

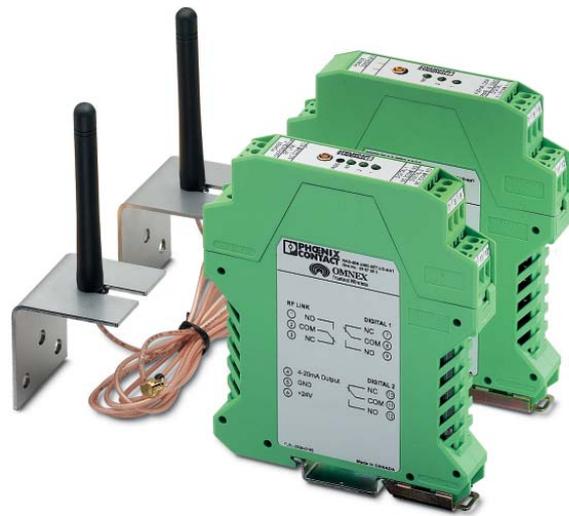
Unidirectional Wireless Transmission System RAD-ISM-2400-SET-UD-ANT

1. Short Description

The **RAD-ISM-2400-SET-UD-ANT** unidirectional radio system comprises a transmitter (Tx) and a receiver (Rx).

The transmitter detects two digital signals in the range from 5 - 30 V AC/DC, and one analog current signal (4...20 mA). These signals are available for further processing at the receiver in the form of two relay Form C contacts and one 4...20 mA current output. In addition, a third relay in the receiver diagnoses the status of the radio connection (RF link).

The radio connection is established automatically when the operating voltage U_B is applied to both devices. When the connection has been established, both RF LEDs are lit and the RF link relay in the receiver has picked up. From now on, a data transmission is started every 27 ms.



2. Technical Data



RAD-ISM-2400-SET-UD-ANT

Description	Type	Order No.	Pcs. Pkt.
Unidirectional wireless transmission system	RAD-ISM-2400-SET-UD-ANT	28 67 28 3	1
Technical Data	Transmitter	Receiver	
Supply	24 V DC	24 V DC	
Supply voltage U_B	-50%/+25%	-50%/+25%	
Tolerance	18 mA	54 mA	
Current consumption (at U_B)	35 mA	120 mA	
		Typical	
		Maximum	
Radio Interface	2.4032 - 2.4799 GHz	2.4220 - 2.4420 GHz	
Frequency range	100 kHz	100 kHz	
Reserved frequency	9/63	9/63	
Channel distance	10 mW	10 mW	
Number of channels	2 dBi Omni	2 dBi Omni	
Transmission power			
Antenna			
Analog Input	4...20 mA	-	
Signal range	10%	-	
Overload capability range	5%	-	
Underload capability range	< 170 Ω	-	
Input resistance	$\pm 0.025\%/\pm 0.075\%$	-	
Tolerance	0.007%/K	-	
Temperature coefficient	U_B	-	
Supply for passive sensors (terminal block 7)			
Analog Output		4...20 mA	
Signal range		10%	
Overload capability range		5%	
Underload capability range		$R_B = (U_B - 10 V)/20 mA$	
Maximum load resistance		$\pm 0.075\%/\pm 0.225\%$	
Tolerance		0.004%/K	
Temperature coefficient			
Digital Input	5...30 V AC/DC	-	
Signal range	5 V DC	-	
High signal	1.5 V DC	-	
Low signal			
Digital Output + RF Link		3	
Contact type	Floating Form C contact	-	
Contact material	Ag, gold-plated	✓	
Switching voltage	Maximum	60 V DC, 30 V AC	
Switching current	Maximum	0.5 A	
Switching frequency	Maximum	2 Hz	
Mechanical service life	Cycles	1×10^7	
Electrical service life	Cycles	8×10^5	
	(at 0.5 A switching current)		
Climatic Data			
Ambient temperature	Operation (IEC 68-1/UL 508)	-20°C to +65°C (-4°F to +149°F)	-20°C to +65°C (-4°F to +149°F)
	Storage	-40°C to +85°C (-40°F to +185°F)	-40°C to +85°C (-40°F to +185°F)
Relative humidity			

Unidirectional Wireless Transmission System – RAD-ISM-2400-SET-UD-ANT

Additional Technical Data

Indicators	RF link: green LED Digital 1 + 2: green LED
Antenna	
Cable length	
Antenna length	
Antenna diameter	
Housing	
Housing material	Polyamide PA, not reinforced
Degree of protection	
Mounting	On TS 35 DIN rail according to EN 60 715
Mounting position	Any
Dimensions (W x H x D)	
Weight	Approximately
Connection Terminal Blocks	
Cable cross section	
Cable length	Supply Signals
Approval	

Transmitter

ON/OFF	1.5 m (4.92 ft.)
ON/OFF	82.5 mm (3.25 in.)
	10 mm (0.39 in.)
✓	
IP20	
✓	
✓	
	(17.5 x 99 x 114.5 mm [0.689 x 3.898 x 4.508 in.])
	110 g
	0.2 - 2.5 mm ² (25 -14 AWG)
	< 10 m (32.81 ft.)
	< 30 m (98.43 ft.)

Receiver

ON/OFF/Flashes	1.5 m (4.92 ft.)
ON/OFF	82.5 mm (3.25 in.)
	10 mm (0.39 in.)

CE 0682 ⓘ

Standards Used

EMC
Radio
Safety
Health

EN 301 489-17:V1.2.1, EN 61000-6-2:2001
EN 300 328-17:V1.4.1
EN 60950-1:2001
EN 50371:2002

Additional Tolerances When Subject to EMI

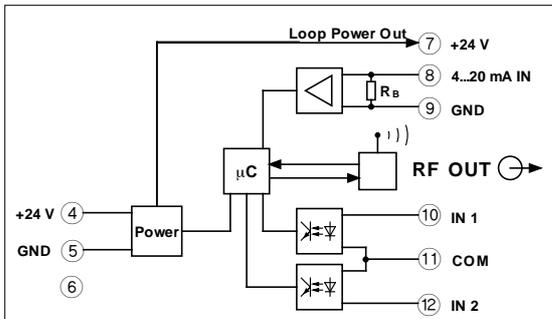
Analog Input

Conducted interference according to EN 61000-4-6
Radiated-noise immunity according to EN 61000-4-3
Radiated-noise immunity according to EN 61000-4-3

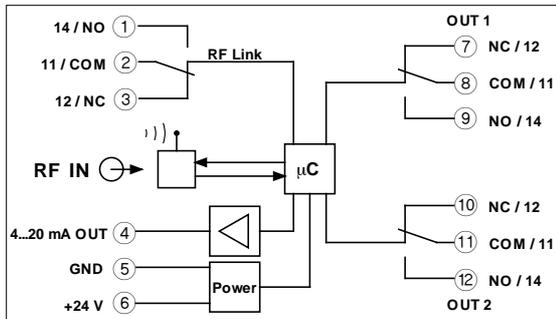
+/-3.5% @ 10 V
+/-2% @ 3 V/m
+/-19% @ 10 V/m

For additional information about the antennas, refer to the "Antennas and Accessories" data sheet.

Transmitter



Receiver



3. Device View, Connections, and Control Elements

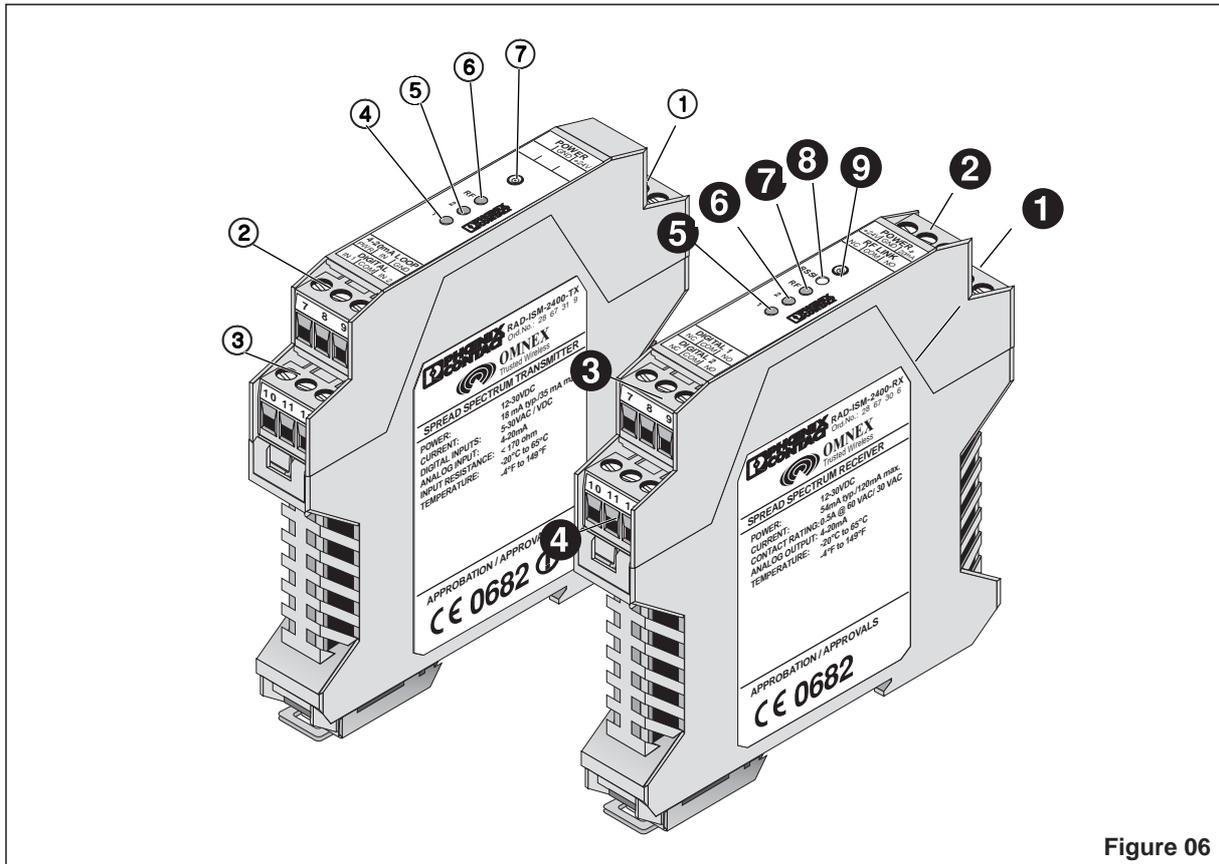


Figure 06

Transmitter:

- ① Connector: Operating voltage U_B
- ② Connector: 4...20 mA input
- ③ Connector: Digital inputs
- ④ LED: Digital input 1
- ⑤ LED: Digital input 2
- ⑥ LED: RF link
- ⑦ Antenna connection

Receiver:

- ① Connector: Operating voltage U_B + analog output
- ② Connector: RF link relay
- ③ Connector: Digital output 1
- ④ Connector: Digital output 2
- ⑤ LED: Digital output 1
- ⑥ LED: Digital output 2
- ⑦ LED: RF link
- ⑧ RSSI test socket
- ⑨ Antenna connection

4. Use



The RAD-ISM-2400-SET-UD-ANT radio system may only be used in the countries listed below:

Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway (not including Spitzbergen), Portugal, Spain, Sweden, and Switzerland.

Phoenix Contact hereby declares that the RAD-ISM-2400-SET-UD-ANT radio system complies with the basic requirements and other relevant regulations specified in directive 1999/5/EC.

The radio system should only be operated using authorized accessories from Phoenix Contact. The use of other additional components may invalidate the device approval status.

4.1 Installation

The modules are snapped onto a DIN rail within a control cabinet or control box. The control cabinet/box must meet the requirements of EN 60 950-1:2001 in terms of fire protection shielding.

In the electrical system of the building, a two-pole disconnecting device must be provided to isolate the equipment from the supply circuit.

In order to protect the modules against electrostatic discharge when working on control cabinets, the operating personnel must remove electrostatic discharge before opening control boxes or control cabinets and before touching the modules.

Observe the mounting instructions for the antenna used. The antenna cable is plugged into the antenna connection sockets (7)/(9).

4.2 Transmitter

Display and Diagnostic Elements

- ④ LED: Digital input 1 = Status of digital input 1
- ⑤ LED: Digital input 2 = Status of digital input 2
- ⑥ LED: RF link ON = Operating voltage U_B present, transmitter is sending data

Analog Input (2)

The 4...20 mA analog input detects active and passive current sensors.

For passive current sensors, the unregulated operating voltage U_B is provided at terminal block 7.

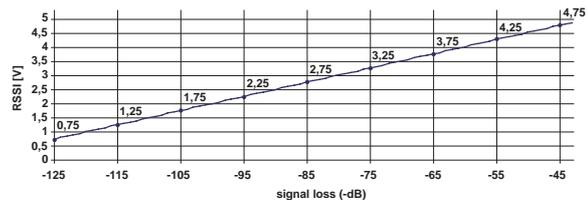
Digital Inputs (3)

Both digital inputs on the transmitter can process voltages from 5 - 30 V AC/DC. They have a shared ground potential (terminal block 11) and are electrically isolated from the operating voltage U_B .

4.3 Receiver

Display and Diagnostic Elements

- ② RF link relay
The RF link relay in the receiver diagnoses the status of the radio connection. It picks up when the radio connection is established.
If no data packets are received correctly over a period of approximately 3.4 seconds, the relay drops again.
It picks up again automatically when the radio connection is re-established. The RF link relay has a Form C contact.
- ⑤ LED: Digital output 1 = Status of digital output 1
- ⑥ LED: Digital output 2 = Status of digital output 2
- ⑦ LED: RF link OFF = No operating voltage U_B ;
Flashes briefly approximately every 2 seconds = No reception;
Flashes quickly = Connection breaking up
- ③ RSSI test socket
A voltage measuring device (manual multimeter) can be connected to the RSSI test socket to measure a voltage to GND, which provides information about the received radio signal (the higher the voltage, the better the reception).
Using the diagram below, the received signal strength in dB can be determined using the voltage value. This can be useful, e.g., when positioning and aligning the antenna.



Analog Output (Also Operating Voltage) (1)

The analog output is supplied internally from the unregulated operating voltage U_B . Terminal block 4 provides a power source at which the actuator is wired to ground (terminal block 5).

The output requires an internal drop voltage of 10 V.

The maximum load at the current output with a nominal voltage of $24\text{ V} = (24\text{ V} - 10\text{ V}) / 20\text{ mA} = 700\text{ Ohm}$. The maximum load therefore depends on the operating voltage U_B used.

Digital Outputs (3/4)

Two floating Form C contacts are used as the digital outputs for the receiver.

4.4 Behavior If the Radio Connection Is Interrupted

If the radio connection is interrupted, all outputs (analog and digital) retain their last value or status (see connection examples in Section 5).

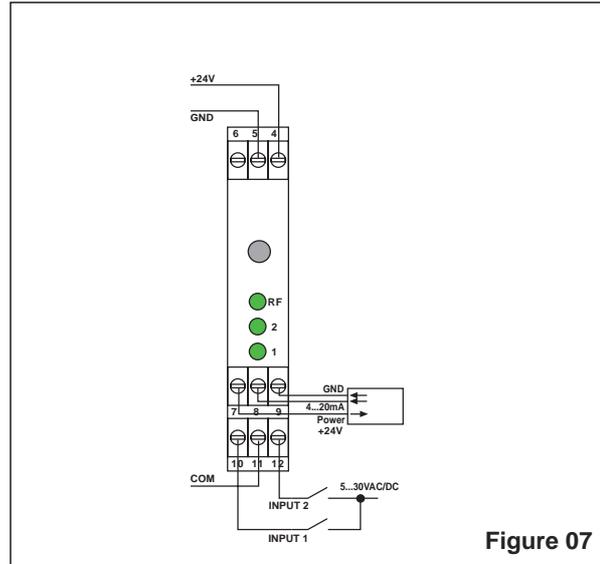
To configure a reset response (revert back to "0") for a digital signal or the analog signal when a radio connection is interrupted, connect the RF link relay contact in series.

To configure a reset response for all signals, use the RF link relay to control one or more additional relays.

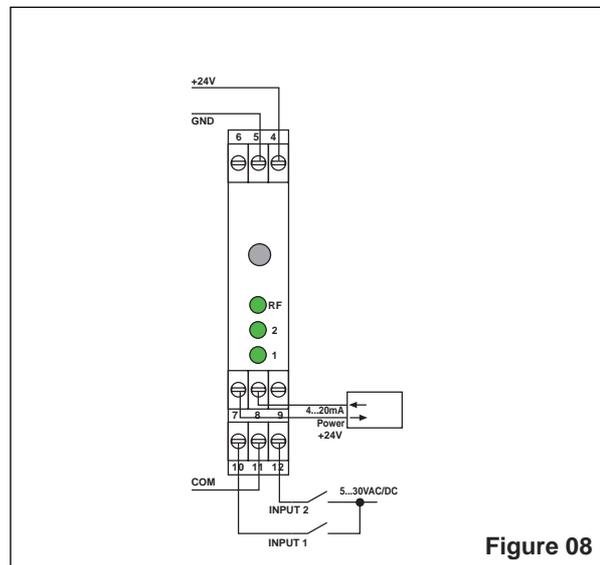
5. Connection Examples

5.1. Transmitter

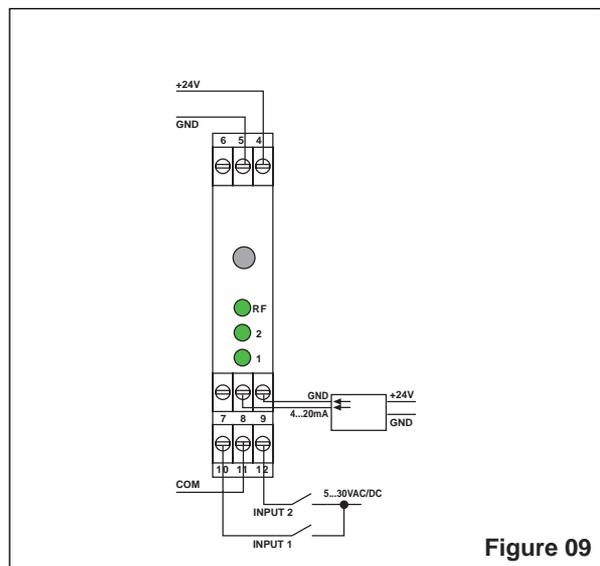
Connection of a passive current sensor in 3-wire technology (see Figure 07).



Connection of a passive current sensor in 2-wire technology (see Figure 08).



Connection of an active current sensor with separate power supply connection (see Figure 09).



5.2. Receiver

Connection Diagram for "Hold" Response for All Outputs

The hold response retains the states of the digital outputs and the analog signal when the radio connection is interrupted (see Figure 10).

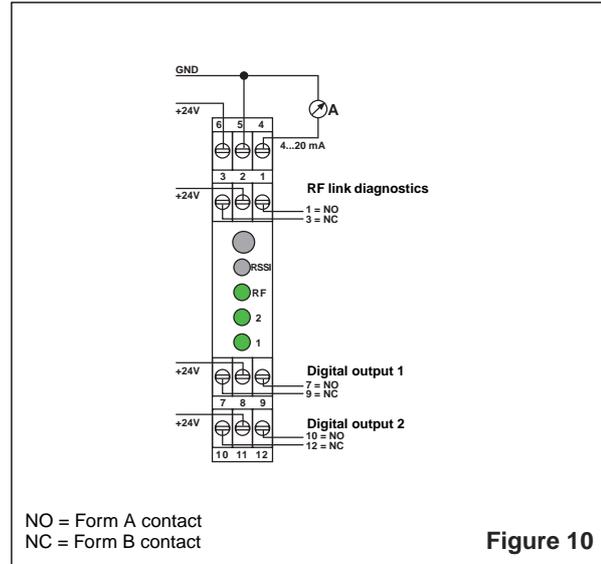


Figure 10

Connection Diagram for "Reset" Response for Digital Outputs

In this example, the RF link relay is connected to the digital outputs in series. This means that the digital outputs are set to "0" when the radio connection is interrupted (see Figure 11).

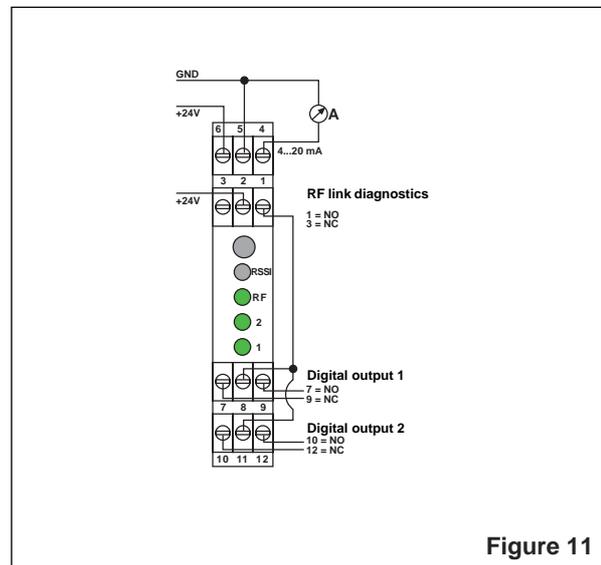


Figure 11

Connection Diagram for "Reset" Response for the Analog Output

In this example, the RF link relay is connected to the analog output in series. This means that the analog output is set to 0 mA when the radio connection is interrupted (see Figure 12).

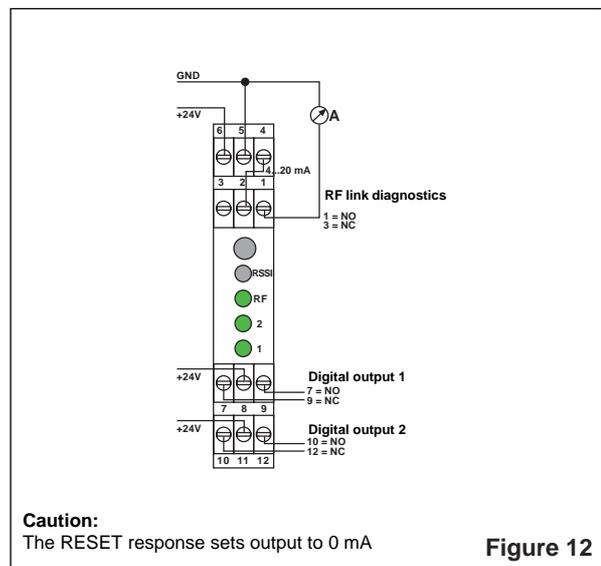
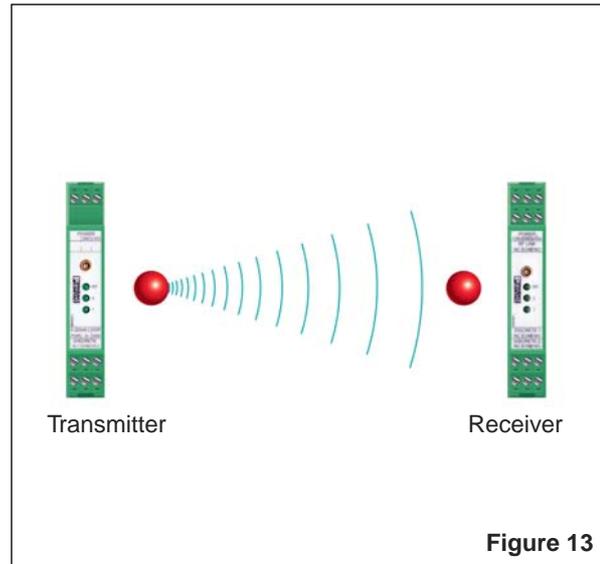


Figure 12

5.3. System Versions

Point-to-Point

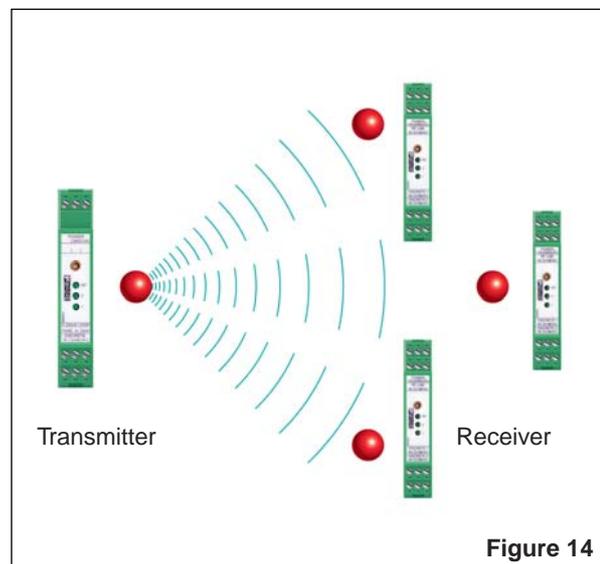
In the point-to-point system version, the set is installed, the signals are connected, and the operating voltage is applied. The radio connection is established automatically – no other settings are required (see Figure 13).



Point-to-Multipoint

In the point-to-multipoint system version, the set (RAD-ISM-2400-SET-UD-ANT Order No. 28 67 283) is installed, the signals are connected, and the operating voltage is applied. The radio connection is established automatically.

Signal paths can be divided or multiplied through the installation of additional receivers (RAD-ISM-2400-RX Order No. 28 67 306) (see Figure 14).



5.4 Additional Receivers

Any number of additional receivers (RAD-ISM-2400-RX Order No. 28 67 306) can be used. The devices are supplied without a HOPKEY.

The HOPKEY contains the transmission frequencies used and the hop sequence. This information is required when installing an additional receiver in an existing system.

To install an additional receiver, proceed as follows:

1. To protect the modules against ESD, the operating personnel must remove electrostatic discharge at appropriate points (e.g., control cabinet) before touching the modules.
2. The existing system must have already established a radio connection.
3. Disconnect the power to the existing system.
4. Open the housing of the receiver in the existing system by pressing both the housing latches on the sides. Remove the electronics module from the housing (see Figure 15).
5. At the bottom right on the printed circuit board is a small printed circuit board in a 10-pos. base – this is the HOPKEY. Remove the HOPKEY and insert it in the same position in the new receiver that you wish to install (see Figure 16).
6. Close all the housing covers and reinsert the devices in the control cabinet(s).
7. Reconnect the supply voltage – the additional receiver now receives the same information as the receiver in the existing system.
8. Repeat the procedure for all additional receivers.

Explanation:

When the supply voltage is connected, the information is transmitted from the connected HOPKEY to a non-volatile memory inside the module. This HOPKEY can then be used to "teach" other receivers. The HOPKEY can be stored in the last receiver.

If no HOPKEY is connected, the information inside the module is used.

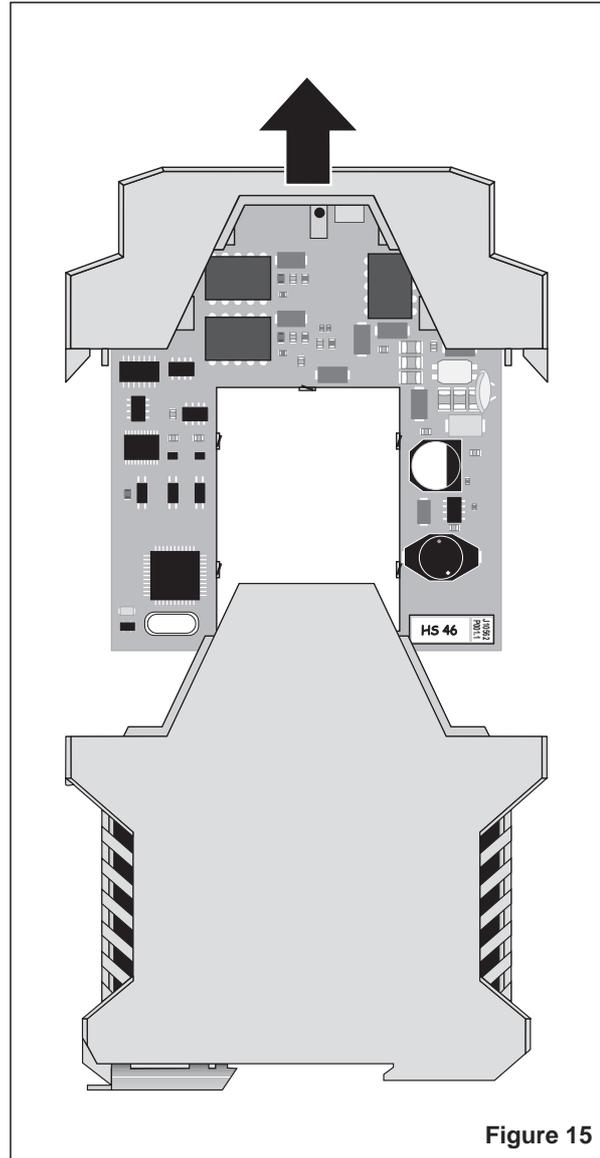


Figure 15

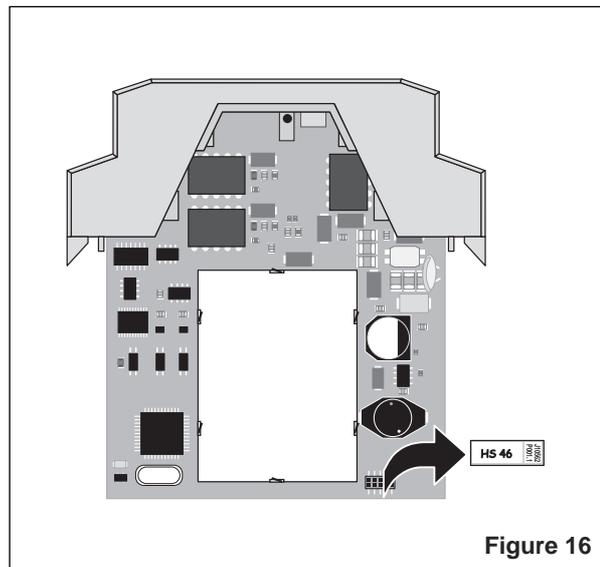


Figure 16

6. Tips and Notes

6.1 Notes on the General Assignment of Frequencies

In Gazette 22/1999, Order 154, the German regulating body for telecommunications and mail (RegTP) has stipulated a general assignment of frequencies.

This general assignment applies to radio systems in the frequency range from 2.400 - 2.4835 GHz for general use.

Section 10 specifies that the radio system operator has a duty to notify the RegTP in writing of the installation of a system, **if it uses transmission paths that extend beyond the site.**

If, for example, another radio system is installed, which adversely affects an existing RAD-ISM system, then this system must adjust its operation if the existing system was already registered with the RegTP. System registration is therefore designed to protect the system operator.

A form, which the system operator can use to notify the RegTP is provided in the appendix.

6.2 Notes for Operating Other Radio Systems in Close Proximity

If other radio transmission systems are operated on the same frequency close to an INTERFACE wireless system, interference may occur.

The effects on the RAD-ISM-2400-SET-UD-ANT are marginal and barely noticeable.

However, in certain circumstances an installed WLAN system (IEEE 802.11b) may be disturbed by frequency hopping, even if all specified maximum values are observed.

To provide a solution for these cases, the RAD-ISM-2400-SET-UD-ANT reserves a small frequency range in the 2.4 GHz band.

This is the range from 2.4220 GHz - 2.4420 GHz, which corresponds to channel 5 of a WLAN system according to IEEE 802.11b.

Should you experience the problem described above, please configure your WLAN system to channel 5.

7. Appendix

- CE declaration of conformity
- Declaration of conformity with health requirements
- Form to notify the RegTP of an installed radio path in/over a public area



EC-Declaration of Conformity

EG-Konformitätserklärung

The Manufacturer/ Importer: **Phoenix Contact GmbH & Co. KG**
Der Hersteller/ Importeur:

Address: **Flachsmarktstrasse 8**
Adresse: **32825 Blomberg**

Declares under his sole responsibility that the product:
Erklärt mit alleiniger Verantwortung, dass das Produkt:

Type: **INTERFACE Wireless**
Typ:

Model:	Pos1	RAD-ISM-2400-SET-UD-ANT	28 67 283
Modell:	with accessories:	RAD-ISM-2400-ANT-OMNI-2-1	28 67 461
		RAD-ISM-2400-ANT-OMNI-9-0	28 67 623
		RAD-ISM-2400-ANT-PAN-8-0	28 67 610
	Pos2	RAD-ISM-2400-RX	28 67 306

meets the essential requirements of the following EC-Directive(s):
die grundlegenden Anforderungen der nachstehenden EU-Richtlinie(n) erfüllt:

Directive 1999/5/EC of the European Parliament and of the Council of 09 March 1999 relating to radio and telecommunications terminal equipment, including the mutual recognition of their conformity

Richtlinie 1999/5/EG des Europäischen Parlaments und des Rates vom 09. März 1999 über Funkanlagen und Telekommunikationsendeinrichtungen und die gegenseitige Anerkennung ihrer Konformität

and that the following standards have been applied:
und dass die folgenden Normen angewandt wurden:

EN 301 489-17:V1.2.1 , EN 61000-6-2 :2001
EN 300 328 V1.4.1.
EN 60950-1:2001
EN 50371:2002

The essential radio test suites identified by the Notified Body 0682
Die wesentlichen Funktestreihen, wie von der Benannten Stelle 0682 festgelegt
 defined in the harmonised standards
festgelegt in den harmonisierten Normen

have been carried out.
wurden durchgeführt.

The following Notified Body was consulted for the Conformity Assessment.
Die folgende Benannte Stelle wurde zur Konformitätsbewertung herangezogen.

CETECOM
ICT Services GmbH
Untertürkheimer Str. 6-10
66117 Saarbrücken
Germany

24.11.03

Datum (Date)

Manufacturer/ Importer
Hersteller/ Importer

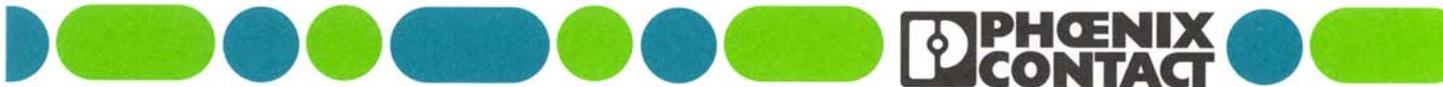
i.A. A. Wenkel

Unterschrift des Fachverantwortlichen
(Signature of the technical person)

24.11.03

Datum (Date)

ppa. J. B. ...
Unterschrift und Titel des Bevollmächtigten
(Signature and title of the authorised person)



Declaration to 1999/5/EG, Article 3, 1a,
Essential requirement "Human Health"

Protection of the user against High Electromagnetic Emission

Basic restrictions related to human exposure to
Electromagnetic fields of mobile phones

Kind of Device:	unidirectional, wireless signal transmission set for two digital and one analog sensor signal		
Model:	Pos 1 with accessories	RAD-ISM-2400-SET-UD-ANT	28 67 283
		RAD-ISM-2400-ANT-OMNI-2-1	28 67 461
		RAD-ISM-2400-ANT-OMNI-9-0	28 67 623
		RAD-ISM-2400-ANT-PAN-8-0	28 67 610
	Pos 2	RAD-ISM-2400-RX	28 67 306
Max. Sending Level:	10 mW		
Frequency Range:	2,400 – 2,483 GHz		

The harmonised requirement EN 50731:2002 had been used for the conformity assessment.

According to this requirement the SAR-measurement has not be conducted when sending level is < 20 mW.

All devices do not exceed the max. permitted sending level of ≤ 10 mW.
Thus this level lies beneath the value of the requirement.

Phoenix Contact GmbH & Co. KG
Flachmarktstr. 8-28
D-32825 Blomberg

Applicant's signature and official stamp

Blomberg, 24.11.03

Place, Date

ppa. J. B.
Name

**Regulierungsbehörde für
Telekommunikation
und Post (Reg TP)**
Postfach 80 01

53105 Bonn

Telefon 02 28/14-0
Fax 02 28/14-88 72

Informationen zu Funkanlage im 2,4GHz ISM Band

Sehr geehrte Damen und Herren,

hiermit setzen wir Sie über die Errichtung einer Funkanlage bei grundstücksüberschreitendem Übertragungsweg gemäss Amtsblatt 22/1999, Verfügung 154/1999, Punkt 10 in Kenntnis.

Genauere Anschrift der ortsfesten Funkanlage:

Höhe der Antenne über Grund:

m

Antennencharakteristik:

- Rundstrahler (OMNI)
 Richtantenne (PANEL)

Bei Richtantenne: Anschrift der Gegenstelle:

Datum der Inbetriebnahme:

____.____.____

Betreiber der Funkanlage:

Name:

Strasse:

Ort:

Telefon:

Mit freundlichen Grüßen

Datum

Unterschrift