



M&H IRT35.70

INFRARED TOOL SETTER

OPERATING INSTRUCTIONS

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1 DESCRIPTION

1.1 General

1.1.1 Preface

The safety instructions in this manual have to be strictly observed to guarantee a safe and reliable function of the tool setter and to avoid personal and material damage. The meaning of the symbols related to the safety instructions is described in the table below.

⚠ CAUTION	CAUTION indicates a hazard which can lead to injuries if not avoided.
NOTICE	NOTICE indicates information considered important, but not hazard-related (e.g. messages relating to property damage).
INFORMATION	INFORMATION indicates important information or helpful advice for working with the described device.

1.1.2 Safety Instructions

⚠ CAUTION
<p>Risk of injuries due to moving machine parts or defect compressed air lines!</p> <ul style="list-style-type: none"> ▪ Installation must only be carried out if the machine is switched to a completely de-energized and de-pressurized state to avoid the risk of injuries due to moving machine parts or defect compressed air lines. ▪ Operation of the tool setter is only allowed with closed guards (safety doors).

NOTICE
<p>Risk of material damage caused by third-party parts!</p> <ul style="list-style-type: none"> ▪ Only the original spare parts listed in this manual are permitted for preventive and correctional maintenance.

INFORMATION
<p>The information given in this manual can be changed by the manufacturer at any time. Thus the user is responsible to regularly inquire 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

This document is valid for the hardware available at the creation date of the manual itself. Technical changes by the manufacturer are reserved.

The latest version of this manual can be downloaded under www.mh-inprocess.com in the Downloads section.

1.2 Purpose

The Tool Setter IRT37.50 is used for determination of tool geometries like tool length and tool radius inside the machine. Moreover it measures single cutters and detects tool breakage. Therefore the measurements can be performed statically or dynamically as well.

1.3 System Components

The components of the system are illustrated in the following figure.



Figure 1 System Components

1.4 Technical Data

Probing Directions	$\pm X; \pm Y; -Z$	
Maximum Stylus Overtravel	$XY = \pm 12.5^\circ; Z = -5 \text{ mm}$	
Trigger Force	$Z = 8 \text{ N} / XY = 2 \text{ N}$	
Smallest Tool	$\varnothing 0.5 \text{ mm}$	
Power Supply	1x Battery (3.6 V / ½AA)	Standby: 18 months
Power Supply (alternative)	1x Batterie (3 V / CR2)	Standby: 12 months
Weight (without base plate)	kb. 750 g	

Operation Temperature Range	10 °C~50 °C
Storage Temperature Range	5 °C~70 °C
Material	Stainless steel
Unidirectional Repeatability	Max. 1 μm (2 Sigma) at 100 mm·min ⁻¹
Replacement Accuracy	±2.5 μm
Sealing	IP68: EN60529 (10 m)
Shock tested	±X; ±Y; -Z 50 g for 7 ms 5000 times
Resonant Frequency Test	Passed

1.5 Dimensions

The dimensions of the tool setter are shown in the figure below.

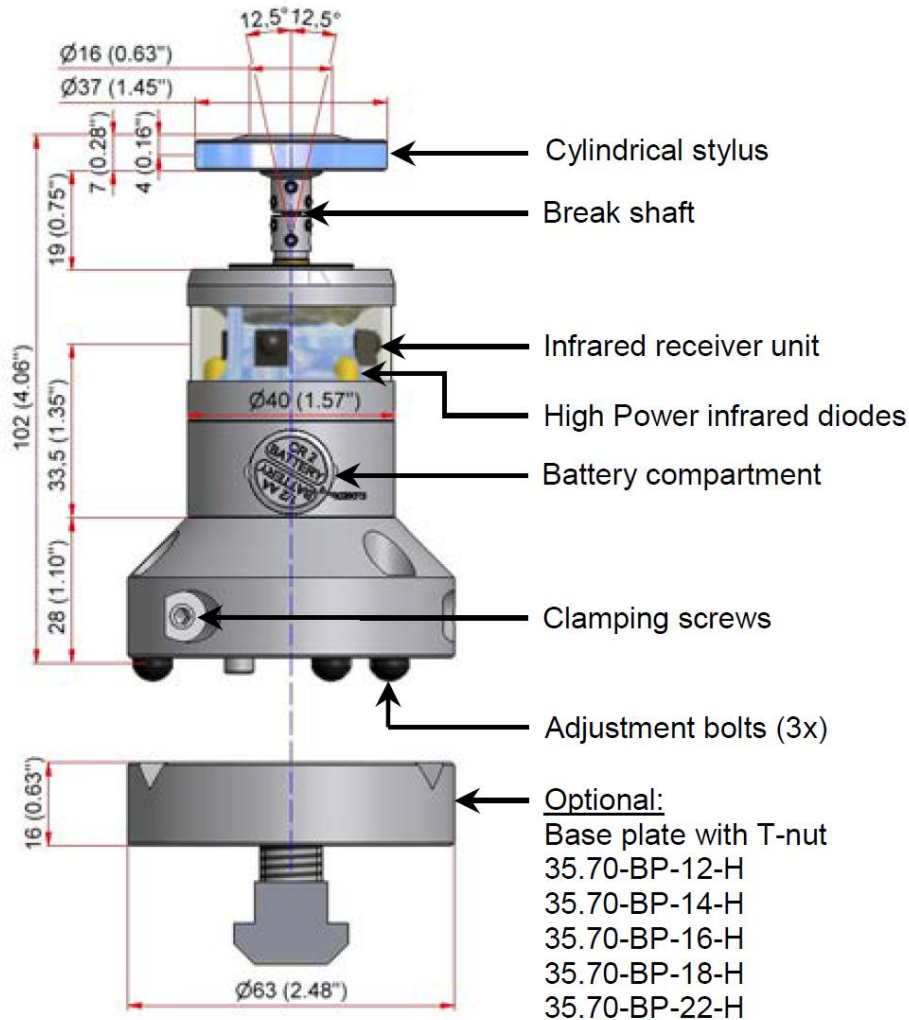


Figure 2 Dimensions

1.6 Transmission-/Reception Area

1.6.1 Reception Area for Tool Setter Activation/ Deactivation

INFORMATION

Fig. 3 shows the reception angles of the tool setter during the ON/OFF procedure. The mounting position of the receiver must be chosen so that the tool setter is in the receiver's transmission range for switching ON/OFF.

The transmission range of the receiver for switching the tool setter ON/OFF amounts to:

IRR91.40/IRR91.42: ≤ 4.0 m

IRR91.50: ≤ 6.0 m

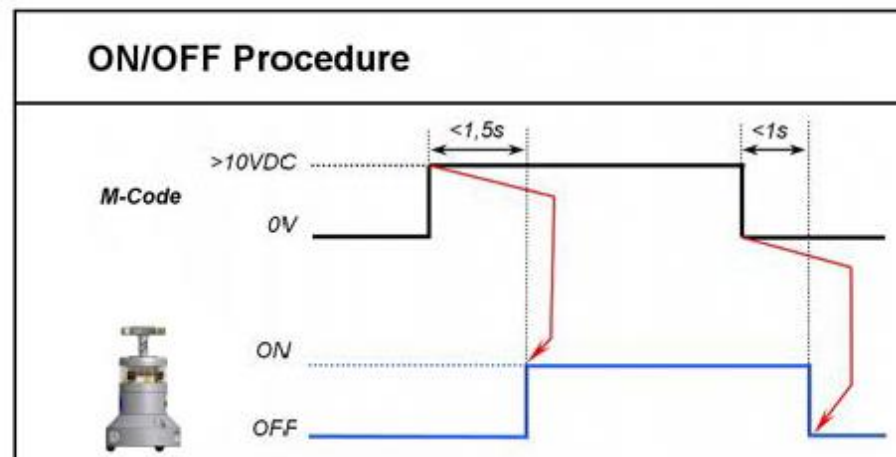
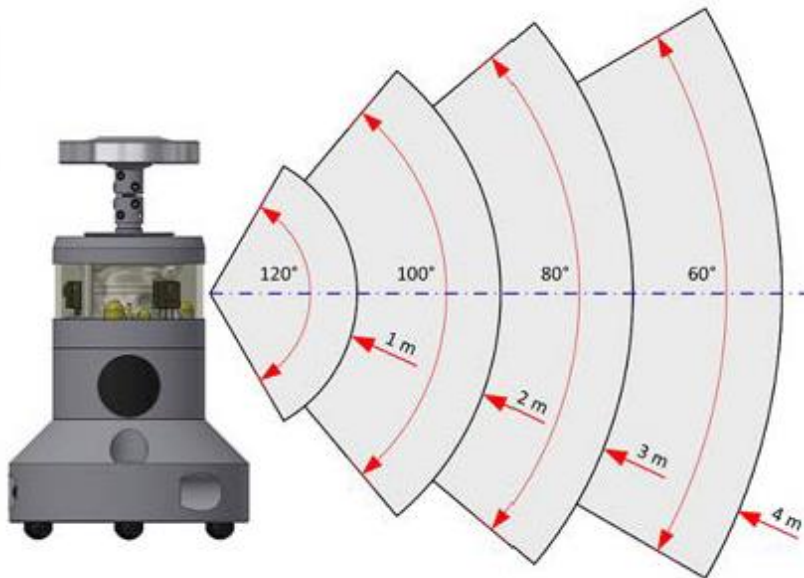


Figure 3 Reception Area during ON/OFF

1.6.2 Transmission Area during Operation

A The infrared tool setter IRT35.70 can be set to the following different transmission ranges:

- ≤ 1.6 m
- ≤ 3.3 m
- ≤ 4.0 m

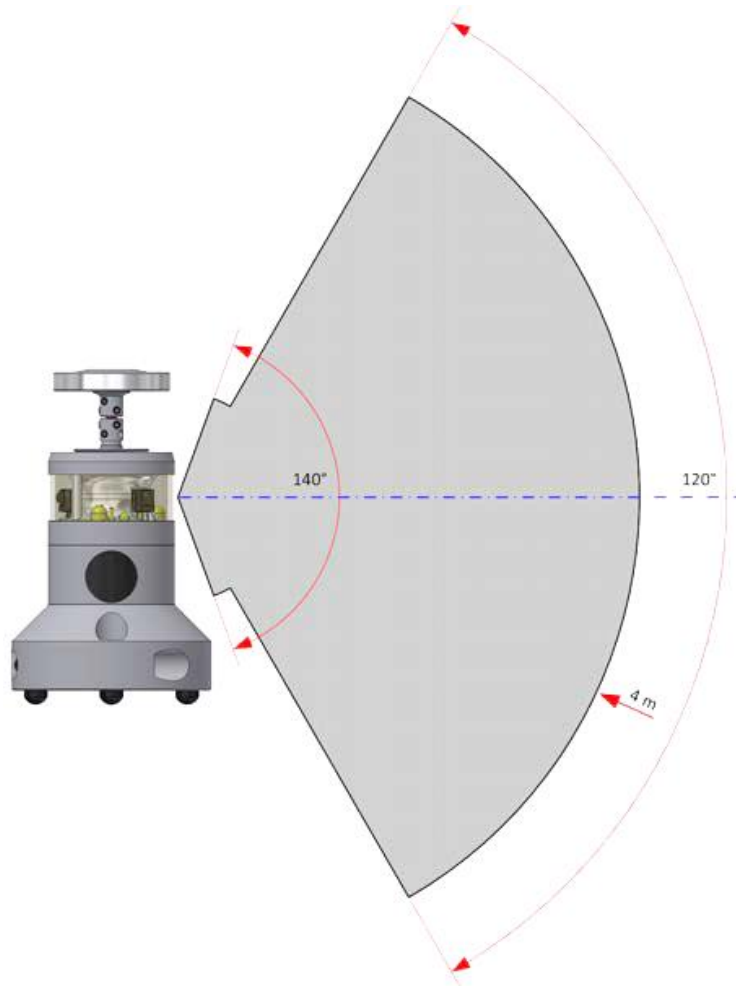



Figure 4 Transmission Area during Operation

1.7 Delivery Contents, Accessories and Spares

1.7.1 Delivery Contents




Order No.	Description
35.70-OTS	m&h Infrared Tool Setter IRT35.70
	1x Cylindrical stylus (35.10-D37/24)
	1x Break shaft adapter M4 (91.00-S-M4-HF)
	2x Battery (3,6 V / ½ AA) (4316)
	Tool box (35.70-TB)

1.7.2 Accessories

Order No.	Description	Illustration
35.70-BP-12-H	Base plate with T-nut 12 mm	
35.70-BP-14-H	Base plate with T-nut 14 mm	
35.70-BP-16-H	Base plate with T-nut 16 mm	
35.70-BP-18-H	Base plate with T-nut 18 mm	
35.70-BP-22-H	Base plate with T-nut 22 mm	






1.7.3 Spare Parts

Order No.	Description	Illustration
35.10-D37/24	Cylindrical stylus	
91.00-S-M4-HF	Break shaft adapter M4 – High Force	
91.00-S-HF	Break shaft – High Force	
4316	Battery (3,6V / ½ AA)	
3920	Battery cover	
3549	O-Ring 13x1 Viton for battery cover	
4277	Adjustment bolt AF 3 mm	
5711	Clamping screw AF 3 mm	
0548	Grub screw M2.5x3	
3240	Service cover	
3455	O-Ring 16x1 Viton	
2906	Metal eyelid	
2931	Conical spring	

Order No.	Description	Illustration
35.70-MAGNET KIT	Magnet Kit for IRT 35.70, consisting of:	
	1x Cylindrical magnet	
	1x Cylindrical screw	
	1x Washer	

2 OPERATION

2.1 Tools, Measurement- and Test-Equipment

Order No.	Description	Illustration
35.20-CP	Calibration pin	
1780	Hexagon key AF 3 mm	
0227	Hexagon key AF 1.3 mm	
0885	Mounting pin	
3079	Dial gauge	
35.70-TB	Toolbox 1x Break shaft – High Force (91.00-S-HF) 1x Hexagon key AF 1.3 mm (02270) 1x Hexagon key AF 3 mm (1780) 1x Mounting pin (0885) 3x Grub screw M2.5x3 (0548) 2x Clamping screw AF 3 mm (5711) 1x Calibration pin (35.20-CP)	Without figure.

2.2 Mounting

2.2.1 Mounting with Base Plate

NOTICE

Risk of material damage!!

- V-Slots and adjustment bolts must be clean and free of chips and must be blown off using compressed air!
- When positioning the tool setter, ensure that the index screw head is in the correct hole!

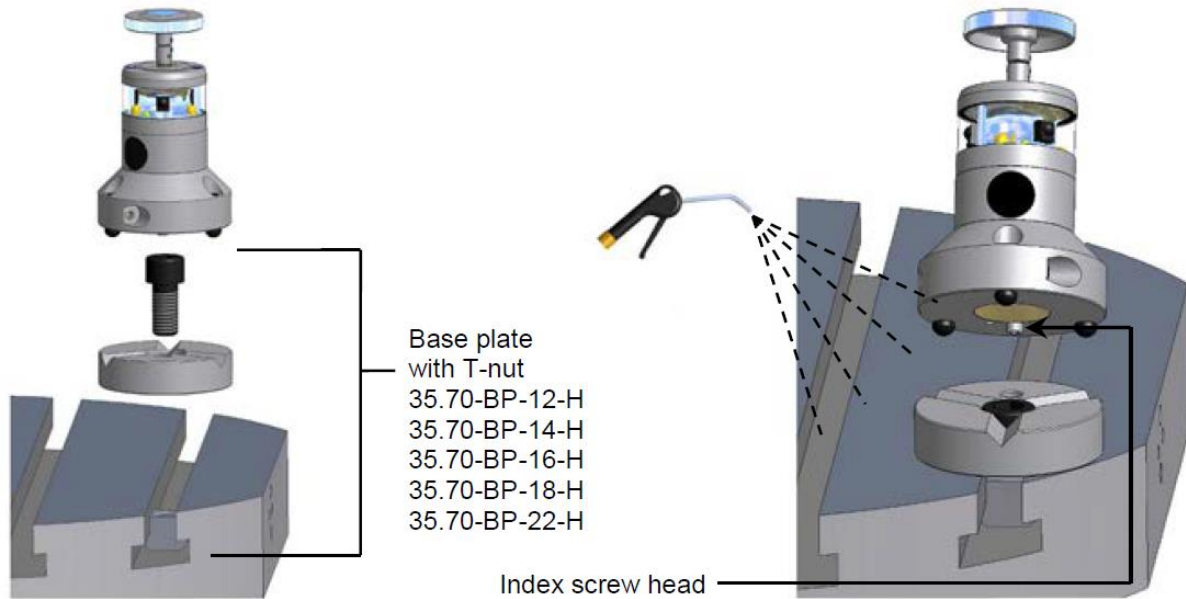


Figure 5 Mounting with Base Plate

2.2.2 Mounting directly on the Machine Table

NOTICE

Risk of material damage!

- Slots must be milled in the machine table!
- V-Slots and adjustment bolts must be clean and free of chips and must be blown off using compressed air!
- When positioning the tool setter, ensure that the index screw head is in the correct hole!

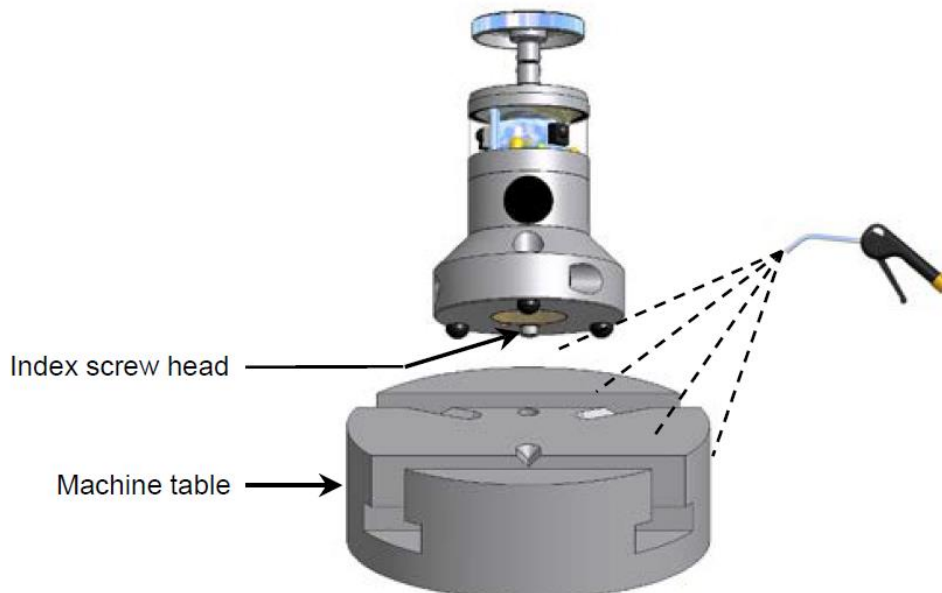


Figure 6 Mounting directly on the Machine Table

T-slots = 14 mm

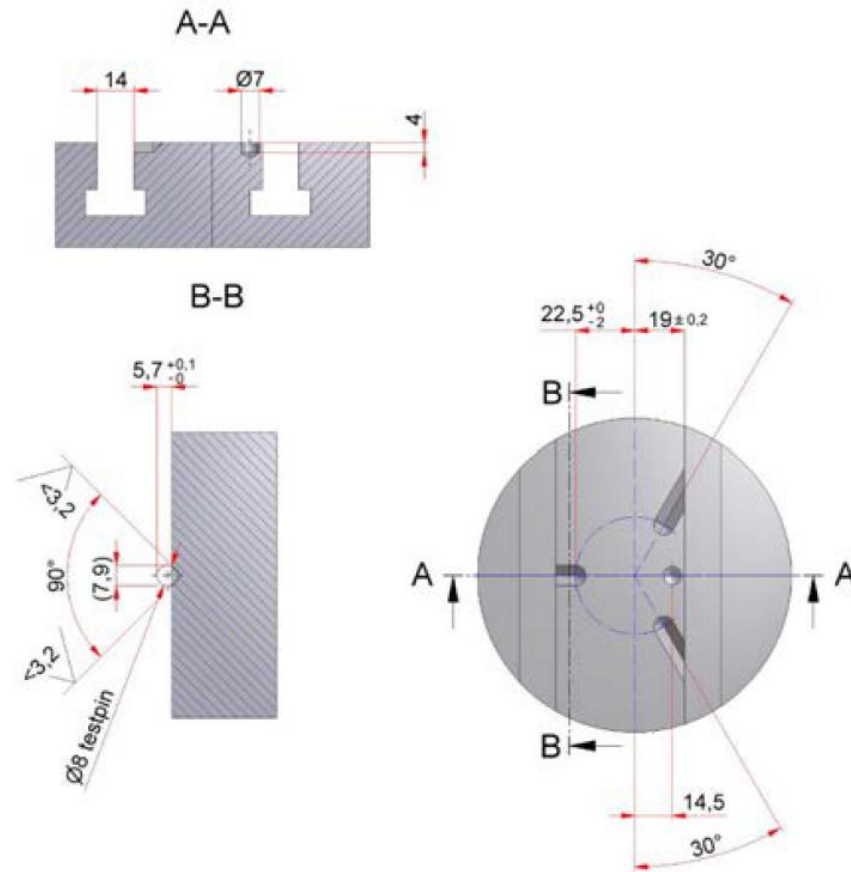


Figure 7 Production drawing for V-slots

2.3 Setting Infrared Transmission Range and Switch Off Time

Infrared transmission range

The infrared transmission range can be set to 1.6m – 3.3m – 4.0 m. Reducing the transmission range can help to prevent interferences with other infrared transmission systems in the close environment. Setting a high transmission range reduces the lifetime of the battery.

Switch off time

If the stylus of the tool setter is not deflected for a specified time the tool setter switches off automatically. This time can be set to 120 ~ 180 s.

1. Remove the tool setter as shown below.

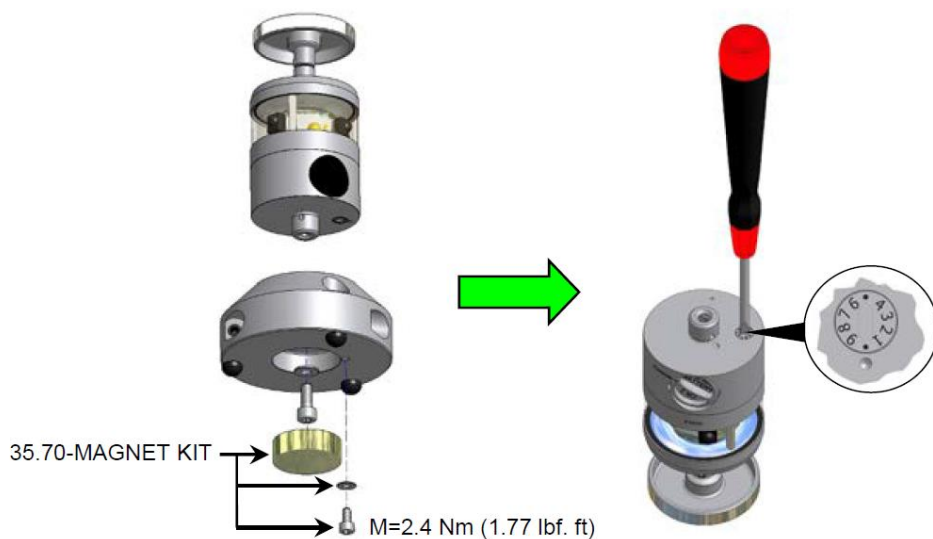


Figure 8 Dismounting and adjusting Tool Setter

2. Choose the settings from the table and adjust the switch using a screwdriver.
3. Remount the tool setter.
4. Calibrate the tool setter.

Setting	Typical infrared transmission range	Switch off time	Battery-lifetime in continuous operation!				Switch ON code
			Battery type ½ AA	Usage 5%	Battery type CR2	Usage 5%	
0	≤ 4.0 m	Infrared OFF	270 h	190 d	180 h	130 d	A
1	≤ 4.0 m	180 s	270 h	190 d	180 h	130 d	A
2	≤ 4.0 m	120 s	270 h	190 d	180 h	130 d	A
3	≤ 3.3 m	120 s	350 h	210 d	220 h	145 d	A
4	≤ 1.6 m	120 s	440 h	240 d	290 h	170 d	A
5	≤ 4.0 m	Infrared OFF	270 h	190 d	180 h	130 d	B
6	≤ 4.0 m	180 s	270 h	190 d	180 h	130 d	B
7*	≤ 4.0 m	120 s	270 h	190 d	180 h	130 d	B
8	≤ 3.3 m	120 s	350 h	210 d	220 h	145 d	B
9	≤ 1.6 m	120 s	440 h	240 d	290 h	170 d	B

* Factory preset

INFORMATION

To activate/deactivate multiple infrared systems independent from each other with only one receiver, the systems must have different switch ON codes (**A**, **B**). For communication with the control the receiver provides an own connecting pin for each of the switch ON codes **A** and **B**.

For measurement only one system can be used at one point in time.

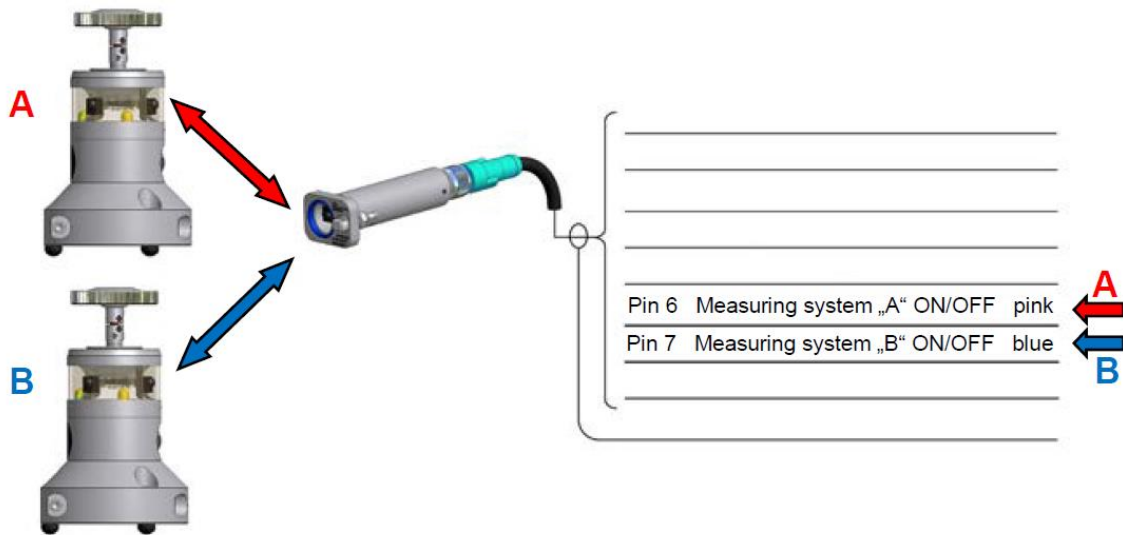


Figure 9 Tool Setter Activation

2.4 Aligning the Stylus

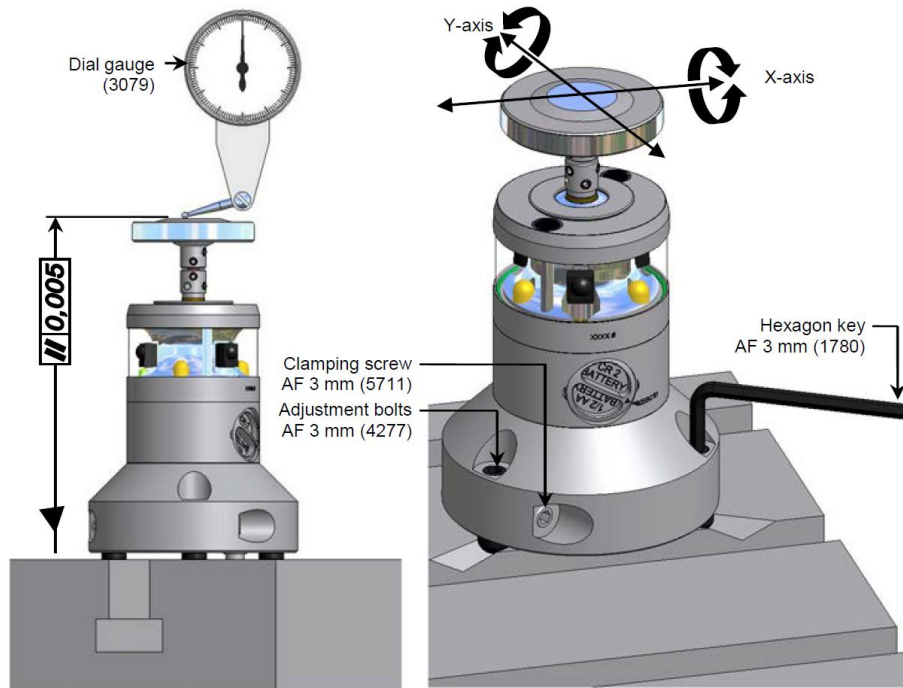


Figure 10 Aligning the Stylus

1. Loosen the clamping screws and turn the adjustment bolts until they reach their limit in the upper position.
2. Tighten the clamping screws until the adjustment bolts can just be turned with moderate force.
3. Blow the adjustment bolts and the V-Slots clean.
4. Place the Tool Setter into the V-Slots.
5. Check the parallelism of the stylus in the X Axis using a dial gauge.
6. Adjust the tool setter in the Y axis to $< 5 \mu\text{m}$ by turning the adjustment bolts.
7. Tighten the clamping screws (2x) of the the adjustment bolts.
8. Using the third adjustment bolt, adjust the tool setter around the X-axis to $< 5 \mu\text{m}$.
9. Tighten the clamping screw of the third adjustment bolt.
10. Take the Tool Setter out of the machine and securely tighten all 3 clamping screws by hand using high hand force (approx.10 Nm).
11. Blow off the adjustment bolts and the V-Slots.
12. Put the tool setter back in the V-Slots and verify the alignment.
13. Calibrate the tool setter.

2.5 Tool Setter Calibration

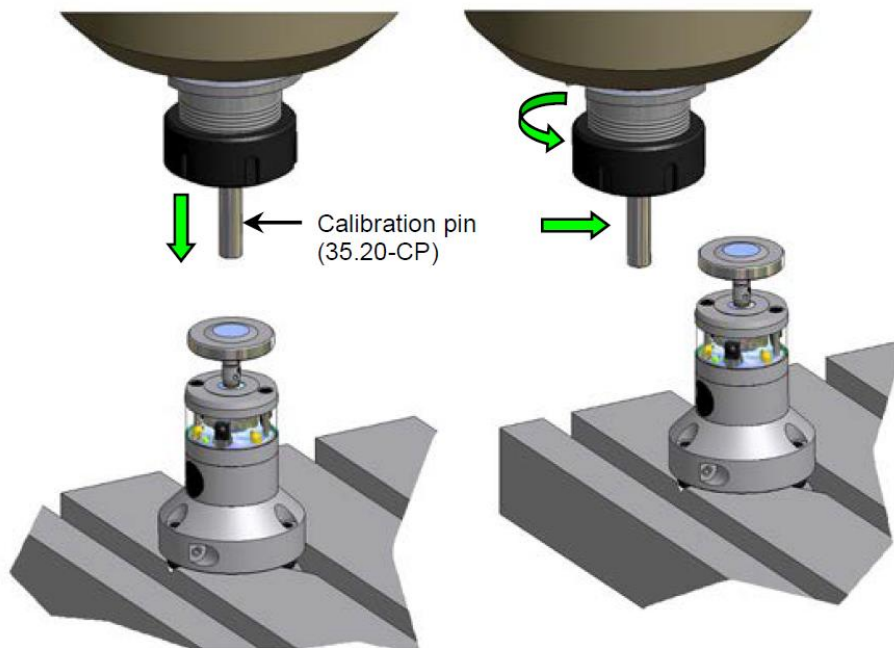


Figure 11 Tool Setter Calibration

INFORMATION

Due to the short delay between triggering and reading the axis position, calibration of the tool setter is required. During calibration the following is determined:

- Switching characteristic of the tool setter in different machine axes
- Effective length of the tool setter
- Response time of the tool setter in relation to the NC

Calibration of the tool setter is performed using control specific calibration cycles.

2.6 Battery Replacement

NOTICE

Risk of equipment damage due to ingress of liquid and battery leakage!

- Before opening Tool Setter, clean and dry well!
- Do NOT blow off with compressed air!
- Replace empty batteries immediately!
- When closing the battery cover check the O-ring for any damage!

1. Turn battery cover with bayonet lock to open and close.

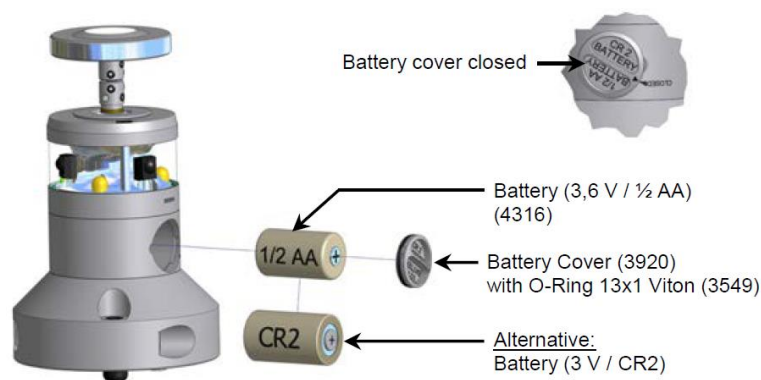


Figure 12 Battery Replacement

2.7 Stylus Change

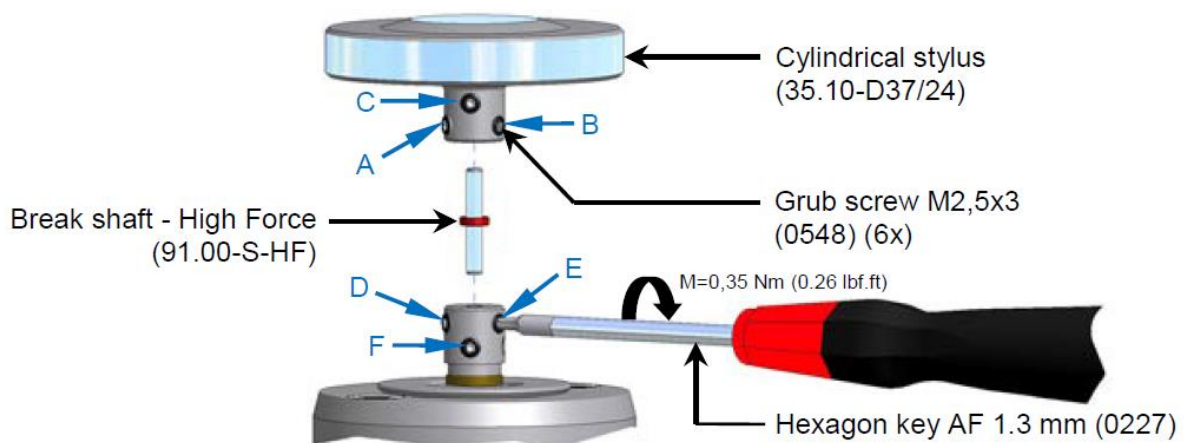


Figure 13 Stylus Change

1. Loosen the grub screws **D**, **E** and **F** (refer to Figure 13) and remove the cylindrical stylus together with the break shaft from the break shaft adapter.
2. Loosen the grub screws **A**, **B** and **C** of the cylindrical stylus (refer to Figure 13) and remove the break shaft.

3. Insert the new break shaft into the stylus first and tighten the grub screws in sequence **A, B, C**.
4. Install the cylindrical stylus together with the break shaft to the break shaft adapter and tighten the grub screws in sequence **D, E, F**.
5. Check the alignment of the measuring surface (refer to chapter 2.4).
6. Calibrate tool setter (refer to chapter 2.5).

2.8 Maintenance of the Tool Setter

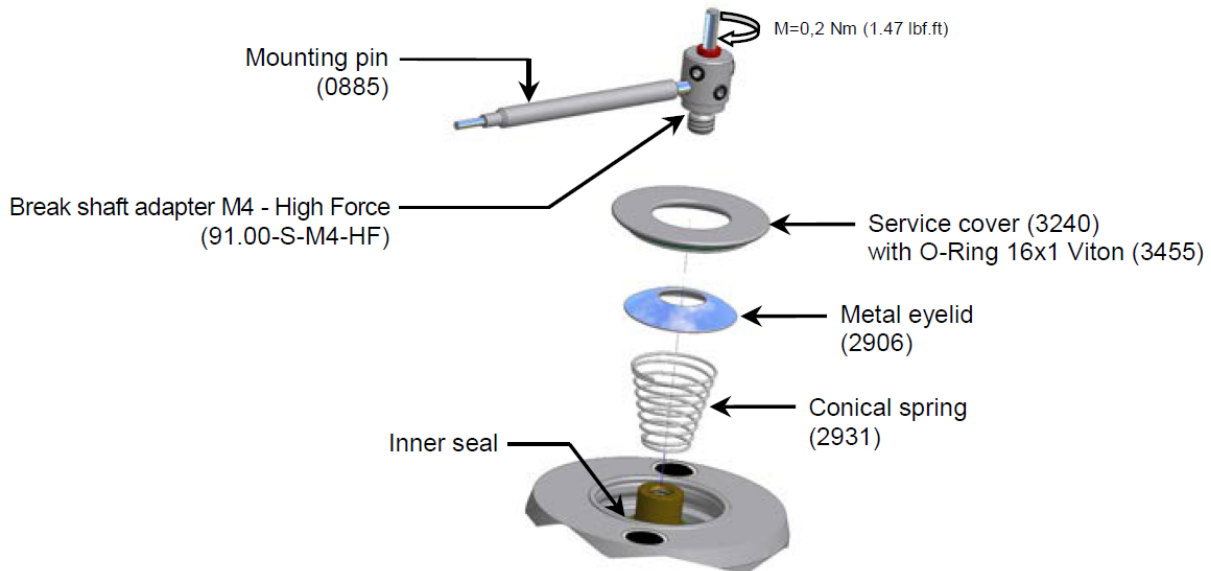


Figure 14 Maintenance of the Tool Setter

NOTICE

Risk of material damage!

- Do NOT use compressed air or high pressure water to clean!
- Do NOT use any sharp tools (these could damage the inner seal)!

1. Unscrew the stylus.

INFORMATION

Dirt can collect under the metal seal.

2. Remove service cover with eyelid and conical spring by hand.
3. Clean tool setter and parts under flowing water.
4. Reassemble all parts.
5. Align the stylus centre.
6. Calibrate the tool setter.

2.9 Optical Status Display

Subsequent table gives an overview of the blinking patterns of the LED (Fig. 15) and their meaning.

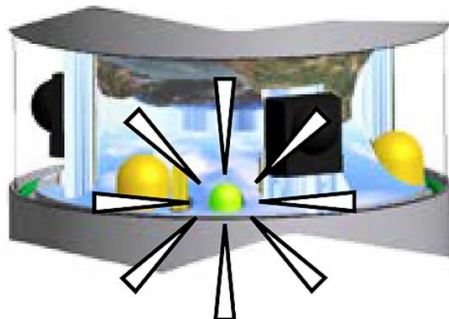


Figure 15 Optical Status Display

Optical display	Interpretation
LED blinking green	Tool setter is transmitting signals.
LED blinking green/red	Low Battery.
LED blinking orange	Stylus deflected.
LED constantly red	Wrong battery type.



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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 Tollsetter**

Model / Type: **IRT35.70**


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

