



M&H IRP40.02

INFRARED TOUCH PROBE

OPERATING INSTRUCTIONS

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1 DESCRIPTION

1.1 General

1.1.1 Preface

It is imperative that the safety information contained in these operating instructions is strictly observed to guarantee the safe and reliable operation of the touch probe and avoid personal injury and damage to property. The meaning of the symbols related to the safety instructions is described in the table below

NOTICE	NOTICE indicates important information that, if not observed, could lead to property damage / malfunctions.
INFORMATION	INFORMATION indicates important information or helpful advice for working with the described device.

1.1.2 Safety Instructions

NOTICE
<p>Risk of material damage!</p> <ul style="list-style-type: none"> ▪ Manual or automatic positioning of the probe must be protected, in a way that the machine axis stops feeding if the probe is triggered during its move to the position where actual measuring should begin!

NOTICE
<p>Risk of material damage!</p> <ul style="list-style-type: none"> ▪ Feedhold or spindle-stop resulting from a trigger or ready signal from a touch probe should only happen if the probe is actually in the spindle. This security logic will protect the machine against a possible spindle or feeding stop under normal milling operation if a signal from a probe reaches the control under one of the conditions outlined below: <ul style="list-style-type: none"> ☞ Battery replacement and subsequent functional check of the touch probe by manually switching it on.

NOTICE
<p>Risk of property damage!</p> <ul style="list-style-type: none"> ▪ Only the original spare parts listed in these operating instructions are permitted for preventive and correctional maintenance.
INFORMATION
<p>The information given in this manual can be changed by the manufacturer at any time. The user is therefore responsible for regularly enquiring about updated information.</p>

1.1.3 Declaration of Conformity

The EC Declaration of Conformity can be found at the end of these operating instructions. If required, a copy of the signed original declaration of conformity may be requested from the address given on the back cover.

1.1.4 Validity

These operating instructions are valid for the hardware available at the creation date of these operating instructions. Technical changes by the manufacturer are reserved. The latest version of these operating instructions can be downloaded at www.mh-inprocess.com under Downloads.

1.2 Purpose

The infrared touch probe IRP40.02 is used for workpiece measurement, and automatic determination and compensation of deviating angular positions of workpieces. Moreover, it is used for setting zero points inside the machine tool.

The infrared touch probe IRP40.02 is capable of measuring workpiece geometries like edges, bores, bosses, slots, webs, angles, corners and circular arches. Furthermore, it allows measuring of complex geometries like 3-dimensional surfaces and measuring with swivelled 4th and 5th axis.

The measurement signals from the touch probe are transmitted to the receiver via infrared transmission.

1.3 System Components

The components of the system are illustrated in figure below.

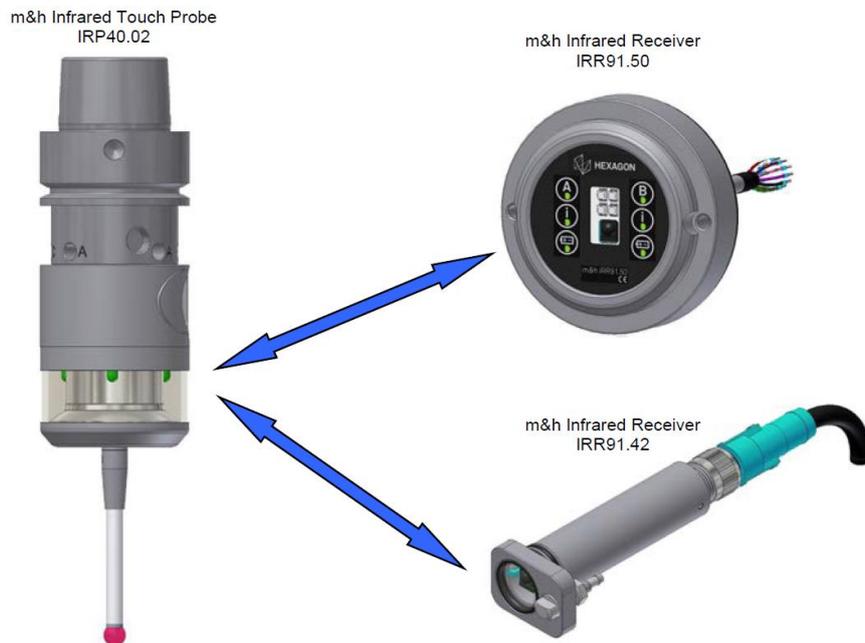


Figure 1 System components

1.4 Technical Data

Technical Data 40.02-IRP – Standard Version	
Sensing Directions	$\pm X; \pm Y; \pm Z$
Maximum Stylus Overtravel	$XY = \pm 12,5^\circ; Z = -5 \text{ mm}$
Trigger Force with 50 mm Stylus	$XY = 0,8 \text{ N}; Z = 5,7 \text{ N}$
Recommended Probing Feedrate	Max. $2000 \text{ mm} \cdot \text{min}^{-1}$
Power Supply	2x Battery (3,6 V / $\frac{1}{2}$ AA), Standby 12 months
Maximum Battery lifetime	approx. 800 hrs
Material	Stainless steel
Weight without Shank	kb. 235 g
Operation Temperature Range	$5^\circ\text{C} \sim 55^\circ\text{C}$
Storage Temperature Range	$5^\circ\text{C} \sim 70^\circ\text{C}$
Unidirectional Repeatability	Max. $0,5 \mu\text{m}$ (2 Sigma) with 50 mm stylus and $254 \text{ mm} \cdot \text{min}^{-1}$ probing feedrate
Sealing	IP68: EN60529 (15 m) tested
Maximum Probing Frequency	$50 \text{ Hz} = 50 \text{ pont/s}$
Shock tested	in $\pm X; \pm Y; -Z$, 50G for 7ms (5000 times)
Resonant Frequency Test	Passed
Deviating Technical Data 40.02-IRP-8N (Version: High Force)	
Trigger Force with 50 mm Stylus	$XY = 1 \text{ N}; Z = 8 \text{ N}$
Unidirectional Repeatability	Max. $1 \mu\text{m}$ (2 Sigma) with 50 mm stylus and $254 \text{ mm} \cdot \text{min}^{-1}$ probing feedrate

1.5 Dimensions

Dimensions of the probe are shown in Figure 2.

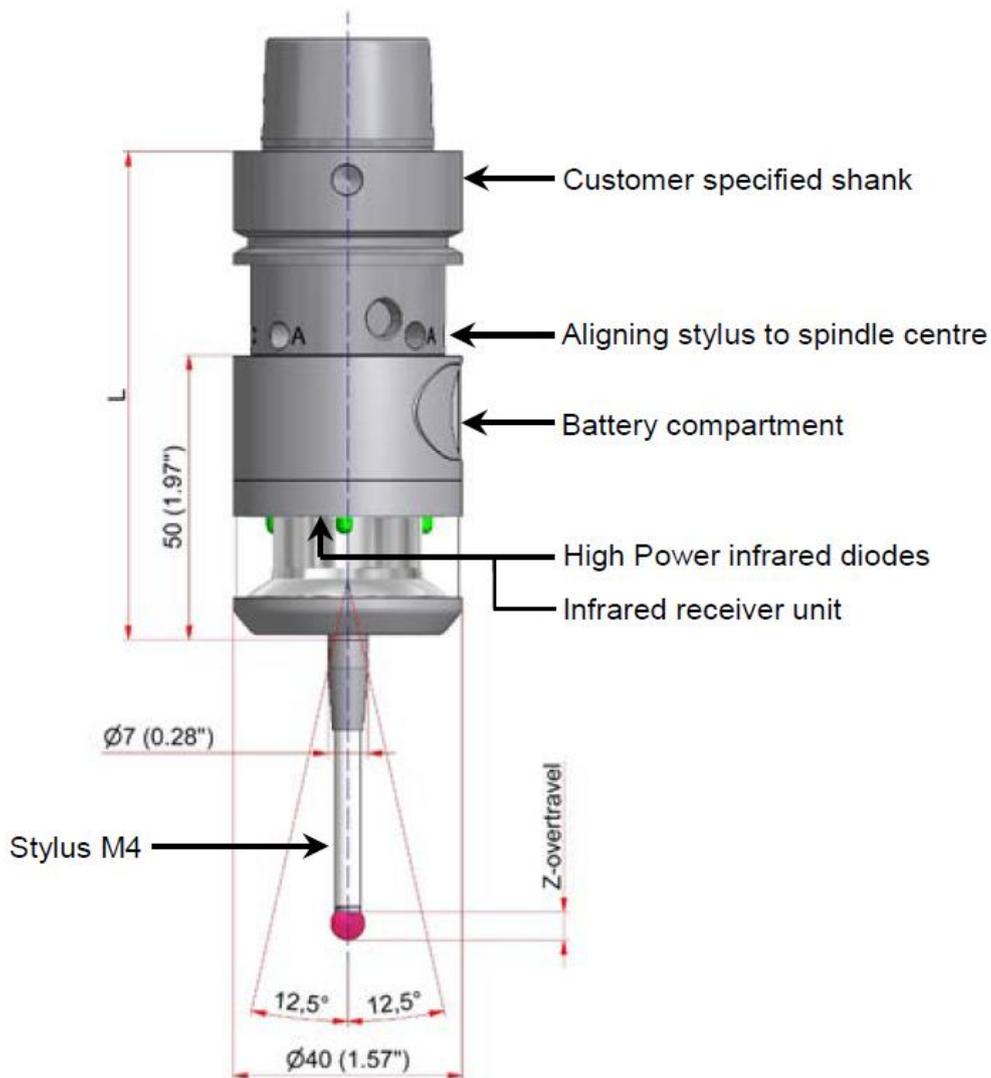


Figure 2 Dimensions

1.6 Transmission-/Reception Angles

1.6.1 Transmission Angles

INFORMATION

The transmission/reception ranges shown below can be reduced by infrared components of the ambient light.

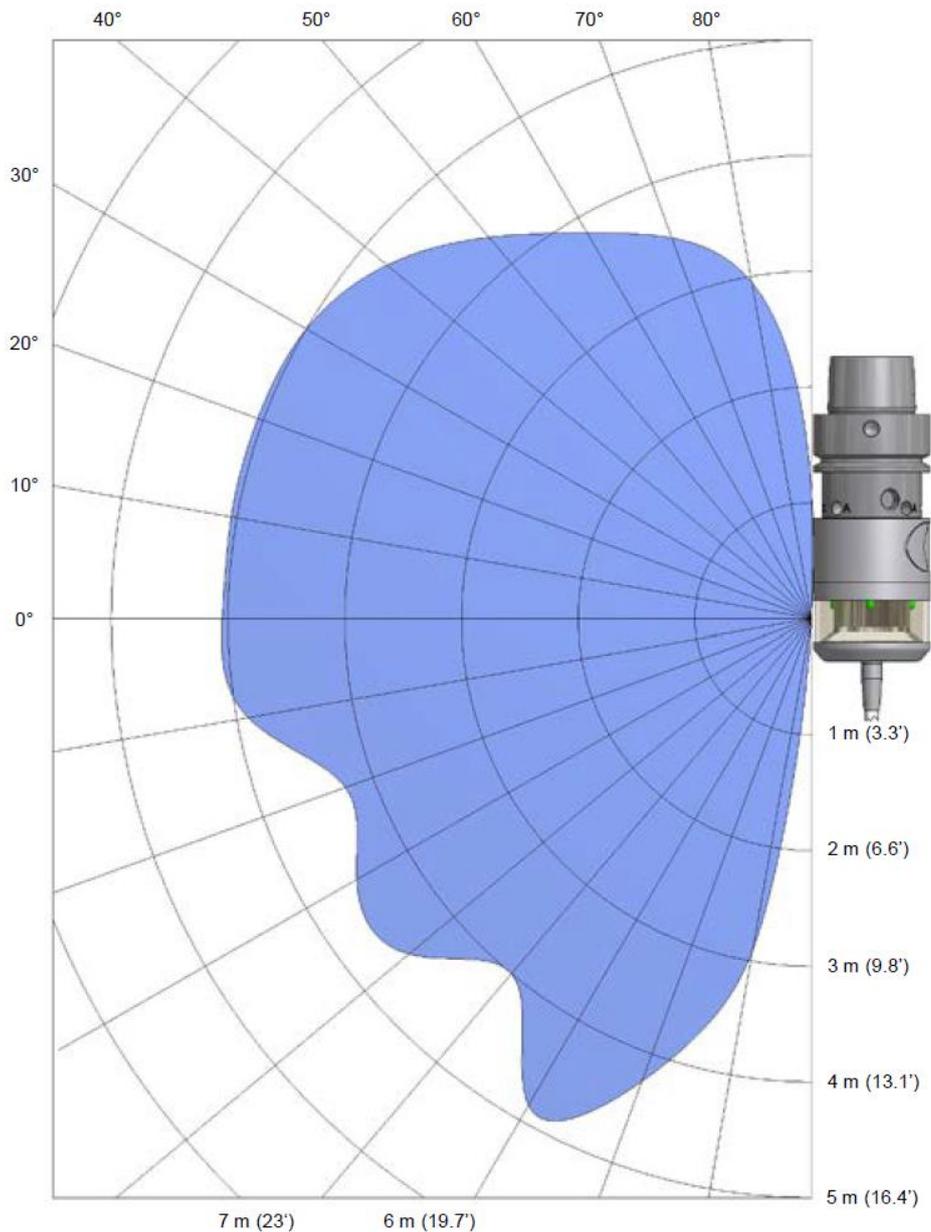


Figure 3 Transmission angles of IRP40.02

1.6.2 Reception Angles

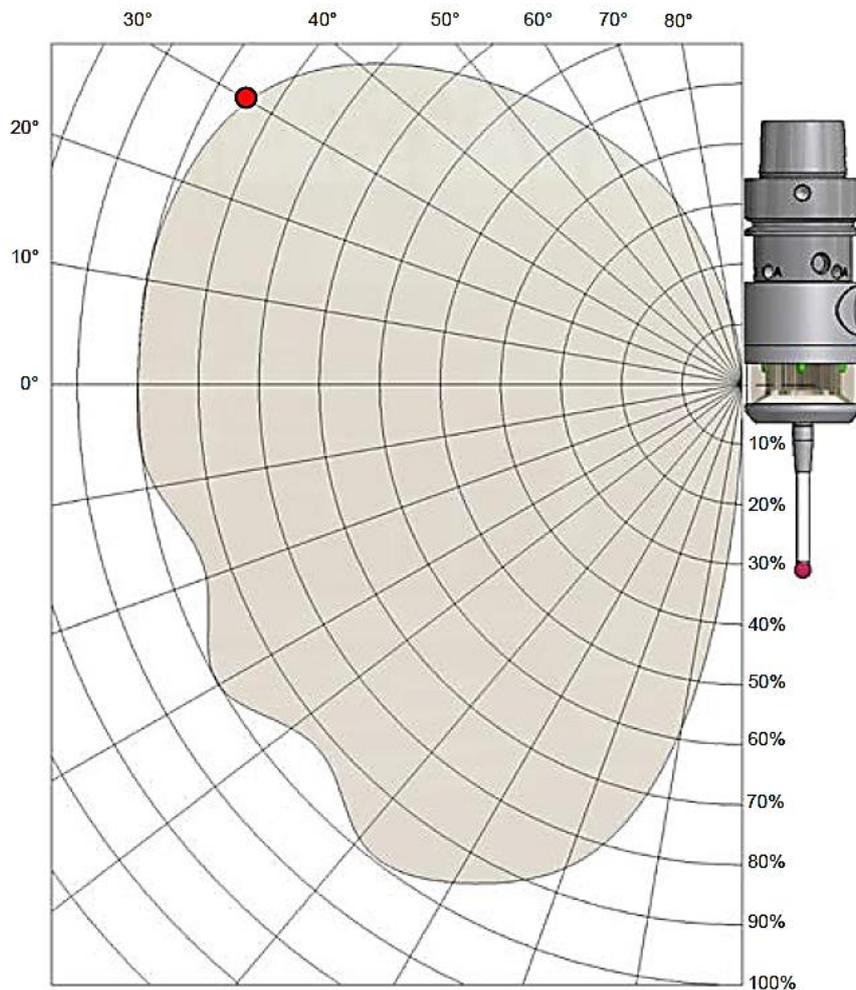


Figure 4 Reception angles of IRP40.02

Example (see red mark):

Transmission range of receiver = 5 m, angle to receiver = 30°; reception power of probe at 30° = approx. 95% → reception range of probe = approx. 4,75 m.

1.7 Delivery Contents, Accessories and Spares

1.7.1 Delivery Contents

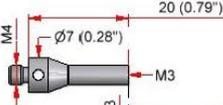
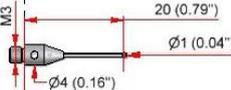
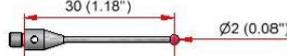
Order No.	Description
40.02-IRP (*40.02-IRP-8N)	m&h Infrared Touch Probe IRP40.02 (*High Force version)
	4x Battery (3,6 V / ½AA) (4316)
	Tool box (40.02-TB)

1.7.2 Styli

M2 styli with shaft Ø3, tungsten carbide

Order No.	Illustration
91.00-TA-M4/M2 (stylus adapter)	
91.00-T10/0,2-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T10/0,3-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T10/0,5-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T10/0,7-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T15,5/1-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T16/2-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T11,5/3-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T21,5/3-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T31,5/3-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T41,5/3-HM-M2 (tungsten carb. shaft, ruby ball)	
91.00-T51,5/3-HM-M2 (tungsten carb. shaft, ruby ball)	

M3 styli with shaft Ø4, tungsten carbide

Order No.	Illustration
91.00-TA-M4/M3 (stylus adapter)	
21.00-T20/1-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T20/2-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T20/3-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T20/4-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T20/5-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T20/6-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T30/2-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T30/3-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T30/4-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T30/5-HM-M3 (tungsten carbide shaft, ruby ball)	
21.00-T30/6-HM-M3 (tungsten carbide shaft, ruby ball)	

M4 styli with shaft Ø7, ceramic

Order No.	Illustration
91.00-TV30-KE-M4 (stylus extension)	
91.00-T53/6-KE-M4 (ceramic shaft, ruby ball)	
91.00-T83/6-KE-M4 (ceramic shaft, ruby ball)	
91.00-T103/6-KE-M4 (ceramic shaft, ruby ball)	
91.00-T32/4-KE-M4 (ceramic shaft, ruby ball)	
91.00-T42/4-KE-M4 (ceramic shaft, ruby ball)	
91.00-T42,5/5-KE-M4 (ceramic shaft, ruby ball)	
91.00-T52,5/5-KE-M4 (ceramic shaft, ruby ball)	
91.00-T62,5/5-KE-M4 (ceramic shaft, ruby ball)	

M4-Styli with shaft Ø7, stainless steel

Order No.	Illustration
91.00-TK-ST-M4 (5-way stylus centre)	
91.00-T20/2-ST-M4-D7 (stainless steel shaft, ruby ball)	
91.00-T20/3-ST-M4-D7 (stainless steel shaft, ruby ball)	
91.00-T20/4-ST-M4-D7 (stainless steel shaft, ruby ball)	
91.00-T20/5-ST-M4-D7 (stainless steel shaft, ruby ball)	
91.00-T20/6-ST-M4-D7 (stainless steel shaft, ruby ball)	
91.00-T20/8-ST-M4-D7 (stainless steel shaft, ruby ball)	

1.7.3 Shanks

Figure 5 shows the shanks to be used with infrared probe IRP40.02:

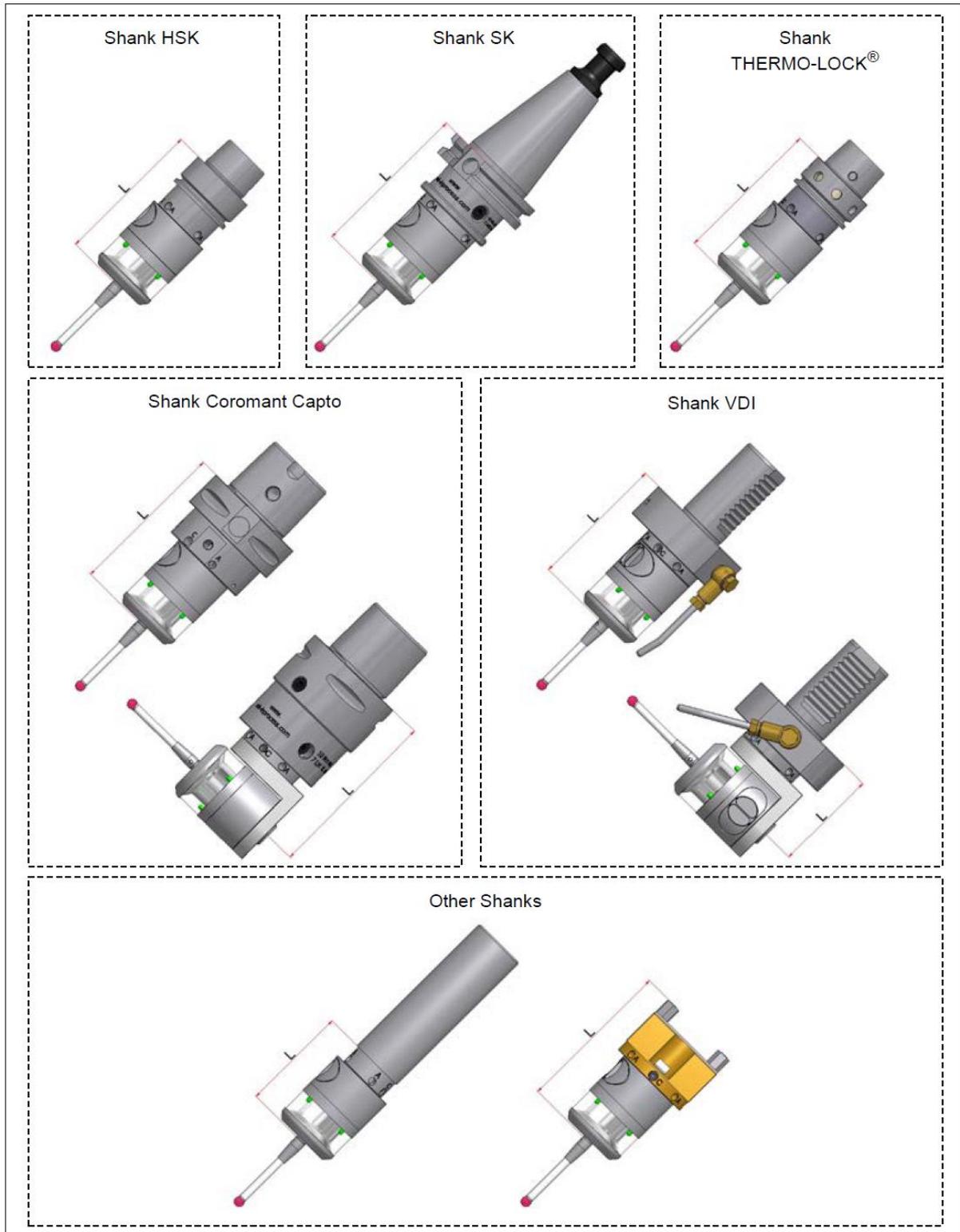


Figure 5 Overview of the shanks (stylus not in the delivery contents)

Shanks for HSK

Available shanks	Length "L" (refer to Fig. 5)	Order Number
DIN69893-HSK-E25	69 mm	40.02-HSK25E
DIN69893-HSK-32	86 mm	40.02-HSK32
DIN69893-HSK-A32	86 mm	40.02-HSK32A
DIN69893-HSK-E32	86 mm	40.02-HSK32E
DIN69893-HSK-40	86 mm	40.02-HSK40
DIN69893-HSK-A40	86 mm	40.02-HSK40A
DIN69893-HSK-E40	86 mm	40.02-HSK40E
DIN69893-HSK-F40	86 mm	40.02-HSK40F
DIN69893-HSK-A50	86 mm	40.02-HSK50A
DIN69893-HSK-A50	116.5 mm	40.02-HSK50A-116,5
DIN69893-HSK-E50	92 mm	40.02-HSK50E
DIN69893-HSK-E50	116.5 mm	40.02-HSK50E-116,5
DIN69893-HSK-F50	92 mm	40.02-HSK50F
DIN69893-HSK-A63	86 mm	40.02-HSK63A
DIN69893-HSK-A63	116.5 mm	40.02-HSK63A-116,5
DIN69893-HSK-A63-70	120 mm	40.02-HSK63A-120
DIN69893-HSK-E63	116.5 mm	40.02-HSK63E
DIN69893-HSK-F63	121.5 mm	40.02-HSK63F
DIN69893-HSK-A80	121.5 mm	40.02-HSK80A
DIN69893-HSK-A100	92 mm	40.02-HSK100A
DIN69893-HSK-A100	121.5 mm	40.02-HSK100A-121,5
Kennametal KM63	121.5 mm	40.02-KM63
Kennametal KM80	121.5 mm	40.02-KM80
Other Shanks		Upon request

Shanks SK

Available shanks	Length "L" (refer to Fig. 5)	Order Number
DIN69871-SK30	94.5 mm	40.02-SK30
DIN69871-SK30-Mubea	94.5 mm	40.02-SK30-MUBEA
DIN69871-SK40	96.5 mm	40.02-SK40
DIN69871-SK40-70	120 mm	40.02-SK40-120
DIN69871-SK50	96.5 mm	40.02-SK50
DIN69871-SK50-76-B	126 mm	40.02-SK50-126
DIN69871-SK60	116.5 mm	40.02-SK60
BT30	77 mm	40.02-BT30
BT30	94.5 mm	40.02-BT30-94,5
BT30	127 mm	40.02-BT30-127
BT30	152 mm	40.02-BT30-152
BT30	177 mm	40.02-BT30-177
BT40	96.5 mm	40.02-BT40
BT40-70	120 mm	40.02-BT40-120
BT50	111.5 mm	40.02-BT50
CAT40	96.5 mm	40.02-AN40
CAT40-70	120 mm	40.02-AN40-120
CAT50	96.5 mm	40.02-AN50
Other Shanks		Upon request

Shanks THERMO-LOCK® (patented)

INFORMATION
Patented THERMO-LOCK® Technology prevents thermal expansion of the HSK and heat transfer from the spindle to the probe. This ensures that the probe delivers stable, precise results even for large temperature differences between the spindle and the HSK.

Available shanks	Length "L" (refer to Fig. 5)	Order Number
DIN69893 HSK-E32	86 mm	40.02-HSK32E-TI
DIN69893 HSK-40	86 mm	40.02-HSK40-TI
DIN69893 HSK-E40	86 mm	40.02-HSK40E-TI
DIN69893-HSK-A50	92 mm	40.02-HSK50A-TI
DIN69893 HSK-E50	92 mm	40.02-HSK50E-TI
DIN69893 HSK-A63	92 mm	40.02-HSK63A-TI
Other Shanks		Upon request

Coromant Capto befogók

Available shanks	Length "L" (refer to Fig. 5)	Order Number
Coromant Capto C4	86 mm	40.02-C4
Coromant Capto C5	86 mm	40.02-C5
Coromant Capto C5	121.5 mm	40.02-C5-121,5
Coromant Capto C5-90°	102.5 mm	40.02-C5-90
Coromant Capto C6	92 mm	40.02-C6
Coromant Capto C6	121.5 mm	40.02-C6-121,5
Coromant Capto C6-90°	102.5 mm	40.02-C6-90
Coromant Capto C8	92 mm	40.02-C8
Coromant Capto C8	121.5 mm	40.02-C8-121,5
Coromant Capto C8-90°	102.5 mm	40.02-C8-90
Other Shanks		Upon request

Shanks VDI

Available shanks	Length "L" (refer to Fig. 5)	Order Number
VDI 16	75 mm	40.02-VDI16
VDI 16-90°	56 mm	40.02-VDI16-90
VDI 20	75 mm	40.02-VDI20
VDI 20-90°	56 mm	40.02-VDI20-90
VDI 25	75 mm	40.02-VDI25
VDI 25-90°	56 mm	40.02-VDI25-90
VDI 30	79 mm	40.02-VDI30
VDI 30-90°	60 mm	40.02-VDI30-90
VDI 40	98.5 mm	40.02-VDI40
VDI 40-90°	79.5 mm	40.02-VDI40-90
VDI 50	98.5 mm	40.02-VDI50
VDI 50-90°	79.5 mm	40.02-VDI50-90
VDI 60	98.5 mm	40.02-VDI60
VDI 60-90°	79.5 mm	40.02-VDI60-90
VDI 80	98.5 mm	40.02-VDI80
VDI 80-90°	79.5 mm	40.02-VDI80-90
Other Shanks		Upon request

Other Shanks

Available shanks	Length "L" (refer to Fig. 5)	Order Number
D20-D8-L25-B	65 mm	40.02-D8-L25
D20-D32-L100-B	62 mm	40.02-D32-L100
NIKKEN-NC5-46	115.5 mm	40.02-NC5-46
NIKKEN-NC5-63	115.5 mm	40.02-NC5-63
D20-Erowa-ITS	91 mm	40.02-ITS

1.7.4 Accessories, general

Order No	Description	Illustration
91.00-SWV-XX (upon request)	Air jet with rotary joint for VDI shanks	
D20-VDI-90	90° Adapter for shank VDI	
D20-MO-B	Modular adapter D20/D28 (Ø20/Ø28)	

1.7.5 Spare Parts

Order No	Description	Illustration
4316	Battery (3,6 V / ½ AA)	
40.02-BATTERIE-DECKEL	Battery cover	
5764	Battery cover lock	
5186	O-Ring 20x1 Viton for battery cover	
1351	Clamping screw AF2,5 mm	
1352	Adjustment screw DIN913 M4x8 (AF2 mm)	
5773	Service cover	
6161	O-Ring 23x1 Viton for service cover	

2 OPERATION

2.1 Tools, Measurement- and Test-Equipment

Order No	Description	Illustration
0885	Mounting pin	
1097	Hexagon key AF2 mm	
1346	Hexagon key AF2.5 mm	
3489	Hexagon key AF4 mm	
5840	Mounting tool for service cover and battery cover	
3079	Dial gauge	
40.02-TB	Tool Box 1x Mounting pin (0885) 2x Hexagon key AF2 mm (1097) 1x Hexagon key AF2.5 mm (1346) 1x Mounting tool for service cover and battery cover (5840)	Not illustrated

2.2 Changing Stylus

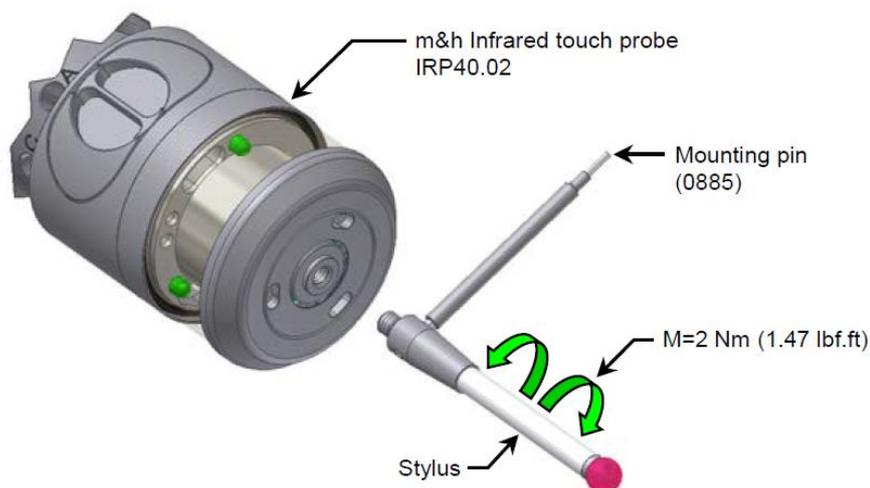


Figure 6 Stylus change

1. Unscrew the stylus from the touch probe using the mounting pin.
2. Carefully screw the new stylus into the touch probe (Figure 6).
3. Align the stylus to spindle centre (refer to chapter 2.5).
4. Calibrate the probe.

2.3 Mounting/Dismounting the Shank

2.3.1 Mounting shanks Ø20

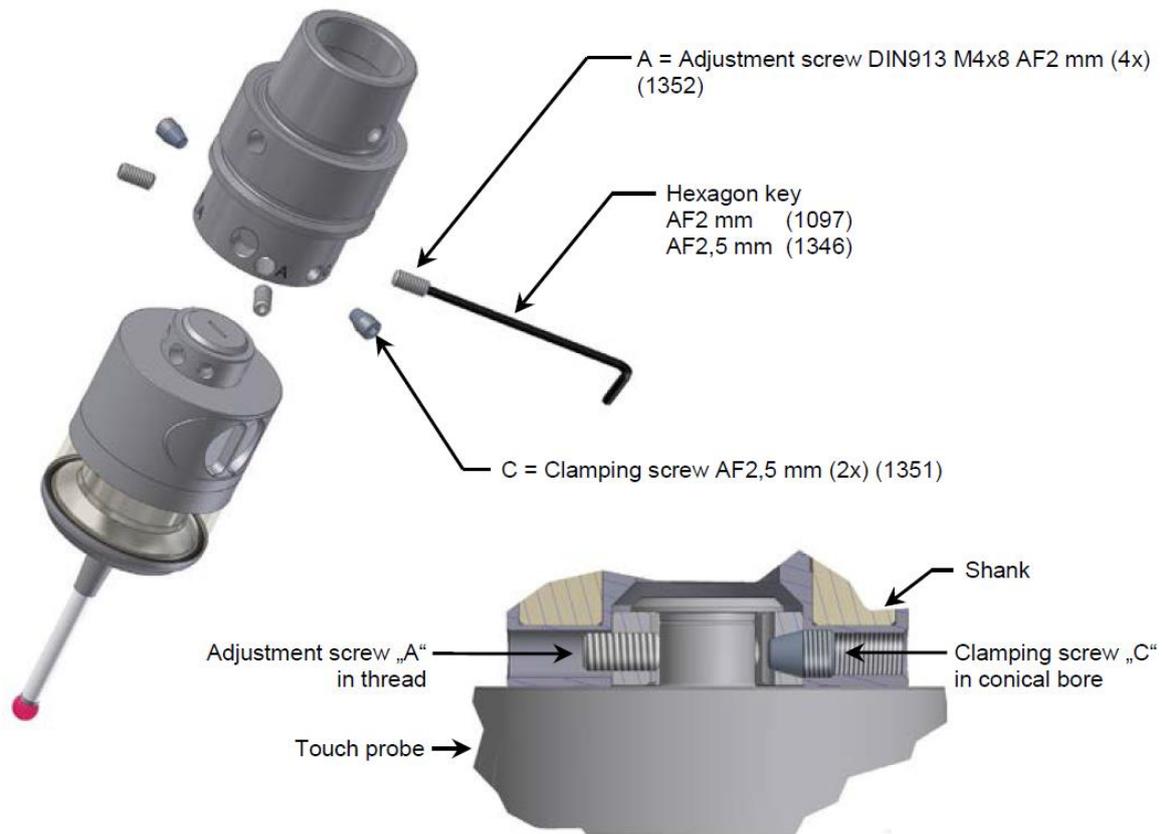


Figure 7 Mounting/dismounting the shank

1. Dismounting the shank:

- ☞ Remove all **A** and **C** screws (refer to Figure 7).
- ☞ Remove shank.

2. Mounting the shank:

- ☞ Carefully slide the shank onto the probe body. Align the **C** threads with the conical bores.
- ☞ Insert both clamping screws **C** and tighten lightly.
- ☞ Insert adjustment screws **A** and tighten lightly.

3. Align the stylus to spindle centre (refer to chapter 2.5).

4. Calibrate the probe.

2.3.2 Mounting shanks Ø28

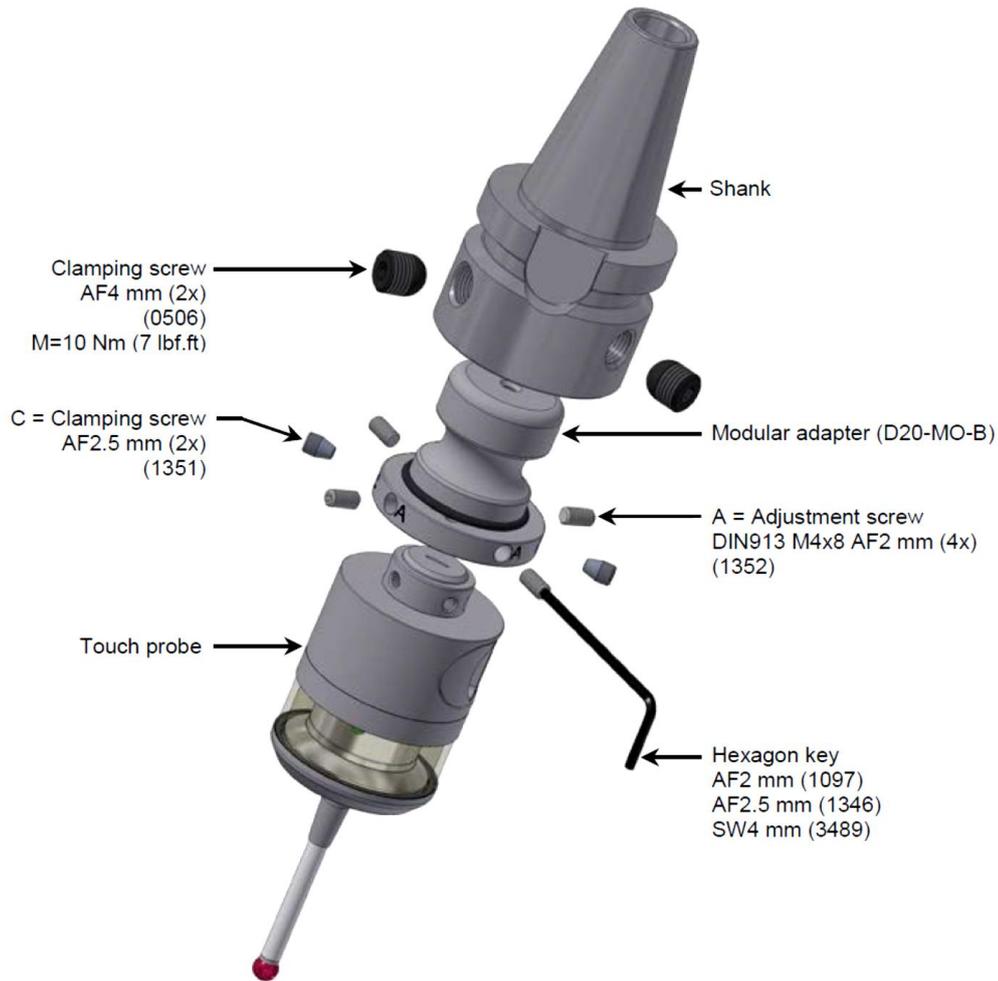


Figure 8 Mounting/dismounting the shank

1. Dismounting the shank:

- ☞ Remove clamping screws from the shank.
- ☞ Remove shank.
- ☞ Remove all **A** and **C** screws from the modular adapter (refer to Figure 8).
- ☞ Remove modular adapter from touch probe.

2. Mounting the shank:

- ☞ Carefully slide the modular adapter onto the probe body. Align the **C** threads with the conical bores.
- ☞ Insert both clamping screws **C** and tighten lightly.
- ☞ Insert adjustment screws **A** and tighten lightly.
- ☞ Slide the shank onto the modular adapter.
- ☞ Insert the clamping screws and tighten to the torque specified in Figure 8.

3. Align the stylus to spindle center (refer to chapter 2.5).

4. Calibrate the probe.

2.4 Replacing Battery

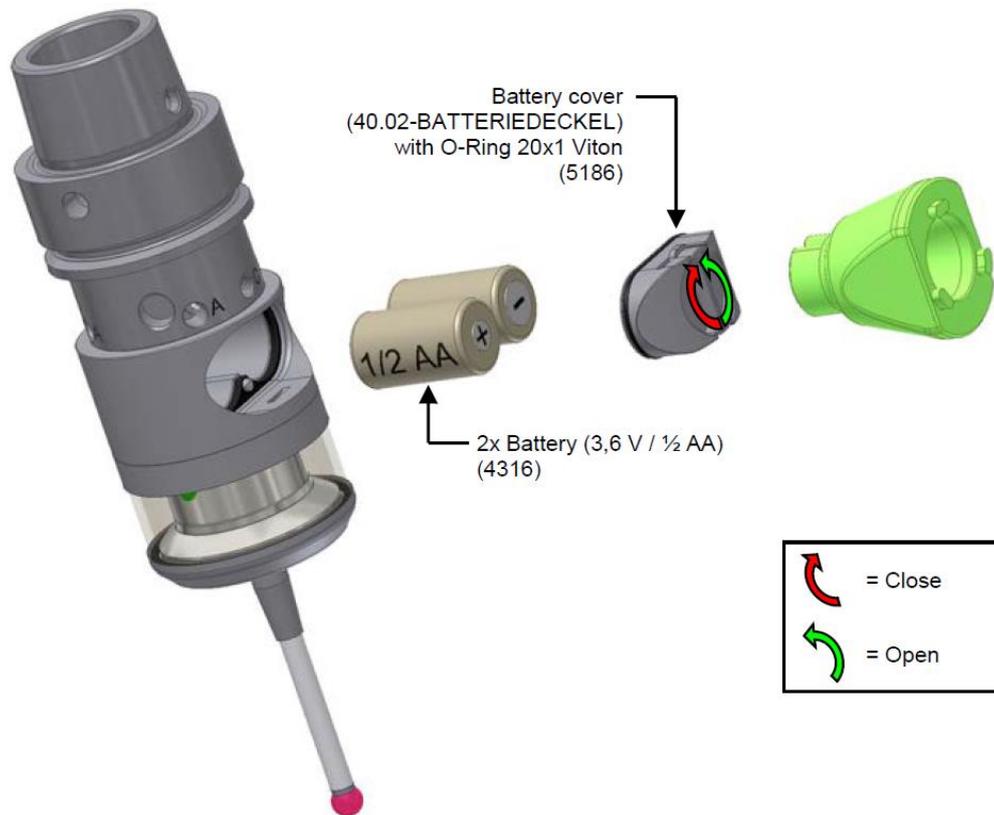


Figure 9 Replacing battery

NOTICE

Risk of damage to the equipment!

- Clean and dry the probe well before opening!
- Do NOT blow off with compressed air!
- Replace empty battery immediately!

1. Turn the battery cover lock counter clockwise and remove the battery cover from the housing of the touch probe to the outside.
2. Remove used battery.

NOTICE

Risk of damage to the equipment!

- When closing the battery compartment, ensure the O-Ring is properly seated and in a faultless condition!!

3. Insert the new batteries into the battery compartment alternately and place the cover in the housing again.
4. Turn the battery cover lock clockwise to lock the battery compartment.

☞ After inserting or replacing the batteries, the touch probe performs an initialization for about 5 s. During this time the LEDs light up blue.

2.5 Aligning Stylus to Spindle Centre

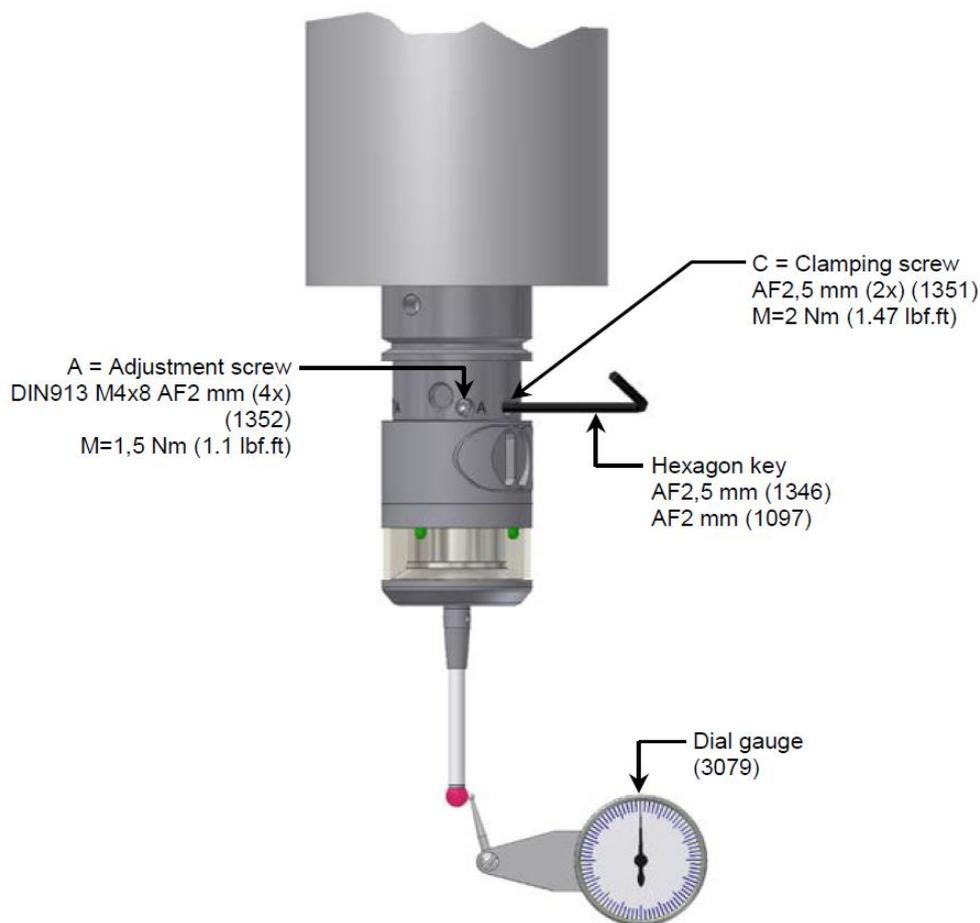


Figure 10 Aligning stylus to spindle centre

1. Loosen clamping screws **C** (Figure 10) (2x) then slightly retighten.
2. Adjust the probe with the adjustment screws **A** (Figure 10) (4x) to within less than 20 μm .
3. Tighten the clamping screws **C** (2x) a little more.
4. Adjust the probe with the adjustment screws **A** (4x) to within less than 5 μm .
5. Tighten the clamping screws **C** (2x) to the torque specified in Figure 10..
6. Tighten the adjustment screws **A** (4x) to the torque specified in Figure 10 against each other.
7. Check the alignment.
8. Calibrate the probe.

2.6 Aligning Probe in Shank with 90° Adapter

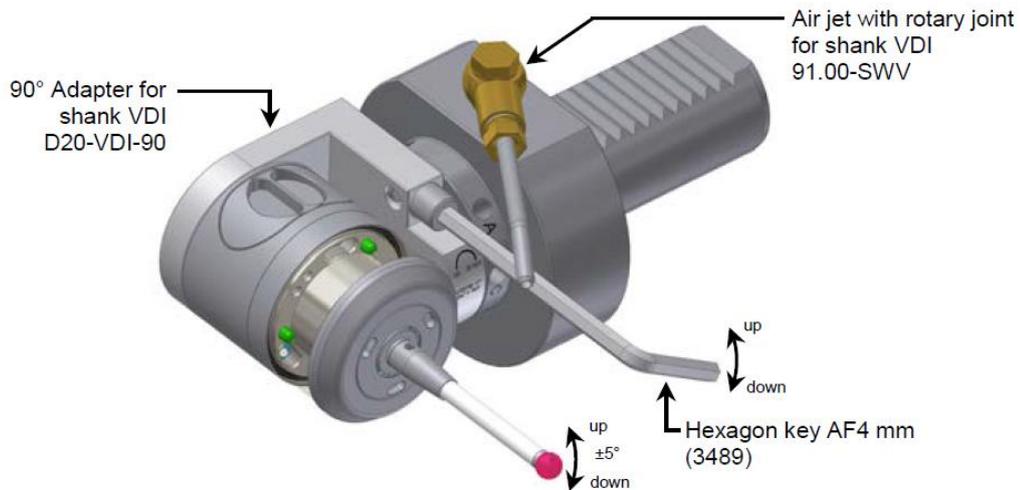


Figure 11 Aligning probe in shank with 90° adapter

1. Loosen adjustment screws **A** (4x) then tighten lightly.
2. Loosen clamping screws **C** (2x) then tighten lightly..
3. Adjust the angular position of the probe using cylinder screw AF4 mm to ($\pm 5^\circ$).
4. Tighten the clamping screws **C** (2x)..
5. Alternately tighten the adjustment screws **A** (4x).
6. Calibrate the probe.

2.7 Optical Status Display

Subsequent table gives an overview of the blinking patterns of the LEDs (Figure 12) and their meaning.

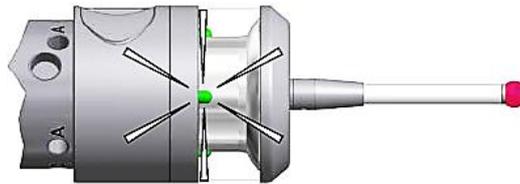


Figure 12 Optical status display

Blinking patterns of the LEDs	Interpretation
LED permanently blue (approx. 5s)	Touch probe initializes after inserting batteries.
LED blinking green	Touch probe is transmitting signals.
LED blinking green/red	Low batterie warning
LED blinking orange	Stylus deflected.
LED permanently red	Wrong type of battery.
LED blinking blue*	Collision of the touch probe in Z probing direction (Z-Crash)

FIGYELMEZTETÉS

Risk of measuring inaccuracies!

After collision of the touch probe in Z probing direction, the basic measuring functions are still working. Nevertheless, the initial accuracy cannot be guaranteed in such a case. After a Z-collision It is recommended to send the probe to the manufacturer for inspection/repair!

2.8 Maintenance and Cleaning of Infrared Touch Probe IRP40.02



Figure 13 Maintenance and cleaning of infrared touch probe IRP40.02

FIGYELMEZTETÉS

Risk of damage to the equipment!

- Clean and dry the probe well before opening!
- Do NOT clean with compressed air or high pressure water!
- Do NOT use any sharp tools (these could damage the inner seal)!

1. Unscrew the stylus.

INFORMATION

Dirt can accumulate under the service cover.

2. Remove the service cover using the mounting tool (5840)..
3. Clean probe and parts under running water.
4. Reassemble all parts.
5. Align the stylus to spindle centre.
6. Calibrate the probe.



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EU Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of m&h Inprocess Messtechnik GmbH.

Manufacturer / Representative: **m&h Inprocess Messtechnik GmbH**
Am Langholz 11
88289 Waldburg
Germany

Product name: **Infrared Touch Probe**

Model / Type: **IRP40.02**

The product mentioned above meets the requirements of the following relevant directives / standards.

Directive / Standard	Issue	Title / Section
2011/65/EU	2011	Restriction of the use of certain hazardous substances in electrical and electronic equipment
2014/30/EU	2014	Electromagnetic compatibility
DIN EN 61326-1	2013	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1
DIN EN 61326-2-2	2013	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2
DIN EN 55011	2017	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
DIN EN 12100	2011	Safety of machinery - General principles for design - Risk assessment and risk reduction



Waldburg, 31.07.2017

Place, Date


Wolfgang Madlener, General Manager

