



M&H IRR91.42

INFRARED RECEIVER

OPERATING INSTRUCTIONS

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1 DESCRIPTION

1.1 General

1.1.1 Preface

The instructions and safety instructions in this manual have to be strictly observed to guarantee a safe and reliable function of the receiver 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 hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE indicates important information that, if not observed, could lead to property damage / malfunctions.
INFORMATION	INFORMATION indicates important information or helpful advices for the work with the described device.

1.1.2 Safety Instructions

⚠ CAUTION
<p>Risk of injuries due to electric shock!</p> <p>When connecting the infrared receiver to the control, there is a danger of electric shock. Incorrect connection may result in unsafe usage of the infrared receiver.</p> <ul style="list-style-type: none"> ▪ Connection must only be carried out if the machine is switched to a completely de-energized state and only by especially trained and qualified personnel.

⚠ CAUTION
<p>Risk of injuries due to moving machine parts or defect compressed air lines!</p> <p>When connecting compressed air lines there is a risk of injuries/eye injuries due to defect compressed air lines and uncontrolled moving machine parts.</p> <ul style="list-style-type: none"> ▪ Installation of the infrared receiver must only be carried out if the machine is switched to a completely de-energized and de-pressurized state. ▪ Installation must only be carried out by appropriately trained and qualified personnel. ▪ The infrared receiver may only be operated with the protective equipment (protective door) closed. Disabling the guards is strictly forbidden.

NOTICE

Risk of material damage caused by third-party parts!

- Only use the original spare parts listed in these operating instructions to perform maintenance and repairs.

INFORMATION

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.

1.1.3 Declaration of Conformity

The EU/UKCA 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 date of creation of these operating instructions. The manufacturer reserves the right to make technical modifications.

The latest version of these operating instructions can be downloaded at www.mh-inprocess.com under Downloads.

1.2 Purpose

The m&h infrared receiver IRR91.42 is used for reception of the measuring signals from the following m&h measurement systems:

- Infrared touch probes IRP25.50-MY/PP and IRP40.02 (signal evaluation HDR+);
- Infrared touch probe IRP40.51 (signal evaluation HDR, activation code B);
- Infrared tool setter IRT35.70 and pick up tool setter IRPT35.40;
- Temperature probe IRP25.50-TP.

1.3 System Components

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

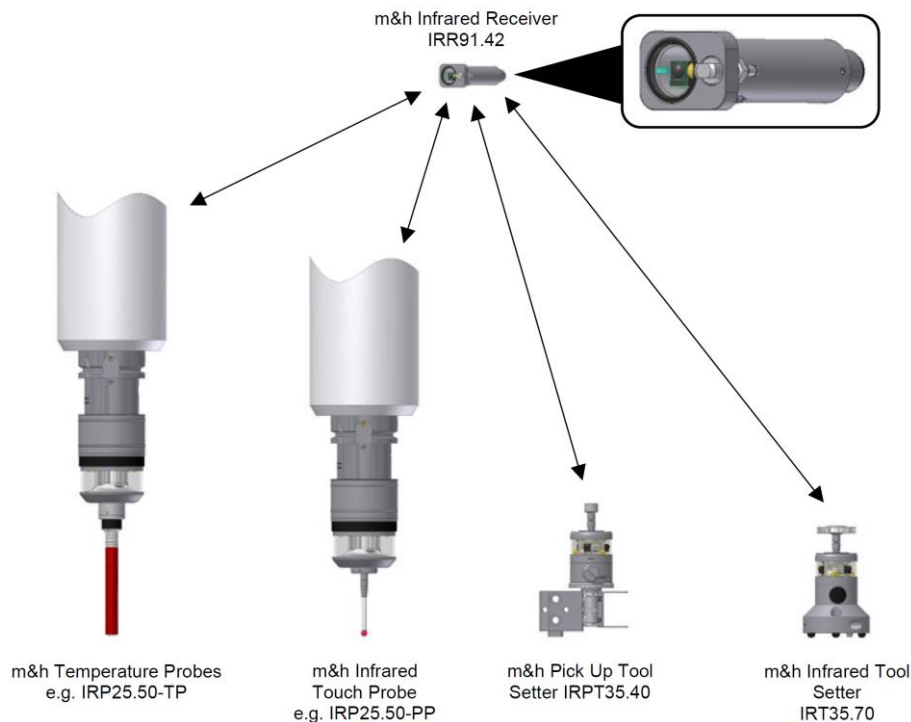


Figure 1 System components

1.4 Technical Data

Signal evaluation	High data rate (HDR-Bidi (B) and HDR+)*
Power supply	12 - 30 VDC, max. 100 mA
Weight	100 g
Operation temperature range	10 °C~50 °C
Storage temperature range	5 °C~70 °C
Material	Stainless steel
Sealing	IP68: EN60529 IEC529/DIN40050 (attached)
Mounting	Air blow screw, M4 thread
Connection	Industry standard 8-pin plug, M12x1 thread
Shock tested	In $\pm X, Y$ and Z 500G for 7 ms 5,000 times
Load resonant frequency	Test passed

* HDR+ is only possible in conjunction with IRP25.50 (mechanical activation and activation code A or C) and IRP40.02.

1.5 Dimensions

The dimensions of the infrared receiver are shown in the following figure.

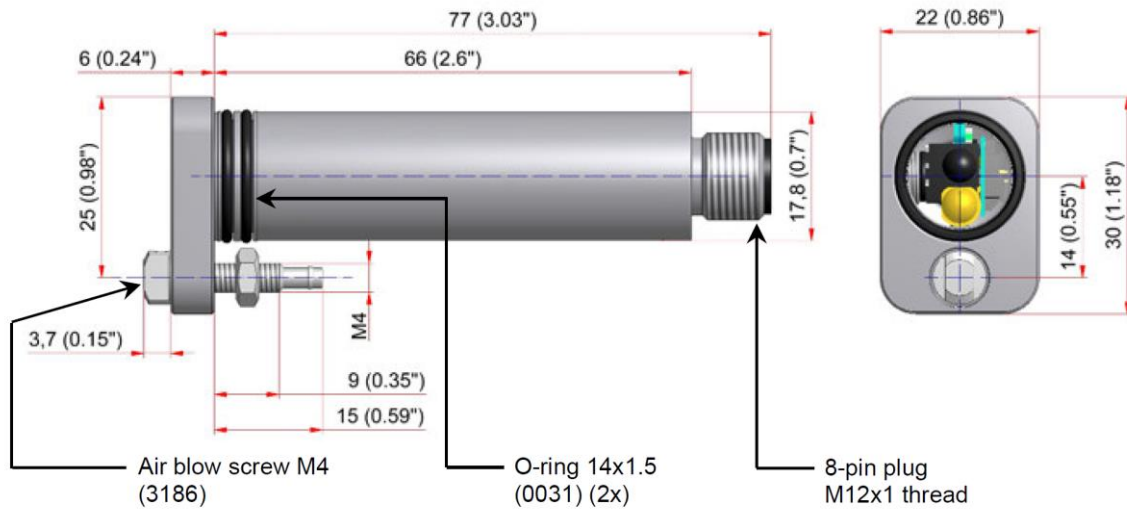


Figure 2 Dimensions

1.6 Transmission and Reception Angles

INFORMATION

The transmission ranges shown below only apply under optimum operating conditions.

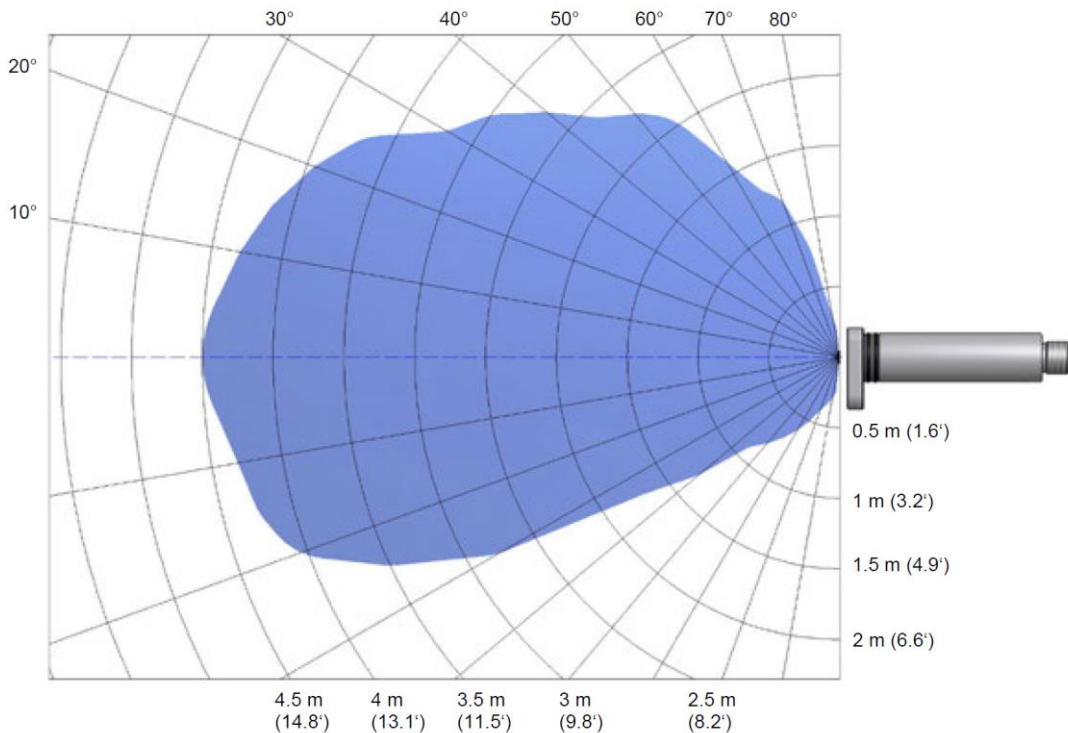


Figure 3 Transmission angles

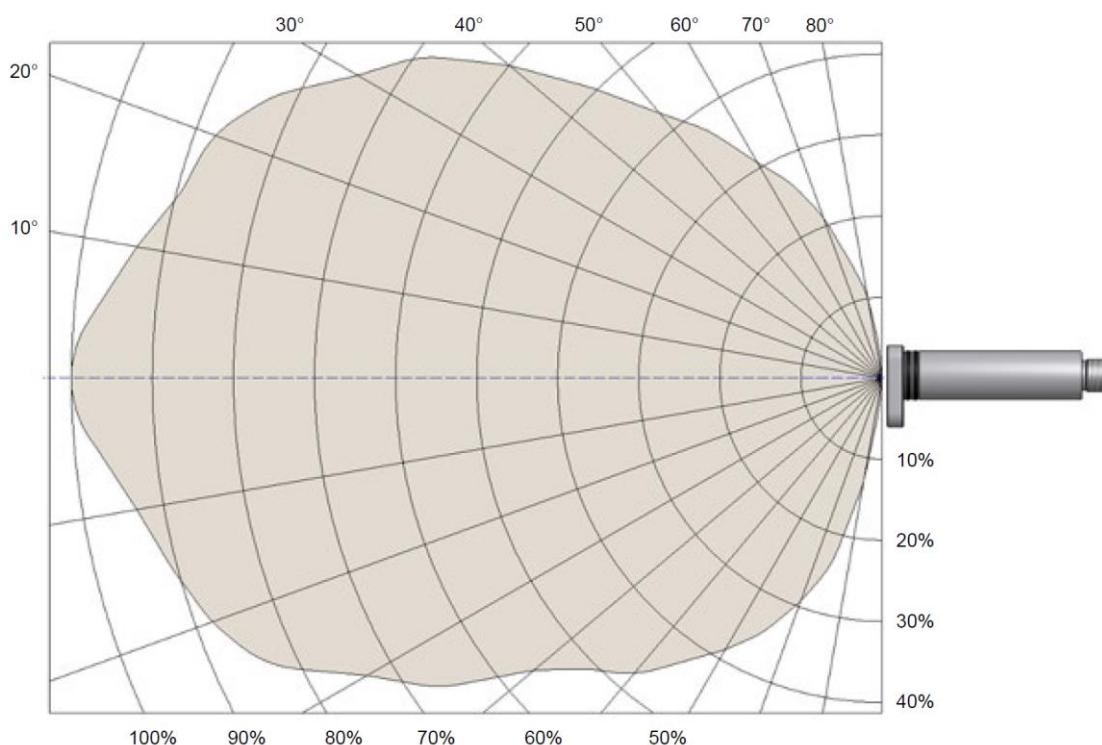




Figure 4 Reception angles (depending on transmitting touch probe)

1.7 Delivery Contents, Accessories and Spares

1.7.1 Delivery Contents

Order Number	Description
91.42-IRR#	Infrared receiver IRR91.42



1.7.2 Mounting Bracket




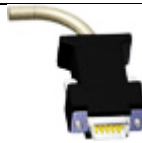
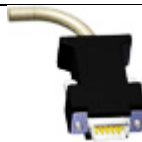







Order Number	Description	Illustration
91.30-M	Mounting bracket, consisting of: <ul style="list-style-type: none"> ▪ Mounting bracket (3310); ▪ Isolation bush $\varnothing 6.2$ (5383); ▪ Isolation washer 6.4×18 (5370). 	
91.30-DS	Rotating/pivoting holder	






1.7.3 Mounting Accessories

Order Number	Description	Illustration
3186	Air blow screw M4	
0899	Nut M4	
0031	O-ring 14x1.5	
3470	Cable protection (L=1 m)	
0852	Nut M5	
3478	Spring washer A5	
2013	Washer 5.3	
3276	Cap head screw M4x8 (AF3mm)	
3602	Cap head screw M5x35 (AF4mm)	
3600	Gasket	

1.7.4 Connecting Cables With Accessories

Order Number	Description	Illustration
91.10-SI-UN	Connecting cable (L=2 m) with plug and strands for Siemens control	
91.10-FA-UN 91.10-FA-UN-15	Connecting cable (L=6 m or L=15 m) with plug and strands for Fa-nuc High Speed Skip	

Order Number	Description	Illustration
91.40-ST2-X12	Connecting cable (L=2 m) with plug and strands for Heidenhain (X12)	
35.40-ST2-X13	Connecting cable (L=2 m) with plug and strands for Heidenhain (X13)	
91.40-ST2-X112	Connecting cable (L=2 m) with plug and strands for Heidenhain (X112)	
91.50-ST2-X112-DUO	Connecting cable (L=2 m) with plug and strands for Heidenhain (X112)	
35.40-ST2-X113	Connecting cable (L=2 m) with plug and strands for Heidenhain (X113)	
91.10-SE-UN	Connecting cable (L=2 m) with plug and strands for Selca control	
91.10-MI-UN	Connecting cable (L=2 m) with plug and strands for Mitsubishi control	
91.30-ST10	Connecting cable (L=10 m) with plug and strands	
91.30-ST15	Connecting cable (L=15 m) with plug and strands	
91.30-ST30	Connecting cable (L=30 m) with plug and strands	
91.30-ST15-W	Connecting cable (L=15 m) with 90° plug and strands	
91.30-W/G	Adapter cable (L=0.3 m or L=15 m) with 90° plug and straight plug	
91.30-EXT2	Extension cable (L=2 m) with plugs	
91.30-EXT10	Extension cable (L=10 m) with plugs	
91.40-ST5-X112-BIDI	Connecting cable (L=5 m) with straight plug and 15-pin plug for Heidenhain (X112)	

Order Number	Description	Illustration
91.40-ST10-X112-BIDI	Connecting cable (L=10 m) with straight plug and 15-pin plug for Heidenhain (X112)	
91.40-ST15-X112-BIDI	Connecting cable (L=15 m) with straight plug and 15-pin plug for Heidenhain (X112)	
91.40-ST10-X112-DUO	Connecting cable (L=10 m) with straight plug and 15-pin plug for Heidenhain (X112)	
91.40-ST5-X112-DBM	Connecting cable (L=5 m) with straight plug and 15-pin plug for Heidenhain (X112)	
91.40-ST10-X112-DBM	Connecting cable (L=10 m) with straight plug and 15-pin plug for Heidenhain (X112)	
91.40-8/8-POLE BIDI	Adapter for Heidenhain cable (#517376) for infrared touch probe with bi-directional activation	
4069	Signal converter for temperature measurement on machines with Heidenhain control	

2 OPERATION

2.1 Mounting

2.1.1 Mounting on the Spindle Head

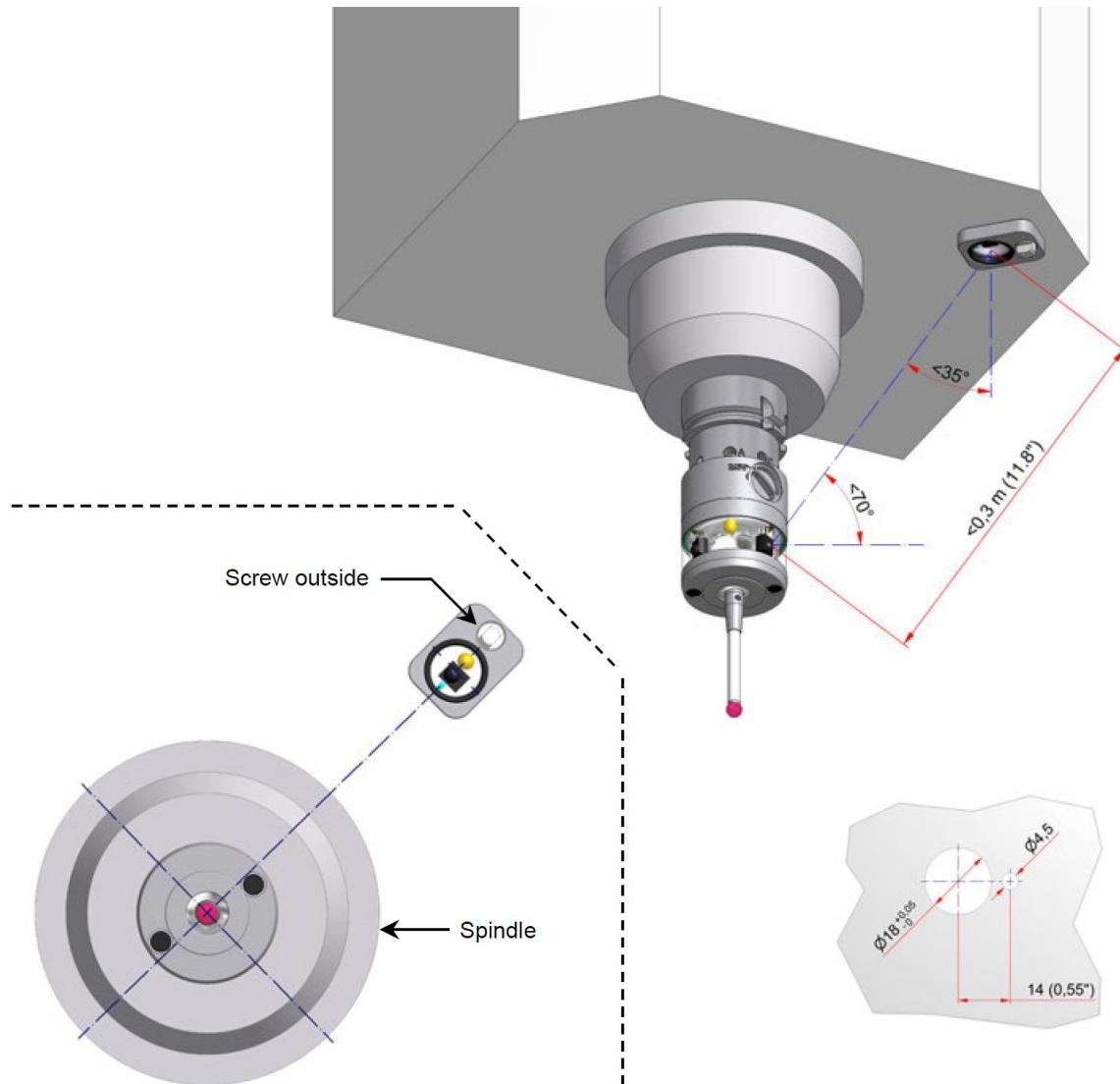


Figure 5 Mounting on the spindle head

2.1.2 Mounting on the Machine Wall

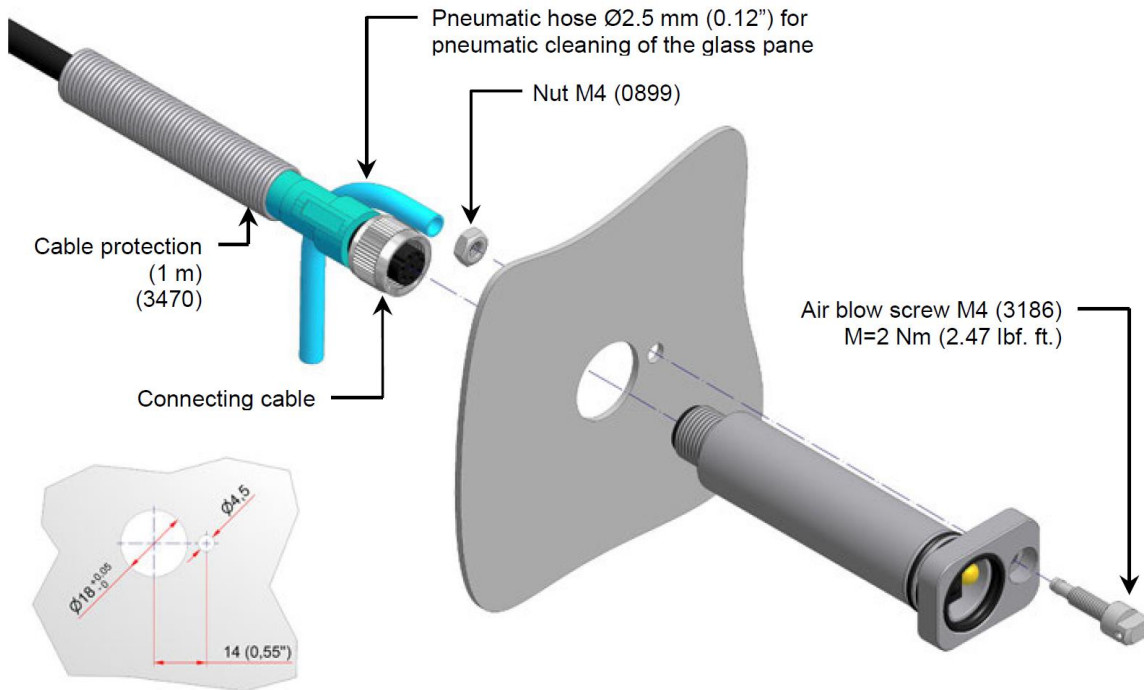


Figure 6 Mounting on the machine wall

2.1.3 Mounting with the Mounting Bracket

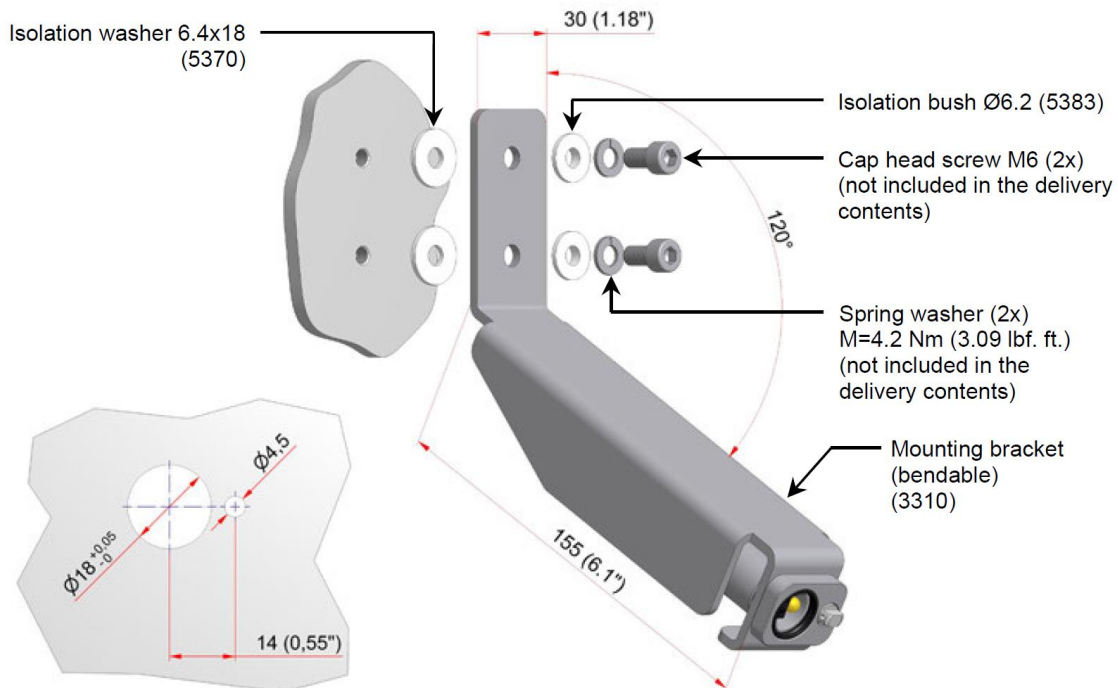


Figure 7 Mounting with the mounting bracket

2.1.4 Mounting with the Rotating/Pivoting Holder

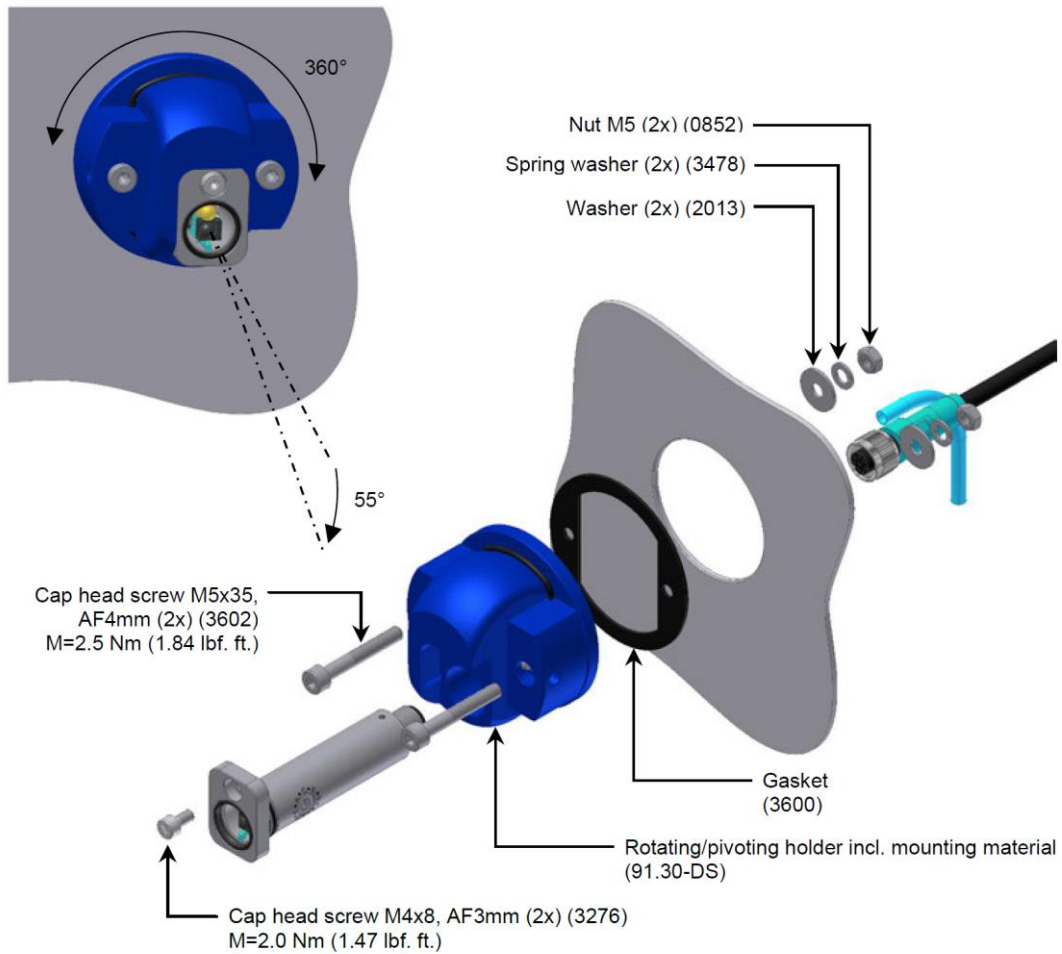


Figure 8 Mounting with the rotating/pivoting holder

2.2 Connection

2.2.1 Electrical Connection

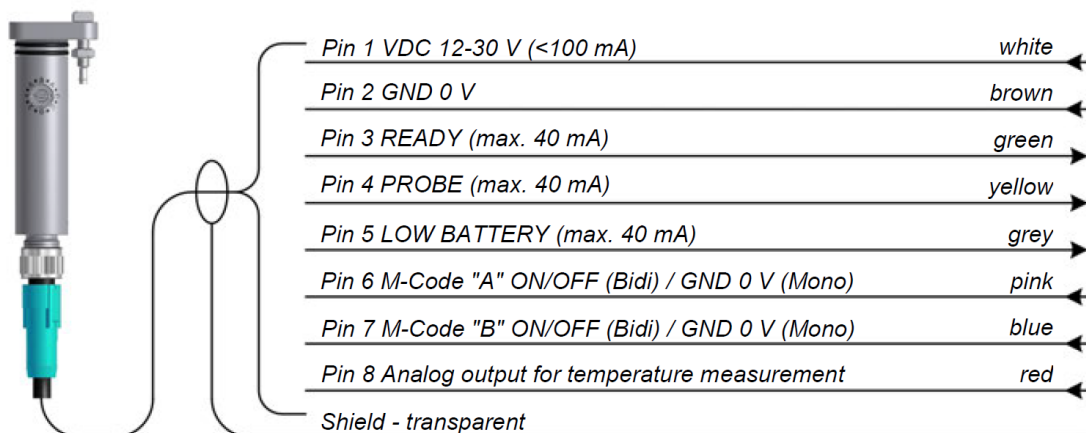
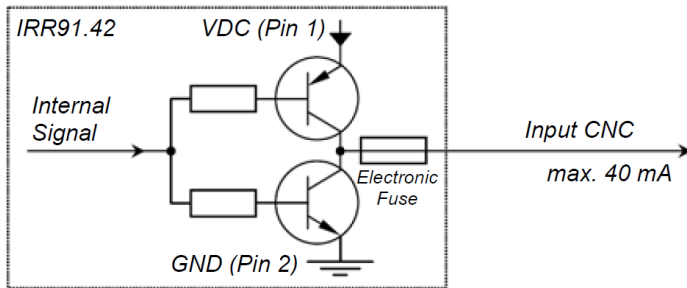


Figure 9 Electrical Connection

2.2.2 Output Circuit Pin 3, 4 and 5



Circuit for outputs

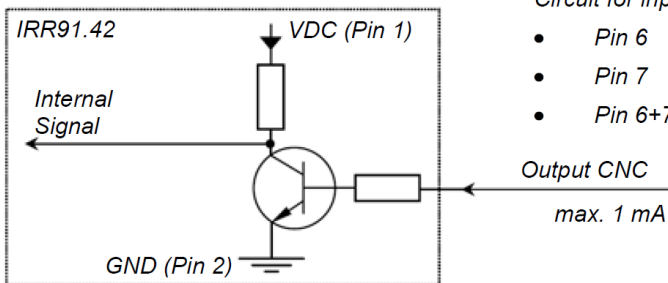
- Pin 3 = READY
- Pin 4 = PROBE
- Pin 5 = LOW BATTERY

Low \leq GND + 1.2 V

High \geq VDC - 2 V

Figure 10 Output Circuit Pin 3, 4 and 5

2.2.3 Input Circuit Pin 6 and 7



Circuit for inputs

- Pin 6 = Measurement system A ON/OFF (HDR+)
- Pin 7 = Measurement system B ON/OFF (HDR-Bidi)
- Pin 6+7 = Measurement system A ON/OFF (HDR+)

Low \leq 3 V – min. GND 0 V

High \geq 10 V – max. 30 VDC

Figure 11 Input Circuit Pin 6 and 7

2.2.4 Output Circuit, Temperature Measuring Pin 8

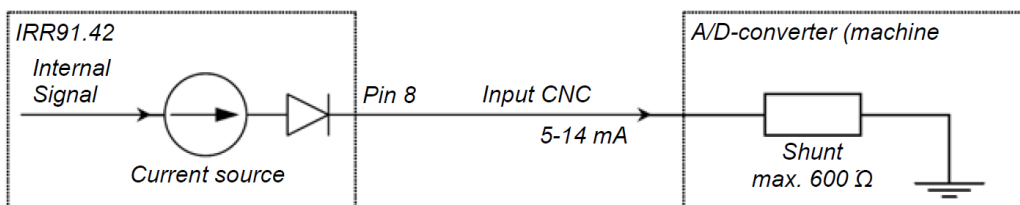


Figure 12 Output Circuit, Temperature Measuring Pin 8

2.2.5 Signal Connection

INFORMATION

Temperature measurement is not possible with signal connection!

INFORMATION

Signal connection is recommended, if the machine control cannot check READY.

The signal connection is scanned once when the receiver restarts

Signal connection is active, if a voltage >10 VDC (High) is applied to Pin 8.

- ERROR causes PROBE.



Figure 13 Signal Connection

2.3 Output Signals

2.3.1 Adjusting the Output Signal

The output signal is set using a rotary coding switch (see Fig. 14). The setting only takes effect after a restart of the receiver.

INFORMATION

In order to ensure receiver restart, disconnect the cable from the receiver or switch off the machine before changing the switch position.



Figure 14 Adjusting the Output Signal

2.3.2 Overview of Output Signal Settings

Configuration	PROBE	ERROR	LOW BATTERY	Control
All output signals Push-Pull: LOW \leq GND+1,2 V; HIGH \geq VDC-2 V				
0*)	HIGH→LOW	HIGH→LOW	HIGH→LOW	Heidenhain/Siemens
1	HIGH→LOW	HIGH→LOW	LOW→HIGH	
2	HIGH→LOW	LOW→HIGH	LOW→HIGH	
3	LOW→HIGH	LOW→HIGH	LOW→HIGH	Fanuc Ordinary Skip
4	LOW→HIGH	LOW→HIGH	HIGH→LOW	Fanuc Ordinary Skip
5	LOW→HIGH	HIGH→LOW	HIGH→LOW	Fanuc Ordinary Skip
6	LOW→HIGH	HIGH→LOW	LOW→HIGH	Fanuc Ordinary Skip
7	HIGH→LOW	LOW→HIGH	HIGH→LOW	
	HIGH = 3.9 V~ 5,4 V			
8	LOW→HIGH	HIGH→LOW	HIGH→LOW	
9	HIGH→LOW	HIGH→LOW	LOW→HIGH	Fanuc High Speed Skip
A	HIGH→LOW	LOW→HIGH	LOW→HIGH	Fanuc High Speed Skip
B	LOW→HIGH	LOW→HIGH	LOW→HIGH	
C	LOW→HIGH	LOW→HIGH	HIGH→LOW	
D	HIGH→LOW	HIGH→LOW	HIGH→LOW	Fanuc High Speed Skip
E	LOW→HIGH	HIGH→LOW	LOW→HIGH	
F	HIGH→LOW	LOW→HIGH	HIGH→LOW	Fanuc High Speed Skip

* Setting for standard delivery.


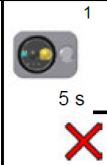


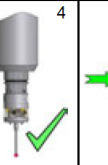
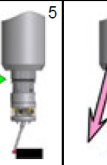





2.4 Signal Diagrams

2.4.1 Signal Diagram (Bi-directional Mode)

Example for switch position 0 (Heidenhain/Siemens)

Bi-directional mode possible with:

- Infrared touch probes IRP40.02 and IRP25.50;
- Pick up tool setter IRPT35.40;
- Infrared tool setter IRT35.70.

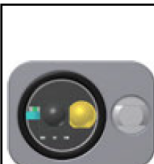


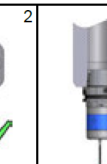
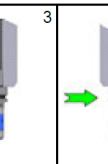




										
Received Signal	IRR91.42 OFF	IRR91.42 ON	Switching ON procedure	Probe ON	Probe deflected	ERROR during PROBE	LOW BATTERY	ERROR	Switching OFF procedure	Probe OFF
PROBE	---	HIGH	HIGH	HIGH	LOW	LOW (saved)	HIGH	HIGH	HIGH	HIGH
READY	---	LOW	LOW	HIGH	HIGH	LOW	HIGH	LOW	HIGH	LOW
LOW BATTERY	---	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	HIGH	HIGH
Pin 6 Measurement system A ON or Pin 7 Measurement system B ON	HIGH	HIGH	LOW	LOW	LOW	LOW	LOW	LOW	HIGH	LOW
LED	---	red	green flashing	green	orange	green flashing	red flashing	green flashing	red-green flashing	red

2.4.2 Signal Diagram (Mono-directional Mode)

Example for switch position 0 (Heidenhain/Siemens)

Mono-directional mode possible with:

- Infrared touch probe IRP25.50.

								
Received Signal	IRR91.42 OFF	IRR91.42 ON	Probe in Spindle (ON)	Probe deflected	ERROR during PROBE	LOW BATTERY	ERROR	Probe from Spindle (OFF)
PROBE	---	HIGH	HIGH	LOW	LOW (saved)	HIGH	HIGH	HIGH
READY	---	LOW	HIGH	HIGH	LOW	HIGH	LOW	LOW
LOW BATTERY	---	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	HIGH
LED	---	red	green	orange	red	red flashing	red	red

2.5 Activation/Deactivation of the Measuring System/Probe

2.5.1 Bi-directional Mode

INFORMATION
Measurement system activation by infrared signals.

INFORMATION
For bi-directional mode the following probes/tool setters can be used: <ul style="list-style-type: none"> ▪ Infrared touch probes IRP25.50 and IRP40.02; ▪ Pick up tool setter IRPT35.40; ▪ Infrared tool setter IRT35.70.

Switching ON the measurement system:

1. Load probe into spindle / position tool setter.
2. Switch ON signal from machine control to receiver.
3. Receiver switches on the measurement system using infrared signals.
4. Measurement system transmits READY signals to receiver.
5. Receiver passes electrical READY signal to machine control.
6. Measurement system ready to work .

Switching OFF the measurement system:

1. Machine control sends switch-off signal to receiver.
2. Receiver switches off the measurement system using infrared signals.
3. Receiver resets electrical READY signal on machine control.
4. Deposit probe in the magazine/remove tool setter.

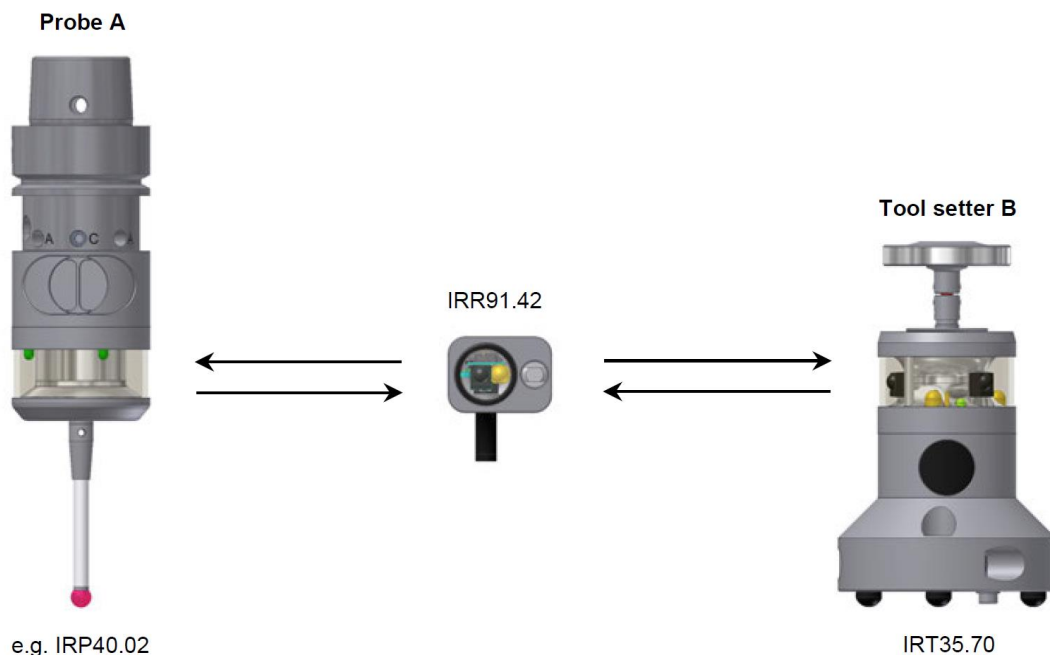
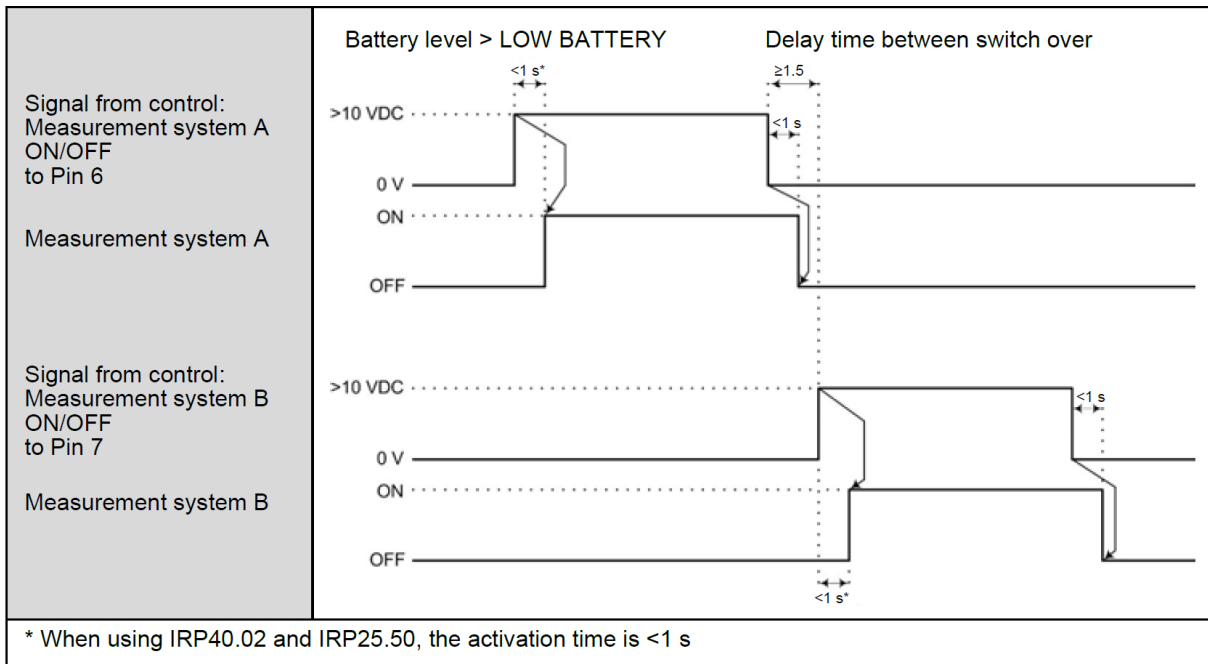


Figure 15 Measurement system activation in bi-directional mode

The following activation options are available with bi-directional activation.

Pin 6	Pin 7	Signal	Available measurement probes/systems
Low	Low	Probe OFF/Mono (HDR+, HDR+ Temp)	IRP25.50
High	Low	Activation A (HDR+, HDR+ temp)	IRP40.02, IRP25.50
Low	High	Activation B (HDR-bidi)	IRPT35.40, IRT35.70
High	High	Activation A (HDR+, HDR+ temp)	IRP25.50

The subsequent table shows the signal curves during probe/tool setter activation in bi-directional mode.



2.5.2 Mono-directional Mode

INFORMATION

Mechanical self activation of the probe.

INFORMATION

For mono-directional mode the following probes can be used:

- Infrared touch probe IRP25.50.

Switching ON the probe:

1. Load probe into spindle.
2. Probe switches ON by mechanical ON-OFF method.
 - AZ → Pullforce at SK-pullstud
 - ME → Switch ON mechanic into HSK
 - PS → Face switch on the HSK

- WS → Cooling water supply or spindle air blast
(Description of mechanical switch ON methods in the respective operating instructions.)
3. Probe transmits READY signal to receiver.
 4. Receiver passes electrical READY signal to machine control.
 5. Probe ready to work.

Switching OFF the probe:

1. Deposit probe in the magazine.
2. Probe switches OFF by itself.
3. Receiver resets electrical READY signal.

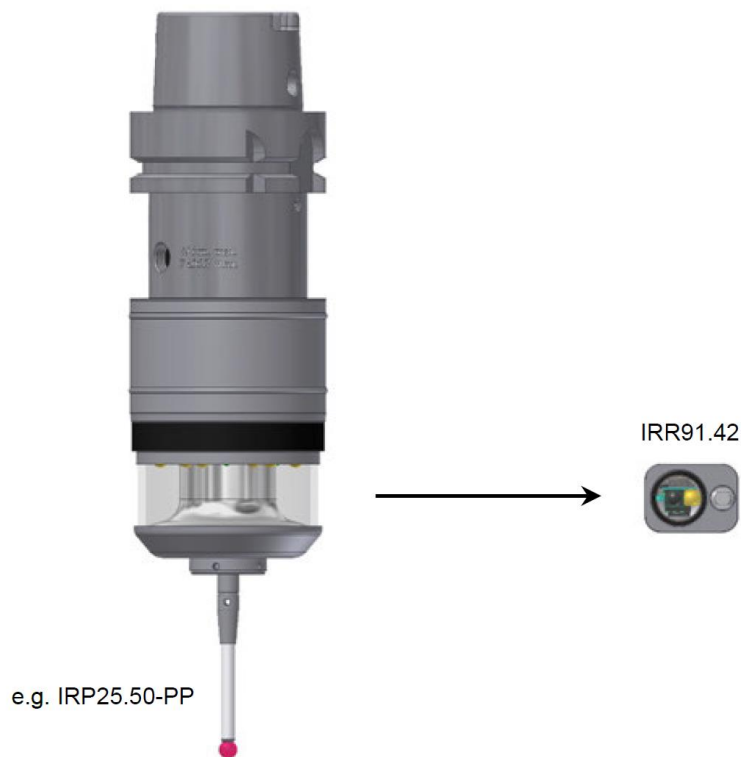


Figure 16 Probe activation in mono-directional mode

2.6 Temperature Measurement

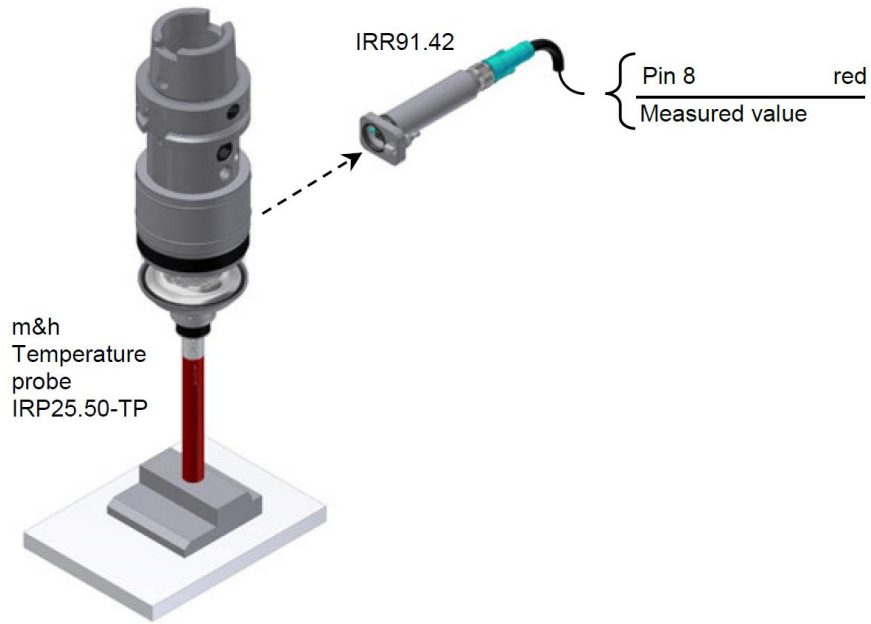


Figure 17 Temperature Measurement

Measuring Range	5~50 °C (5~14 mA)
Resolution	$\Delta 0,1 \text{ } ^\circ\text{C} \cong \Delta 20 \text{ } \mu\text{A}$

Temperature Calculation

$$(x \text{ mA} \times 5 \text{ } ^\circ\text{C}/\text{mA}) - 20 \text{ } ^\circ\text{C} = \text{Temperature in } ^\circ\text{C}$$

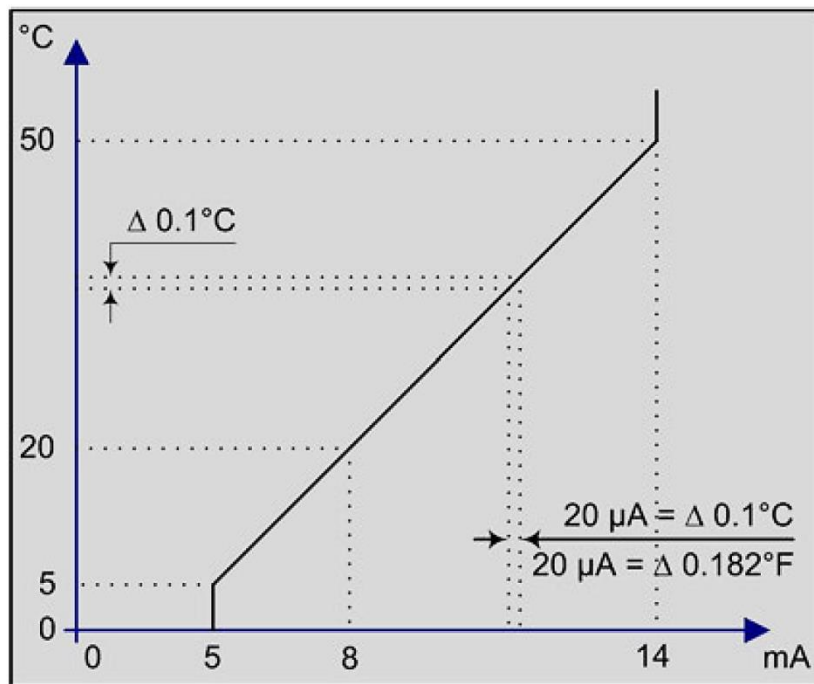


Figure 18 Temperature Characteristic of IRR91.42

2.7 Optical Indicators

2.7.1 Indicators in Bi-directional Mode

Blinking pattern	Meaning
Blue (5 s)	<ul style="list-style-type: none"> Receiver is initialised
Green flashing (1 Hz)	<ul style="list-style-type: none"> Receiver sends an ON signal for measurement system A with transmission protocol HDR+ No signals from measurement system
Green flashing (2 Hz)	<ul style="list-style-type: none"> Receiver sends an ON signal for measurement system B No signals from measurement system
Blue flashing	<ul style="list-style-type: none"> Receiver sends an ON signal for measurement system C with transmission protocol HDR+ or HDR+ temp No signals from measurement system
Red and green flashing	<ul style="list-style-type: none"> Receiver sends an OFF signal for measurement system A, B or C
Red flashing	<ul style="list-style-type: none"> Status: LOW BATTERY Measurement system transmits low battery warning Change measurement system batteries!
Green	<ul style="list-style-type: none"> Status: READY Receives signals from measurement system
Orange	<ul style="list-style-type: none"> Status: PROBE Measurement system deflected
Red	<ul style="list-style-type: none"> Status: ERROR No signals from probe Receiver power supply present
Green, orange and red flashing	<ul style="list-style-type: none"> Error: Short circuit of pin 3, 4 or 5 Error: Pin 8 wiring incorrect during temperature measurement Error: Signal transmission

2.7.2 Indicators in Mono-directional Mode

Blinking pattern	Meaning
Blue (5 s)	<ul style="list-style-type: none"> Receiver is initialised
Red	<ul style="list-style-type: none"> Status: ERROR No signals from probe Receiver power supply present
Red flashing	<ul style="list-style-type: none"> Status: LOW BATTERY Probe transmits low battery warning Change probe batteries!

Blinking pattern	Meaning
Green	<ul style="list-style-type: none"> Status: READY Receives signals from probe
Orange	<ul style="list-style-type: none"> Status: PROBE Probe deflected
Green, orange and red flashing	<ul style="list-style-type: none"> Error: Short circuit of pin 3, 4 or 5 Error: Pin 8 wiring incorrect during temperature measurement Error: Signal transmission

2.8 Cleaning the Glass Pane on the Receiver

When dirty, the glass pane on the receiver must be cleaned at regular intervals with compressed air from the air blow screw.



Figure 19 Cleaning the glass pane

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 Receiver**

Model / Type: **IRR91.42**

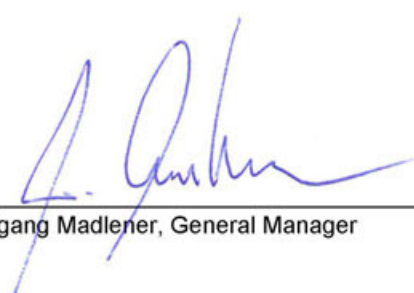
The product mentioned above meets the requirements of the following relevant directives / standards.

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 ISO 12100	2011	Safety of machinery - General principles for design - Risk assessment and risk reduction



Waldburg, 31.07.2017

Place, Date


Wolfgang Madlener, General Manager