Baumer ///IDENT

OIS-W: User's Manual

Hardware

Contents

The Aim of the Document

Contents of the pictures

Contents of the tables

Contents of the Indices

The Aim of the Document

The document describes the hardware of the Ident System OIS-W of Baumer Ident as an user's manual. It is addressed to maintenance staff and system integrators.

For maintenance staff a PC based Service Software „Basic" is available which is described in the additional document „Service Software Basic".

For system integrators a PC based Service Software „Development" is available which is described in the additional document „Service Software Development".

Baumer Ident supplies the OIS-W preconfigured and set up in parameters. In the normal case the user needn't read the whole document to succeed in putting the system in operation.

This document is based on the system configuration below:

Terms	Reference-Code
Reader	WR-xxxx (without WR-xx2x)[1] with DSP SW 2.26
Tag	WT-xxxx
Antenna	WA-xxxx
Mounting Aids	WM-xxxx
RF Cable	WC-xxxx

Table 1-1: area of validity

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[1] WR-xx2x (with Profibus-DP) is in preparation!

1 User's Instructions

1.1 Technical hot line

Please report any problems to:

- Baumer Ident @ Baumer Electric AG
  Hummelstrasse 17
  CH-8500 Frauenfeld
  Switzerland

  Tel.:   +41-52-728 11 22
  Fax: +41-52-728 11 44
  e-mail: dzehnder@baumerelectric.com

1.2 Certification

The OIS-W was designed, constructed and certified according to the following references:

- BAPT 211 ZV 037/2050   April 97
  Bundesamt für Post und Telekommunikation (D); „Zulassungsvorschrift für Funkanlagen für
  Identifizierungszwecke"

- BAKOM SR 784.103.12 / 1.33 1.6.1996
  Bundesamt für Kommunikation (CH), „Technische Anforderungen für Funkanlagen mit geringer
  Reichweite die im Frequenzbereich 1 GHz bis 25 GHz auf Sammelfrequenzen betrieben
  werden"

- I-ETS 300 440 Dec. 1995
  ETSI, „Radio Equipment and Systems (RES); Short range devices; Technical characteristics
  and test methods to be used in the 1 GHz to 25 GHz frequency range", Dec. 1995.

1.3 Warranty

This Baumer Ident product is warranted against defects in material and workmanship for a period of one year from date of delivery. During the warranty period, Baumer Ident will, at its option, either repair or replace products which prove to be defective.

Baumer Ident warrants that its software and firmware designated by Baumer Ident for use with an OIS-W will execute its programming instructions when properly installed on that system. Baumer Ident does not warrant that the operation of the system will be uninterrupted or error-free.

The foregoing warranty shall not apply to defects resulting from improper or inadequate operation by buyer, buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. Baumer Ident will decline liability for units that have been opened without permission of Baumer Ident.

2 Safety Instructions

2.1 General Instructions

Observe the following safety instructions, in order to avoid injuries and damage to this product and to the devices connected to it. To avoid the potential dangers, only use the product as described.

- **Service work must only be carried out by qualified service staff.**

- **Correct procedure with rf systems**. Incorrect handling of rf systems can damage the health. Use only certified antennas supplied by Baumer Ident. Never use amplifying device in the transmitting line between reader and antenna.

- **Use the correct supply voltage**. Consult the product label before connecting the mains cable.

- **Correct connections**. Do not connect or remove any cable from any connection or any interface while the system is switched on.

- **Observe all nominal values at the terminals**. To avoid the danger of fire or an electric shock, pay attention to all nominal values and inscriptions on the product. When necessary read the additional information regarding nominal values in the user's manual before connecting the units or cables.

- **Do not open the unit**. Never remove the covers or the front panel for any reason.

- **Do not work without the cover in place**. Never operate the unit with the covers or front panel dismounted.

- **Do not operate units that are possibly damaged**. If it is suspected that the unit is damaged, it should be checked by qualified staff.

2.2 General Graphic Instruction

These indications appear in this user's manual.
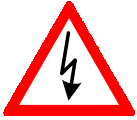
Danger!
Specific danger through electric voltage

Danger!
Specific danger through high frequency

Caution!
Risks to the system

Advice!
Advice to facilitate the handling

Picture 2-1: general graphic instructions

3 Description of the Hardware Components

3.1 System
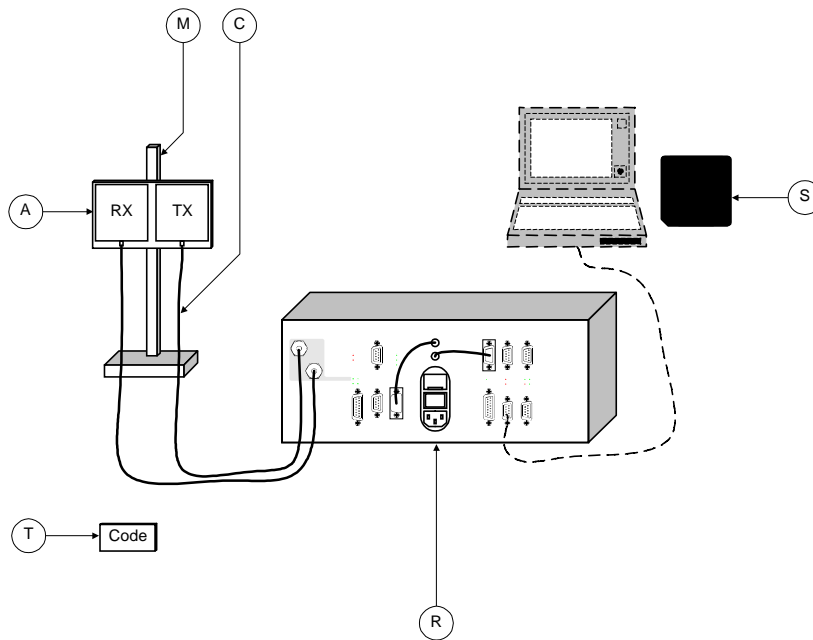
Picture 3-1: system; general view

Abbreviation	Term	Reference-Code
R	reader	WR-xxxx
T	tag	WT-xxxx
A	antenna	WA-xxxx
M	mounting aids	WM-xxxx
C	rf cable	WC-xxxx
S	service software (S)	WS-xxxx

Table 3-1: terms of the system

The OIS-W system shows a flexible, modular product concept. The reader (R) is in principle separated from the antenna (A). Thereby the reader (R) may be placed in another environment (temperature, humidity, explosive atmosphere) than the antenna (A).

Before delivery Baumer Ident will configure and parameterize the OIS-W system based on the respective application. This procedure allows a short commissioning.

Baumer Ident supplies a service software (S) to optimize the configuration parameters during the commissioning and for the maintenance. The service software (S) is not necessary during the operation.

Serial interfaces and fieldbus interfaces allow integration in a customer data network or teleservice.

3.2 Reader

3.2.1 Introduction

A flexible and modular system consisting of the reader (R) and the optional integrated interface unit forms the basis for the most common possibilities to integrate into a higher-order system. Interfaces with RS 232 and RS 422 are available in the basic reader type. The optional interface unit is necessary for interfaces with Profibus-DP, InterBus-S, CAN or Ethernet.

The reader (R) is designed and built according to the newest state-of-the-art techniques. It contains a DSP[1], a FPGA[2] and a DDS[3].

Essentially the functions of the reader (R) are realized with a DSP. It is responsible for the reliable decoding of the reflected microwave signal and for steering and control of the whole unit. The program modules and the configuration file are saved in a Flash-EPROM. As the functions are realized with software, application specific modifications or software updates can easily be carried out.

The reader (R) is the most important module of the OIS-W system. It generates the microwave signal to interrogate a tag, sends is out by the antenna (A), processes the receiving signal, evaluates the code and communicates the data with selectable serial interfaces or with an optional fieldbus interface to a network.

The OIS-W transponders are fix code tags. The linking of this fix code with an application specific identification number can be carried out with the help of a look up table within the reader (R) .

One or two antennas(A) can be connected to the reader (R) according to its type. This allows the realization of the identification points with only one OIS-W system.

The reader (R) can be operated either in the operation mode „event driven" or „triggered". The reader (R) can be triggered either with a digital input or with a telegram from a higher order system. The user has the choice whether the interrogation signal is constantly on or only if required.

For various additional steering functions as e.g. switching of external loads or interrogation of errors, there are one or more digital outputs per antenna available according to the reader (R) type. This may possibly make a PLC or a PC obsolete. For experienced users it is possible to program themselves the functionality of the digital outputs with the help of the microcontroller.

The readers (R) is supplied as 19 inch plug-in unit or integrated into a case with the protection class IP40 or IP65. Both varieties are available with a 24 VDC or 100-250 VAC // 50/60 Hz power supply.

If several reader (R) are operated in a closed space they have to be synchronized. The „parallel synchronization" as opposed to the „sequential synchronization" can do without additional cabling.

Baumer Ident supplies each reader (R) configured and parametrized. The user installs the reader (R) at the defined identification point. After that the configuration parameters are optimized during a short commissioning. If you have any questions do not hesitate to make use of our technical hot line.

Advice!
Refer to summary of all the reader types in table 3.3.

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[1] Digital Signal Processor

[2] Field Programmable Gate Array

[3] Direct Digital Synthesizer

3.2.2 Overview
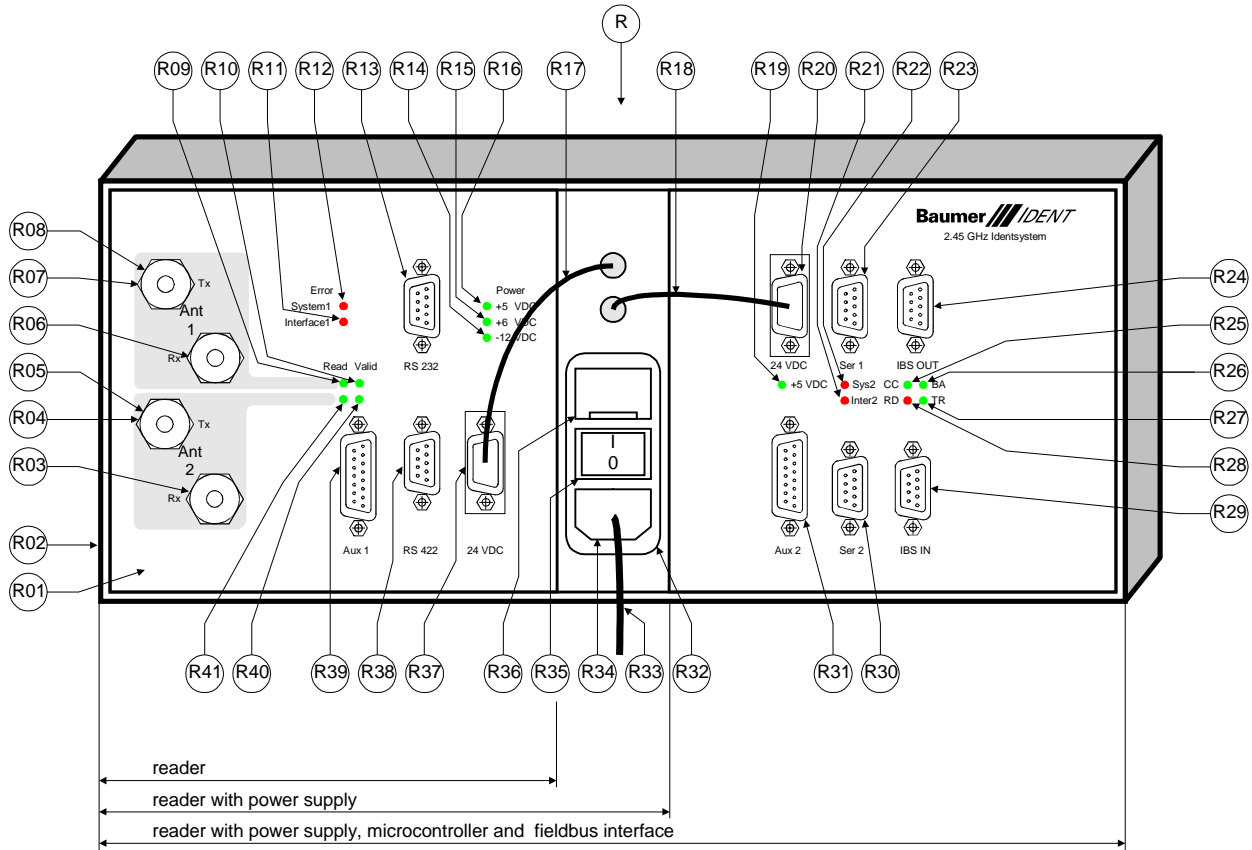
Picture 3-2: reader (R)

Advice!
The above picture and the table on the right show and describe all the available components of the reader. Depending on the reader type not all the components exist. The respective configuration based on the reference code is mentioned in table 3.3.

Abbr.	Labeling on front panel	Element	Correct term
R	OIS-W WT-xxxx		reader
R01	without	front panel	front panel
R02	without	case	case
R03	Ant 2: Rx	TNC-jack	receiver input antenna 2
R04	Ant 2: Tx	TNC-jack	transmitter output antenna 2
R05	Ant 2: Tx/Rx	TNC-jack	receiver input / transmitter output antenna 2
R06	Ant 1: Rx	TNC-jack	receiver input antenna 1
R07	Ant 1: Tx	TNC-jack	transmitter output antenna 1
R08	Ant 1: Tx/Rx	TNC-jack	receiver input / transmitter output antenna 1
R09	Read 1	green LED	reader status antenna 1
R10	Valid 1	green LED	detection status antenna 1
R11	Interface 1	red LED	communication failure 1
R12	System 1	red LED	system failure 1
R13	RS 232	'D' Sub 9-way plug	serial interface RS 232
R14	Power -12 VDC	green LED	-12 VDC power supply status
R15	Power +6 VDC	green LED	+ 6 VDC power supply status
R16	Power +5 VDC	green LED	+5 VDC power supply status
R17	without	shielded cable	power supply cable 1
R18	without	shielded cable	power supply cable 2
R19	+ 5 VDC	green LED	+5 VDC power supply status
R20	24 VDC	'D' Sub 3-way plug	+24 VDC input 2
R21	Interface 2	red LED	communication failure 2
R22	System 2	red LED	system failure 2
R23	Ser 1	'D' SUB 9-way plug	serial interface 1
R24	IBS OUT	'D' Sub 9-way socket	output socket InterBus-S
R25	CC	green LED	cable check status InterBus-S
R26	BA	green LED	bus active status InterBus-S
R27	TR	green LED	transmit / receive status InterBus-S
R28	RD	red LED	remotebus disable status InterBus-S
R29	IBS IN	'D' Sub 9-way plug	input plug InterBus-S
R30	Ser 2	'D' Sub 9-way plug	serial interface 2
R31	Aux 2	'D' Sub 15-way plug	binary inputs / outputs 2
R32	without	switched double fused chassis plug	switched double fused chassis plug
R33	without	mains cable	mains cable
R34	without	built-in to switched double fused chassis plug	chassis plug
R35	without	built-in to switched double fused chassis plug	mains switch
R36	without	built-in to switched double fused chassis plug	fuseholder
R37	24 VDC	'D' Sub 3-way plug	+24 VDC input 1
R38	RS 422	'D' Sub 3-way socket	serial interface RS 422
R39	Aux 1	'D' Sub 3-way plug	binary inputs / outputs
R40	Valid 2	green LED	detection status antenna 2
R41	Read 2	green LED	reader status antenna 2

Table 3-2: terms of the reader (R)

3.2.3 Types of Readers

```
         ┌──┬──┐    ┌──┬──┬──┬──┐
         │W │R │────│X │X │X │X │
         └──┴──┘    └──┴──┴──┴──┘
                      ▲  ▲  ▲  ▲
Reader version ───────┘  │  │  │
Number of antennas ──────┘  │  │
Interface ──────────────────┘  │
Special features ──────────────┘
```
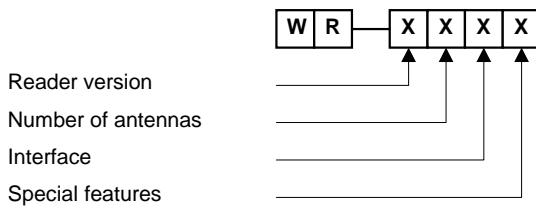
	Value	Description	Application
Reader version	0	Basic reader, rack mountable, 24 VDC	For applications in existing rack housing and 24 VDC power input
	1	Reader with microcontroller, rack mountable, 24 VDC	For applications in existing rack housing and 24 VDC power input. The microcontroller gives the reader additional data and aux port control features
Number of antennas	1	One antenna, in combination with WA-0xxx	For applications where one reader controls one ID point
	2	Two independent, time multiplexed antennas, in combination with WA-0xxx	For applications where one reader controls two closed ID points
	3	One antenna, in combination with WA-1xxx	For applications where one reader controls one ID point [1]
	4	Two independent, time multiplexed antennas, in combination with WA-1xxx	For applications where one reader controls two closed ID points [1]
Interface	0	RS 232 and RS 422	Standard
	1	Interbus-S and two serial interfaces, in combination with WR-1xxx	Available only upon request [2]
	2	Profibus DP and two serial interfaces, in combination with WR-1xxx	Available only upon request [2]
	3	CAN and two serial interfaces, in combination with WR-1xxx	Available only upon request [2]
	4	Ethernet and two serial interfaces, in combination with WR-1xxx	Available only upon request [2]
Special features	0	No additional features	Standard
	1	Additional 100 – 240 VAC power supply	Includes a separate, rack mountable power supply
	2	Additional housing, IP 40	Includes a protecting reader housing
	3	Additional 100 – 240 VAC power supply and housing, IP 40	Includes a separate, rack mountable power supply and a protecting housing
	4	Additional housing, IP 65	Includes a protecting reader housing
	5	Additional 100 – 240 VAC power supply and housing, IP 65	Includes a separate, rack mountable power supply and a protecting housing

1) The reading distance is reduced according to the antenna data sheet
2) Fieldbus interfaces are not available at the moment, time of delivery is 6 months

Table 3-3: overview of the readers (R)

Advice!
We gladly advice you on choosing the optimum reader!

3.2.4 Mechanical Dimensions
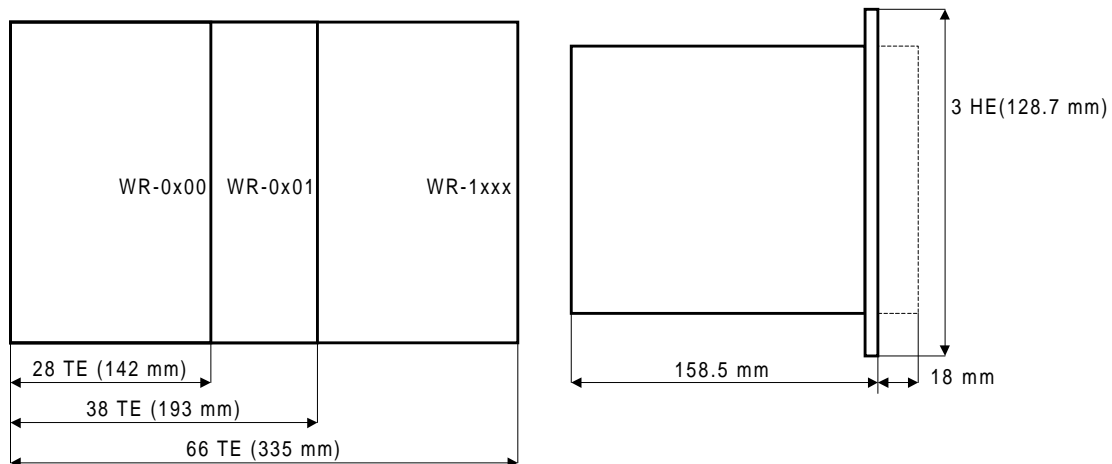
Picture 3-3: mechanical dimensions of the reader (R), without case

3.2.5 Specifications for Applications

Parameter	Limits
Frequency range	2400 - 2483.5 MHz
Transmitter power	500 mW EIRP max.
Operating temperature	0 °C to + 55 °C
Humidity	non condensing
Power supply	24 VDC $\pm$ 10 % / $\leq$ 1 A // 100-250 VAC $\leq$ 1 A
Class of protection	see Table 3-3

Table 3-4: specification for application of the reader (R)

3.2.6 Description of all Reader Components assessable from the Outside

front panel (R01)

The front panel is made of aluminum and is 2.0 mm thick. On the front side it is anodized and on the back side passivated.

case (R02)

Generally the reader can be supplied with or without case (as a 19in plug-in unit). Cases are available in the degrees of protection IP40 and IP65.

receiver input of ant 2 (R03)

- Impedance: 50 Ohm
- Connector: TNC jack

transmitter output of ant 2 (R04)
- Impedance: 50 Ohm
- Connector: TNC jack

receiver input / transmitter output of ant 2 (R05)
This connector is used with the reader types WR-x1xx and WR-x3xx (both with circulator) in combination with the antenna WA-1xxxx.
- Impedance: 50 Ohm
- Connector: TNC jack

receiver input of ant 1 (R06)
- Impedance: 50 Ohm
- Connector: TNC jack

transmitter output of ant 1 (R07)
- Impedance: 50 Ohm
- Connector: TNC jack

receiver input / transmitter output of ant1 (R08)
This connector is used with the reader types WR-x1xx and WR-x3xx (both with circulator) in combination with the antenna WA-1xxxx.
- Impedance: 50 Ohm
- Connector: TNC jack

reader status of ant 1 (R09)
If the green LED is on, the antenna sends out an interrogation signal.

detection status of ant 1 (R10)
If the red LED is on the reader (R) has recognized a valid tag (T).

communication failure 1 (R11)
If the red LED is on, the communication partner of the serial interface RS 232 (R13) or the serial interface RS 422 (R38) has not answered within the length of time defined by the parameters.
Please note that the red LED is briefly on during the start up of the reader (R).

system failure 1 (R12)
If the red LED is on, there is an internal failure which generally cannot be fixed by the user.
Please note that the red LED is briefly on during the start up of the reader (R).

serial interface RS 232 (R13)

This serial interface is used as a service or data output to the service PC.

Feature	Definition			
Signal Levels	RS232			
Baud rates default optional	 9600 baud 115'200 baud			
Parameter	8 bit, 1stop bit, no parity			
Connector	9-Pin D-Sub, male (DTE)			
Pin Assignment			1	DCD
	DSR	6	2	RXD
	RTS	7	3	TXD
	CTS	8	4	DTR
	RI	9	5	GND

Table 3-5: serial interface RS 232 (R13)

-12 VDC power supply status (R14)

If the green LED is on the -12 VDC power supply is available.

+6 VDC power supply status (R15)

If the green LED is on the +6 VDC power supply is available.

+5 VDC power supply status (R16)

If the green LED is on the +5 VDC power supply is available.

power supply cable 1 (R17)

The 24 VDC power supply which is only integrated in the reader type 0xx1/0xx3/0xx5 is to be connected with the power supply cable 1 (R17) to the +24 VDC input 1 (R37). Herewith the power supply of the reader is secured.

- cable: $2 \times 0.5mm^2$; shielded
- jack: Phoenix Power Subcon PSC 1,53/3-F
- jack socket: Phoenix Subcon jack socket

power supply cable (R18)

The 24 VDC power supply which is only integrated in the reader type 0xx1/0xx3/0xx5 is to be connected with the power supply cable (R18) to the +24 VDC input 2 (R20). Herewith the power supply of the microcontroller and fieldbus unit is secured

- cable: $2 \times 0.5mm^2$; shielded
- jack: Phoenix Power Subcon PSC 1,53/3-F
- jack socket: Phoenix Subcon jack socket

+5 VDC power supply status (R19)

If the green LED is on the +5 VDC power supply is available.

+24 VDC input 2 (R20)

The 24 VDC power supply which is only integrated in the reader type 0xx1/0xx3/0xx5 is to be connected with the power supply cable (R18) to the +24 VDC input 2 (R20). Herewith the power supply of the microcontroller and fieldbus unit is secured.

- plug: Phoenix Power Subcon PSC 1,5/3-M

Parameter	min.	Type	max.	units
power supply voltage	+21.6	+24.0	+26.4	VDC
power supply current			500	mA

Pin	Contact
1 (above)	24 VDC
2 (middle)	0 V
3 (below)	--
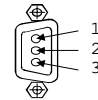
Table 3-6: +24 VDC input 2 (R20)

communication failure (R21)

Not yet released!

system failure 2 (R22)

Not yet released!

serial interface 1 (R23)

This interface is provided as an additional data communication interface and can be assembled as RS232, RS422 or RS485. The communication can be adapted to special customer needs with the help of the integrated microcontroller.

Feature	Definition			
Signal level:	RS232			

Baud rates
    default
    optional
	9600 baud
	1200, 2400, 4800, 19200, 38400			

Parameter	8 bit, 1stop bit, no parity			
Plug	9-Pin D-Sub, male (DTE)			
Pin assignment			1	
		6	2	RXD
	RTS	7	3	TXD
	CTS	8	4	
		9	5	GND

Table 3-7: serial interface 1 (R23), variation with RS232

Feature	Definition			
Signal level:	RS422			

Baud rates
    default
    optional
	9600 baud
	1200, 2400, 4800, 19200, 38400			

Parameter	8 bit, 1stop bit, no parity			
Plug	9-Pin D-Sub, male (DTE)			
Pin assignment			1	
	T-	6	2	
	T+	7	3	
	R+	8	4	
	R-	9	5	

Table 3-8: serial interface 1 (R23), variation with RS422

Feature	Definition			
Signal level:	RS485			
Baud rates default optional	9600 baud 1200, 2400, 4800, 19200, 38400			
Parameter	application specific			
Plug	9-Pin D-Sub, male (DTE)			
Pin assignment			1	
	R-/T-	6	2	
	R+/T+	7	3	
	R+/T+	8	4	
	R-/T-	9	5	

Table 3-9: serial interface 1 (R23), variation with RS485

output socket of InterBus-S (R24)

- outgoing InterBus-S interface

Feature	Definition			
Signal level:	InterBus-S			
Jack:	9-Pin D-Sub, female			
Pin assignment			1	DO2
	/DO2	6	2	DI2
	/DI2	7	3	GND
		8	4	
	RBST	9	5	+5V

Table 3-10: output socket of InterBus-S (R24)

cable check status of IBS (R25)

The green LED is on if the InterBus-S cable connection is in order and the InterBus-S interface module is not in the reset mode.

bus active status of IBS (R26)

The green LED is on if the data communication on the InterBus-S is active.

transmit / receive status of IBS (R27)

Not yet released!

remotebus disable status of IBS (R28)

The red LED is on if the continuous fieldbus is switched off.

input plug of IBS (R29)

- incoming InterBus-S interface

Feature	Definition			
Signal level:	InterBus-S			
Plug:	9-Pin D-Sub, male			
Pin assignment			1	DO1
	/DO1	6	2	DI1
	/DI1	7	3	GND1
		8	4	
		9	5	

Table 3-11: input plug of IBS (R29)

serial interface 2 (R30)

As a standard the serial interface 2 (R30) of the reader type WR-111x is to be fixed with the serial interface RS 422 (R38). This connection provides the communication between the reader (R) and the microcontroller and fieldbus unit.

Feature	Definition			
Signal level:	RS422			
Baud rates: default optional	9600 baud 1200, 2400, 4800, 19200, 38400			
Parameter	8 bit, 1stop bit, no parity			
Plug	9-Pin D-Sub, male (DTE)			
Pin assignment			1	
	T-	6	2	
	T+	7	3	
	R+	8	4	
	R-	9	5	

Table 3-12: serial interface 2 (R30)

binary inputs / outputs 2 (R31)

In combination with the microcontroller unit two further digital outputs are available. Contrary to the Binary Inputs / Outputs 1 (R39) they are not assigned directly to the antenna but can generally be programmed freely with the help of the integrated microcontroller. In that way in an application a PLC or a PC may become obsolete. Experienced users can do the programming themselves.

Pin Assignment				
Connector:	15-Pin D-Sub, male			
Digital inputs	+AUX_IN2 -AUX_IN2	9 10	1 2	+AUX_IN1 -AUX_IN1
Digital outputs	AUX_OUT2a AUX_OUT2b	11 12	3 4	AUX_OUT1a AUX_OUT1b
Error messages	IntErr	15	7 8	SysErr Common

Table 3-13: pin assignment of the binary Inputs / Outputs 2 (R31

Specification					
Parameter	min.	typ.	max.	Unit	Note
Digital inputs					optically isolated
voltage	15	24	30	V DC	
current			10	mA	
Digital outputs					single pole single throw relay
voltage			30	V DC	
current			1	A	
Error Outputs					open collector
voltage			30	VDC	
current			4	mA	

Table 3-14: specifications of the binary Inputs / Outputs 2 (R31)

switched double fused chassis plug (R32)

- Nominal voltage 250 VAC
- Class of protection I

mains cable (R33)

- three-pole

chassis plug (R34)

- IEC 320

mains switch (R35)

- two-pole, non-illuminated

fuseholder (R36)

- for two fuses 5 x 20 mm, 0.8 A fast

+24 VDC input 1 (R37)

The 24 VDC power supply which is only integrated in the reader type 0xx1/0xx3/0xx5 is to be connected with power supply cable 1 (R17) to the +24 VDC input 1 (R37). Herewith the power supply of the reader unit is secured.

- Plug: Phoenix Power Subcon PSC 1,5/3-M

Parameter	min.	Type	max.	units
power supply voltage	+21.6	+24.0	+26.4	VDC
power supply current			500	mA

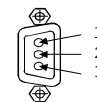| Pin	Contact
1 (above)	24 VDC
2 (middle)	0 V
3 (below)	--

Table 3-15: +24 VDC input 1 (R37)

serial interface RS 422 (R38)

This interface is primarily used as a data output. Either the higher-order system is connected here if required or the interface is connected with a cable to the serial interface 2 (R30).This is necessary if you use a reader type with a microcontroller and fieldbus unit.

Feature	Definition			
Signal level:	RS422			

Baud rates:
        default
        optional
	
	9600 baud
	115'200 baud			

Parameter	8 bit, 1stop bit, no parity			
Plug	9-Pin D-Sub, male (DTE)			
Pin assignment			1	
	T–	6	2	
	T+	7	3	
	R+	8	4	
	R–	9	5	

Table 3-16: serial interface RS 422 (R38)

binary inputs / outputs 1 (R39)

One digital input and one digital output are available per antenna (A). In the operation mode „triggered" the external trigger signal (e.g. light barrier) is to be connected to the reader (R) via the respective binary input.

The respective digital output signals a valid identification and it is to be connected to an external control circuit if required. With the help of the configuration file several output functions (e.g. release delay) can be parameterized for each binary output.

System failure 1 (R12) and communication failure 1 (R11) are also connected to binary outputs.

Pin assignment				
Connector:	15-Pin D-Sub, male			
Digital inputs	+AUX_IN2 -AUX_IN2	9 10	1 2	+AUX_IN1 -AUX_IN1
Digital outputs	AUX_OUT2a AUX_OUT2b	11 12	3 4	AUX_OUT1a AUX_OUT1b
Error messages	IntErr	15	7 8	SysErr Common

Table 3-17: pin assignment of the binary Inputs / Outputs 1 (R39)

Specification					
Parameter	min.	typ.	Max.	units	remarks

Digital   inputs
        voltage
        current sink
	
	15
	
		24
		
			30
			10
				
				V DC
				mA
					optically isolated

Digital   outputs
        voltage
        current
			
			30
			1
				
				V DC
				A
					single pole single throw relay

Error Outputs
        voltage
        current
			
			30
			4
				
				VDC
				mA
					open collector

Table 3-18: specification of the binary Inputs / Outputs 1 (R39)

detection status of ant 2 (R40)

If the green LED is on the reader (R) has detected a valid tag (T).

reader status of ant 2 (R41)

If the green LED is on the antenna (A) sends out an interrogating signal.

3.3 Tag

3.3.1 Introduction

The tags (T) are extremely rugged and can be used for most demanding applications including high temperatures up to 250^0C.

The tags (T) have an extraordinary long life span and are completely maintenance-free. These advantages are the result of an innovative technical approach eliminating the battery and other active electronic components.

The code is defined during the production of the SAW device and cannot be changed in the field (fix code). The linking of this code with an application specific identification number can be carried out with the help of a look up table within the reader (R). In this case only the application specific identification numbers appear on the data interface. The code or the application specific identification number can be printed on or engraved in the housing.

There exist various types of tags covering the most demanding requirements from logistics to access control. The tags (T) are also modular and can be adapted well to specific requirements of any application.

The user only fixes the tags (T) on the objects which are to be identified and creates the look up table if required.

3.3.2 Overview
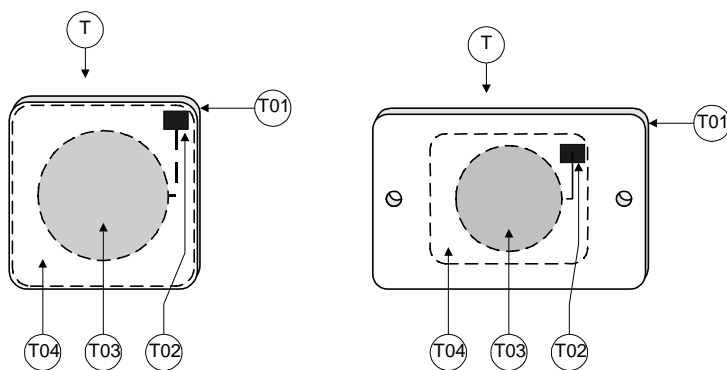
Picture 3-4: tag (T)

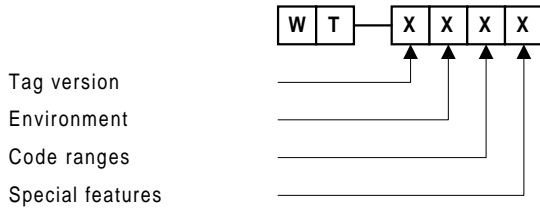The picture on the left shoes a tag (T) for access control and the picture on the right one for logistics.

NR.	Term
T	Tag
T01	Housing
T02	SAW device
T03	Patch antenna
T04	Board

Table 3-19: terms of the tag (T)

3.3.3 Types of Tag

The tags (T) are specified as follows:

```
W  T ──── X  X  X  X
```

Tag version
Environment
Code ranges
Special features

	Value	Description	Application
Tag version	0	Public code	For applications where different customers use the same code range
	1	Protected code, only available for WT-1x4x	Up to about 100 mio. unique codes for access control
Environment	1	Temperature range -30°C to + 80°C, IP 40 tag housing	Standard housing with reduced mechanical strength and no fixing holes
	2	Temperature range -30°C to + 100°C, IP 68 tag housing	Mechanically robust housing with additional fixing holes
	3	Temperature range 0°C to + 200°C Intermittent temperature range 0°C to + 250°C IP 68 tag housing	Mechanically robust housing with additional fixing holes
	4	Temperature range 0°C to + 250°C, IP 68 tag housing	Mechanically robust housing with additional fixing holes
Code range	1		
	2	Code range 1 to 10'000 (D4)	Industrial and long reaching logistic or access control applications
	3		
	4	Code range 1 to 100'000'000 (D8)	Logistic and access control applications [1]
Special features	0	Standard	Standard applications
	1	For tag fixation at the inside of a vehicle's windshield glass	For vehicle access control applications
	2	Special tag fixation	Available only open request

1)   Available in summer 2001

Table 3-20: overview of the tags (T)

Advice!
We gladly advice you on choosing the optimum tag!

3.3.4 Mechanical Dimensions

WT-x1x0 and WT-x1x1   WT-x2x0, WT-x3x0 and WT-x4x0

Thickness: 6 mm   Thickness: 9 mm
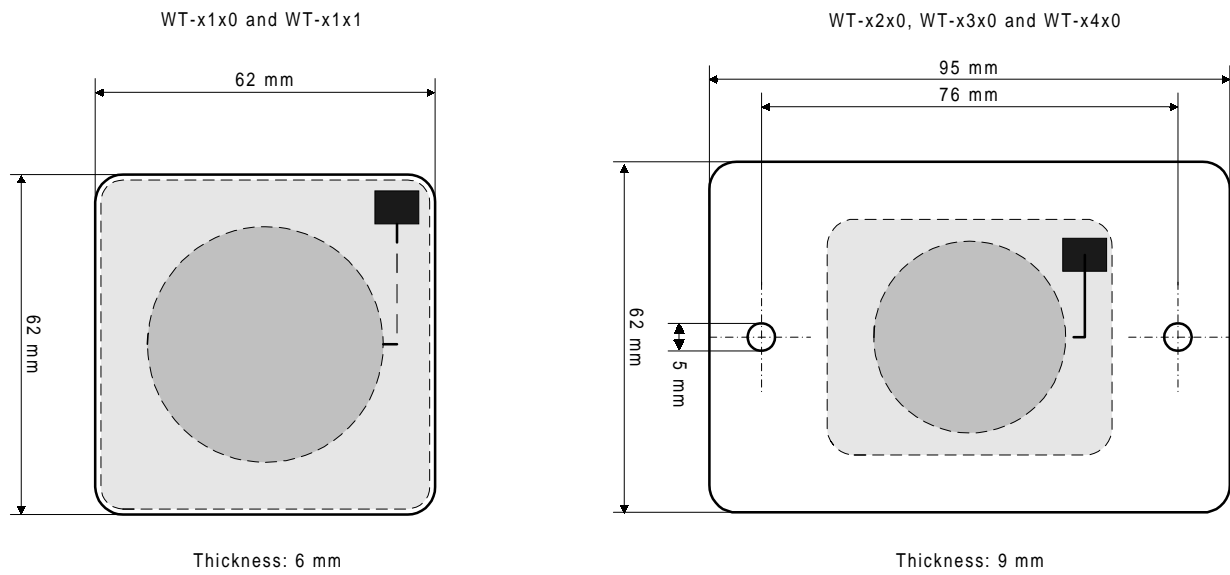
Picture 3-5: mechanical dimensions of the tags (T)

3.3.5 Specifications for Applications

Parameter	Range
Operation temperature	see Table 3-20
Protection class	see Table 3-20

Table 3-21: specifications for applications of the tags (T)

3.4 Antenna

3.4.1 Introduction

The separated antenna (A) is a fully passive component. Due do this advantage the system can be operated also in harsh environmental condition and in areas potentially endangered by explosive materials.

A standard OIS-W antenna consists logically of a transmitter antenna element and a receiver antenna element. They have to be connected to the reader (R) with an rf cable (C). These two elements can also be assembled to one physical element with the help of a circulator which can be optionally integrated into the reader (R). This may reduce the reading distance.

There are three different standard antennas (A) with different beam widths and ranges. The reading distance depends essentially on the chosen antenna (A). But also the chosen tags (T) and the influences of the environment are of an importance which cannot be underestimated. The right choice, orientation and installation of the antenna (A) is important to reach the maximum possible performance of the system. We recommend concrete field tests in the real environment to determine the optimum antenna for the needed range.

The user fixes the antenna (A) at the defined identification points.

3.4.2 Overview
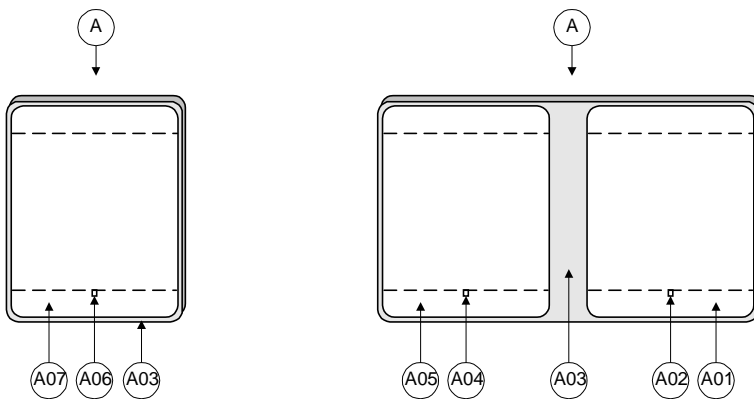
Picture 3-6: antenna (A); on the left with and on the right without circulator

NR.	Term	Element
A	antenna	
A01	receiver antenna element[1]	
A02	jack to receiver	SMA-jack
A03	carrier board	
A04	jack to transmitter	SMA-jack
A05	transmitter antenna element	
A06	combined jack to receiver / transmitter	SMA-jack
A07	combined receiver and transmitter antenna element	

Table 3-22: terms of the antenna (A)

---

[1] Receiver antenna element (A01) and transmitter antenna element (A05) can be exchanged.

3.4.3 Types of Antennas

The antennas (A) are defined as followed:

```
W  A  ── X  X  X  X
```

Antenna version

Antenna gain

Mounting

Special features
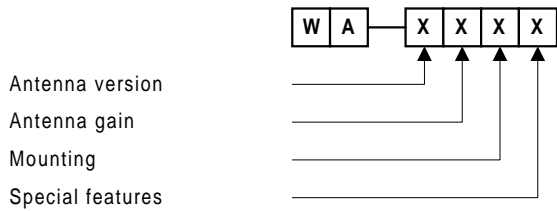
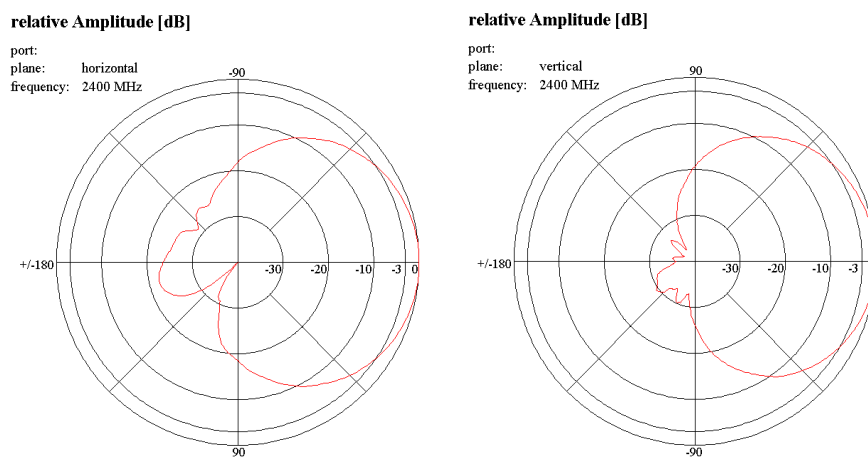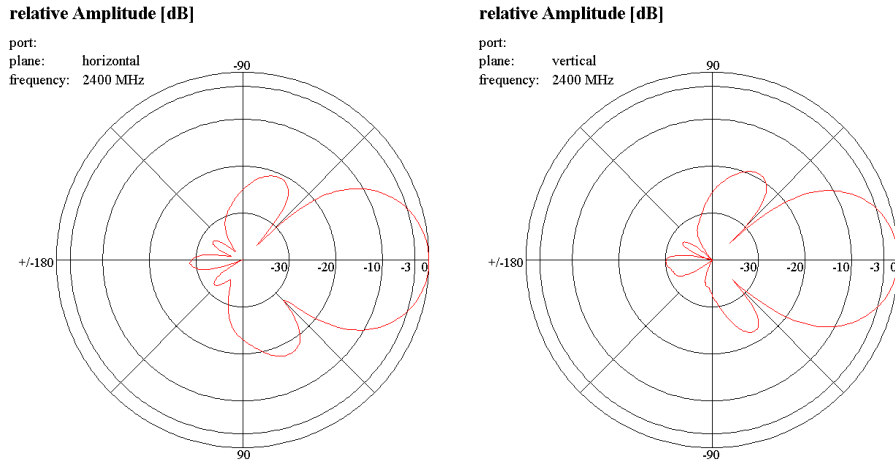|	Value	Description	Application	
Antenna version	0	Two element antenna, one antenna element for Tx and RX, respectively [1]	Long reading range antenna	
	1	Single element antenna, in combination with reader WR-x3xx and WR-x4xx	Medium reading range antenna (reduced size, same antenna element for Tx and Rx)	
Antenna gain	1	Rx and Tx: 8.5 dBi (3 dB beamwidth: ca. 65 - 70°)	Max. reading distance[2]	< 2.0 m for WA-0xxx < 1.0 m for WA-1xxx
	2			
	3	Rx and Tx: 14.5 dBi (3 dB beamwidth: ca. 35°)	Max. reading distance[2]	< 4.5 m for WA-0xxx < 2.5 m for WA-1xxx
	4	Rx and Tx: 16.5 dBi (3 dB beamwidth: ca. 25 - 30°)	Max. reading distance[2]	< 6.0 m for WA-0xxx < 3.0 m for WA-1xxx
Mounting	0	Mounting holder for two element antenna	Standard	
	1	Mounting holder for one element antenna	Standard	
Special features	0	Operating temperature - 40°C to + 80°C	Standard	
	1	Explosion proof version		
	2	Antenna without silicon sealing	For automotive industry	

1) Tx: Transmitting signal channel / Rx: Receiving signal channel
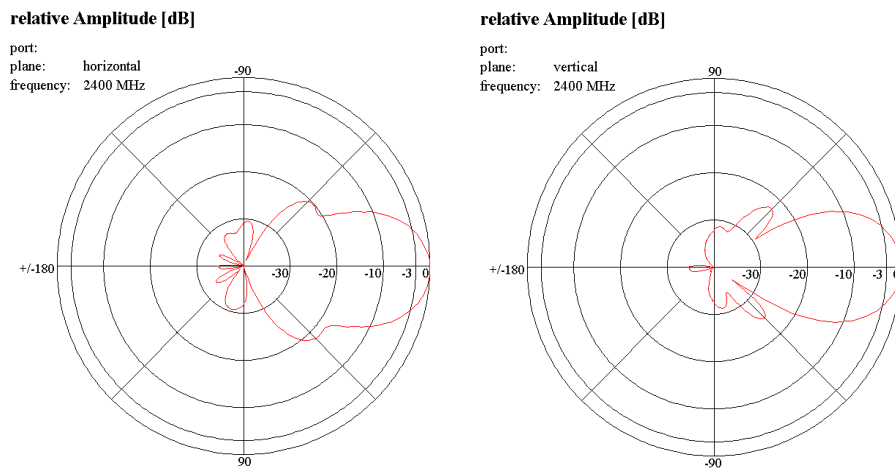2) Reading distance depends on tag type, cable length and system environment

Table 3-23: overview of the antennas (A)

Picture 3-7: antenna diagram WA-x1xx

relative Amplitude [dB]

port:
plane: horizontal
frequency: 2400 MHz

relative Amplitude [dB]

port:
plane: vertical
frequency: 2400 MHz

Picture 3-8: antenna diagram WA-x3xx

relative Amplitude [dB]

port:
plane: horizontal
frequency: 2400 MHz

relative Amplitude [dB]

port:
plane: vertical
frequency: 2400 MHz

Picture 3-9: antenna diagram WA-x4xx

Danger!
Incorrect handling of rf systems can damage the health. Use only antennas supplied and certificated by Baumer Ident. Never use amplifying devices in the transmitting line between reader and antenna.

Caution!
The antennas are important system components. Optimum quality, beam width and reading direction pay off in price and performance. We warrant the optimum performance of the OIS-W only with antennas supplied by Baumer Ident.

Advice!
We recommend concrete field tests in the real environment to determine the optimum antenna for the needed reading range. We gladly advice you.

3.4.4 Mechanical Dimensions
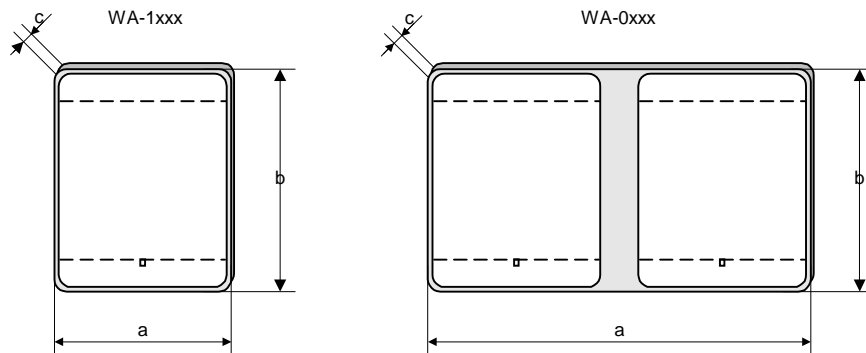
Picture 3-10: mechanical dimensions of the antennas (A)

	a [mm]	b [mm]	c [mm]	Color
WA-11xx	95	100	35	gray; RAL 7035
WA-13xx	220	270	30	gray; RAL 7035
WA-14xx	280	340	30	gray; RAL 7035
WA-01xx	230	100	35	gray; RAL 7035
WA-03xx	470	270	30	gray; RAL 7035
WA-04xx	560	340	30	gray; RAL 7035

Table 3-24: mechanical dimensions of the antennas (A)

3.4.5 Specifications for the Application

Parameter	Range
Operation temperature	-40 ... +80°C
Protection class	IP65

Table 3-25: specifications for the applications of the antenna (A)

3.5 Cable

3.5.1 Introduction

If you use frequency at 2.45 GHz the cable loss is very high. For this reason cable length and cable routing are very important. Furthermore the suppliers specify minimum bending radius. A careful planning and execution of the installation pay off. The cable assemblies are available in various standard lengths up to 20 m. Basically cable lengths > 20 m are also possible though the reading distance is reduced. Cables with normal loss can be used with cable length shorter than 10 m. Cables with low loss are recommended with cable lengths longer than 5 m (see Table 3-27).

The user connects reader (R) and antenna (A) with the rf cable (C).

3.5.2 Overview
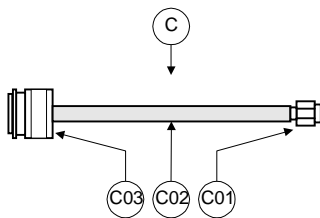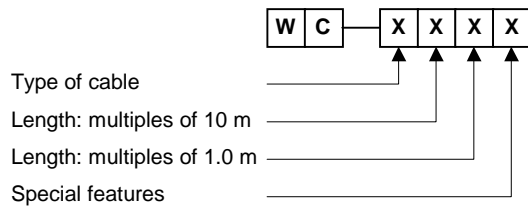

Picture 3-11: rf cable (C)

NR.	Term	Element
C	Rf cable	
C01	Plug to antenna	SMA-plug
C02	Coaxial cable	
C03	Plug to reader (C03)	TNC-plug

Table 3-26: terms of the rf cable (C)

3.5.3 Types of Cables

The cables are specified as follows:

```
          W  C ──── X  X  X  X
Type of cable ──────────┘  │  │  │
Length: multiples of 10 m ─┘  │  │
Length: multiples of 1.0 m ───┘  │
Special features ────────────────┘
```

	Value	Description	Application
Type of cable	0	Antenna cable, cable loss 0.8 dB/m	For cable lengths below 10 m
	1	Antenna cable, cable loss 0.4 dB/m	For cable lengths above 10 m
Multiples of 10 m	0/1/2	Cable length in multiples of 10 m	Cables > 20m only upon request
Multiples of 1.0 m	0/5	Cable length in multiples of 1.0 m	Standard is 5 m
Special features	0/1	Special requirement according to application	Available only upon request

Table 3-27: overview of the rf cables (C)

Caution!
The cables are important system components. Optimum quality, cable lenght and routing pay off in price and performance. We warrant the optimum performance of the OIS-W only with cables supplied by Baumer Ident.

Advice!
Please do not hesitate to contact us if you want to use cable lengths of more than 15 meters.

3.5.4 Mechanical Dimensions

WC-xxxx
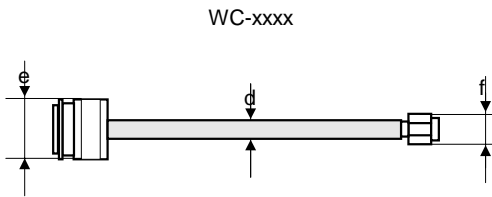
Picture 3-12: mechanical dimensions of the rf cables (C)

	WC-0xxx	WC-1xxx
d [mm]	5.4	6.1
e [mm]	16	15
f [mm]	8.1	8.1
Weight [kg/100m]	5.5	5.0
Color	black	black

Table 3-28: mechanical dimensions of the rf cable (C)

3.5.5 Specifications for the Applications

Parameter	WC-0xxx	WC-1xxx
Operation temperature [°C]	-40 ... +70	-40 ... +85
Min. static bending radius [mm]	30	30
Min. dynamic bending radius [mm]	90	90

Table 3-29: specifications for the applications for the rf cables (C)

3.6 Mounting Aids

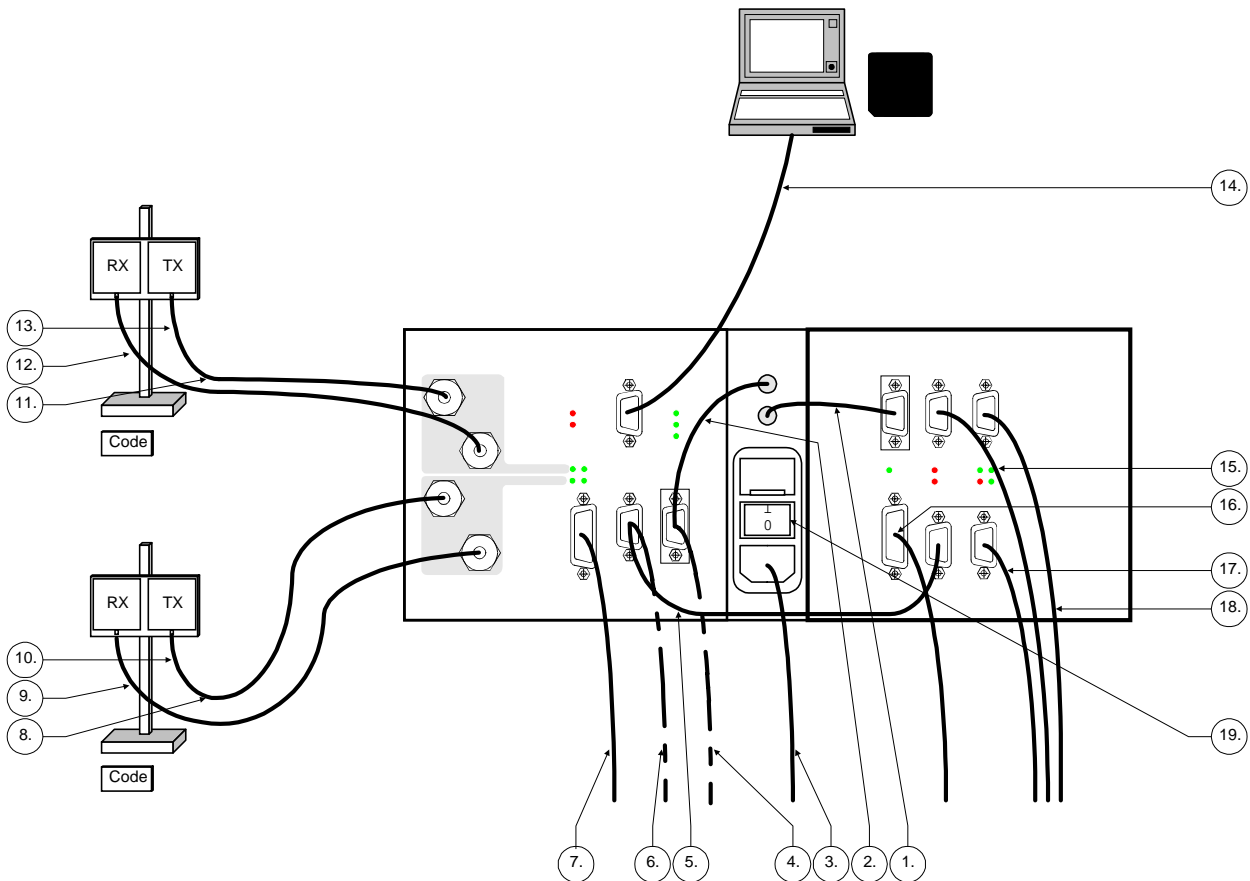In preparation!

3.6.1 Introduction

3.6.2 Overview

3.6.3 Types of Mounting Aids

3.6.4 Mechanical Dimensions

3.6.5 Specifications for the Application

4 How to connect the Hardware Components and switch on the Reader

Picture 4-1: hardware connections

Advice!
Familiarize yourself with the terms of hardware in chapter 3. Please execute only the points in the following table which are relevant to your reader type.

Pos.	Type of Reader	Action
1.	1xxx with microcontroller /fieldbus unit	Connect the power supply cable (R18) to the +24 VDC input 2 (R20).
2.	xxx1/xxx3/xxx5 with power supply	Connect the power supply cable 1 (R17) to the +24 VDC input 1 (R37).
3.	xxx1/xxx3/xxx5 with power supply	Compare the declaration of the rating plate with the existing nominal voltage. Connect the mains cable (R33) to the chassis plug (R34).
4.	xxx0/xxx2/xxx4 without power supply	If you use a reader (R) without power supply connect the +24 VDC input 1 (R37) to an external power supply (24 VDC / 1A) with a shielded cable.
5.	1xxx with microcontroller / fieldbus unit	Connect the serial interface 2 (R30) to the serial interface RS 422 (R38) with the delivered cable „internal".
6.	0xxx without microcontroller / fieldbus unit	If you use a serial communication with a higher-order system connect a serial communication cable to the serial interface RS 422 (R38).
7.	xxxx	If you use the digital in- and outputs connect a parallel cable to the binary inputs / outputs 1 (R39).
8.	x2xx for 2 antennas	Connect the transmitter output of ant 2 (R04) to the jack to transmitter (A04) of antenna 2 with a rf cable (C).
9.	x2xx for 2 antennas	Connect the receiver input of ant 2 (R03) to the jack to receiver (A02) of antenna 2 with a rf cable (C).
10.	x4xx for 2 antennas with circulator	Connect the receiver input / transmitter output of ant 2 (R05) to the combined jack to receiver / transmitter (A06) of antenna 2 with a rf cable (C).
11.	x1xx, x2xx for 1 or 2 antennas	Connect the transmitter output of ant 1 (R07) to the jack to transmitter (A04) of antenna 1 with a rf cable (C).
12.	x1xx, x2xx for 1 or 2 antennas	Connect the receiver input of ant 1 (R06) to the jack to receiver (A02) of antenna 1 with a rf cable (C).
13.	x3xx, x4xx for 1 or 2 antennas	Connect the receiver input / transmitter output of ant1 (R08) to the combined jack to receiver / transmitter (A06) of antenna 1 with a rf cable (C).
14.	xxxx	Connect a serial interface of your service PC (COM1 or COM2) to the serial interface RS 232 (R13) with the delivered cable „service".
15.	1xxx	If you use an additional serial interface connect a serial communication cable to the serial interface 1 (R23).
16.	1xxx	If you use additional digital in- and outputs connect a parallel cable to the binary inputs / outputs 2 (R31)
17.	1x1x with InterBus-S	Connect the incoming InterBus-S cable to the input plug of IBS (R29).
18.	1x1x with InterBus-S	Connect the outgoing InterBus-S cable to the output socket of InterBus-S (R24).
19.	xxx1, xxx3, xxx5 with power supply	Switch on the reader (R) with the mains switch (R35).
20.	xxx0, xxx2, xxx4 without power supply	Switch on the reader (R) with the external power supply.
21.	0xxx without microcontroller / fieldbus unit	After switch on and start up the following LED's are continuous on: • +5 VDC power supply status (R16) • +6 VDC power supply status (R15) • -12 VDC power supply status (R14)
22.	1xxx with microcontroller / fieldbus unit	After switch on and start up the following LED's are continuous on: • +5 VDC power supply status (R16) • +6 VDC power supply status (R15) • -12 VDC power supply status (R14) • +5 VDC power supply status (R19)

Table 4-1: how to connect the hardware components and switch on the reader

Danger!
Do not open the reader. Never remove the covers or the front panel for any reason. Baumer ident will decline liability for units that have been opened without permission of Baumer Ident.

Danger!
Incorrect handling of rf systems can damage the health. Use only antennas supplied and certificated by Baumer Ident. Never use amplifying devices in the transmitting line between reader and antenna.

Caution!
The input voltage on the chassis plug (R34) is specified with 100 VAC to 250 VAC // 50/ 60Hz. The one at +24 VDC input 1 (R37) and the one at +24 VDC input 2 (R20) are specified with 24 VDC +/- 10%. These tolerances have to be followed without fail for a correct function.

5 Personal Notices