WAGO I/O SYSTEM 750

Fieldbus Independent I/O Modules

EnOcean Radio Receiver 750-642

Manual

Version 1.1.0

WAGO INNOVATIVE CONNECTIONS

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded, we would appreciate any information or ideas at any time.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

Content

1 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

1.1 Legal Bases

1.1.1 Copyright

1.1.2 Personnel Qualifications

The use of the product described in this Manual requires special personnel qualifications, as shown in the following table:

Activity	Electrical specialist	Instructed personnel*)	Specialists**) having qualifications in PLC programming
Assembly	X	X	
Commissioning	X		X
Programming			X
Maintenance	X	X	
Troubleshooting	X		
Disassembly	X	X	

*) Instructed persons have been trained by qualified personnel or electrical specialists.

**) A specialist is a person, who – thanks to technical training – has the qualification, knowledge and expertise to meet the required specifications of this work and to identify any potential hazardous situation in the above listed fields of activity.

All responsible persons have to familiarize themselves with the underlying legal standards to be applied. WAGO Kontakttechnik GmbH & Co. KG does not assume any liability whatsoever resulting from improper handling and damage incurred to both WAGO´s own and third-party products by disregarding detailed information in this Manual.

1.1.3 Use of the 750 Series in Compliance with Underlying Provisions

Couplers, controllers and I/O modules found in the modular WAGO-I/O-SYSTEM 750 receive digital and analog signals from sensors and transmit them to the actuators or higher-level control systems. Using programmable controllers, the signals can also be (pre-)processed.

The components have been developed for use in an environment that meets the IP20 protection class criteria. Protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured. Unless otherwise specified, operation of the components in wet and dusty environments is prohibited.

1.1.4 Technical Condition of Specified Devices

The components to be supplied Ex Works, are equipped with hardware and software configurations, which meet the individual application requirements. Changes in hardware, software and firmware are permitted exclusively within the framework of the various alternatives that are documented in the specific manuals. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Standards and Guidelines for Operating the 750 Series

Please adhere to the standards and guidelines required for the use of your system:

- The data and power lines shall be connected and installed in compliance with the standards required to avoid failures on your system and to substantially minimize any imminently hazardous situations resulting in personal injury.
- For assembly, start-up, maintenance and troubleshooting, adhere to the specific accident prevention provisions which apply to your system (e.g. BGV A 3, "Electrical Installations and Equipment").
- Emergency stop functions and equipment shall not be made ineffective. See relevant standards (e.g. DIN EN 418).
- The equipment of your system shall be conform to EMC guidelines so that any electromagnetic interferences will be eliminated.
- Operating 750 Series components in home applications without further measures is permitted only if they meet the emission limits (emissions of interference) in compliance with EN 61000-6-3. You will find the detailed information in section "WAGO-I/O-SYSTEM 750" → "System Description" → "Technical Data".
- Please observe the safety precautions against electrostatic discharge in accordance with DIN EN 61340-5-1/-3. When handling the modules, please ensure that environmental factors (persons, working place and packaging) are well grounded.
- The valid standards and guidelines applicable for the installation of switch cabinets shall be adhered to.

1.3 Symbols

Danger
Always observe this information to protect persons from injury.

Warning
Always observe this information to prevent damage to the device.

Attention
Marginal conditions that must always be observed to ensure smooth and efficient operation.

ESD (Electrostatic Discharge)
Warning of damage to the components through electrostatic discharge. Observe the precautionary measure for handling components at risk of electrostatic discharge.

Note
Make important notes that are to be complied with so that a trouble-free and efficient device operation can be guaranteed.

Additional Information
References to additional literature, manuals, data sheets and internet pages.

1.4 Safety Information

When connecting the device to your installation and during operation, the following safety notes must be observed:

Danger
The WAGO-I/O-SYSTEM 750 and its components are an open system. It must only be assembled in housings, cabinets or in electrical operation rooms. Access is only permitted via a key or tool to authorized qualified personnel.

Danger
All power sources to the device must always be switched off before carrying out any installation, repair or maintenance work.

Warning
Replace defective or damaged device/module (e.g. in the event of deformed contacts), as the functionality of field bus station in question can no longer be ensured on a long-term basis.

Warning
The components are not resistant against materials having seeping and insulating properties. Belonging to this group of materials is: e.g. aerosols, silicones, triglycerides (found in some hand creams). If it cannot be ruled out that these materials appear in the component environment, then the components must be installed in an enclosure that is resistant against the above mentioned materials. Clean tools and materials are generally required to operate the device/module.

Warning
Soiled contacts must be cleaned using oil-free compressed air or with ethyl alcohol and leather cloths.

Warning
Do not use contact sprays, which could possibly impair the functioning of the contact area.

Warning
Avoid reverse polarity of data and power lines, as this may damage the devices.

ESD (Electrostatic Discharge)
The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched.

Warning
For components with ETHERNET/RJ-45 connectors:
Only for use in LAN, not for connection to telecommunication circuits.

1.5 Font Conventions

italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Programs\WAGO-IO-CHECK*
italic	Menu items are marked in italic-type, bold letters. e.g.: ***Save***
\	A backslash between two names characterizes the selection of a menu point from a menu. e.g.: ***File \ New***
END	Pushbuttons are marked as bold with small capitals e.g.: **ENTER**
< >	Keys are marked bold within angle brackets e.g.: **<F5>**
`Courier`	The print font for program codes is Courier. e.g.: `END_VAR`

1.6 Number Notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.7 Scope

This manual describes the Special Module 750-642 EnOcean Radio Receiver of the modular WAGO-I/O-SYSTEM 750.

Handling, assembly and start-up are described in the manual of the Fieldbus Coupler/Controller. Therefore this documentation is valid only in the connection with the appropriate manual.

2 I/O Modules

2.1 Special Modules

2.1.1 750-642 [EnOcean Radio Receiver]

EnOcean Radio Receiver

Attention
Accessories required: WAGO RF-ANTENNA 868MHz/SMA, Item-No.: 758-910 (**not included** in delivery)!

Attention
Use excluding the recommended WAGO RF-ANTENNA 868MHz/SMA (Item-No.: 758-910). Only these antennas can guarantee the technical characteristics and that the EMC and the R&TTE guideline are kept.

2.1.1.1 View

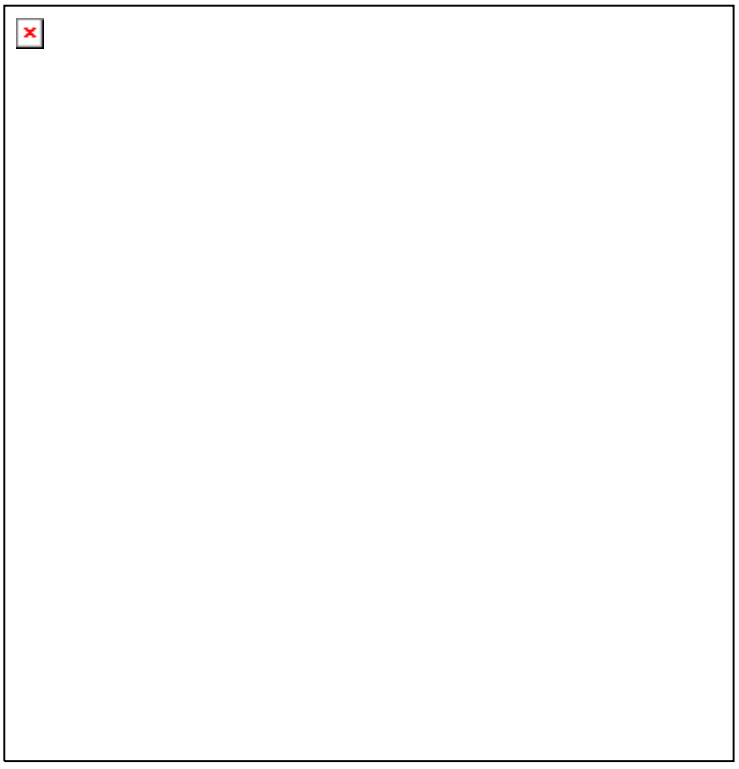


Fig. 2.1.1-1: View g064200e

2.1.1.2 Description

The 750-642 Radio Receiver module receives digital and analogue sensor signals from the field area by radio link.

Danger
The radio receiver modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.
This results from the classification of the radio receiver module in class 2 Equipment according to ETSI EN 301 489-3 V1.4.1 (2202-08) "Specific conditions for short-range devices (SRD)".

The module receives the radio transmitter data via an antenna with a carrier frequency of 868.3 MHz situated outside the enclosure.
For this an antenna equipped with an SMA plug (WAGO RF ANTENNA 868 MHz/SMA, Item-no.: 758-910) is connecting to the SMA socket fitted to the module.

Attention
The WAGO RF-ANTENNA 868MHz/SMA is not included in delivery of the Radio Receiver module!
It is to order separately as accessories under the Item-No.: 758-910.

Attention
Use excluding the recommended WAGO RF-ANTENNA 868MHz/SMA (Item-No.: 758-910). Only these antennas can guarantee the technical characteristics and that the EMC and the R&TTE guideline are kept.

The module has two potential free CAGE CLAMP® connections (1 and 2) without electrical function. These make the mechanical fixing of the antenna line possible.

Attention
Mechanical stress such as vibration or shock may cause wire breakage. For that reason, appropriate action needs to be taken to fix the antenna cable (see chapter 2.1.1.9 "Installation in Case of mechanical Stress (Vibration, Shock)".

The applications for this module are, for example, in operator, control and signaling systems in building automation (office, exhibition halls, private households...), in cabin automation on ships, and anywhere sensors (radio transmitters) require intelligent controllers or gateways to other bus systems.

The revolutionary EnOcean radio technology offers the decisive advantage that the specially developed sensors have very low power consumption.
They require no external power supply or batteries for radio transmission. This means that the sensors need no servicing (battery replacement), can be installed retrospectively without difficulty and, due to the wireless technology, can be freely positioned, even on glass facades.
For the necessary electrical energy, the sensors use either mechanical energy converted by piezo elements or solar energy. This provides sufficient energy for the respective sensor to send a unidirectional radio signal.

The number of sensors can be chosen virtually at will, although the maximum per module is around 100 sensors due to increasing density with growing numbers.

Further Information
Partner sites for suppliers of radio sensors and other accessories for the radio technology can be found at http://www.enocean.com **(References/Partners).**

To be able to use the installed radio transmitters for an application, these must be uniquely identified. With some sensors, the ID can be directly read from the back of the sensor. If this is not the case, the 32-bit ID code of the sensor can be read using an IEC 61131-3 application. The IEC application can be implemented in the connected programmable fieldbus controller (PFC) of the fieldbus node using the WAGO-I/O-PRO programming tool or, where a fieldbus coupler is connected, in a primary controller.

The data of individual sensors is not mapped in the process image of the connected coupler/controller, but packaged in EnOcean radio telegrams and tunneled unmodified to a function block of the application, via an internal RS 232 interface. The function block decodes the messages to enable the analogue or digital sensor data to be interpreted and processed at application level.

LEDs indicate the operational readiness of the module and fault-free communication on the internal data bus.

Any configuration of the modules is possible when designing the fieldbus node. Grouping of module types is not necessary.

Attention
This module has no power contacts. For field supply to downstream I/O modules, a supply module will be needed

Note
The receiver module cannot be used in a combination of LONWORKS® fieldbus coupler 750-319 with WAGO *TOPLON*® IF and PRIO plug-ins.

The module is directly supported by the controllers of the WAGO-I/O-SYSTEM 750. Where a coupler is used, the use of a primary controller is necessary for control of the module.
This module can be used with all couplers/controllers of the WAGO-I/O-SYSTEM 750 (except for the economy types 750-320, -323, -324 and -327).

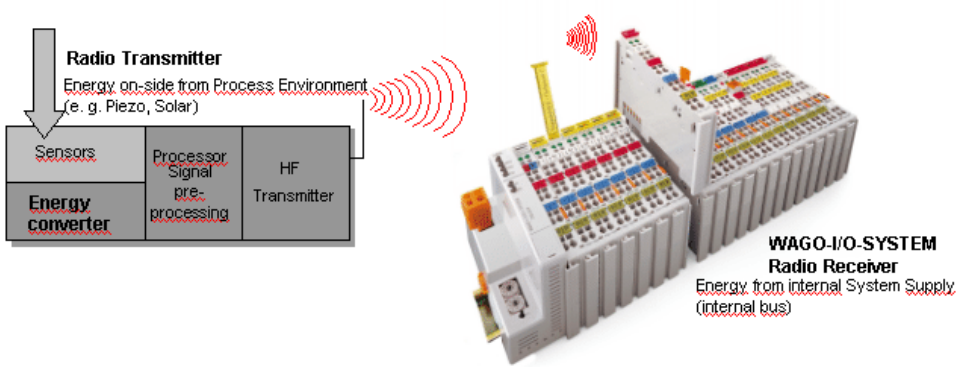


Fig. 2.1.1-2: Operating principle of the EnOcean Radio Receiver module g064217e

2.1.1.3 Display Elements

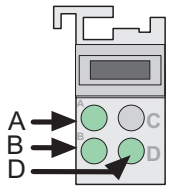


Fig. 2.1.1-3: Display Elements g064229x

LED	Designation	State	Function
A	Function	off	No operational readiness or the internal data bus communication is interrupted
		green	Operational readiness and trouble-free internal data bus communication
B	RSSI	off	no or insufficient receiver field intensity
		green	sufficient receiver field intensity, time of persistence 0.5 sec.
D	RxD	off	no signal transmission RxD
		green	Signal transmission RxD

2.1.1.4 Schematic Diagram

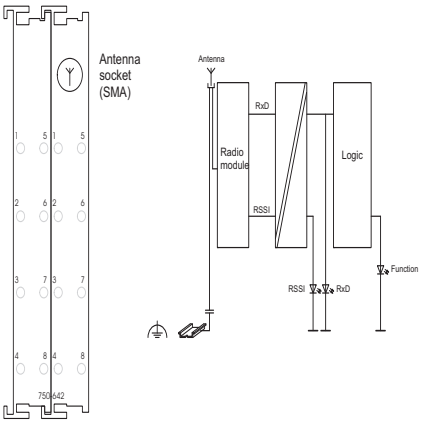


Fig. 2.1.1-4: Schematic Diagram g064201e

2.1.1.5 Technical Data

Module Specific Data	
Current consumption $_{max}$ (internal)	< 80mA
Voltage supply	via system voltage DC/DC
Isolation	500 V antenna connection/system
Bit width	1x 24 Bit in / out [1] (3 Byte Data) 1 x 8 Bit Control / Status
Front side connections	Antenna input (SMA socket), 2 CC contacts, potential free, to the optional mechanical fixing of the ferrite core on the antenna cable
Frequency band	868.3 MHz
Transmission protocol (Radio telegram)	EnOcean 53-130 Bit depending on the sensor type (32 Bit Sensor Identity number, up to 4 Byte sensor data, CRC)
Range	approx. 300 m (in the open) approx. 30 m (within buildings) [2]
Dimensions (mm) W x H x L	24 x 64*) x 100 *) from upper edge of carrier rail (excess length of the SMA socket ca. 6.5 mm)
Weight	85 g
Pollutants	acc. to IEC 60068-2-42
Vibration and Shock resistance	acc. to IEC 60068-2-6 acc. to IEC 60068-2-27
Protection class	IP20
[1] The module does not support transmitting of signals (receive only) i.e. the 3 bytes of output data are unused. [2] The actual range depends on the prevailing conditions within the building. The relevant information can be found in the section: “Notes on installation”.	
Standards and Regulations (cf. Chapter 2.2 of the Coupler/Controller Manual)	
EMC-Immunity to interference (CE)	acc. to EN 61000-6-2 (2005)
EMC-Emission of interference (CE)	acc. to EN 61000-6-3 (2007)
EMC-Immunity to interference (Ship building)	acc. to Germanischer Lloyd (2003) *)
EMC-Emission of interference (Ship building)	acc. to Germanischer Lloyd (2003) *)

Approvals (cf. Chapter 2.2 of the Coupler/Controller Manual)		
	$_{C}UL_{US}$ (UL508)	
	$_{C}UL_{US}$ (ANSI/ISA 12.12.01)	Class I Div2 ABCD T4
	DEMKO / IEC	I M2 / II 3 G/D Ex nL IIC T4
	Conformity Marking	
Accessories		
External antenna	external antenna with magnetic stand, SMA plug and 2.5 m supply line 758-910	
Miniature WSB quick marking system		

More Information
Detailed references to the approvals are listed in the document "Overview Approvals WAGO-I/O-SYSTEM 750", which you can find on the CD ROM "AUTOMATION Tools and Docs" (Item-No.: 0888-0412)
or in the internet under: http://www.wago.com → Documentation → WAGO-I/O-SYSTEM 750 → System Description

2.1.1.6 Process Data

The data of individual sensors is not mapped in the process image of the connected coupler/controller, but packaged in EnOcean radio telegrams and tunneled unmodified via an internal RS 232 interface to the application.

The EnOcean Radio Receiver module maps 4 data bytes into both the input and output areas of the process image of the coupler/controller (in exactly the same way as the WAGO RS 232 interface module, part no.: 750-650).
Up to 3 input bytes are employed for transfer of the received data. Since the transmit channel of the interface is not used, the 3 bytes for output data are unused.
The additional control and status byte of the module is used for the handling of the data transmission on the internal I/O bus.

An EnOcean radio telegram tunneled by means of these data bytes has a total length of 14 bytes. These include a 32-bit sensor ID number, up to 4 bytes of sensor data depending on the type of sensor and CRC (cyclic redundancy checksum) as error control procedure.

As a result, several module bus cycles are required to completely map the message in the controller or primary controller.

Depending on whether the module is used in a fieldbus node with PFC or with a coupler and primary controller, different detail information is relevant for the accessing and interpretation of the process data.

2.1.1.6.1 For PFC Application

Appropriate IEC 61131-3 function blocks are available for WAGO-I/O-*PRO* for reading the process data via the controller.

In the WAGO-I/O-*PRO* application, the function block ENOCEAN_RECEIVE receives the data packets arriving from several module bus cycles.
After assembling the packets into a radio telegram, this block tests the message for checksum errors.

Further function blocks then interpret and process the message content.

Further Information
The function blocks for WAGO-I/O-*PRO* can be downloaded free of charge from the Internet. These can be found at:
www.wago.com → Service → Downloads → Building automation → WAGO-I/O-PRO libraries.

Identification of PTM Sensors

The function block ENOCEAN_SHOW_ID_BY_BUTTON can only be used to read the ID of PTM sensors.
At the input of this block, you enter how many buttons must be simultaneously pressed to cause the block to display the transmitter IDs contained in the radio telegram at the output. Radio telegrams in which, for example, only one button is pressed, are ignored.

Identification of digital and analogue Sensors

The function block ENOCEAN_SHOW_ID_BY_CLICK is used to read the 32-bit ID code of digital and analogue sensors.
At the input of this block, you first enter the type of sensor (PTM, STM or CTM) of which the ID is to be read. In addition, you enter how often a button must be pressed so that the block displays the transmitter IDs contained in the radio telegram at the output. Radio telegrams in which only one button is pressed, are ignored.

2.1.1.6.2 For Coupler Application with Primary Controller

The detailed process image of the module and the structure of the radio telegram is only relevant in applications where a coupler is used, when you need to create an IEC 61131-3 application for the primary controller.

Process Image

Input Data		Output Data	
S	Status byte	C	Control byte
D0	Input byte 0	D0	Output byte 0 – not used
D1	Input byte 1	D1	Output byte 1 – not used
D2	Input byte 2	D2	Output byte 2 – not used

Control byte							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	0	0	0	0	IR	RA	TR

TR	Transmit request
RA	Receive acknowledge
IR	Initialization request
0	Constant value should always be 0.

Status byte							
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	BUF_F	IL 2	IL 1	IL 0	IA	RR	TA

TA	Transmit acknowledge
RR	Receive request
IA	Initialization acknowledge
IL 0, IL 1, IL 2	Frames available in input area IL2 is always 0. I.e. IL2, IL1, IL0 = 0,1,0 2 characters were received and reside in input 0 and input 1.
BUF_F	Input buffer is full.
0	Constant value should always be 0.

The control byte is sent from the controller to the module and the status byte from the module to the controller. Requests are indicated by a change of a bit. An assigned bit indicates execution by adopting the value of the request bit.

Further Information
A detailed description of the method of operation of the internal interface can be found in the manual for the RS 232 C serial interface (item-no. 750-650). This is available on the Internet at: http://www.wago.com .

Attention
In opposite to the description in the manual for the RS 232 C serial interface (item-no. 750-650) the bit sequence of the status byte changed!

EnOcean Telegram

Bit 7		Bit 0
SYNC_BYTE 1 (A5 Hex)		
SYNC_BYTE 0 (5A Hex)		
H_SEQ	LENGTH	
ORG		
DATA_BYTE 3		
DATA_BYTE 2		
DATA_BYTE 1		
DATA_BYTE 0		
ID_BYTE 3		
ID_BYTE 2		
ID_BYTE 1		
ID_BYTE 0		
STATUS		
CHECKSUM		

SYNC_BYTE 0...1	(8 bit each)	Synchronization Bytes
H_SEQ	(3 bit)	Header identification: 0 dec for unknown transmitter ID received 1 dec for known transmitter ID received 2 dec for new transmitter learned
LENGTH	(5 bit)	Number of octets following the header octet (11 dec)
ORG	(8 bit)	Type of telegram
DATA_BYTE 0...3	(8 bit each)	Data bytes 0...3
ID_BYTE 0...3	(8 bit each)	32-bit transmitter ID
STATUS	(8 bit)	Status field
CHECKSUM	(8 bit)	Checksum (Last LSB from addition of all octets except sync bytes and checksum

ORG Field Description

ORG Field Value (decimal)	Acronym	Description
5	**RPS**	Telegram from a Piezo Transmitter Module (PTM) received (original or repeated message)
6	**1BS**	1 Byte data telegram from a Solar Transmitter Module (STM) received
7	**4BS**	4 Byte data telegram from a Solar Transmitter Module (STM) received
8	**HRC** (Hand Remote Control)	Telegram from a solar supplied hand remote control (CTM) received
0-4, 9-255	**-**	Reserved

STATUS Field Description

a) if ORG = 5 (Telegram from a Piezo Transmitter Module (PTM):

Bit 7			Bit 0
Reserved	**T21**	**NU**	**RP_COUNTER**

Reserved	(2 bit)	For future use
T21	(1 bit)	T21=0 → PTM switch module of type 1, T21=1 → PTM switch module of type 2
NU	(1 bit)	NU=1 → N-message, NU=0 → U- message.
RP_COUNTER	(4 bit) =0..15	Repeater level: 0 is original message (not repeated)

PTM switch modules of Type 1 (e.g. PTM 100) do not support interpretation of operating more than one rocker at the same time:

- N- message received → Only one pushbutton was pressed.
- U- message received → No pushbutton was pressed when activating the energy generator, or more than one pushbutton was pressed.

PTM switch modules of Type 2 allow interpretation of operating two buttons simultaneously:

- N- message received → Only one or two pushbuttons have been pressed.
- U- message received → No pushbutton was pressed when activating the energy generator, or more than two pushbuttons have been pressed.

Note
For telegrams from Piezo Transmitter Modules PTM 100:
In most rocker switch device implementations, pressing the rocker sends a N-message and releasing the rocker sends an U-message.

b) if ORG = 6, 7 or 8 (all other telegrams):

Bit 7		Bit 0
Reserved	**RP_COUNTER**	

Reserved	(4 bit)	for future use
RP_COUNTER	(4 bit)	Repeater level: 0 is original message (not repeated)

DATA_BYTE 3..0 Field Description

a) if ORG = 5 and NU = 1 (N-message from a Piezo Transmitter Module (PTM):

DATA_BYTE2..0 always = 0
DATA_BYTE3 as follows:

Bit 7					Bit 0
RID	**UD**	**PR**	**SRID**	**SUD**	**SA**

RID*)	(2 bit)	Rocker ID, from left (A) to right (D): 0, 1, 2 and 3 (decimal)
UD	(1 bit)	UD=1 → O-button, UD=0 → I-button
PR	(1 bit)	PR=1 → Button pressed, PR=0 → Button released
SRID	(2 bit)	Second Rocker ID, from left to right: 0, 1, 2 and 3
SUD	(1 bit)	(Second) SUD=1 → Up button, SUD=0 → Down button
SA	(1 bit)	SA=1 → Second action, SA=0 → No second action

*) The Rocker ID (RID) is checked in addition to the Header Identification (H_SEQ). H_SEQ indicates, whether the Transmitter is known or not.

b) if ORG = 5 and NU = 0 (U-message of a Piezo Transmitter Module (PTM):

DATA_BYTE2..0 always = 0
DATA_BYTE3 as follows:

Bit 7		Bit 0
BUTTONS	**PR**	**Reserved**

BUTTONS	(3 bit)	Number of simultaneous pressed buttons, as following: 0 = 0 Buttons 1 = 2 Buttons (PTM of Type 1 only) 2 = 3 Buttons 3 = 4 Buttons 4 = 5 Buttons 5 = 6 Buttons 6 = 7 Buttons 7 = 8 Buttons
PR	(1 bit)	PR = 1 → Button pressed, PR = 0 → Button released
Reserved	(4 bit)	For future use

c) if ORG = 6 (1 Byte Data telegram from a Solar Transmitter Module (STM):

DATA_BYTE2..0 always = 0
DATA_BYTE3 Sensor data byte.

d) if ORG = 7 (4 Byte Data telegram from a Solar Transmitter Module (STM):

DATA_BYTE3 Value of third sensor analog input
DATA_BYTE2 Value of second sensor analog input
DATA_BYTE1 Value of first sensor analog input
DATA_BYTE0 Sensor digital inputs as follows:

Bit 7				Bit 0
Reserved	**DI_3**	**DI_2**	**DI_1**	**DI_0**

e) if ORG = 8 (Telegram from a solar supplied hand remote control (CTM) set into HRC operation:

DATA_BYTE2..0 always = 0
DATA_BYTE3 as follows:

Bit 7				Bit 0
RID	**UD**	**PR**	**SR**	**Reserved**

RID*)	(2 bit)	Rocker ID, from left (A) to right (D): 0, 1, 2 and 3 (decimal)
UD	(1 bit)	UD=1 → O-button, UD=0 → I-button
PR	(1 bit)	PR=1 → Button pressed, PR=0 → Button released
SR**)	(1 bit)	SR=1 → Store, SR=0 → Recall
Reserved	(3 bit)	for future use

*) The Rocker ID (RID) is checked in addition to the Header Identification (H_SEQ). H_SEQ indicates, whether the Transmitter is known or not.
**) The bit SR is used only when the lower 3 bits from ID_BYTE0 = '111' (scene switch), and RID ≠ 0 (indicates that the memory buttons M0-M6 are operated in the handled remote control.

2.1.1.7 Notes on Application

Danger
The radio receiver modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.
This results from the classification of the radio receiver module in class 2 Equipment according to ETSI EN 301 489-3 V1.4.1 "Specific conditions for short-range devices (SRD)".

Attention
The use of the devices does not need to be registered and is free in the European Union, Switzerland, Cyprus, the Czech Republic, Poland and in Slovenia. The use in other countries requires explicit clarification!

2.1.1.8 Notes on Installation

Avoid installing the module, the antenna and the antenna line close to sources of transient interferences, such as fluorescent tubes with defective starter, frequency converters and power cables. As a result, communication failures may occur leading to faulty digital and analog values.

Notes on external Antenna Installation

1) Use only suitable antennas.

Attention
Use excluding the recommended WAGO RF-ANTENNA 868MHz/SMA (Item-No.: 758-910). Only these antennas can guarantee the technical characteristics and that the EMC and the R&TTE guideline are kept.

Attention
Order the WAGO RF-ANTENNA 868MHz/SMA separately as accessories under the Item-No.: 758-910. The WAGO RF-ANTENNA 868MHz/SMA is **not** included in delivery of the radio receiver module!

2) The antenna is to be mounted on a plate measuring at least 9.8 x 9.8 inches (25 x 25 cm).

3) The distance of interfering sources to the antenna and antenna line must be at least 11.8 inches (30 cm) and the free space between the antenna and the next wall must be at least 13.78 inches (35 cm).

4) The antenna cable should, under no circumstances, be bent sharply, since irreversible damage may result to the antenna line (RG174 bend radius > 0.6 inches/15 mm).

Typical maximum Transmission Ranges

1) Visual line of sight: 98 ft (30 m) in corridors, up to 328 ft (100 m) in halls

2) Gypsum board/wood partition walls: 98 ft (30 m) transmission range through max. 5 partition walls

3) Brick/lightweight concrete partitions: 65 ft (20 m) transmission range through max. 3 partition walls

4) Reinforced concrete walls/ceilings: 33 ft (10 m) transmission range through max. 1 ceiling

Switchgear cabinets and elevator shafts are obstacles to the transmission.

Restriction of the Transmission Range

Restriction of the transmission range can also be due to:

- Hollow lightweight walls with insulating wool on metal foil,
- suspended ceilings with panels made of metal or carbon fiber,
- lead glass or glass with metal coating,
- metal furniture,
- metal wall mounting of the switch.

In addition, the angle of incidence of a radio signal transmitted towards a wall changes the effective wall thickness and consequently the signal attenuation. Radio signals should therefore not be transmitted at a shallow angle through brickwork and wall bays or niches should be avoided..

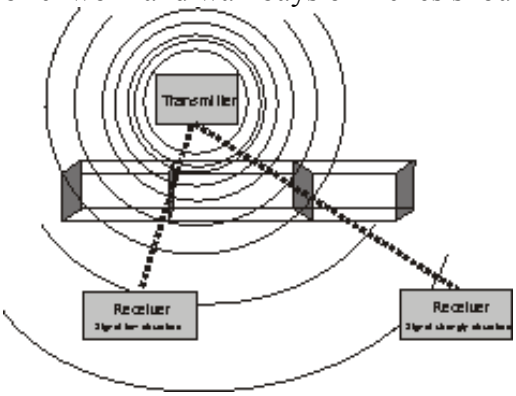


Fig. 2.1.1-5: Dependence of the effective wall thickness on the angle of incidence g064220e

Basically, the maximum transmission ranges need to be tested before using the module!

Fresnel Zone

To obtain the maximum radio range (in the open), it is not enough just to have the direct line-of-sight between transmitter and receiver clear of obstacles.

A certain area, called the Fresnel zone, must also be clear. The Fresnel zone is ellipsoid in shape.
The widest point of the ellipsoid is at the middle of the line-of-sight. There must therefore be no significant obstacle in this area if you wish to obtain the maximum range.

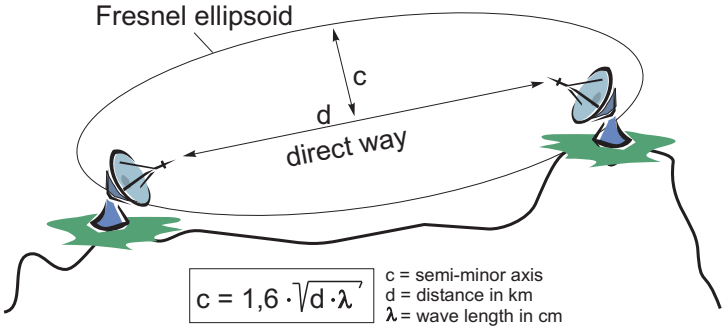


Fig. 2.1.1-6: Fresnel zone g064219e

2.1.1.9 Installation in Case of mechanical Stress (Vibration, Shock)

Attention
Mechanical stress such as vibration or shock may cause wire breakage. For that reason, appropriate action needs to be taken to fix the antenna cable.

A vibration-proof antenna mount could be easily implemented, for example, by using a rigid wire bridge and two cable ties.
The ends of the wire bridge are inserted into the potential-free CAGE CLAMP® connections (1 and 2). After that, the antenna cable is attached to the wire bridge on both sides of the ferrite core using the cable ties (see drawing).

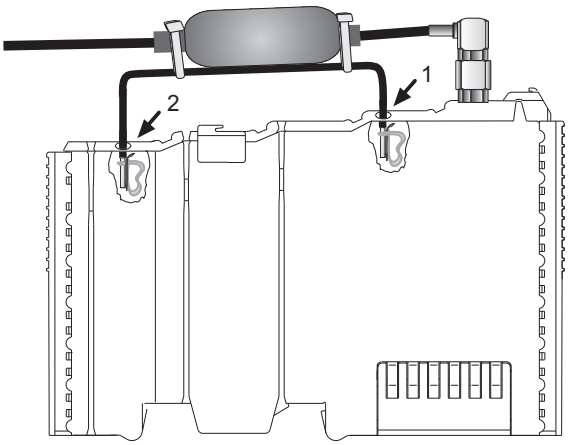


Fig. 2.1.1-7: Example of a vibration-proof antenna mount g064221x

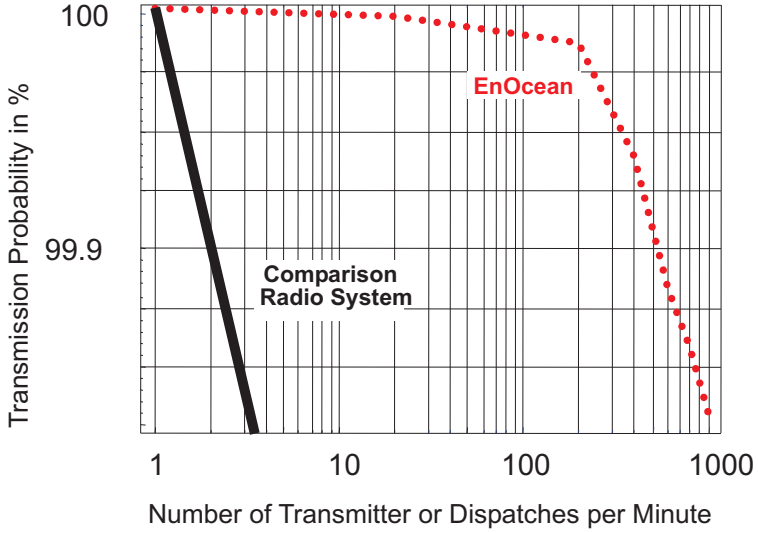
2.1.1.10 EnOcean Key Data

Energy generation	from button press, vibration, movement, light, heat, etc.
Frequency band	868.3 MHz
Transmitter power$_{max}$	10 mW EIRP
Modulation method	ASK
Data rate	120 Kbps
Bandwidth	280 KHz
Range	300 m in open air
Radio telegram	53 to 130 bits depending on sensor type (32-bit sensor ID no., up to 4 bytes sensor data, checksum)
Transmission time	around 40 ms for three identical telegrams, each around 1 ms and delayed at random

2.1.1.11 Further Performance Features

In addition to the outstanding special features of EnOcean radio technology such as freedom from maintenance and flexibility, EnOcean offers further characteristic performance features:

- **Unique for systems with many sensors**



- **Unique transmitter / receiver assignment**
  4,000,000,000 fixed code numbers
- **Time saving**
  Quick integration, assembly and configuration
- **Reduction of fire loads**
- **Cost benefits**
  In integration, in installation and in operation
- **Reduction of electrosmog**
  The ecological institute ECOLOG confirms that the HF radiation of an EnOcean switch is 100x smaller than that of a conventional switch (loss of radio connection).
  With 1,000,000th of the radiation energy of a mobile phone, the RF radiation of EnOcean is very low.
  Integrated power flux densities in the frequency range 100 MHz to 3.0 GHz:

Device/system	Integrated power flux density [W/m²]
Radio switch	$1{,}3*10^{-5}$
Conventional switch	$1{,}5*10^{-3}$

In addition, the low frequency electrosmog is clearly reduced due to significantly fewer power cables in the building.

2.1.1.12 EC Certificate of Conformity

2.1.1.12.1 English

EC Certificate of Conformity

Document No.: 750642/02
Month/Year: 11/10

This is to certify that the product designated hereunder conforms to the requirements, which are defined in the directive of the council for adaptation of the member states' legal prescriptions on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (1999/5/EG).

750-642

The following standards have been applied to check the electromagnetic compatibility of the product:

EN 61000-6-2 : 2005
EN 61000-6-3 : 2007
EN 50371 : 2002
EN 301 489-1 : V1.6.1
EN 301 489-3 : V1.4.1
EN 300 220-2 : V2.1.2

This declaration is valid for the manufacturer/authorized representative

WAGO Kontakttechnik GmbH
Hansastr.27
32423 Minden

made by

Dr. Thomas Albers
Technical director electronics

Minden, 06.11.10

This declaration certifies compliance with the indicated directives but implies no warranty of properties.

The safety instructions of the accompanying product documentation shall be observed.

2.1.1.12.2 German

EG-Konformitätsbescheinigung

Dokument Nr.: 750642/02
Monat/Jahr: 11/10

Für das im folgenden bezeichnete Erzeugnis

750-642

wird hiermit bestätigt, daß es den Anforderungen entspricht, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über Funkanlagen und Telekommunikationsendeinrichtungen und die gegenseitige Anerkennung ihrer Konformität (1999/5/EG) festgelegt sind.

Zur Beurteilung des Erzeugnisses hinsichtlich elektromagnetischer Verträglichkeit wurden folgende Normen herangezogen:

EN 61000-6-2 : 2005
EN 61000-6-3 : 2007
EN 50371 : 2002
EN 301 489-1 : V1.6.1
EN 301 489-3 : V1.4.1
EN 300 220-2 : V2.1.2

Diese Erklärung ist verantwortlich für den Hersteller/Bevollmächtigter

WAGO Kontakttechnik GmbH
Hansastr.27
32423 Minden

abgegeben durch

Dr. Thomas Albers
Leiter Technik Elektronik

Minden, 06.12.2010

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften.

Die Sicherheitshinweise der Produktdokumentation sind zu beachten.

2.1.1.12.3 French

Certificat de conformité CE

N° de document: 750642/02
Mois/Année: 11/10

Pour le produit désigné ci-après

750-642

il est certifié que celui-ci est conforme aux exigences définies dans la directive du conseil pour l'adaptation des prescriptions légales des états membres concernant les équipements hertziens et les équipements terminaux de télécommunications et la reconnaissance mutuelle de leur conformité (1999/5/EG).

Les normes suivantes ont été appliquées pour contrôler la compatibilité électromagnétique du produit:

EN 61000-6-2 : 2005
EN 61000-6-3 : 2007
EN 50371 : 2002
EN 301 489-1 : V1.6.1
EN 301 489-3 : V1.4.1
EN 300 220-2 : V2.1.2

Cette déclaration est valable pour le fabricant/fondé de pouvoir

WAGO Kontakttechnik GmbH
Hansastr.27
32423 Minden

effectuée par

Dr. Thomas Albers
Directeur techniques électronique
Minden, 06.11.2010

Cette déclaration certifie la conformité aux directives mentionnées, mais n'implique cependant aucune garantie quant aux qualités.

Il faut tenir compte des conseils de sécurité mentionnés dans la documentation du produit.

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