HEXAGON

Operating Instructions

m&h Radio-wave Receiver

RC-R-100

Manual Version V01.00-REV01.00
Release Date 2021-03-23

Table of Contents

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 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

Risk of injuries due to electric shock!

When connecting the radio-wave receiver to the control, there is a danger of electric shock. Incorrect connection may result in unsafe usage of the radio-wave receiver.

- 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

Risk of injuries due to moving machine parts or defect compressed air lines!

When connecting compressed air lines there is a risk of injuries/eye injuries due to defect compressed air lines and uncontrolled moving machine parts.

- Installation of the radio-wave 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 radio-wave 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 Validity

This document is valid for the hardware available at the creation date of this document. The manufacturer reserves the right to make technical modifications.

1.2 Purpose

The radio-wave receiver RC-R-100 is used for reception of the measuring signals from the touch probe system RWP20.50-G and from the laser scanner LS-R-4.8.

1.3 Declarations and Approvals

1.3.1 Europe and UK (EC and UKCA Declarations of Conformity)

The EU and UKCA Declarations of Conformity can be found at the end of these operating instructions. If required, a copy of the signed original declarations of conformity may be requested from the address given on the back cover.

1.3.2 USA (FCC Declaration)

This device complies with Part 15 of the FCC. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the device is operated in a commercial environment. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In order to comply with FCC and IC RF Exposure requirements, the device must be installed and operated such that a minimum separation distance of 20 cm is maintained between the device and all persons during normal operation.

Changes or modifications not expressly approved by m&h Inprocess Messtechnik GmbH may void the FCC/RSS authorization to operate this equipment.

FCC ID: MFFRCR100, Contains FCC ID: R68XPICO200

1.3.3 Canada (IC /RSS Declaration)

English:

This device complies with Industry Canada licence-exempt RSS standard(s).
Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Français:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC: 5782A-RCR100, Contains IC: 3867A-XPICO200

1.3.4 China

This device has an RTA certificate (**R**adio Transmission Equipment **T**ype **A**pproval Certificate) issued by the SRRC (**S**tate **R**adio **R**egulatory **C**ommittee) for use in China.

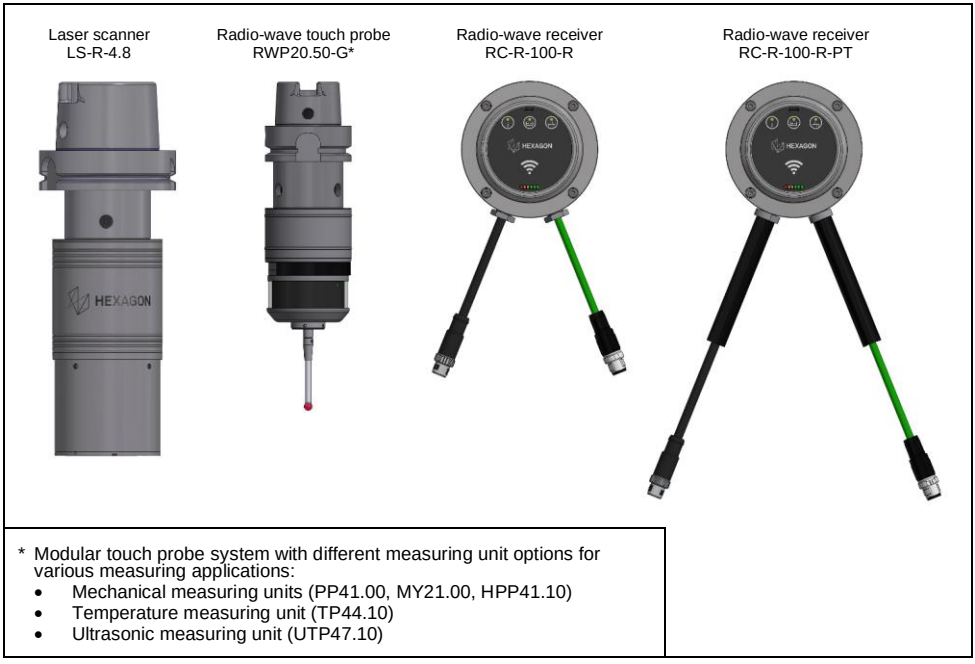
CMIIT ID: XXXXXXXXXX

1.3.5 Japan

This device has a certificate issued by the Japanese MIC (**M**inistry of **I**nternal Affairs and **C**ommunications) for use in Japan. This certification complies with the Japanese Radio Law:

㊣ R 202-LSI070

1.4 System Components



* Modular touch probe system with different measuring unit options for various measuring applications:

- Mechanical measuring units (PP41.00, MY21.00, HPP41.10)
- Temperature measuring unit (TP44.10)
- Ultrasonic measuring unit (UTP47.10)

Fig. 1 System Components

1.5 Technical Data

1.5.1 Technical Data RC-R-100

Transmission frequency	2400-2483.5 MHz (2.4 GHz) 5.18-5.24 GHz (WLAN 5GHz) (20 MHz channels 36, 40, 44, 48)
Transmission/reception range	Up to 15 m
Power supply	12 - 30 VDC, max. 400 mA* (*depending on the output load and the operating state)
Weight	RC-R-100-R = 1210 g (with cable) RC-R-100-R-PT = 1570 g (with cable and protection tube)
Temperature range	Operation: 10° - 50°C Storage: 5° - 70°C
Material	Stainless steel
Sealing	IP68: EN60529 IEC529/DIN40050
Installation(TD)	4x Cap head screws M4
Connecting cable	RC-R-100-R = 0.5 m with plug RC-R-100-R = 2 m with plug

1.5.2 Technical Data PC (Hardware Requirements for Laser Scanning)

CPU	Intel® Core™ i3-2100, 3 GHz
Graphics adapter	NVIDIA or AMD graphics adapter with at least 2 GB of RAM
RAM	4 GB dual channel DDR3-memory
Harddisk	15 GB free hard disk memory
Network	2 Ethernet ports (100Base-T) for RC-R-100 and CNC
Network (alternative)	1 Ethernet port (100Base-T) for RC-R-100 1 USB 3.0 port for CNC (with USB/Ethernet Adapter)
Operating system	Microsoft Windows 10 Professional (64 bit)
Rights management	Administrator rights for installation of "NC Measure"

1.6 Dimensions

1.6.1 Dimensions RC-R-100-R

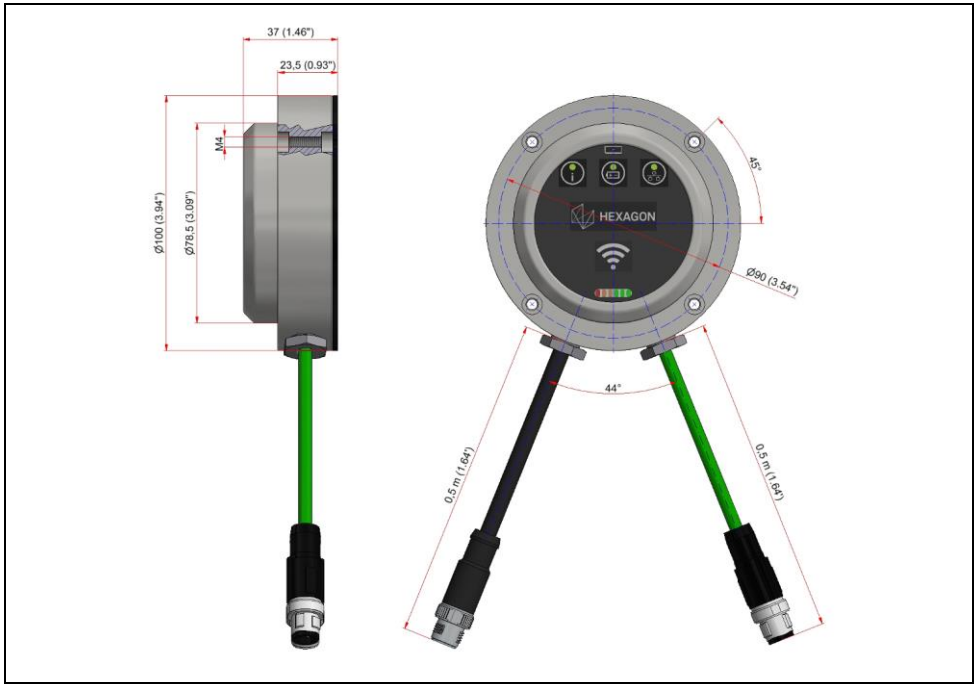


Fig. 2 Dimensions RC-R-100-R (cable outlet radial)

1.6.2 Dimensions RC-R-100-R-PT

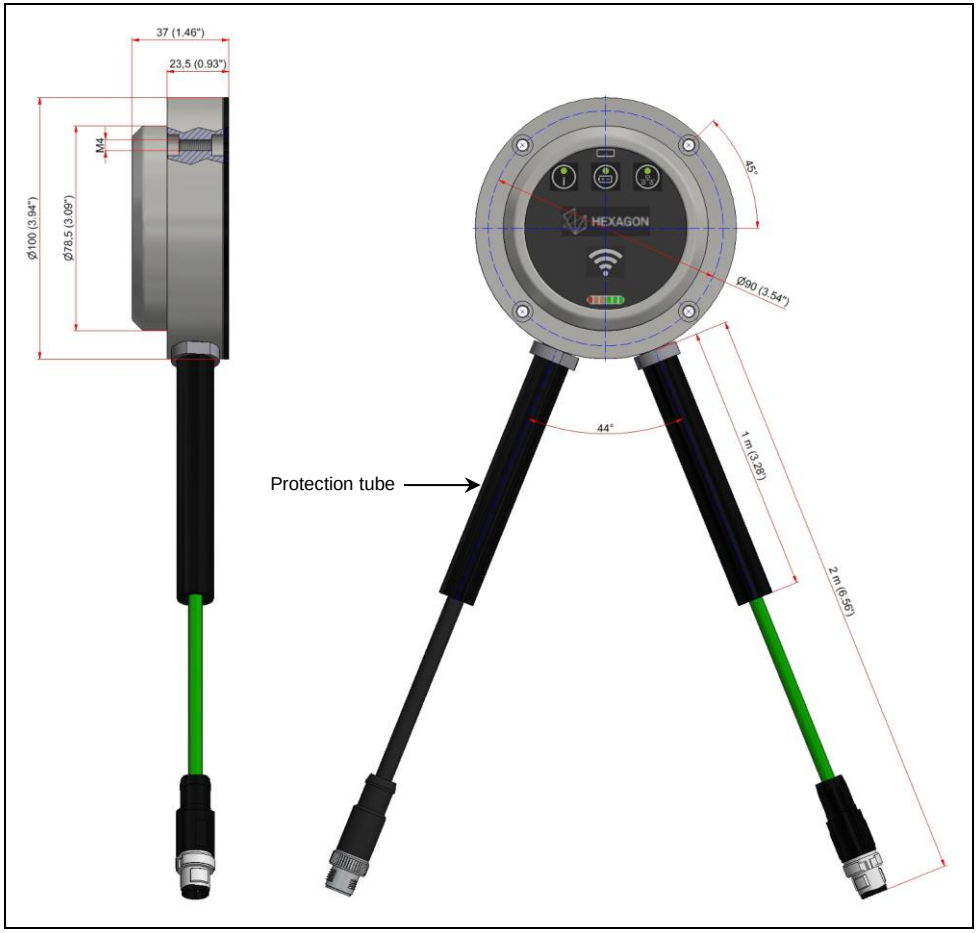


Fig. 3 Dimensions RC-R-100-R-PT (cable outlet radial)

1.7 Markings

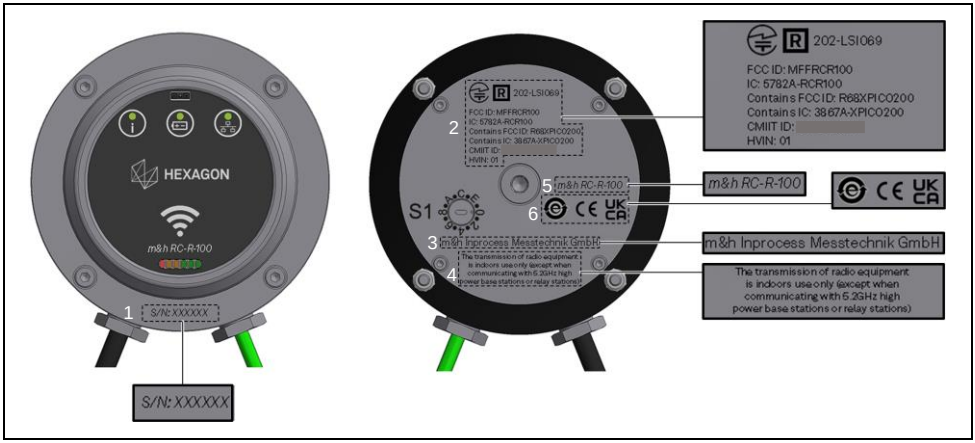


Fig. 4 Markings RC-R-100

Position	Labeling	Description
1	S/N: XXXXXX	Serial number of radio-wave receiver
2	202-LSI069 FCC ID: MFFRCR100 IC: 5782A-RCR100 Contains FCC ID: R68XPICO200 Contains IC: 3867A-XPICO200 CMIIT ID: HVIN: 01	Approval numbers for national radio approvals
3	m&h Inprocess Messtechnik GmbH	Registered applicant for radio licenses
4	The transmission of radio equipment is indoors use only (except when communicating with 5.2GHz high power base stations or relay stations)	Radio declaration for indoor use
5	m&h RC-R-100	Type description
6	CE UK CA	Conformity labels

1.8 Transmission and Reception Area

INFORMATION
The transmission/reception ranges shown below only apply under optimum operating conditions. For a secure signal transmission, measurement system and receiver must be located in the transmission area of the other device. The range for a secure signal transmission is up to 15 m.

It is recommended that the receiver is arranged so that the measurement system is within an angle of -30° to 30° relative to the receiver (see Fig. 5).

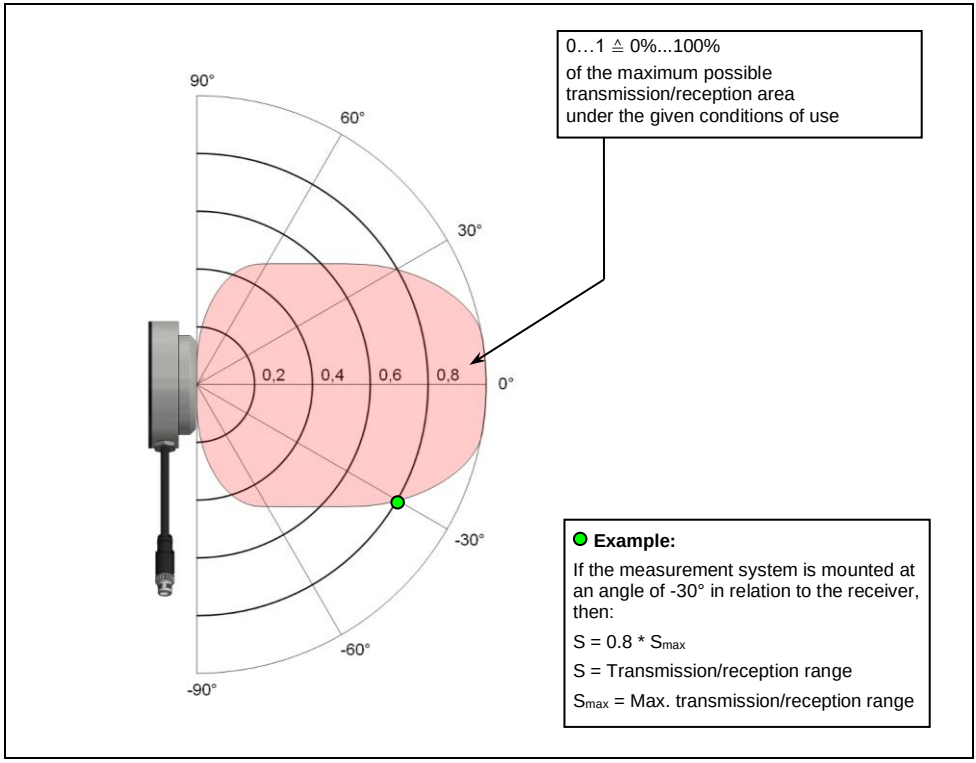


Fig. 5 Transmission and reception area (emission behaviour of antenna)

1.9 Delivery Contents, Accessories and Spares

1.9.1 Delivery Contents

Order Number	Description
RC-R-100-R#	Radio-wave receiver **RC-R-100-R** with connection cable (0,5 m)
RC-R-100-R-PT#	Radio-wave receiver **RC-R-100-R-PT** with connection cable (2 m) and protection tube (1 m)
	Mounting parts (**all versions**):
	4x Cap head screw DIN EN ISO 4762, M4x25 (5191)
	1x Gasket (Viton) (6204)
	4x Spring washer DIN128 (2012)
	4x Nut DIN EN 24032, M4 (0899)
	Additional mounting parts (only **RC-R-100-R-PT**):
	1x Threaded cable gland M25x1.5 (6282)
	1x Nut M25x1,5 (6283)

1.9.2 Accessories

Order Number	Description	Illustration
91.10-SI-UN	Connecting cable (L=2 m/6.6') with plug and wires for Siemens control	
91.10-FA-UN 91.10-FA-UN-15	Connecting cable (L=6 m/19.7' or L=15 m/49.2') with plug and wires for Fanuc High Speed Skip	
91.40-ST2-X12	Connecting cable (L=2 m/6.6') with plug and wires for Heidenhain (X12)	
35.40-ST2-X13	Connecting cable (L=2 m/6.6') with plug and wires for Heidenhain (X13)	
91.40-ST2-X112	Connecting cable (L=2 m/6.6') with plug and wires for Heidenhain iTNC 530 HSCI / TNC620/640 (X112)	
91.50-ST2-X112-DUO	Connecting cable (L=2 m/6.6') with plug and wires for Heidenhain iTNC 530 HSCI / TNC620/640 (X112)	
35.40-ST2-X113	Connecting cable (L=2 m/6.6') with plug and wires for Heidenhain iTNC 530 HSCI / TNC620/640 (X113)	
91.10-SE-UN	Connecting cable (L=2 m/6.6') with plug and wires for Selca control	
91.10-MI-UN	Connecting cable (L=2 m/6.6') with plug and wires for Mitsubishi control	

Order Number	Description	Illustration
H00028050	Sensor cable (M12/F12-W-L05) with plug and wires (L=5 m/16.4')	
H00028051	Sensor cable (M12/F12-W-L10) with plug and wires (L=10 m/32.8')	
H00028052	Sensor cable (M12/F12-W-L15) with plug and wires (L=15 m/49.2')	
H00028053	Sensor cable (M12/F12-W-L30) with plug and wires (L=30 m/98.4')	
H00028047	Ethernet cable (L=5 m/16.4')	
H00028048	Ethernet cable (L=10 m/32.8')	
H00028049	Ethernet cable (L=30 m/98.4')	
6407	Network adapter M12 D-Code/RJ45	
4069	Signal converter	
RC-R-ETHERNETPACK	Ethernet connecting pack., consisting of: • 1x Network adapter M12 D-Code/RJ45 (6407) • 1x Network adapter USB3.0/RJ45 (USB-ETHERNET-3G) • 2x Ethernet cable (L = 2 m/6.56') (H00027665)	not illustrated

1.9.3 Spares

Order Number	Description	Illustration
5191	Cap head screw DIN EN ISO 4762, M4x25	
3826	Cap head screw DIN EN ISO 4762, M5x12	
2012	Spring washer DIN128	
0899	Nut DIN EN 24032, M4	
6204	Gasket (Viton)	
6282	Threaded cable gland M25x1.5	
6283	Nut M25x1.5	
95.51-M	Mounting bracket with mounting parts: 2x Cap head screw DIN912 M4x25 (5191) 2x Cap head screw DIN912 M5x12 (3826) 2x Nut DIN EN 24 032 M4 (0899) 2x Spring washer DIN128 (2012)	

2 Operation

2.1 Mounting

2.1.1 General Instructions for Mounting

NOTICE
Risk of transmission faults! • Never mount the receiver in the vicinity of electrical components. • Mount the receiver as close as possible to the touch probe. • Preferably mount the receiver isolated from the machine for optimum reception.

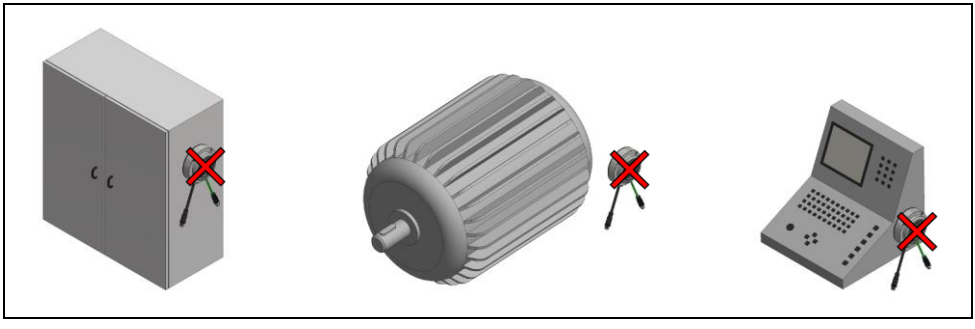


Fig. 6 Mounting Instructions

2.1.2 Mounting RC-R-100-R-PT

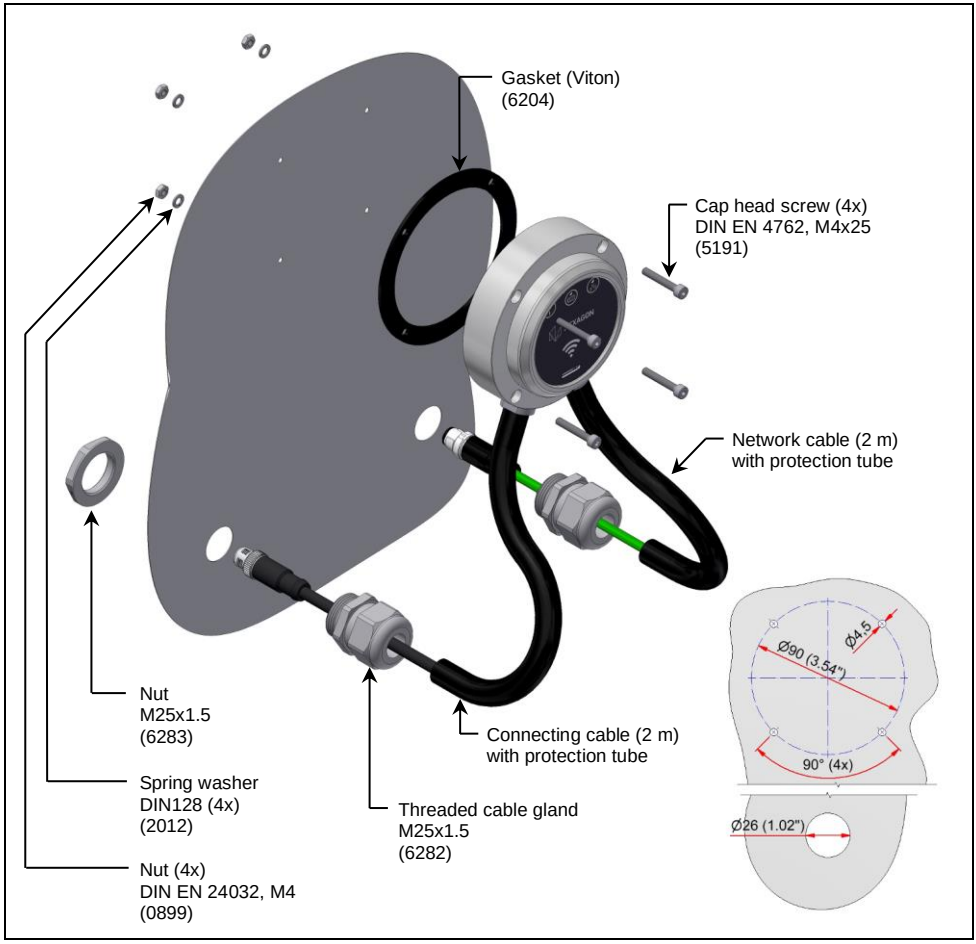


Fig. 7 **Mounting RC-R-100-R-PT**

2.1.3 Mounting RC-R-100-R / RC-R-100-R-PT with Mounting Bracket (machine wall, internal)

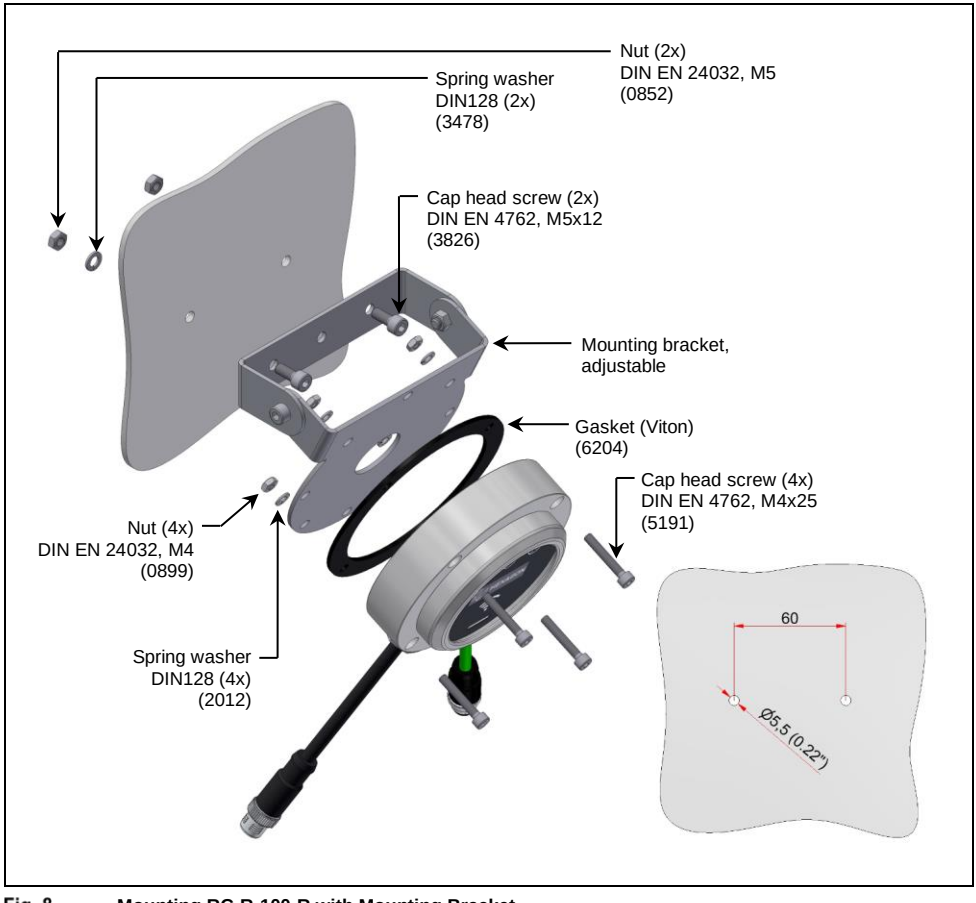


Fig. 8 **Mounting RC-R-100-R with Mounting Bracket**

2.1.4 Mounting RC-R-100-R (machine wall, external)

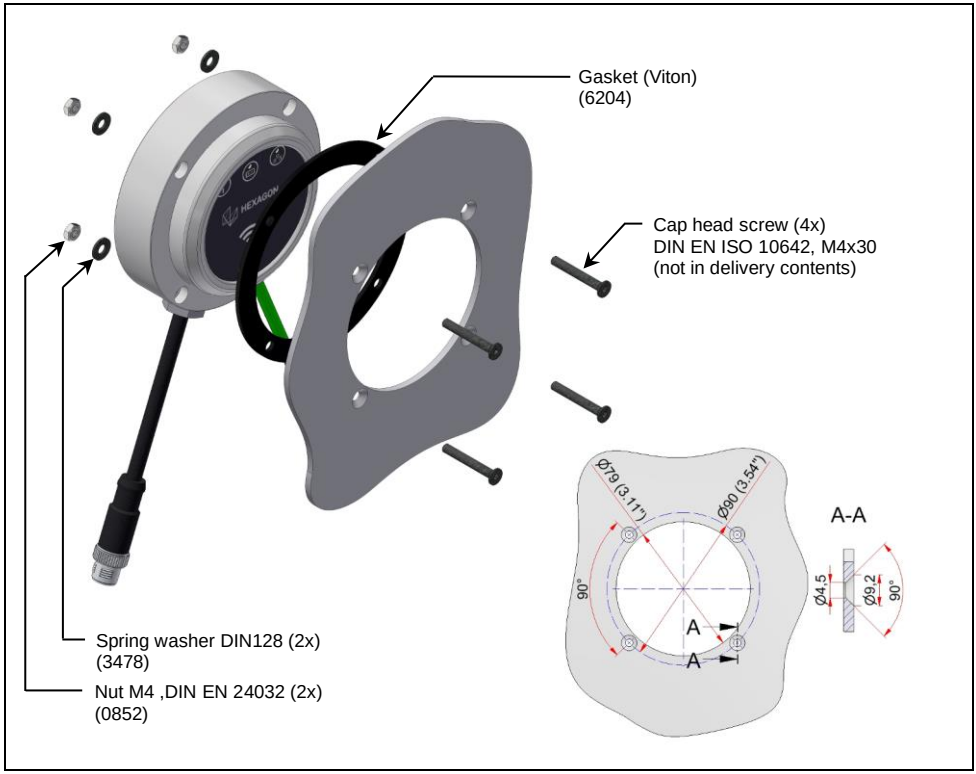


Fig. 9 Mounting RC-R-100-R (machine wall, external)

2.2 Connection

2.2.1 Overview over machine control/PC connections

2.2.1.1 Connections when using the laser scanner LS-R-4.8

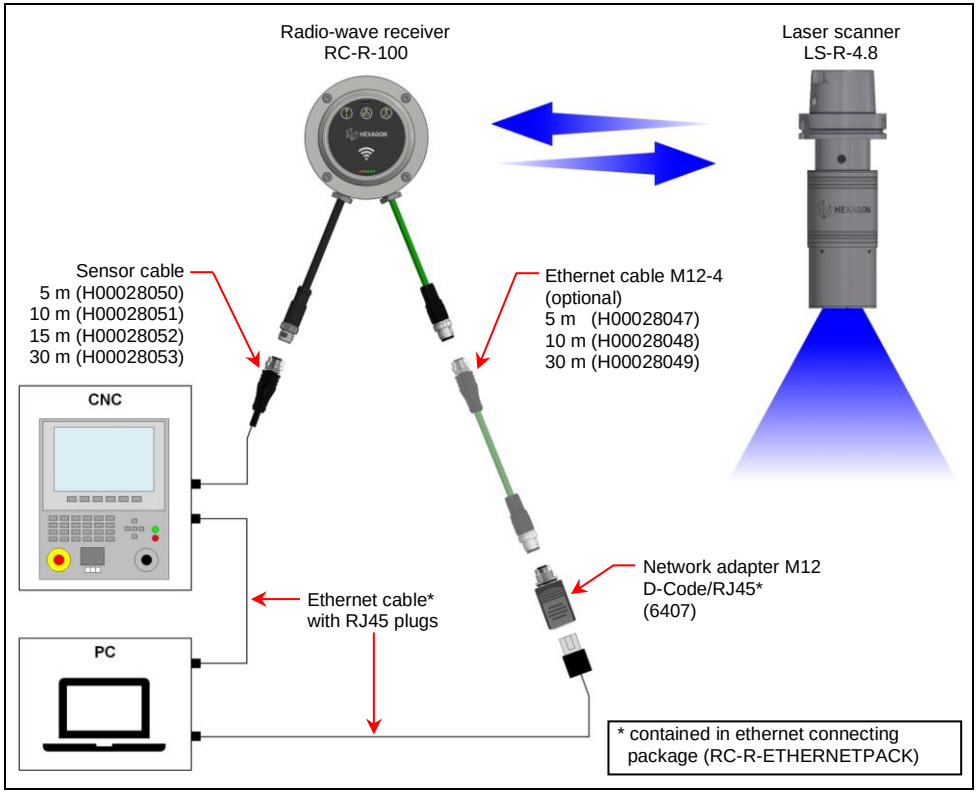


Fig. 10 Overview of connections when using the laser scanner LS-R-4.8

NOTICE

Risk of malfunctions due to poor network connection!

To ensure the best possible network connection, it is recommended to use a PC with 2 RJ45 network connections.
When using a PC with only one RJ45 network connection, a USB3.0/RJ45 adapter can be used to provide a second network connection on the PC. The following instructions must be observed to ensure reliable function of the laser scanner system.

- Always connect the PC to the radio-wave receiver via a direct network connection (without adapter).
- Connect the PC to the machine control using a USB3.0/RJ45 adapter.

2.2.1.2 Connections when using the radio-wave touch probe RWP20.50-G

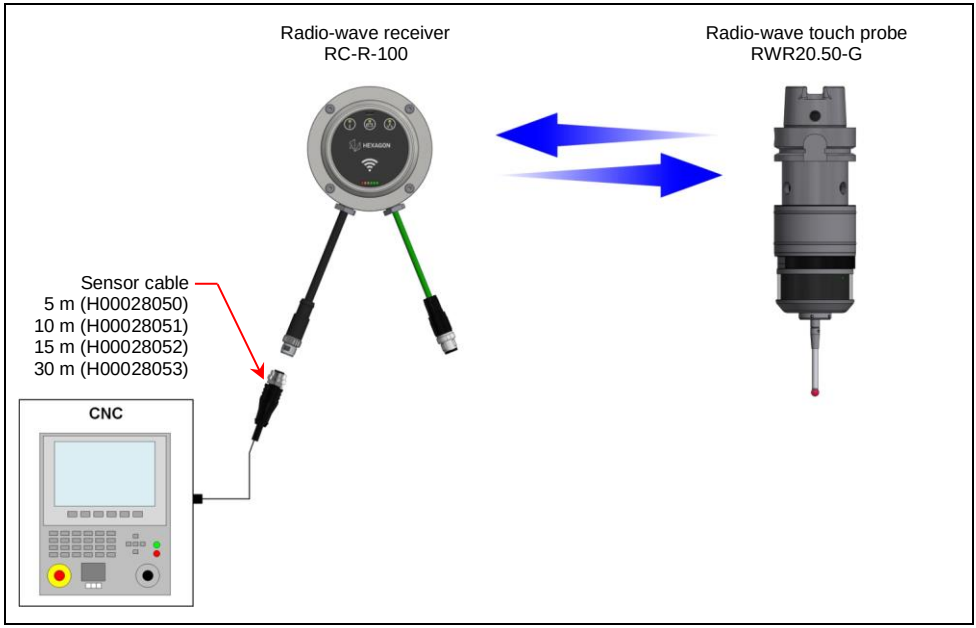


Fig. 11 **Connections when using the radio-wave touch probe RWP20.50-G**

2.2.2 Electrical connection to the machine control

INFORMATION
Wiring diagrams for specific controls and measurement-system combinations are available upon request.

NOTICE
Risk of material damage! • First set the output signals (refer to chapter 2.3.1), then connect pins 4, 5 and 6.

2.2.2.1 Sensor cable pin assignment (receiver)

Pin	Description
1	GND 0 V*
2	12-30 V*
3	ON/OFF (Bidi) / GND 0 V (Mono)
4	Probe (max. 40 mA)
5	READY (max. 40 mA)
6	LOW BATTERY (max. 40 mA)
7	Activation code Bit1 / Serial IN
8	Activation code Bit2 / Serial CLOCK
9	Activation code Bit3
10	Analog output / Serial OUT
11	not assigned
12	Signal Connection

☐ Input (signal from machine control)
☐ Output (signal to machine control)

*The signals can be switched to Pin 1/2. The receiver can be operated with both polarities.

Fig. 12 Electrical connection to the machine control

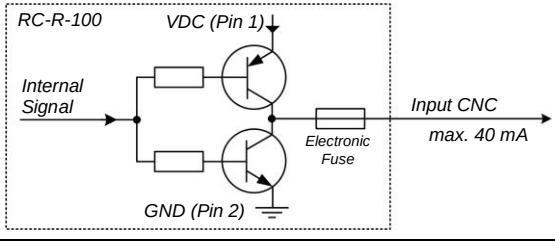
2.2.2.2 Overview of wire colours for the sensor cable

Pin	Description	Colour
1	GND 0 V*	brown
2	12-30 V*	blue
3	M code ON/OFF (Bidi) / GND 0 V (Mono)	white
4	Probe (max. 40 mA)	green
5	READY (max. 40 mA)	pink
6	LOW BATTERY (max. 40 mA)	yellow
7	Activation code Bit1 / Serial IN	black
8	Activation code Bit2 / Serial CLOCK	grey
9	Activation code Bit3	red
10	Analog output / Serial OUT	purple
11	not assigned	grey-pink
12	Signal Connection	red-blue

*The signals can be switched to Pin 1/2. The receiver can be operated with both polarities.

Fig. 13 Electrical connection Single Probe versions

2.2.2.3 Output Circuit Pin 4, 5 and 6



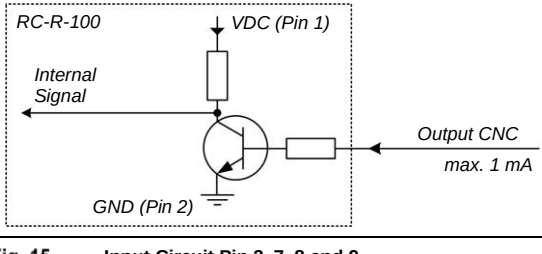
Circuit for outputs

- *Pin 4 = PROBE*
- *Pin 5 = READY*
- *Pin 6 = LOW BATTERY*

Low ≤ GND + 1.2 V
High ≥ VDC - 2 V

Fig. 14 Output Circuit Pin 4, 5 and 6

2.2.2.4 Input Circuit Pin 3, 7, 8 and 9



Circuit for inputs

- *Pin 3 = Measurement system ON/OFF*
- *Pin 7 = Activation code Bit 1*
- *Pin 8 = Activation code Bit 2*
- *Pin 9 = Activation code Bit 3*

Low < 3 V – min. GND 0 V
High > 10 V – max. 30 V

Fig. 15 Input Circuit Pin 3, 7, 8 and 9

2.2.2.5 Output Circuit, Temperature measurement Pin 10

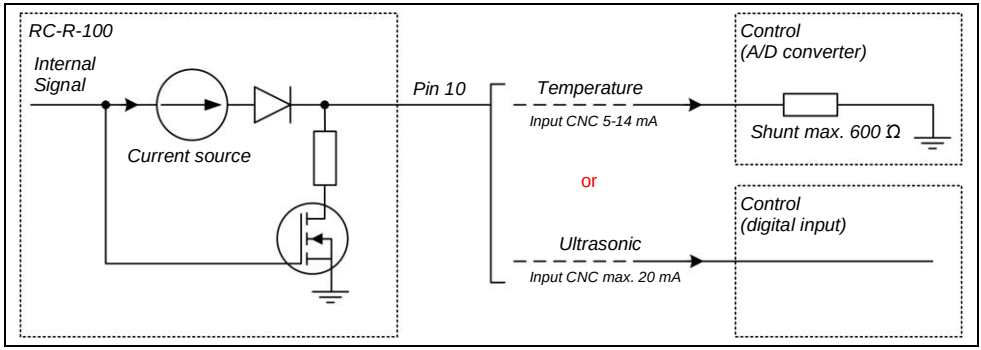


Fig. 16 Output Circuit, Temperature/Ultrasonic Measurement Pin 10

2.2.2.6 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 12:

- ERROR causes PROBE

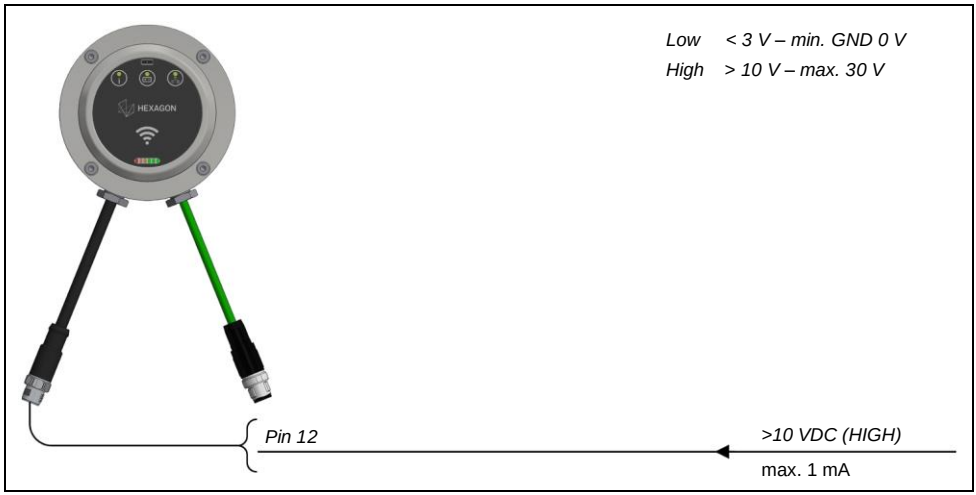


Fig. 17 Signal Connection

2.3 Output Signals

2.3.1 Setting the Behaviour of the Output Signals

The behaviour of the output signals is set using a rotary coding switch on the read of the device. The setting only takes effect after a restart of the receiver.

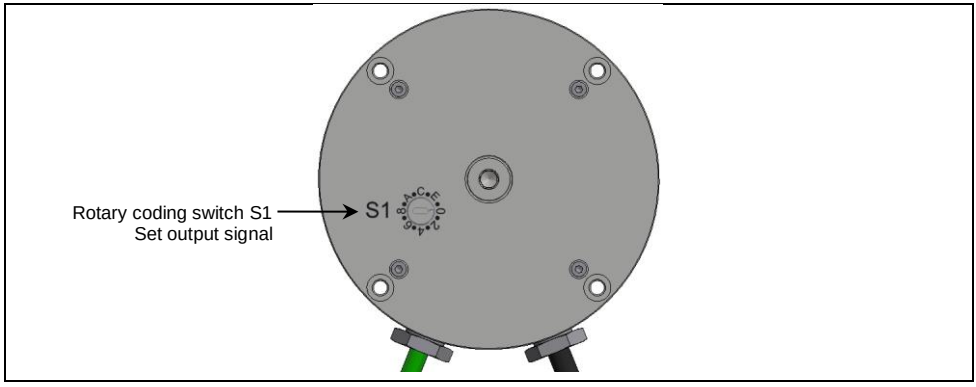


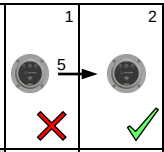
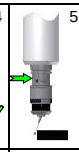
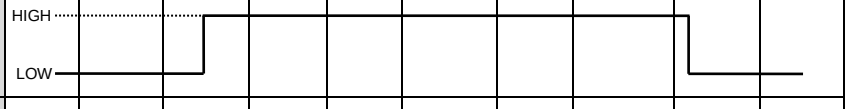
Fig. 18 Setting of output signal with the rotary coding switch

2.3.2 Overview of Output Signal Settings

Configuration	PROBE	ERROR	LOW BATTERY	Control
0*)	HIGH→LOW	HIGH→LOW	HIGH→LOW	Heidenhain/Siemens
1	HIGH→LOW	HIGH→LOW	LOW→HIGH	Fanuc Ordinary Skip / Siemens
2	HIGH→LOW	LOW→HIGH	LOW→HIGH	Fanuc Ordinary Skip / Siemens
3	LOW→HIGH	LOW→HIGH	LOW→HIGH	Fanuc Ordinary Skip / Siemens
4	LOW→HIGH	LOW→HIGH	HIGH→LOW	Fanuc Ordinary Skip / Siemens
5	LOW→HIGH	HIGH→LOW	HIGH→LOW	Fanuc Ordinary Skip / Siemens
6	LOW→HIGH	HIGH→LOW	LOW→HIGH	Fanuc Ordinary Skip / Siemens
7	HIGH→LOW	LOW→HIGH	HIGH→LOW	Fanuc Ordinary Skip / Siemens
8	LOW→OPEN	HIGH→LOW	HIGH→LOW	Fanuc High Speed Skip
9	OPEN →LOW	HIGH→LOW	LOW→HIGH	Fanuc High Speed Skip
A	HIGH→ OPEN	LOW→HIGH	LOW→HIGH	Fanuc High Speed Skip
B	LOW→ OPEN	LOW→HIGH	LOW→HIGH	Fanuc High Speed Skip
C	LOW→ OPEN	LOW→HIGH	HIGH→LOW	Fanuc High Speed Skip
D	OPEN →LOW	HIGH→LOW	HIGH→LOW	Fanuc High Speed Skip
E	LOW→ OPEN	HIGH→LOW	LOW→HIGH	Fanuc High Speed Skip
F	OPEN →LOW	LOW→HIGH	HIGH→LOW	Fanuc High Speed Skip
*) Setting for standard delivery				

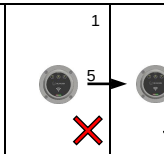
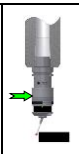
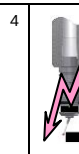
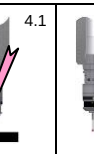
2.3.3 Signal Diagram for Touch Probe in Bi-directional Mode

Example of output signal "0" (Heidenhain/Siemens)

	1	2	3	4	5	5.1	6	7	8	9
										
Received Signal	RC-R-100 OFF	RC-R-100 ON	Switching ON procedure	Touch probe ON	Touch probe deflected	ERROR during PROBE	LOW BATTERY	ERROR	Switching OFF procedure	Touch probe OFF
PROBE	---	HIGH	HIGH	HIGH	LOW	HIGH	HIGH	HIGH	HIGH	HIGH
READY	---	LOW	LOW	HIGH	HIGH	LOW	HIGH	LOW	LOW	LOW
LOW BATTERY	---	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	HIGH	HIGH
Pin 3 Measurement system ON										
		red	green flashing	green	orange	red	green	red	red	red
							red			

2.3.4 Signal Diagram for Touch Probe in Mono-directional Mode

Example of output signal "0" (Heidenhain/Siemens)

	1	2	3	4	4.1	5	6	7
								
Received Signal	RC-R-100 OFF	RC-R-100 ON	Touch probe in Spindle (ON)	Touch probe deflected	ERROR during PROBE	LOW BATTERY	ERROR	Touch probe from Spindle (OFF)
PROBE	---	HIGH	HIGH	LOW	HIGH	HIGH	HIGH	HIGH
READY	---	LOW	HIGH	HIGH	LOW	HIGH	LOW	LOW
LOW BATTERY	---	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	HIGH
		red	green	orange	red	green	red	red
						red		

2.4 Pairing a Measuring System ("Pairing Mode")

Each RC-R-100 receiver is able to control the addresses of **8 bi-directional** measurement systems (Activation code A-H). These measurement systems are assigned in the so-called **"Pairing mode"**. Pairing mode is started by the measurement system and the precise procedure for assignment is described in the operating instructions for the relevant measurement system.

2.4.1 Pairing a Touch Probe

With **bi-directional activation**, a touch probe is assigned either via the integrated **IrDA interface** or via the radio-wave connection, after **entering the serial number of the receiver** on the touch probe. The address of the receiver is uniquely assigned to the touch probe and the address of the touch probe to the receiver.
Should another touch probe be assigned the same activation configuration (A-H) as a touch probe already assigned at a later time, then the address of the touch probe first assigned is deleted in the receiver and the address of the new touch probe is saved.
If a touch probe that has already been paired is paired with another set activation code, the previous pairing will be deleted. This means that it is not possible to pair a touch probe more than once using different activation codes.

With **mono-directional activation**, the address of the touch probe is also assigned to the receiver in "pairing mode". Any number of mono-directional touch probes can be operated by only one receiver. They only have to be paired once with their first use and are automatically detected by the receiver with subsequent use.

2.4.2 Pairing a laser scanner

In principle, a laser scanner is assigned similar to the assignment of a bi-directional activated touch probe. However, pairing is **not** possible via the IrDA interface. Transmission of the pairing information from the laser scanner to the receiver is generally performed **using the radio-wave connection**. The pairing data (serial number of the receiver, activation code) is entered on the laser scanner using a RAW IR stick connected to a PC and the associated software. After transmitting the pairing data to the laser scanner, radio-wave pairing is initiated and once completed, a corresponding message is displayed in the user interface of the software tool.

2.5 Automatic Frequency Assignment for Data Transmission

Blocking of Faulty Frequencies:

Providing the receiver is in "ERROR" status (no active connection between the measuring system/receiver), the receiver checks the environment for radio interference and evaluates the available frequencies in terms of their suitability for communication with the measuring system (signal quality). This enables all radio interference to be detected within a short time. Should a measuring system now be activated bidirectionally or should a mono-directionally activated measuring system issue a communication request, then the receiver assigns it to a transmission frequency with as small an interference range as possible.

Release of Frequencies:

If it is in "ERROR" status (no active connection between the measuring system/receiver), the receiver continues to always check the environment and constantly evaluates the frequencies. Therefore with new or additional communication requests, frequencies previously classified as poor can also be assigned, as the environmental situation (interference) has now been able to be improved.

2.6 Activation/Deactivation of the Measuring System

2.6.1 Touch probe/laser scanner in bi-directional mode

INFORMATION
In "ERROR" mode, the receiver scans the entire frequency range available to it for interference and internally evaluates the available frequency bands for their quality. If a measurement system (**touch probe or laser scanner**) is activated with a radio-wave signal, then the information is simultaneously transmitted with the activation signal about which frequency band communication is to be made (best quality). The transmission is a semi-duplex transmission, i.e. the signal transmission takes place alternately in both directions.

1. Switching ON the measurement system:
   - 1.1 Load the measurement system
   - 1.2 Machine control transmits switch ON signal and activation code to receiver.
   - 1.3 Receiver switches measurement system on by radio-wave signal and transmits the optimum frequency band for further communication.
   - 1.4 Measurement system transmits "READY" signals to receiver.
   - 1.5 Receiver transmits "READY" signal to machine control.
   - 1.6 Measurement system ready for use.
2. Switching OFF the measurement system:
   - 2.1 Machine control sends switch-off signal to receiver.
   - 2.2 The measurement system automatically switches to Standby mode as soon as no transmission confirmation from the receiver is registered.

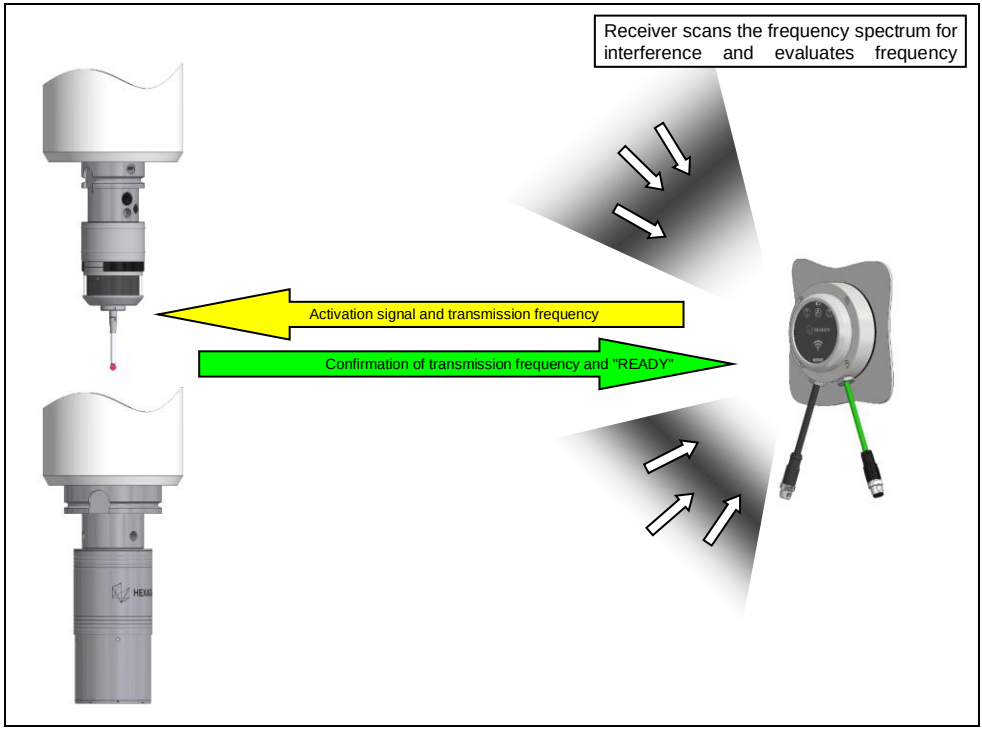
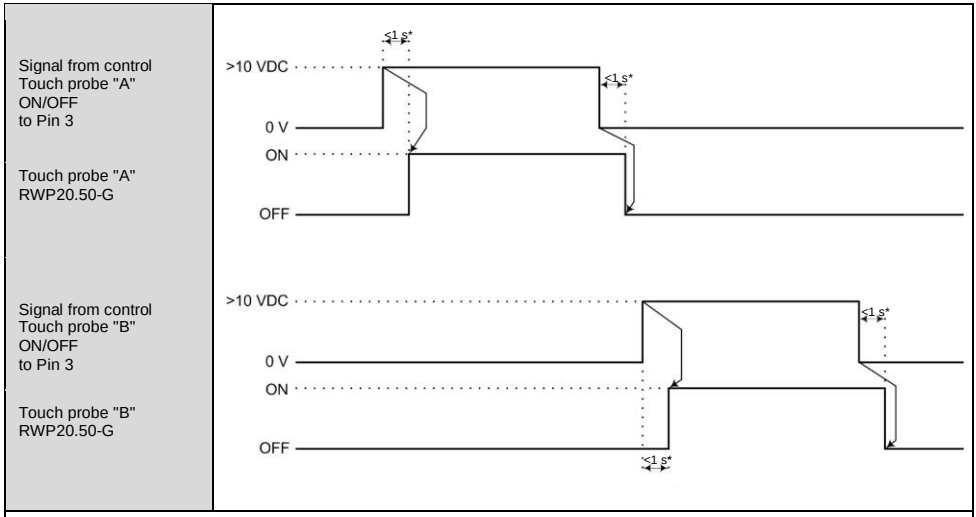


Fig. 19 Measurement system activation in bi-directional mode

The touch probe RWP20.50-G and the laser scanner LS-R-4.8 can be activated and deactivated by the radio-wave receiver RC-R-100. Once the M code has been set, the relevant measurement system will be activated in < 1 s* and deactivated again < 1 s* after reset. When **activating the laser scanner** LS-R-4.8, **an additional 10 seconds** are required to establish the **WLAN connection** for measurement data transmission.
The subsequent table shows the signal curves during measurement system activation in bi-directional mode:



* When activating the LS-R-4.8, an additional 10 seconds are required to establish the WLAN connection

Fig. 20 Signal curves during measurement system activation in bi-directional mode

INFORMATION
The activation code set with the connection pins 7, 8 and 9 does not take effect, until the measurement system is activated via connection pin 3. The activation code **must** therefore be set before activating the measurement system!

Set the activation code of the measurement system on the receiver:

In order to establish a connection between the RC-R-100 radio-wave receiver and a measurement system (RWP20.50-G/LS-R-4.8), the receiver must be set to the activation code of the measurement system (A-H). To do this, the connection pins 7, 8 and 9 of the receiver must be wired according to the following table:

	Measurement system activation code							
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Pin7 (Bit 1)	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Pin 8 (Bit 2)	LOW	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH
Pin 9 (Bit 3)	LOW	LOW	LOW	LOW	HIGH	HIGH	HIGH	HIGH

INFORMATION
The activation code set with the connection pins 7, 8 and 9 does not take effect, until the measurement system is activated via connection pin 3. The activation code **must** therefore be set before activating the measurement system!

The exact procedure for setting the activation code of the measurement system or for checking the existing setting is described in the RWP20.50-G or LS-R-4.8 operating instructions.

2.6.2 Touch Probe in Mono-directional Mode

INFORMATION
Mechanical self activation of the probe. • Activation time <0.35 s

1. Switching ON the touch probe:
   - 1.1 Load probe into spindle.
   - 1.2 Probe switches ON by mechanical ON-OFF method:
     - AZ → Pullforce at SK-pullstud
     - ME→ Switch ON mechanism in HSK
     - WS→ Cooling water supply or spindle air blast

     (Description of mechanical switch ON methods in the respective operating instructions)
   - 1.3 Probe transmits Wake-Up signal to receiver.
   - 1.4 Receiver transmits transmission frequency to be used to probe.
   - 1.5 Probe sends confirmation of transmission frequency and "READY" signal to receiver.
   - 1.6 Receiver passes electrical READY signal to machine control.
   - 1.7 Probe ready to work.
2. Switching OFF the touch probe:
   - 2.1 Remove the probe from the spindle to switch off the probe.

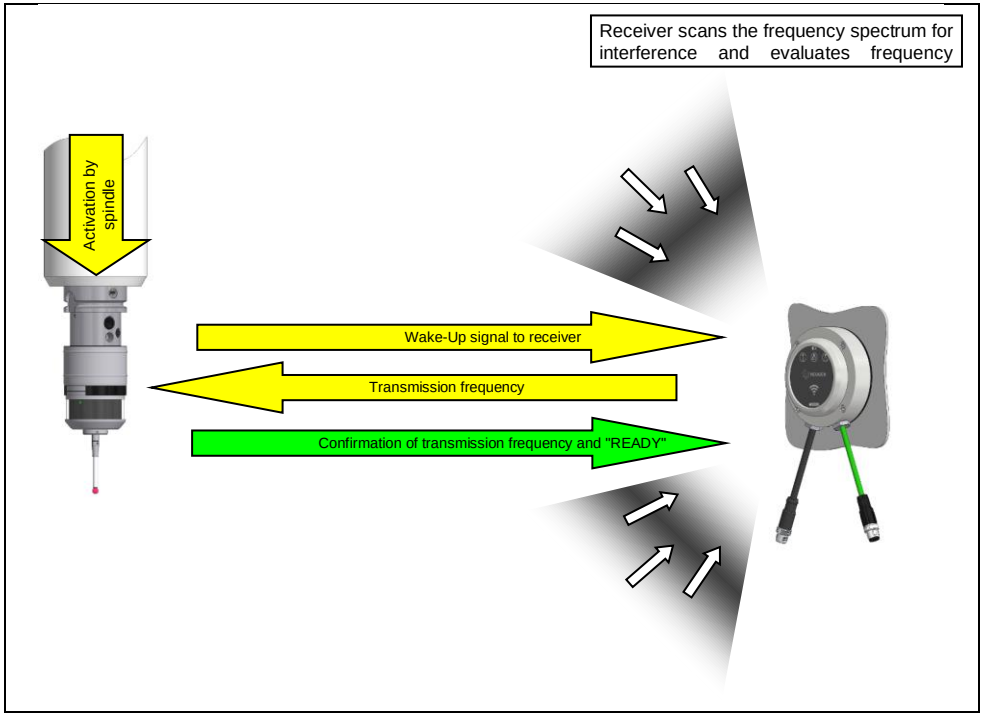


Fig. 21 Activation of the measurement system in mono-directional mode

2.7 Temperature Measurement

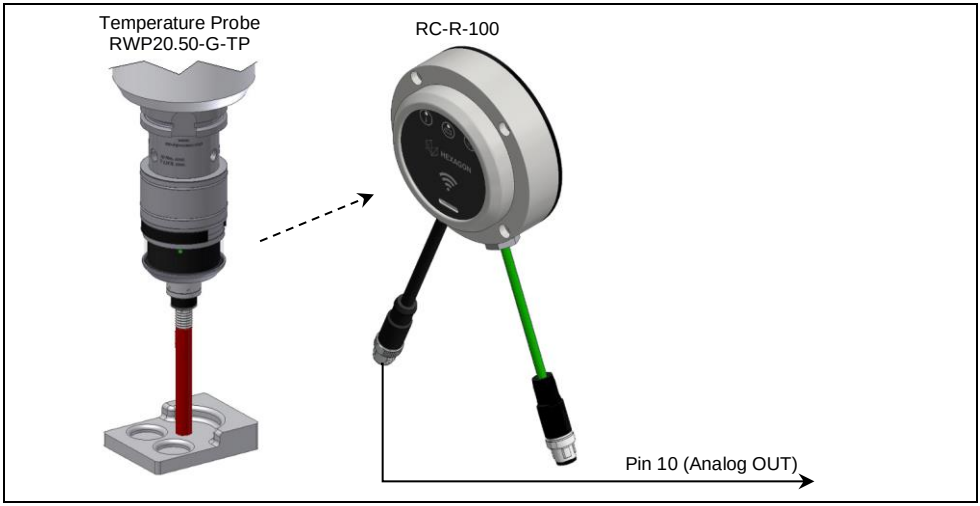


Fig. 22 Temperature Measurement

Measuring Range	5 - 50°C (5-14 mA)
	41 - 122°F (5-14 mA)
Resolution	Δ 0.1°C = 20 µA
	Δ 0.182°F = 20 µA

Temperature Calculation:
(x mA * 5°C/mA) - 20°C = Temperature in °C
(x mA * 9°F/mA) - 4°F = Temperature in °F

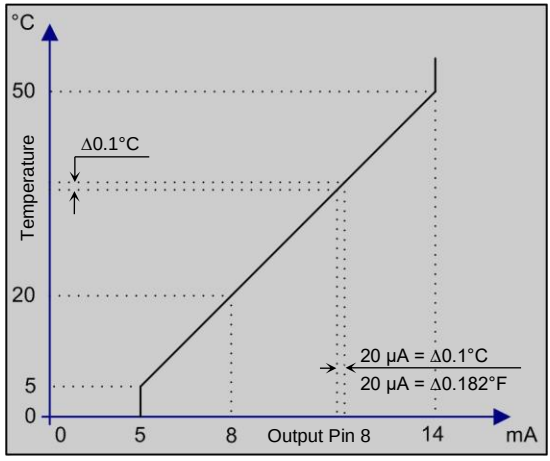


Fig. 23 Temperature Characteristic of RC-R-100

2.8 Ultrasonic measurement

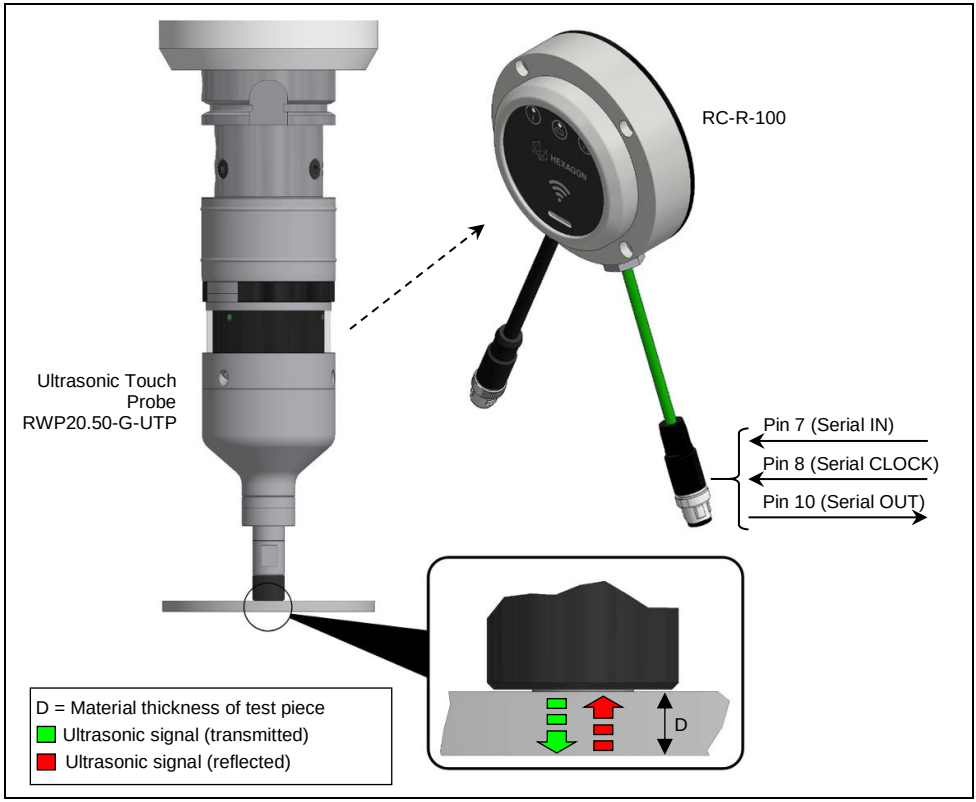


Fig. 24 Ultrasonic measurement

Accuracy and Measuring Range:

The accuracy and measuring range of ultrasonic measurement depend on the material to be measured, the calibration and the selected probe head.

2.9 Laser scanning

During laser scanning, data is transmitted from the laser scanner to the radio-wave receiver on 2 paths. The laser scanner is activated/deactivated by the receiver, and the operating parameters ("READY", "PROBE", "LOW BATTERY") of the laser scanner are transmitted to the receiver via a 2.4 GHz radio-wave connection. The scan data (measurement data) are transmitted via an additional WLAN connection, which is automatically set up once during pairing (see chapter 2.4.2). The scan data are then forwarded via a network connection from the receiver to a PC, where they can be processed/evaluated in real time using the NC Measure evaluation software.

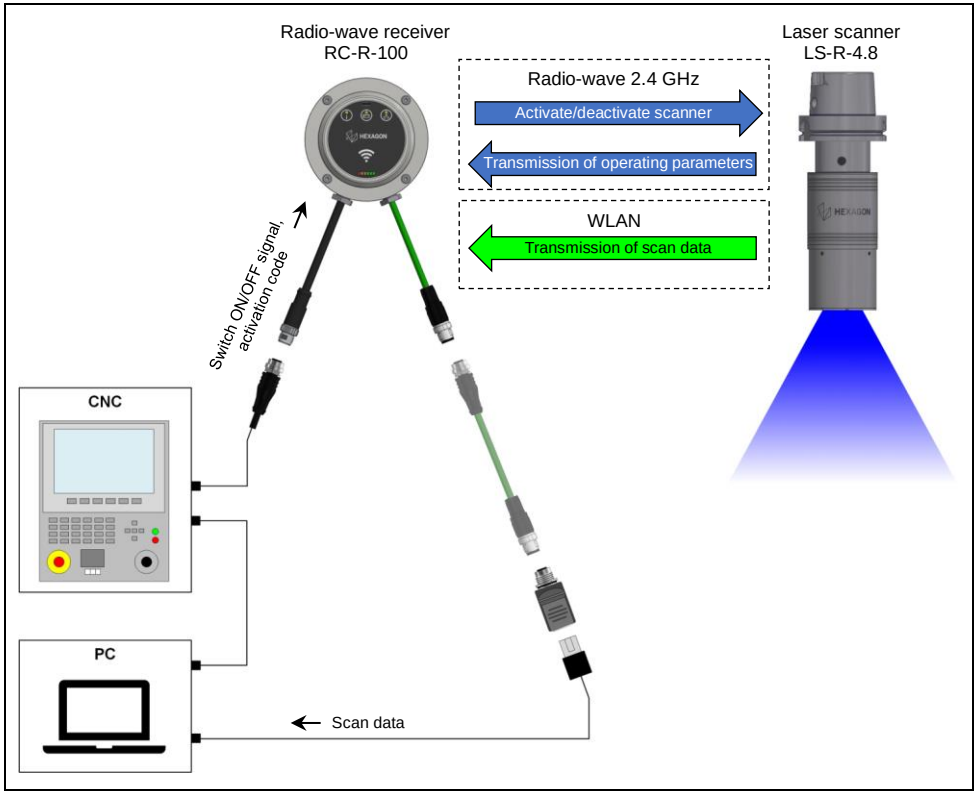


Fig. 25 Data transfer during laser scanning

2.10 Optical Indicators

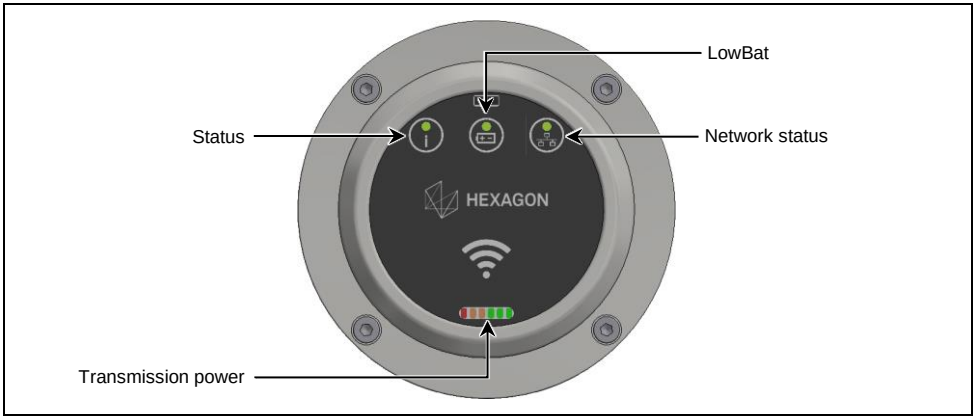


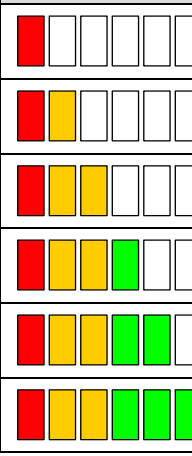
Fig. 26 LED Indicators of RC-R-100

2.10.1 Operating status indicators

Status	Status	LowBat	Network*
• Initialisation (5 s after start)			
• Inactive status of measurement system • Status: ERROR			
• Activation of measurement system (only in bi-directional mode)			
• Receives signals from measurement system • Status: "READY"			
• Measurement system deflected • Status: PROBE			
• LOW BATTERY measurement system • Status: LOW BATTERY			

* When the network connection is successfully established, the network status display lights up green.
If this indicator light goes out or lights up in a different colour, there is a network connection error.

2.10.2 Transmission Power Indicator

Transmission/Reception Power	Indicator
Poor  Optimum	

2.10.3 Status-LED Error Outputs

Status	Status	LowBat	Network
• Short circuit Pin 4, 5, 6 ▶ Check circuit of pin 4, 5, 6			
• No touch probe has been applied/paired for the selected activation code			
• Error during first probing ▶ Repeat measurement			

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:	**Radio-wave receiver**
Model / Type:	**RC-R-100**

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
2014/53/EU	2014	Making radio equipment available on the market
2014/30/EU	2014	Electromagnetic compatibility
EN 61326-1	2013	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1
EN 61326-2-2	2013	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2
EN 55011	2016	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
ETSI EN 300328	2019	Wideband transmission systems - Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques
ETSI EN 301489-1	2020	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1
ETSI EN 301489-3	2019	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 3
ETSI EN 301489-17	2017	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 17
EN 12100	2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 62368-1	2014	Audio/video, information and communication technology equipment - Part 1: Safety requirements

CE

Waldburg, 28.05.2021

Place, Date

Wolfgang Madlener, General Manager

UKCA Declaration of Conformity

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ETSI EN 301489-3	2019	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 3
ETSI EN 301489-17	2017	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 17
BS EN 12100	2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
BS EN 62368-1	2015	Audio/video, information and communication technology equipment - Part 1: Safety requirements

UK CA

Waldburg, 28.05.2021

Place, Date

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