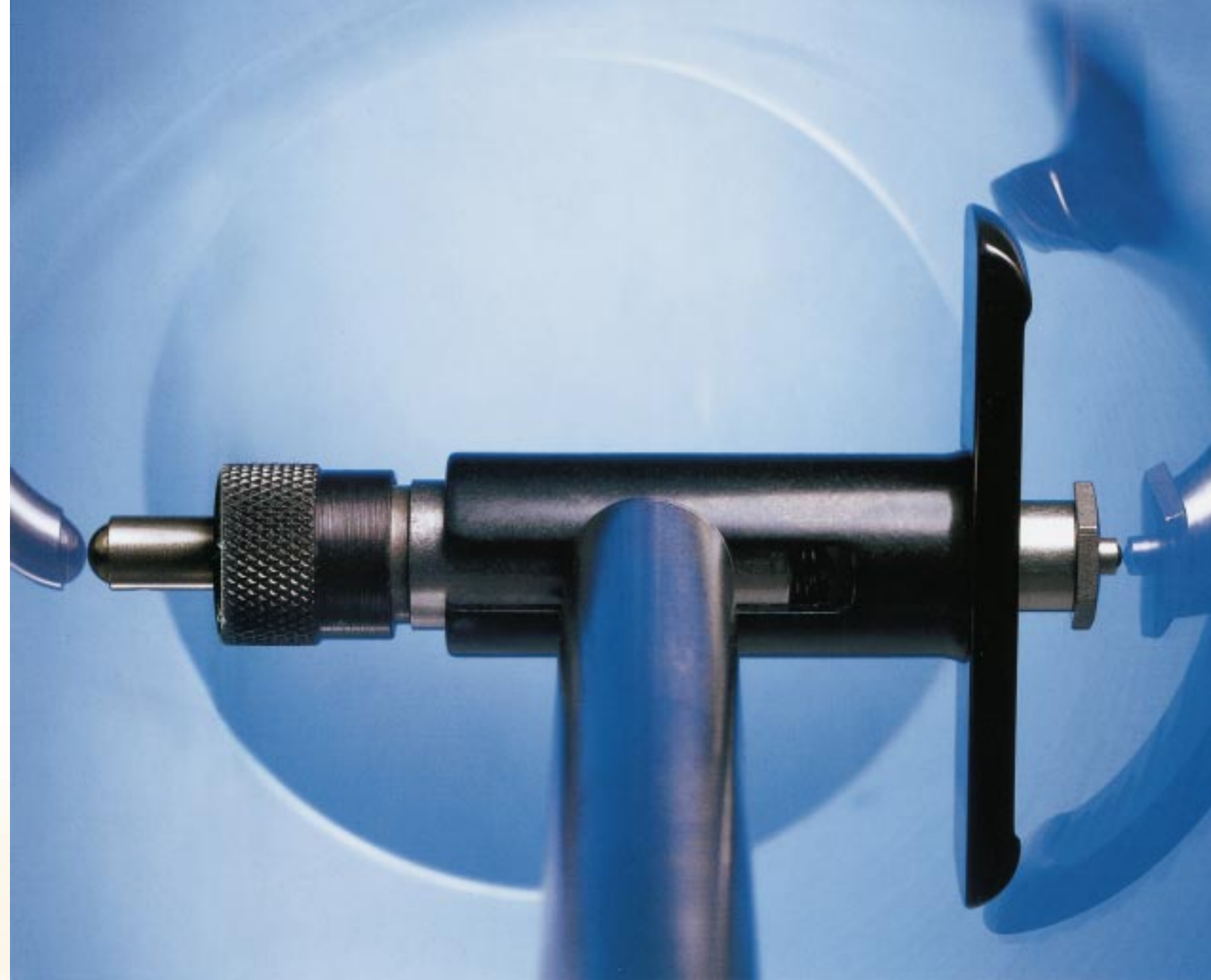


Basic information



**The application possibilities**

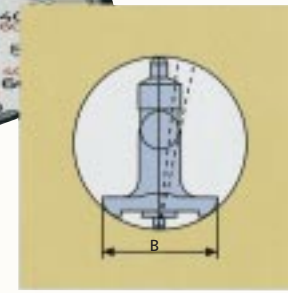
The SUBITO is a universal and rugged two-point contact comparator instrument for the use in the room for precision measuring, in the production as well as in the incoming and final inspection. It is suitable for measuring purposes with high demands on the accuracy in the single as well as in the series production. The simple handling of the gauge enables a reliable measuring process for specialists and for semi-skilled workers.



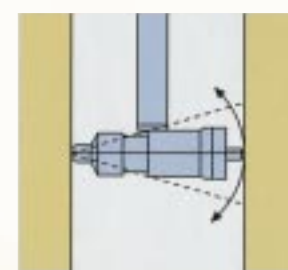
application possibilities  
bore measurement



Basic information



Zentriervorgang



Pendelvorgang



**Basic information on the bore measurement with the SUBITO**

The centring of the SUBITO in the bore is effected automatically; the basis therefore is formed by the centring plate with the width B. The wider the centring basis B, the more reliable the gauge is centred in the bore. This fact has already been taken into consideration in 1921, when fixing the application ranges, which are valid until today.

During the measuring process with the SUBITO, it is necessary to determine the so-called reversal point. This is realised by oscillating the gauge around the fixed measuring pin. Automatically, the point with the minimum value is passed through, where the measuring gauge axis is exactly vertical to the bore axis. In case of a mechanical display unit, this is clearly shown through the direction change of the pointer. Using digital display units, a minimum value storage is helpful.





### The advantages

#### Highest precision

The precision of a comparator gauge is shown clearly with the repeatability. For the SUBITO, this is within 0,5 µm. Furthermore, a deviation of max. 2,0 µm over the complete measuring range of a gauge is guaranteed. The segment is mainly responsible for this high precision. Moreover, the invar tube (with special nickel alloy) makes the gauge very insensitive to sources of heat such as hand-heat or high ambient temperature.

#### High measuring certainty

This is guaranteed by the subdivision into 11 ranges of application with a diameter between 4,5 and 800 mm.

#### Easy handling

With this precision measuring instrument, it is possible to effect measurements at any position. The gauge effects a self-centring by the spring-loaded centring plate. The search of the reversal point during the oscillating process leads to a clearly visible and exactly repeatable measuring result.

#### Extensive range of application

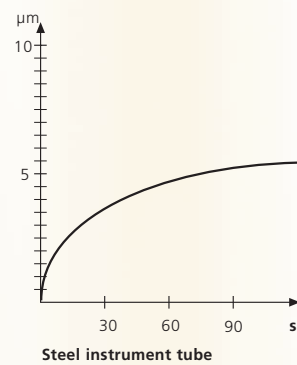
The simple exchanging of the pins and increment washers allows the instrument to be adapted easily to other diameters, so it is able to cover an extensive range of application.

#### Reliable determination of deviations in form

By rotating or moving the gauge inside the bore, form deviations as e. g. deviations of roundness or cylindricity are determined (thus far as possible with the two-point contact comparator method).

#### High service life/robustness

The SUBITO contact pins are fitted with tungsten carbide balls as standard. Measuring pins as an option. All inside wearing parts are made either of tungsten carbide or of wear resistant and hardened steel. The segment deviation ensures an extensive insensitivity to shocks. In contrast to other deviation principles, the segment deviation is very easy to maintain and adjustable.



#### Easy setting

As dimensional references for the setting of the SUBITO, the following devices are used in practice: master setting rings, gauges, micrometer screws. Also the setting device ESU, used together with precision slip gauges and the reference unit RV, both developed by SCHWENK, are suitable therefore. The ESU and the RV are fitted with setting jaws, especially adjusted to the centring plates of the different SUBITO sizes. These setting jaws ensure a reliable calibration of the gauge. The measuring certainty of each comparator gauge depends on the precision of the measurement reference used.

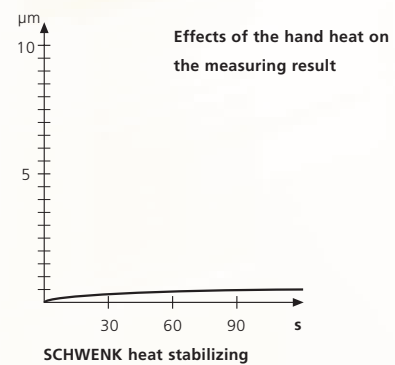
#### Versatility

Many variants of precision measuring instruments, which are described on the following pages, are based on the proven measuring principle of the SUBITO.

#### Delivery volume

SUBITO holder with the corresponding measuring pins and increment washers as well as the necessary wrenches. All in a wooden box, without master setting ring and dial gauge.

**With the SUBITO series SU/SK, an additional calibration certificate is delivered free of charge.**



#### Internal measuring instrument series SU 50-100

#### Accessories/special performance

- plug-in measuring depth extensions MTV out of invar, suitable from Ø 35 mm (standard length: graduated from 250 up to 2000 mm)
- measuring range extensions for the following gauge sizes:

for SUBITO	extension L = (mm)	application range up to (mm)
SU 50 - 100	50	150
SU 100 - 160	70	230
SU 160 - 290	70	360
SU 280 - 410	100	510

e. g. for in-between sizes, hard-chrome plated, fitted with ruby or ceramics

- special centring plates, e. g. with a coating or for special profiles

- setting device ESU and reference unit RV for reliable calibration of the measuring instrument

- master setting rings for all diameters (up to Ø 300 mm)

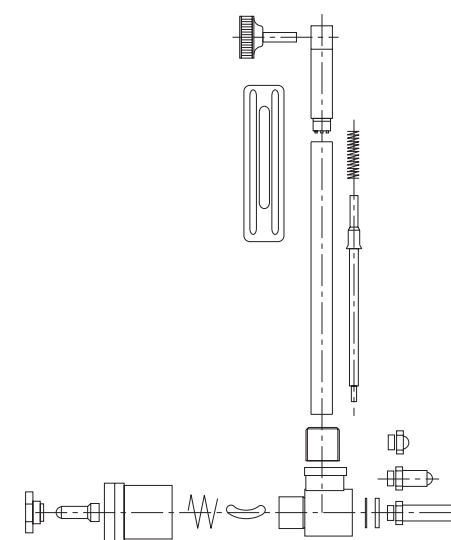
- prompt spare part and repair service

- calibration service for all SCHWENK measuring instruments: manufacturer inspection certificate on request

- various special measuring instruments for special measuring problems

- dial gauge holder for a clamping shaft 3/8"

- SUBITO for diameters > 800 mm





#### SUBITO holder

##### Technical data SU/SK

range of application	4,5 - 290 mm
repeatability	$f_w < 0,5 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

range of application	280 - 800 mm
repeatability	$f_w < 1,5 \mu\text{m}$
max. deviation	$f_e < 3 \mu\text{m}$
hysteresis	$f_u < 3,5 \mu\text{m}$

#### SUBITO SW angled

##### Technical data SW

range of application	4,5 - 290 mm
repeatability	$f_w < 1 \mu\text{m}$
max. deviation	$f_e < 4 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

range of application	280 - 800 mm
repeatability	$f_w < 2,5 \mu\text{m}$
max. deviation	$f_e < 5 \mu\text{m}$
hysteresis	$f_u < 3,5 \mu\text{m}$

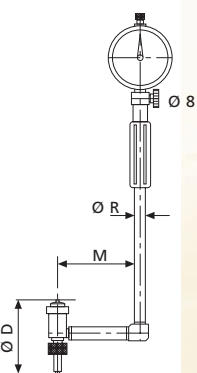
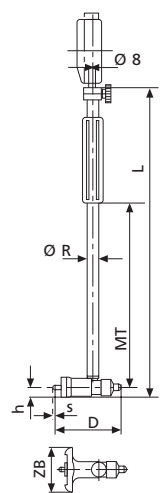
#### SUBITO SVS Vario system

##### Technical data SV/SVS

range of application	6 - 160 mm
repeatability	$f_w < 0,5 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

range of application	160 - 800 mm
repeatability	$f_w < 1,5 \mu\text{m}$
max. deviation	$f_e < 3 \mu\text{m}$
hysteresis	$f_u < 3,5 \mu\text{m}$

SUBITO holder  
 SUBITO SW angled  
 SUBITO SMT special measuring depth  
 SUBITO Vario SV  
 SUBITO Vario system SVS



#### Selection criteria for SUBITO SV/SVS

	SV						SVS			
<b>range of application D</b>										
from	6	10	18	50	160	400	18	50	20	50
to	9,5	18	50	160	430	800	50	160	50	140
<b>travel s</b>	0,5	0,75	1,3	1,4	1,6	2,6	1,3	1,4	1,5	1,5
<b>measuring depth MT</b>	100	102	145	147	180	180	28	30	93	42
<b>angle meas. depth M</b>	26	35	82	84	-	-	82	84	143	94
<b>total length L</b>	165	169	247	252	332	342	130	132	186	138
<b>tube Ø R</b>	5	5	10	10	24	24	10	10	10	10
<b>centring plate width ZB</b>	5,2	8,5	14,8	45	120	300	14,8	45	18	34
<b>front distance h</b>	2,6	4,25	5,35	8,5	11,5	17,5	5,35	8,5	1,5	1,5
<b>no. of measuring pins</b>	8	9	9	11	7	11	9	11	3	3
<b>no. of incr. washers</b>	1	1	2	3	4	4	2	3	-	-
<b>extensions</b>	-	-	(1)/ 16	(1)/ 55	(3)/ 70	(2)/ 100	(1)/ 16	(1)/ 55	-	-

Please note:  
table for SU, SK and SW is on the  
reverse of this brochure

#### A. SUBITO holder

If it is requested to measure only one or a few defined diameters, it is not absolutely necessary to buy a complete measuring instrument with all measuring pins in a wooden box. The most economical solution therefore is a SUBITO holder, that means the upper part of the instrument and the according bottom part, however without the corresponding measuring pins and without wooden box. The necessary measuring pins, also with special length, must be ordered separately.

#### B. SUBITO SW angled

By an angle piece fixed in the tube, it is possible to measure also bores, which are difficult to reach. Inside the angle piece another segment is integrated, so that the transmission of the contact pin travel is effected almost without friction. The angle piece decreases the measuring depth.

#### C. SUBITO SMT special measuring depth

If it is requested to effect continually measuring in deep bores, it is recommendable to use a gauge with a holder length adapted to the measuring depth. The measuring accuracy obtained with the SMT is higher than the values of the plug-in measuring depth extensions MTV (friction loss). Furthermore, the SMT model is more robust than the SUBITO with a MTV plugged-in.

#### D. SUBITO Vario SV

This type is an economical combination of main components of two different gauge sizes for covering an extensive range of application from 6 to 800 mm. This universal useable modular system is very suitable for measuring tasks, which are often changing within a wide measuring range. This can be done by changing the measuring heads and the according measuring pins. A SUBITO Vario gauge consists of the instrument upper part and 1 to 2 measuring heads. All advantages of the SUBITO are analogous for the instruments of the series SV, therefore the high precision and measuring accuracy are kept. In case of spare part order it should be taken into consideration, that the Vario gauge is partly fitted with other components than the standard SUBITO.

#### E. SUBITO Vario system SVS

This is the instrument type which is most universal, useable for diameters from 18 up to 160 mm. For the SVS system everything is valid, which has already been said for the system SV. Two SUBITO blind hole measuring heads are additionally included in the delivery volume of the SVS and are fitted with the corresponding tungsten carbide tipped measuring slides for a range of 20 to 140 mm. These SUBITO SVS measuring heads can also be screwed into the (short) upper part of the gauge. Therefore, a bore measurement starting at 1,5 mm from the bottom of the bore is possible.

**Accessories for SV/SVS:**  
 - plug-in measuring depth extensions MTV to reach higher measuring depths  
 - angle piece for bores difficult to reach

The variants



SUBITO setting device ESU

### F. SUBITO setting device ESU

The ESU in connection with an existing gauge block set offers a reliable, flexible and economical calibration possibility for two-point contact comparator gauges of the series SU, SK and SW as well as for similar products of other manufacturers. The range of application is from 4,5 to 800 mm. For the SUBITO blind hole measuring instruments of the series SS there is an ESU with special setting jaws. The ESU is recommendable if different diameters should often be calibrated. It can be used in horizontal or vertical position, depending on the position in which the measuring instrument shall be used afterwards. The tube of the ESU is out of stainless steel, the measuring anvils are out of tungsten carbide. The remarkable feature of the ESU is its high precision:

- deviation of planeness of the carbide measuring anvils  $\leq 0,6 \mu\text{m}$
- setting uncertainty (gauge block quality is not taken into consideration)  $\leq 2 \mu\text{m}$

For the calibration, the two measuring anvils are pressed against one gauge block or a gauge block combination; afterwards this unit is fixed in the groove of the ESU tube, so that the measuring anvils stay connected tightly with the gauge blocks. Thus the contact force of the gauge to be calibrated is without influence.

### G. SUBITO KT for internal profiles

The SUBITO KT is used for the measurement of internal profiles and internal gear teeth, groove toothings and spline bore hub profiles. The SUBITO segment deviation guarantees high reliability and accu-

racy. By the interchangeable KT measuring inserts, an extensive range of application can be covered. The ball inserts are fitted with tungsten carbide balls and are screwed in the contact pin and the interchangeable measuring pins. The therefore used tungsten carbide balls are already available from a diameter of 0,5 mm; they are graduated by 0,001 mm and have a diameter tolerance of  $< 2 \mu\text{m}$ . If requested, it is possible to make a calibration certificate for the KT ball inserts. During the oscillation process, the instrument is centred automatically, as the balls are guided prismatically in the profile to be measured. Master pieces or master setting rings are serving for the setting of those comparator gauges.

### Accessories

- sets of ball inserts
- measuring depth extensions
- toothed setting master rings

### H. Vario plug gauge SCA

"SCA" "self centring and aligning" means, that the measuring instrument centres and aligns itself automatically inside the bore. Therefore, a special centring plate has been developed. The SCA is a pro-user combination of the world-famous SUBITO with the indicating plug gauge of the series OD (for the measurement of larger series). Its range of application is the measurement of cylindrical bores from  $\varnothing 20 - 170 \text{ mm}$  and their form deviations, for single-series or large-scale series, in the production and the control. The construction principle of the SCA is based on the reliable segment deviation of the SUBITO, so that the resulting advantages are also valid for the SCA. The advantages of the SCA are as follows:

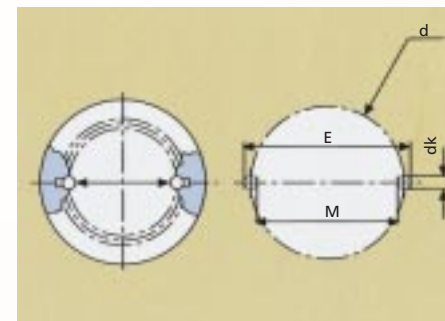
- extensive and flexible range of application, due to the interchangeable measuring pins

- easy handling, therefore fast and reliable measurement without search of reversal point by oscillating
- long service life, because of the standard fitting with tungsten carbide of the contact and measuring pins. Furthermore, all internal wearing parts of the SCA are hardened or fitted with tungsten carbide, the same as for the SUBITO.

- high "Gauge R & R capability", so that the SCA can also be operated by inexperienced users, i. e. the measuring result is nearly independent of the user of the measuring instrument.
- high measuring accuracy (repeatability better than  $1 \mu\text{m}$ )

### Accessories

- setting device ESU with special setting jaws for the SCA
- retraction for centring plate to ease the insertion into the bore



setting dimension for KT



### SUBITO KT

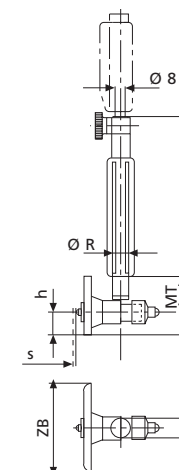
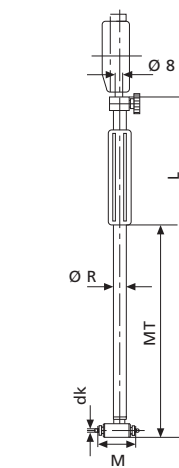
#### technical data KT

range of application	8 - 510 mm
repeatability	$f_w < 0,5 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

### Vario plug gauge SCA

#### technical data SCA

range of application	20 - 170 mm
repeatability	$f_w < 1 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$



### Selection criteria for SUBITO KT

range of application D	mm	mm	mm	mm	mm
from	8	12	22	55	100
to	12	22	55	250	510
travel s	0,6	0,6	1,0	1,5	1,5
measuring depth MT	100	102	110	177	235
total length L	165	168	204	290	363
tube Ø R	5	5	8	12	18
no. of measuring pins	5	11	9	7	5
no. of increment washers	1	1	2	3	4
extension	-	-	(1)/ 16	(3)/ 50	(5)/ 70
thread ball insert	M 1,6	M 1,6	M 2,5	M 4	M 4

### selection criteria for SUBITO SCA

range of application D	mm	mm	mm	mm	mm
from	20	35	50	80	120
to	35	55	80	120	170
travel s	1,3	1,3	1,4	1,4	1,6
measuring depth MT	21	23	24	24	30
total length L	119	129	147	147	167
tube Ø R	8	10	12	12	18
centring plate width ZB	16	28	45	60	85
front distance h	9	10	15	15	18
no. of measuring pins	8	6	7	9	5
no. of increment washers	2	2	3	3	4
extension	-	-	-	(1)/50	-



### SUBITO SS for blind holes

#### technical data SS

range of application	20 - 60 mm
repeatability	$f_w < 1,0 \mu\text{m}$
max. deviation	$f_e < 4,0 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

range of application	50 - 400 mm
repeatability	$f_w < 1,0 \mu\text{m}$
max. deviation	$f_e < 2,5 \mu\text{m}$
hysteresis	$f_u < 3,0 \mu\text{m}$

### I. SUBITO SS for blind holes

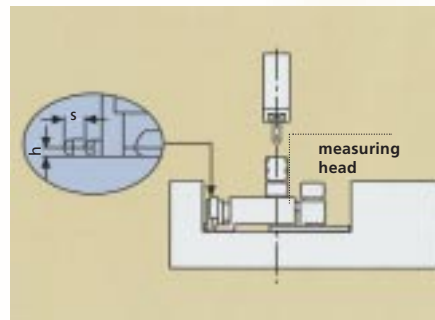
With the SUBITO SS it is possible to measure bores very close to the bottom and short centring shoulders, as well as their deviations in form, e. g. their roundness and cylindricity. The range of application is from 20 up to 400 mm. The minimum distance from the bore bottom is "h" = 1,0 mm. During the measuring process, the device is lying on the bore bottom, so that it is not necessary to search the reversal point by oscillating the gauge. The construction of the SUBITO SS is based on the proven and unsurpassed measuring principle of the standard SUBITO, the adjustable segment deviation. The pre-setting of this comparator gauge is effected by changing or displacing the toothed and scaled measuring slides.

### The SUBITO blind hole vario SSV

This type is an economical combination of main components of two different instrument sizes, so that in total a range of application from 20 to 140 mm is covered. The SSV consists of one upper part and two screw-in blind hole measuring heads as well as the corresponding measuring slides. Here, it is also possible to effect measurements starting at 1,0 mm from the bore bottom.

#### Accessories/options for SS/SSV

- special measuring slides for a fixed dimension
- measuring slides for  $\varnothing$  up to 500 mm
- measuring slides fitted with ruby
- measuring depth extensions
- setting master ESU for SS



measuring head SUBITO SS

### The advantages of the SS/SSV are:

- extensive and flexible range of application by simple interchanging of the measuring slides
- easy handling, as the device is lying on the bore bottom
- high measuring certainty by subdivision into three measuring ranges
- high precision because of the SUBITO deviation principle. The repeatability is max. 1  $\mu\text{m}$ , the deviation is max. 4  $\mu\text{m}$ .
- long service life, as the contact pins and the interchangeable measuring slides are fitted with tungsten carbide at the measuring contacts.
- easy adjustment, the same as for the SUBITO.

The precision setting can be effected with master setting rings, master pieces or the setting device ESU with special setting jaws for the SS.



### SUBITO ST for pillow block bores, grooves and recesses

#### technical data ST

range of application	50 - 220 mm
repeatability	$f_w < 1 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

range of application	180 - 530 mm
repeatability	$f_w < 1,5 \mu\text{m}$
max. deviation	$f_e < 3 \mu\text{m}$
hysteresis	$f_u < 3,5 \mu\text{m}$

### J. SUBITO ST for pillow block bores, grooves and recesses

This measuring instrument has been developed especially for the determination of internal diameters, where a smaller bore lying in front of this diameter, has to be passed. Furthermore it serves for the measurement of grooves and undercuts, also in high measuring depths (up to 2000 mm).

A measuring pin rotatable by 180° makes this possible, which is lying parallel to the centring plate during the passing of the small bore d1 and is rotated around a connection link for the measurement of the larger diameter d2. The ST instrument is distinguished by a considerable retraction travel of up to 40 % of the diameter d2. The range of application of the ST instrument is from 30 up to 530 mm for the diameter d2. Because of the subdivision of the range of application into seven instrument sizes,

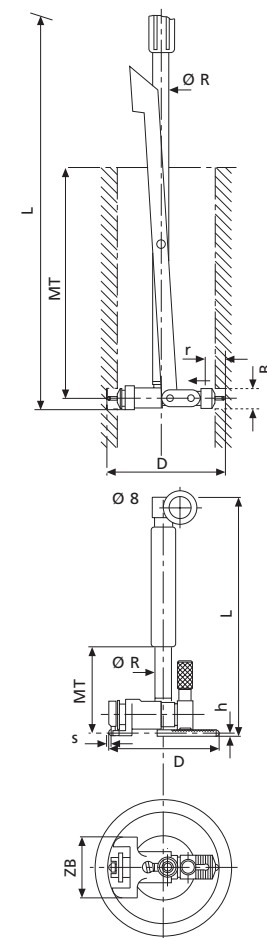
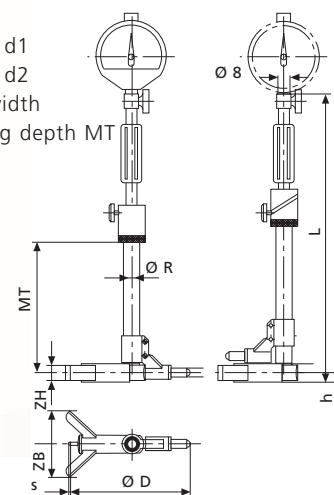
a good centring in the bore to be measured and therefore a high measuring certainty is guaranteed. The exact bore diameter is determined by oscillating the measuring instrument. The measuring principle of the ST instrument is based on the SUBITO deviation, which guarantees a high precision. The calibration of the instrument is effected with the fixed measuring pin swung out, by means of a master setting ring or the setting device ESU with special setting jaws for the ST series.

### K. SUBITO SN for grooves and recesses

The measuring instruments of the series SN serve also for the measurement of grooves and recesses. The retraction of the fixed measuring pin is here smaller than it could be achieved with the series ST, however it is possible to determine also small groove diameters. The basis

of this instrument is also the SUBITO. The range of application goes from 58,5 up to 300 mm. In contrast to the ST, a special measuring depth is not possible with the SN. The calibration of the instrument is effected with a master setting ring. If it is requested to measure a groove only with an accuracy of 1/100, the economical SCHWENK alternative for this is the series ON/ONM (s. product range 09/1996, page 13f). To decide which measuring instrument is suitable for each situation, the following information is needed:

- diameter d1
- diameter d2
- groove width
- measuring depth MT
- accuracy



### SUBITO for recesses and grooves SN

#### technical data SN

range of application	58,5 - 300 mm
repeatability	$f_w < 1 \mu\text{m}$
max. deviation	$f_e < 2 \mu\text{m}$
hysteresis	$f_u < 2,5 \mu\text{m}$

#### selection criteria for SUBITO SN

	mm	mm	mm
range of application D			
from	58,5	120	180
up to	120	180	300
travel s	1,4	1,6	1,6
measuring depth MT	180	230	230
total length L	295	365	365
retraction travel r	8,5	23	30
tube Ø R	12	18	18
centring plate width ZB	45	75	120
front distance h	8	10	13
width of groove B	≥ 3	≥ 4	≥ 4
no. of measuring pins	13	13	8
no. of increment washers	6	6	4
extension	1(16)	1(16)	1(20) 1(70)

#### selection criteria for SUBITO SS

	mm	mm	mm
range of application D			
from	20	50	110
up to	50(60)	110(140)	300(400)
travel s	1,5	1,5	1,6
measuring depth MT	77	60	90
total length L	163	144	163
tube Ø R	10	12	18
front distance h	1,5/1,0	1,5/1,0	2,0/1,0
centring plate width ZB	18	34	81
no. of measuring slides	3(4)	2(3)	4(6)

#### selection criteria for SUBITO ST

	mm	mm	mm	mm	mm	mm	mm
range of application D							
from	30	50	60	80	120	180	290
up to	52	70	100	150	220	360	530
travel s	1,3	1,3	1,4	1,4	1,4	1,6	1,6
measuring depth MT	60	60	60	95	107	148	170
total length L	194	208	209	243	270	343	409
tube Ø R	12	12	14	14	15,3	22	28
centring plate width ZB	-	19,5	29,5	39	63	98	155
front distance h	4,25	5,25	7	7	8	12	15
centring plate height ZH	-	6	8	8	10	12	18
no. of measuring pins	6	5	8	7	7	6	6 12
no. of increment washers	2	3	3	3	3	4	4
extension	12	-	-	(1)35	(2)35	(2)60	(3)60



SUBITO SL

**L. SUBITO SL for the measurement of bores with boring bar left in the workpiece**

If there is an obstruction in the centre of the bore to be measured, a standard measuring instrument cannot be used. This can occur for example if a workpiece is still clamped in the turning machine and the boring bar cannot be moved away for measuring. The range of application of the 4 SL-instrument size goes from 25 to 280 mm. Inside the range of application of the instrument, the SL gauge can be adjusted freely by a column for the pre-adjustment of the instrument. The measuring depth extends from 12 mm for the smallest gauge to 30 mm for the biggest gauge, i.e. it is relatively small. However, in many application cases this is completely sufficient. The calibration of the instrument is effected with a master setting ring or a workpiece.

**M. SUBITO SBO/SBU with ring bow**

The internal measuring instrument SBO suits the same applications as the series SL, when it is not possible to measure a bore directly because of a hub or a boring bar. As for the plug gauges OD, the measuring instrument is constructed individually in relation with the diameter to be measured and with the corresponding tolerance.

- Case 1: measuring of a bore around a hub or a journal with the SUBITO SBO
- Case 2: measuring of a bore with boring bar left in the workpiece with the SUBITO SBU

In comparison with the series SL, it is possible to reach larger measuring depths with the series SBO/SBU.

In order to decide which measuring instrument is suitable for each individual case, the following information is needed:

- diameter of the bore with tolerance
- diameter of the hub/journal/boring bar
- measuring depth MT
- distance "h" of the measuring axis from the bore bottom



SUBITO SBO/ SBU



SUBITO SL for the measurement of bores with boring bar left in the workpiece  
SUBITO SBO/SBU with ring bow

The variants

**Selection criteria for SUBITO SL**

range of application D	mm	mm	mm	mm
from	25	35	100	100
up to	70	105	210	280
travel s	2,0	3,0	3,5	3,5
measuring depth MT	12	17,5	30	30
front distance	1,8	3,0	4,5	4,5
total length L min./max.	190/235	212/285	293/403	293/473
max. boring bar Ø B	45	70	130	130
dimension c	17	23	37	37
dimension G	160	177	190	190
dimension H	7,7	6	10	10
min. difference	6	12	18	18
Ø D - Ø B				

