ATR60LF RFID Reader CAN Bus

Product Manual

260301 Revision A

Brooks Automation

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Accelerating Innovation

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Revision History

This section gives an overview of the change history for the document.

Revision	ECO Number	Date	Explanation of Changes
A	XXXXX	25/10/2016	Initial Release

Table of Contents

1 Identification

This chapter gives you an overview of the following topics:

- ➔ Model
- ➔ Designated Use
- ➔ Incorrect Use

1.1 Model

ATR60LF READER CAN Bus

Serial number e.g. 1607SNI12345

Part number TLS-33C-4O00-C1-00E2

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 operating instructions
- 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 Brooks. 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.
- 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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment.

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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- This equipment is only intended for professional installation.

FCC ID: N5GATR60LFCAN

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

IMPORTANT

Changes or modifications not expressly approved by Brooks Automation, Inc. could 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 ATR60LF CAN Reader
Function: RFID Reader
Part Number: TLS-33C-XXXX-XX-XXXX

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

The Product Manual must be read prior to the initial start-up. Observe the safety instructions!
Store for future use!
Follow the general safety instructions in the chapter ➔ Safety 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 operating instructions
- 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 operating instructions serve as support and contain all the necessary safety information that must be followed for general safety, transport, installation and operation.

These operating instructions 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

The operating instructions are addressed to personnel with the following areas of responsibility:

Area of responsibility	Competence
Installation, transport and storage	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:

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

4.1 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.

4.2 Area of Application and Symbols

DANGER

Danger to Life, Risk of Injuries or Loss of Property

Risks exist when disregarding the operating instructions and the safety instructions therein.

Carefully read the operating instructions 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 operating instructions are the responsibility of the company operating the device or of the assigned personnel. Malfunctions that could compromise safety must be eliminated immediately.

4.2.1 Safety Symbols - in Compliance with DIN 4844-2

WARNING

Risk of Injuries When Disregarding Safety Symbols

Risks exist when disregarding warnings in the operating instructions.

Please heed the warnings.

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

4.2.2 Warning Symbols

Warning: Hazardous area

Warning against hazardous electrical voltage

Warning against electromagnetic radiation

Warning: Flammable materials

Warning: Potentially explosive atmosphere

Warning against electrostatically sensitive components

4.2.3 Prohibition Symbols

Unauthorized access is prohibited

Fire, open flame and smoking is prohibited

Switching is prohibited

Prohibition

4.2.4 Other Symbols

Dispose of packing material according to regulations

Recycling

Important information

Refer to manual

Disconnect from power supply

4.3 Obligations

4.3.1 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!**
- **Prevent unsafe and/or dangerous work procedures! If necessary, check employees' actions!**
- **Only permit personnel to be trained or instructed within the scope of general training on the device under the supervision of an experienced person!**
- **Personnel must have understood the operating instructions. 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!**

4.3.2 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 Brooks on behalf of the operating company.

All warranty claims are void when disregarded.

4.4 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 touching any components on the interior of the device!**
- **Touch electronically sensitive parts carefully and only at their corners!**

4.5 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 operating instructions 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 with 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.

4.6 Additional Instructions

- Read and understand all safety and operating instructions prior to installing and operating the device.
- This documentation was written for specifically trained personnel. The installation, operation and defect management may only be carried out by specifically trained personnel.
- Retain these instructions. Keep this documentation in a location that is accessible to all personnel involved with the installation, use and troubleshooting of the device.
- Observe all warnings. Follow all warnings on and in the device and in the documentation.
- Install the device only in accordance with Brooks instructions.
- Use only the accessories and cables supplied by Brooks.
- Troubleshooting that is not described in the chapter ➔ Service and Troubleshooting may only be performed by Brooks.
- 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 bend the antenna cables too far or subject them to mechanical forces.
- When spare parts are required, use only the spare parts that were specified by Brooks. 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

5 Product Specifications

This chapter gives you an overview of the following topics:

- → Function
- → Images
- → Description of Components
- → Technical Data

5.1 Function

5.1.1 General

The BROOKS RFID reader system is a radio-frequency identification system.

The reader of the system sends an electromagnetic field to the battery-free transponder via the antenna. This activates the transponder and sends the stored data back to the reader.

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 RFID CAN Gateway via:

- CAN Bus Interface

5.1.2 Basic Functions

The reader can support various basic functions:

- Reading of data
- Writing of data
- Setting and reading reader parameters
- Subsystem commands
- Read status

5.1.3 Normal Mode

In normal mode the Brooks RFID reader is ready for operation directly after a hardware reset. ATR60LF also sends an power up event to the host when it starts up. In this mode it does not perform any independent actions. The latter usually have to be triggered by the host issuing protocol commands. The exceptions are sensors and pushbuttons that on some Brooks device variants are located on the exterior of the housing. Status changes at the inputs generate messages that are automatically sent to the host, provided a connection exists.

Individual protocol commands can be sent to the device as soon as the reader has been connected to the Gateway. For communication the default settings of the CAN Bus interface have to be observed (➔ Parameters of the CAN Bus Interface).

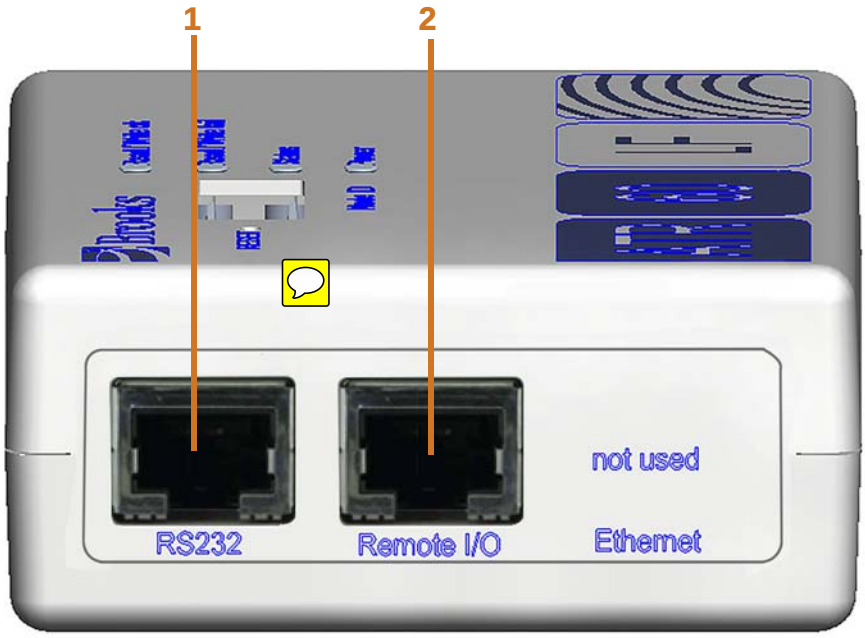
5.1.4 Automatic Reading

Brooks RFID CAN Bus readers provide the option of “Automatic Reading”. In this case a read operation is performed which is triggered by a sensor. If a connection exists, the data of the automatic read operation is then sent to the host immediately.

This automatic read operation is enabled by multiple parameters. After a defined sensor delay time the reader detects the sensor change. With the “Watchport” parameter the behavior is defined for when a sensor change has been detected. With the „PIP_XYZ“ parameters the behavior of the automatic reading is enabled and adjusted. If the read function has been enabled, the device performs the automatic read operation independently.

5.2 Images

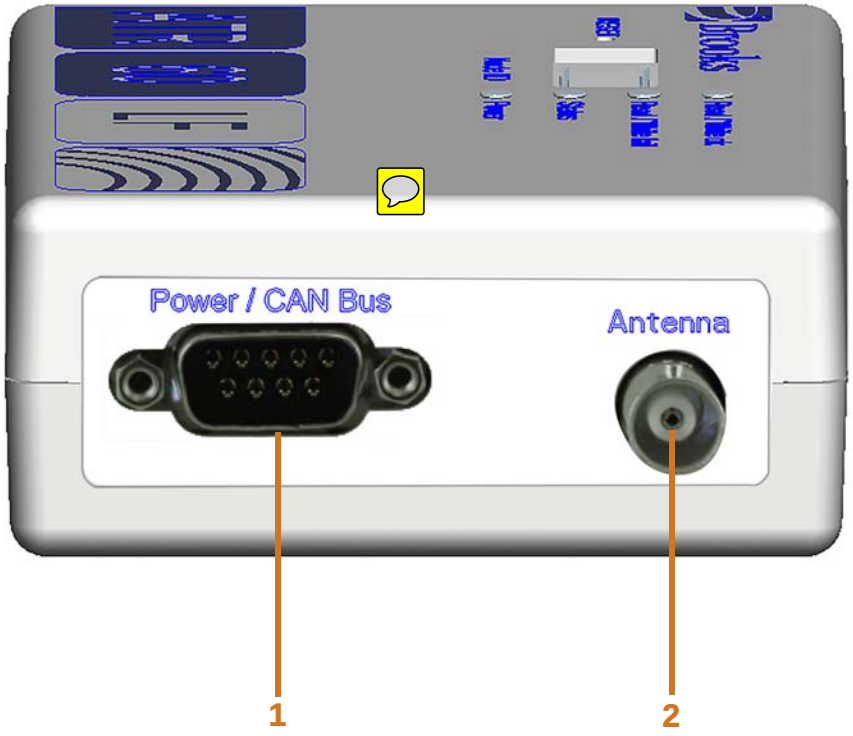
5.2.1 Front View



1 RS232 port

2 Remote I/O port

5.2.2 Rear View



1 Power/CAN bus connection

2 Antenna port

5.2.3 Top View

1	Reset button
2	DIP switches
3	Status LEDs

5.3 Description of Components

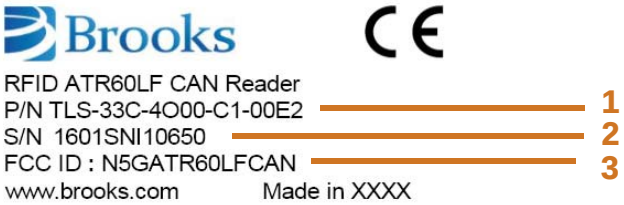
Components	Description
RS232 interface	The data are passed down serially to the RS232 interface (RJ45) with the different protocols. Baud rates of 4,800 up to 57,600 Bd are possible.
Remote I/O	The Remote I/O port is used for external presence sensors and an external output like a LED for status indication.
Power / CAN Bus connection	Connector for power supply and CAN Bus
Antenna port	Port for connecting an antenna
Reset button	If the Reset button will be pressed a short time, the communication parameters of the reader will be reseted to default values. The network settings, RS232, RS485, and protocol timer parameters are involved. The CID parameters will not be changed. If the Reset button will be pressed longer than 5 seconds, the reader is restarted and all parameters are set to default values.
DIP switches	The DIP switches are used for setting the reader address, test mode, protocol selection, switching between reading and writing action in test mode and for activation of automatic antenna tuning (➔ DIP Switches)
Power LEDs	If the correct power supply is connected to the device, the power LED lights up green and the device is ready for operation.
Status LED	The status LED indicates the current status of the device.
Read / write ok and Read / write fail LED	The two Read / write LEDs indicate the result of the last read or write action.

5.4 Technical Data

Technical data - device	
Operating temperature	0 °C to +50 °C 32 °F to 122 °F
Storage temperature	-20 °C to +70 °C -4 °F to +158 °F
Permissible humidity at 50 °C / 122 °F	25 - 80%
Frequency	134.2 kHz
Protection class	IP40
Housing material	PS
Weight	about 180 g l 6.35 oz.
Dimensions	111.5 x 80 x 35 mm 4.4 x 3.1 x 1.4 in.
Fuse	375 mA (T)
Serial interface RS232	4,800 Bd - 57,600 Bd
CAN Bus interface	500 kBits/sec
Vibration/shock test	EN 60721-3-3:1995 Class 3M4

5.4.1 Device Label

The device label with the CE mark, part and serial number is on the device housing.



1 Part number

2 Serial number (example)

3 FCC ID

5.4.2 Power Supply and Current Input

Description	Min	Type	Max	Unit
Voltage (proof against connecting to the wrong port)	18	24	30	V DC
Current (reading/writing) pulsed current (70 ms)		100	 400	mA
Current (passive)		80		mA

6 Installation

This chapter gives you an overview of the following topics:

- → Safety Instructions
- → Qualified Installation Personnel
- → Unpacking
- → Assembly of the Device
- → Antenna Installation
- → Connecting the RFID Reader
- → Power/CAN Bus Connection
- → RS232 Connection
- → Commissioning
- → Input and Output
- → DIP Switches

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

The installation is to be carried out by specially trained personnel only. If you are uncertain about their qualification, contact Brooks.

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

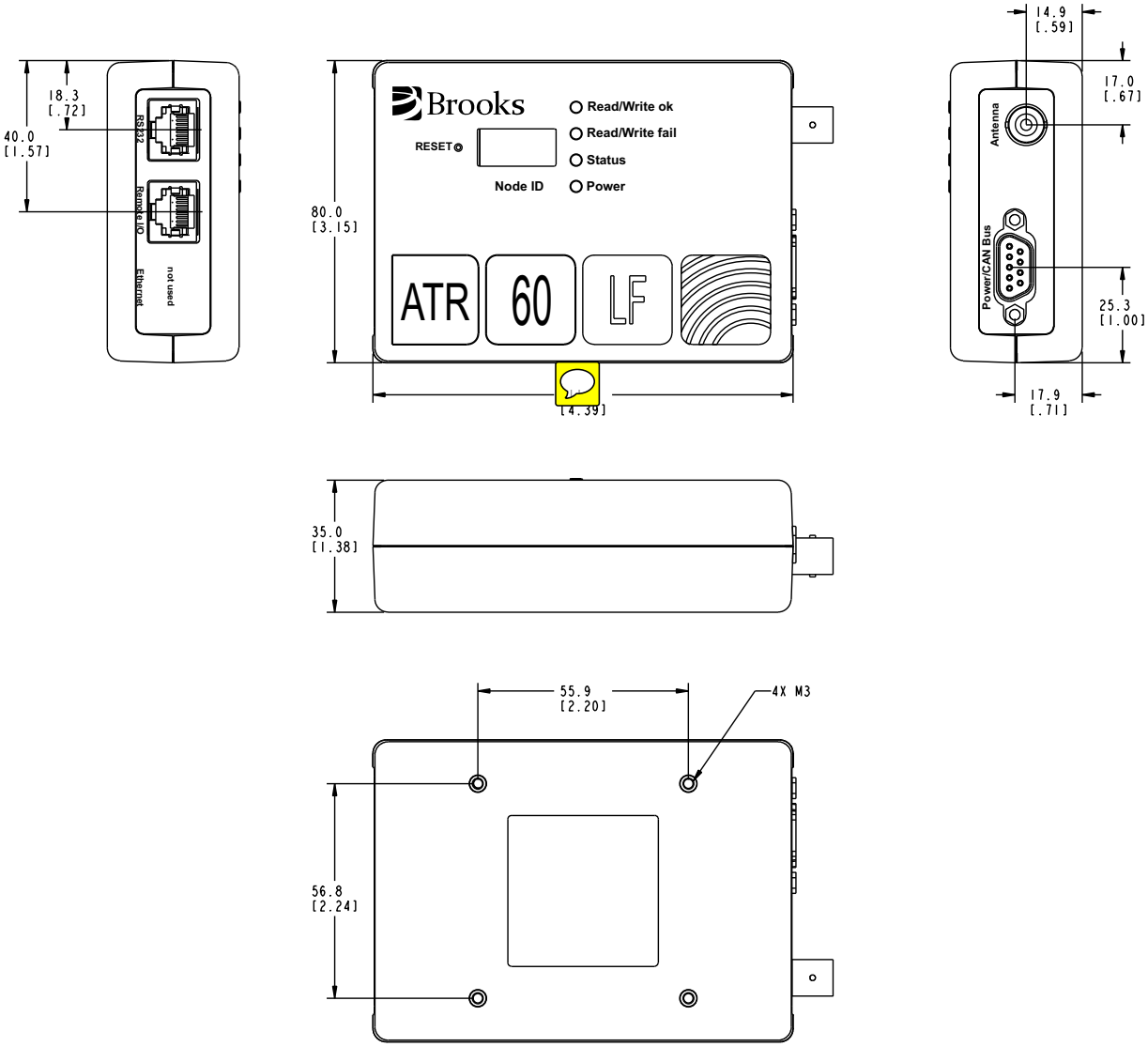
ATTENTION

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



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.

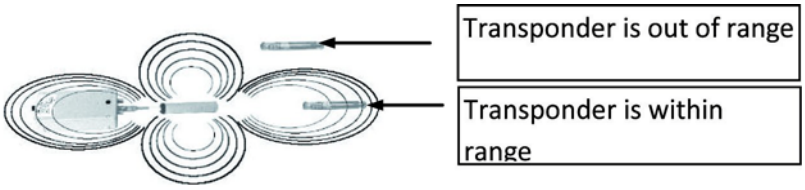
If the transponder is very close to the antenna, the transponder may be de-tuned by the metal of the antenna and a reading/writing is not possible. We recommend keeping a minimum distance between transponder and antenna of about 10 mm.

After antenna installation the antenna should be tuned (➔ DIP Switches).

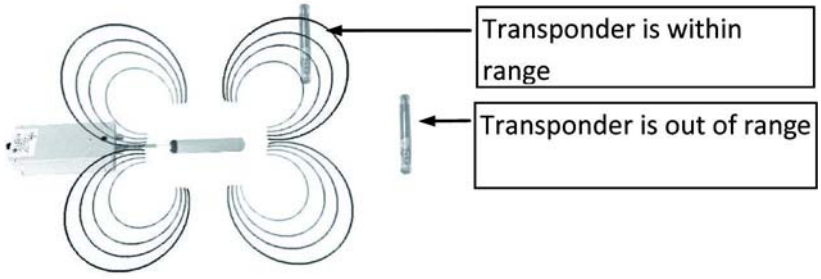
6.5.1 Positioning the Antenna

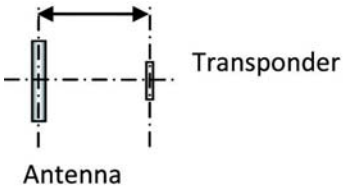
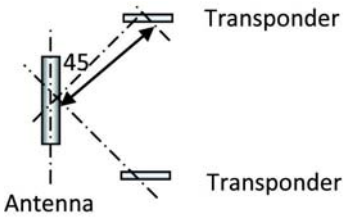
Reliable reading and writing depends on the distance from and orientation of the transponder to the antenna.

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.	

6.5.2 Available Antenna Types

Different types of antennas are available on request.

6.6 Connecting the RFID Reader

Connect the antenna to the antenna port (➔ Rear View) and tune the antenna.

Connect the reader to a power supply (➔ Front View) and a Gateway connection (CAN).

ATTENTION

The antenna-connector housing should have no connection to other objects,

e.g. mounting plate!

6.7 Power/CAN Bus Connection

DANGER

Risk of death due to dangerous voltage

Risks exist when supplying the device with the incorrect voltage.

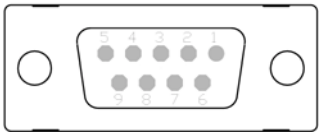
Only use cables, plugs and adapters supplied by Brooks.

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 ➔ Customer Service.

Pin	Signal
1	Not used
2	CAN Low
3	Signal ground
4	Not used
5	Power ground
6	Signal ground
7	CAN High
8	Not used
9	+24 V DC



6.8 RS232 Connection

The RS232 port is a shielded RJ45 socket. A cable for connecting to a PC is available.

Pin	Signal
4	Ground
5	TxD
6	RxD

6.9 Commissioning

6.9.1 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 Gateway must be connected to the reader.

6.9.2 Parameters of the Serial Interface

Baud rate	9,600
Data bits	8
Stop bit	1
Parity	NONE

6.9.3 Parameters of the CAN Bus Interface

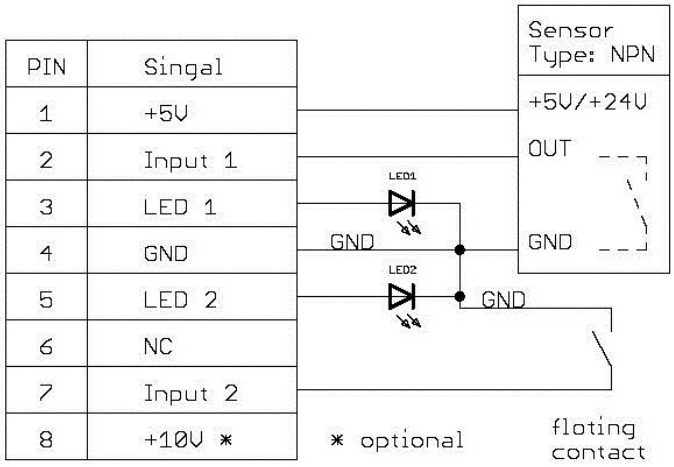
CAN Bus Interface	500 kBits/Sec
Message Length	8

6.10 Input and Output

The port labeled Remote I/O is used for external presence sensors and an external output like a LED for status indication. The input signal is used for pod placement and pod removal events.
The port is a shielded RJ45 socket.

Pin	Signal
1	+ 5 V
2	Input 1
3	LED 1 out
4	GND
5	LED 2 out
6	NC
7	Input 2
8	10 V (optionally)

connection example In-/Output



6.11 DIP Switches

The DIP switches 1 to 5 set the TargetID (0 - 31). The TargetID of the CAN Gateway has value 0. The new TargetID is set when the reader is powered. Switch 1 is the LSB and switch 5 is the MSB of the TargetID. A switch at ON or Open position is 1, a switch at OFF or Close is 0.

Switch #	1	2	3	4	5
Binary digit	1	2	4	8	16

Switch position values:
01 - 00001
03 - 00011
10 - 01010
16 - 10000
27 - 11011
31 - 11111

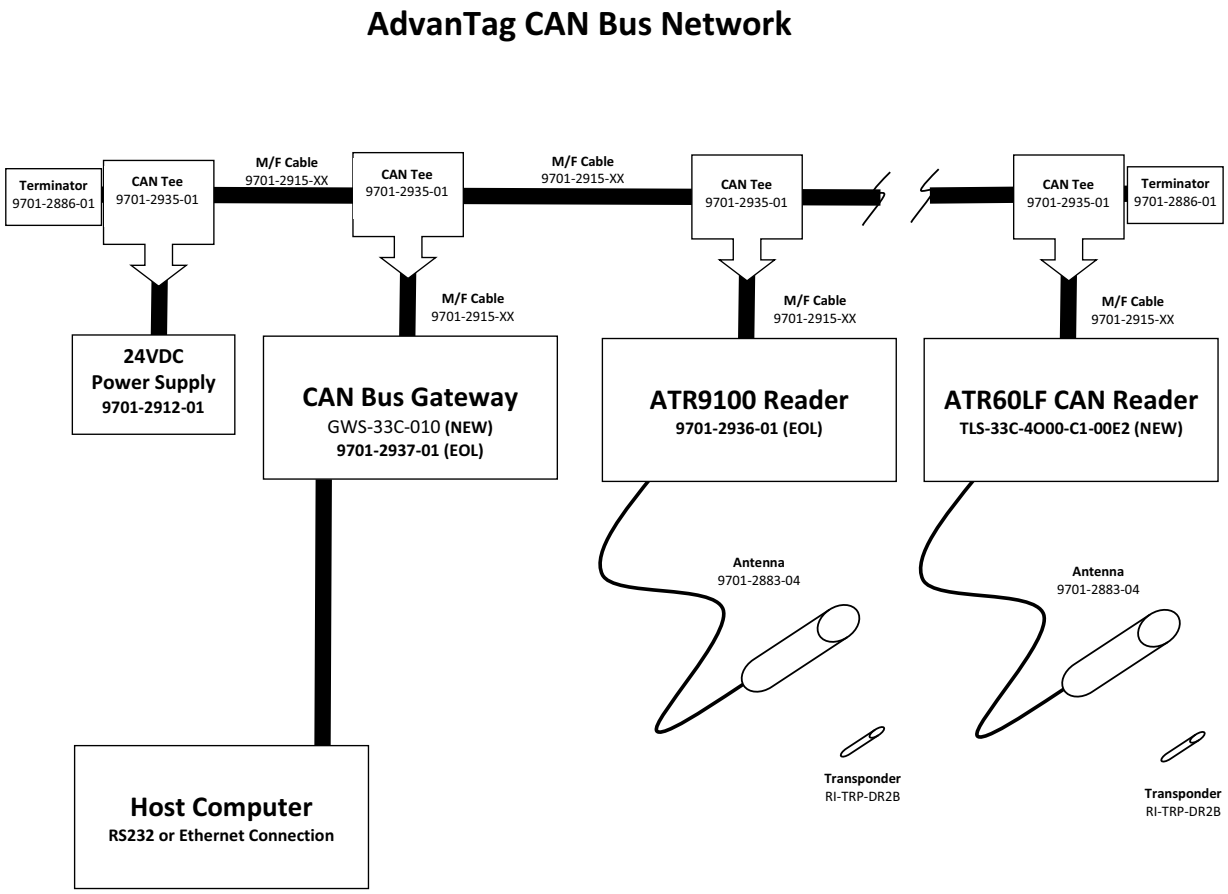
e.g. ID = 1

e.g. ID = 5

e.g. ID = 21

Switch #	Function
6	Switches between reading and writing action in test mode. OFF - only reading a transponder ON - reading and writing a transponder
7	Switches the reader into test mode. In test mode, the reader reads or writes (depends on the setting of switch 6) permanently to the transponder, and shows the result via LED 'Read/Write ok' and 'Read/Write fail'. "ON" test mode activation
8	The trigger in the ON position performs an antenna tuning cycle.

6.12 CAN Bus Network Topology



7 Operation

This chapter gives you an overview of the following topics:

- ➔ Operating Personnel
- ➔ Data Items Dictionary
- ➔ Attribute (ECID and SVID) Values
- ➔ Operation of the SECS Protocol

7.1 Operating Personnel

CAUTION

The RFID Reader ATR60LF CAN is designed to be operated by specially trained personnel only. If you have doubts about the required qualifications, contact Brooks.

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

7.2 Theory of Operation

7.2.1 ATR60LF CAN Reader

The ATR60LF CAN Reader only communicate with the CAN Gateway through CAN Bus Port. It is backwards compatible with the ATR9100 in CAN Bus mode. It is up to 31 ATR60LF CAN Readers can connect to the ATR CAN Gateway via a single host. The host system can address each of the ATR60LF CAN reader via the Gateway, which makes the Gateway a transparent system. The Communication between the ATR Gateway and the multiplexed ATR60LF CAN Reader occurs on the CAN Bus.

7.3 Data Items Dictionary

This section defines the data items used in the standard SECS-II messages and in the ASCII protocol. Some data items are for SECS communication only and others are for ASCII communication only. Most of them are used in both protocols.

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. 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.

ATTRID	Format: 41

Identifier for an attribute for a specific type of object.

Attributes are Auto-ID configuration parameters (similar to ECIDs) and status variables (similar to SVID).
For available attributes and their values, see data item ATTRVAL.

Where used S18F1, S18F3

ATTRVAL	Format: 41

Value of an attribute for a specific type of object.
See ➔ Attribute (ECID and SVID) Values.

Where used S18F2, S18F3

CEID	Format: 41

Group Event Report ID

01 - Material (pod/cassette) arrival event
02 - Material (pod/cassette) removal event
08 - Power-up event

Where used S18F71

CPVAL	Format: 41

Command Parameter Value (see description of message S18F13).

This parameter provides the command to be carried out by the target.

LEDStatus
LED state, 1 byte
0 = Off
1 = On
2 = Flash
3 - 255 = Reserved

LEDNo
LED number, 1 byte
1 = Status LED
2 = Status LED
3 = External output
4 - 9 = Reserved

OpStatus
Operation status: Maintenance or Idle
MT = Maintenance
OP = Operational/Idle

PageNo
PageNo refers to the page of the transponder.
PageNo takes values from 1 - 17.

Timeout
Timeout period, 2 bytes
Units: seconds
Range: 1 - 98
"99" has a special meaning: it specifies "always". For example, an LED is turned on with the TIMEOUT value of 99; it will stay on until the host turns it off or the device is reset.

Where used S18F13

DATA	Format: 41

Transponder data

Read or write data within the available capacity of the Auto-ID.
Foup transponder - single page ID: 8 bytes (read only)
Foup transponder - multi-page ID: depending on model number up to 120 bytes

Where used S18F6, S18F7

DATALENGTH	Format: 41, A9

Total bytes to be sent.

Range: 1 - 120

IMPORTANT

If the field has a length of zero, all the data from the DATASEG onwards is reported.

- < DATASEG > must start with the first character "0" and be followed by other numeric numbers. It indicates that the reading will start from this offset up to the specified DATALENGTH.
- Format code A9 is available on earlier versions of the software. Please contact Brooks for availability of these format codes.
- If DATALENGTH is present but DATASEG is not present, an error is returned.
- If both DATALENGTH and DATASEG have a length of zero, all data is read.
- To read/write pages, DATASEG ranges from "P1" - "P17" and DATA-LENGTH ranges from 1 - 8.

Where used S18F5, F7

DATASEG	Format: 41

Used to identify the source of the requested data.

Range: 0 - 119

- “0” and numeric offset: This is the byte offset (address) of the start of specified data location to read from or write to.
- If this field is zero length, DATASEG 00 is assumed.
- To read/write pages, DATASEG ranges from “P1” - “P17” and DATA-LENGTH ranges from 1 - 8.

Where used S18F5, S18F7

MDLN	Format: 41

Equipment model number, maximum 6 bytes

Where used S18F2

MHEAD	Format: 21

SECS message block header associated with message block in error.

Where used S9F3, S9F5, S9F7, S9F9

MID (CID/CarrierID)	Format: 41

MaterialID/CarrierID is a configurable field on the reader side.

CarrierIDOffset, CarrierIDLength, CID_MAX_LENGTH determines MID.

Where used S18F10, S18F11

SOFTREV	Format: 41

Software revision code, maximum 6 bytes.

Where used S1F2

SSACK	Format: 41

SSACK acknowledge code, 2 bytes.

If there is more than one error in a message, this code represents the first error.

NO - Normal operation
CE - Communication error, could not communicate with the transponder
TE - Transponder error, could not write to the transponder, RFN only
HE - Hardware error, cannot communicate to the RFN
EE - Execution error

If EXTENDEDSSACK is ON (➔ Attribute (ECID and SVID) Values), the following error codes are also returned. However, these codes are not defined by the SEMI standard and are manufacturer-specific.

01 - Wrong TargetID
02 - Invalid seg offset
03 - Invalid data length
04 - Data too long
05 - Data length does not match data
06 - Denied, at least one attribute does not exist
07 - Denied, at least one attribute out of range
08 - Not used
09 - Not used
10 - Could not write because transponder is locked
11 - Not used
12 - Not used

13 - Not used
14 - Subsystem command does not exist
15 - At least one parameter in the command is invalid
16 - Acknowledge, command will be performed with completion signaled later
17 - Not used
18 - Wrong time-out value
19 - Wrong data format
20 - Not used
21 - Not used
22 - Not used
23 - Invalid transponder serial number; returned only if High Integrity is enabled
24 - CRC error in transponder data; probable cause is multipage transponder in
the range
25 - Could not write MID because the first page is read only
26 - Single-page transponder detected; read/write command is only allowed for
multipage transponders
27 - More than 8 bytes MID could not be written because transponder is single-
page. Please try writing 8 bytes only.
28 - Not used
29 - Not used
30 - Not used
31 - Not used
32 - Not used
33 - Not used
34 - Reset not allowed. Please see RESET_ENABLED (ECID table)
35 - 60 Not used
61 - Received S9F1, ASCII only. Used for SECS to ASCII conversion.
62 - Received S9F2, ASCII only. Used for SECS to ASCII conversion.
63 - Received S9F3 ASCII only. Used for SECS to ASCII conversion.
64 - Received S9F4, ASCII only. Used for SECS to ASCII conversion.
65 - Received S9F5, ASCII only. Used for SECS to ASCII conversion.
66 - Received S9F6, ASCII only. Used for SECS to ASCII conversion.
67 - Received S9F7, ASCII only. Used for SECS to ASCII conversion.
68 - Received S9F8, ASCII only. Used for SECS to ASCII conversion.
69 - Received S9F9, ASCII only. Used for SECS to ASCII conversion.
70 - Received S9F10, ASCII only. Used for SECS to ASCII conversion.
71 - Received S9F11, ASCII only. Used for SECS to ASCII conversion.
72 - Received S9F12, ASCII only. Used for SECS to ASCII conversion.
73 - Received S9F13, ASCII only. Used for SECS to ASCII conversion.
74 - Received S9F14, ASCII only. Used for SECS to ASCII conversion.
75 - 80 Not used
81 - Inter-character timeout, ASCII protocol only
82 - Inter-block timeout, ASCII protocol only
83 - Incorrect block sequence, ASCII protocol only
84 - Invalid checksum, ASCII protocol only

85 - Invalid ASCII command, ASCII protocol only
86 - Can not communicate to the target device; Link Manager only
87 - Invalid command structure, ASCII protocol only
88 - Invalid CarrierIDOffset, CarrierIDLength
89 - Non-printable ASCII character in MID
90 - 99 Not used

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

SSCMD	Format: 41

Auto-ID subsystem commands
01 - 03: Not used
04: Switch LED on device
CPVAL <LEDStatus>
<Timeout>
<LEDNo>
05 - 06: Not used
07 or PerformDiagnostics
Self Test
08 - 12: Not used
13 or Reset: Reset unit (same effect as hardware power-up of unit)
14: Not used
15 or ChangeStatus:
Change the status from Maintenance to Operating and vice versa
CPVAL M or MT = Change to maintenance
O or OP = Change to operating
GetStatus
Get Status information
CPVAL IDLE or
MANT
LOCK
Lock specified page
CPVAL <PageNo>
DefaultParams
The parameters are set to default values.
The factory settings will not change.

ADJUST Starts an automatic adjustment process of the antenna.
DefParNoNetSet Parameters are set to default values. Only the network settings will not be reseted.

Where used S18F13

STATUS	Format: 41

The status of UP-STREAM CONTROLLER and its associated NODEs, 1 byte.

“1” - Component added to the bus
“2” - Component removed from the bus

Where used S18F71

STATUSn	Format: 41

Current values of status transitions with the corresponding attributes for CIDRW and Head (if applicable). It has the following values:

1. “PMInformation” - Preventive maintenance information
   “NE” = Normal execution
   “MR” = Maintenance required
2. “AlarmStatus” - Current CIDRW sub-status of ALARM STATUS
   “0” = NO ALARMS
   “1” = ALARMS
3. “OperationalStatus” - Current CIDRW sub-status of OPERATIONAL
   “IDLE”
   “BUSY”
   “MANT”
4. “HeadStatus” - The current status
   “IDLE”
   “BUSY”
   “NOOP”

TARGETID	Format: 41

Subsystem ID, 2 bytes (SEMI E99-0200A, referred to as HeadID), e.g. 00, 01, 03, 10, 11, etc.

Identifies where a request for action or data is to be applied. It is zero for the Gateway (RS485) and non-zero for the associated subsystem components. It can only be set using the DIP switches on the subsystem.

IMPORTANT

Both 1 and 2 bytes are accepted as TargetID, but a response is always two bytes.

Where used all stream 18 messages

7.4 Attribute (ECID and SVID) Values

AlarmStatus (Read only)

Current CIDRW sub-status of ALARM STATUS
“0” = NO ALARMS
“1” = ALARMS

ASCII_T1 (ASCII only)

Inter-byte timeout

2 - 100 * 0.1 s (0.2 - 10 s)

Default: 100 (10 s)

ASCII_T3 (ASCII only)

Inter-block timeout

2 - 120 * 1 s (2 - 120 s)

Default: 45 (45 s)

BAUDRATE

Specifies the communication baud rate

1 - 4,800
2 - 9,600
3 - 19,200
4 - 28,800
5 - 57,600

Default: 9,600

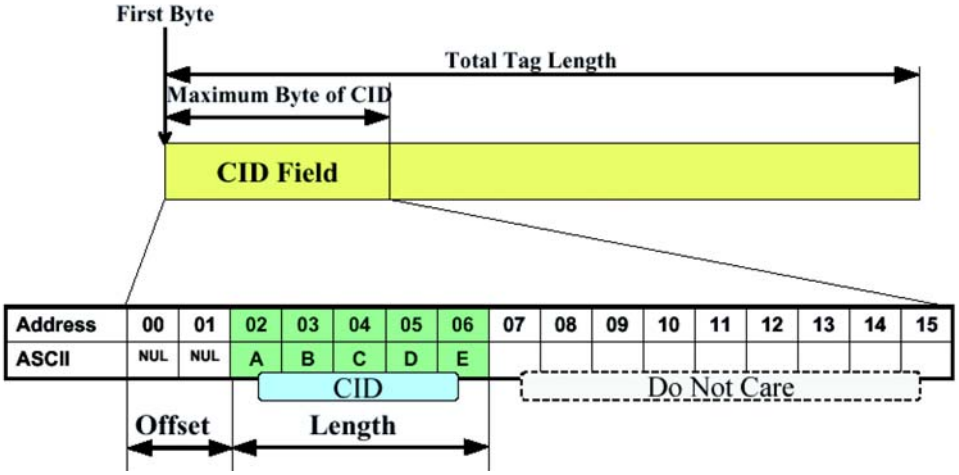
CarrierIDLength

CarrierIDLength ranges from 1 to CID_MAX_LENGTH.

Default: 16

CarrierIDOffset

CarrierIDOffset ranges from 0 to CID_MAX_LENGTH-1.



CarrierIDOffset + CarrierIDLength cannot be larger than the length of the CID field (CID_MAX_LENGTH).

Default: 0

CHECKSUM (ASCII only)

Checksum enabled or disabled.

EN = Enabled
DI = Disabled

Default: DI

CID_DISPLAY

OFF - returns MID without padding information and allows non-printable characters in MID while reading even if CID_NP_ASCII = OFF.
ON - returns MID along with padding information

Default: ON

CID_E99_PAD

Customer has the possibility to look for padding information in MID in E99 mode. If CID_E99_PAD is set to ON the padding information will not be filtered.

Default: OFF

CID_ERROR

ON - returns an error if length of MID < CarrierIDLength
OFF - pads the MID as per the attributes CID_PAD and CID_JUSTIFY

Default: ON

CID_JUSTIFY

R - MID is right-justified in MID space
L - MID is left-justified in MID space

Default: L

CID_MAX_LENGTH

Takes value of (8 * N) where N = page 1 to 17

Default: 16

CID_NP_ASCII

OFF - returns an error while reading/writing MID if MID contains non-printable characters
ON - allows non-printable characters in MID while reading/writing MID

Default: OFF

CID_PAD

ZERO - ASCII 0 (0x30) pads the MID
NUL - (0x00) pads the MID

Default: ZERO

Configuration (Read only)

Number of connected heads (for Gateway). In case of reader only, the value is always 01.

01 through 31

DeviceID

Messages coming from the host will be replied with the same DeviceID as sent from the host.

0x00 - 0xFF

Default: 0xFF

DeviceType (Read only)

DeviceType is „CIDRW“.

DUAL_SENSOR

At default value OFF only one sensor is defined and can be used to trigger an automatic read.
The detection of sensor 1 will produce arrival event (S18F71) with MID of the tag. The release of sensor 1 will produce removal event (S18F71) without MID (zero length).
At value ON two sensors can trigger an automatic read. There is the following behavior:
The detection of sensor 1 will produce arrival event (S18F71) with MID of the tag. The external LED1 stays ON during read (HOST_CONT_PORT1_LED=ON). The release of sensor 2 will produce

	removal event (S18F75) with MID of the tag. The external LED2 stays ON during read (HOST_CONT_PORT1_LED=ON) Range: ON or OFF Default OFF
ENABLE_EVENTS	Enable events (pod arrival/removal and power-up) ON = Events are generated OFF = Events are not generated Default: ON
ENABLE_TIMEOUTS (ASCII only)	Enable communication timeouts. ON = Timeout events are generated OFF = Timeout events are not generated Default: ON
EXTENDEDSSACK	Enables the extended error codes in SSACK. The SEMI standard specifies only five codes (NO, EE, CE, HE and TE). When this option is ON, manufacturer-specific codes might be generated. Please see SSACK for all error codes. ON = All error codes are generated OFF = Only SEMI standard error codes are generated Default: ON
HardwareRevision-Level	Subsystem hardware revision of Gateway or reader (Head). Up to 8 bytes
HeadID	Returns the HeadID or TargetID. Two digits
HeadStatus	IDLE or MANT
HOST_CONT_PORT1_LED	If set to ON, the host can control external LED's through S18F13 command. Range: ON or OFF Default: OFF
HOSTNAME	The network option HOSTNAME. ASCII string of maximum 15 characters to identify the reader in a network. Default: “ATR60LF CAN”
MANTWRITEONLY	If this attribute is enabled, MID (CID) and data is read and written according to the E99 standard. EN = Enabled DI = Disabled Default: EN

Manufacturer Returns “Brooks”

MDLN Brooks model number of Gateway or reader (Head)

Up to 6 bytes

ModelNumber See ➔ MDLN

OperationalStatus IDLE or MANT

Read only. To change the operational status use S18F13.

PARITY Parity of the serial communication port

0 = no parity
1 = even parity
2 = uneven parity

Default: 0

PIP (Read only) Pod-in-place status.

Shows whether the PIP sensor is ON or OFF.

POD_ARRIVED - PIP sensor is occupied
POD_REMOVED - PIP sensor is released

PIP_AUTOREAD Auto-read ON or OFF

ON = on
OFF = off

Default: ON

PIP_AUTOREAD_DATA The memory type to read pod-in-place events.

Value Byte offset of DATA area or MID

IMPORTANT

This attribute should be modified with respect to PIP_AUTOREAD_LENGTH and the size of the DATA area.

Value MID, 00 - 119 (one byte less than size of available DATA area)

Default: MID

PIP_AUTOREAD_ LENGTH

Length of DATA to read upon pod arrival.

IMPORTANT

This is only applicable if PIP_AUTOREAD_DATA has an offset value.

IMPORTANT

This attribute should be modified with respect to PIP_AUTOREAD_DATA.

Value 1 - 120

Default: 16

PIP_SENSOR_ POLARITY

PIP sensor polarity

HI = Active-high; when sensor goes high, a pod arrival event is generated.
LO = Active-low; when sensor goes low, a pod arrival event is generated.

Default: LO

RADIO_RETRY

Configurable radio retries before returning a communication error.

Range 1 - 99

Default: 3

RDA

AdvanTag returns either RD or RDA in response to the ASCII RD command.

EN = Enabled, returns RDA
DI = Disabled, returns RD

Default: EN

RW_ADJUSTMENT

The ability to set the adjustment of the antenna for read and write operations manually. If manual antenna adjustment is set, the control of the antenna voltage is deactivated, which is used to detect a defect antenna.

Range 0 - 7

Default: the value from the last automatic adjustment

RW_REPEATTIME

If the read/write action fails, the action can be repeated after the rw_repeattime. The number of repeats is defined by the parameter radio_retry.

Unit 1 ms
Range 100 - 5,000

Default: 50

SELF_TEST_ RESULT

Last self-test flag

P - Pass
F - Failed

SENSOR_TIMEOUT

Sensor delay after the trigger

Range 1 - 20
Unit 1 = 100 ms

Default: 01

SERIALNUM

Serial number of the target device

Assigned at the factory and indicated on the label of the device, e.g. 1101MIS100001.

SerialNumber

See ➔ SERIALNUM

SIGNALSTRENGTH (Read only)

Read only information RF signal strength (noise level!)

SW_PARTNUMBER

Software part number

SOFTREV

Subsystem software revision of Gateway or reader (head)

SoftwareRevision-Level

See ➔ SOFTREV

STATUS_ENABLE

If set to Enable, Head communicates the STATUS information back to the host.

EN = Enabled
DI = Disabled

Default: EN

TARGETID

The TargetID of the device, adjustable through the DIP switches (see ➔ HeadID)

USETESTDIP

Use DIP switches 6, 7 or 8 for test mode acitvities.

Unit Bit 0 - activity of DIP switch 8 (tuning)
Bit 1 - activity of DIP switch 7 (test mode)
Bit 2 - activity of DIP switch 6 (type of test)
Bit 4 - tuning only allowed in test mode
Range 0 - 15

Default: 7

7.5 Operation of the SECS Protocol

7.5.1 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 production.

The standard does not define the data contained within a message. The meaning of messages must be determined through a message content standard such as SEMI Equipment Communications 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.

7.5.2 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.

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
	2		Lower device 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 **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.

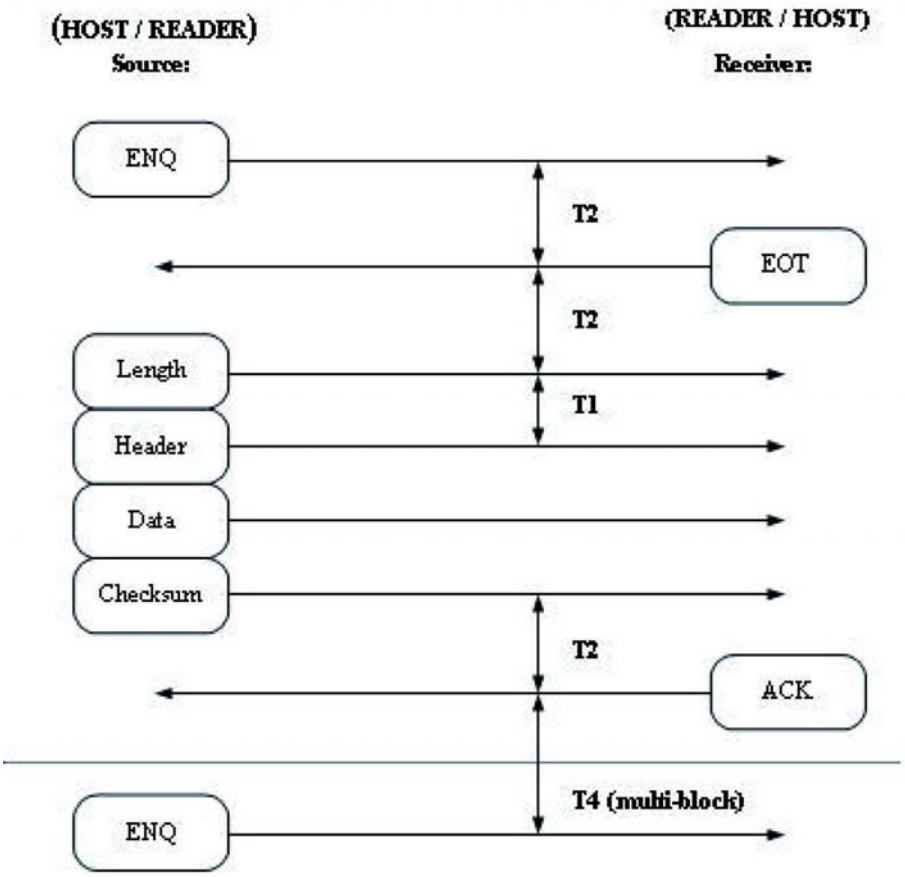
The **checksum** is calculated as the numeric sum of the unsigned binary values of all the bytes, after the length byte and before the checksum and in a single block.

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)

7.5.3 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.

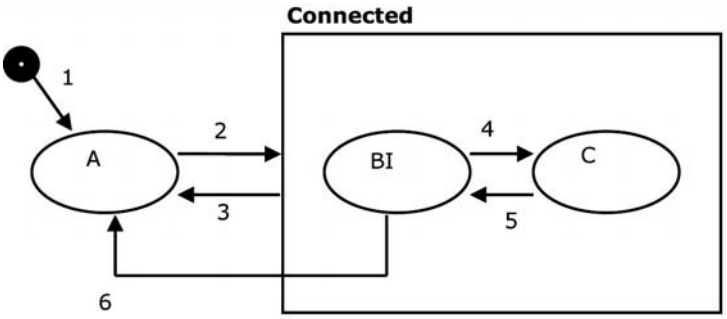
It is possible to operate all readers connected to the network via one or several HOST PCs.

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.

7.5.4 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

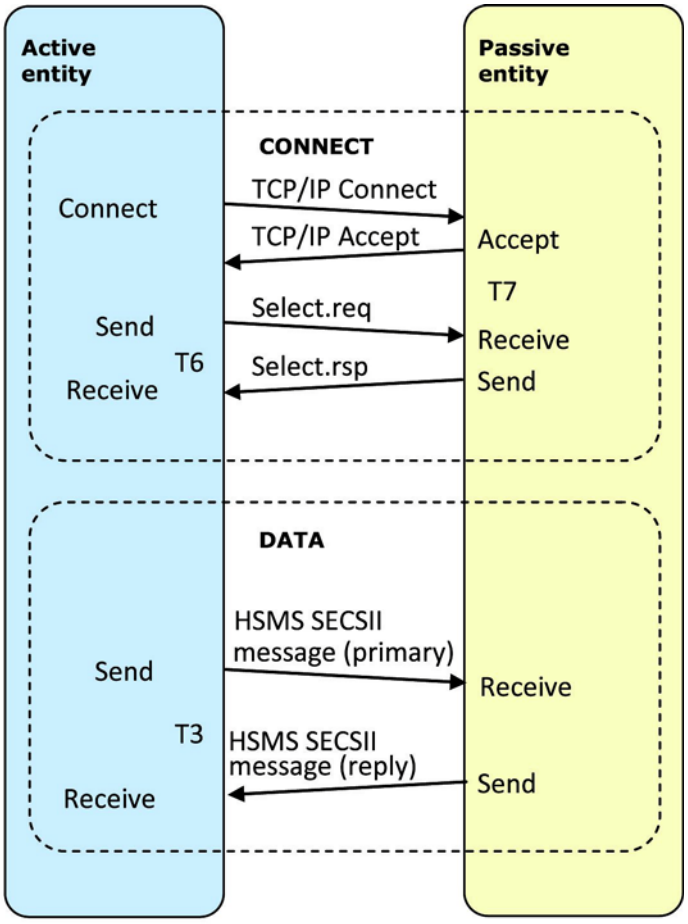
A sub-status of CONNECTED in which at least one HSMS session has been established. This is the normal “operating” status of HSMS: data messages may be exchanged in this status.

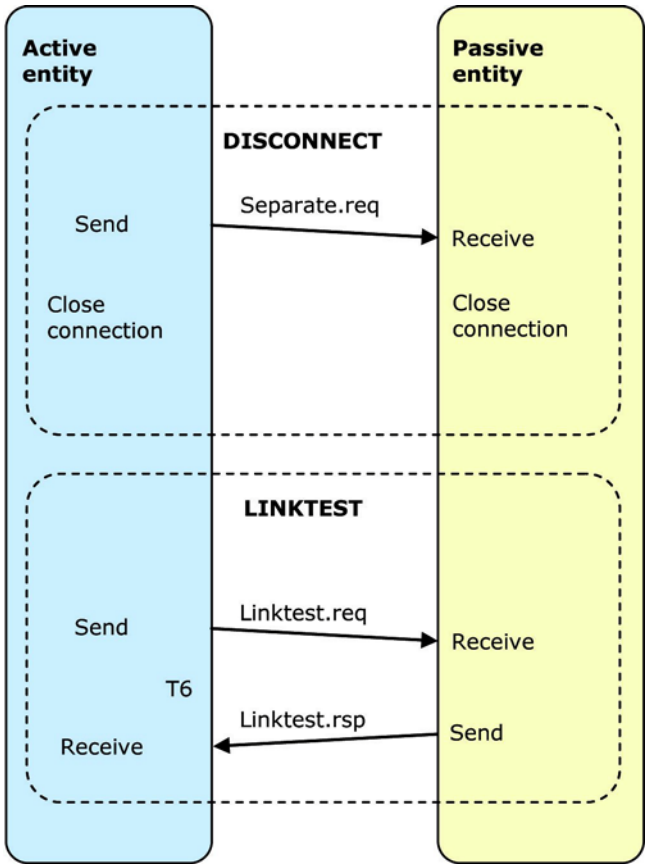
#	Current status	Trigger	New status	Comment
1	...	Local entity-specific preparation for TCP/IP communication	Not connected	Action depends on connection procedure to be used: active or passive.
2	Not connected	A TCP/IP connection is established for HSMS communication.	Connected - Not selected	None
3	Connected	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

7.5.5 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 LF60C SoliD Gen3 reader consists of the following different stream types.

Stream 1: (Equipment status)

S1F1 and S1F2 Are you there request

Stream 9: (System errors)

S9F1	Unrecognized device ID (UDN)
S9F3	Unrecognized stream type (USN)
S9F5	Unrecognized function type (UFN)
S9F7	Illegal data (IDN)
S9F9	Transaction timer timeout (TTN)

According to SEMI E99 carrier ID read/writer functional standard for SECS-I and SECS-II protocol, the RFID Reader LF60C SoliD Gen3 supports these defined stream 18 messages:

Stream 18: (Equipment status)

S18F1	Read attribute request (RAR)
S18F3	Write attribute request (WAR)
S18F5	Read data request (RDR)
S18F7	Write data request (WDR)
S18F9	Read material ID request (RMID)
S18F11	Write material ID request (WMID)
S18F13	Subsystem command request (SCR)
S18F71	Event report send (ERS)
S18F79	Read STATUS request (STATE)

7.5.6 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.

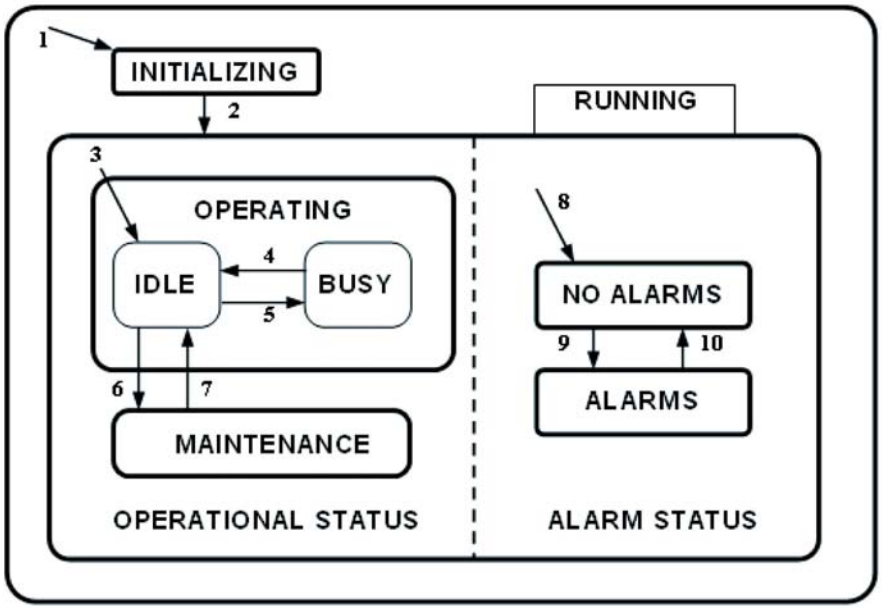
Scope:

- 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 the state of the hardware are completed	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.	Get status	Get 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.

7.5.7 Message Details

Equipment status

S1F1: ARE YOU THERE REQUEST (R) H -> E

This message is used to perform a heartbeat between host and connected device.

S1F1 W . * Header only

S1F2: ON-LINE DATA (D) E -> H

The device signifies that it is online and reports the model number and the software revision of the head.

S1F2
<L[2]
<MDLN >
<SOFTREV >
>

System errors

S9F1: UNRECOGNIZED DEVICE ID (E -> H)

The device ID in the message block header does not correspond to the equipment device ID.

S9F1
<MHEAD > .

S9F3: UNRECOGNIZED STREAM TYPE (E -> H)

The reader does not recognize the stream type in the message block header.

S9F3
<B[10] MHEAD > .

S9F5: UNRECOGNIZED FUNCTION TYPE (E -> H)

The reader does not recognize the function number in the message block header.

S9F5
<B[10] MHEAD > .

S9F7: ILLEGAL DATA (E -> H)

The reader does not recognize the data in the message.

S9F7
<B[10] MHEAD > .

S9F9: TRANSACTION TIMER TIMEOUT (E -> H)

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 controlled.

S9F9
<B[10] SHEAD > .

Subsystem control and data

S18F1: READ ATTRIBUTE REQUEST (RAR) (H -> E)

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

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

S18F2: READ ATTRIBUTE DATA (RAD) (E -> H)

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
<TARGETID>
<SSACK>
L,n
<ATTRVAL1>
...
<ATTRVALn>
L,s
<STATUS1>
...
<STATUSs>

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

Exceptions:
If the attribute list is empty (L,0), the following 10 attributes are returned in the order specified bellow:
Configuration
AlarmStatus
OperationalStatus
HeadStatus
HeadID
HardwareRevisionLevel
Manufacturer
ModelNumber
SoftwareRevisionLevel
SerialNumber

If the TargetID is invalid, no statuses are sent (list of zero).

S18F3: WRITE ATTRIBUTE REQUEST (WAR) (H -> E)
This message requests the subsystem to set the value of the read/write attributes of the component specified in the TARGETID.

S18F3 is a transactional message, i.e. either all attributes will be set at once or none.

S18F3 ,W
L,2
<TARGETID>
L,2
<ATTRID1>
<ATTRVAL1>

L,2
<ATTRIDn>
<ATTRVALn>

S18F4: WRITE ATTRIBUTE ACKNOWLEDGE (WAA) (E -> H)

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
    <TARGETID>
    <SSACK>
    L,1
        L,s
            <STATUS1>
            ...
            <STATUSs>
```

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

S18F5: READ DATA REQUEST (RDR) (H -> E)

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. DATA-LENGTH is used to limit the amount of data for that section.

```
S18F5 W
    L,3
    <TARGETID>
    <DATASEG>
    <DATALENGTH>
```

If DATASEG and DATALENGTH are both omitted (zero length items), up to 200 bytes of the data area are requested. If only DATALENGTH is omitted, all data within the indicated section is requested.

S18F6: READ DATA (RD) (E -> H)

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
    <TARGETID>
    <SSACK>
    <DATA>
```

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

S18F7: WRITE DATA REQUEST (WDR) (H ->E)

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
<TARGETID>
<DATASEG>
<DATALENGTH
<DATA>

If DATASEG and DATALENGTH are both omitted (zero length items), up to 200 bytes 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 is 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) (E -> H)

This message acknowledges the success or failure of writing data to the subsystem indicated in the TARGETID.

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

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

Exceptions:

- This command is not allowed for single-page TIRIS transponders.
- If the TargetID is invalid, no statuses are sent (list of zero).

S18F9: READ ID REQUEST (RMID) (H -> E)

This message is used to request the subsystem indicated by the TARGETID to read the MID.

S18F9,W
<TARGETID>

S18F10: READ ID DATA (MID) (E -> H)

This message returns a requested material identifier MID as read by the subsystem indicated in the TARGETID.

S18F10
L,4
<TARGETID>
<SSACK>
<MID>
L,s
<STATUS1>
...
<STATUSs>

Exceptions:

- If the TargetID is invalid, no statuses are sent (list of zero).

S18F11: WRITE MATERIAL ID REQUEST (WMID) (H -> E)

This message is used to request the subsystem indicated by the TARGETID to write the MID.

S18F11 W
L,2
<TARGETID>
<MID>

ATTENTION

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

ATTENTION

If the length of the MID is longer than what the subsystem can accept, the subsystem will return a failure message in the reply SSACK. If the length of the MID is less than the maximum allowed length of device, then the MID will be padded with “0” in the front. Refer to MicroTag READ/WRITE OPERATION in this document.

S18F12: WRITE ID ACKNOWLEDGE (WIA) (E -> H)

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

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

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

Exceptions:

- For single-page TIRIS transponders, only 8 bytes are written.
- If this command fails, some or all of the previous data in the transponder might be lost. Read the transponder to confirm the contents of the transponder.
- If the TargetID is invalid, no statuses are sent (list of zero).

S18F13: SUBSYSTEM COMMAND REQUEST (SCR) (H -> E)

This message is used to request the subsystem indicated in the TARGETID to perform a specific action.

```
S18F13 W
        L,3
          <TARGETID>
          <SSCMD>
          L,n
              <CPVAL>
              ...
              <CPVALn>
```

SSCMD 04:

Flashing LED on node/device

```
      L,3
        <TargetID>
        <04>
        L,3
                <LEDSTATE> /* On, off, or flashing */
                <TIMEOUTTIMEOUT> /* Number of seconds */
                <LEDNO> /* The LED number: 1, 2, etc */
```

SSCMD 07 or PerformDiagnostics:

Initiate self test

```
      L,3
        <TargetID>
        <07> or <PerformDiagnostics>
        L,0
```

SSCMD 13 or Reset:

Reset unit

```
      L,3
        <TargetID>
        <13> or <Reset>
        L,0
```

SSCMD 15 or ChangeState:

Change the operating state.

```
      L,3
        <TargetID>
        <15> or <ChangeState>
        L,1
        <OpState> (MT or OP)
```

SSCMD GetStatus:

Get status

L,3
<TargetID>
<GetStatus>
L,0

SSCMD LOCK: (future development)

Lock specified page

L,3
<TargetID>
<LOCK>
L,1
<PageNo>

S18F14: SUBSYSTEM COMMAND ACKNOWLEDGE (SCA) (H -> E)

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

S18F14

L,3
<TARGETID>
<SSACK>
L,s
<STATUS1>
...
<STATUSs>

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

Exceptions:

- If the TargetID is invalid, no statuses are sent (list of zero).

S18F71: EVENT REPORT SEND (ERS) (E -> H)

Events are sent to the host using this command.

The format is as follows:

```
L,4
  <TargetID>
 <SSACK>
 <CEID>
 L,n
  <DVNAME1>
  <DVVAL1>
  <DVNAMEn >
  <DVVALn >
```

Response:

There is no primary or secondary response expected from the host, except the normal SECS-1 ACK for the receipt of the block.

Note:

To eliminate false or spurious events, the pod arrival/removal events are filtered. Once a change has been detected (an arrival or removal), the next change will not be registered for 1.5 to 2 seconds.

CEID: 01 - Material (pod/cassette) arrival event:

```
L,4
  <TargetID>
  <SSACK>
  <01> * CEID
L,2
  "AutoReadData"
  <Data> /* If auto read, then data. Otherwise null string */
```

CEID: 02 - Material (pod/cassette) removal event:

```
L,4
  <TargetID>
  <SSACK>
  <02> * CEID
  L,0
```

CEID: 08 - RFN power-up event:

```
L,4
  <TargetID>
  <SSACK>
  <08> * CEID
  L,0
```

S18F75: EVENT REPORT SEND SENSOR2 (E -> H)

If the second sensor is available and activated (parameter DUAL_SENSOR=ON) than the events from this sensor will be shown by the function S18F75.

Response:

There is no primary or secondary response expected from the host, except the normal SECS-1 ACK for the receipt of the block.

Note:

At dual sensor mode only the removal event from the second sensor will be displayed with automatic read data.

CEID: 02 - Material (pod/cassette) removal event:

S18F75
L,4
<TargetID>
<SSACK>
<02> * CEID
L,2
„AutoReadData“
<Data> / *If auto read ...

S18F79: READ STATE REQUEST (STATE) (H -> E)

Query the CIDRW state of the transition model.
S18F79,W
<TargetID>

S18F80: TRANSITION STATE (State) (E -> H)

This message returns the current state of the transition model.
S18F80
L,3
<TARGETID>
<SSACK>
<STATUS> (IDLE, BUSY, ALARMS or MAINTENANCE)

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
- ➔ 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 Brooks 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 Brooks Product Support, see ➔ Customer Service. Have the serial number of the RFID reader ready as shown on the label (see ➔ Device Label) when contacting Brooks Product Support!**

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 Brooks Product Support.

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 Brooks.

8.4 Error Codes

8.4.1 SSACK

SSACK	Name	Description	Possible cause	Correcting action
NO	Normal mode	indicates the success of the operation requested	-	no
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
HE	Hardware error	error in the head of the ID reader/writer, head of the ID reader/writer is deactivated		

SSACK	Name	Description	Possible cause	Correcting action
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
			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

For more detailed information see also the data item ➔ SSACK.

8.4.2 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	Check availability of the host system (terminal), check RS232 cable and connector, check link LED and traffic LED, check IP address settings

8.5 Error Display with LED

8.5.1 Power LED Does Not Light Up

- **Check the power supply and the connection cables!**
- **If the LED does not light up, disconnect the device from the power supply and carefully remove the fuse. Test the fuse. If it is defective, replace it with a fuse specified by Brooks!**
- **If the above measures do not solve the problem, leave the reader disconnected and contact Brooks Technical Support!**

8.5.2 Read Fail LED Flashes

- **Reader detected a hardware failure: no valid antenna adjustment or antenna has broken.**
- **Switch DIP8 to "On" to start an antenna tuning!**

If Read fail LED flashes again:

- **Check if the antenna is located too near to a strong metallic environment. Relocate the antenna with more distance!**
- **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 Brooks Technical Support!**

8.6 Reader Does Not Respond

- **Check if the interface connection cable is undamaged and correctly connected to both reader and Gateway!**
- **Check the status as indicated by the LED!**
- **If these measures do not solve the problem, contact Brooks Technical Support!**

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. During the self-tests, all LEDs (Status, Read OK and Read Fail) light up.**

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. During the self-tests, all LEDs (status, read fail, read ok) light up. On power-up reset all connected external LEDs light up in addition.

If the test was successful, all LEDs, except for the power LED, go out.

8.9 Software Releases

Release Date	Version	Description
May 2016	CAN10	First release with reset of communication parameters triggered by reset button

8.10 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

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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.

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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