BALLUFF

sensors worldwide

BIS U-6020-053-10_ RS232
BIS U-6027-054-10_ TCP/IP
BIS U-6020-059-11_ RS232
BIS U-6027-060-11_ TCP/IP
BIS U-6020-059-12_ RS232
BIS U-6027-060-12_ TCP/IP
BIS U-6020-059-13_ RS232
BIS U-6027-060-13_ TCP/IP
BIS U-6020-059-15_ RS232
BIS U-6027-060-15_ TCP/IP
BIS U-6020-059-17_ RS232
BIS U-6027-060-17_ TCP/IP

Technical Description, Operating Manual

BISU

english

www.balluff.com

1 User Instructions

1.1 About this Manual

This manual contains a description of the processor unit used in the BIS U-6020 and BIS U-6027 identification systems as well as all the steps for initial setup and immediate operation.

1.2 Typographical Conventions

The following conventions are used in this manual.

Enumerations

Enumerations are shown as a list with an en-dash.
– Entry 1.
– Entry 2.

Actions

Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.
► Action instruction 1.
⇒ Action result.
► Action instruction 2.

Syntax

Numbers:
– Decimal numbers are shown without additional indicators (e.g. 123),
– Hexadecimal numbers are shown with the additional indicator $_{hex}$ (e.g. 00_{hex}).

Parameters:
Parameters are shown in italics (e.g. *CRC-16*).

Directory paths:
References to paths where data is stored or to be saved are shown in small caps (e.g. Project:\Data Types\User-Defined).

Control characters:
Control characters for sending are set in angle brackets (e.g. <ACK>).

ASCII code:
Characters transmitted in ASCII code are set in apostrophes (e.g. 'L').

1.3 Symbols

Caution!
This symbol indicates a safety instruction that must be followed without exception.

Note, tip
This symbol indicates general notes.

1.4 Abbreviations

ACMA	Australian Communications and Media Authority
BIS	Balluff Identification System
CRC	Cyclic Redundancy Check
EEPROM	Electrical Erasable and Programmable ROM
EIRP	Equivalent Isotropically Radiated Power
EMC	Electromagnetic compatibility
EPC™	Electronic Product Code
ERP	Effective Radiated Power
FCC	Federal Communications Commission
IC	Industry Canada
IP	Internet Protocol
LF CR	Line Feed with Carriage Return
MAC	Media Access Control
n. c.	not connected
PLC	Programmable Logic Controller
Tag	Data carrier with antenna
TCP	Transmission Control Protocol
TID	Tag identifier
UHF	Ultra-high frequency
SCT	Secretaría de Comunicaciones y Transportes
ANATEL	Agência Nacional de Telecomunicações

2 Safety

2.1 Intended Use

The processor unit BIS U-602_ is a component of the identification system BIS U. Within the identification system, it is used to connect to a higher-level controller (PLC, PC); it may only be used in the industrial sector.

This description applies to processor units of the following series:
- For operation within the European Community
  BIS U-6020-053-10_-…
  BIS U-6027-054-10_-…
- For operation in the USA, Canada, Mexico and Argentina
  BIS U-6020-059-11_-…
  BIS U-6027-060-11_-…
- For operation in China
  BIS U-6020-059-12_-…
  BIS U-6027-060-12_-…
- For operation in Brazil
  BIS U-6020-059-13_-…
  BIS U-6027-060-13_-…
- For operation in Japan
  BIS U-6020-059-15_-…
  BIS U-6027-060-15_-…
- For operation in Australia
  BIS U-6020-059-17_-…
  BIS U-6027-060-17_-…

2.2 Meaning of Warning Notes

⚠ **Caution!**
The pictogram used with the word "Caution" warns of a situation that could harm someone's health or damage equipment. Failure to observe these warning notes may result in injury or damage to equipment.
► Always observe the described measures for preventing this danger.

2.3 General Safety Notes

⚠ **Caution!**
This UHF system consists of a processor unit and antennas according to specifications and may only be operated within the specified countries subject to all applicable national legal regulations and standards.
► When using the UHF system in the European Community, the provisions in ETSI standard 302 208 apply.
► When using the UHF system in the USA, the directives of the FCC, Part 15 B and 15 C, apply.
► When using the UHF system in Canada, the directives of the IC, RSS-210 apply.
► When using the UHF system in Mexico, the directives of the SCT, NOM-121-SCT1-2009 apply.
► When using the UHF system in Argentina, the directives of Resolución SC 729/80 and SC 784/87 apply.
► When using the UHF system in Brazil, the directives of the ANATEL, 506/2008 and 442/2006 apply.
► When using the UHF system in China, the directives of the RFID National Standard and GB 9254 apply.
► When using the UHF system in Japan, the directives of "Radio Law" and ARIB T106 apply.
► When using the UHF system in Australia, the directives of the Radiocommunications Class License 2000 (Item 32A) apply.

2 Safety

Installation and startup
Installation and startup are to be performed by trained technical personnel only. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and liability claims against the manufacturer.

When connecting the processor unit to an external controller, observe proper selection and polarity of the connection as well as the power supply (see "Installation" on page 11).
The processor unit may only be used with approved power supplies (see "Technical Data" on page 14).

Caution!

The antennas of the identification system BIS U transmit ultra-high frequency electromagnetic waves.

IEC 62369 stipulates that personnel must not remain within close range of the UHF antenna for long periods (several hours).

For operation within the European Community:
When selecting the installation position for the processor unit, make sure that the minimum distance between the UHF antenna and the workplace is 26 cm.
The radiated power must not exceed the maximum permitted limit values:
– 0.5 watts$_{ERP}$ for antennas with an opening angle > 70°.
– 2.0 watts$_{ERP}$ for antennas with an opening angle ≤ 70°.

For operation within the People's Republic of China:
When selecting the installation position for the processor unit, make sure that the minimum distance between the UHF antenna and the workplace is 26 cm.
The radiated power must not exceed the permissible limit value of 2 watts$_{ERP}$.

For operation in the USA, Canada, Mexico, Argentina, Brazil, Japan and Australia:
When selecting the installation position for the processor unit, make sure that the minimum distance between the UHF antenna and the workplace is 30 cm.
The radiated power must not exceed the permissible limit value of 4 watts$_{EIRP}$.

Note
See the "Basic UHF manual" for more information on minimum/maximum distances and antenna power.

2 Safety

2.4 Conformity

BIS U-6020-053-10_-...
BIS U-6027-054-10_-...

This product was developed and manufactured in accordance with all applicable European Directives. CE conformity has been verified.

BIS U-6020-059-11_-...
BIS U-6027-060-11_-...

The product was developed and manufactured in accordance with the directives applicable in the USA, Canada, Mexico and Argentina. Conformity has been verified.

BIS U-6020-059-12_-...
BIS U-6027-060-12_-...

CMIIT-ID 2014DJ1522 The product was developed and manufactured in accordance with the directives applicable in China. Conformity has been verified.

BIS U-6020-059-13_-...
BIS U-6027-060-13_-...

The product was developed and manufactured in accordance with the directives applicable in Brazil. Conformity has been verified.

BIS U-6020-059-15_-...
BIS U-6027-060-15_-...

The product was developed and manufactured in accordance with the directives applicable in Japan. Conformity has been verified.

BIS U-6020-059-17_-...
BIS U-6027-060-17_-...

The product was developed and manufactured in accordance with the directives applicable in Australia. Conformity has been verified.

All approvals and certifications are no longer valid if:
– Components are used that are not part of the identification system BIS U.
– Components are used that have not been explicitly approved by Balluff.

Operation and testing
The operator is responsible for ensuring that local safety regulations are observed. If defects and persistent faults occur in the identification system, take it out of service and secure it against unauthorized use.

2 Safety

2.5 Special Considerations when Operating the UHF System in Mexico

Caution!
For operation of the UHF system in Mexico, the antennas listed below are approved.

Antenna type	Gain [dB]	Impedance [ohm]
BIS U-301-C1-TNCB	5.5	50
BIS U-302-C1-TNCB	8.3	50

When using other antennas, a maximum antenna gain of 8.3 dB must not be exceeded.

The operation of this device is subject to the following two conditions:
1. The device must not cause any harmful interference
2. It must accept any interference, including interference that causes unwanted operation.

2.6 Special Considerations when Operating the UHF System in Japan

Caution!
For operation of the UHF system in Japan, the antennas listed below are approved.

Antenna type	Gain [dB]	Impedance [ohm]
BIS U-301-C1-TNCB	5.5	50
BIS U-302-C1-TNCB	8.3	50

The radiated power must not exceed 4 W_{EIRP} under any circumstances.
Before commissioning this device, the operator must register it with the MIC in Japan (www.soumu.go.jp).
RFID UHF Reader 4 Port
Balluff / 52010223
Certificate No: 14-112548

3 Basic Knowledge

3.1 Function Principle of Identification Systems

The identification system BIS U is classified as a non-contacting system with read and write function, which not only allows it to detect information programmed permanently in the data carrier, but also to collect and pass on current information.

Main components of the identification system BIS U include:
– Processor unit,
– Antennas,
– Data carrier.

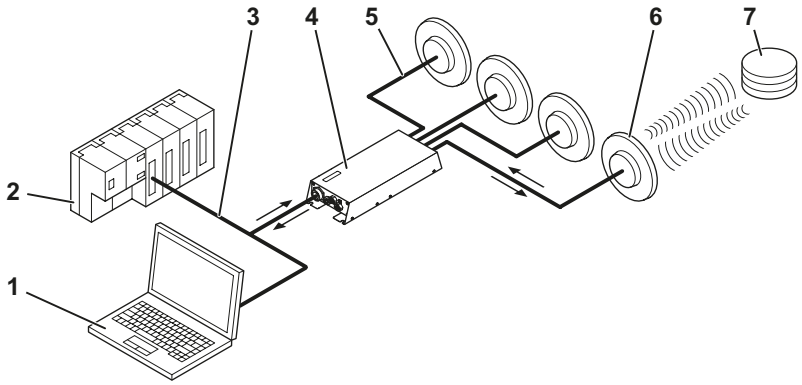


Figure 1: System overview

1 PC
2 PLC
3 Connection to the controlling system
4 Processor unit
5 Antenna cable
6 Antennas (max. 4)
7 Data carrier

The main areas of application are:
– In production for controlling material flow (e.g. for model-specific processes, conveying systems that transport workpieces, acquisition of safety-relevant data)
– In tool coding and monitoring
– In organization of tools and equipment
– In warehousing for monitoring material movement
– In transporting and conveyor technology
– In waste disposal for quantity-based fee assessment.

Note
See the "Basic UHF manual" for more information on UHF identification systems.

3.2 Product Description

– UHF-RFID (for working frequencies, see "Operating frequencies and radiated power" on page 15),
– Read / write distance (typically) up to 6 m, depending on ambient conditions and installed system components such as antennas, data carriers, cables, etc.,
– Group reading of multiple data carriers,
– Connection option for 4 antennas,
– 4 digital outputs and 2 digital inputs for additional functions,
– Standard interfaces: RS232 or TCP/IP,
– Rugged metal housing,
– Control indicators for communication and the status of ports,
– Data carrier types according to ISO 18000-6 type C or EPCglobal™ Class 1 Generation 2.

3 Basic Knowledge

3.3 Control Function

The processor unit is the link between data carrier and controlling system. It manages two-way data transfer between data carriers and antennas and provides buffer storage.

The processor unit uses the antennas to write data from the controlling system to the data carrier or read data from the carrier and make it available to the controlling system.
Controlling systems may be the following:
– A control computer (e.g. industrial PC)
– A PLC

3.4 Data Integrity

In order to ensure data integrity, the data transfer between the data carrier and processor unit can be monitored using a CRC-16 data check.

3.5 Network Connection

The processor unit and controlling system communicate
– Via the RS232 serial interface (BIS U-6020)
– Via the physical Ethernet network (BIS U-6027)
The device uses the Internet Protocol (IP) for network communication. The Transmission Control Protocol (TCP) is used to ensure all the data is transferred in the correct sequence without error.

4 Installation

4.1 Processor Unit Scope of Delivery

Included in the scope of delivery:
– BIS U-602_
– 5x end cap

Note
Visit www.balluff.com for more information on available software and accessories.

4.2 Processor Unit Installation

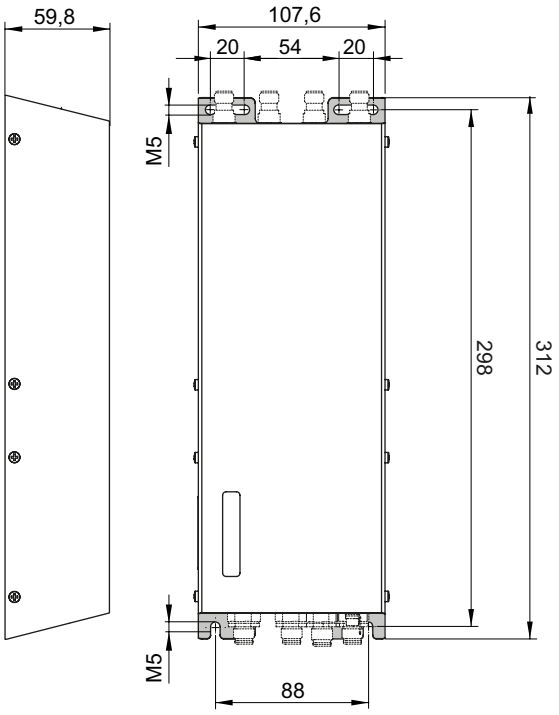


Figure 2: Installation

Caution!
The antennas for the identification system BIS U transmit ultra-high frequency electromagnetic waves!
► The installation position of the processor unit and antennas must guarantee a safety distance between the antennas and the workplaces of personnel (for safety distances, see "Safety" on page 6).

The read/write distance can (typically) be as great as 6 m, depending on the ambient conditions and installed system components. See the "Basic UHF manual" for more information on minimum/maximum distances.

► Select a suitable installation position.
► Secure the processor unit using four M5 screws
(strength category 8.8, lightly oiled, tightening torque M = 5.2 Nm).

Note
Optional mounting plates are available for installing the processor unit (see "Accessories" on page 47).

4 Installation

4.3 Interface Information / Wiring Diagrams

Note
Make the ground connection either directly or using an RC combination to ground. When making your connection to the Ethernet, make sure that the shield is perfectly connected to the connector body.

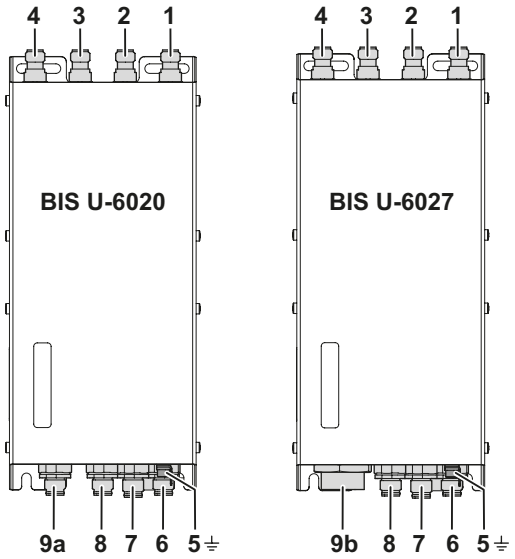


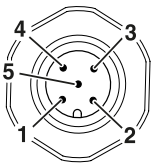
Figure 3: Electrical connection

1 Antenna port 1
2 Antenna port 2
3 Antenna port 3
4 Antenna port 4
5 Function ground FE
6 X1 - Power supply
7 X2 - Control inputs / outputs
8 X3 - Service interface RS232
9a X4 - Application interface variant RS232
9b X4 - Application interface variant TCP/IP

Note
Not all antenna ports (1-4) have to be assigned.

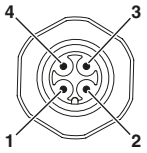
4 Installation

X1 - Power supply



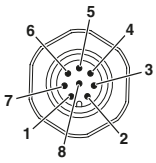
PIN	Function
1	$+V_S$
2	n. c.
3	$-V_S$
4	n. c.
5	n. c.

X3 - Service interface



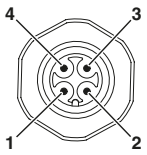
PIN	Function
1	n. c.
2	TxD
3	GND
4	RxD

X2 - Control inputs / outputs



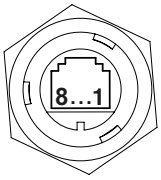
PIN	Function
1	Digital output 1
2	Digital output 2
3	Digital output 3
4	Digital output 4
5	Digital input 1
6	$+V_S$
7	$-V_S$
8	Digital input 2

X4 - Application interface BIS U-6020



PIN	Function
1	n. c.
2	TxD
3	GND
4	RxD

X4 - Application interface BIS U-6027



PIN	Function
1	TD+
2	TD–
3	RD+
4	n. c.
5	n. c.
6	RD–
7	n. c.
8	n. c.

5 Technical Data

Dimensions

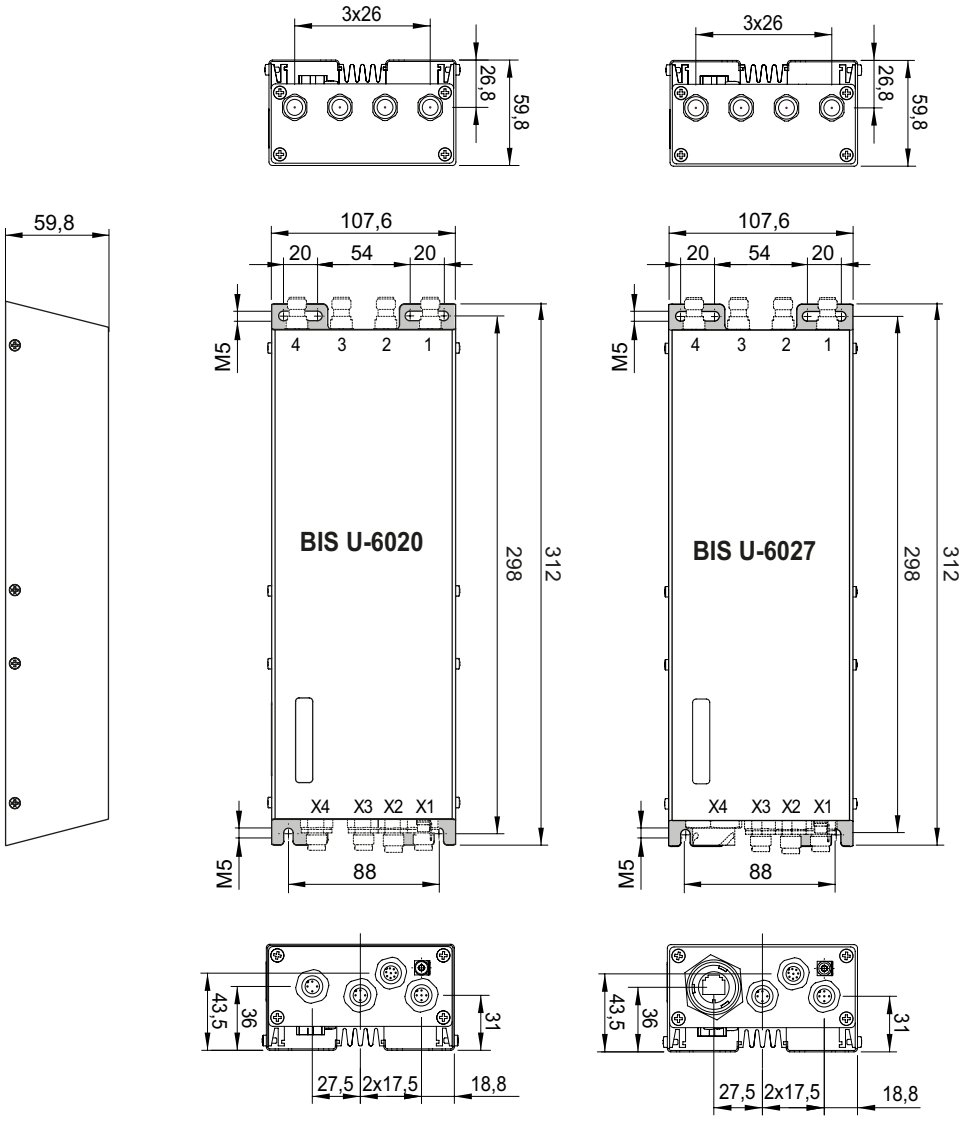


Figure 4: Dimensions (in mm)

Mechanical data

Housing material	Profiled housing and frame made from coated steel
X1 - Power supply	V_s 24 V DC - M12 integral plug, 5-pin
X2 - Control inputs / outputs	M12 integral plug, 8-pin
X3 - Service interface	M12 integral plug, 4-pin
X4 - Application interface	M12 integral plug, 4-pin (BIS U-6020) Bayonet connector RJ45 (BIS U-6027)
Antenna ports 1-4	Antenna socket R-TNC
Degree of protection as per IEC 60529	IP 65
Weight	2100 g

5 Technical Data

Electrical data

Supply voltage V_S	24 V DC ±20%
Residual ripple	≤ 10%
Current draw at 24 V DC	≤ 1 A
X3 - Service interface	RS232
X4 - Application interface	RS232 (BIS U-6020) Ethernet (BIS U-6027)
Characteristic impedance of the antenna ports	50 Ω
Adjustable power at the antenna ports	17...30 dBm (50 mW…1 W)

Operating frequencies and radiated power

BIS U-6020-053-10_-…
BIS U-6027-054-10_-…

Operating frequency	865.6…867.6 MHz
Maximum permissible radiated power (ERP)	2 $watts_{ERP}$
Number of used channels	4 ETSI channels: 4, 7, 10, 13
Channel selection process	Manual (channel assignment plan)

BIS U-6020-059-11_-…
BIS U-6027-060-11_-…

Operating frequency	902…928 MHz
Maximum permissible radiated power (EIRP)	4 $watts_{EIRP}$
Number of used channels	52
Channel selection process	Automatic (frequency hopping method)

BIS U-6020-059-12_-…
BIS U-6027-060-12_-…

Operating frequency	920.5…924.5 MHz
Maximum permissible radiated power (ERP)	2 $watts_{ERP}$
Number of used channels	16
Channel selection process	Automatic (frequency hopping method)

BIS U-6020-059-13_-…
BIS U-6027-060-13_-…

Operating frequency	915…928 MHz
Maximum permissible radiated power (EIRP)	4 $watts_{EIRP}$
Number of used channels	26
Channel selection process	Automatic (frequency hopping method)

5 Technical Data

BIS U-6020-059-15_-…
BIS U-6027-060-15_-…

Operating frequency	916.7…920.5 MHz
Maximum permissible radiated power (EIRP)	4 watts$_{EIRP}$
Number of used channels	4
Channel selection process	Automatic (frequency hopping method)

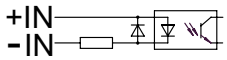
BIS U-6020-059-17_-…
BIS U-6027-060-17_-…

Operating frequency	920…926 MHz
Maximum permissible radiated power (EIRP)	4 watts$_{EIRP}$
Number of used channels	12
Channel selection process	Automatic (frequency hopping method)

Control inputs / outputs

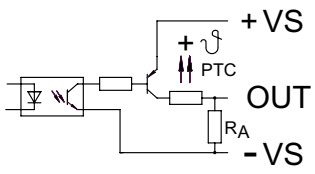
Digital input (+IN, –IN)

Control inputs	2, galvanically isolated via opto-coupler
Control voltage active	4...40 V
Control voltage inactive	1.5…–40 V
Input current at 24 V	11 mA
Delay time, typical	5 ms



Control output (01, 02, 03, 04)

Control outputs	4, galvanically isolated via opto-coupler, PNP, positive switching
Supply voltage, output V_S	19.2…28.8 V DC
Output current	≤ 50 mA
Voltage drop at 20 mA	Approx. 2.5 V
Output resistance R_A	10 kΩ to $–V_S$



5 Technical Data

Operating conditions

Ambient temperature	–20 °C…+55 °C
Storage temperature	–20 °C…+60 °C
EMC (Europe) EN 61000-6-2 – Severity level as per EN 61000-4-2/3/4/5/6 – Severity level as per EN 61000-4-3 80 MHz – 2000 MHz 2000 MHz – 2700 MHz	 – 2A/3B/2B/3A – 3A – 2A
Interference radiation – EN 55022 – FCC Part 15 B – CISPR22 – GB 9254	 – Class A
Vibration/shock	EN 60068 Part 2-2-6/27/29/32

This UHF system consists of a processor unit and antennas as outlined in specifications and may only be operated in countries issuing operating licenses, subject to all applicable national legal regulations and standards.

Data carrier

ISO 18000-6	Type C
EPCglobal™	Class 1 Generation 2

Function indicators

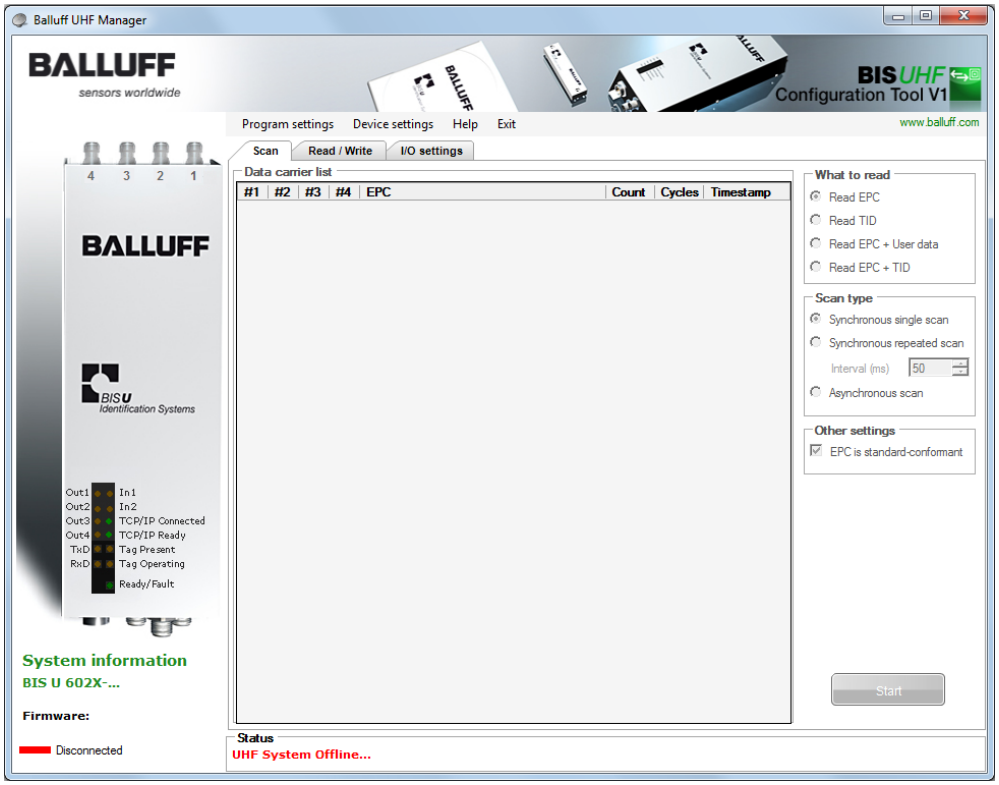
Operating states	Ready Fault Tag present Tag operating Digital input 1 Digital input 2 Digital output 1 Digital output 2 Digital output 3 Digital output 4	Green LED Red LED Orange LED Orange LED Orange LED Orange LED Orange LED Orange LED Orange LED Orange LED
Connection status	Transmit Data (TxD) Receive Data (RXD) TCP/IP Ready (BIS U-6027 only) TCP/IP Connected (BIS U-6027 only)	Orange LED Orange LED Green LED Green LED

6 Network Connection

6.1 UHF Manager

The "BIS UHF Manager" configuration software forms the basis for incorporating the processor unit into the network. "BIS UHF Manager" is a software package that enables the configuration of the processor unit prior to installation. This requires that the processor unit be connected via connections X3 or X4 to a computer where "BIS UHF Manager" must be installed.

You can find the "BIS UHF Manager" software on the BIS software CD provided or on the Internet at www.balluff.com.



► Start "BIS UHF Manager".
⇒ If "Connect on startup" was selected in the "Interface Settings" window (factory setting), the device automatically attempts to establish the last known connection.

If the device is able to establish the last known connection, "BIS connected..." appears in the status bar.

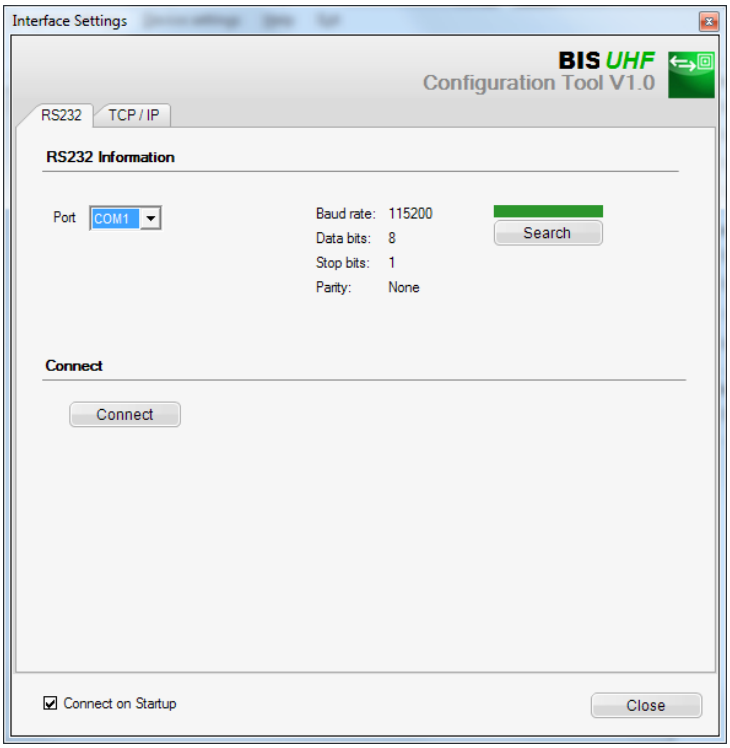
If the device is not able to establish a connection, "BIS not connected..." appears in the status bar. The device must be connected manually:

► Click "Program Settings" and "Interface" in the menu bar.
⇒ The "Interface Settings" window opens.

6 Network Connection

6.2 RS232 Interface Settings

The processor unit BIS U-6020 and the controlling system communicate via the RS232 serial interface.



When the program is started, the device connects automatically if "Connect at startup" is selected in the "Interface settings" window (factory setting).

When the "Interface Settings" window is opened, the last known connection is displayed and the bar above the "Search" button turns yellow.

► Click the "Search" button.
⇒ The program searches for connections.

If the program finds a connection, the connection settings are displayed and the bar above the "Search" button turns green.

► Click the "Connect" button.
⇒ The device is connected.

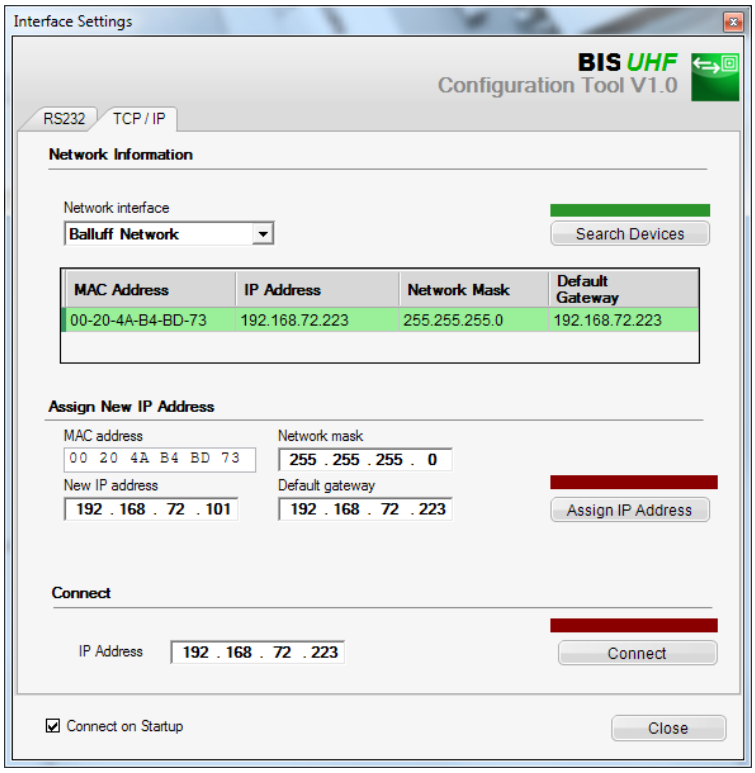
If the program does not find a connection, the bar above the "Search" button turns red.

6 Network Connection

6.3 TCP/IP Interface Settings

The processor unit BIS U-6027 and the controlling system communicate via Ethernet. Assigning a unique IP address associates the processor unit with a network.

The MAC address forms the basis for incorporating the processor unit into the network. This hardware address is unique and identifies network devices such as the processor unit.



When the program is started, the device connects automatically if "Connect at startup" is selected in the "Interface settings" window (factory setting).

If a connection is not established automatically, the device must be connected manually.

Connecting using a known IP address:

► Enter the IP address in the "Connect" field.
► Click the "Connect" button.
⇒ The device is connected.

Connecting using an unknown IP address:

► Select a network interface within which to search for the device.
► Click the "Search BIS" button.
⇒ The devices found are listed.
⇒ The bar above the "BIS Search" button turns green.
► Click on the located device.
⇒ The line containing the selected device is highlighted.
⇒ The MAC address appears in the "MAC address" field.
⇒ The IP address appears in the "IP address" field.
► Click the "Connect" button.
⇒ The device is connected.

6 Network Connection

Assigning a new IP address

► Manually enter the MAC address, new IP address, network mask and standard gateway.
► Click the "Assign IP address" button.
⇒ The IP address, network mask and standard gateway are assigned to the device.
⇒ The device is configured.
⇒ A new device search starts.

or

► Click the "Search BIS" button.
► Click on the located device whose IP address you wish to change.
⇒ The MAC address appears in the "MAC address" field.
► Enter an available IP address in the "New IP address" field.
► Enter the network mask and standard gateway accordingly.
► Click the "Assign IP address" button.
⇒ The IP address, network mask and standard gateway are assigned to the device.
⇒ The device is configured.
⇒ A new device search starts.

7 Setting the Processor Unit Parameters

7.1 Protocol Type

The CRC-16 check procedure is selected ex works for data transfers between the data carrier and processor unit.
Either the CRC-16 check procedure or the end identifier LF CR can be selected for data transfers between the processor unit and controlling system.

Example for terminating the telegrams:

Protocol type	Telegram with "Synchronous detection" command from the EPC	Termination	Acknowledgment	End identifier
End identifier LF CR	CSE_ _ _ _ _ [1)]	LF CR	<ACK> '0'	<LF><CR>
Data check CRC-16	CSE_ _ _ _ _ [1)]	CRC-16 [2)]	<ACK> '0'	CRC-16

1) "_" = space or ignored character

2) Generator polynomial as per CCITT: x^16+x^12+x^5+1 with preinitialization 0_{hex}

7.2 Factory Settings

The device is preset ex works. The factory settings are highlighted for the respective parameters.

Some parameters are fixed and cannot be modified:

Multiplexing:
The multiplexing sequence and the dwell time in front of each antenna are fixed.
– The sequence in which the antennas are activated is always 1-2-3-4-1-2-….

7.3 Configuration Software

The parameters are configured using the "BIS UHF Manager" software.
One requirement is that the processor unit is connected to the controlling system. The configuration can be overwritten at any time.
The parameters can be saved in an XML file so that they can be retrieved whenever needed.
The "BIS UHF Manager" software can be found on the accompanying BIS software CD or on the Balluff website.

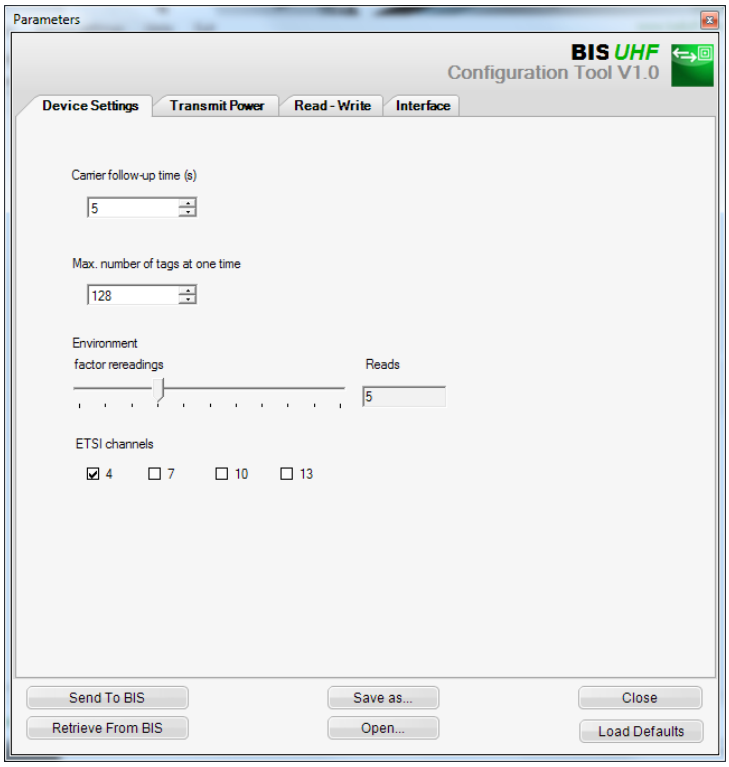
Note
Detailed information on "BIS UHF Manager" can be found in the software's online help system.

► Start "BIS UHF Manager".
► Click "Device Settings" and "Parameters" in the menu bar.
⇒ The "Settings" window appears.

Note
Only the parameters described in the following can be modified. The area for configuring advanced device parameters is password-protected and can only be accessed by a Balluff service technician.

7 Setting the Processor Unit Parameters

7.4 Device Settings



Filtering field

Carrier follow-up time
Follow-up time in seconds of the switched-on antennas after the command is sent. The read or write command should be executed within this time after detection.

Factory setting: *5 seconds*

Max. number of tags at the same time
Maximum number of expected data carriers in the field.

Factory setting: *128*

Environment
Rereadings factor (only for "Asynchronous detection").

Number of rereadings after which a data carrier is reported as present (tag coming) or number of failed rereadings after a data carrier is reported as absent (tag going). Refer also to "Asynchronous detection (CA)" on page 32

Factory setting: *5*

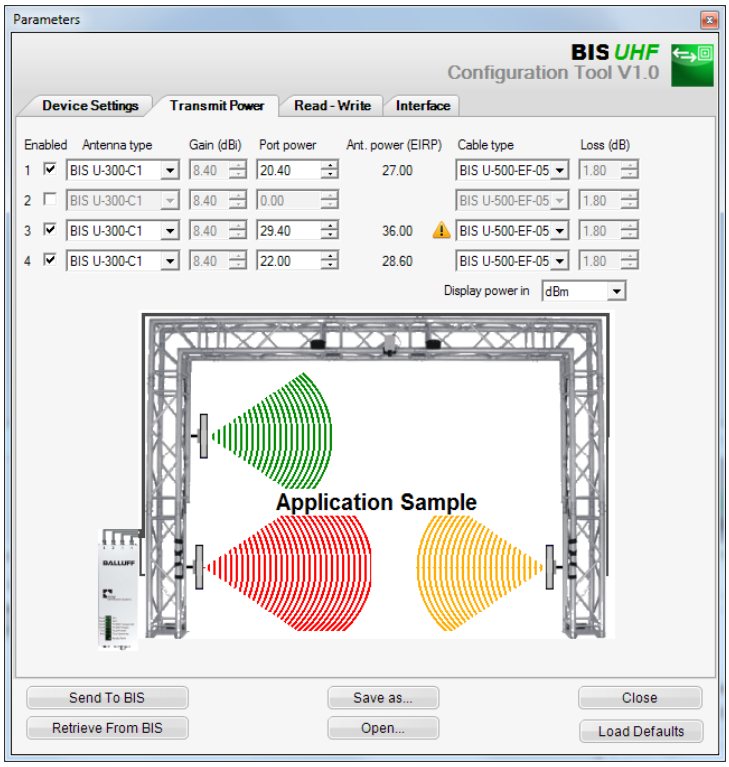
ETSI channels
The channel setting determines the channel assignment. If multiple channels are activated, the device automatically selects them by means of the frequency hopping method.

Factory setting: *channel 4 switched on, channels 7...13 switched off*

Note
The ETSI channels selection is only available when using the devices within the European Community.

7 Setting the Processor Unit Parameters

7.5 Transmitting Power



Note
The *Gain* and *Loss* parameters are defined in the *Antenna type* and *Cable type* fields. These values are used to determine the maximum permissible radiated power.
The maximum permissible radiated power and factory settings differ depending on the set country profile. For notes on the applicable directives for various countries, see "Safety" on pages 5–8.
In the countries of the European Union and in China, the radiated power is specified in the form of ERP (max. 2 watts$_{ERP}$).
In the USA, Canada, Mexico, Argentina, Australia, Brazil and Japan, the radiated power is specified in the form of EIRP (max. 4 watts$_{EIRP}$).
See the "Basic UHF manual" for more information on radiated power.

Enabled:
Enables/disables antennas 1…4.
Factory setting: *antenna 1 enabled, antennas 2…4 disabled.*

Antenna type
Selection of the used antenna.
Factory setting: *BIS U-302-C1 or BIS U-302-C0*

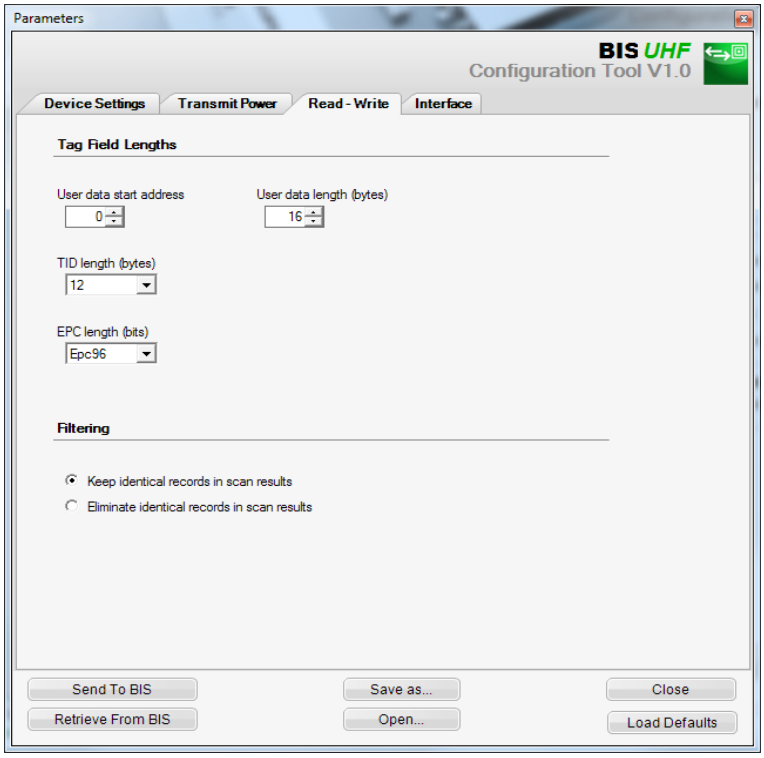
Port power
For selecting the power on the device (port power).
Factory setting: *22.5 dBm (176 mW) or 20.5 dBm (112 mW)*

Antenna power
Power at the antenna (EIRP or ERP).
Factory setting: *27 dBm (500 mW)*

Cable type
Selection of the cable used.
Factory setting: *BIS U-500-EF-05*

7 Setting the Processor Unit Parameters

7.6 Reading/writing



Tag Field Lengths area

User data start address
Start address of the USER data for automatic reading during data carrier searches and if USER data is used as an address during reading or writing.

Factory setting: *0 bytes*

User data length
Length of the USER data for automatic reading during data carrier searches and if USER data is used as an address during reading or writing. The value range is 1 to 16.

Factory setting: *16 bytes*

TID length
Length of the TID data for automatic reading during data carrier searches and if TID data is used as an address during reading or writing. The value range is 2 to 12.

Factory setting: *12 bytes*

Note
Data carriers with a TID length different than that set here are not answered in the detection, read and write commands.

7 Setting the Processor Unit Parameters

EPC length
Length of the EPC format on the data carriers. This parameter determines the byte length of the address (16 or 62 bytes) in the read and write commands and the byte length of the data block for EPC (12 or 62 bytes) in the detection, read and write commands.

Factory setting: *96 bits*

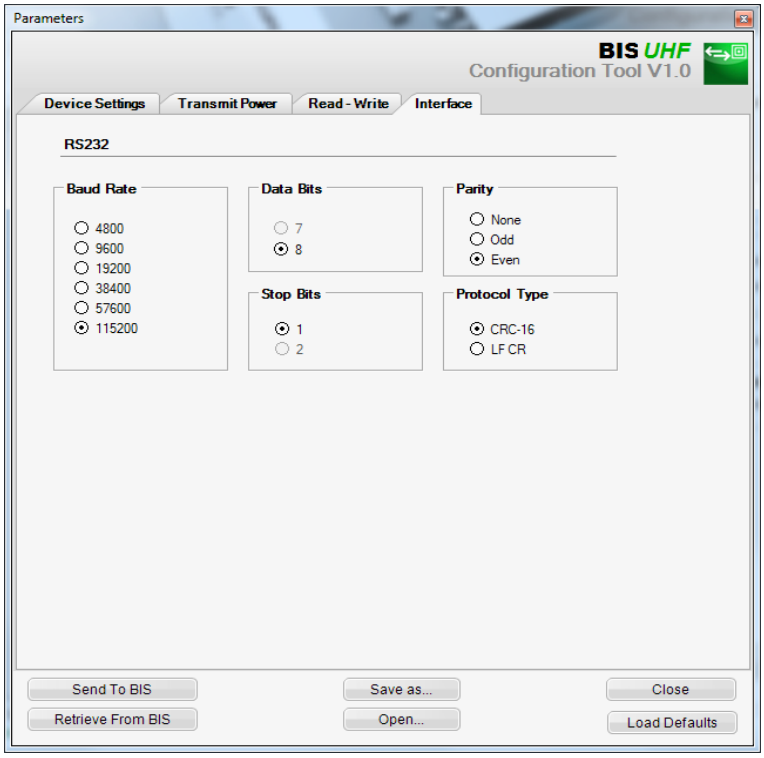
Note
If the actual EPC length is greater than 96 bits, the value 496 bits is to be set. Otherwise, the detection, read and write commands are not answered.

Filtering
If this parameter is active, data carriers with the same ID (EPC, TID or USER data) are grouped together in a response for automatic reading during a data carrier search.

Factory setting: *Filtering off*

7 Setting the Processor Unit Parameters

7.7 Interface



Baud rate
Baud rate setting for an RS232 connection.

Factory setting: *115200*

Data bits
Setting for the number of data bits for an RS232 connection.

Factory setting: *8 (cannot be changed)*

Stop bits
Setting for the number of stop bits for an RS232 connection.

Factory setting: *1 (cannot be changed)*

Parity
Parity setting for an RS232 connection.

Factory setting: *none*

Protocol type
Setting the termination.

Factory setting: *CRC-16*

8 Device Function

8.1 Function Principle of the BIS U-6020

The processor unit and the controlling system communicate via the serial interface.
A sequence protocol determines the communication type.

8.2 Function Principle of the BIS U-6027

The processor unit and the controlling system communicate via the physical Ethernet network.
The device uses the Internet Protocol (IP) for network communication.
The Transmission Control Protocol (TCP) is used to ensure all the data is transferred in the correct sequence without error.

The controlling system and the processor unit BIS U-6027 communicate via TCP/IP sockets.
Communication occurs in raw mode (only user data is exchanged, not configuration or status information).

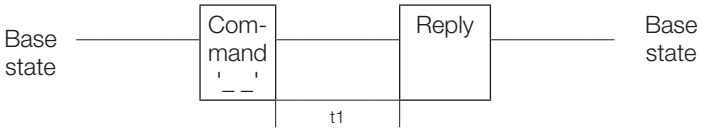
Establishing a connection:
– Socket connection to the IP address of the device, port 10001. The connection depends on the PC operating system and programming language being used.

8.3 Protocol Sequence

Synchronous commands are structured according to the "Command-response-end" principle.
This command type is standard.

Synchronous commands

Command sequence:

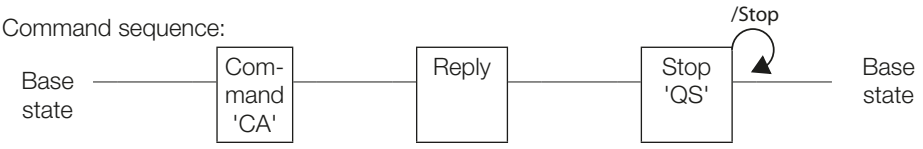


– For all commands, the delay time t1 depends on the number of data carriers and bytes to be read.

Asynchronous commands

The only asynchronous command is 'CA'. Sending the CA command once initiates the "Detect" action. Then the read field is monitored continuously. Only modifications in the data carrier population are reported to the system.
The command is issued until it is terminated by the stop command 'QS'.

Command sequence:



8 Device Function

8.4 Communication

The controlling system and processor unit communicate with one another via telegrams. Specific telegrams exist for individual tasks and always begin with the command associated with the telegram type.

Telegram types with associated command (ASCII characters)

'CS'	Synchronous detection
'CA'	Asynchronous detection
'R'	Reading
'W'	Writing
'QH'	Reset
'QS'	Stop
'QP'	Standby (power save)
'IR'	Import control inputs
'OS'	Switch control outputs

Note
Continual polling on the port is not permitted. The waiting time between two commands must be a minimum of 20 ms.

Explanations of telegram content

Start address and number of bytes	The start address (A5, A4, A3, A2, A1, A0) and the number of bytes to send (L5, L4, L3, L2, L1, L0) for the USER data are transmitted as ASCII characters in decimal format. A range of 0 to 999999 can be used for the start address and 1 to 1024 for the number of bytes. A0 through L5 each represent one ASCII character.
Note	The start address + number of bytes must not exceed the data carrier capacity.
Field lengths	The user data start address and length, TID length and EPC length parameters affect the format of the telegrams.
Acknowledgment	The acknowledgment <ACK> is sent by the identification system if the serial transmitted characters were recognized as correct and there is a data carrier located within the working range of the antennas. <NAK> + 'Status No.' is used to acknowledge a detected error.
Bytes sent	The data is sent code-transparent (no data conversion).
Identification via EPC	The EPC memory in the data carriers must be addressed with 'E' according to EPCglobal™ tag data standards. All other data carriers with 'e' acc. to ISO / IEC 15691.

8 Device Function

Telegram Synchronous detection (CS)

One-time detection of EPC, TID or USER data from all data carriers located in the read field. Then the processor unit switches automatically to the base state.

The following combinations are possible:
– EPC
– TID
– EPC + USER
– EPC + TID

1. Controller sends:

	Com-mand	EPC	TID	USER	Reserved[1]	End identifier
Character	'CS'	'E' or 'e' or '␣'	'T' or '␣'	'U' or '␣'	'␣␣␣'	CRC-16 or <LF><CR>
Byte length	2	1	1	1	3	2

2. Processor unit replies:

	Reply	Frame length[2]	Com-mand	EPC	TID	USER	No. of tags	Res.[1]	Data block	End identifier
Character	<ACK>	00_{hex} to $07B5_{hex}$	'CS'	'E' or 'e' or '␣'	'T' or '␣'	'U' or '␣'	'000' to '999'	00_{hex}	See "Data block" table	CRC-16 or <LF><CR>
Byte length	1	4	2	1	1	1	3	3	Variable	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

1) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U. The reserved bytes are filled with 0x00 in any replies that the device sends.
2) The frame length refers to the number of bytes in the frame that follow the length field.

8 Device Function

Data block in positive reply:

	Antenna port[1)]	Reserved[2)]	EPC	TID	USER
Character	'1' to 'F'	00_{hex}	[...][3)]	[...][3)]	[...][3)]
Byte length	1	1	0, 12 or 64	0 to 12	0 to 16

Content of the EPC field in the data block if EPC format is set to 496 bits (62 bytes):

	No. of bytes	EPC
Character	'02' to '62'	[...][4)]
Byte length	2	62

1) Display of the antennas with the data carriers:
   Port 1: '1', Port 2: '2', Port 3: '4', Port 4: '8', Port 1+2: '3', etc.
2) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U. The reserved bytes are filled with 0x00 in any replies that the device sends.
3) Placeholder for data block.
4) The EPC data is sent aligned to the right and the remaining characters are filled with 0x00. Only the right-aligned values from the specified number of bytes are evaluated.

8 Device Function

Telegram Asynchronous detection (CA)

Detection of EPC, TID or USER data from all data carriers located in the read field.
The read field is then monitored continuously for changes in the data carrier population (coming or going data carriers). The command must be terminated with a stop command.

The following combinations are possible:
– EPC
– EPC + USER
– EPC + TID

1. Controller sends:

	Com-mand	EPC	TID	USER	Reserved[1]	End identifier
Character	'CA'	'E' or 'e'	'T' or '␣'	'U' or '␣'	'␣␣␣'	CRC-16 or <LF><CR>
Byte length	2	1	1	1	3	2

2. Processor unit replies:

	Reply	Frame length[2]	Com-mand	EPC	TID[3]	USER[3]	Number of tags[4]	TAG status[5]	Data block	End identifier
Character	<ACK>	00_{hex} to $07B5_{hex}$	'CA'	'E' or 'e' or '␣'	'T' or '␣'	'U' or '␣'	'001'	'100' or '000'	See "Data block" table	CRC-16 or <LF><CR>
Byte length	1	4	2	1	1	1	3	3	Variable	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

1) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U. The reserved bytes are filled with 0x00 in any replies that the device sends.
2) The frame length refers to the number of bytes in the frame that follow the length field.
3) If the TAG status is coming and TID or USER is requested but this information could not be read by the data carrier, the field is filled with a '?'.
   If the TAG status is going and TID or USER is requested, the field is filled with a blank space.
4) With asynchronous detection, a separate reply is sent for each tag, i.e. "Number of tags" is always '001'.
5) TAG status is only used for asynchronous detection commands.
   TAG status '100': TAG coming, TAG status '000': TAG going.

8 Device Function

Data block in positive reply for "TAG coming":

	Antenna port[1)]	Reserved[2)]	EPC	TID	USER
Character	'1'…'F'	00_{hex}	[...][3)]	[...][3)]	[...][3)]
Byte length	1	1	0, 12 or 64	0…12	0…16

Content of the EPC field in the data block if EPC format is set to 496 bits (62 bytes):

	No. of bytes	EPC
Character	'02'…'62'	[...][4)]
Byte length	2	62

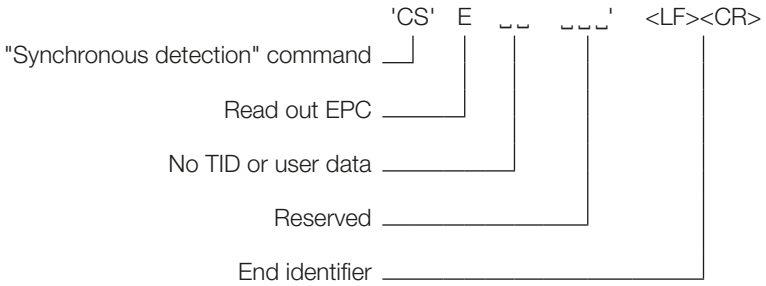
1) Display of the antennas with the data carriers:
   Port 1: '1', Port 2: '2', Port 3: '4', Port 4: '8'
2) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U. The reserved bytes are filled with 0x00 in any replies that the device sends.
3) Placeholder for data block.
   If the TAG status is coming and TID or USER is requested but this information could not be read by the data carrier, the TID or USER data block is filled with 0x00.
   If the TAG status is going and TID or USER is requested, the TID or USER data block is filled with 0x00.
4) The EPC data is sent aligned to the right and the remaining characters are filled with 0x00. Only the right-aligned values from the specified number of bytes are evaluated.

8 Device Function

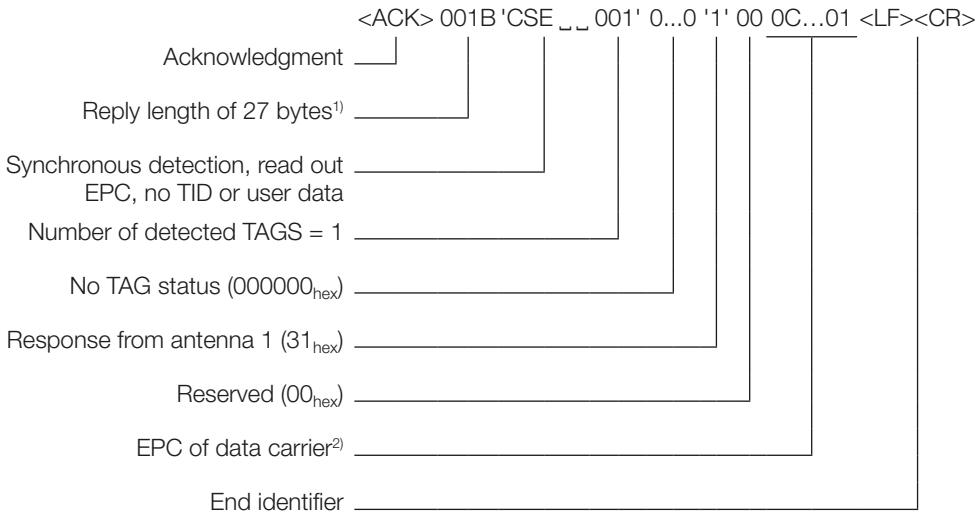
Telegram example Detection

Telegram example 'CS' synchronous detection:
1 data carrier in the read field (with EPC 0102030405060708090A0B0C$_{hex}$), detected by antenna 1. Only the EPC was required.

1. Command: 'CSE␣␣␣␣␣'<LF><CR>



2. Reply: <ACK>001B'CSE␣␣001'000000'1'000C0B0A090807060504030201<LF><CR>



1) Number of bytes without <ACK> and length field
2) Fully recognized EPC: 0102030405060708090A0B0C$_{hex}$.
Only EPC data (12 bytes) was requested and therefore the byte length of TID and user data in the data block equals zero.

8 Device Function

Telegram Read (R)

Reading data (such as EPC, TID or USER data) on recognized data carriers.

Note
For data carriers with the same information, one randomly selected data carrier is answered.

1. Controller sends:

	Command	ID type	ID[1]	Data type		Start address[2]	Number of bytes[2]	Reserved[3]	End identifier
Character	'R'	'T' or 'E' or 'e' or 'U'	[...][5]	'E' or 'e' or 'T' or '␣'	'U' or '␣'	'000000' to '999999'	'000001' to '001024'	'␣␣'	CRC-16 or <LF><CR>
Byte length	1	1	16 or 64	1	1	6	6	2	2

2. Processor unit replies:

	Reply	Frame length[4]	Command	ID type	ID[1]	Data type		Start address[2]	Number of bytes[2]	Reserved[3]	Data	End identifier
Character	<ACK>	00_{hex} to 0458_{hex}	'R'	'T' or 'E' or 'e' or 'U'	[...][5]	'E' or 'e' or 'T' or '␣'	'U' or '␣'	'000000' to '999999'	'000001' to '001024'	00_{hex}	[...][5]	CRC-16 or <LF><CR>
Byte length	1	3	1	1	16 or 64	1	1	6	6	2	Variable	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

Content of the ID or data fields if ID type or data type = EPC and EPC format = 496 bits (62 bytes) is set:

	No. of bytes	EPC
Character	'02'…'62'	[...][5]
Byte length	2	62

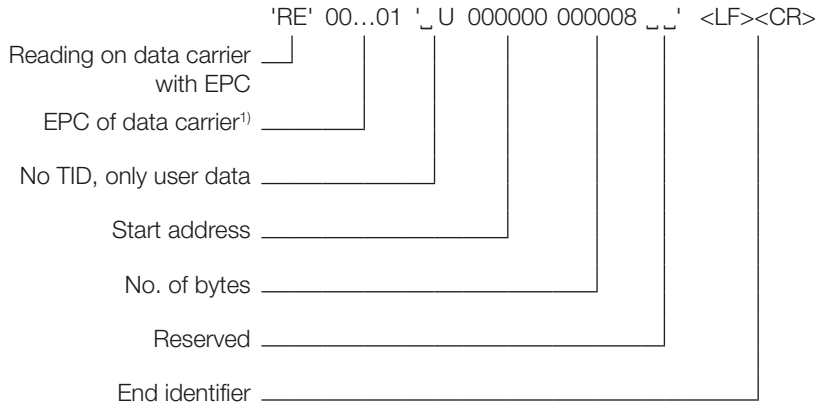
1) Length of the "ID" field depends on the selected EPC format.
2) Start address and number of bytes refer only to the reading in the user area (U). EPC and TID are always transferred in their full length. Values depend on the data carrier being used.
3) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U. The reserved bytes are filled with 0x00 in any replies that the device sends.
4) The frame length refers to the number of bytes in the frame that follow the length field.
5) Placeholder for data block. The data is sent aligned to the right and the remaining characters filled with 0x00. Only the right-aligned values from the programmed number of bytes are evaluated.

8 Device Function

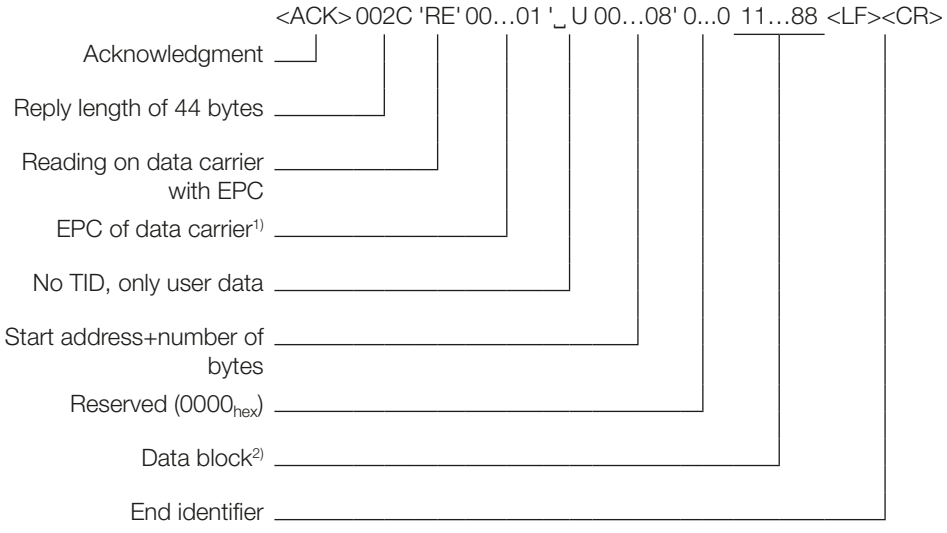
Telegram example Read 'R'

Reading 8 bytes of user data (1122334455667788) from TAG with EPC 0102030405060708090A0B0C$_{hex}$ from address 0.

1. Command: 'RE'000000000C0B0A090807060504030201'␣U000000000008␣␣'<LF><CR>



2. Reply: <ACK>002C'RE'000000000C0B0A090807060504030201'␣U000000000008'0000112233444667788<LF><CR>



1) Fully recognized EPC: 0102030405060708090A0B0C$_{hex}$, filled to 16 bytes with 00000000$_{hex}$.
2) Data block 8 bytes: Address 0: 11$_{hex}$, Address 1: 22$_{hex}$, Address 3: 33$_{hex}$,... Address 7: 88$_{hex}$.

8 Device Function

Telegram Write (W)

Writing data (such as EPC or USER data) to recognized data carriers.
The TID cannot be modified.

Note
For data carriers with the same identification, all data carriers are answered.

1. Controller sends:

	Com-mand	ID type	ID[1]	Data type	Reser-ved	Start address[2]	Number of bytes[2]	Reser-ved[3]	Data	End identifier
Character	'W'	'T' or 'E' or 'e' or 'U'	[...][4]	'E' or 'e' or 'U'	'␣'	'000000' to '999999'	'000001' to '001024'	'␣␣'	[...][4]	CRC-16 or <LF><CR>
Byte length	1	1	16 or 64	1	1	6	6	2	Variable	2

2. Processor unit replies:

	Reply	Status number	End identifier
Character	<ACK>	'0'	CRC-16 or <LF><CR>
Byte length	1	1	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

Content of the ID or data fields if ID type or data type = EPC and EPC format = 496 bits (62 bytes) is set:

	No. of bytes	EPC
Character	'02'…'62'	[...][4]
Byte length	2	62

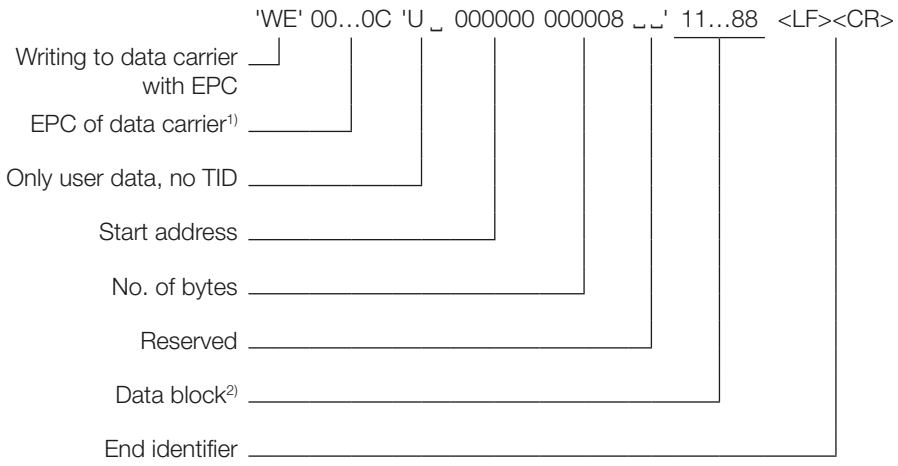
1) Length of the "ID" field depends on the selected EPC format.
2) Start address and number of bytes refer only to the reading in the user area (U). EPC and TID are always transferred in their full length. Values depend on the data carrier being used.
3) Any character can be allocated to reserved bytes, which are ignored in commands to the BIS U.
4) Placeholder for data block. The data is sent aligned to the right and the remaining characters filled with 0x00. Only the right-aligned values from the programmed number of bytes are evaluated.

8 Device Function

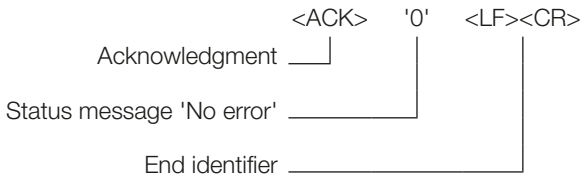
Telegram example Write 'W'

Writing 8 bytes of user data (1122334455667788) to TAG with EPC 0102030405060708090A0B0C$_{hex}$ from address 0.

1. Command: 'WE'000000000C0B0A090807060504030201'U ␣ 000000000008 ␣␣'
1122334455667788<LF><CR>



2. Reply: <ACK>'0'<LF><CR>



1) Fully recognized EPC: 0102030405060708090A0B0C$_{hex}$, filled to 16 bytes with 00000000$_{hex}$.
2) Data block 8 bytes: Address 0: 11$_{hex}$, Address 1: 22$_{hex}$, Address 3: 33$_{hex}$,... Address 7: 88$_{hex}$.

8 Device Function

Telegram Reset (QH)

Resetting the processor unit to the basic state (hardware reset).

Note
The processor unit needs up to 15 seconds to reset to the basic state.

1. Controller sends:

	Command	End identifier
Character	'QH'	CRC-16 or <LF> <CR>
Byte length	2	2

2. Processor unit replies:

	Reply	Status number	End identifier
Character	<ACK>	'0'	CRC-16 or <LF><CR>
Byte length	1	1	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

Telegram Stop (QS)

Terminating asynchronous commands that are in progress. Synchronous commands such as read, write, etc. cannot be terminated.

1. Controller sends:

	Command	End identifier
Character	'QS'	CRC-16 or <LF> <CR>
Byte length	2	2

2. Processor unit replies:

	Reply	Status number	End identifier
Character	<ACK>	'0'	CRC-16 or <LF><CR>
Byte length	1	1	2

or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

8 Device Function

Telegram Standby (QP)

Setting the processor unit to energy-saving standby mode.
The following modes are available:
– '00' = Standby off,
– '01' = Standby on,
– '02' = Automatic mode, depending on data traffic

Note
In automatic mode, the response time of a telegram is delayed by up to 15 seconds. After switching off standby mode, the processor unit needs up to 15 seconds to reset to the basic state.

1. Controller sends:

	Command	Mode	End identifier
Character	'QP'	'00' or '01' or '02'	CRC-16 or <LF> <CR>
Byte length	2	2	2

2. Processor unit replies:

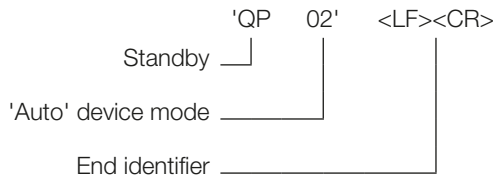
	Reply	Mode	End identifier
Character	<ACK>	'0' or '1' or '2'	CRC-16 or <LF><CR>
Byte length	1	1	2

or

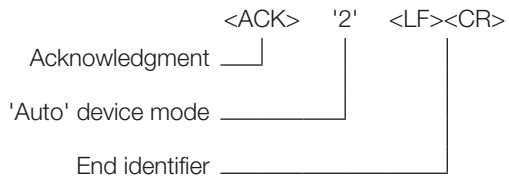
	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

Telegram example Standby 'QP'

Setting the processor unit to automatic mode.
1. Command: 'QP02'<LF><CR>



2. Reply: <ACK>'2'<LF><CR>



8 Device Function

Telegram Read digital inputs (IR)

Monitoring the digital inputs on the device.
Active inputs have a supply voltage of $+V_s$. Reset inputs have 0 V DC available.

The following replies are possible:
– '0' = Both inputs OFF,
– '1' = Input 1 ON ($+V_S$), input 2 OFF (0 V DC),
– '2' = Input 1 OFF (0 V DC), input 2 ON ($+V_S$),
– '3' = Input 1 ON ($+V_S$), input 2 ON ($+V_S$).

1. Controller sends:

	Com-mand	End identifier
Character	'IR'	CRC-16 or <LF> <CR>
Byte length	2	2

2. Processor unit replies:

	Reply	Status	End identifier
Character	<ACK>	'0' or '1' or '2' or '3'	CRC-16 or <LF><CR>
Byte length	1	1	2

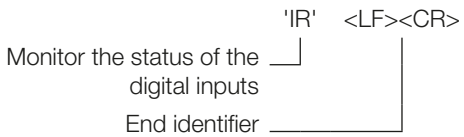
or

	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

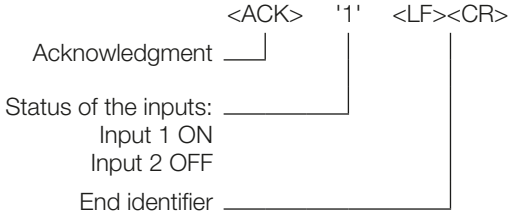
Telegram example Read digital inputs 'IR'

Monitoring the digital inputs on the device.

1. Command: 'IR'<LF><CR>



2. Reply: <ACK>'1'<LF><CR>



8 Device Function

Telegram Switch digital outputs (OS)

Setting or resetting the digital outputs on the device.
Active outputs have a supply voltage of $+V_s$. Reset outputs have 0 V DC available.

Possible operations:
'X' = No change, '0' = Reset, '1' = Set, 'I' = Invert.

1. Controller sends:

	Com-mand	Operation[1]	End identifier
Character	'OS'	'X' or '0' or '1' or 'I'	CRC-16 or <LF> <CR>
Byte length	2	4	2

2. Processor unit replies:

	Reply	Reserved	Status[2]	End identifier
Character	<ACK>	0_{hex}	'0' or '1'	CRC-16 or <LF> <CR>
Byte length	1	1	4	2

or

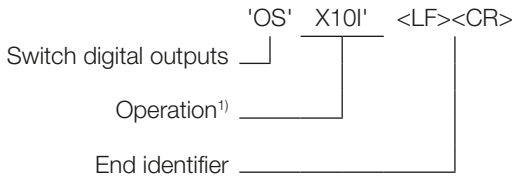
	Reply	Status number	End identifier
Character	<NAK>	See "8.5 Status Indicators" on page 43	CRC-16 or <LF><CR>
Byte length	1	1	2

1) 1 byte for each output.
2) Status of the outputs after the operation. 1 byte for each output.

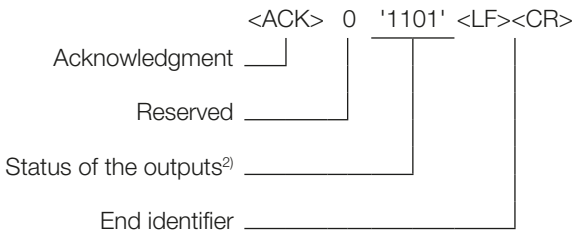
Telegram example Switch digital outputs 'OS'

Switching the digital outputs with the operator 'X10I'. Status of the outputs before the operation: output 1: ON, output 2: OFF, output 3: ON, output 4: OFF.

1. Command: 'OSX01I'<LF><CR>



2. Reply: <ACK>0'1101'<LF><CR>



1) Operation 'X10I': output 1: unchanged, output 2: set, output 3: reset, output 4: invert
2) Status '1101': output 1: ON, output 2: ON, output 3: OFF, output 4: ON

8 Device Function

8.5 Status Indicators

If an application command is not completed successfully, the processor unit replies with <NAK> and a status message.
Following that, the procedure is terminated and the device reverts to the basic state.

No.	Meaning	Remedy
General		
0	No error	

Communication with the data carrier			
1	No data carrier present. Data carrier too far from antenna. Data carrier defective or not approved.	Increase transmitting power, reduce distance, replace data carrier.	
2	Read error.	Repeat read command. Replace data carrier if error occurs frequently.	
3	Read error because the data carrier was removed or is located within the antenna limit range.	Move the data carrier closer to the antenna, increase transmitting power.	
4	Write error.	Repeat the write command, replace the data carrier if error occurs frequently.	⚠ Caution! When a write operation is canceled, incomplete data may have been written to the data carrier.
5	Write error because the data carrier was removed or is located within the antenna limit range.	Move the data carrier closer to the antenna, increase transmitting power.	
F	Command outside the address range of the data carrier.	Correct the address range or number of bytes, use a data carrier with a larger address range.	

8 Device Function

No.	Meaning	Remedy
Communication between application and device		
6	Interface error (e.g. parity or stop bit error).	Check the interface settings in the controller and the device, check the cable connections.
7	Telegram format error. Unexpected character received (e.g. too many characters, too few characters, incorrect characters).	Correct the structure of the telegram.
8	CRC-16 is preset and the calculated CRC checksum does not match the checksum that was received.	Correct the CRC calculation, check the communication connection.
P	Standby is on and a forbidden command is received.	Switch off standby, activate automatic mode.
R	The asynchronous detection command is active and a forbidden command is received.	Send stop, repeat command.

System diagnostics		
9	Cable break.	Check the connection on the antenna and the antenna cable.
C	Error when reading or writing parameters from the internal memory.	Reset. Contact Balluff service department.
D	Arbitrary device behavior.	Reset. Contact Balluff service department.

8 Device Function

8.6 Displays

The operating states of the identification system and the TCP/IP connection are indicated by LEDs.

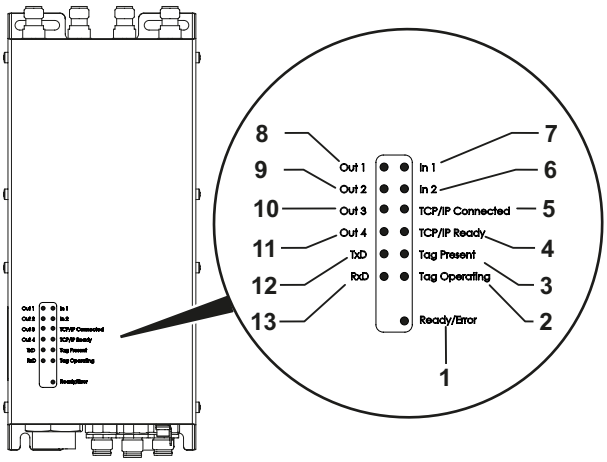


Figure 5: Function indicators

Identification system

1 Ready / Error
2 Tag operating
3 Tag present
4 TCP/IP ready (BIS U-6027 only)
5 TCP/IP connected (BIS U-6027 only)
6 Digital input 2
7 Digital input 1
8 Digital input 1
9 Digital input 2
10 Digital input 3
11 Digital input 4
12 Transmit data (TxD)
13 Receive data (RxD)

Start-up phase

The "Ready / Error" status LED flashes green during the start-up phase.
When setup is finished and the system is ready for operation, the "Ready / Error" status LED lights up green.

Diagnostics

Identification system

Status LED	Meaning
Ready / Error	
Off	Not ready
Illuminated green	Ready
Flashing green	Setup
Flashing red	Error (e.g. device error or broken cable)

Tag operating	
Off	No command
Illuminated orange	Command to data carrier (e.g. detection, read or write)

8 Device Function

Status LED	Meaning
Tag present	
Off	No command
Flashing orange	No data carrier detected in the read field
Illuminated orange	Data carrier detected in the read field

In 1…In 2	
Off	Digital inputs not connected
Illuminated orange	Digital inputs connected

Out 1…Out 4	
Off	Digital outputs not set
Illuminated orange	Digital outputs set

Transmit Data (TxD)	
Off	No data transfer
Flashing orange	Device sends data

Receive Data (RxD)	
Off	No data transfer
Flashing orange	Device receives data

TCP / IP connection

TCP/IP ready	
Off	TCP/IP connection inactive
Flashing green	TCP/IP connection active

TCP/IP connected	
Off	Device has no TCP/IP connection
Illuminated green	Device has a TCP/IP connection

Appendix

Type code

BIS U– 6020 –059–114–00–ST26

Balluff Identification System

Series U read/write system

Hardware type

6020 = Serial interface RS232 (metal housing)
6026 = EtherNet/IP (metal housing)
6027 = Ethernet TCP/IP (metal housing)
6028 = PROFINET (metal housing)

Software type

034 = Balluff protocol EtherNet/IP
048 = Balluff protocol PROFINET
053 = Balluff protocol RS232 UHF for Europe
054 = Balluff protocol Ethernet TCP/IP UHF for Europe
059 = Balluff protocol RS232 UHF for USA/Canada/Mexico/Brazil/China/Japan etc.
060 = Balluff protocol Ethernet TCP/IP UHF for USA/Canada/Mexico/Brazil/China/Japan etc.

Antenna socket version

10_ = Country setting 865…868 MHz Europe
11_ = Country setting 902…928 MHz USA/Canada/Mexico/Argentina
12_ = Country setting 920.5…924.5 MHz China
13_ = Country setting 915…928 MHz Brazil
15_ = Country setting 916.8…920.4 MHz Japan
17_ = Country setting 920…926 MHz Australia
__4 = 4 antenna sockets

Interface

00 = RS232
06 = Ethernet

Customer connection

ST22= for PROFINET device with AIDA connector
ST26= for serial device
ST27= for TCP/IP device
ST28= for PROFINET device
ST35= for EtherNet/IP device

Accessories (optional, not included in the scope of delivery)

Type	Ordering code
Mounting plates	BIS Z-HW-004

Note
You can find more accessories for the BIS U-602-... in the Balluff BIS catalog and under www.balluff.com.

Appendix

ASCII table

Decimal	Hex	Control code	ASCII	Decimal	Hex	ASCII	Decimal	Hex	ASCII
0	00	Ctrl @	NUL	43	2B	+	86	56	V
1	01	Ctrl A	SOH	44	2C	,	87	57	W
2	02	Ctrl B	STX	45	2D	-	88	58	X
3	03	Ctrl C	ETX	46	2E	.	89	59	Y
4	04	Ctrl D	EOT	47	2F	/	90	5A	Z
5	05	Ctrl E	ENQ	48	30	0	91	5B	[
6	06	Ctrl F	ACK	49	31	1	92	5C	\
7	07	Ctrl G	BEL	50	32	2	93	5D	[
8	08	Ctrl H	BS	51	33	3	94	5E	^
9	09	Ctrl I	HT	52	34	4	95	5F	_
10	0A	Ctrl J	LF	53	35	5	96	60	`
11	0B	Ctrl K	VT	54	36	6	97	61	a
12	0C	Ctrl L	FF	55	37	7	98	62	b
13	0D	Ctrl M	CR	56	38	8	99	63	c
14	0E	Ctrl N	SO	57	39	9	100	64	d
15	0F	Ctrl O	SI	58	3A	:	101	65	e
16	10	Ctrl P	DLE	59	3B	;	102	66	f
17	11	Ctrl Q	DC1	60	3C	<	103	67	g
18	12	Ctrl R	DC2	61	3D	=	104	68	h
19	13	Ctrl S	DC3	62	3E	>	105	69	i
20	14	Ctrl T	DC4	63	3F	?	106	6A	j
21	15	Ctrl U	NAK	64	40	@	107	6B	k
22	16	Ctrl V	SYN	65	41	A	108	6C	l
23	17	Ctrl W	ETB	66	42	B	109	6D	m
24	18	Ctrl X	CAN	67	43	C	110	6E	n
25	19	Ctrl Y	EM	68	44	D	111	6F	o
26	1A	Ctrl Z	SUB	69	45	E	112	70	p
27	1B	Ctrl [	ESC	70	46	F	113	71	q
28	1C	Ctrl \	FS	71	47	G	114	72	r
29	1D	Ctrl]	GS	72	48	H	115	73	s
30	1E	Ctrl ^	RS	73	49	I	116	74	t
31	1F	Ctrl _	US	74	4A	J	117	75	u
32	20		SP	75	4B	K	118	76	v
33	21		!	76	4C	L	119	77	w
34	22		"	77	4D	M	120	78	x
35	23		#	78	4E	N	121	79	y
36	24		$	79	4F	O	122	7A	z
37	25		%	80	50	P	123	7B	{
38	26		&	81	51	Q	124	7C	|
39	27		'	82	52	R	125	7D	}
40	28		(	83	53	S	126	7E	~
41	29		)	84	54	T	127	7F	DEL
42	2A		*	85	55	U			

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