Ready for RFID?

Radio Frequency IDentifiation

LF80C ZeniD RFID Reader

Product Manual

278580 Revision A

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Brooks Automation

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Original manual printed in English. Printed in the U.S.A.

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Revision History

Part Number. 278580

Product Name: LF80C ZeniD RFID Reader Product Manual

Revision	ECO Number	Date	Explanation of Changes
A	94411	3/24/2017	Initial Release

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Table of Contents

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1 Identification

This chapter gives you an overview of the following topics:

- → Model
- → Designated Use
- → Incorrect Use

1.1 Model

LF80C ZeniD

Serial number e.g. 1106MIS12051
Part number TLG-E2B-1O00-S0-00EB

Manufacturer

Brooks Automation Inc.
46702 Bayside Parkway
Fremont, CA 94538

Tel: +1 510-661-5000

Fax: +1 510-661-5166

Website www.brooks.com

For information on the label, see → Device Label.

1.2 Designated Use

This product was developed for reading and writing transponders only. Any other use of this device constitutes misuse and renders the user's authority to install and operate the device invalid.

This product is designed to be mounted and operated in an industrial setting as a built-in-device only. It is not designed to be used as a stand-alone or portable device or in a non-industrial setting, such as a household, vehicle or in the open-air.

Intended use also includes the following:

- following all instructions in the product manual
- observing all safety information

Before using the device, the user should ensure that the national approval requirements for use are met.

1.3 Incorrect Use

Incorrect use, which can endanger the device, the user and third parties, includes:

- the use of the device contrary to its intended use (➔ Designated Use)
- modifying, extending or reconstructing the device without first consulting Brooks Automation
- operating the device when there are obvious problems

WARNING

Risk of injury through incorrect modifications

There are risks from unauthorized modifications to the machine.

Only use original spare parts from the manufacturer. Do not make any changes, attachments or modifications to the device without the approval of Brooks Automation.

WARNING

Risk of injury and malfunction of machine operation through incorrect use

There are risks attached to using the device incorrectly.

Use the device exclusively according to its intended use.

2 Declaration of Conformity

This chapter gives you an overview of the following topics:

- → USA - Federal Communications Commission (FCC)
- → Europe - CE Conformity

2.1 USA - Federal Communications Commission (FCC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference and followed, read and understood by all persons working with the device (especially the safety information)
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, in accordance with part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception - this can be determined by turning the equipment off and on - the user is encouraged to try to correct the interference using one or more of the following measures:

- Reposition or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to an outlet to a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

FCC ID [redacted] N5GLF80BC1

Compliance with:

FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.205
FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.209

WARNING

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

2.2 Europe - CE Conformity

Brooks	**Declaration of Conformity For the European Union**	**Document #:** **Rev.: A**

Description	LF80C ZeniD RFID Reader
Function:	RFID Reader
Part Number:	TLG-E2B-1O00-S0-00EB

Business name and full address of the manufacturer of the machinery:
Brooks Automation Inc., 15 Elizabeth Drive, Chelmsford, MA, USA 01824
Name and address of the person, established in the Community, authorized to compile the relevant technical documentation:
Brooks Automation (Germany) GmbH, Ernst-Ruska-Ring 11, 07745 Jena, Germany

The manufacturer declares:

- That this product fulfills all the relevant provisions of Directive 1999/5/EC (R&TTE Directive) on Radio Equipment and Telecommunication Terminal Equipment.
- The product is in conformity with the following standards and/or other normative documents:
  - HEALTH & SAFETY (Article 3(1)(a)):
    - IEC 60905-1 : 2013/05/28
  - EMC (Article 3(1)(b)):
    - EN 300 330-1 V1.7.1
    - EN 300 330-2 V1.5.1
  - SPECTRUM (Article 3(2)):
    - EN 301 489-1 V1.9.2
    - EN 301 489-3 V1.6.1
    - EN 55032: 2012/AC: 2013
  - OTHER:
    - Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Signature

Date: 18-Oct-2016
Location: Fremont CA, USA

3 General Instructions

This chapter gives you an overview of the following topics:

- → Liability and Warranty
- → Objectives of the Operating Instructions

3.1 Liability and Warranty

The "General sales and delivery conditions" of Brooks Automation always apply.

The warranty period is 12 months beginning with the delivery of the device, which is verified by the invoice or other documents.

The warranty includes repairs of all damages to the device that occur during the warranty period and were clearly caused by material or manufacturing defects.

Liability and warranty claims in cases of damage to persons or property are excluded if they can be attributed to one or more of the following causes:

- incorrect use of the device
- disregard of the information in the product manual
- unauthorized structural modifications of the device
- insufficient maintenance and repairs
- disasters due to foreign objects or force majeure

3.2 Objectives of the Operating Instructions

These product manual serves as support and contain all the necessary safety information that must be followed for general safety, transport, installation and operation.

This product manual including all safety information (as well as all additional documents) must be:

- followed, read and understood by all persons working with the device (especially the safety information)
- easily available to all persons at all times
- immediately consulted in case of doubt (safety)

Objectives:

- to avoid accidents
- to increase the service life and reliability of the device
- to reduce costs due to production downtimes

3.2.1 Target Group

This product manual is addressed to personnel with the following areas of responsibility:

Area of responsibility	Competence
Installation	Specialized personnel
Commissioning, operation and decommissioning	Instructed personnel
Troubleshooting	Specialized personnel

Definition according to DIN EN 60204-1:

Instructed Personnel
Persons who have been instructed and, if required, trained by a specialist as to the tasks assigned to them, the possible risks of incorrect behavior and the required safety equipment and safety measures.

Specialized Personnel

Persons who can evaluate the work assigned to them and recognize possible risks based on their specialized training, knowledge, experience and familiarity with the relevant standards.

4 Safety Instructions

This chapter gives you an overview of the following topics:

- → Archiving
- → Symbols and Signal Words
- → Area of Application and Symbols
- → Obligations
- → ESD Instructions
- → Residual Risks
- → Additional Information

4.1 Archiving

- Store the product manual in the vicinity of the device!
- Always keep the product manual handy!

4.2 Symbols and Signal Words

The following symbols and signal words are used in this documentation. The combination of a pictograph and a signal word classifies the respective safety information. The symbol can vary depending on the type of danger.

	Symbol	Signal word	Description
Death		**DANGER**	This signal word must be used if death or irreversible damage to health can occur if the hazard information is not followed.
Risk of injury and property damage		**WARNING**	This signal word indicates bodily injuries and property damage including injuries, accidents, and health risks.
		**CAUTION**	This signal word indicates a risk of property damage. In addition, there is a slight risk of injuries.

No damage		**ATTENTION**	This signal word warns of malfunctions and may only be used if no damage to health can occur.
		**IMPORTANT**	This signal word indicates cross-references and ways in which operations are facilitated. It excludes all risks of property damage and injury risks.

4.3 Area of Application and Symbols

DANGER

Danger to life, risk of injuries or damage to property

Risks exist when disregarding the product manual and the safety instructions therein.

Carefully read the product manual before initial commissioning. Perform the required safety measures before initial commissioning.

Follow the general safety information as well as the special safety information given in other chapters.

The device was constructed according to state-of-the-art technology and recognized safety regulations. In order to prevent any risks to life and limb of the user, third parties or damage to the device, only use the device for its intended purpose and in perfect condition with regard to safety.

Bodily injuries and/or property damage resulting from non-compliance with the instructions given in the product manual are the responsibility of the company operating the device or of the assigned personnel. Malfunctions that could compromise safety must be eliminated immediately.

4.3.1 Safety Symbols – in compliance with 4844-2

WARNING

Risk of injuries when disregarding safety symbols

Risks exist when disregarding warnings in the product manual.

Please heed the warnings.

Special safety symbols in accordance with DIN 4844-2 are used in the corresponding passages in the text of this product manual and require special attention depending on the combination of signal word and symbol.

4.3.2 Warning Symbols

Warning against hazardous area

Warning against hazardous electrical voltage

Warning against electromagnetic radiation

Warning against flammable materials

Warning against potentially explosive atmosphere

Warning against electrostatically sensitive components

4.3.3 Prohibition Symbols

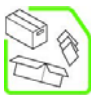
Unauthorized access is prohibited

Fire, open flame and smoking is prohibited

Switching is prohibited

Prohibition

4.3.4 Other Symbols



Dispose of packing material according to regulations

Recycling

Important information

Refer to manual

Disconnect from power supply

4.4 Obligations

4.4.1 Operating Company's Obligations

The safe condition and use of the device is a requirement for the safe operation of the device. The company operating the device therefore has the obligation to ensure that the following points are adhered to:

- **The device may only be operated by trained and authorized personnel!**
- **Avoid unsafe and/or dangerous work procedures! If necessary, check employees' actions!**
- **Only permit personnel to be trained or instructed within the scope of a general training work on the device under the supervision of an experienced person!**
- **Personnel must have understood the product manual. Have this confirmed by signature!**
- **Precisely establish responsibilities according to the various task areas (operation, installation)!**
- **Operating personnel must be committed to immediately reporting to their superior any identifiable safety deficiencies which occur!**

4.4.2 Operating Personnel's Obligations

Operators are obligated to contribute to the prevention of work accidents and the consequences of them by their personal conduct.

WARNING

Risk of injuries due to insufficient personnel qualifications

A risk exists for personnel and the proper operation due to insufficiently qualified personnel.

Only trained personnel may operate the device. New operators must be instructed by the current operating personnel. The operating company must precisely regulate and monitor the personnel's areas of responsibility and competence.

Personnel for the areas of responsibility mentioned above must have the corresponding qualification for this work (training, instructions). If necessary, this can be done by the manufacturer on behalf of the operating company.

All warranty claims are void when disregarded.

4.5 ESD Instructions

CAUTION

Static electricity can damage electronic components in the device. All persons installing or maintaining the device must be trained in ESD protection.

ESD protective measures must be applied when opening the device.

- **Disconnect the power supply prior to removing or adding components.**
- **Discharge your body and all tools used prior to contacting any components on the interior of the device!**
- **Touch electronically sensitive parts carefully and at the corners!**

4.6 Residual Risks

Even if all precautions have been taken, there may be unapparent residual risks!

Adhering to the safety instructions, the intended use, and the product manual as a whole can reduce residual risks!

DANGER

Risks from electric current

Electrical energy remains in lines, equipment and devices even when the device is switched off.

Only allow qualified electricians to perform work on the electrical supply system.

ATTENTION

Disconnect the device from the power supply system if active parts of the device can be accessed by using tools. Access is only permitted for authorized personnel.

Regularly check the electrical equipment of the device. Regularly check all moving cables for damage within the scope of maintenance and repairs.

DANGER

Risk of fire and explosions

Fire and explosions may occur within the vicinity of the device.

Smoking, open flames and fire are strictly prohibited in the vicinity of the device. Do not store any flammable liquids within the hazardous area. Keep a fire extinguisher in the vicinity of the device.

WARNING

Warning against electromagnetic radiation

Electromagnetic radiation develops when transmitting and receiving data.

All Brooks RFID devices of the LF family comply with the standard EN 50357:2001.

4.7 Additional Information

- Read and understand all safety and product manuals prior to installing and operating the device.
- This documentation was written for specifically trained personnel. Installation, operation and troubleshooting may only be carried out by specifically trained personnel.
- Retain this product manual. Keep this documentation in a location that is accessible to all personnel involved with the installation, use and troubleshooting of the device.
- Follow all warnings. Follow all warnings on and in the device and in the documentation.
- Install the device only in accordance with the manufacturer's instructions.
- Use only the accessories and cables from the manufacturer.
- Troubleshooting that is not described in Chapter ➔ Service and Troubleshooting may only be performed by the manufacturer.
- People with hearing aids should be aware that the radio signals emitted by the device can cause annoying noises in the hearing aid.
- Do not connect the device to power supplies such as normal household electrical outlets. The device should only be connected to power supplies as specified in this document.

- When removing a cable, only pull on the plug and not on the cable. Connect cable connectors straight and carefully to avoid damaging the contacts.
- Never overbend the antenna cables or subject these to mechanical forces.
- When replacement parts are required, use only the replacement parts that were specified by the manufacturer. Unauthorized spare parts can result in fire, electric shock or other hazards.

Rules and regulations

The provisions of the accident prevention regulations of the government safety organizations always apply to all work on the device.

The following must also be observed:

- applicable legally binding accident-prevention regulations
- applicable binding regulations at the place of use
- the recognized technical rules for safe and professional work
- existing environmental protection regulations
- other applicable regulations

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5 Product Specifications

This chapter gives you an overview of the following topics:

- → Function
- → Indicating and Operating Elements
- → Inside View
- → Description of the Components
- → Technical Data
- → Antenna Cable
- → Contents of Delivery

5.1 Function

The BROOKS RFID Reader LF80C ZeniD is a high-frequency identification system that uses FM transmissions.

The basic item is a transponder that works as a forgery-proof electronic identity disk.

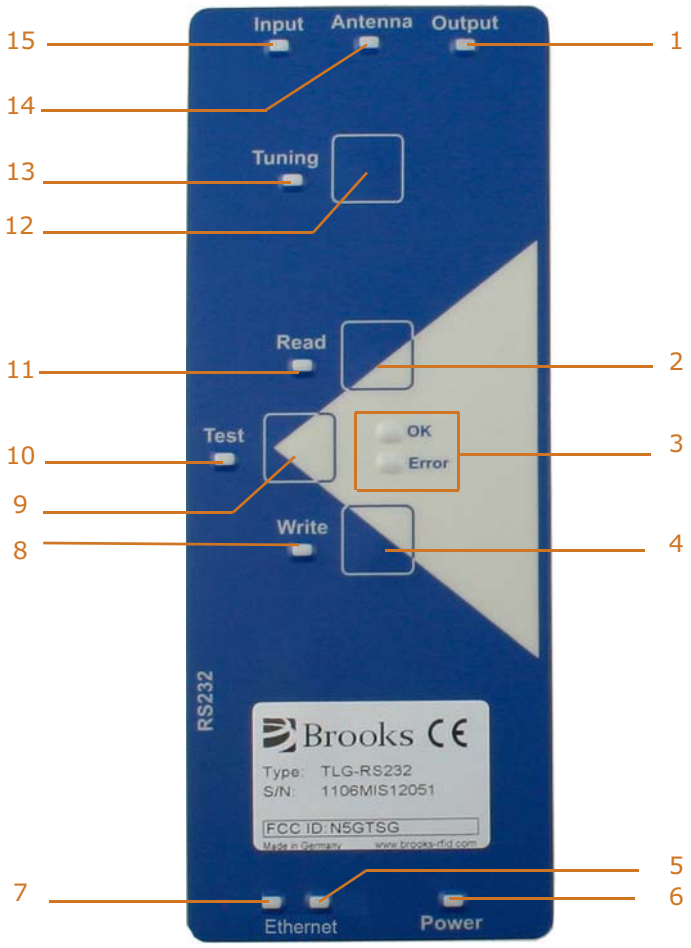
The reading unit of the system sends an energy impulse via the antenna. The capacitor of the passive, battery-free transponder is charged by this impulse. After that, the transponder returns a signal with the stored data.

The total reading cycle takes less than 100 ms.

Since a sight connection between the transponder and the reader is not absolutely necessary, the transponder can also be identified through non-metallic material.

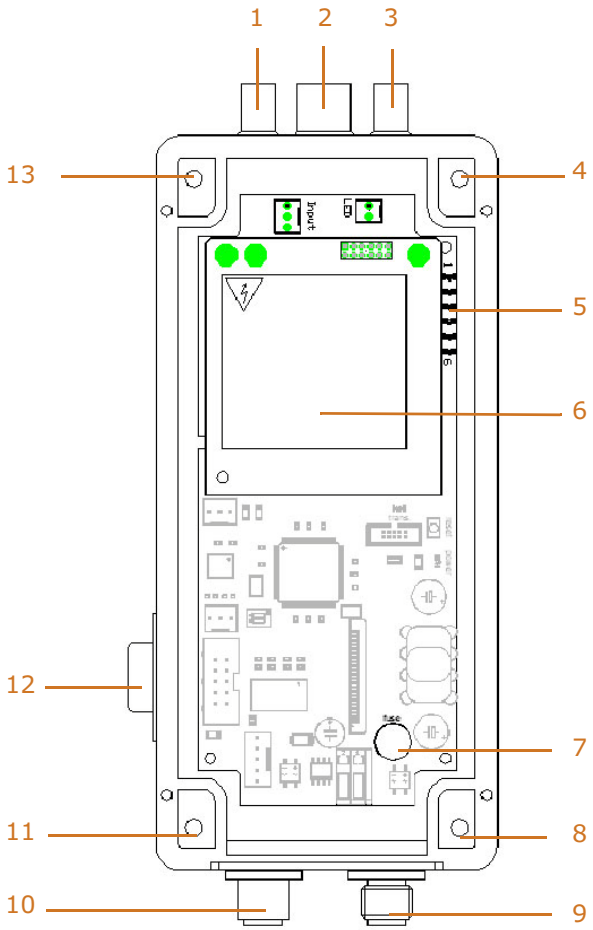
The data received by the RFID reader is transmitted to the host computer via a serial interface.

5.2 Indicating and Operating Elements



1	External Output LED	9	Test mode button
2	Read button	10	Test LED
3	Status LEDs	11	Read LED
4	Write button	12	Tuning button
5	Traffic LED	13	Tuning LED
6	Power LED	14	Antenna LED
7	Link LED	15	Input LED
8	Write LED		

5.3 Inside View



1	External input	8	Assembly hole
2	Port for antenna	9	Power supply port
3	External output	10	Ethernet interface with PoE
4	Assembly hole	11	Assembly hole
5	Tuning LED	12	RS232 interface 9-pin Sub-D female plug
6	LF module	13	Assembly hole
7	Fuse		

5.4 Description of the Components

Component	Description
LF module	Via the antenna the LF module supplies the transponder with energy and it transmits the received data to the controller.
Tuning LEDs	The six Tuning LEDs show the switch status of the adjustment relays.
RS232 interface	The data are passed down serially to one of the two **RS232 interfaces** (9-pin Sub-D female plug) with the different protocols. Baud rates of 300 Bd up to 115.2 kBd are possible.
Ethernet interface	Communication with the device can be carried out via the 10/100 BaseT Ethernet interface (IEEE 802.3) with PoE.
External output	The external output (usually a LED) shows the status of the reader. The behavior of the external output is depending on the sensor triggered automatic reading. The LED remains on until the read operation is complete. The LED goes off if the reader receives confirmation that the page was read, or if an error message occurs. If the host does not return confirmation after the page was read, the LED remains on until either a new read process is started and successfully completed, or until the device is reset.
External input	A sensor (such as an optical sensor) can be connected to the external input.
Fuse	TR5 housing, 400 mA T (low-breaking).
Tuning LED	The antenna's efficiency is optimized by pushing the automatic calibration button. The LED lights up during the calibration process and subsequently goes off when tuning is successful. If a fault occurs, the LED flashes until the next calibration process is successful. Possible faults could be caused by a defective antenna or a strong metallic environment near the antenna.
Antenna LED	If the antenna sends LF signals (to load a transponder or send data, for example), the LED is activated for this period.

Component	Description
Input LED	The Input LED indicates that the external sensor was initiated, or that an external potential-free contact was actuated.
Output LED	If the external output is set, the LED is on; if not, the LED does not light up.
Link and Traffic LED	**Link LED**: LED is on → Link OK. **Traffic LED**: LED is flashing → Rx or Tx activity
Test LED	The test mode is used to check the most important reader features (reading or writing), which are operated by pressing the corresponding button in test mode. To switch the reader to test mode, press the Test mode button and keep it pressed for at least five seconds. The Test LED flashes when the reader is in test mode. Press the Test mode button again to leave test mode.

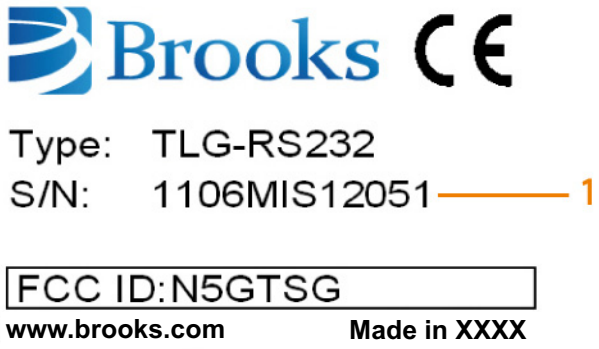
5.5 Technical Data

Technical data - device	
Operating temperature	0 °C to +50 °C 32 °F to 122 °F
Storage temperature	-25 °C to +70 °C -13 °F to +158 °F
Permissible humidity at 50 °C / 122 °F	25 - 80 %
Transmitting frequency	134.2 kHz
Max. field strength in 3 m distance	110 dB µV/m
Typ. period of charging impulse	50 ms
Max. repeat of reading	4/s
Max. repeat of programming	1/s
Protection class	IP 40
Housing material	ABS
Weight	about 440 g
Fuse	400 mA (T)
Serial interface RS232	300 Bd - 115.2 kBd
Ethernet interface	10/100 BaseT (IEEE 802.3) with PoE (endspan only)

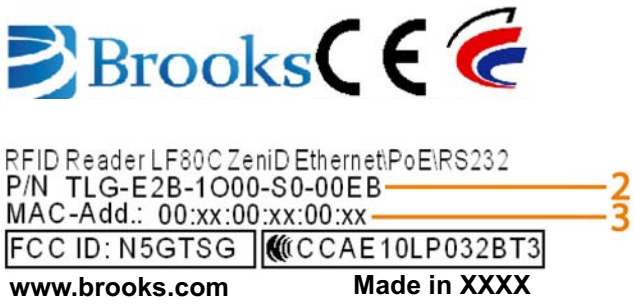
5.5.1 Device Label

The device labels with the CE mark, serial and part number and MAC address are on the device housing.

Label on top



Label at the side



1 Serial number (example)

2 Part number

3 MAC address

5.5.2 Power Supply and Current Input

Description	Min	Type	Max	Unit
Voltage (reverse polarity protected)	18	24	30	V DC
Current with/without presence sensor (power-up process excluded)		70/95		mA
Reading/writing impulse Rod antenna without/with presence sensor Micro antenna without/with presence sensor		 160/185 140/165		mA

5.6 Antenna Cable

5.6.1 Cable for Rod Antenna and Frame Antenna

Standard cable	
Diameter	5.6 mm
Bending radius	84 mm If the device is installed immediately and the cable is therefore only bent one single time, a bending radius of 33 mm is permitted.
Material	PVC
Approvals	VDE, IEC, UL

Highly flexible cable (suitable for energy chains)	
Diameter	6 mm
Bending radius	60 mm
Material	PVC
Approvals	VDE, IEC, UL

5.6.2 Cable for Mini Antenna and Micro Antenna

Standard cable	
Diameter	4.1 mm
Bending radius	41 mm If the device is installed immediately and the cable is therefore only bent one single time, a bending radius of 20.5 mm is permitted.
Material	PVC
Approvals	VDE, IEC, UL

Highly flexible cable (suitable for energy chains)	
Diameter	5 mm
Bending radius	50 mm
Material	PVC
Approvals	VDE, IEC, UL

IMPORTANT

Special antennas with other highly flexible cables are available upon request.

5.7 Contents of Delivery

Quantity	Description
1	RS232 RFID reader
1	Mounting set
1	Accompanying letter

IMPORTANT

For available or required accessories, e.g. antennas, adapters and cables, see ➔ Accessories.

IMPORTANT

For additional information, software, drivers, etc., our extensive download area is available to you at www.brooks.com -> Service -> Download.

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6 Installation

This chapter gives you an overview of the following topics:

- → Safety Instructions
- → Qualified Installation Personnel
- → Unpacking
- → Assembly of the Device
- → Antenna Installation
- → Power Supply
- → Terminal Connection
- → Ethernet Connection
- → External Input and Output
- → Commissioning

Follow the instructions in the safety chapter

Follow the general safety instructions in the chapter → Safety Instructions.

6.1 Safety Instructions

CAUTION

The device is designed for indoor use in an industrial setting only.

Installation is only allowed in an interior room at a constant temperature between 0° C / 32 °F and +50 °C / 122 °F, and a relative humidity between 25 % and 80 %.

Never use the device near or in water.

Never pour liquids of any type over the device. If the device should accidentally come in contact with liquid, disconnect it and have it checked by a technician.

Do not install the device near heat sources such as radiators, heat registers, stoves or other devices (including amplifiers) that generate heat.

Do not install the device in a flammable environment.

CAUTION

Never expose the device to extreme temperature fluctuations, since otherwise condensation develops in the device and causes damage.

Do not install the device in the vicinity of voltage lines or other power lines with which they could collide (for example, when drilling), which could result in serious injuries or even death.

The device (especially the antenna) should not be installed in the immediate vicinity of electrical equipment such as medical devices, monitors, telephones, TV sets, magnetic disks and metal objects.

This could result in reduced read and write ranges.

Never use the device in explosive areas (such as paint warehouses).

CAUTION

Do not use the device in areas where it is exposed to vibrations or shocks.

ATTENTION

The installation location must be adequately illuminated during the installation.

Never install the device during a lightning storm.

Verify that the installation meets the requirements of the (country specific) FCC for human exposure to radio frequencies.

ATTENTION

When determining the installation site, keep in mind the length of the antenna wire and the read/write range of the antenna used.

6.2 Qualified Installation Personnel

CAUTION

Installation is to be carried out by specially trained personnel only. If you are uncertain about their qualification, contact the manufacturer.

CAUTION

Operating the device without special training can result in damage to the reader and/or connected devices.

6.3 Unpacking

The device and the accessories are packed under clean-room conditions. In order to maintain this condition, the device must also be unpacked in clean-room conditions.

Disposing of the packaging material

The packaging material consists of cardboard and foil. Dispose of these materials separately and observing the respective regulations of your country.

6.4 Assembly of the Device

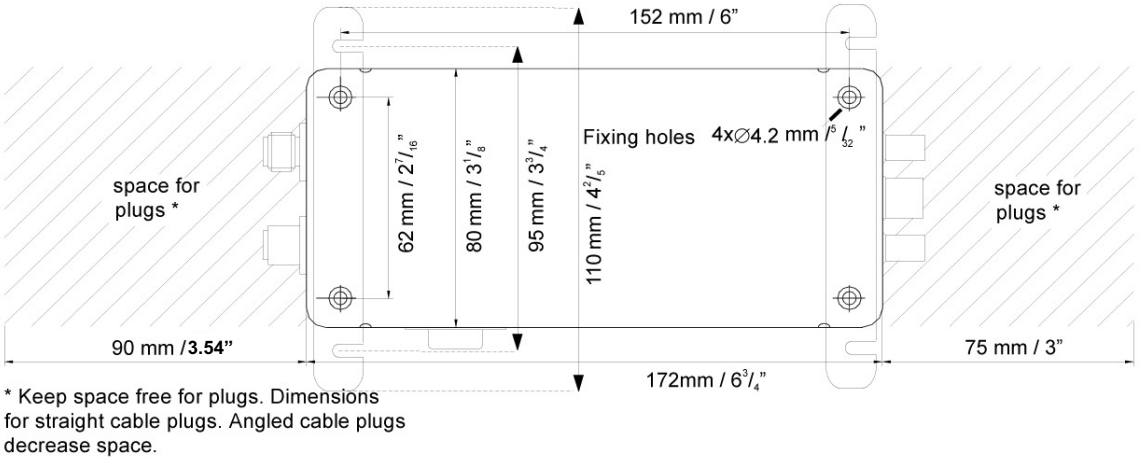
ATTENTION

The mounting surface must be stable, non-flammable, dry and clean.

If necessary, clean it before installing the device.

The device must be installed so that air can freely circulate vertically through the heat sink, and the operating and environmental conditions specified under ➔ Technical Data are met at all times.

Installation dimensions



* Keep space free for plugs. Dimensions for straight cable plugs. Angled cable plugs decrease space.

6.4.1 Standard Housing for Enclosed Assembly Material (Recommended)

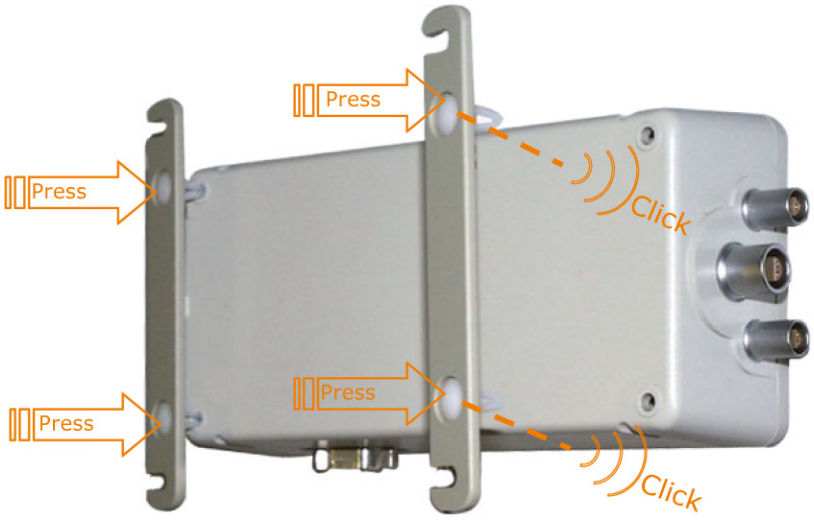
Required materials and tools

- Enclosed mounting set, containing two mounts, four expanding rivets and a drilling template
- Four cylinder head screws: M4 (EU), UNC 8/32 (USA)
- Four dowels (in case of wall mounting)
- Appropriate screwdriver
- Drilling machine with fitting drill

Assembly

- **Drill four holes using the enclosed drilling template.**
- **When mounting the device on a wall, insert four dowels.**
- **Insert four expanding rivets into the two mounts as shown in the image.**

- **Plug the mounts into the four mounting holes of the device as shown in the image.**



- **Screw the device onto the assembly surface.**
- **Connect the device as described in the section ➔ Indicating and Operating Elements.**

6.4.2 Housing Without Mounts

If you intend to install the device without mounts, you will have to remove the housing lid.

CAUTION

Static electricity can damage electronic components in the device. All persons installing or maintaining the device must be trained in ESD protection.

When removing the housing lid, note that the housing lid may be connected to the case with a cable. Remove the lid carefully to prevent damage - do not pull on it.

Required materials and tools

- Four cylinder head screws: M4 (EU), UNC 8/32 (USA)
- Four dowels (in case of wall mounting)
- Appropriate screwdriver
- Drilling template (enclosed)
- Drilling machine with fitting drill

Assembly

➲ **Drill four holes using the enclosed drilling template.**

➲ **When mounting the device on a wall, insert four dowels.**

➲ **Unscrew the four housing lid screws.**

➲ **Carefully remove the lid.**

➲ **Screw the device onto the assembly surface using the four assembly holes inside the case.**

➲ **Screw the housing lid back onto the device.**

➲ **Connect the device as described in the section ➔ Indicating and Operating Elements.**

6.5 Antenna Installation

ATTENTION

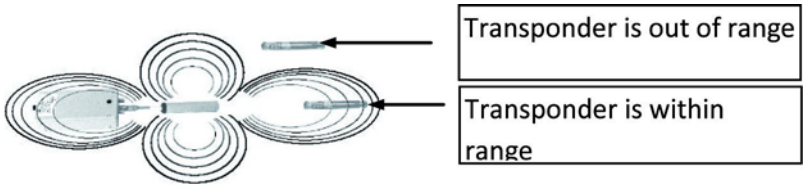
When installing the antenna, consider the required reading and writing ranges. The reader can only be used properly if the transponder is located within the individual reading/writing range of the antenna.

If the transponder is very close to the antenna, the transponder may be detuned by the metal of the antenna and a reading/writing is not possible. We recommend keeping a minimum distance between transponder and antenna of about 10 mm.

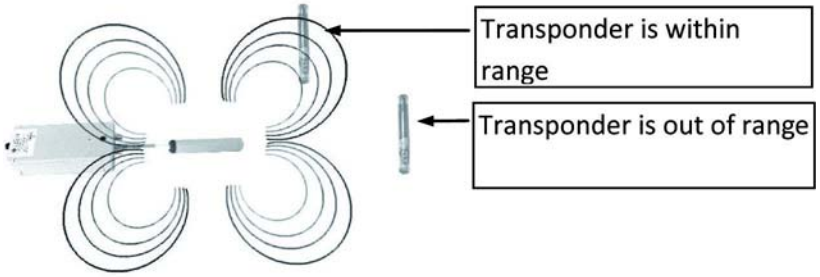
6.5.1 Positioning the Antenna

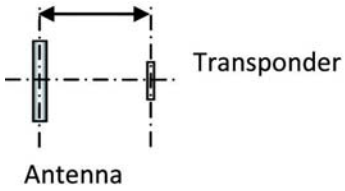
Reliable reading and writing depends on the distance from and orientation of the transponder to the antenna.

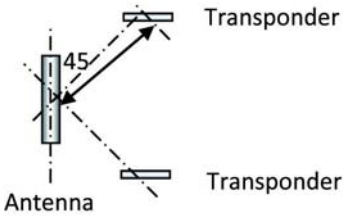
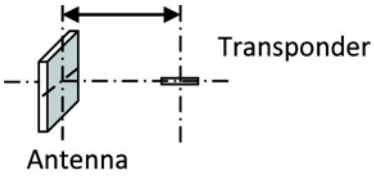
Transponder parallel to the axis of the antenna:



Transponder perpendicular to the axis of the antenna:



Parallel	The illustration shows the optimal position of the transponder if it is positioned parallel to the axis of the antenna.	

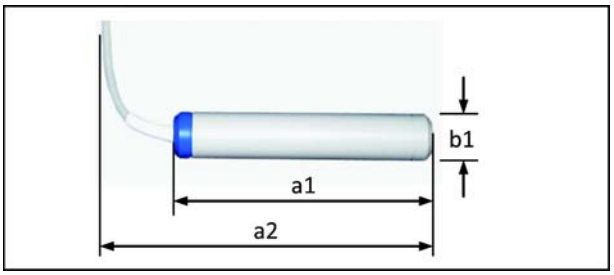
Perpendicular	The illustration shows the optimal position of the transponder if it is perpendicular to the axis of the antenna.	
Perpendicular (frame antenna)	The illustration shows the optimal position of the transponder if it is perpendicular to the axis of a frame antenna.	

6.5.2 Available Antenna Types

Different types of antennas are available on request.

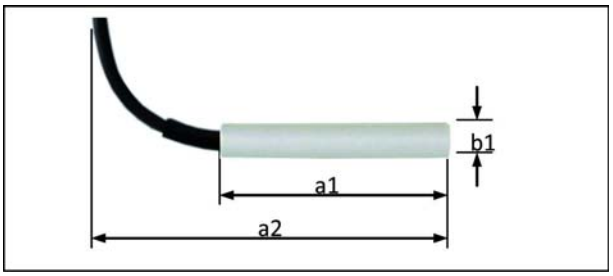
6.5.3 Dimensions for Planning

Rod antenna



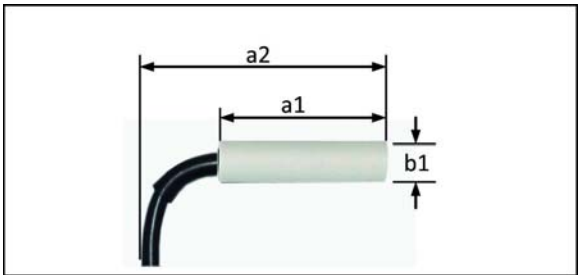
a1	Length of antenna cylinder	125 mm
a2	Complete mounting dimensions (cable with 90° angle)	150 mm
b1	Diameter of antenna cylinder	23.0 mm

Mini antenna



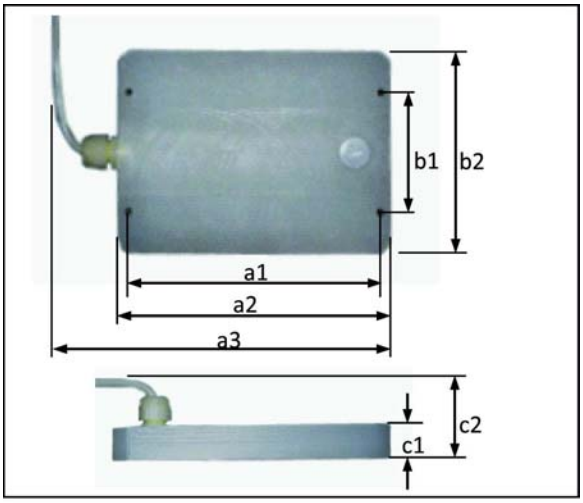
a1	Length of antenna cylinder	68 mm
a2	Complete mounting dimensions (cable with 90° angle)	85 mm
b1	Diameter of antenna cylinder	10.0 mm

Micro antenna



a1	Length of antenna cylinder	40 mm
a2	Complete mounting dimensions (cable with 90° angle)	60 mm
b1	Diameter of antenna cylinder	10.0 mm

Frame antenna



a1	Distance between mounting holes (length)	148 mm
a2	Length of frame antenna	161 mm
a3	Complete mounting dimensions length (cable screwing at the side)	210 mm
b1	Distance between the mounting holes (width)	70 mm
b2	Width of frame antenna	120 mm
c1	Height of frame antenna	19 mm
c2	Complete mounting dimensions height (cable screwing at the top)	70 mm

6.6 Power Supply

DANGER

Risk of death due to dangerous voltage

Risks exist when supplying the device with the incorrect voltage.

Only use cables, plugs and adapters supplied by the manufacturer.

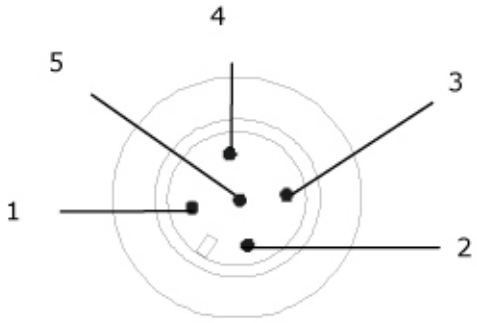
Observe power ratings of the technical data (➔ Technical Data).

The device can be connected to an interior DC power circuit of the equipment or to a DC adapter.

Once the device is connected to the power supply, the power LED lights up.

If the LED does not light up, please refer to chapter ➔ Visit us online: www.brooks.com.

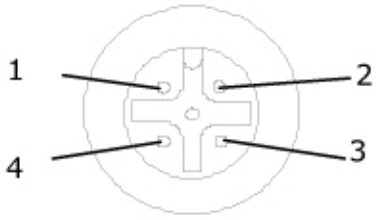
Pin	Signal
1	+24 V
2	0 V
3	NC
4	NC
5	NC



6.7 Terminal Connection

Ethernet interface (M12 d-coded)

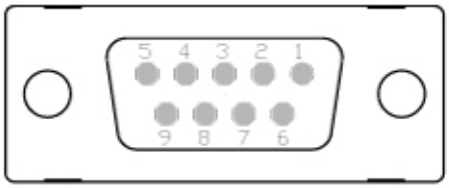
PIN	DB9
1	Tx +
2	Rx +
3	Tx -
4	Rx #



Sub-D female plug (RS232 interface #2)

The serial interface is a Sub-D female plug (9-pin); a serial connection line (switched 1:1) can be used.

PIN	DB9
1	NC
2	TxD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC



Parameters of the serial interface

Baud rate	19,200
Data bits	8
Stopp bit	1
Parity	EVEN (ASCII) NONE (SECS)

6.8 Ethernet Connection

The 10/100 BaseT Ethernet interface has the following default settings:

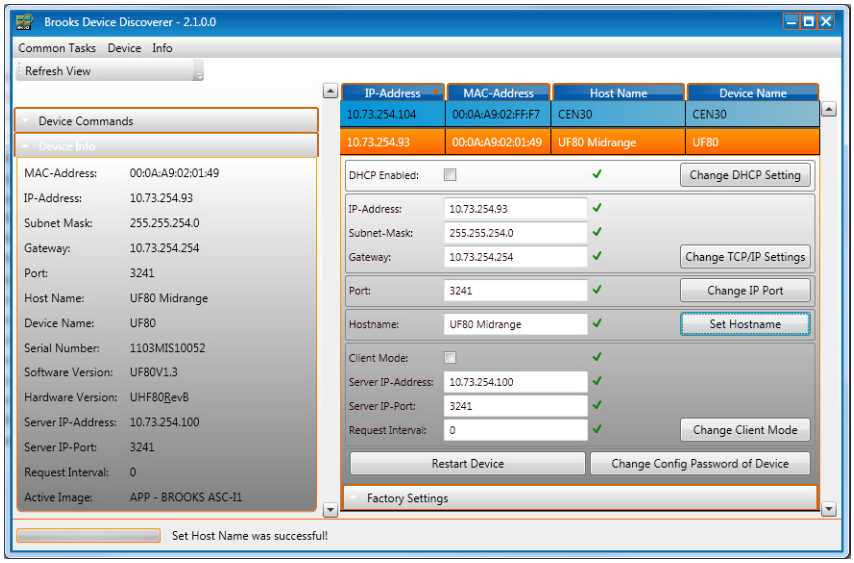
DHCP mode	OFF
IP address	10.73.254.211
Gateway address	10.73.254.254
Subnet mask	255.255.254.0

If DHCP is enabled and the DHCP Server is not available, the device initializes the Ethernet connection with the following values:

IP address	169.254.MAC5.MAC6
Gateway	169.254.MAC5.254
Subnet mask	255.255.255.0
Primary DNS Server IP	0.0.0.0
Secondary DNS Server I	0.0.0.0
(MAC address	MAC1:MAC2:MAC3:MAC4:MAC5:MAC6)

The Brooks Device Discoverer Tool can be used to find a device in the network and to change the network settings easily. After sending a configuration message, the tool requests the device configuration password. Please enter the default password for Brooks RFID devices: **BROOKS**.

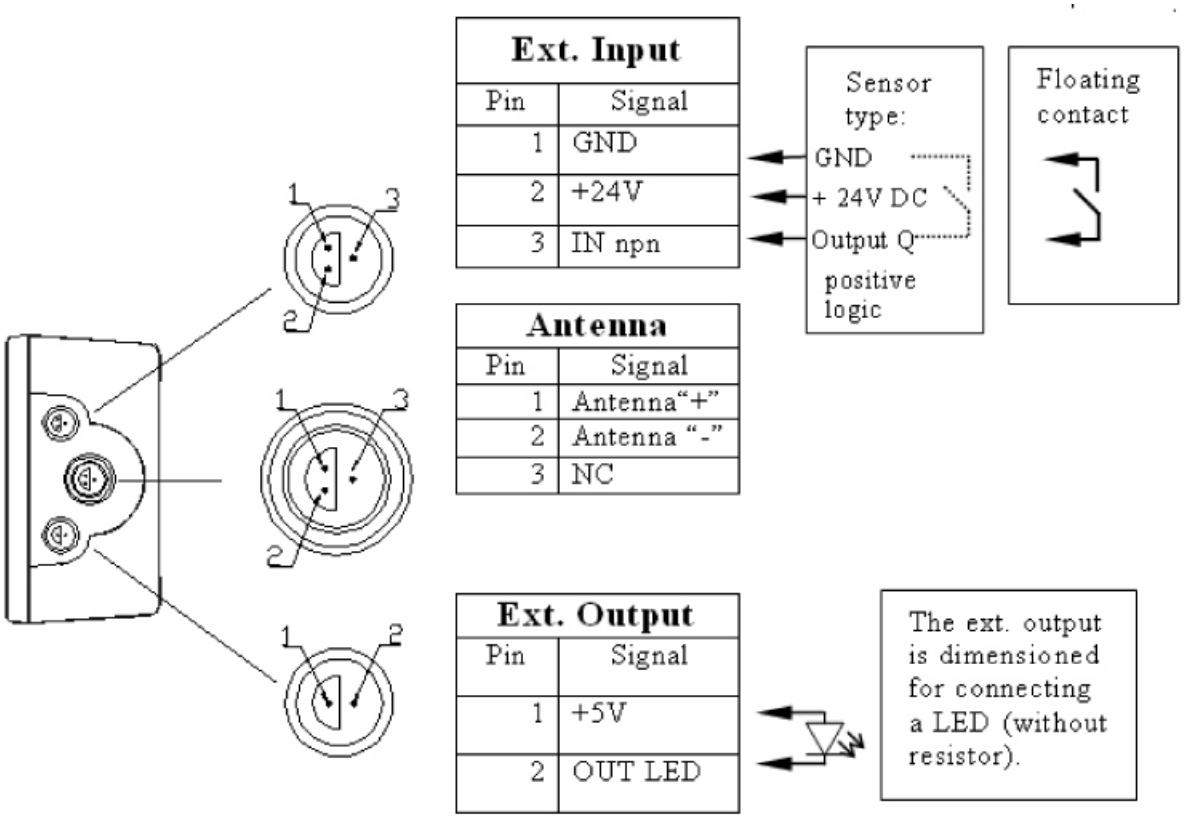
The tool can also be used to perform a firmware update!



ATTENTION

For more information our extensive download area is available to you at www.brooks.com -> Service -> Download.

6.9 External Input and Output



ATTENTION

External input must be a floating contact. The current consumption of the sensor must not exceed 200 mA. The LED output current is approx. 10 mA.

6.10 Commissioning

6.10.1 Required Operating Conditions

To operate the reader, the following requirements must be met:

- **An antenna must be connected correctly to the reader.**
- **The power supply must be connected.**
- **The transponder must be located within the individual reading/writing range of the antenna.**
- **A host must be connected to the reader.**

6.10.2 Tuning

Before the reader can be operated, it must be calibrated so that it can communicate with the transponder.

- **Press the Tuning button (see → Indicating and Operating Elements). The Tuning LED lights up and goes off again. A flashing LED indicates a malfunction (see → Service and Troubleshooting).**

7 Operation

This chapter gives you an overview of the following topics:

- → Operating Personnel
- → Operation of the ASC-I1 Protocol
- → Operation of SECS Protocol

7.1 Operating Personnel

CAUTION

The RFID Reader LF80C ZeniD is designed to be operated by specially trained personnel only. If you have doubts about the required qualifications, contact the manufacturer.

Operating the device without special training can result in damage to the reader and/or connected devices.

7.2 Operation of the ASC-I1 Protocol

7.2.1 Structure of the Communication Protocol

General remarks:

- The communication is done with ASCII packages.
- Each reader represents a RFID reader with an RS232 interface to which an address from 0 to E can be assigned. When the reader is delivered, the address is 0.
- After each command to the reader, a defined response is sent. We recommend waiting for this response before sending a new command.

7.2.2 Package Contents

General remarks:

Each package includes a package header (three characters), a message (two or more characters) and the end of the package (five characters).

Package header	Message	End of package

Package header

The header includes the start character (one character) and the package length (two characters).

Package header		
Start	Length 1	Length 2

Start	Start character (ASCII character ´S´)
Length 1	High byte package length (hexadecimal) ASCII character ´0´..´F´
Length 2	Low byte package length (hexadecimal) ASCII character ´0´..´F´

The message length describes the number of characters of a message.

Message structure

The message includes a command, a target address and a source address as well as information.

Message		
Command	Address	Information

Command	ASCII character (➔ Message items)
Address	Target/source address; ASCII character '0'...'E' for the reader *
Information	Depends on the command (includes none, one or more ASCII characters '0'...'F')

The message length describes the number of characters of a message.

* The reader is preset with 0 when delivered.

End of package

The end of the package includes an end character (one character) and a checksum (four characters).

End of package				
End	Checksum 1	Checksum 2	Checksum 3	Checksum 4

End	End character ASCII character no. 13 (hexadecimal 0D)
Checksum 1	High byte - XOR logic of all data (package header, message and end character); ASCII '0'..'F'
Checksum 2	Low byte - XOR logic of all data (package header, message and end character); ASCII '0'..'F'
Checksum 3	High byte - addition of all data (package header, message and end character); ASCII '0'..'F'
Checksum 4	Low byte - addition of all data (package header, message and end character); ASCII '0'..'F'

ATTENTION

When using the TCP/IP interface option, the checksum is not used (is not transmitted).

7.2.3 Commands of Protocol

Commands

Command	Description
X	→ X - Read data
W	→ W - Write data
R	→ R - Automatic read
G	→ G - Request parameter value
P	→ P - Set parameter
E	→ E - Error message
H	→ H - Heartbeat
V	→ V - Query software version
L	→ L - Lock a page of the transponder
I	→ I - Set tuning of the RF module
J	→ J - Request tuning settings of RF module
A	→ A - Sensor event
N	→ N - Reset

Message items

CMD	1 byte

Command of the message. See table in chapter ➔ Message items

Data	16 bytes

The data are interpreted in HEX format. That means that 2 ASCII characters define one byte tag data in HEX format. The data always contains all 8 bytes of the specified page of the transponder.

Example:

Tag data in ASCII "12345678" (8 bytes)
Tag data in HEX 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38
Data in message "3132333435363738" (16 ASCII characters)

Error ID	1 Byte

For more information on error codes and the corresponding correcting actions please refer to ➔ Error Codes.

Page	2 bytes

Defines the page of the transponder for a read or write action. The two ASCII characters (2 bytes) define the page number of the tag in decimal format.

Example: page 1 → "01"
page 10 → "10"
page 17 → "17"

Parameter No.	1 byte

Number of the parameter. One ASCII character (1 byte) display the parameter number in hex format.

Example: parameter 1 "1"

Parameter value	2 bytes

Value of a parameter. Two ASCII characters (2 bytes) display the value of the parameter in decimal format.

Example: value 45 "45"

Reader ID	1 byte

Address of the device („0“ .. „E)“.

One ASCII character (1 byte) shows the address in HEX format.

Response code	4 bytes

This feature is not used for the single reader. This code is always "0000".

Serial No.	4 bytes

Contains the hexadecimal serial number of the reader. This number has 4 ASCII characters. The serial number is also shown on the label of the reader.

Example: “1234”

The last 5 characters of the complete serial number of the device are interpreted as decimal number. Converted to hexadecimal, this is the 2 byte serial number, which is transmitted as 4 ASCII characters.

Example:
The decimal number „1234“ is „3039“ when converted to hexadecimal format. This number is transmitted as 4 ASCII characters.

X - Read data

Command X starts the reading of a transponder.

If there is no tag in the reading range of the antenna, the reader returns an error message (error 4 - no tag).

Data item "Page" can have the following values.

Value	Description
'01' to '17'	read page#
'98'	read more pages until end character or empty character[1)]
'99'	read entire tag data

[1)] 'E' respectively 'F' in ID Bit 0...3 of the reading ID

Host → Reader		
CMD	**Reader ID**	**Page**
X	1 byte	2 bytes

Reader → Host			
CMD	**Reader ID**	**Page**	**Data**
x	1 byte	2 bytes	16 bytes

If there is no tag in the reading range of the antenna, the reader repeats the reading before an error message is sent out. The number of repeats is defined in ➔ Parameter 4 (0x04).

No acknowledgment is expected from the host.

In case of a read request for more than one page (value 98 or 99), the protocol is repeated. For the end of reading the reader sends an additional package. The message includes the command 'x' and the source address '0'...'E'.

If the reading fails, the reading is repeated in the defined time frame (➔ Parameter 3 (0x03); ➔ Parameter 4 (0x04)). If it fails again, the reader sends an error message 'no tag(4)' to the host.

If the sensor check is activated, the status of a floating contact connected to the external input is checked before a reading process (writing process) is triggered. If it is not connected, the error message "NOTAG" is sent; otherwise the read process is started.

W - Write data

The command W starts the writing to a transponder.

If there is no tag in the writing range of the antenna, the reader returns an error message (error 4 - no tag).

Host → Reader			
CMD	**Reader ID**	**Page**	**Data**
W	1 byte	2 bytes	16 bytes

Reader → Host	
CMD	**Reader ID**
w	1 byte

If 'write tag' fails, writing is repeated in the defined time frame (➔ Parameter 3 (0x03); ➔ Parameter 4 (0x04). If it fails again, the reader sends an error message 'no tag(4)' to the terminal.

If the sensor check is activated, the status of a floating contact connected to the external input is checked before a reading process (writing process) is triggered. If it is not connected, the error message "NOTAG" is sent; otherwise the write process is started.

R - Automatic read

The external input is used to trigger an automatic read action. The R command sends the read data to the host. The host then has to confirm the message.

Depending on the readmode configuration (parameter 1: readmode), the reader reads the following pages:

readmode = page (0)	sequential read for different pages (parameter 2: readpage)
readmode = tag (1)	read a tag until the end character ('E' - end character or 'F' empty) in ID bit 0…3
readmode = whole (2)	read the whole tag (all pages)

Reader → Host			
CMD	**Reader ID**	**Page**	**Data**
R	1 byte	2 bytes	16 bytes

Host → Reader	
CMD	**Reader ID**
r	1 byte

Reading more pages (readmode "tag" or "whole"): protocol is repeated. The end package includes the command 'R' and the source address '0'...'E'

No acknowledgment from the host: information is repeated with the following parameters (➔ Parameter 5 (0x05); ➔ Parameter 6 (0x06))

Reading not possible: repeated read time frame (➔ Parameter 3 (0x03); ➔ Parameter 4 (0x04)).

Reading again not possible: tag sends error message no tag (4) to the host.

The delay time for the presence sensor is configurable (➔ Parameter 0 (0x00)).

An automatic reading is only possible if all messages that have to be confirmed have been confirmed by the previous read, or if the waiting period (➔ Parameter 5 (0x05)) has expired after the last sending (➔ Parameter 6 (0x06)).

If the sensor check is activated, the status of a floating contact connected to the external input is checked before a reading process (writing process) is triggered. If it is not connected, the error message “NOTAG” is sent, otherwise the read-process is started.

G - Request parameter value

The command G is used to request the value of all public parameters of the device.

Host → Reader	
CMD	**Reader ID**
G	1 byte

Reader → Host			
CMD	**Reader ID**	**Parameter No.**	**Parameter value**
g	1 byte	1 byte	2 bytes

The reader sends an individual protocol package for each available public parameter. After the last parameter the reader finally sends an additional package. The message includes the command 'g' and the source address '0'..'E'.

P - Set parameter

Command P can be used to change the value of individual parameters. After successfully changing a parameter, the device sends a confirmation message.

Host → Reader			
CMD	**Reader ID**	**Parameter No.**	**Parameter value**
P	1 byte	1 byte	2 bytes

Reader → Host	
CMD	**Reader ID**
p	1 byte

E - Error message

If an error occurs, the device sends an error message with the corresponding error code to the host.

Reader → Host		
CMD	**Reader ID**	**Error ID**
e	1 byte	1 byte

For more information on error codes and the corresponding correcting actions please refer to ➔ Error Codes.

H - Heartbeat

The command H sends a heartbeat request to the reader. The reader responds with his serial number and a response code.

Host → Reader	
CMD	**Reader ID**
H	1 byte

Reader → Host			
CMD	**Reader ID**	**Serial No.**	**Response code**
h	1 byte	4 bytes	4 bytes

The response code is part of the protocol but is not used for this device. The response code is always '0000'.

Because of compatibility with other systems, the heartbeat is also allowed with the address 'F'.

V - Query software version

The command V is used to request the installed software version of the RFID reader.

Host → Reader	
CMD	**Reader ID**
V	1 byte

Reader → Host		
CMD	**Reader ID**	**Software version**
v	1 byte	16 bytes

The 8 characters of the software version are described by 16 ASCII characters. Each character is described in HEX format represented by 2 ASCII characters (see section ➔ Message Examples).

L - Lock a page of the transponder

An individual page of a multipage transponder can be locked (read only).

Host → Reader		
CMD	**Reader ID**	**Page**
L	1 byte	2 bytes

Reader → Host	
CMD	**Reader ID**
l	1 byte

If the page of the transponder could not be locked, the writing action is repeated automatically (➔ Parameter 3 (0x03) and ➔ Parameter 4 (0x04)).

If the page still could not be locked, an error message NoTag (4) is sent to the host. If the page was already locked, the successful feedback follows just as at the first locking.

If the sensor check is activated, the status of a floating contact connected to the external input is checked before a reading process (writing process) is triggered. If the sensor is not triggered, the error message "NOTAG" is sent; otherwise the lock process is started.

ATTENTION

A locked page cannot be unlocked. This page is locked permanently.

I - Set tuning of the RF module

Depending on the surroundings of the antenna it might be necessary to tune the RF module to get the optimal reading/writing range for this special installation environment. The RF module has 6 capacitors C_0 - C_5 which can be switched ON or OFF.

Each capacitor can be addressed by one bit. This bit is used to activate (1) or disable (2) a capacitor.

The tuning can be set manually (not recommended) or automatic tuning can be performed (recommended).

- 0 - OFF
- 1 - ON

Bit 2^0 corresponds to capacitor C_0.

Host → Reader		
CMD	**Reader ID**	**Tuning**
I	1 byte	2 bytes

Reader → Host	
CMD	**Reader ID**
i	1 byte

Parameter structure from C_0 to C_5:

Hex. value	Bin. value	Meaning
00	0000 0000	no capacitor is set
3F	0011 1111	all 6 capacitors are set
40	0100 0000	starts the automatic tuning

For the calibration of the antenna exclusively the automatic calibration (calibration value 0x04) should be used as in this case the antenna sends and receives optimally, that means with maximal range.

For special cases (for example reading and writing range shall be reduced) it can be necessary that the efficiency of the antenna has to be reduced by connecting or disconnecting single capacitors. But this should be carried out only by qualified staff.

If no reasonable calibration was found, the error "5 - Invalid" is sent instead of the confirmation, and all capacitors are switched ON.

J - Request tuning settings of RF module

Command J requests the current setting of the tuning capacitors. The response message contains the current status of the capacitors in hexadecimal format.

Each capacitor can be addressed by one bit. This bit is used to activate (1) or disable (2) a capacitor.

Host → Reader	
CMD	**Reader ID**
J	1 byte

Reader → Host		
CMD	**Reader ID**	**Tuning**
j	1 byte	2 bytes

Parameter structure from C_0 to C_5:

Hex. value	Bin. value	Meaning
00	0000 0000	no capacitor is set
3F	0011 1111	all capacitors are set

A - Sensor event

If ➔ Parameter 7 (0x07) is activated ('01'), the reader reports the release event of the external sensor. The event message must be confirmed by the host.

Reader → Host	
CMD	**Reader ID**
A	1 byte

Host → Reader	
CMD	**Reader ID**
a	1 byte

If the host does not send an acknowledge message, the message is repeated (➔ Parameter 6 (0x06)) in the defined time frame (➔ Parameter 5 (0x05)).

N - Reset

The command N performs a reset of the reader hardware and software. After the reset the device sends a confirmation message.

Host → Reader	
CMD	**Reader ID**
N	1 byte

Reader → Host	
CMD	**Reader ID**
n	1 byte

If the power to the device has been turned on (hardware reset), the host is informed about it (RS232 interface only).

7.2.4 Parameter

No. (dec.)	No. (hex)	Parameter name
0	0x00	→ Sensor delay
1	0x01	→ Read mode
2	0x02	→ Read page
3	0x03	→ r/w repeat time
4	0x04	→ r/w max repeat
5	0x05	→ RS232 repeat time
6	0x06	→ RS232 max repeat
7	0x07	→ Watch port
F		→ Reader address

Parameter 0 (0x00) **Sensor delay**

Operation delay for the presence sensor.

01 .. 99 (0.1 seconds)

Default: 10 (1s)

Parameter 1 (0x01) **Read mode**

Readmode for automatic read triggered by external input.

00 - read only one page

01 - read until end character or empty character[2)]

02 - read all pages

10 - read only one page with sensor check first[1)]

11 - read until end/empty character with sensor check first[1) 2)]

12 - read all pages with sensor check first[1)]

99 - deactivate sensor

[1)] If the sensor check is activated, the status of a floating contact connected to the external input is checked before a reading process (writing process) is triggered. If it is not connected, the error message "NOTAG" is sent, otherwise the read respectively write process is started.

[2)] 'E' respectively 'F' in ID Bit 0...3 of the reading ID

Default: 00 (read only one page)

Parameter 2 (0x02) **Read page**

Page for readmode "00".

01 .. 17 - Page of multipage transponder

Default: 01 (page 1 of multipage transponder)

Parameter 3 (0x03) **r/w repeat time**

Time between two read or write attempts.

01 .. 99 (0.1 s)

Default: 05 (0.5 s)

Parameter 4 (0x04) **r/w max repeat**

Maximum number of read/write attempts.

01 .. 99

Default: 05

Parameter 5 (0x05) **RS232 repeat time**

In case no confirmation message from the host was received, the device waits this time before sending again the message to be confirmed. The number of repeats is defined in ➔ Parameter 6 (0x06).

01.. 99 (0.1 s)

Default: 45 (4.5 s)

Parameter 6 (0x06) **RS232 max repeat**

If the host does not send the expected confirmation message, the device repeats the message according the value of this parameter. After that, an error message is sent.

00 - never ending
01 .. 99 - number of attempts

Default: 3

Parameter 7 (0x07) **Watch port**

Enables/disables the event message to the host that the floating contact (external input) was opened.

00 - not activated (no event message)
01 - activated

Default: 1

Parameter F **Reader address**

ReaderID or address of the device.

0 .. E

Default: 0

7.2.5 Message Examples

ASCII	HEX	Description
'S'	53	start character
'0'	30	high byte message length
'2'	32	low byte message length
'H'	48	first character message: value
'0'	30	second character message: target address
CR	0D	end character
'2'	32	high byte checksum XOR
'4'	34	low byte checksum XOR
'3'	33	high byte checksum addition
'A'	41	low byte checksum addition

Calculation for the XOR checksum:

53 XOR 30 XOR 32 XOR 48 XOR 30 XOR 0D = 24 → '2' '4'

Calculation for the addition checksum:

53 + 30 + 32 + 48 + 30 + 0D = 13A

Only low significant bytes are used: → 3A → '3' 'A'

X - Read data (read page 1 of multipage transponder)

>> X001

<< x0013232323232323232

Command	X
Reader ID	0
Page	01
Data	'3232323232323232' → ASCII "22222222"

W - Write data (write to page 1 of multipage transponder)
>> W0013132333435363738
<< w0

Command	W
Reader ID	0
Page	01
Data	'3132333435363738' → ASCII "12345678"

R - Automatic reading
<< R0013132333435363738
>> r0

Command	R
Reader ID	0
Page	01
Data	'3132333435363738' → ASCII "12345678"

V - Request software version
>> V0
<< v0524956352E302E30

Command	V
Reader ID	0
Software Version	'524956352E302E30' → ASCII "RIV5.0.0"

7.3 Operation of SECS Protocol

7.3.1 Introduction

The SECS-I standard defines a communication interface that is suitable for exchanging messages between semiconductor processing equipment and a host. A host is a computer or network of computers that exchanges information with the equipment to perform/execute the production.

The standard does not define the data contained within a message. The meaning of messages must be determined through a message contents standard such as SEMI Equipment Communication Standard E5 (SECS-II).

This standard provides the means for independent manufacturers to produce equipment and hosts that can be connected without requiring specific knowledge of each other.

The SECS-I protocol can be seen as a layered protocol used for point-to-point communication. The layers within SECS-I are the physical link, the block transfer protocol and the message protocol.

The standard is not intended to meet the communication needs of all possible applications. For example, the speed of RS232 may be insufficient to meet the needs of transferring mass amounts of data or programs in a

short period, such as may be required for high-speed functional test applications.

In a network, the roles of host and equipment may be assumed by any party of the network. In this situation, one end of the communications link must assume the role of the equipment and the other the role of the host.

Electronic Industries Association Standards:
EIA RS-232-C Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.

7.3.2 SECS-I Implementation

This message set describes the communication between a SECS-I reader and a host. The host and the RFID reader communicate via an RS232 interface (SECS-I).

Character structure

Data is transmitted or received in a serial bit stream of 10 bits per character at one of the specified data rates. The standard character has one start bit (0), 8 data bits and one stop bit (1). All bit transmissions are of the same duration.

SECS-I performs no parity or other verification of the individual bytes.

Block transfer protocol

The gateway uses an interpretation of SECS-I by a serial transport layer. The following are some points to note about this implementation.

Master-Slave

The host connects to the reader. If there is a conflict, the host "gives in" (i.e. receives before sending).

In the course of communication, the reader takes on the role of the master and the host takes on the role of the slave.

Control characters

The four standard handshake codes used in the block transfer protocol are displayed in the table below.

<ENQ>	0x05	Request to send
<EOT>	0x04	Ready to receive
<ACK>	0x06	Correct reception
<NAK>	0x15	Incorrect reception

Message block structure

SECS message blocks have the following form:

	Byte	msb	Description
Length	0	Length without checksum, 10 - 254	
Header	1	R	Upper device ID (Reader ID)
	2		Lower device ID (Gateway ID)
	3	W	Upper message ID (Stream)
	4		Lower message ID (Function)
	5	E	Upper block number
	6		Lower block number
System bytes	7	System byte 1	
	8	System byte 2	
	9	System byte 3	
	10	System byte 4	
Text	11 - 254	Message text, user data	
Checksum	255, 256	16-bit unsigned checksum	

The operation of all communication functions above the block transfer protocol is linked in information contained in a 10-byte data element, called the header.

The header is always the first 10 bytes of every block sent by the block transfer protocol.

The **length** includes all bytes sent after the length byte, excluding the two checksum bytes. The maximum block length allowed by SECS-I is 254 bytes and the minimum is 10 bytes.

The **reverse bit** (R bit) signifies the direction of a message. The R-bit (msb) is set to 0 for messages to the equipment and to 1 for messages to the host.

The **device ID** is a definite number to contact the reader.

The device ID consists of the 8-bit gateway ID (bit 0 - bit 7), which is identical with the last two characters of the reader's serial number, and a 5-bit fixed reader number
(bit 8 - bit 14 = 0x01).

Of course, the ID can be changed within the valid scope.

Upper device ID	R-bit	0	0	0	0	0	0	1
Lower device ID	Last two digits of the serial number							

Direction reader to host 0x81xx *
Direction Host to equipment (reader) 0x01xx *

* The serial number is located on a label on the reader.

The **W** bit indicates that the sender of a primary message expects a reply. A value of 1 in the W bit means that a reply is expected.

The **message ID** identifies the format and content of the message being sent.

A primary message is defined as any odd-numbered message.
A secondary message is defined as any even-numbered message.

The **end bit** determines whether a block is the last block of the message. A value of 1 means that the block is the last block.

A message sent as more than one block is called a **multi-block message**. A block number of 1 is given to the first block, and the block number is incremented by one for each subsequent block until the entire message is sent.

As all messages can be sent in one block, the block number always has the value 1.

The **system bytes** in the header of each message for a given device ID must meet the following requirements:

- The system bytes of a primary message must be distinct from the bytes of all currently open transactions initiated from the same end of the communications link.
- The system bytes of the reply message are required to be the same as the system bytes of the corresponding primary message.

The system bytes are incremented for each primary message.

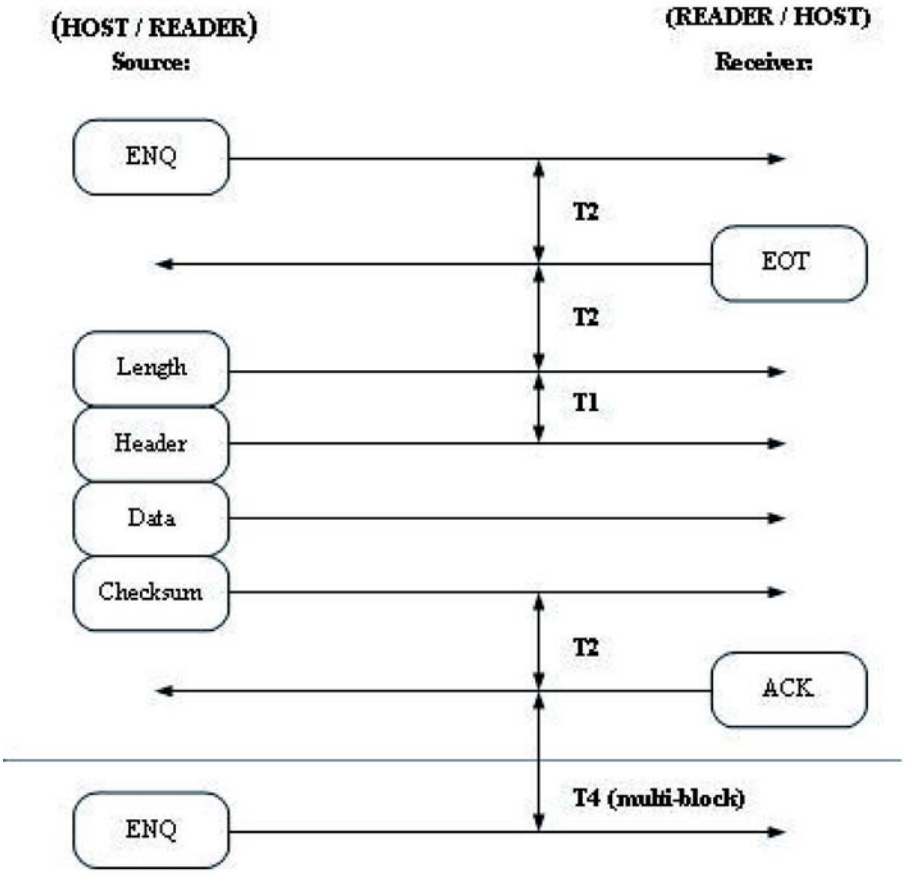
The **checksum** is calculated as the numeric sum of the unsigned binary values of all the bytes, after the length byte and before the checksum and in a single block.

Block transfer protocol

The drawing below illustrates some simple message interactions between the host and the equipment. The figure shows the possible handshake sequence to acquire the status of the equipment.

When the host wants to send, it first sends an **<ENQ>** and then tries to read.

If it receives an **<EOT>**, it sends its message and then expects an **<ACK>**.



If it receives an **<ENQ>**, it puts off sending its message, sends an **<EOT>** and then reads the other message.

When both the host and the equipment try to send at the same time, the host must cancel its inquiry because the host is working in slave mode. It must first receive the equipment message because the reader is the master. Only then can the host send its message.

For more detailed information about all possible cases, see SEMI E4.

(SEMI Equipment Communication Standard 1 Message Transfer SECS-I)

7.3.3 HSMS Option

The hardware version with an Ethernet interface uses the HSMS protocol. It works as a HSMS server. That means that it waits for a connection inquiry of any HOST PC.

TCP/IP: IP address xxx.xxx.xxx.xxx Port 3241

If a connection inquiry of any HOST takes place, the reader initializes the HSMS connection, and the SECS-II messages defined in the message set are forwarded from the reader to the respective HOST and vice versa.

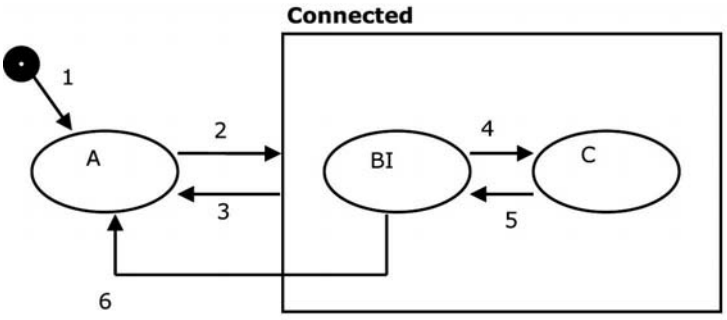
It is possible to operate all readers connected to the network via one or several HOST PCs.

But one HSMS reader can only be connected to one HOST at a time.

Use the Brooks Device Discoverer to change the TCP/IP settings.

7.3.4 HSMS Implementation

HSMS defines the procedure for all message exchanges between entities across the TCP/IP. The HSMS Connection Status Diagram - The HSMS status machine is illustrated in the diagram below. The behavior described in this diagram defines the basic requirements of HSMS:



A - NOT CONNECTED

The entity is ready to listen for or to initiate TCP/IP connections, but either has not yet established any connections or all previously established TCP/IP connections have been terminated.

CONNECTED

A TCP/IP connection has been established. This status has two sub-statuses, NOT SELECTED and SELECTED.

B - NOT SELECTED

A sub-status of CONNECTED in which no HSMS session has been established or any previously established HSMS sessions have ended.

C - SELECTED

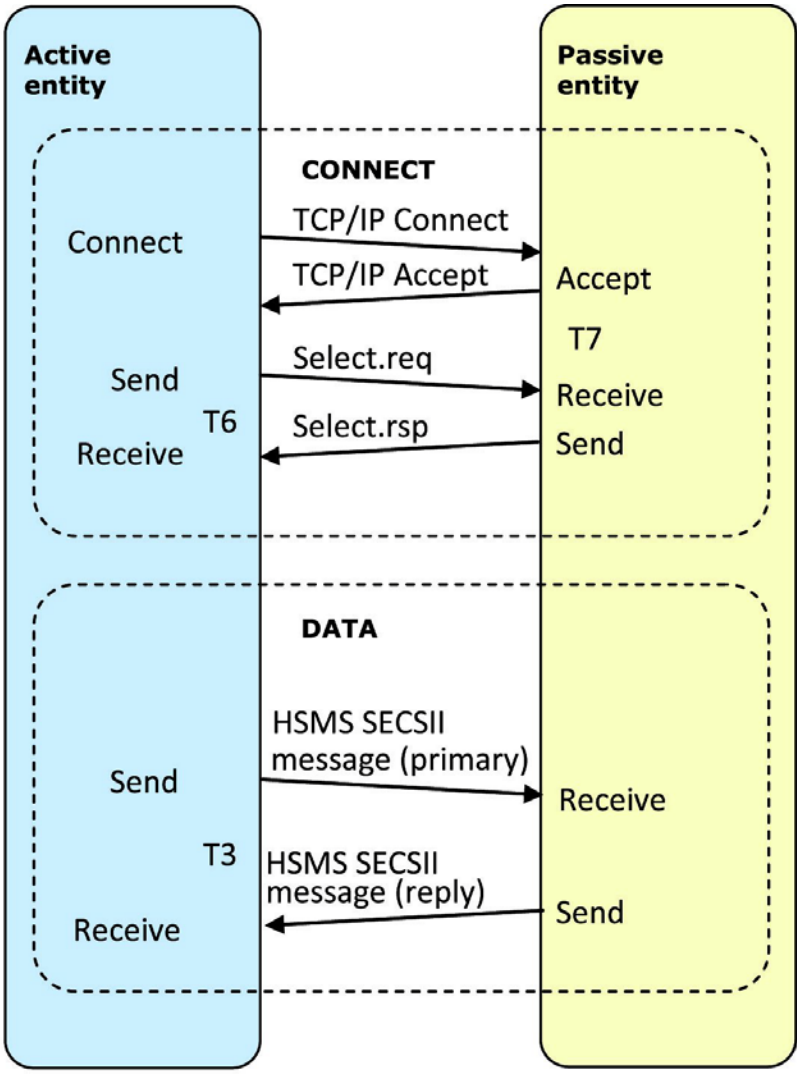
A sub-status of CONNECTED in which at least one HSMS session has been established. This is the normal "operating" status of HSMS: data messages may be exchanged in this status.

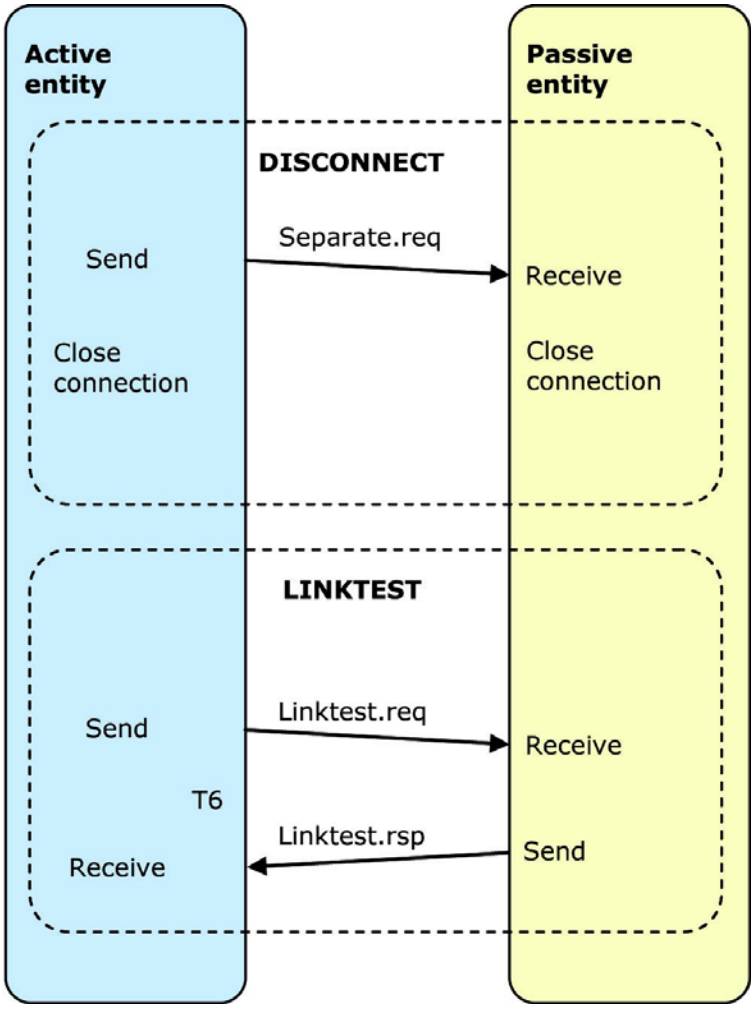
#	Current status	Trigger	New status	Comment
1	...	Local entity-specific preparation for TCP/IP communication	Not connected	Action depends on connection procedure to be used: active or passive.
2	Not connected	A TCP/IP connection is established for HSMS communication.	Connected - Not selected	None
3	Connected	Breaking of TCP connection	Not connected	HSMS only permits termination of the connection when the connection is in the Not selected sub-status.
4	Not selected	Successful completion of HSMS Select procedure.	Selected	HSMS communication is now fully established: data message exchange is permitted.
5	Selected	Successful completion of HSMS Deselect or Separate.	Not selected	This transition normally indicates the end of HSMS communication; an entity would immediately proceed to break the TCP/IP connection.
6	Not selected	T7 connection timeout	Not connected	There is a time limit on how long an entity is required to remain in the Not selected status before either entering in Selected status or returning to Not connected status.

The specification of a required TCP Application Program Interface (API) for use in implementations is outside the scope of HSMS. An HSMS implementation may use any TCP/IP API sockets, TLI (Transport Layer Interface), etc.

HSMS message exchange procedures

HSMS defines the procedures for all message exchanges between entities across the TCP/IP connection established according to the procedures in the previous section. As explained in the overview, once the connection is established, the two entities establish HSMS communications with the Select procedure. The data messages may be exchanged in any direction at any time. When the entities wish to end HSMS communication, the Deselect or Separate procedure is used to terminate the HSMS communication.





HSMS message format

This section defines the detailed format of the messages used by the procedures in the previous section. An HSMS message is transmitted as a single continuous stream of bytes in the following order:

Number of bytes	Description
4 bytes	Message length. MSB first. Specifies the number of bytes in the message header plus the message text.
10 bytes	Message header
0 - n bytes	Message text. Format is further specified by P-type field of message header. The message text corresponds to message data by SECS-II encoding.

The minimum possible message length is 10 (header only).
The maximum possible message length depends on SECS-I.

HSMS message header

The message header is a 10-byte field. The bytes in the header are numbered from byte 0 (first byte transmitted) to byte 9. The format of the message header is as follows:

Bytes	Description
0-1	Session ID (Device ID)
2	Header byte 2
3	Header byte 3
4	P-type
5	S-type
6-9	System bytes

The physical byte order is designed to correspond as closely as possible to the SECS-I header.

The session ID is a 16-bit unsigned integer value, which occupies bytes 0 and 1 of the header (byte 0 is MSB). Its purpose is to provide an association by reference between control messages and subsequent messages.

Header byte 2 is used in different ways for different HSMS messages. For control messages, it contains 0 or a status code. For a data message, it contains the W bit and SECS stream.

Header byte 3 contains 0 or a status code for control messages. For data messages, it contains the SECS function.

P-type is an 8-bit unsigned integer value which occupies byte 4 of the message header; message header and message text are encoded. Only P-type = 0 is defined by HSMS to mean SECS-II message encoding. For non-zero P-type values, see SEMI E37.

Value	Description
0	SECS-II Encoding
1 - 127	Reserved for subsidiary standards
128 - 255	Reserved, not used

S-type (session type) is a 1-byte unsigned integer value which occupies header byte 5.

Value	Description	Value	Description
0	Data message	6	Linktest.rsp
1	Select.req	7	Reject.req
2	Select.rsp	8	Not used
3	Deselect.req	9	Separate.req
4	Deselect.req	10	Not used
5	Linktest.req	11-255	Reserved, not used

The system bytes are used to uniquely identify a transaction among the set of open transactions. The system bytes are also defined as SECS-I-specific.

HSMS message format summary

Message header							
Message type	bytes 0 - 1 Session ID	byte 2	byte 3	byte 4 P-type	byte 5 S-type	bytes 6 - 9 System bytes	Message text
Data message	* (no R bit)	W bit and SECS stream	SECS Function	0	0	Primary: Unique Reply: Same as primary	Text
Select req	*	0	0	0	1	Unique	None
Select.rsp	Same as.req	0	Select status	0	2	Same as.req	None
Deselect.req	*	0	0	0	3	Unique	None
Deselect.rsp	Same as.req	0	Deselect Status	0	4	Same as.req	None
Linktest.req	0xFFFF	0	0	0	5	Unique	None
Linktest.rsp	0xFFFF	0	0	0	6	Same as.req	None
Reject.req	Same as message being rejected	P-type or S-type of message being rejected	Reason code	0	7	Same as message being rejected	None
Separate.req	*	0	0	0	9	Unique	None

* Indicates further specification by subsidiary standards

7.3.5 SECS-II Implementation

Introduction

The SEMI Equipment Communication Standard Part 2 (SECS-II) defines how messages exchanged between intelligent equipment and a host are interpreted.

It is the intent of this standard to be fully compatible with SEMI Equipment Communication Standard E4 (SECS-I).
The messages defined in this specification support the typical activities required for the BROOKS RFID reader.

SECS-II gives form and meaning to messages exchanged between the equipment and the host using a message transfer protocol, such as SECS-I. SECS-II defines the method of conveying information between the equipment and the host in the form of messages.

These messages are organized into categories of activities, called streams, which contain specific messages, called functions. In SECS-II, messages are identified by a stream code (0-127, 7 bits) and a function code (0-255, 8 bits). Each combination of stream and function represents a unique message identification.

SECS-II defines the structure of messages into entities called items and lists of items. These data structures define the logical divisions of the message as distinct from the physical division of the message transfer protocol.

An item is an information packet that has a length and format defined by the first 2, 3 or 4 bytes of the item. These bytes are called the item header. The item header consists of the format byte and the length byte as shown below.

Byte	Name	Description
0	Format and number of the length bytes	The data format is coded in the upper 6 bits. The two less significant bits determine the number of the following length bytes.
1 1-2 1-3	Length bytes	The length corresponds to the number of the bytes of a data element. In the "List" format, the length corresponds to the number of the list elements. The standard does not require the minimum possible number of length bytes for a given data length.
Next <Length>	Data	Data bytes of a data element or number of the data elements in case of the "List" format.

A list is an ordered set of elements, whereby an element can be either an item or a list. The list header has the same form as an item header with format type 0. However, the length byte refers to the number of elements in the list rather than to the number of bytes.

Data items

The formats represent arrays of types: <type>[number of elements], whereby <type> is one of the following:

Oct-code	Hex-code	Format	Meaning	Example
00	01	List	List element with the number of the "Length" data elements	**<L2> <A "Hello"> <B 0x00>**
11	25	Boolean	1-byte Boolean false = 00 true = 01	**<Boolean1 0x00>**
10	21	Binary	Byte sequence of the length "Length"	**<B1 0x01>**
20	41	ASCII	Printable ASCII characters	**<A "Hello">**
31	65	I1	1-byte signed integer	**<I1 123>**
32	69	I2	2-byte signed integer	**<I2 -12345>**
34	71	I4	4-byte signed integer	**<I4 2147483647>**
30	61	I8	8-byte signed integer	**<I8 931372980293834>**
51	A5	U1	1-byte unsigned integer	**<U1 0>**
52	A9	U2	2-byte unsigned integer	**<U2 #empty>**
54	B1	U4	4-byte unsigned integer	**<U4 429489725>**
50	A1	U8	8-byte unsigned integer	**<U8 763468676756767>**
40	91	F8	8-byte floating point	**<F8 1.223 e204>**
44	81	F4	4-byte floating point	**<F4 -1.23 >**

Data item examples

Meaning	Format	Length						
1-byte integer	65	01	xx					
4-byte integer	71	04	MSB	...	...	LSB		
ASCII	41	06	1st chr	2nd chr	3rd chr	4th chr	5th chr	6th chr
Zero-length	xx	00						
List data item	01	03	1st element		2nd element		3rd element	

Message set

The SECS-II message set used by the LDN reader consists of six different stream types.

Stream 1: (Equipment status)

S1F1	and	S1F2	Are you there request
S1F15	and	S1F16	Request offline
S1F17	and	S1F18	Request online

Stream 2: (Equipment control)

S2F13	and	S2F14	Request parameter
S2F15	and	S2F16	Set parameter
S2F19	and	S2F20	Reset send

Stream 3: (Material status)

S3F5	and	S3F6	Cassette found send
S3F7	and	S3F8	Cassette lost send
S3F11	and	S3F12	Read MID at I/O port
S3F13	and	S3F14	Return read MID
S3F65	and	S3F66	Write MID at I/O port
S3F67	and	S3F68	Return write success
S3F73	and	S3F74	Lock MID at I/O port
S3F75	and	S3F76	Return lock success

Stream 5: (Exception handling)

S5F1	and	S5F2	Alarm report send

Stream 9: (System errors)

S9F1	Unrecognized device ID
S9F3	Unrecognized stream type
S9F5	Unrecognized function type
S9F7	Illegal data
S9F9	Transaction timer timeout

For more information on error codes and the corresponding correcting actions please refer to ➔ Error Codes.

According to SEMI E99 carrier ID read / writer functional standard for SECS-I and SECS-II protocol, the RFID Reader LF80C ZeniD supports these defined stream 18 messages:

Stream 18: (Equipment status)

S18F1	and	S18F2	Read attribute request
S18F3	and	S18F4	Write attribute request
S18F5	and	S18F6	Read request
S18F7	and	S18F8	Write request
S18F9	and	S18F10	Read ID request
S18F11	and	S18F12	Write ID request
S18F13	and	S18F14	Subsystem command request

Data item dictionary

This section defines the data items used in the standard SECS-II messages described in ➔ Message Details.

Syntax:

Name	A unique name for this data item. This name is used in the message definitions.
Format	The permitted item format code which can be used for this standard data item. Item format codes are shown in hex and octal, as described in the chapter ➔ Data items. The notification "3()" indicates any of the signed integer formats (30, 31, 32, 34).
Description	A description of the data item, with the meanings of specific values.
Where used	The standard messages in which the data item appears.

ACKC3 **Format: B[1]**

Acknowledge code

0	:	Sensor 0 was the initiator
>0	:	Error, not accepted

Where used S3F6, S3F8

ACKC5 **Format: B[1]**

Acknowledge code

0	:	No error
>0	:	Error, not accepted

Where used S5F2

ALARM STATUS	Format: A[1]

Description The value of the alarm status refers to the last reading process. If a read or write error occurs, the alarm status is set.

A successful read or write resets the alarm status. When leaving maintenance mode, the alarm status is also deleted.

0 ... No alarm
1 ... Alarm

Where used S18F13

ALCD	Format: B[1]

Alarm code byte

Only the occurrence of an error is reported. Errors are not generally reset.

bit 8 = 1 Alarm is set

Where used S5F1

ALID	Format: B[1]

Alarm identifier

0 No error
1 Auto read failed, the reader is engaged
2 External read failed, the reader is engaged
3 External write failed, the reader is engaged
4 No tag could be recognized when the sensor was covered or the carrier had been removed prematurely (sensor uncovered)
5 Invalid command or parameter detected
6 Unknown error
7 Reserved
8 Parity error or checksum error detected
9 Unexpected confirmation was sent
10 Locked page could not be written
11 Reserved
12 Incorrect type of transponder
13 External read or write failed because the sensor is not covered

14 Reserved
15 Reserved
16 Reserved

Where used S5F1

For more information on error codes and the corresponding correcting actions please refer to ➔ Error Codes.

ALTX	Format: A[max40]

Alarm text

The length of the alarm text is 0 to 40 characters.
According to the reader version, status information about the sensor or sensors is also transmitted during a reader error message.

The information should be interpreted as follows:

ALTX[0] Initiator of an error message
"0": Sensor 0
"1": Sensor 1 (not available)
"F": Cannot be assigned

ALTX[1] Status of sensor 0
"0": Sensor not occupied
"1": Sensor is occupied
"E": Sensor status is not available
"F": Sensor not defined

ALTX[2] Status of sensor 1
"0": Sensor not occupied
"1": Sensor is occupied
"E": Sensor state is not available
"F": Sensor not defined

ALTX[3] ':' a colon separates the alarm text from the sensor statuses

Where used S5F1

ATTRID	Format: A[max25]

Description: Identifier for an attribute for a specific type of object.

CIDRW attribute definitions:

"Configuration"…	Number of heads
"AlarmStatus"	Current CIDRW sub-status of ALARM STATUS
"OperationalStatus"	Current CIDRW sub-status of OPERATING STATUS
"SoftwareRevisionLevel"	Revision (version) of software - 8-byte maximum
"CarrierIDOffset"	Offset of CID in CID field (MID area)
"CarrierIDLength"	Length of CID in CID field (MID area)

"ECID_00" → parameter 0 - → Gateway ID
"ECID_01" → parameter 1 - → Baudrate
"ECID_02" → parameter 2 - → Inter-character timeout T1
"ECID_03" → parameter 3 - → Block protocol timeout T2
"ECID_04" → parameter 4 - → Reply timeout T3
"ECID_05" → parameter 5 - → Inter-block timeout T4
"ECID_06" → parameter 6 - → Retry limit RTY
"ECID_07" → parameter 7 - → TARGETID high byte
"ECID_08" → parameter 8 - → TARGETID low byte
"ECID_09" → parameter 9 - → Heartbeat time[1)]
"ECID_11" → parameter 11 -→ ReaderID
"ECID_12" → parameter 12 - → HeadID
"ECID_20" → parameter 20 - → Sensor delay for presence sensor
"ECID_22" → parameter 22 - → Sensor-triggered action for presence sensor
"ECID_23" → parameter 23 - → Triggered read frequency
"ECID_24" → parameter 24 - → r/w max repeat
"ECID_25" → parameter 25 - → Transponder type
"ECID_26" → parameter 26 - → Sensor activity
"ECID_27" → parameter 27 - → Watchport for presence sensorr
"ECID_28" → parameter 28 - → Transmitter level (read mode)
"ECID_29" → parameter 29 - → Transponder load duration (read mode)
"ECID_30" → parameter 30 - → r/w synchronize
"ECID_31" → parameter 31 - → Auto-adjust value (read mode)
"ECID_32" → parameter 32 - → Auto-adjust value (write mode)
"ECID_33" → parameter 33 - → Automatic antenna adjustment
"ECID_34" → parameter 34 - → Sensor type for presence sensor
"ECID_35" → parameter 35 - → Special features
"ECID_36" → parameter 36 - → Lock membrane keyboard
"ECID_37" → parameter 37 - → MID area
"ECID_38" → parameter 38 - → Test after software reset
"ECID_39" → parameter 39 - → Transmitter level (write mode)
"ECID_40" → parameter 40 - → Transponder load duration (write mode)

"ECID_41" → parameter 41 - ➔ Delay time between read cycles
"ECID_42" → parameter 42 - ➔ CarrierIDOffset
"ECID_43" → parameter 43 - ➔ CarrierIDLength
"ECID_44" → parameter 44 - ➔ FixedMID
"ECID_45" → parameter 45 - ➔ MIDFormat
"ECID_99" → parameter 99 - ➔ Customer code

Head attribute definitions: *

"HeadStatus"	The current status
"HeadID"	Head number 00-31 (2 digits)

* With regard to an RFID Reader LF80C ZeniD, the head attribute definition "HeadStatus" is equal to the "OperationalStatus" of the CIDRW. The "HeadID" is also 01 and equal to the CIDRW "Configuration" attribute.

Where used S18F1, S18F3

ATTRVAL	Format: A[max4]

Description: Value of the specified attribute.

CIDRW attribute definitions:

"Configuration"	Number of heads "01"
"AlarmStatus"	Current CIDRW sub-status of ALARM STATUS "0" …NO "1" …ALARMS
"OperationalStatus"	Current CIDRW sub-status of OPERATING "IDLE" … Reader in IDLE mode "BUSY" … Reader is busy "MANT" … Maintenance mode
"SoftwareRevisionLevel"	Revision (version) of Software - 8-byte maximum

ECID_00 to ECID_45 see data item ECV parameters 0 - 45

Head attribute definitions:

"HeadStatus"	The current status "IDLE" ... Reader in IDLE mode "BUSY" ... Reader is busy "NOOP" ... Not operating
"HeadID"	Head number 00-31 (2 digits) "00" ... Reader 0 "31" ... Reader 31
Where used	S18F2, S18F3

CPVAL	Format: A[]

Description	Status request value
"OP" ...	Operating status
"MT" ...	Maintenance status
Where used	S18F13

DATA	Format: A[]

Description	A vector or string of unformatted data.
Multipage transponder	DATA area depends on the MID area, can be page 1 - page 17
Read/write transponder	DATA correspond to 8 byte MID
Read/only transponder	DATA correspond to 8 byte MID
Where used	S18F6, S18F7

DATALENGTH	Format: U2

Description Total bytes to be sent.

The DATALENGTH corresponds to the quantity of bytes that are to be read or written.

The valid range depends on the length of the MID area (➔ Parameter 37 (0x25)).

Where used S18F5, S18F7

DATASEG	Format:A[2]

Description Used to identify the data requested.

The DATASEG corresponds to the page number (PAGEID) of multipage, read/only and read/write transponders.

"00" First page of any type of transponder or first page of DATA
area in case of a multipage transponder.

Multipage-transponder (page 1 to page 17):

Start the reading or writing on the following page of a multipage transponder:

"01"	page 1	"81"	Locked page 1
...		...	
"11"	page 17	"91"	Locked page 17

Read/only transponder	"F0"	Read only the one page
Read/write transponder	"F1"	Read or write only the one page

Where used S18F5, S18F7

EAC	Format: B[1]

Acknowledge code for new reader constant
0 ... Parameter was set successfully
1 ... Parameter could not be set

Where used S2F16

ECID	Format: U1

Parameter number of reader (see data item ECV)

Where used S2F13, S2F15

ECV	Format: U1

Reader parameter definition.
The values are displayed as decimal values, see ➔ Parameters.

LEDNR	Format: A[]

3 ...	external LED
4 ...	OK
5 ...	Error
6 ...	Antenna
7 ...	Output
12 ...	Read
13 ...	Write
14 ...	Tuning

Where used S18F13

LEDSTATE	Format: A[]

Description	Status request value
"On"	Reader is on
"Off"	Reader is off
"Flash"	LED flashes

Where used S18F13

MDLN	Format: A[6]

Equipment model number.

Where used S1F2

MF	Format: B[1]

Material format code.

20: The material port number corresponds to the sensor number and status

Where used S3F5, S3F7

MHEAD	Format: B[10]

SECS message block header associated with message block in error.

Where used S9F1, S9F3, S9F5, S9F7, S9F9

MID	Format: A
Description	Material ID Depending on the type of transponder, it is possible to modify the length of the MID.
Multipage transponder	MID can be set from "0" (no MID) to "10" (MID occupies the first 10 pages (writeable))
Read/write transponder	MID corresponds to DATA (writeable)
Read/only transponder	MID corresponds to DATA (fix)
Where used	S18F10, S18F11

MIDAC **Format: B[1]**

Material ID acknowledge code

0 Material ID acknowledged; the presence sensor was the initiator

1 Not defined

2 Material ID acknowledged - reaction on externally triggered action; the message cannot be related to any sensor

>2 Material ID not acknowledged

The data item port number PTN indicates the initiator.

Where used S3F14, S3F68

MIDRA **Format: B[1]**

Material ID acknowledge code

2 Acknowledge, will send MID later in S3F13

Where used S3F12

OFLACK **Format: B[1]**

Acknowledge code for OFF-LINE request.

0 OFF-LINE acknowledge (reader is offline)

Where used S1F16

ONLACK	Format: B[1]

Acknowledge code for ON-LINE request.

0 ON-LINE accepted (reader is online)

Where used S1F18

PAGE_ID	Format: B[1]

Page number of multipage, read/only and read/write transponders

0x00 : First page of the data area of a multipage transponder.

Multipage transponder (pages 1 to 17):
If only one page of the multipage transponder is read, note the following:

0x01	: (1)	page 1	0x81	: (129)	locked page 1
...			...		
0x11	: (17)	page 17	0x91	: (146)	locked page 17

Read-only transponder:
0xF0 : (240) Read one page only

Read/write transponder:
0xF1 : (241) Read or write one page only

Where used S3F11

PAGEDATA	Format: B[9]

The transponder data that has been read or will be written. The PAGEDATA corresponds to the value of a transponder page.

PAGEDATA [0] Corresponds to the page number. The value of the page number is displayed in the data item "PAGE_ID".

PAGEDATA [1] The 8 bytes (one page) of the transponder ID follow.

PAGEDATA [8]

Where used S3F7, S3F12, S3F13, S3F65

PM Information	Format: A[2]

Description Preventive maintenance information

"NE" … Normal execution
"MR" … Maintenance required

Where used S18F2, S18F4, S18F8, S18F10, S18F12, S18F14

PTN	Format: B[1]

Information about the status of up to two sensors and the initiator of the message.
The second sensor is not implemented yet.
For special applications, the reading process of the RFID reader is triggered by two sensors. In this case it is necessary to distinguish between the two sensors. The initiator represents the number of the sensor that has caused the message.

Default: Only sensor 0 is defined.

Initiator	Sensor 1	Sensor 0
Bit 7	...	bit 0

Sensor 0: *bit 0 - bit 2*
The current status of sensor 0 is described in three bits.
0 Sensor not occupied
1 Sensor occupied
7 Sensor not defined

Sensor 1: *bit 3 - bit 5 (defined for future developments)*
The current status of sensor 1 is described in three bits.
0 Sensor not occupied
1 Sensor occupied
7 Sensor not defined

Initiator: *bit 6 - bit 7*
The initiator represents the number of the sensor that has caused the message.
0 Sensor 0
1 Sensor 1 (not implemented yet)
3 Cannot be assigned

Where used S3F5, S3F7, S3F12, S3F13, S3F67

RAC	Format: B[1]

Reset acknowledge code

0	…	Reset could be done
1	…	Reset could not be done

Where used S2F20

RIC	Format: B[1]

Reset code

1	…	Power-up reset
2	…	Software reset

Where used S2F19

SHEAD	Format: B[10]

Stored SECS message block header. Only the last message is stored, which must still be confirmed by the host.

Where used S9F9

SOFTREV	Format: A[max 6]

Software version.

Where used S1F2

SSACK	Format: A[2]

Description: Result information on the status of the request concerning the service request.

"NO" Normal operation
Indicates the success of the requested action.

"EE" Execute error
Cannot read tag data. Cannot read ID sequence.
However, equipment is normal.

"CE" Communication error
Syntax error of message or message format or value.

"HE" Hardware error
ID reader/writer head fault, ID reader/writer head is powered off.

"TE" Tag error

Where used S18F2, S18F4, S18F6, S18F8, S18F10, S18F12, S18F14

SSCMD	Format: A[max 18]

Description: Indicates an action to be performed by the subsystem.
Used to differentiate between the different subsystem commands indicated.

"ChangeStatus"	…	Change status
"GetStatus"	…	Get status
"Reset"	…	Reset CIDRW
"PerformDiagnostics"	…	Perform diagnostics
"DefaultParams"	…	Reset default parameter*
"FactorySettingParams"	…	Reset factory settings and default parameter
"ADJUST"	…	Automatic antenna calibration (parameter 33)
"SetLED"	…	Set LED*

Where used S18F13

STATUS	Format: A[2]

Description — Provides status information of a subsystem component.

Consists of PM Information and the current values of the CIDRW attributes AlarmStatus, OperatingStatus, and HeadStatus.

List of a Status

L,4
<PMInformation>
<AlarmStatus>
<OperatingStatus>
<HeadStatus>

For data items OperatingStatus and HeadStatus, see data item ATTRVAL.

Where used — S18F2, S18F4, S18F8, S18F10, S18F12, S18F14

TARGETID	Format: A[max 4]

Description — Identifies where a request for action or data is to be applied. Alternatively, you can use the HeadID.

See also reader parameter definitions (data item ECV) parameter 7, 8 and 12.

The 4 ASCII character TARGETID is changeable (only changeable for LF80C devices), and defined in parameter 7

and 8 ("ECID_07", "ECICD_08").
The 2 ASCII character HeadID is changeable, and defined in parameter 12 ('ECID_12').

Where used — S18F1, S18F3, S18F5, S18F7, S18F9, S18F11, S18F13

7.3.6 Parameters

No. (dec)	No. (hex)	Parameter name
0	0x00	→ Gateway ID
1	0x01	→ Baudrate
2	0x02	→ Inter-character timeout T1
3	0x03	→ Block protocol timeout T2
4	0x04	→ Reply timeout T3
5	0x05	→ Inter-block timeout T4
6	0x06	→ Retry limit RTY
7	0x07	→ TARGETID high byte
8	0x08	→ TARGETID low byte
9	0x09	→ Heartbeat time
11	0x0B	→ ReaderID
12	0x0C	→ HeadID
20	0x14	→ Sensor delay for presence sensor
22	0x16	→ Sensor-triggered action for presence sensor
23	0x17	→ Triggered read frequency
24	0x18	→ r/w max repeat
25	0x19	→ Transponder type
26	0x1A	→ Sensor activity
27	0x1B	→ Watchport for presence sensor
28	0x1C	→ Transmitter level (read mode)
29	0x1D	→ Transponder load duration (read mode)
30	0x1E	→ r/w synchronize
31	0x1F	→ Auto-adjust value (read mode)
32	0x20	→ Auto-adjust value (write mode)
33	0x21	→ Automatic antenna adjustment
34	0x22	→ Sensor type for presence sensor
35	0x23	→ Special features

No. (dec)	No. (hex)	Parameter name
36	0x24	➔ Lock membrane keyboard
37	0x25	➔ MID area
38	0x26	➔ Test after software reset
39	0x27	➔ Transmitter level (write mode)
40	0x28	➔ Transponder load duration (write mode)
41	0x29	➔ Delay time between read cycles
42	0x2A	➔ CarrierIDOffset
43	0x3B	➔ CarrierIDLength
44	0x2C	➔ FixedMID
45	0x2D	➔ MIDFormat
99	0x63	➔ Customer code
123	0x7B	➔ Fine version

Parameter 0 (0x00) **Gateway ID**

The gateway ID is a part of the device ID. The BROOKS SECS-I reader works simultaneously as a gateway and as a reader (CIDRW with integrated head).

It is the "lower message ID" in the message header.

00 .. 255

Default: Last two characters of hex serial number

The default gateway ID corresponds to parameter 8 (TARGETID low byte). For more details see ➔ Parameter 8 (0x08).

Parameter 1 (0x01) **Baudrate**

Data transmission rate to the SECS-Host

3:	300 Baud
6:	600 Baud
12:	1,200 Baud
24:	2,400 Baud
48:	4,800 Baud
96:	9,600 Baud
192:	19,200 Baud
200:	38,400 Baud
201:	57,600 Baud
202:	115,200 Baud

Default: (192) 19,200 Baud (see accompanying letter of the reader)

Parameter 2 (0x03) **Inter-character timeout T1**

1 .. 100 1/10 s

Default: (5) 0.5 s

Parameter 3 (0x03) **Block protocol timeout T2**

2 .. 250 1/10 s

Default: (10) 1 s

Parameter 4 (0x04) **Reply timeout T3**

1 .. 120 1 s

Default: (45) 45 s

Parameter 5 (0x05) **Inter-block timeout T4**

This parameter is ineffective if the used messages are not larger than one block.

1 .. 120 1 s

Default: (45) 45 s

Parameter 6 (0x06) **Retry limit RTY**

Number of times a question or message is to be repeated.

0 .. 31

Default: (0)

Parameter 7 (0x07) **TARGETID high byte**

High byte of the predefined TARGETID.

The TARGETID is changeable.
The default value is delivered from the serial number.

The following example shows the relation between serial number and default TARGETID: serial number „0203MIS04660"

The last 5 characters of the serial number are to be interpreted as a decimal device counter and they are used for the default TARGETID. In the example, the decimal number „04660" can be interpreted as a hexadecimal value 0x1234. The default value for the TARGETID has the value „1234" and the parameter 7 has the default value 0x12.

Parameter 8 (0x08) **TARGETID low byte**

Low byte of the predefined TARGETID.

The TARGETID is changeable.
The default value is delivered from the serial number.

The following example shows the relation between serial number and default TARGETID: serial number „0203MIS04660"

The last 5 characters of the serial number are to be interpreted as a decimal device counter and they are used for the default TARGETID. In the example, the decimal number „04660" can be interpreted as a hexadecimal value 0x1234. The default value for the TARGETID has the value „1234" and the parameter 8 has the default value 0x34.

Parameter 9 (0x09) **Heartbeat time**

The reader offers the option of generating a regular heartbeat. This means the reader sends an S1F1 message to the host at the defined interval.

0 … No heartbeat
1 … 255 10 s (10 s - 2,550 s)

Default: 0 no heartbeat

Parameter 11 (0x0B) **ReaderID**

The reader ID is a part of the device ID. In the message header, it corresponds to the 7 LSB (last significant bits) of the "upper message ID".

00 .. 127

Default: 0x01

The BROOKS SECS-I reader works simultaneously as a gateway and a reader (CIDRW with integrated head). Therefore the reader ID is predefined as 0x01. Of course, the ID can be changed within the valid scope.

Parameter 12 (0x0C) **HeadID**

If you use a 2-byte TARGETID, this parameter corresponds to TARGETID.

00 .. 31

Default: 0x01

The head ID is predefined as 0x01. Of course, the ID can be changed within the valid scope.

Parameter 20 (0c14) **Sensor delay for presence sensor**

Delay time for sensor signal to start an automatic read.

0 .. 255 1/10 s

Default: (10) 1 s

Parameter 22 (0x16) **Sensor-triggered action for presence sensor**

0: Read all transponders
1: Read page 1 of a multipage transponder
...
17: Read page 17 of a multipage transponder
240: Read a read/only transponder
241: Read a read/write transponder

Default: (0) read all transponders

Parameter 23 (0x17) **Triggered read frequency**

If a read/write error occurs, the triggered read frequency defines the time between two attempts to read or write a transponder; or the read frequency if there is a triggered read (no polling).

2 .. 10 from 1 s

Default: (5) 500 ms

Parameter 24 (0x18) **r/w max repeat**

If a read/write error occurs, this parameter defines the maximum number of attempts to read or write a transponder.

0 .. 255

Default: 5

Parameter 25 (0x19) **Transponder type**

This parameter defines the validity of the read transponder data.

00 ... Read and write TIRIS type
Each transponder page consists of 8 data bytes. The validity of the data bytes is checked by a 2 byte CRC checksum.

Default: 00

Parameter 26 (0x1A) **Sensor activity**

The RFID reader offers the option of deactivating the connected sensor.

0 Sensor not activated
1 Sensor activated

Default: 1

Parameter 27 (0x1B) **Watchport for presence sensor**

Enables a message to the host if a cassette/FOUP is detected on the I/O port, or if it is removed from the I/O port.
A sensor is required to use this option.

0 Report nothing
1 Report cassette/FOUP is removed
2 Report cassette/FOUP is detected
3 Report cassette/FOUP is detected and cassette is removed

Default: (3) Report cassette/FOUP is detected and removed

Parameter 28 (0x1C) **Transmitter level (read mode)**

The intensity of the field strength to load a transponder during a read process.
The default value (1) should not be changed.

0 Reduced field strength
1 Maximum field strength

Default: (1) Maximum field strength

Parameter 29 (0x1D) **Transponder load duration (read mode)**

The time required to load a transponder during a read process.
The default value (50 ms) should not be changed.

00 .. 255 ms

Default: (50) 50 ms

Parameter 30 (0x1E) **r/w synchronize**

Enables/disables reader synchronization. If synchronization is enabled, the reader takes notice of interference or other active readers and synchronizes the reading cycle.

00	…	Synchronization disabled
01	…	Synchronization enabled

Default: (01) enabled

Parameter 31 (0x1F) **Auto-adjust value (read mode)**

The influence of interferences in the environment of the readers can be minimized by using the automatic adjustment during the operation. If the parameter is set to defined values (0x00 - 0x40), the reader starts the adjustment.

In case of automatic adjustment, the reader requires up to two seconds. During this time the reader cannot receive any serial data.

00 ... 0x3F	Range of manual adjustment (read mode only)
0x40	Start automatic adjustment (read and write mode)

IMPORTANT

Automatic adjustment changes the adjustment of the read and write modes (➔ Parameter 31 (0x1F) and ➔ Parameter 32 (0x20)).

Parameter 32 (0x20) **Auto-adjust value (write mode)**

The influence of interferences in the environment of the readers can be minimized by using the automatic adjustment during the operation. If the parameter is set to defined values (0x00 - 0x40), the reader starts the adjustment.

In the case of automatic adjustment, the reader requires up to two seconds. During this time the reader cannot receive any serial data.

00 ... 0x3F	Range of manual adjustment (write mode only)
0x40	Start automatic adjustment (read and write mode)

Parameter 33 (0x21) **Automatic antenna adjustment**

The parameter defines the permitted causes for an antenna adjustment.

0 Automatic adjustment is not activated
1 Automatic adjustment only by Tuning button
2 Automatic adjustment only by external command
3 Automatic adjustment by Tuning button or external command

Default: (3) automatic antenna adjustment by Tuning button or external command

Parameter 34 (0x22) **Sensor type for presence sensor**

Type of sensor signal to start an automatic read.

0 Automatic read starts if sensor is covered
1 Automatic read starts if sensor is not covered

Default: (0) sensor is covered

Parameter 35 (0x23) **Special features**

After a hardware reset, the reader offers an automatic read if the presence sensor is covered.

bit 0: value 0: Execute auto read after reset, if sensor is covered
value 1: Execute no auto read after reset, if sensor is covered (default)
bit 1: value 0: Execute a sensor triggered auto read (default)
value 1: Execute no sensor triggered auto read
bit 2: without function
bit 3: without function
bit 4: The setting of the LEDs by S18F13 "SetLED" is prioritized

Default: 0x01 (0000 0001)

Parameter 36 (0x24) **Lock membrane keyboard**

This parameter defines the key statuses of the membrane keyboard. If a bit is set, it activates the specified button.

xxx0 0001 Tuning button is active in test mode
xxx0 0010 Tuning button is active in normal mode
xxx0 0100 Test button is active
xxx0 1000 Read button is active
xxx1 0000 Write button is active

Default: (0001 1111)

Parameter 37 (0x25) **MID area**

This parameter defines the range of the MID.

'0' … '10' pages

Default: '2' - MID area = 2 pages = 16 bytes (depends on ➔ Parameter 25 (0x19)).

IMPORTANT

See also ➔ Parameter 42 (0x2A) - ➔ Parameter 45 (0x2D) and ➔ Parameter 99 (0x63).

Parameter 38 (0x26) **Test after software reset**

This parameter enables/disables the initial test after a software reset.

0 No initial test after software reset
1 Initial test after software reset

Default: (0) No initial test after software reset

Parameter 39 (0x27) **Transmitter level (write mode)**

The intensity of the field strength to load a transponder during a write process. The default value (1) should not be changed.

0 Reduced field strength
1 Maximum field strength

Default: (1) Maximum field strength

Parameter 40 (0x28) **Transponder load duration (write mode)**

The time required to load a transponder during a write process.
The default value (50 ms) should not be changed.

00 .. 255 ms

Default: (50) 50 ms

Parameter 41 (0x29) **Delay time between read cycles**

The delay time between two reading cycles. It takes care of the reading module lifetime.
To increase reading speed, set the delay time to zero. There is no restriction when using a mini or micro antenna. If you use a frame or rod antenna, the reading module will approach the boundary conditions. There is no problem if you read only a few pages or if you have a break between two readings (all pages). If you want to read all pages continuously without any break, please use the default value.

00...20 50 ms

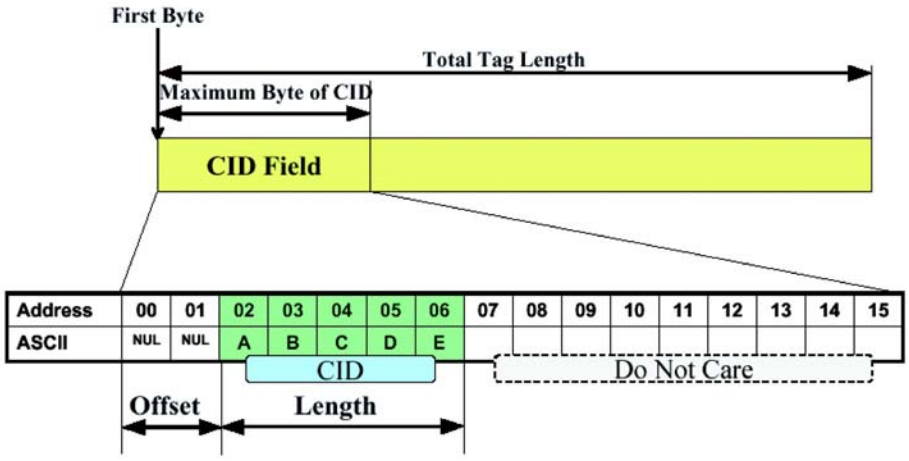
Default: (2) 100 ms

Parameter 42 (0x2A) **CarrierIDOffset**

Defines the offset of the CID within the CID field (MID area -➔ Parameter 37 (0x25)).
The valid value range depends on the value of the MID area and the value of the CarrierIDLength.

Valid range 0 … maximum bytes of CID -1

Default: 0



Offset + Length cannot be larger than the length of the CID field.

Parameter 43 (0x2B) **CarrierIDLength**

Defines the length of the CID within the CID field (MID area -➔ Parameter 37 (0x25)).
The valid value range depends on the value of the MID area and the value of the CarrierIDOffset (see ➔ Parameter 42 (0x2A)).

Valid range: 1 … maximum bytes of CID field

Default: 16

Parameter 44 (0x2C) **FixedMID**

Defines the read, write and error behavior regarding the CarrierIDLength defined in SEMI E99-0303.

0 Dynamic CID length (to ensure compatibility with older versions).
MID length is variable for writing to the tag.
Reading up to the first non-visible ASCII character.

1 Fixed CID length (to meet the new standard revision).
Length of MID in the tag must be the same as the reader settings.

If

there is a non-visible ASCII character within the CID field, an error occurs.

Default: 1

Parameter 45 (0x2D) **MIDFormat**

Defines the physical format of the MID data in the transponder memory.
Affects the messages S18F9/F10 and S18F11/F12.

0 E99 standard format left aligned - meets the requirement of the SEMI standard E99
1 MID format right aligned – filler byte is ASCII ‘0’ (0x30)
Reading: leading will displayed.
2 MID format right aligned – filler byte is ASCII ‘0’ (0x30)
Reading: leading ‘0’ will not displayed.

Examples: MID string is '123456789ABC'

Parameter 45 = ’0’

Tag memory:

Page 2	9	A	B	C	0x00	0x00	0x00	0x00
Memory address	15	14	13	12	11	10	9	8
Page 1	1	2	3	4	5	6	7	8
Memory address	7	6	5	4	3	2	1	0

→ Output string: '123456789ABC'

Parameter 45 = ’1’ or ’2’

Tag memory:

Page 2	0	0	0	0	1	2	3	4
Memory address	15	14	13	12	11	10	9	8
Page 1	5	6	7	8	9	A	B	C
Memory address	7	6	5	4	3	2	1	0

→ Output string (parameter 45 = ‘1’): ‘0000123456789ABC’
→ Output string (parameter 45 = ‘2’): ‘123456789ABC’

Default: 0

Parameter 99 (0x63) **Customer code**

If the customer requires special parameter settings that deviate from the default values, a customer code can be assigned by BROOKS to set several parameter values via one parameter.
The following parameters are defined:

'00' Sets the following parameters:
Reader complies with the last revisions of SEMI E99-0303

Parameter	Value
37	2
42	0
43	16
44	1
45	0

'03' Sets the following parameter:
Reader complies with older reader versions before the revision of SEMI E99-0303.

Parameter	Value
37	1
42	0
43	8
44	0
45	0

Parameter 123 (0x7B)

Fine version

This parameter is used to query the fine version.

7.3.7 SEMI E99

Introduction

The purpose of the Carrier ID reader/writer functional standard is to provide a common specification for concepts, behavior and services provided by a carrier ID reader/writer to an upstream controller. A standard interface increases the interchangeability of a carrier ID reader/writer, so that users and equipment suppliers have a wide choice.

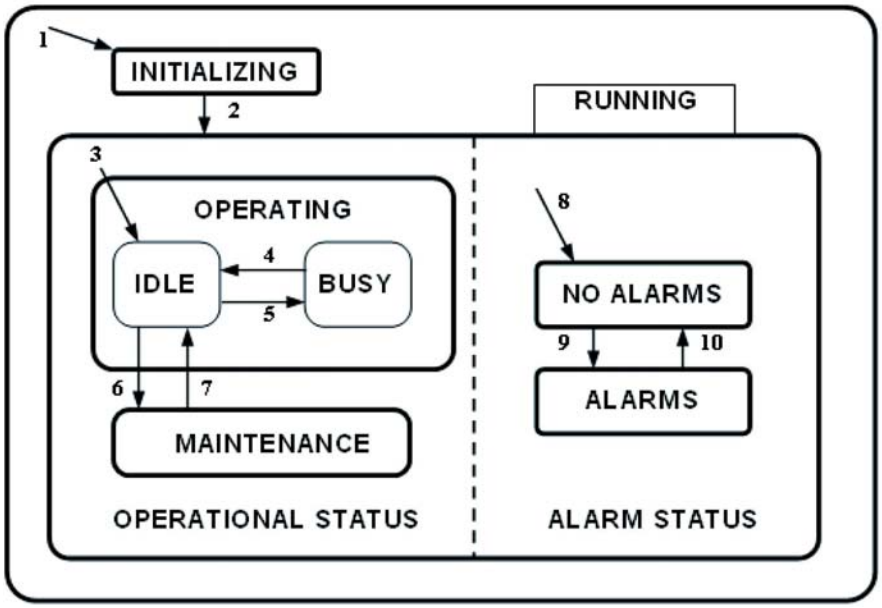
Scope:

- The interface standard addresses the functional requirements for a generic carrier ID reader/writer interface with an upstream controller.
- The specification includes the required behavior and required communications for a carrier ID reader and writer.
- The specification does not require, define or prohibit asynchronous messages sent by the carrier ID reader or writer.
- This standard does not purport to address safety issues, if any, associated with its use.

Status models

To facilitate independent control of the individual heads, there are two separate status models defined, one for the CIDRW subsystem and one for each individual head. The BROOKS reader combines the CIDRW subsystem with the head.

The status model for the BROOKS reader is displayed in the status model below.



The table below defines the status of the BROOKS RFID reader.

Status	Definition
ALARM STATUS	Displays the presence or absence of alarms.
ALARMS	An alarm condition exists.
BUSY	A service is being performed that affects the status of the hardware.
CIDRW	Super-status of the CIDRW status model. Always active when the CIDRW is powered on.
IDLE	No service is being performed. All heads are idle.
INITIALIZING	The CIDRW is carrying out initialization and a self-diagnostic. Presence or absence of alarms is initially determined in this status.
NO ALARMS	No alarm condition exists.
OPERATING	Normal operating status where reading and/or writing operations can be performed.
OPERATING STATUS	The CIDRW is fully capable of performing all services that it supports.
RUNNING	The CIDRW is operational and able to communicate.
MAINTENANCE	Internal setup and maintenance activities.

The table below defines the transitions of the BROOKS SECS-I status model of the RFID reader.

#	Previous state	Trigger	New status	Action	Comment
1	Any	Power-up or reset	INITIALIZING	Initialize hardware and software	Default entry on power-up
2	INITIALIZING	Initialization is complete.	RUNNING	None	The CIDRW is now able to communicate.
3	INITIALIZING	Default entry into OPERATING	IDLE	None	Internal
4	IDLE	A service request to read or write or perform diagnostics is received.	BUSY	None	
5	BUSY	All services request that effect	IDLE	None	
6	IDLE	A user selects the MAINTENANCE status and all heads are IDLE.	MAINTENANCE	None	The upstream controller may send a request or the operator may set a switch to select the MAINTENANCE status. Maintenance and setup activities may now be performed.
7	MAINTENANCE	A user selects the OPERATING status and all heads are IDLE.	IDLE	None	The upstream controller may send a request or the operator may set a switch to select the OPERATING status. Normal operating activities may now be performed.
8	INITIALIZING	Default entry into ALARM STATUS	ALARMS or NO ALARMS	None	
9	NO ALARMS	An alarm condition is detected.	ALARMS	None	
10	ALARMS	All alarm conditions have cleared.	NO ALARMS	None	
11	Any	A reset service request is received.	CIDRW	None	

Valid services per status

The following table shows which of the various services can be performed by the reader when the reader is in various individual statuses.

	Service									
	Write ID	Write data	Set attributes	Reset	Read ID	Read data	Perform diag.	Request status	Request attributes	Change status
Reader status										
INIT										
IDLE/BUSY		X	X	X	X	X	X	X	X	X
MANT	X		X	X	X		X	X	X	X

IMPORTANT

Note that the CIDRW may not be able to communicate when in initializing status after power-up or reset service.

7.3.8 Message Details

Equipment status

S1F0: ABORT TRANSACTION (reader <-> host)

Used instead of an expected reply to abort a transaction. Function 0 is defined in every stream and has the same meaning in every stream.
S1F0 W . * Header only

S1F1: ARE YOU THERE REQUEST (reader <-> host, reply)
Establishes if the gateway/reader or host is online.

S1F1 W . * Header only

S1F2: ON-LINE DATA (host -> reader)
The host signals that it is online.

```
S1F2
   <L[2]
      <A[6]MDLN >
      <A[6]SOFTREV >
>
```

S1F2: ON-LINE (reader -> host)
The reader signals that it is online.

```
S1F2
    <L[2]
       <A[6]MDLN >
       <A[6]SOFTREV >

>.
```

S1F15: REQUEST OFF_LINE (host -> reader, reply)
The reader is requested to change the communication status to offline. The reader can only be set online again by using message S1F17 (or reset S2F19); all other messages are aborted by the SxF0 message.
S1F15 W. *Header only

S1F16: OFFLINE ACKNOWLEDGE (reader -> host)
Acknowledge.

```
S1F16
     <B[1]OFLACK>.
```

S1F17: REQUEST ON_LINE (host -> reader, reply)
The reader is requested to change the communication status to online.
S1F17 W. *Header only

S1F18: ONLINE ACKNOWLEDGE (reader -> host)
Acknowledge.

S1F18
<B[1]ONLACK>.

Equipment control

S2F0: ABORT TRANSACTION (reader <-> host)
Used instead of an expected reply to abort a transaction. Function 0 is defined in every stream and has the same meaning in every stream.

S2F0 W. * Header only

S2F13: EQUIPMENT CONSTANT REQUEST (host -> reader, reply)
The host requests an attribute from the reader.

S2F13 W
<L[1]
<U1[1] ECID>
>.

S2F14: EQUIPMENT CONSTANT DATA (reader -> host)
The reader sends the requested attribute to the host.

S2F14
<L[1]
<U1[1] ECV>
>.

S2F15: NEW EQUIPMENT CONSTANT SENT (host -> reader, reply)
The host changes a reader attribute.

S2F15 W
<L[1]
<L[2]
<U1[1] ECID>
<U1[1] ECV>
>
>.

S2F16: NEW EQUIPMENT CONSTANT ACKNOWLEDGE (reader -> host)
The reader acknowledges the setting of the reader parameter.

S2F16
<B[1] EAC>.

S2F19: RESET SENT (host -> reader, reply)
The host requests the reader to reset the hardware and software.
If a heartbeat time is set (➔ Parameter 9 (0x09)), the reader sends an S1F1 message when the reset is finished.
The power-up reset requires a few seconds.

S2F19 W
<B[1] RIC>.

S2F20: RESET ACKNOWLEDGE (reader -> host)
The reader acknowledges the reset.
This message is only displayed in case of a power-up reset (RIC=2).

S2F20
<B[1] RAC>.

Material status

S3F0: ABORT TRANSACTION (reader <-> host)
Used instead of an expected reply to abort a transaction. Function 0 is defined in every stream and has the same meaning in every stream.

S3F0 W. * Header Only

S3F5: CASSETTE FOUND SENT (reader -> host, reply)
The reader sends the information that a cassette was detected by the presence sensor.

This message is sent only if a sensor is connected and activated (see ➔ Parameter 27 (0x1B) and ➔ Parameter 26 (0x1A)).

S3F5 W.
<L[2]
<B[1] MF>
<B[1] PTN>
>.

S3F6: CASSETTE FOUND ACKNOWLEDGE (host -> reader)
The host acknowledges the cassette found message.

S3F6
<B[1] ACKC3>.

S3F7: CASSETTE LOST SEND (reader -> host, reply)
The reader sends the information that the cassette was removed from the I/O port (presence sensor).

This message is sent only if a sensor is connected and activated (see ➔ Parameter 27 (0x1B)' and ➔ Parameter 26 (0x1A)). The PAGEDATA can be given only if the PAGEDATA that was read last is still available.

S3F7 W.
<L[3]
<B[1] MF >
<B[1] PTN >
<B[9] PAGEDATA >*
>.
* a zero-length PAGEDATA indicates that no PAGEDATA is available (case of error)

S3F8: CASSETTE LOST ACKNOWLEDGE (host -> reader)

The host acknowledges the cassette lost message.

S3F8
<B[1] ACKC3>.

S3F11: READ MID AT I/O PORT (host -> reader, reply)
The host requests the reader to read the PAGEDATA of the given PAGE_ID.

S3F11 W
<B[1] PAGE_ID>.

S3F12: READ ACKNOWLEDGE (reader -> host)
The reader only acknowledges the receipt of the reading command.
The PAGEDATA is sent later.

S3F12
<L[3]
<B[1] PTN>*
<B[1] MIDRA>
<B[9] PAGEDATA>**
>.
* a zero-length PTN indicates that no PTN is available
** a zero-length PAGEDATA indicates that no DATA is available

S3F13: RETURN READ MID (reader -> host, reply)
The reader sends the ID of the cassette at the I/O port to the host.

S3F13 W
<L[2]
<B[1] PTN>
<B[9] PAGEDATA >
>.

S3F14: MID ACKNOWLEDGE (host -> reader)
The host acknowledges the received data.

S3F14
<B[1] MIDAC>.

S3F65: WRITE MID AT I/O PORT (host -> reader, reply)
The host requests that the reader write the PAGEDATA.

S3F65 W
<B[9] PAGEDATA >

S3F66: WRITE ACKNOWLEDGE (reader -> host)
The reader only acknowledges the receipt of the write command. The write acknowledge is sent later.

S3F66
<L[2]
<B[1] MIDRA>
<B[9] PAGEDATA >
>.

S3F67: RETURN WRITE SUCCESS (reader -> host, reply)
The reader reports the successful writing of the transponder. The reader sends information about the presence sensor.

S3F67 W
<B[1] PTN>.

S3F68: WRITE SUCCESS ACKNOWLEDGE (host -> reader)

The host acknowledges the received data.

S3F68

<B[1] MIDAC>.

S3F73: LOCK MID AT I/O PORT (host -> reader, reply)
The host requests the reader to lock the requested page.

S3F73 W
<B[1] PAGE_ID>.

ATTENTION

Locking a transponder page is permanent.
You cannot unlock a transponder page.

S3F74: LOCK ACKNOWLEDGE (reader -> host)
The reader acknowledges the receipt of the locking command only. The locking acknowledgment is sent later.

S3F74
<L[2]
<B[1] MIDRA>
<B[9] PAGEDATA >
>.

S3F75: RETURN LOCK SUCCESS (reader -> host, reply)
The reader reports the successful locking of the given page. The reader sends information about the presence sensor.

S3F75 W
<B[1] PTN>.

S3F76: LOCK SUCCESS ACKNOWLEDGE (host -> reader)
The host acknowledges the receipt of the lock success message (S3F75).

S3F76
<B[1] MIDAC>.

Exception handling

S5F0: ABORT TRANSACTION (reader <-> host)
Used instead of an expected reply to abort a transaction. Function 0 is defined in every stream and has the same meaning in every stream.

S5F0 W . * Header only

S5F1: GATEWAY READER ALARM REPORT SEND (reader -> host, reply)
The reader reports all errors to the host.

```
S5F1 W
    <L[3]
        <B[1] ALCD >          * alarm code byte
        <B[1] ALID >          * alarm ID
        <A[MAX 40] ALTX > * alarm text
    >.
```

S5F2: ALARM REPORT ACKNOWLEDGE (host -> reader)
The host acknowledges an alarm.

```
S5F2
      <B[1] ACKC5>.
```

System errors

S9F1: UNRECOGNIZED DEVICE ID (reader -> host)
The device ID in the message block header does not correspond to expected device ID.

```
S9F1
<B[10] MHEAD > .
```

S9F3: UNRECOGNIZED STREAM TYPE (reader -> host)
The reader does not recognize the stream type in the message block header.

```
S9F3
< B[10] MHEAD > .
```

S9F5: UNRECOGNIZED FUNCTION TYPE (reader -> host)
The reader does not recognize the function number in the message block header.

```
S9F5
< B[10] MHEAD > .
```

S9F7: ILLEGAL DATA (reader -> host)
The reader does not recognize the data in the message.

```
S9F7
    < B[10] MHEAD > .
```

S9F9: TRANSACTION TIMER TIMEOUT (reader -> host)

This message indicates that a transaction timer has timed out and that the corresponding transaction was aborted. Only the last sent message (which must be confirmed by the host) is stored and its confirmation is temporally controlled.

S9F9
< B[10] SHEAD > .

For more information on error codes and the corresponding correcting actions please refer to .

Subsystem control and data

S18F1: READ ATTRIBUTE REQUEST (RAR) (host -> reader, reply)

This message requests the current values of specific attributes of the subsystem component indicated in the TARGETID.

S18F1 W
L,2
1. <TARGETID>
2. L,n
1. <ATTRID1>
…
n. <ATTRIDn>

S18F2: READ ATTRIBUTE DATA (RAD) (reader -> host)

This message returns the current values of the requested attributes and the current status of the requested component indicated in the TARGETID.

S18F2
L,4
1. <TARGETID>
2. <SSACK>
3. L,n
1. <ATTRVAL1>
…
n. <ATTRVALn>
4. L,1
L,s
1. <STATUS1>
…
s. <STATUSs>

If the ATTRID of the S18F1 message is unknown, the corresponding ATTRVAL has the value <nothing>.

S18F3: WRITE ATTRIBUTE REQUEST (WAR) (host -> reader, reply)

This message requests the subsystem to set the value of the read/write attributes of the component specified in the TARGETID.

S18F3 ,W
L,2
1. <TARGETID>
2. L,n
1. L,2
1. <ATTRID1>
2. <ATTRVAL1>

n. L,2
1. <ATTRIDn>
2. <ATTRVALn>

S18F4: WRITE ATTRIBUTE ACKNOWLEDGE (WAA) (reader -> host)

This message acknowledges the success or reports the error of the request to write attribute data to the subsystem indicated in the TARGETID.

S18F4
L,3
1. <TARGETID>
2. <SSACK>
3. L,1
L,s
1. <STATUS1>
…
s. <STATUSs>

If the ATTRID of the S18F3 message is unknown, a communication error (CE) occurs.

S18F5: READ REQUEST (RR) (host -> reader, reply)
The host requests the subsystem indicated in the TARGETID to read information. DATASEG may be used to indicate a specific section of data to be read. DATALENGTH is used to limit the amount of data for that section.

S18F5 W
L,3
1. <TARGETID>
2. <DATASEG>
3. <DATALENGTH>

If DATASEG and DATALENGTH are both omitted (zero length items), then all pages of the data area are requested. If only DATALENGTH is omitted, all data within the indicated section is requested.

S18F6: READ DATA (RD) (reader -> host)
This message is used to return requested information from the subsystem indicated in the TARGETID or to acknowledge the result of the request.

S18F6
L,3
1. <TARGETID>
2. <SSACK>
3. <DATA>

If the TARGETID is unknown, a communication error (CE) occurs.

S18F7: WRITE DATA REQUEST (WAR) (host -> reader, reply)
This message requests to write data to the subsystem component indicated in the TARGETID. DATASEG may be used to indicate a specific section of the data area to be written or overwritten.

S18F7 W
L,4
1. <TARGETID>
2. <DATASEG>
3. <DATALENGTH
4. <DATA>

If DATASEG and DATALENGTH are both omitted (zero length items), then all data in the data area are to be overwritten. If only DATALENGTH is omitted or if DATALENGTH has a value of zero, then all data within the indicated section are to be written.

If DATASEG is omitted (zero length items), the value of DATALENGTH sets the length of data that is to be written. If the length of the data that is to be written is longer than the value of DATALENGTH, a communication error (CE) occurs.

S18F8: WRITE DATA ACKNOWLEDGE (WDA) (reader -> host)
This message acknowledges the success or failure of writing data to the subsystem indicated in the TARGETID.

S18F8
L,3
1. <TARGETID>
2. <SSACK>
3. L,1
L,s
1. <STATUS1>
…
s. <STATUSs>

If the TARGETID is unknown, a communication error (CE) occurs.

S18F9: READ ID REQUEST (RIR) (host -> reader, reply)
This message is used to request the subsystem indicated by the TARGETID to read the MID.

S18F9,W
<TARGETID>

S18F10: READ ID DATA (RID) (reader -> host)
This message returns a requested material identifier MID as read by the subsystem indicated in the TARGETID.

S18F10
L,4
1. <TARGETID>
2. <SSACK>
3. <MID>
4. L,1
L,s
1. <STATUS1>
…
s. <STATUSs>

S18F11: WRITE ID REQUEST (WIR) (host -> reader, reply)
This message is used to request the subsystem indicated by the TARGETID to write the MID.

S18F11 W
L,2
1. <TARGETID>
2. <MID>

ATTENTION

The reader must be in maintenance mode to write the MID with message S18F11.

S18F12: WRITE ID ACKNOWLEDGE (WIA) (reader -> host)

This message acknowledges the success or error of writing the MID to the subsystem indicated in the TARGETID.

S18F12
L,3
1. <TARGETID>
2. <SSACK>
3. L,1
   L,s
   1. <STATUS1>
   …
   s. <STATUSs>

If the TARGETID is unknown, a communication error (CE) occurs.

S18F13: SUBSYSTEM COMMAND REQUEST (SCR) (host -> reader, reply)
This message is used to request the subsystem indicated in the TARGETID to perform a specific action.

S18F13 W
L,3
1. <TARGETID>
2. <SSCMD>
3. L,n
   1. <CPVAL>
   …
   n. <CPVALn>

S18F14: SUBSYSTEM COMMAND ACKNOWLEDGE (SCA) (reader -> host)

This message reports the result from the subsystem specified in the TARGETID for the requested action.

S18F14
L,3
1. <TARGETID>
2. <SSACK>
3. L,1
   L,s
   1. <STATUS1>
   …
   s. <STATUSs>

If the TARGETID is unknown, a communication error (CE) occurs.

7.3.9 HSMS Message Examples

Starting routine of the HSMS protocol

Outgoing: Length byte (00 00 00 0A)
Outgoing: Select.req (FF FF 00 00 00 01 80 00 00 01)
Incoming: Length byte (00 00 00 0A)
Incoming: Select.rsp (FF FF 00 00 00 02 80 00 00 01)
Outgoing: Length byte (00 00 00 0A)
Outgoing: Linktest.req (FF FF 00 00 00 05 80 00 00 02)
Incoming: Length byte (00 00 00 0A)
Incoming: Linktest.req (FF FF 00 00 00 05 80 00 00 01)
Outgoing: Length byte (00 00 00 0A)
Outgoing: Linktest.rsp (FF FF 00 00 00 06 80 00 00 01)
Incoming: Length byte (00 00 00 0A)
Incoming: Linktest.rsp (FF FF 00 00 00 06 80 00 00 02)

Link test

Incoming: Length byte (00 00 00 0A)
Incoming: Linktest.req (FF FF 00 00 00 05 80 00 00 1C)
Outgoing: Length byte (00 00 00 0A)
Outgoing: Linktest.rsp (FF FF 00 00 00 06 80 00 00 1C)

Separate request

Incoming: Length byte (00 00 00 0A)
Incoming: Separate.req (FF FF 00 00 00 09 80 00 00 03)

7.3.10 SECS-I Message Examples

All examples are produced with the default gateway-ID 255 (decimal) or 0x00FF (hexadecimal)!

S1F1 Message from the reader to the host

Reader to Host: S1F1
10:30:47 Incoming: ENQ (05)
10:30:47 Outgoing: EOT (04)
10:30:47 Incoming: Length Byte (0A)
10:30:47 Incoming: Header (81 FF 81 01 80 01 00 01 00 01)
10:30:47 Incoming: Checksum (02 85)
10:30:47 Outgoing: ACK (06)

Host to Reader: S1F2
10:30:47 Outgoing: ENQ (05)
10:30:47 Incoming: EOT (04)
10:30:47 Outgoing: Length Byte (10)
10:30:47 Outgoing: Header (01 FF 01 02 80 01 00 01 00 01)
10:30:47 Outgoing: Data (01 02 41 00 41 00)
10:30:47 Outgoing: Checksum (0B 02)
10:30:47 Incoming: ACK (06)

S1F1 Message from the host to the reader

Host to Reader: S1F1
10:29:00 Outgoing: ENQ (05)
10:29:00 Incoming: EOT (04)
10:29:00 Outgoing: Length Byte (0A)
10:29:00 Outgoing: Header (01 FF 81 01 80 01 00 00 00 01)
10:29:00 Outgoing: Checksum (04 02)
10:29:00 Incoming: ACK (06)

Reader to Host: S1F2
10:29:00 Incoming: ENQ (05)
10:29:00 Outgoing: EOT (04)
10:29:00 Incoming: Length Byte (1C)
10:29:00 Incoming: Header (81 FF 01 02 80 01 00 00 00 01)
10:29:00 Incoming: Data (01 02 41 06 52 53 72 64 30 31 41 06 56)
10:29:00 Incoming: Data (31 2E 30 2E 30)
10:29:00 Incoming: Checksum (05 B5)
10:29:00 Outgoing: ACK (06)

Message S1F15 sets the reader offline

Host to Reader: S1F15

10:32:53 Outgoing: ENQ (05)
10:32:53 Incoming: EOT (04)
10:32:54 Outgoing: Length Byte (0A)
10:32:54 Outgoing: Header (01 FF 81 0F 80 01 00 00 00 02)
10:32:54 Outgoing: Checksum (13 02)
10:32:54 Incoming: ACK (06)

Reader to Host: S1F16

10:32:54 Incoming: ENQ (05)
10:32:54 Outgoing: EOT (04)
10:32:54 Incoming: Length Byte (0D)
10:32:54 Incoming: Header (81 FF 01 10 80 01 00 00 00 02)
10:32:54 Incoming: Data (21 01 00)
10:32:54 Incoming: Checksum (02 36)
10:32:54 Outgoing: ACK (06)

Message S1F17 sets the reader online

Host to Reader: S1F17

10:33:24 Outgoing: ENQ (05)
10:33:24 Incoming: EOT (04)
10:33:24 Outgoing: Length Byte (0A)
10:33:24 Outgoing: Header (01 FF 81 11 80 01 00 00 00 04)
10:33:24 Outgoing: Checksum (17 02)
10:33:24 Incoming: ACK (06)

Reader to Host: S1F18

10:33:24 Incoming: ENQ (05)
10:33:24 Outgoing: EOT (04)
10:33:24 Incoming: Length Byte (0D)
10:33:24 Incoming: Header (81 FF 01 12 80 01 00 00 00 04)
10:33:24 Incoming: Data (21 01 00)
10:33:24 Incoming: Checksum (02 3A)
10:33:24 Outgoing: ACK (06)

Request reader attribute with message S2F13

Host to Reader (Gateway): S2F13
10:34:01 Outgoing: ENQ (05)
10:34:01 Incoming: EOT (04)
10:34:01 Outgoing: Length Byte (0F)
10:34:01 Outgoing: Header (01 FF 82 0D 80 01 00 00 00 05)
10:34:01 Outgoing: Data (01 01 21 01 01) → Parameter 1
10:34:01 Outgoing: Checksum (3A 02)
10:34:01 Incoming: ACK (06)

Reader to Host: S2F14
10:34:01 Incoming: ENQ (05)
10:34:01 Outgoing: EOT (04)
10:34:01 Incoming: Length Byte (0F)
10:34:01 Incoming: Header (81 FF 02 0E 80 01 00 00 00 05)
10:34:01 Incoming: Data (01 01 A5 01 C0) → Value 192
10:34:01 Incoming: Checksum (03 7E)
10:34:01 Outgoing: ACK (06)
The host requests the reader parameter "1" (transmission rate).
The reader sends the value "C0" (192) that confirms the 19200 baud.

New Reader attribute send with S2F15

Host to Reader: S2F15
10:39:32 Outgoing: ENQ (05)
10:39:32 Incoming: EOT (04)
10:39:32 Outgoing: Length Byte (14)
10:39:32 Outgoing: Header (01 FF 82 0F 80 01 00 00 00 07)
10:39:32 Outgoing: Data
01 01
01 02
A5 01 14 → Parameter 20
A5 01 05 → Value 5
10:39:32 Outgoing: Checksum (83 02)
10:39:32 Incoming: ACK (06)

Reader to Host: S2F16
10:39:32 Incoming: ENQ (05)
10:39:32 Outgoing: EOT (04)
10:39:32 Incoming: Length Byte (0D)
10:39:32 Incoming: Header (81 FF 02 10 80 01 00 00 00 07)
10:39:32 Incoming: Data (21 01 00) → ECV 0
10:39:32 Incoming: Checksum (02 3C)
10:39:32 Outgoing: ACK (06)
The Host sets the reader parameter "20" (Sensor delay for presence sensor) to the value "5".
The reader acknowledges the new constant with ECV = 0.

Host requests a software reset with S2F19

Host to Reader: S2F19

11:26:48 Outgoing: ENQ (05)
11:26:48 Incoming: EOT (04)
11:26:48 Outgoing: Length Byte (0D)
11:26:48 Outgoing: Header (01 FF 82 13 80 01 00 00 00 1C)
11:26:48 Outgoing: Data (21 01 02) → Software reset
11:26:48 Outgoing: Checksum (56 02)
11:26:48 Incoming: ACK (06)

Reader to Host: S2F20

11:26:48 Incoming: ENQ (05)
11:26:48 Outgoing: EOT (04)
11:26:48 Incoming: Length Byte (0D)
11:26:48 Incoming: Header (81 FF 02 14 80 01 00 00 00 1C)
11:26:48 Incoming: Data (21 01 00) → RAC
11:26:48 Incoming: Checksum (02 55)
11:26:48 Outgoing: ACK (06)

The reader sends the message S3F5 after the sensor detects a cassette

Reader to Host: S3F5

15:51:45 Incoming: ENQ (05)
15:51:46 Outgoing: EOT (04)
15:51:46 Incoming: Length Byte (12)
15:51:46 Incoming: Header (81 FF 83 05 80 01 00 03 00 04)
15:51:46 Incoming: Data
01 02
21 01 20 → MF 0x20
21 01 39 → Initiator=0, Sensor 0=1
15:51:46 Incoming: Checksum (03 30)
15:51:46 Outgoing: ACK (06)

Host to Reader: S3F6

15:51:46 Outgoing: ENQ (05)
15:51:46 Incoming: EOT (04)
15:51:46 Outgoing: Length Byte (0D)
15:51:46 Outgoing: Header (01 FF 03 06 80 01 00 03 00 04)
15:51:46 Outgoing: Data (21 01 00) → ACKC3
15:51:46 Outgoing: Checksum (B4 01)
15:51:46 Incoming: ACK (06)

The reader sends the message S3F13 after the sensor was detected and the transponder could be read

Reader to Host: S3F13

15:51:46 Incoming: ENQ (05)
15:51:46 Outgoing: EOT (04)
15:51:46 Incoming: Length Byte (1A)
15:51:46 Incoming: Header (81 FF 83 0D 80 01 00 03 00 05)
15:51:46 Incoming: Data
01 02
21 01 39 → Initiator=0, Sensor 0=1
21 09 81 11 11 11 11 10 00 00 00 → PAGEDATA
15:51:46 Incoming: Checksum (03 F6)
15:51:46 Outgoing: ACK (06)

Host to Reader: S3F14

15:51:46 Outgoing: ENQ (05)
15:51:46 Incoming: EOT (04)
15:51:46 Outgoing: Length Byte (0D)
15:51:46 Outgoing: Header (01 FF 03 0E 80 01 00 03 00 05)
15:51:46 Outgoing: Data (21 01 00) → ACKC3
15:51:46 Outgoing: Checksum (BD 01)
15:51:46 Incoming: ACK (06)

The material ID acknowledgment MIDAC depends on the sensor state PTN. The initiator was the sensor 0 and the host acknowledges with "0".

The reader sends the message S3F7 after the cassette was removed from the sensor.

Reader to Host: S3F7

15:51:52 Incoming: ENQ (05)
15:51:52 Outgoing: EOT (04)
15:51:52 Incoming: Length Byte (1D)
15:51:52 Incoming: Header (81 FF 83 07 80 01 00 03 00 06)
15:51:52 Incoming: Data
01 03
21 01 20 → MF 0x20
21 01 39 → Initiator=0, Sensor 0=1
21 09 81 11 11 11 11 10 00 00 00 Last read PAGEDATA
15:51:52 Incoming: Checksum (04 34)
15:51:52 Outgoing: ACK (06)

Host to Reader: S3F8

15:51:52 Outgoing: ENQ (05)
15:51:52 Incoming: EOT (04)
15:51:52 Outgoing: Length Byte (0D)
15:51:52 Outgoing: Header (01 FF 03 08 80 01 00 03 00 06)
15:51:52 Outgoing: Data (21 01 00) → ACKC3
15:51:52 Outgoing: Checksum (B8 01)
15:51:52 Incoming: ACK (06)

The reader detects an unrecognized device ID and sends the message S9F1.

Host to Reader: S1F1
16:42:58 Outgoing: ENQ (05)
16:42:58 Incoming: EOT (04)
16:42:58 Outgoing: Length Byte (0A)
16:42:58 Outgoing: Header (02 FF 81 01 80 01 00 00 00 31)
16:42:58 Outgoing: Checksum (35 02)
16:42:58 Incoming: ACK (06)

Reader to Host: S9F1
16:42:58 Incoming: ENQ (05)
16:42:58 Outgoing: EOT (04)
16:42:58 Incoming: Length Byte (16)
16:42:58 Incoming: Header (81 FF 09 01 80 01 00 07 00 18)
16:42:58 Incoming: Data
21 0A 02 FF 81 01 80 01 00 00 00 31 → MHEAD error message
16:42:58 Incoming: Checksum (04 8A)
16:42:58 Outgoing: ACK (06)
The device ID in the message block header does not correspond to the device ID in the reader detecting the error.

The reader detects a wrong stream number and sends the S9F3 message

Host to Reader: S4F1
20:03:20 Outgoing: ENQ (05)
20:03:20 Incoming: EOT (04)
20:03:20 Outgoing: Length Byte (0A)
20:03:20 Outgoing: Header (01 FF 84 01 80 01 00 00 00 08)
20:03:20 Outgoing: Checksum (0E 02)
20:03:20 Incoming: ACK (06)

Reader to Host: S9F3
20:03:20 Incoming: ENQ (05)
20:03:20 Outgoing: EOT (04)
20:03:20 Incoming: Length Byte (16)
20:03:20 Incoming: Header (81 FF 09 03 80 01 00 00 00 09)
20:03:20 Incoming: Data (21 0A 01 FF 84) =>The wrong message header
20:03:20 Incoming: Data (01 80 01 00 00 00 08)
20:03:20 Incoming: Checksum (04 4F)
20:03:20 Outgoing: ACK (06)
The stream "4" is not part of the BROOKS SECS-II message set, so a S9F3 error message will appear.

The reader detects an unrecognized function and sends the message S9F5.

Host to Reader: S1F3

19:54:43 Outgoing: ENQ (05)
19:54:43 Incoming: EOT (04)
19:54:43 Outgoing: Length Byte (0A)
19:54:43 Outgoing: Header (01 FF 81 03 80 01 00 00 00 06)
19:54:43 Outgoing: Checksum (0B 02)
19:54:43 Incoming: ACK (06)

Reader to Host: S9F5

19:54:43 Incoming: ENQ (05)
19:54:43 Outgoing: EOT (04)
19:54:43 Incoming: Length Byte (16)
19:54:43 Incoming: Header (81 FF 09 05 80 01 00 00 00 07)
19:54:43 Incoming: Data (21 0A 01 FF 81) =>The wrong message header
19:54:43 Incoming: Data (03 80 01 00 00 00 06)
19:54:43 Incoming: Checksum (04 4C)
19:54:43 Outgoing: ACK (06)

The function "3" is not part of the SECSII message set, so a S9F5 error message will appear.

The reader detects wrong data and sends the S9F7 message

Host to Reader: S2F13

16:49:00 Outgoing: ENQ (05)
16:49:00 Incoming: EOT (04)
16:49:00 Outgoing: Length Byte (0F)
16:49:00 Outgoing: Header (01 FF 82 0D 80 01 00 00 00 36)
16:49:00 Outgoing: Data (01 01 21 01 0F)
16:49:00 Outgoing: Checksum (79 02)
16:49:00 Incoming: ACK (06)

Reader to Host: S2F14

16:49:00 Incoming: ENQ (05)
16:49:00 Outgoing: EOT (04)
16:49:00 Incoming: Length Byte (0E)
16:49:00 Incoming: Header (81 FF 02 0E 80 01 00 00 00 36)
16:49:00 Incoming: Data (01 01 A5 00)
16:49:00 Incoming: Checksum (02 EE)
16:49:00 Outgoing: ACK (06)

Reader to Host: S9F7:

16:49:00 Incoming: ENQ (05)
16:49:00 Outgoing: EOT (04)
16:49:00 Incoming: Length Byte (16)
16:49:00 Incoming: Header (81 FF 09 07 80 01 00 07 00 1F)
16:49:00 Incoming: Data (21 0A 01 FF 82)
16:49:00 Incoming: Data (0D 80 01 00 00 00 36)
16:49:00 Incoming: Checksum (04 A8)
16:49:00 Outgoing: ACK (06)

The reader replies to the S2F13 equipment constant request message without data, because the parameter was invalid. Additionally, the reader sends the S9F7 illegal data message.

The secondary message fails and the reader sends the S9F9 message

Reader to Host: S1F1

20:07:16 Incoming: ENQ (05)
20:07:16 Outgoing: EOT (04)
20:07:16 Incoming: Length Byte (0A)
20:07:16 Incoming: Header (81 FF 81 01 80 01 00 00 00 01)
20:07:16 Incoming: Checksum (02 84)
20:07:16 Outgoing: ACK (06)

Host to Reader: S9F9

20:08:01 Incoming: ENQ (05)
20:08:01 Outgoing: EOT (04)
20:08:01 Incoming: Length Byte (16)
20:08:01 Incoming: Header (81 FF 09 09 80 01 00 00 00 02)
20:08:01 Incoming: Data (21 0A 81 FF 81) =>The stored header
20:08:01 Incoming: Data (01 80 01 00 00 00 01)
20:08:01 Incoming: Checksum (04 C3)
20:08:01 Outgoing: ACK (06)

After sending the S1F1 message, the reader waits for an answer from the host.

If the secondary message does not appear, a transaction timeout occurs and the reader sends the S9F9 message.

Host requests reader attributes with S18F1

Host to Reader: S18F1

15:19:31 Outgoing: ENQ (05)
15:19:31 Incoming: EOT (04)
15:19:31 Outgoing: Length Byte (5A)
15:19:31 Outgoing: Header (01 FF 92 01 80 01 00 00 00 03)
15:19:31 Outgoing: Data (
01 02
41 04 31 32 33 34
01 04
41 0D 43 6F 6E 66 69 67 75 72 61 74 69 6F 6E
41 0B 41 6C 61 72 6D 53 74 61 74 75 73
41 11 4F 70 65 72 61 74 69 6F 6E 61 6C 53 74 61 74 75 73
41 15 53 6F 66 74 77 61 72 65 52 65 76 69 73 69 6F 6E 4C 65 76
65 6C)
15:19:31 Outgoing: Checksum (CD 02)
15:19:31 Incoming: ACK (06)

Reader to Host: S18F2

15:19:31 Incoming: ENQ (05)
15:19:31 Outgoing: EOT (04)
15:19:31 Incoming: Length Byte (44)
15:19:31 Incoming: Header (81 FF 12 02 80 01 00 00 00 03)
15:19:31 Incoming: Data
01 04
41 04 31 32 33 34 → TARGETID "1234"
41 02 4E 4F → SSACK "NO"
01 04
41 02 30 31 → Configuration "01"
41 01 30 → Alarmstatus "0"
41 04 49 44 4C 45' → OperationalStatus "IDLE"
41 06 56 31 2E 30 2E 30 → SoftwareRevision Level
01 04 → STATUS <L4>
41 02 4E 45 → PMInformation "NE"
41 01 30 → Alarmstatus "0"
41 04 49 44 4C 45 → OperationalStatus "IDLE"
41 04 49 44 4C 45 → HeadStatus "IDLE"
15:19:31 Incoming: Checksum (0C 29)
15:19:31 Outgoing: ACK (06)

The host requests all fundamental CIDRW attributes defined in ATTRID. The reader answers with the actual attribute values.

Host writes new reader attributes with S18F3

Host to Reader: S18F3

17:11:07 Outgoing: ENQ (05)
17:11:07 Incoming: EOT (04)
17:11:07 Outgoing: Length Byte (77)
17:11:07 Outgoing: Header (01 FF 92 03 80 01 00 00 00 04)
17:11:07 Outgoing: Data

```
        01 02
          41 04 31 32 33 34
          01 04
            01 02                    → Configuration "01"
              41 0D 43 6F 6E 66 69 67 75 72 61 74 69 6F 6E
              41 02 30 31
            01 02                    → Alarmstatus "0"
              41 0B 41 6C 61 72 6D 53 74 61 74 75 73
              41 01 31
            01 02                    → OperationalStatus "IDLE"
              41 11 4F 70 65 72 61 74 69 6F 6E 61 6C 53 74 61 74 75 73
              41 04 4D 41 4E 54
            01 02                    → SoftwareRevisionLevel "V1.0.0"
             41 15 53 6F 66 74 77 61 72 65 52 65 76 69 73 69 6F 6E 4C 65
              76 65 6C
              41 06 56 31 2E 30 2E 30
```

17:11:07 Outgoing: Checksum (F2 02)
17:11:07 Incoming: ACK (06)

Reader to Host: S18F4

17:11:07 Incoming: ENQ (05)
17:11:07 Outgoing: EOT (04)
17:11:07 Incoming: Length Byte (2D)
17:11:07 Incoming: Header (81 FF 12 04 80 01 00 00 00 04)
17:11:07 Incoming: Data

```
        01 03
          41 04 31 32 33 34          → TARGETID "1234"
          41 02 4E 4F                → SSACK "NO"
          01 01
            01 04                    → STATUS <L4>
        41 02 4E 45                  → PMInformation "NE"
        41 01 31                     → Alarmstatus "1"
        41 04 4D 41 4E 54            → OperationalStatus "MANT"
        41 04 4E 4F 4F 50            → HeadStatus "NOOP"
```

17:11:07 Incoming: Checksum (08 54)
17:11:07 Outgoing: ACK (06)

The host writes all fundamental CIDRW attributes defined in ATTRID.
The reader answers with the actual attribute values.

Host reads data on page 8 of a multipage transponder with S18F5

Host to Reader: S18F5

17:52:17 Outgoing: ENQ (05)
17:52:17 Incoming: EOT (04)
17:52:17 Outgoing: Length Byte (1A)
17:52:17 Outgoing: Header (01 FF 92 05 80 01 00 00 00 08)
17:52:17 Outgoing: Data
01 03
41 04 31 32 33 34 → TARGETID "1234"
41 02 30 38 → DATASEG "08"
A9 02 00 08 → DATALENGTH 0x08
17:52:17 Outgoing: Checksum (91 02)
17:52:17 Incoming: ACK (06)

Reader to Host: S18F6

17:52:17 Incoming: ENQ (05)
17:52:17 Outgoing: EOT (04)
17:52:17 Incoming: Length Byte (20)
17:52:17 Incoming: Header (81 FF 12 06 80 01 00 00 00 08)
17:52:17 Incoming: Data
01 03
41 04 31 32 33 34 → TARGETID "1234"
41 02 4E 4F → SSACK "NO"
41 08 30 31 32 33 34 35 36 37 → DATA "01234567"
17:52:17 Incoming: Checksum (05 F9)
17:52:17 Outgoing: ACK (06)

The host reads 8 bytes on page 8 of a multipage transponder. The reader shows the success of the operation with SSACK "NO" (normal operation) and with the read values.

Host writes data on page 10 with S18F7

Host to Reader: S18F7

13:14:15 Outgoing: ENQ (05)
13:14:15 Incoming: EOT (04)
13:14:15 Outgoing: Length Byte (24)
13:14:15 Outgoing: Header (01 FF 92 07 80 01 00 00 00 18)
13:14:15 Outgoing: Data

```
01 04
  41 04 31 32 33 34          → TARGETID "1234"
  41 02 30 41                → DATASEG  "0A"
  A9 02 00 08                → DATALENGTH  0x08
  41 08 41 42 43 44 45 46 47 48   → DATA  "ABCDEFGH"
```

13:14:15 Outgoing: Checksum (1A 02)
13:14:15 Incoming: ACK (06)

Reader to Host: S18F8

13:14:16 Incoming: ENQ (05)
13:14:16 Outgoing: EOT (04)
13:14:16 Incoming: Length Byte (2D)
13:14:16 Incoming: Header (81 FF 12 08 80 01 00 00 00 18)
13:14:16 Incoming: Data

```
01 03
  41 04 31 32 33 34          → TARGETID "1234"
  41 02 4E 4F                → SSACK "NO"
  01 01
    01 04                    → STATUS <L4>
      41 02 4E 45            → PMInformation "NE"
      41 01 30               → Alarmstatus "0"
      41 04 49 44 4C 45      → OperationalStatus "IDLE"
      41 04 49 44 4C 45      → HeadStatus "IDLE"
```

13:14:16 Incoming: Checksum (08 3B)
13:14:16 Outgoing: ACK (06)

The host writes the ASCII string "ABCDEFGH" to page 10. The reader confirms the write command with SSACK "NO" in the S18F8 message.

Host reads material ID of a multipage transponder with S18F9

Host to Reader: S18F9

14:31:32 Outgoing: ENQ (05)
14:31:32 Incoming: EOT (04)
14:31:32 Outgoing: Length Byte (10)
14:31:32 Outgoing: Header (01 FF 92 09 80 01 00 00 00 2D)
14:31:32 Outgoing: Data
41 04 31 32 33 34 → TARGETID "1234"
14:31:32 Outgoing: Checksum (58 02)
14:31:32 Incoming: ACK (06)

Reader to Host: S18F10

14:31:32 Incoming: ENQ (05)
14:31:32 Outgoing: EOT (04)
14:31:32 Incoming: Length Byte (37)
14:31:32 Incoming: Header (81 FF 12 0A 80 01 00 00 00 2D)
14:31:32 Incoming: Data
01 04
41 04 31 32 33 34 → TARGETID "1234"
41 02 4E 4F → SSACK "NO"
41 08 4E 72 2E 30 30 31 32 33 → MID "Nr.00123"
01 01
01 04 → STATUS <L4>
41 02 4E 45 → PMInformation "NE"
41 01 30 → Alarmstatus "0"
41 04 49 44 4C 45 → OperationalStatus "IDLE"
41 04 49 44 4C 45 → HeadStatus "IDLE"
14:31:32 Incoming: Checksum (0A 80)
14:31:32 Outgoing: ACK (06)

The host wants to read the material ID of any transponder. The reader confirms the success of the read command with SSACK "NO" and returns the material ID "No.00123" (see ➔ Data items).

Host writes material ID of a multipage transponder with S18F11

Host to Reader: S18F11

```
16:46:22  Outgoing: ENQ ( 05 )
16:46:22  Incoming: EOT ( 04 )
16:46:22  Outgoing: Length Byte ( 1C )
16:46:22  Outgoing: Header ( 01 FF 92 0B 80 01 00 00 00 66 )
16:46:22  Outgoing: Data
        01 02
          41 04 31 32 33 34              → TARGETID "1234"
          41 08 4E 72 2E 30 30 41 42 43  → MID "Nr.00ABC"
16:46:22  Outgoing: Checksum ( F3 02 )
16:46:22  Incoming: ACK ( 06 )
```

Reader to Host: S18F12

```
16:46:23  Incoming: ENQ ( 05 )
16:46:23  Outgoing: EOT ( 04 )
16:46:23  Incoming: Length Byte ( 2D )
16:46:23  Incoming: Header ( 81 FF 12 0C 80 01 00 00 00 66 )
16:46:23  Incoming: Data
        01 03
          41 04 31 32 33 34          → TARGETID "1234"
          41 02 4E 4F                → SSACK "NO"
          01 01
            01 04                    → STATUS <L4>
              41 02 4E 45            → PMInformation "NE"
              41 01 30               → Alarmstatus "0"
              41 04 4D 41 4E 54      → OperationalStatus "MANT"
              41 04 4E 4F 4F 50      → HeadStatus "NOOP"
16:46:23  Incoming: Checksum ( 08 BD )
16:46:23  Outgoing: ACK ( 06 )
```

The host wants to write a new material ID to any transponder. The reader confirms the success of the write MID command with SSACK "NO". Note: the material ID can be changed only if the reader is in the maintenance state (MANT).

If the reader remains in the IDLE state, the command fails and the reader answers with SSACK "EE" (execute error).

Host changes the reader state from IDLE to MANT with S18F13

Host to Reader: S18F13

```
17:12:29  Outgoing: ENQ ( 05 )
17:12:29  Incoming: EOT ( 04 )
17:12:29  Outgoing: Length Byte ( 25 )
17:12:29  Outgoing: Header ( 01 FF 92 0D 80 01 00 00 00 67 )
17:12:29  Outgoing: Data
        01 03
        41 04 31 32 33 34           → TARGETID "1234"
        41 0B 43 68 61 6E 67 65 53 74 61 74 65
                                    → SSCMD "ChangeState"
          01 01
            41 02 4D 54             → CPVAL1 "MT"
17:12:29  Outgoing: Checksum ( 13 02 )
17:12:29  Incoming: ACK ( 06 )
```

Reader to Host: S18F14

```
17:12:29  Incoming: ENQ ( 05 )
17:12:29  Outgoing: EOT ( 04 )
17:12:29  Incoming: Length Byte ( 2D )
17:12:29  Incoming: Header ( 81 FF 12 0E 80 01 00 00 00 67 )
17:12:29  Incoming: Data
        01 03
          41 04 31 32 33 34         → TARGETID "1234"
          41 02 4E 4F               → SSACK "NO"
          01 01
            01 04                   → STATUS <L4>
            41 02 4E 45             → PMInformation "NE"
            41 01 30                → Alarmstatus "0"
            41 04 4D 41 4E 54       → OperationalStatus "MANT"
            41 04 4E 4F 4F 50       → HeadStatus "NOOP"
17:12:29  Incoming: Checksum ( 08 C0 )
17:12:29  Outgoing: ACK ( 06 )
```

ChangeState is an optional service that requests the CIDRW to change its operational sub state to MAINTENANCE ("MT") or to OPERATING ("OP"). In the MAINTENANCE state, the reader could not read (S18F5) or write (S18F7) any DATA in the defined DATASEG.

Host requests a reset with S18F13

Host to Reader: S18F13

```
11:45:34  Outgoing: ENQ ( 05 )
11:45:34  Incoming: EOT ( 04 )
11:45:34  Outgoing: Length Byte ( 1F )
11:45:34  Outgoing: Header ( 01 FF 92 0D 80 01 00 00 00 3F )
11:45:34  Outgoing: Data
        01 03
          41 04 31 32 33 34          → TARGETID "1234"
          41 05 52 65 73 65 74       → SSCMD "Reset"
          01 01
            41 02 4D 54              → CPVAL1 "MT"
11:45:34  Outgoing: Checksum ( A1 02 )
11:45:34  Incoming: ACK ( 06 )
```

Reader to Host: S18F14

```
11:45:34  Incoming: ENQ ( 05 )
11:45:34  Outgoing: EOT ( 04 )
11:45:34  Incoming: Length Byte ( 2D )
11:45:34  Incoming: Header ( 81 FF 12 0E 80 01 00 00 00 3F )
11:45:34  Incoming: Data
        01 03
          41 04 31 32 33 34          → TARGETID "1234"
          41 02 4E 4F                → SSACK "NO"
          01 01
            01 04                    → STATUS <L4>
              41 02 4E 45            → PMInformation "NE"
              41 01 30               → Alarmstatus "0"
              41 04 49 44 4C 45      → OperationalStatus "IDLE"
              41 04 49 44 4C 45      → HeadStatus "IDLE"
11:45:34  Incoming: Checksum ( 08 68 )
11:45:34  Outgoing: ACK ( 06 )
```

Reset is an optional service used to reinitialize the reader. If reader parameter 9 is unequal to 0x00, the reset causes a S1F1 "Are you there" message from the reader.

The reader detects a wrong TARGETID

Host to Reader: S18F5

13:44:33 Outgoing: ENQ (05)
13:44:33 Incoming: EOT (04)
13:44:33 Outgoing: Length Byte (1A)
13:44:33 Outgoing: Header (01 FF 92 05 80 01 00 00 00 40)
13:44:33 Outgoing: Data
01 03
41 04 30 30 30 30 → TARGETID "0000"
41 02 30 31 → DATASEG "01"
A9 02 00 08 → DATALENGTH 0x08
13:44:33 Outgoing: Checksum (B8 02)
13:44:33 Incoming: ACK (06)

Reader to Host: S18F6

13:44:33 Incoming: ENQ (05)
13:44:33 Outgoing: EOT (04)
13:44:33 Incoming: Length Byte (18)
13:44:33 Incoming: Header (81 FF 12 06 80 01 00 00 00 40)
13:44:33 Incoming: Data
01 03
41 04 31 32 33 34 → TARGETID "1234"
41 02 43 45 → SSACK "CE"
41 00 → DATA ""
13:44:33 Incoming: Checksum (04 78)
13:44:33 Outgoing: ACK (06)

The TARGETID in the S18F5 message does not correspond to the TARGETID in the reader detecting the error. The reader therefore answers with a communication error "CE".

The reader detects no tag

Host to Reader: S18F5

17:29:25 Outgoing: ENQ (05)
17:29:25 Incoming: EOT (04)
17:29:25 Outgoing: Length Byte (1A)
17:29:25 Outgoing: Header (01 FF 92 05 80 01 00 00 00 43)
17:29:25 Outgoing: Data
01 03
41 04 31 32 33 34 → TARGETID "1234"
41 02 30 31 → DATASEG "01"
A9 02 00 08 → DATALENGTH 0x08
17:29:25 Outgoing: Checksum (C5 02)
17:29:25 Incoming: ACK (06)

Reader to Host: S18F6

17:29:27 Incoming: ENQ (05)
17:29:27 Outgoing: EOT (04)
17:29:27 Incoming: Length Byte (18)
17:29:27 Incoming: Header (81 FF 12 06 80 01 00 00 00 43)
17:29:27 Incoming: Data
01 03
41 04 31 32 33 34 → TARGETID "1234"
41 02 54 45 → SSACK "TE"
41 00 → DATA ""
17:29:27 Incoming: Checksum (04 8C)
17:29:27 Outgoing: ACK (06)

The reader receives a valid S18F5 message.
If there is no tag in the reading (writing) range of the antenna, the reader answers with a tag error "TE".

8 Service and Troubleshooting

This chapter gives you an overview of the following topics:

- → General
- → Qualified Troubleshooting Personnel
- → Safety Instructions
- → Error Codes
- → Error Display with LED
- → Reader Does Not Respond
- → Reset
- → Power Cut
- → Protocol Switching
- → Software Releases
- → Customer Service

8.1 General

Follow the instructions specified in the safety chapter

Follow the general safety information in the chapter → Safety Instructions.

- **The RFID reader and its components must be serviced by the manufacturer only!**
- **If errors occur, follow the instructions in this section. Do not carry out any error eliminating measures other than the ones described in this section!**
- **If you are uncertain about errors and their handling, contact the manufacturer, see → Visit us online: www.brooks.com. Have the serial number of the RFID reader ready as shown on the label (see → Device Label) when contacting the manufacturer!**

8.2 Qualified Troubleshooting Personnel

CAUTION

Error handling shall be carried out by specially trained personnel only. If you are uncertain about the qualifications that are required, contact the manufacturer.

CAUTION

Error handling the device without the special skills required and unqualified interference with the device can result in personal injury and damage to the reader and/or connected devices.

8.3 Safety Instructions

All antenna resonant circuit components carry high voltages.

WARNING

When spare parts are required, use only manufacturer-specified parts.

Unauthorized substitution of parts can result in fire, electric shock or other hazards.

Electrostatic charges can damage electronic components within the device.

ESD protective measures must be applied when opening the device (➔ ESD Instructions).

CAUTION

Never short-circuit the fuse! This may result in fire or damage to the device.

Only use fuses specified by the manufacturer.

CAUTION

When removing the housing lid, note that the housing lid is connected to the case with a cable.

Remove the lid carefully to prevent damage - do not pull it! Do not operate the device when the housing lid is removed!

8.4 Error Codes

8.4.1 Error ID and Alarm ID

ID	Name	Description	Possible cause	Correcting action
0	none	no error	not used	no
1	auto fail	automatic reading is not possible *	reader is still busy with a former read or write request	wait until the former request is done
2	ex fail	read or write initiated from the host and/or other actions cannot be carried out *	reader is still busy with a former read or write request	wait until the former request is done
3	write fail	data transfer to the transponder not possi-ble *	reader is still busy with a former read or write request	wait until the former request is done
4	no tag	no transponder or antenna is installed	no readable tag within the reading range	put a transponder into the antenna range, verify type and function of the transponder
			antenna is not connected correctly	check antenna connection
			antenna and transponder are in a bad orientation	check orientation between antenna and transponder (see ➔ Antenna Installation)
			antenna is not tuned	perform an antenna tuning
			disturbing field at transmitting frequency	check antenna surroundings for possible disturbing sources (monitors, servo motors, ...)
			antenna is damaged or too close to metal	exchange antenna, verify antenna installation
5	invalid	invalid parameter or data	data sent with a command are wrong	check syntax and data of command
			sent parameter is not implemented or is out of range	check syntax and value of parameter
6	unknown	unknown error	not used	no
7	unconfig	the device is not configured	wrong reader address is sent	check syntax of message, check parameter F „Reader address“

ID	Name	Description	Possible cause	Correcting action
8	check	parity and/or checksum error	wrong baud rate is set	check baud rate of serial interface (COM port)
			transmission errors on serial communication	check RS232 cable and connectors, check disturbing sources at RS232
9	void ackn	no valid acknowledge (unexpected acknowledge)	double or wrong acknowledgment	check host communication settings
			serial communication is interrupted	check RS232 cable and connectors, check disturbing sources at RS232
			Ethernet communication is interrupted	check Ethernet cable and connectors, check the Link LED and the Traffic LED, verify IP address settings
A (10)	locked	locked page cannot be written	page to be written is locked (permanently write protected)	check page number to write, replace tag with new one
:	msg len	message too long or too short or message is not received completely	length of message is longer than shown at the length byte	check message length, check length byte
			no valid end sign of message (end sign 0xD) detected	check syntax of message
			not all characters are transmitted (Intercharacter timeout)	check syntax of messages, check RS232 or Ethernet connection
;	invalid	invalid command	unknown command was sent	check syntax of command
B (11)	no ackn	the message which has to be confirmed has been sent the maximum number of times (RS232 maxrepeat) and has not been confirmed by the terminal within the defined time frame (see ➔ Parameter 5 (0x05))	host system does not acknowledge the message	check availability of the host system (terminal), check RS232 cables and connectors, check Ethernet cable and connectors, check the Connect LED and the Traffic LED, verify IP address settings

ID	Name	Description	Possible cause	Correcting action
C (12)	bad type	incorrect transponder type	incorrect transponder type is used (read only or read/write instead of Multipage)	check transponder type and replace it

* because the device is still busy or because a message has not been confirmed by the previous read up to now

8.4.2 SSACK

SSACK	Name	Description	Possible cause	Correcting action
EE	Execute error	transponder data and read ID sequence cannot be read	transponder has no or too less valid ASCII characters on MID area	program transponder with valid ASCII characters on MID area
			parameters for MID area are not matching transponder data	set reader parameters for MID area corresponding to transponder data area for the MID
			reader is still busy with a former read or write request	wait until the former request is done
			incorrect reader mode for operation	switch to correct mode (MANT for writing MID)
CE	Communication error	syntax error of message ore message format or incorrect value	data sent with a command are wrong	check syntax and data of command
			list format, amount of lists or data type is wrong	check syntax of SECS message
			sent parameter is not implemented or not within the range	check syntax and parameter value
TE	Tag error	no transponder or antenna installed	no readable tag within the reading range	put a transponder into the antenna range, verify type and function of the transponder
			antenna is not connected correctly	check antenna connection
			antenna and transponder are in a bad orientation	check orientation between antenna and transponder (see ➔ Antenna Installation)
			antenna is not tuned	perform an antenna tuning

SSACK	Name	Description	Possible cause	Correcting action
			disturbing field at transmitting frequency	check antenna surroundings for possible disturbing sources (monitors, servo motors, ...)
			antenna is damaged or too close to metal	exchange antenna, verify antenna installation

8.4.3 Stream Function

Stream Function	Description	Possible cause	Correcting action
S9F1	unrecognized DeviceID	message with wrong DeviceID was sent to the reader	send a message with the correct DeviceID (can be taken from the S9F1 message)
S9F3	unrecognized stream type	message with a unknown stream type was sent to the reader	check stream function syntax of the message
S9F5	unrecognized function type	message with a unknown function type was sent to the reader	check stream function syntax of the message
S9F7	illegal data	wrong RIC at reset message	check RIC value
S9F9	Transaction Timer Timeout	host system does not acknowledge the message or sends no answer	

8.5 Error Display with LED

8.5.1 Power LED Does Not Light Up

- **Check the power supply and the connection cables!**
- **Remove the housing lid as described in ➔ Housing Without Mounts, and check if the power LED inside the reader is lit up (see ➔ Indicating and Operating Elements)!**
- **If the LED does not light up, disconnect the device from the power supply and carefully remove the fuse (see ➔ Inside View). Test the fuse. If it is defective, replace it with a fuse specified by the manufacturer!**
- **If the above measures do not solve the problem, leave the reader disconnected and contact the manufacturer!**

8.5.2 Error LED Lights Up (in Test Mode)

- **Press the tuning button.**
- **If the OK LED does not light up, the transponder is not within the reading/writing range of the antenna. Install the antenna closer to the transponder (see individual antenna ranges: www.brooks-rfid.com). If this does not solve the problem, contact the manufacturer!**

If the tuning LED flashes:

- **Check if the antenna is located too near to a strong metallic environment. Relocate the antenna with more distance!**
- **Press the Tuning button for antenna tuning.**
- **Check if the antenna and the antenna cable are connected correctly. Use another antenna cable if available!**
- **If these measures do not solve the problem, contact the manufacturer!**

8.6 Reader Does Not Respond

- **Check if the interface connection cable is undamaged and correctly connected to both reader and host!**
- **Check the status as indicated by the LED!**
- **Download the test software from the Internet www.brooks.com → Service → Download. Follow the instructions!**
- **If these measures do not solve the problem, contact the manufacturer!**

8.7 Reset

- **In the case of a malfunction, a hardware reset can be performed by switching the power supply off and on!**
- **After the reset, the reader performs a self-test. The self-test can take up to five seconds. As the first step in these self-tests, all LEDs of the membrane keyboard light up. At the second step, the reader displays the key statuses of the membrane keyboard. If a LED is on, the specified button is active. The input LED signalizes the ASCII protocol and the output LED signalizes the SECS protocol. If the test was successful, all LEDs - except for the power LED - go off.**

8.8 Power Cut

After a power cut, the reader performs a reset with self-test. The self-test can take up to five seconds. In the first step of these self-tests, all LEDs of the membrane keyboard light up. In the second step, the reader displays the key statuses of the membrane keyboard.

If a LED is on, the specified button is active. The input LED signalizes the ASCII protocol and the output LED signalizes the SECS protocol. If the test was successful, all LEDs - except for the power LED - go off.

8.9 Protocol Switching

It is possible to change the type of protocol on a power-up reset. If the read and the write buttons are pressed at the time of power-up reset, the reader changes the protocol type from SECS to ASCII or ASCII to SECS. Wait until the Input or Output LED does not change and light up. Release the buttons to start the reader with the new protocol type.

8.10 Software Releases

Release Date	Version	Description
June 2011	RIV5.0	Basic version
March 2013	RIV5.1.3/ RS2V51	Hardware version up to 25 characters, factory settings by serial UDP message

8.11 Customer Service

For Technical Support:

Location	**GUTS® Contact Number**
North America	+1-800-FOR-GUTS (1-800-367-4887)
	+1-978-262-2900
Europe	+49-1804-CALL-GUTS (+49-1804-2255-4887)
Japan	+81-45-477-5980
China	+86-21-5131-7066
Taiwan	+886-3-5525225
Korea	+82-31-288-2500
Singapore	+65-6464-1481

Visit us online: **www.brooks.com**

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9 Dismantling and Storage

This chapter gives you an overview of the following topics:

- → Dismantling
- → Storage

9.1 Dismantling

- **Remove the power supply device!**
- **Remove all cables!**
- **Loosen and remove the mounting screws!**
- **Remove the device from the installation area!**

9.2 Storage

Store the reader and its components in a clean and dry environment with the power supply disconnected.

Make sure the contacts remain clean. Observe the necessary storage conditions.

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10 Transport and Disposal

This chapter gives you an overview of the following topics:

- → Transport
- → Disposal

10.1 Transport

For transportation purposes such as mailing, use a firm cardboard box. Use adequate padding material to protect the device on all sides.

10.2 Disposal

The device and its components are made of various materials.

Dispose of these materials separately, and observing the legal regulations of your country.

Do not dispose of the device in regular household waste.

Disconnect the electronic components from the case and dispose of them as follows:

- the case as plastic trash
- the electronic components, antennas and cables as electronic waste

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11 Accessories

This chapter gives you an overview of the following topics:

- → Antennas
- → Plugs
- → Cables
- → Mounting Brackets
- → Mounting Brackets

11.1 Antennas

11.1.1 Available Types

Type	Part-No.	Picture
Micro antenna (ANT-1Mxx)	ANT-1Mxx	
Mini antenna (ANT-1Kxx)	ANT-1Kxx	
Rod antenna (ANT-1Sxx)	ANT-1Sxx	
Frame antenna (ANT-1Rxx)	ANT-1Rxx	

xx = cable length

03 → 300 mm
05 → 500 mm
10 → 1,000 mm
15 → 1,500 mm

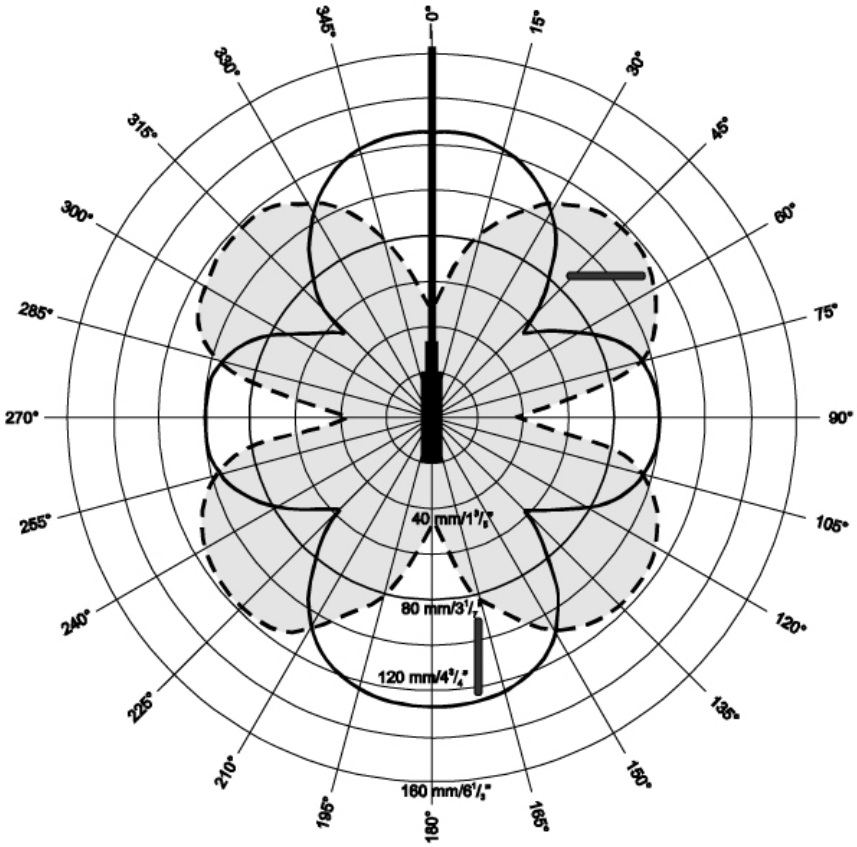
11.1.2 Reading and Writing Ranges

ATTENTION

If the transponder is very close to the antenna the transponder may be de-tuned by the metal of the antenna and reading/writing is not possible. We recommend keeping a minimum distance between transponder and antenna of about 10 mm.

The following reading/writing ranges are measured with a 32 mm glass transponder (read only, read/write, multipage). If you use a multipage transponder, the diagrams are only valid for page 1 of the multipage transponder.

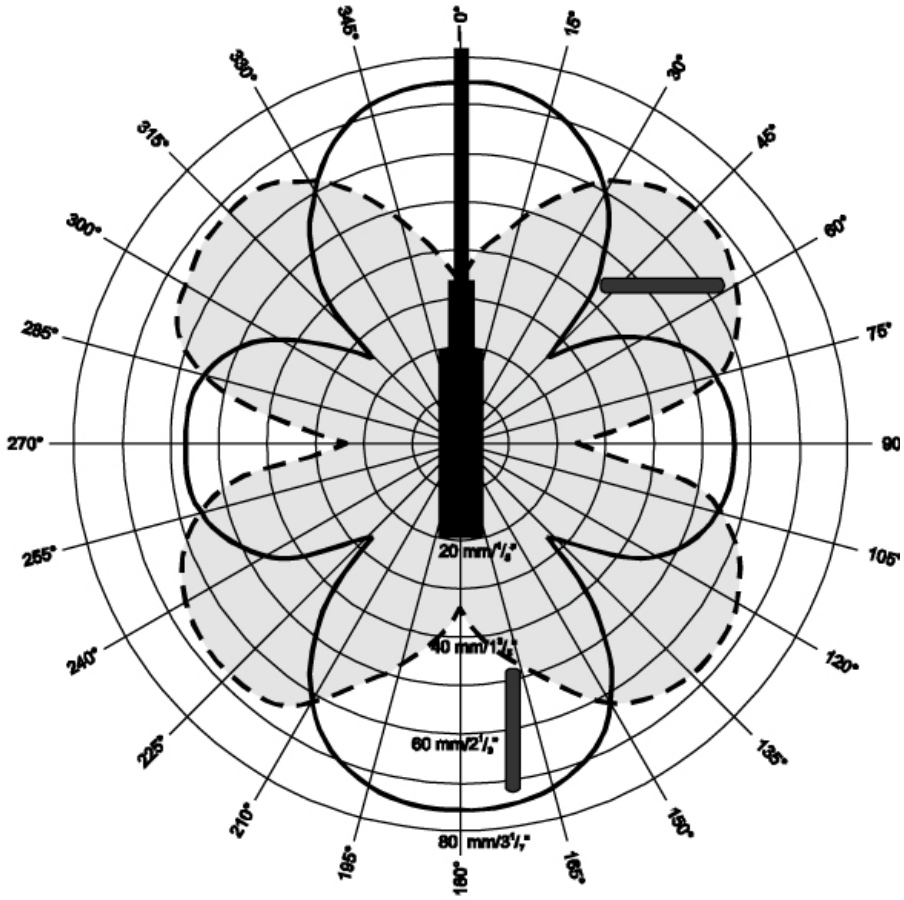
Reading range micro antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

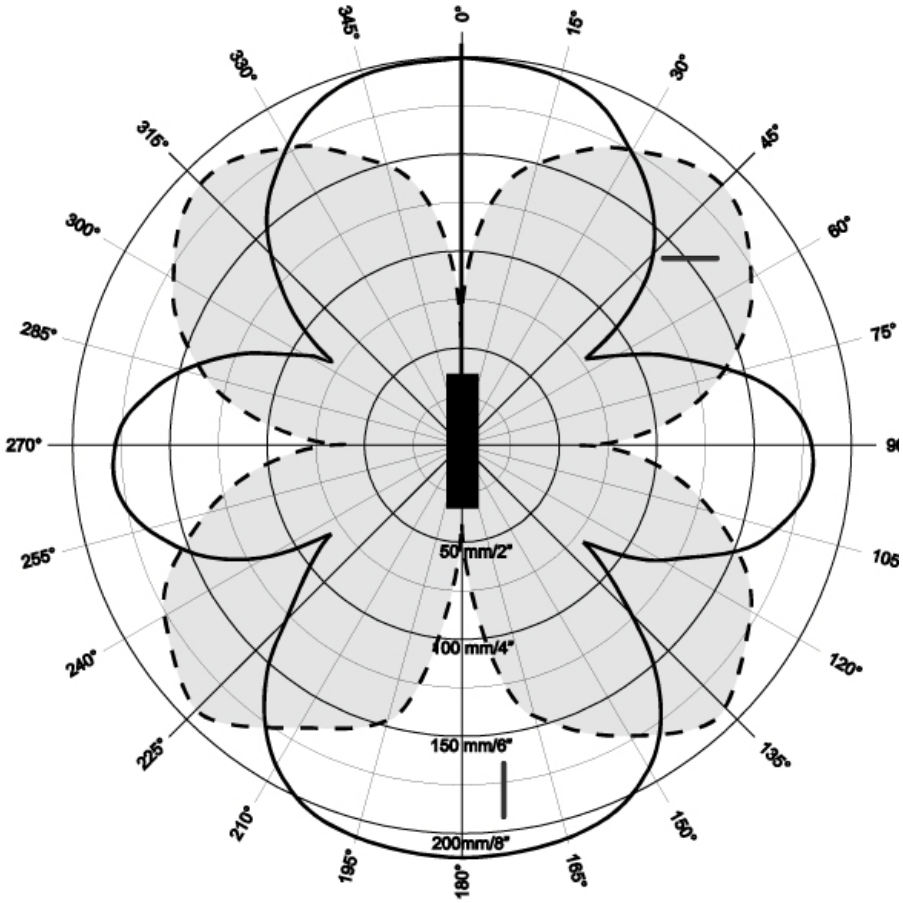
Writing range micro antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

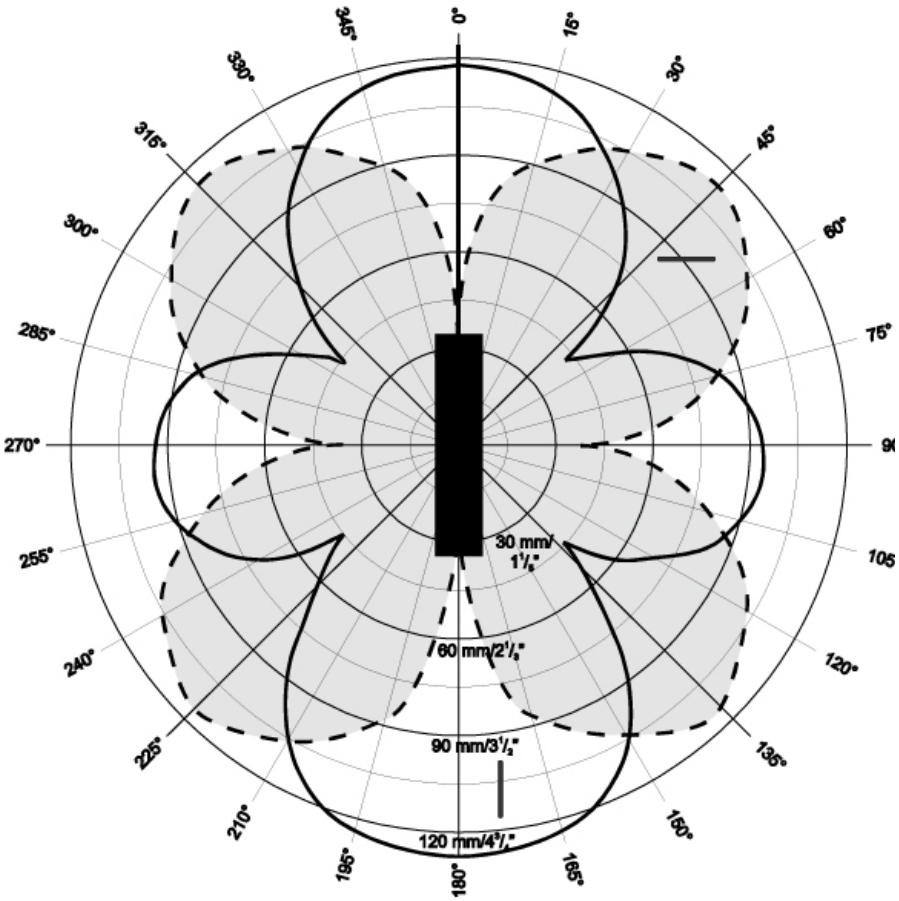
Reading range mini antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

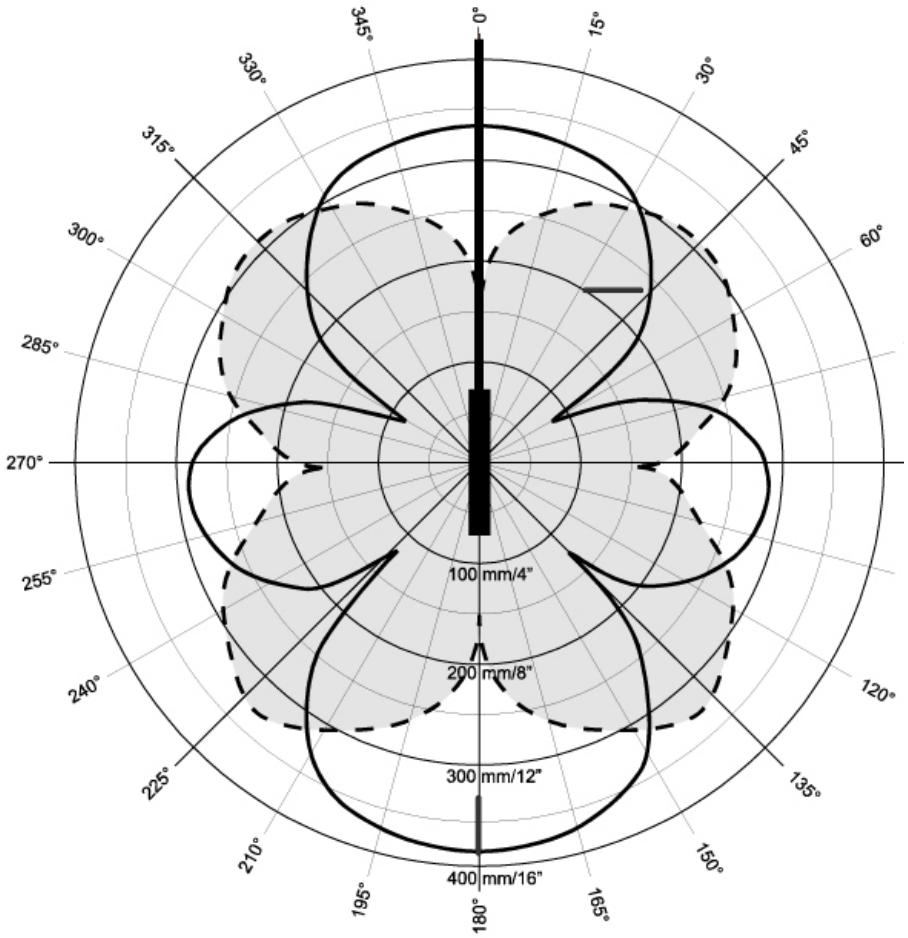
Writing range mini antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

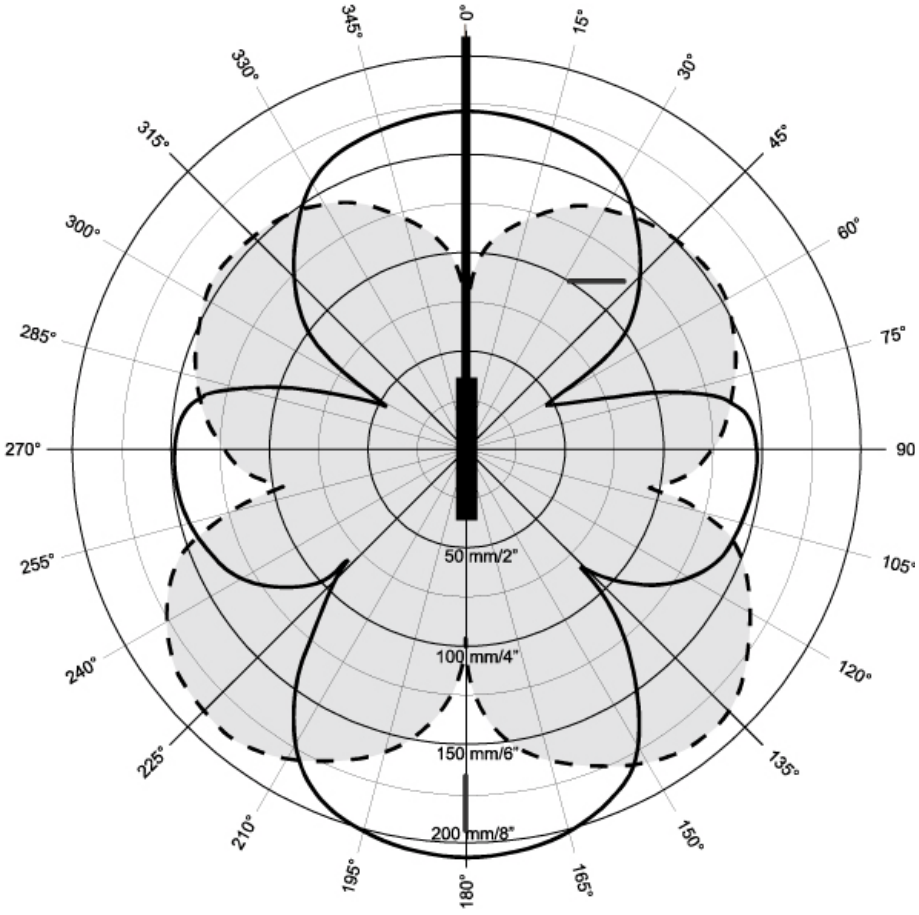
Reading range rod antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

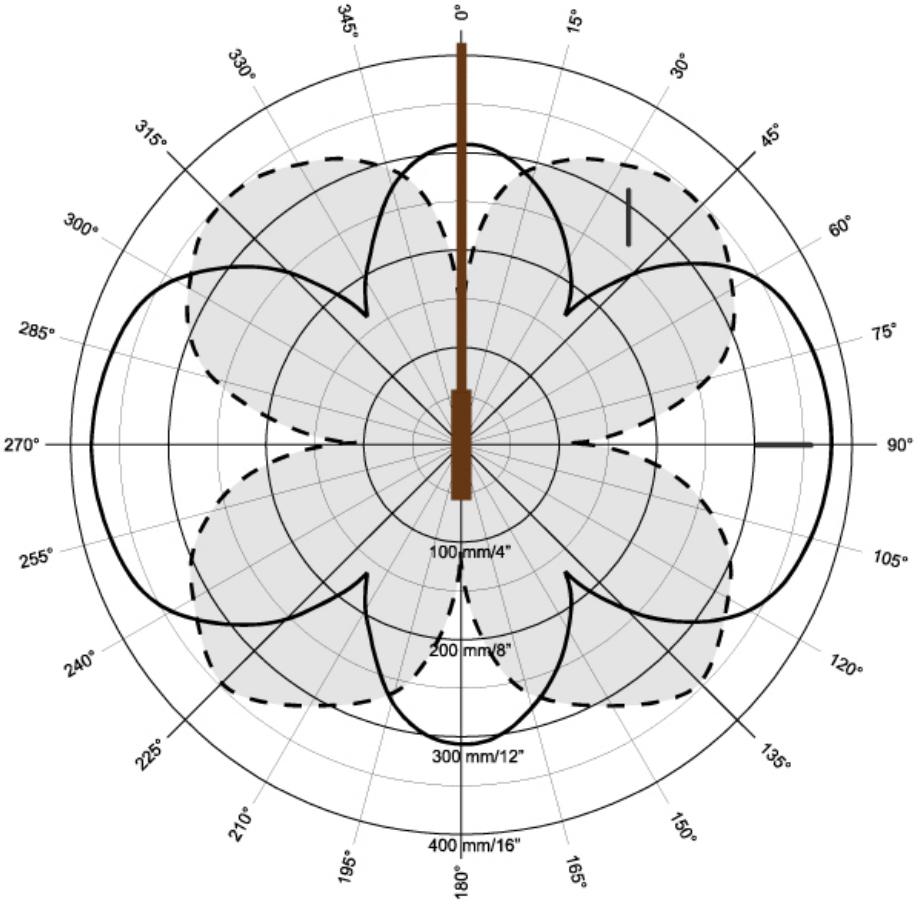
Writing range rod antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

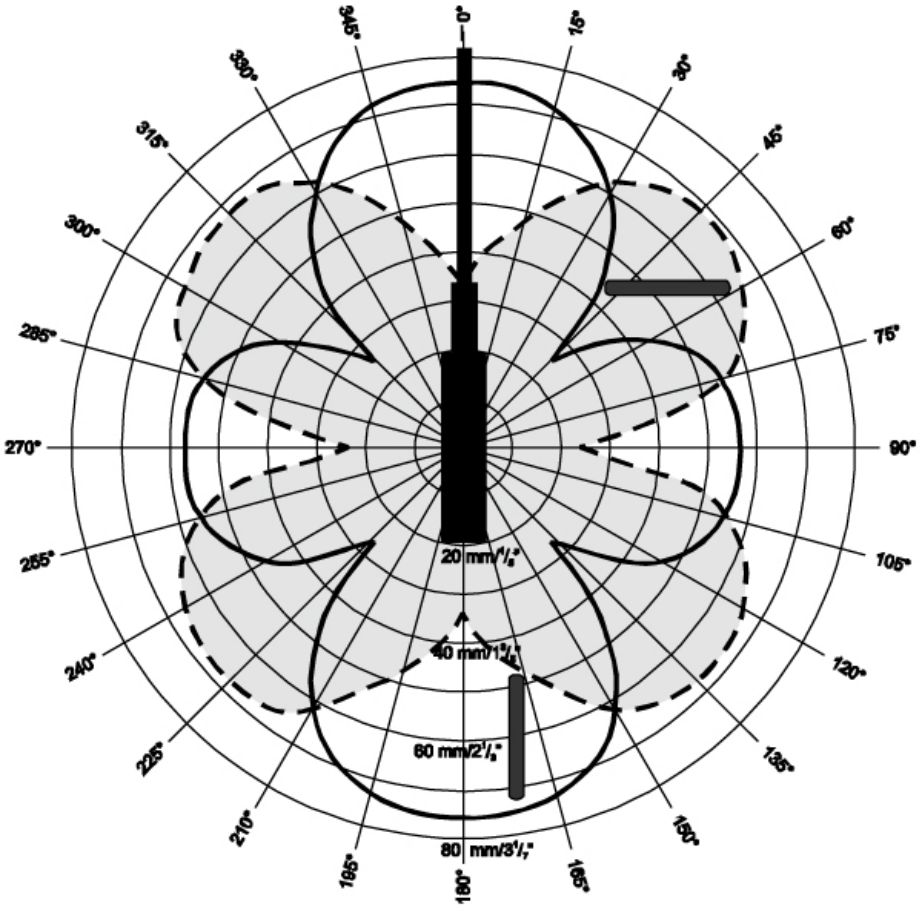
Reading range frame antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

Writing range frame antenna



_____ Transponder parallel to antenna

- - - - - - - Transponder vertical to antenna

11.2 Plugs

Type	Part No.	Picture
Female power plug, straight	KBV-GK	
Female power plug, angled	KBV-WK	
Cable plug, ext. sensor, metal	KS-SENS1	
Cable plug, ext. output, metal	KS-LED1	

11.3 Cables

Type	Part No.	Picture
RS 232 serial communication cable RSK9-10 = 1,000 mm RSK9-20 = 2,000 mm RSK9-60 = 6,000 mm	RSK9-10 RSK9-20 RSK9-60	
Power supply cable KBV24-05 = 500 mm KBV24-10 = 1,000 mm KBV24-20 = 2,000 mm KBV24-30 = 3,000 mm KBV24-60 = 6,000 mm	KBV24-05 KBV24-10 KBV24-20 KBV24-30 KBV24-60	

11.4 Mounting Brackets

Type	Part No.	Picture
Mounting set for standard housing	RMS-01	

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Index