

# Wireless Batterless Device Instructions

## AVAILABLE RECEIVER DEVICES

RRH9 → 902MHz receiver for wireless batteryless transmitters

## DEVICES IDENTIFICATION

RRH devices are equipped with a side label with all the identity information, including the device serial number.

## TRANSMISSION PROTOCOL

The transmission between transmitter and receiver is performed with ENOCEAN communication protocol. The signal generation is made without batteries generating energy from motion during the device actuation. The transmission uses an operating frequency 902MHz for RFH9 and RRH9 devices.



## REFERENCE DIRECTIVES AND REGULATIONS

FCC Regulation PART 15B (RRH9) - ICES-003 Regulation (RRH9) - RoHS2 Directive 2011/65/CE + UE 2015/863  
Delegate Directive - REACH Regulation

## VALIDATIONS AND APPROVALS

UL according to UL 508 → cULus LISTED - NKCR - E189258  
FCC SDoC (RRH9) → SDoCFCC01 download on [www.comepi.eu](http://www.comepi.eu)  
IC SDoC (RRH9) → SDoCIC01 download on [www.comepi.eu](http://www.comepi.eu)  
FCC (RFH9) → Contains FCC ID SZV-PTM330U  
IC (RFH9) → Contains IC ID 5713A-PTM330U

## LIMIT OF USE

Do not use the device in safety applications preventing dangerous situations for people and equipment. Do not use in environments where continuous changes of temperature take place, where it is possible that condensation inside the device can be formed. Do not use in working areas non-compatible with the IP protection degree of the device. Do not install in presence of flammable dust or gas. Do not use above or below the specified operating temperature limits. Do not use in presence of corrosive chemical agents that can damage the hardware of the device. Use the device in full respect of the standards in forces. Following the installation instructions and stay within the limit of use. In case of non-compliant use, not following the instructions for use, installation and maintenance provided by unqualified people and functional tests omission, the vendor is excluded from any responsibility.

## ENVIRONMENTAL RATINGS

The device is design for application inside the electrical panel EN 60529 protection degree is IP20. Room air temperature limits during operations 0°C ... +55°C. The upper temperature limit expected from UL requirements according to UL508 is +40°C.

## DEVICE INTERFACE AND WIRING

The device is equipped with six signaling LEDs. The PWR LED indicates the proper connection to supply the 24Vdc voltage. The CH1 - CH2 - CH3 - CH4 LEDs show the current state of the relay outputs: they light up when the corresponding relay is closed. The SIGN LED gives a feedback on the received signal intensity. The device is equipped with a CONFIG button to set the operating modes and properly configure the device. The device is equipped with screw terminals to for the conductor connections.

Min. and max. allowed conductor sections: 0.14mm<sup>2</sup> ... 2.5mm<sup>2</sup>

Conductor stripping or cable terminal length: 7mm

Before the wiring operations make sure that the supply voltage is off on the device. At the end of wiring verify that the terminals are free from external contaminating objects and that all the connected wires are firmly fixed to the terminals. During and after installation do not pull on the wired conductors. If improper tractions are applied on the device some serious damage can happen.

Before putting the device on service verify that the supply values are suitable with the ones reported here: 24Vdc (-15%...+10%) - Max 0.5A

## DEVICE OUTPUTS

RRH9 receivers are equipped with four independent relay outputs. A single transmitter can be associated to more outputs and the same output can manage more than one associated transmitter. The output contact is an electromechanical relay in NO configurations, with following electrical rated values:  $U_i = 250V$  -  $U_e/I_e = 250Vac/3A$  -  $U_{imp} = 2,5kV$  - Utilization Categories AC-15 DC-13 according to EN 60947-5-1

## POWER-ON PROCEDURE

Power up the device, when the supply voltage is correct the CH1 - CH2 - CH3 - CH4 LEDs light up. Their shutdown signal that the device is ready to be used in operating mode. Supply voltage: 24Vdc (-15%...+10%)

Use only a supply voltage given by a 24Vdc power supply to conform to the reference Directives. Do not connect directly to the main power supply.

## DEVICE PRE-SET

To be used at first device use and in case of complete reset needed

1. Perform the power-on procedure.
2. Press and hold the CONFIG button for a time longer than 15s.
3. Three simultaneous flashes of CH1 - CH2 - CH3 - CH4 LEDs signal that the pre-set procedure was correctly done and the device is reset.
4. Switch off and on again the device to enter in operating mode.

NOTE: The PRESET deletes from the device memory all the associated wireless transmitters and the relative association with relay outputs. The PRESET also set all the relays in impulsive operating mode.

## WIRELESS TRANSMITTERS PAIRING

(How to associate the wireless batteryless transmitters to the independent relays)

During the transmitters pairing phase, be sure that no batteryless transmitters with the same Enocean transmission protocol are working near the area. Otherwise, the receiver will not work properly during phase 4 of this pairing procedure.

1. Perform the power-on procedure.
2. Press and hold the CONFIG button for a time between 5 and 10 seconds.
3. After releasing the button a simultaneous flash of CH1 - CH2 - CH3 - CH4 LEDs indicates the entrance inside the Pairing Menu.
4. Actuate the wireless transmitter that has to be associated to the receiver: when the signal is correctly received and identified CH1 and CH4, LEDs flash simultaneously one time.
5. For 2 seconds press the CONFIG button as many time as the number of relay output you want to associate to the previously actuated transmitter.
6. After 2 seconds without actions one flash of the selected LED indicates that the transmitter has been properly associated with the selected relay output.
7. Repeat this procedure from point 3 for all the transmitters you need to associate.
8. To each channel is possible to associate up to 28 transmitters. All the transmitters associated to the same relay will have the same assigned command function.
9. When all the needed transmitters are paired, turn the receiver off and then on again to enter in operating mode.

NOTE: to delete a transmitter previously associated, at point 4 of this pairing procedure press the CONFIG button while all the relay will light off. After 2 seconds without actions on simultaneous flash of CH1 - CH2 - CH3 - CH4 LEDs signal that the transmitter has been deleted from the receiver memory.

## RELAY OPERATING MODE SETTING

1. Perform the power-on procedure.
2. Press and hold the CONFIG button for a time between 10 and 15 seconds.
3. After releasing the button two simultaneous flash of CH1 - CH2 - CH3 - CH4 LEDs indicates the entrance inside the Operating Mode Setting Menu.
4. Press the CONFIG button as many time as needed to light up the desired LED (the number of the LED indicates the relay for which you need to set the operating mode)
5. After 2 seconds without actions the CH4 LED will start flash quickly: it is now possible to select the operating mode for the selected relay.

6. Press the CONFIG button for a number of times corresponding to the operating mode you need to select: Press CONFIG button one time: Impulsive mode Press CONFIG button two times: Maintained mode Press CONFIG button three times: Reverse impulsive mode Press CONFIG button four times: Reverse maintained mode Press CONFIG button five times: Two-stage mode
7. After 2 seconds without actions a double flash of CH1 - CH2 - CH3 - CH4 LEDs indicate the set of the selected operating mode.
8. Repeat this procedure from point 4 for all the relay you need to configure.
9. When all the needed relays are set, turn the receiver off and on again to enter in operating mode.

#### AVAILABLE RELAY OPERATING MODES

**IMPULSIVE MODE:** each transmitter actuation corresponds to a signal from the paired relay. The output signal has durability of 1 second and is not maintained.

**MAINTAINED MODE:** each transmitter actuation corresponds to a change of status of the paired relay. The signal is maintained until a new incoming signal form one of the paired transmitters.

**REVERSE IMPULSIVE MODE:** each traction/release of the transmitter corresponds to a signal from the paired relay. The output signal has durability of 1 second and is not maintained.

**REVERSE MAINTAINED MODE:** each transmitter traction/release corresponds to a change of status of the paired relay. The signal is maintained until a new incoming signal from one of the paired transmitters, generated by actuation or a release.

**TWO\_STAGE MODE:** each transmitter actuation closes the associated relay output, until a subsequent release of the transmitter. The relay status replicates the real position of the actuator. In case one of the release signal will lost a new release signal will occur to restore the proper operating loop. Let 5 seconds between consecutive actuation and release in order to guarantee maximum reliability of the transmission. In this operating mode each relay must have only in paired transmitter.

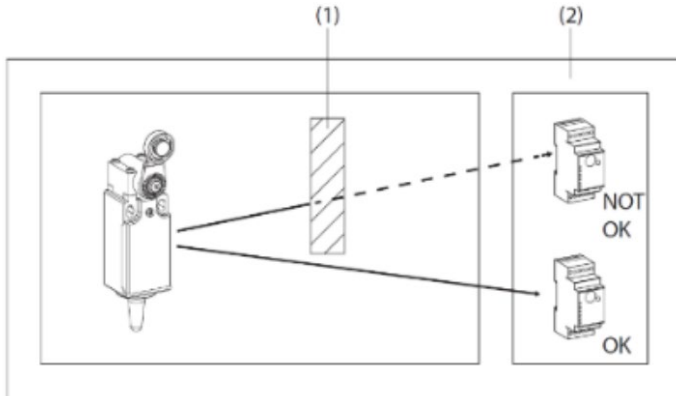
#### USAGE TIPS FOR THE DIFFERENT OPERATING MODES

The impulsive modes (1 and 3) were designed to give a start or power signal to a control unit, for example to start machinery or open an automated door. The maintained modes (2 and 4) were designed to maintain the signal active for a certain time, commanding for example the illumination of an area or the start of a production line until an incoming off signal. The reverse operating modes (3 and 4) were designed to receive signals from batteryless rope switches. The two-stage operating mode (5) was designed to reply the real position of the actuator on the transmitter, with signaling function for a certain event, for example the opening of a door or a window. Pay attention to the limit of use of the device: **these switches must not be substituted for safety signals expected on machinery or on the plant for emergency situations or to guarantee the functional safety of the system.**

#### MANAGE OF THE INCOMING TRANSMISSIONS

To each relay output it is possible to pair up to 28 transmitters, each paired transmitter will have the same functionality of the others with whom it shares the destination output channel. If the receiver manages only a single output the max. operating frequency of the transmitter can be up to 3600 operations per hour (1op/s). Higher operating frequency can wear and break the transmitter, as well as cause a loss of transmission reliability. If the receiver simultaneously manages more than one output the operating frequency has to be decreased down to 1800 operations per hour on the single output (0.5op/s). This operating slowdown allows to maintain the same transmission reliability also when the receiver has to manage simultaneous transmissions that have to be sorted to the four available output relays. In case of two simultaneous transmissions ( $\Delta < 1s$ ) directed to the same output relay they would overlap using impulsive operating modes, while they would collide using the maintained operating modes. When using the two-stage operative mode, it is necessary to foresee a -minimum time of 5 seconds between the actuation and release signal of the transmitter, this will allow to maintain high transmission reliability and minimize loss of signal and consequently the necessity to restore the proper transmission loop. In general, with the target to obtain a perfect wireless experience, it is recommended to think well about the operating mode to be used and design well the number of receiver and transmitters to be used on the working area. COMEPI technical support is available to give assistance and find the best solution for any application where it is necessary: [tecnico@comepi.it](mailto:tecnico@comepi.it)

## MOUNTING AND WIRING



Mount the fixed transmitter on a plain surface. Be sure that the portable device will always be available inside the working area. The wireless batteryless transmitter has to be paired and configured following the instruction contained inside this manual. The operating range depends a lot from the environmental conditions of the working area. The radio signal can be obscured and attenuated by conductive materials. This is valid also for thin foils like the aluminum coatings on insulating materials. It is necessary to design as well as possible the working area in order to maximize the performances of the devices using the installation tips reported inside the technical documentation.

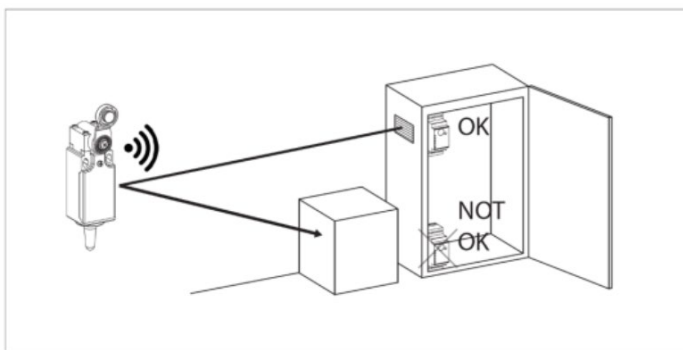
## OPERATING RANGE CONSIDERATIONS

Since they are radio signals there are electromagnetic waves and the signal intensity can be lowered along the path from transmitter to receiver. This means that the signal goes lowered both in electrical and magnetic fields intensity, inversely proportional to the square of the distance ( $E, H \sim 1/r^2$ ). In addition to the distance, other sources of disturbances can be metallic parts, for example wall armors, metal foils for thermal insulation, metallized safety glasses. All of them can reflect the wireless signal, lowering the range. Behind these a shaded area may form: while much the waves can penetrate these obstacles, they will have an impact on operating range.

Following an example of signal lowering power of various materials:

Material	Attenuation of signal through the material
Metal parts	Between 50 and 100%
Concrete walls	Between 70 and 80%
Brick walls	Between 50 and 70%
Drywall	Between 30 and 45%
Glass window or wood panel	Between 10 and 20%

NOTE: The values inside this table are purely estimates. Real values can change according to thickness and specific composition of the material to be penetrated by the signal



The radio signal generated by the transmitter develops with an elliptical shape, where receiver and transmitter are located at the focal points. Because of this the working area shape near the device can condition the operating distance. E.g. the installation in narrow corridors with shielding walls reduces the operating range.

## TYPICAL OPERATING DISTANCES

Open fields operation without obstacles: about 80 metres  
 Industrial environment operations: About 30 metres  
 Industrial environmental operations, with concrete obstacles on the way (drywalls, metal shelves): about 20 metres if the receiver is properly installed with antenna  
 Industrial environmental operations, with concrete obstacles on the way (drywalls, metal shelves): less than 10 metres if the receiver is mounted behind a shielding wall, if the receiver is mounted on a corner of the room, if a suitable antenna is not properly installed.

## ANTENNAS ORIENTATION



Ideal conditions



Acceptable conditions



Unsuitable conditions



## SIGNAL LED USE

The SIGNAL LED can be used as diagnostic tool in order to verify the proper installation conditions for the involved devices. The LED lights up green when the signal has an intensity over the 50% of its rated value. When the SIGNAL LED lights up yellow the signal has an intensity under the 50% of its rated value. When the SIGNAL LED lights up yellow the signal is anyway received and processed by the receiver, but is suggested to better set the working area in order to maximize the performance of the involved devices.

## MAINTENANCE

Do not disassemble or try to repair the device. In case of damages or faults, replace the all devices. The sequence of functional tests to which the device will be submitted is responsibility of the installer. Installation must be performed according to the standard in forces and performed exclusively by qualified operators. Be sure to install the device in places difficult to reach for unauthorized people.

## DEVICE INSTALLATION

The receiver must be installed in a proper environment according to its declared IP protection degree. The receiver has to be fixed in a solid and plain way on the DIN rail. The device has 35mm width on DIN rail. It is suggested to install the RRH8/RRH9 receiver with a distance at least of 50cm from any high frequency disturbance source (pc, audio or video equipment, etc.) or other transmission sources (GSM, WI-FI, etc.). Transmitter RFH8/RFH9 could be installed at any distance between these sources. Use only installation wires with length down to 3m to connect the receiver.

## ANTENNA

The receiver must be equipped, during its normal operations, with a radio frequency antenna, approved according to the referenced directives and suitable to receiving 902MHz (RRH9) signals. The antenna must be screwed on the SMA connector located on the receiver. The connector on the receiver is a female SMA type. The connector on the antenna is a male SMA type. The antenna must be fixed without exceeding in screwing torque and not forced into its place. In case of breakages due to a higher torque using to fix the antenna, the warranty is invalidated and a substitute the device will not be provided. The use of the antenna is necessary to guarantee the rated performances of the device. For a proper use, COMEPI makes it available the following accessories that can be bought separately:

ANT90201 → Orientable antenna for RRH9

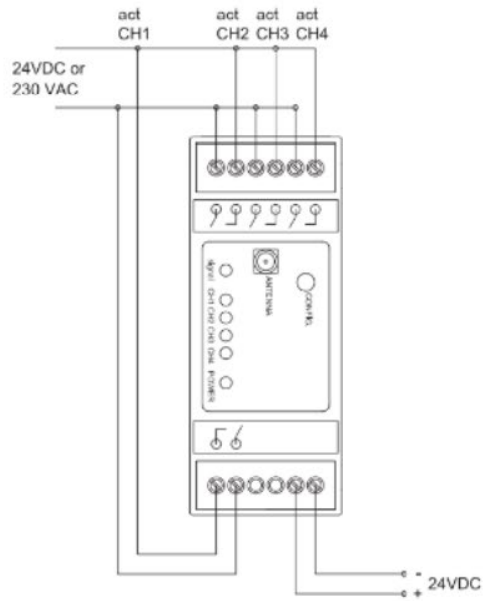
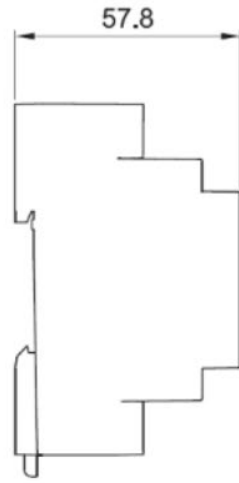
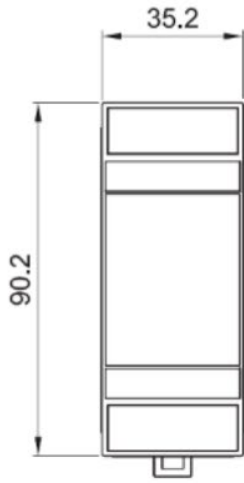
ANT90202 → Antenna with cable for RRH9

More details available on website [www.comepi.eu](http://www.comepi.eu) and technical catalogue.

## ADDITIONAL PRECAUTIONS FOR USE

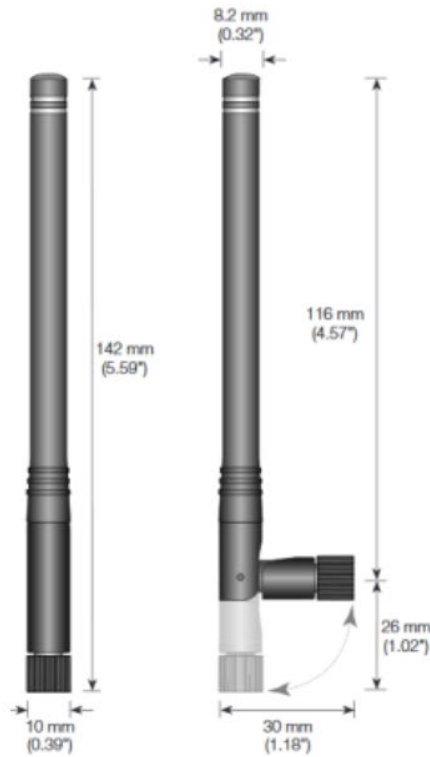
Verify periodically the proper operations of the device as reported in maintenance section - The installation must be performed only by qualified operators - The use of this device must conform to the limit of use specified and allowed by the standard in forces - The installation of the device must be performed only by people who know well the reference standard in forces - Installation of the device must be performed according the standard in forces - This product is not designed to be integrated in a safety system, it has to be used in applications without scope of protection for people or equipment - In case of any doubt or particular applications contact the COMEPI's technical assistance - Make this instruction sheet available on the technical documentation of the machinery where this device is mounted - Make this instruction sheet always available for the operators who are going to use the machine where this device is mounted - Before eventual painting or similar works protect the label of the device - Do not remove the label from the device, the absence of label makes the CE mark of the device expire - Do not install in presence of strong vibrations and shocks, these conditions can damage the device and don't let it work properly - Do not modify the device in its construction - Do not dismantle and re-assemble the device - Substitute the device after passing the mechanical durability limit (1M of operations) - Use only the supply values intended for this device - Use the proper tightening torque to wire the device - During the configuration press the CONFIG button with a suitable tool, paying attention to not damage the device - At the end of its life the device must be disposed according to the rules that apply in the country of use.

### DEVICE WIRING AND DIMENSIONS



### ANTENNA DIMENSIONS

ANT86801 / ANT90201



ANT86802 / ANT90202

