User Manual
Transponder Reader L60 Gen2

(Serial/SECS1)

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1 INTRODUCTION

1.1 About this Device

The BROOKS Transponder Reader System is a high-frequency identification system that uses FM transmission.

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.

As 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 transponder reader are transmitted via the serial interface.

1.2 About this Manual

This manual contains information about installing, operating and error handling the BROOKS LDN Transponder Reader. It consists of nine chapters:

- Introduction
- Safety Instructions
- Product Description
- Installation
- Operation
- Service and Error Handling
- Deinstallation and Storage
- Transportation and Disposal
- Accessories

2 SAFETY INSTRUCTIONS

This product is manufactured in accordance with state of the art technology and corresponds to recognized safety regulations. Nevertheless, there are dangers associated with the use of the equipment even for its intended purpose. You should therefore read the following safety information carefully and keep it in mind.

Only install and operate this equipment if it is in perfect condition and with reference to this manual. Do not use the equipment if it is damaged.

2.1 Symbols and Types Used in this Manual

	This symbol alerts you to dangerous voltage
	This symbol alerts you to important instructions
	This symbol indicates electromagnetic radiation
	This symbol alerts you to risk of explosion
	This symbol alerts you to risk of fire
	This symbol indicates important additional information
	Electrostatically sensitive components

`13:44:33`
`Incoming:`
`ENQ (05)`
	This type represents transmitted data display

2.2 General Safety Instructions

1 Read and understand all safety and operating instructions before installing and operating the device.

2 This instruction is designed for specially trained personnel. This device is NOT intended for use by the “general population” in an uncontrolled environment. Installation, operation and error handling the device shall be carried out by specially trained personnel only (see additional information on pages 12, 22, 34, and 113).

3 Keep these instructions. Store this manual in a place that can be accessed at any time by all persons involved in installing, operating and error handling the device.

4 Heed all warnings. Follow all warnings on and inside the device and operating instructions.

5 Install in accordance with the manufacturer's instructions only.

6 Only use attachments, accessories and connecting cables supplied by the manufacturer.

7 All error handling other than the error handling listed in chapter 6 of this manual must be carried out by the manufacturer.

8 People with hearing aids should remember that radio signals transmitted by the device might cause a very unpleasant buzzing noise in their hearing aids.

9 Do not connect the device to any kind of power supply such as a standard household power supply. The device should be connected to a power supply of the type described in these instructions only.

10 When you disconnect a cable, pull on its conductor and not on the cable itself. Keep the connector evenly aligned to avoid bending any connector pins. When you connect a cable, ensure that the connector pins are positioned correctly.

11 Never over bend the antenna cable or expose it to mechanical loads.

12 When replacement parts are required, use the replacement parts specified by the manufacturer only. Unauthorized substitutions may result in fire, electric shock, or other hazards.

All antenna resonant circuit components carry high voltage!

The installer is responsible for installing the device to comply with FCC requirements of human exposure to radio frequency.

To prevent fire, shock hazard, or annoying interference, use recommended accessories only.

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

Do NOT operate this device without a proper antenna attached. Proper antennas are antennas supplied by the manufacturer and listed in section „Accessories“.

Never locate the antenna so that it is very close to or touching parts of the body while transmitting.

2.3 ESD Instructions

Static electricity can harm electronic components inside the device. All persons who install or maintain the device must be trained in ESD protection. ESD protection measures must be observed when opening the device.

- ☞ Before removing or inserting components, disconnect the power supply.
- ☞ To prevent electrostatic damage, static electricity must be discharged from the body and tools before touching components inside the device.
- ☞ Touch electro sensitive components carefully at their edges only.

2.4 Proper Use

This product was developed for reading and writing the TIRIS® transponder only. Any other use of this device would constitute abuse and would render the user's authority to install and operate the device invalid.

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

2.5 Qualified Personnel

This manual is designed for specially trained personnel only. This device must be installed and maintained by the manufacturer or its specially trained representatives.

Intervention or error handling not expressively approved in this manual must be carried out by the manufacturer's personnel only. If you are unsure about the qualifications that are actually required, contact the manufacturer.

Unqualified interventions may result in personal injury or damage to the device!

2.6 Declaration of Conformity

2.6.1 USA – Federal Communications Commission (FCC)

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

1) This device may not cause harmful interference and
2) 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 instructions, 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 N5GLF60

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

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

2.6.2 Europe – CE Conformity

Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)

Declaration of Conformity in accordance with the Radio and Telecommunications Terminal. Equipment Act (FTEG) and Directive 1999/5/EC (R&TTE Directive)

Hersteller / Verantwortliche Person *Manufacturer / responsible person*	**Brooks Automation (Germany) GmbH / Herr Dittrich**
erklärt, dass das Produkt *declares that the product*	**LF60 Gen2 (LDN)**
Type (ggf. Anlagenkonfiguration mit Angabe der Module) *Type (if applicable, configuration including the modules)*	
☐ Telekommunikations(Tk-)endeinrichtung *Telecommunications terminal equipment*	☑ Funkanlage *Radio equipment*
Verwendungszweck / *Intended purpose*	**Identification system**
Geräteklasse / *Equipment class*	**1**

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a))

Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a))

angewendete harmonisierte Normen *Harmonised standards applied*	**EN 60950:2006**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards / Spezifikationen) *Other means of proving conformity with the essential requirements (standards / specifications used)*	**---**

Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit (§ 3 (1) 2, Artikel 3 *(1) b)*

Protection requirements concerning electromagnetic compatibility § 3(1)(2), (Article 3(1)(b))

Angewendete harmonisierte *Normen* *Harmonised standards applied*	**EN 301 489-3 V1.6.1** **EN 301 489-3 V1.4.1**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise(hierzu verwendete Standards / Spezifikationen) *Other means of proving conformity with the essential requirements (standards / specifications used)*	

Maßnahmen zur effizienten Nutzung des Funktrequenzspektrums

Measures for the efficient use of the radio frequency spectrum

☑ Luftschnittstelle bei Funkanlagen gemäß § 3(2) (Artikel 3(2))
Air interface of the radio systems pursuant to § 3(2) (Article 3(2))

Angewendete harmonisierte Normen *Harmonised standards applied*	**EN 300 330-1 V1.3.1** **EN 300 330-2 V1.3.1**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards /Schnittstellenbeschreibungen) *Other means of proving conformity with the essential requirements (standards/interface specifications used)*	**---**

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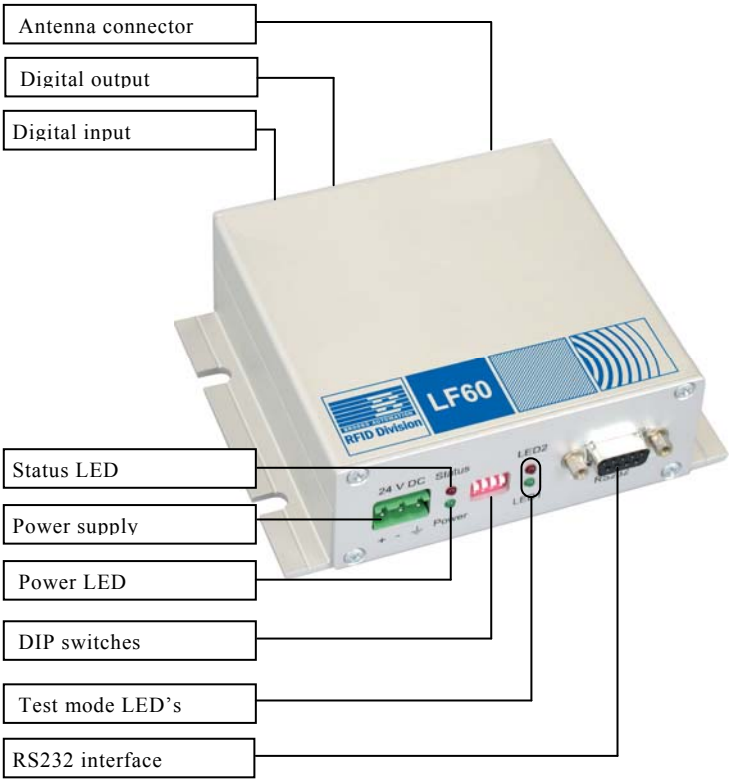
Mistelgau, 01.03.2008

Gerald Dittrich

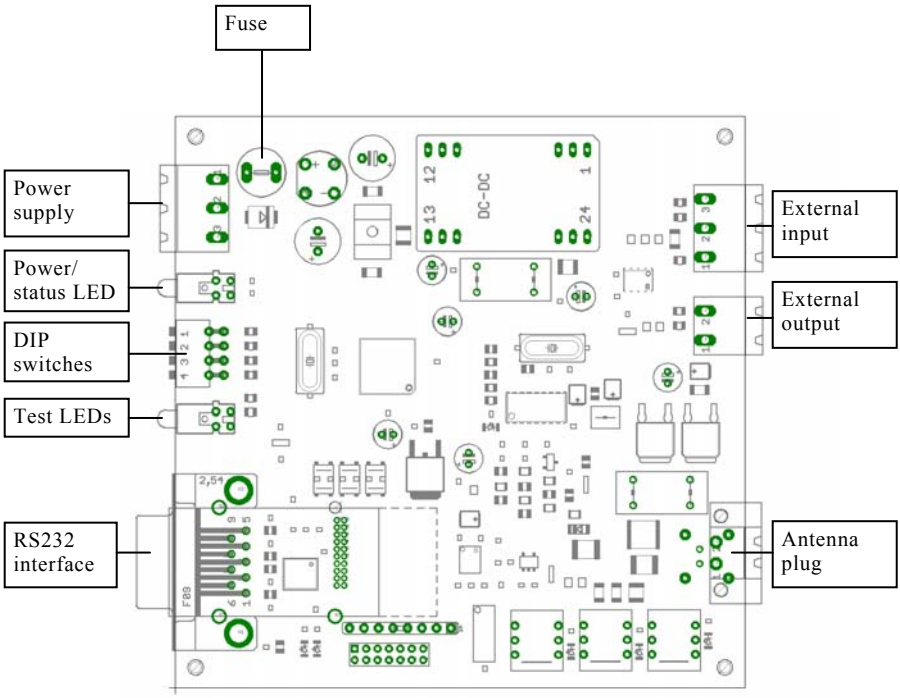
(Place and date of issue) Name and signature

3 PRODUCT DESCRIPTION

3.1 Indicating and Operating Elements



3.2 Inside View



3.3 Description

Power supply

Connector for the power supply.

Power LED

If the device is connected to a power supply, the LED is illuminated green and the reader is ready for use.

Status LED

The status LED shows different operation modes.

DIP switches

The DIP switches can be used for tuning the antenna and for test mode.

Test LED's

The two test LED's shows the success or failure of a test read or write.

RS232 interface

The data are passed down serially to the **RS232 interfaces** (9 contact Sub-D female plug). Baud rates of 300 Bd up to 115.2 kBd are possible.

External input

A sensor (such as an optical sensor) can be connected to the external input.

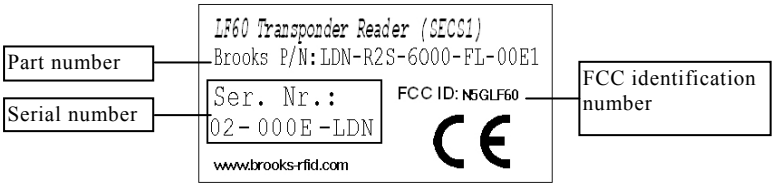
External output

The external output, usually a LED, shows the status of the device (software-dependent).

Fuse

TR5 housing, 500 mA T (low breaking).

3.4 Labeling Information



3.5 Technical Data

3.5.1 Transponder Reader

Parameter	Value
Operation temperature	0°C to +50°C 32°F to 122°F
Stock temperature	-20°C to +70°C -4°F to +158°F
Permissible humidity @ 50C°	25 - 80 %
Transmitter frequency	134.2 kHz
Protection mode	IP 40
Housing material	ALU
Weight	about 420g / 14.8 oz
Fuse type TR5	500mA (T)
Serial interface RS232	300 Bd – 115.2 kBd

3.5.2 Power Supply and Current Input

Description	Min	Type	Max	Unit
Voltage (proof against connecting to the wrong terminal)	18	24	30	VDC
Current (reading/writing)		80		mA
Current (passive)		50		mA

3.6 Contents of Delivery

Number	Description
1	LF60 Transponder Reader Gen2
1	Instruction manual
1	Accompanying letter

☞ For available or required accessories, e.g. antennas, adapters and cables, see section “Accessories” on page 118 in this manual.

3.7 Warranty and Liability

The warranty period is 12 months and begins with the moment of delivery of the device as proved by an invoice or other documents.

The warranty includes the repair of all damages to the device that occur within the warranty period, and which are evidently caused by faults of the material or production defects.

The warranty does not include damages caused by incorrect connection, inappropriate handling and non-observance of the technical reports.

4 INSTALLATION

4.1 Installation Environment

This device is designed for use in an indoor industrial environment only. Installation is only permitted in an environmental indoor climate with a constant temperature of between 0°C and +50°C / 32°F and 122°F, humidity between 25% and 80%, and a maximum temperature of +50°C / 122°F.

Do not install or use this device in or near water. Never spill liquids of any kind onto the device. Should spillage occur, unplug the device and have it checked by a technician.

Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not install the device in a flammable environment.

Never expose the device to intense changes in temperature, otherwise condensation can develop inside the device and cause damages.

Do not locate the device near overhead power lines or other electric lights, or power circuits or where it can encounter such circuits. When installing the device, take extreme care not to encounter such circuits as they can cause serious injury or death.

The device should not be used in the immediate vicinity of electrical units (such as medical units, monitors, telephones, televisions and energy-saver lamps), magnetic data carriers, or metallic objects. This could result in reduced reading/writing ranges.

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

Do not position the device in a location where it can suffer from vibration or shock.

When the device is installed, the installation location must be adequately illuminated.

Do not install the device during periods of lightning.

Ensure the installation location complies with FCC requirements for human exposure to radio frequency.

☞ When determining the assembly location, consider the length of the antenna cable that will be used, and the reading and writing range. See section „Accessories/Antennas“ for further information.

4.2 Qualified Installation Personnel

The installation shall be carried out by specially trained personnel only. If you are uncertain about the qualification, contact the manufacturer.

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

4.3 Unpacking

This device and its accessories were packed under clean room conditions. To preserve these conditions, the device must be unpacked under clean room conditions.

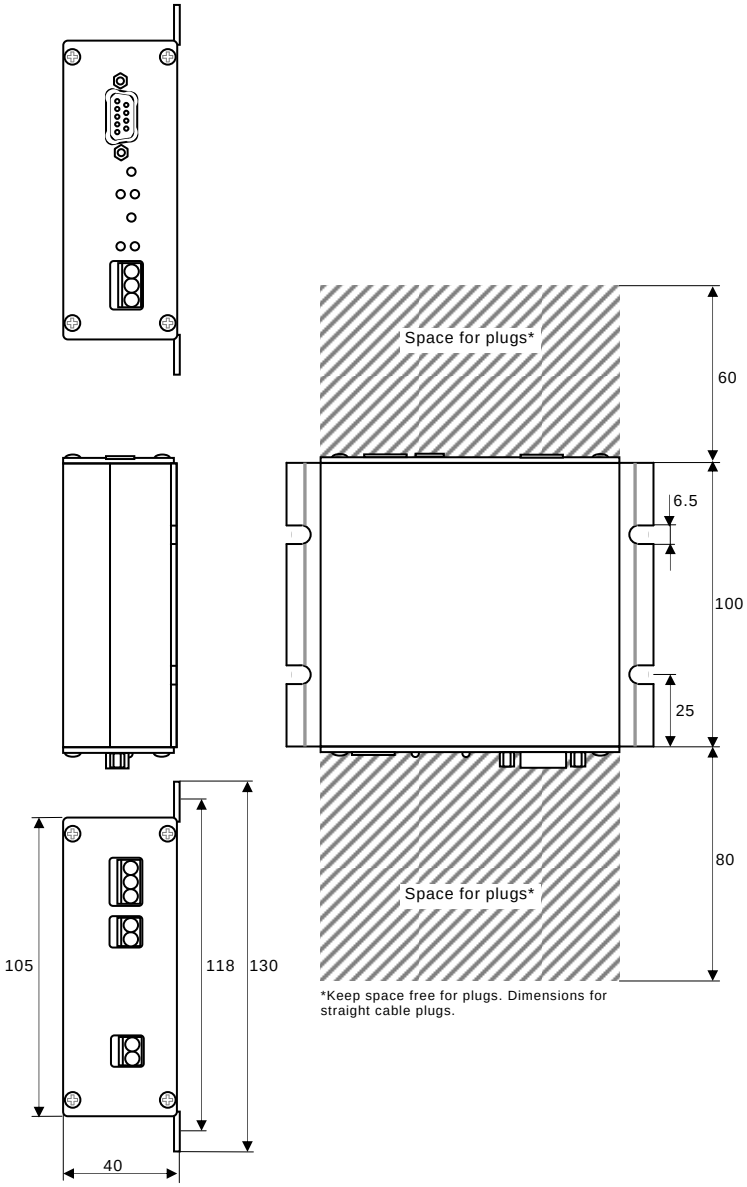
4.3.1 Disposal of Packing Material

The packing material consists of cardboard and film. Dispose of these materials separately in accordance with the relevant legislation in your country.

4.4 Mounting the Transponder Reader

☞ The mounting surface must be stable, non-flammable, dry and clean. If necessary, clean it before installing the device.

4.4.1 Dimensions for Planning



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

4.4.2 Standard Housing

4.4.2.1 Required Materials and Tools

- Four cylinder head screws
- Four dowels (in case of wall mounting)
- Appropriate screwdriver
- Drilling machine with fitting drill

4.4.2.2 Assembly

1. Drill four holes (see dimensions on page 23).
2. When mounting the device on a wall, insert four dowels.
3. Screw the device onto the assembly surface.
4. Connect the device as described in section “Connecting” (page 30).

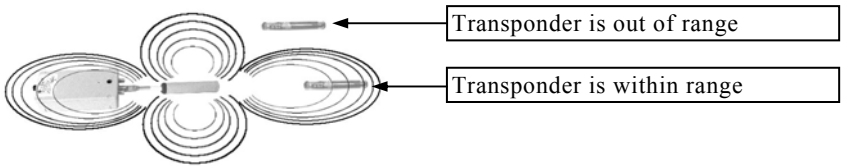
4.5 Installing the Antenna

☞ When installing the antenna, consider the required reading and writing ranges (see section “Accessories”, page 118). The reader can be used properly only if the transponder is located within the individual reading/writing range of the antenna!

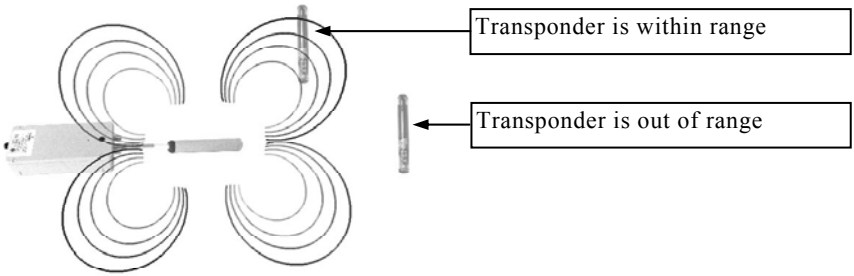
4.5.1 Positioning

Reliable reading and writing depends on the range and position of the transponder to the antenna.

Transponder parallel to the axis of the antenna:

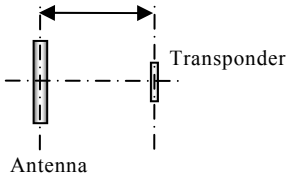


Transponder perpendicular to the axis of the antenna:



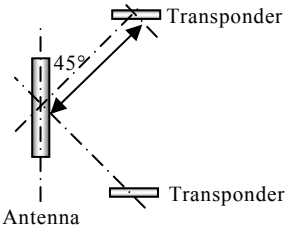
Parallel

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



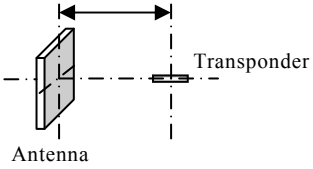
Perpendicular

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.

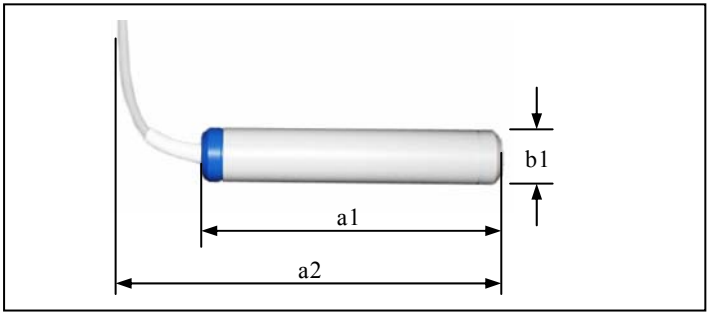


4.5.2 Available Antenna Types

For the antennas that are available, see chapter „Accessories“, page 118).

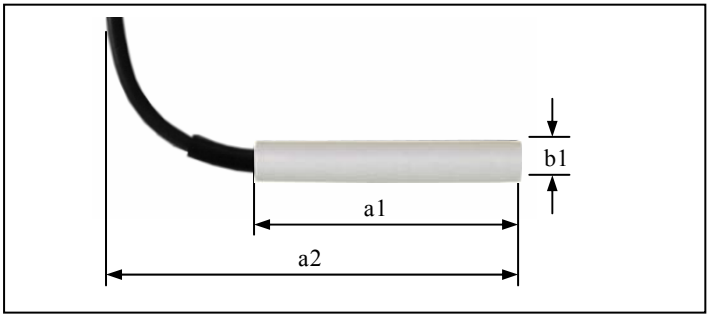
4.5.3 Dimensions for Planning

4.5.3.1 Rod Antenna



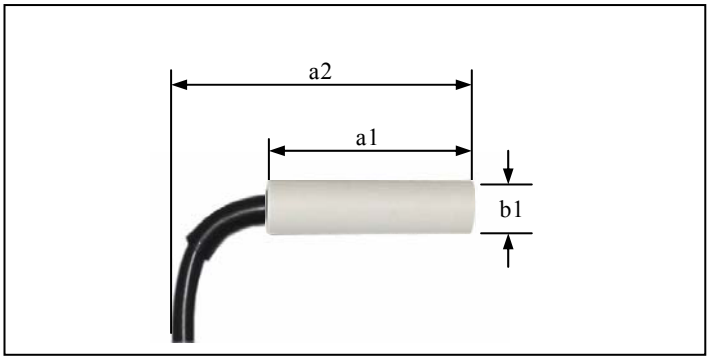
a1	Length of antenna cylinder	125mm / $4^{9}/_{10}$″
a2	Complete mounting dimensions (cable with 90° angle)	150mm / $5^{9}/_{10}$″
b1	Diameter of antenna cylinder	23.0mm / $^{9}/_{10}$″

4.5.3.2 Mini Antenna



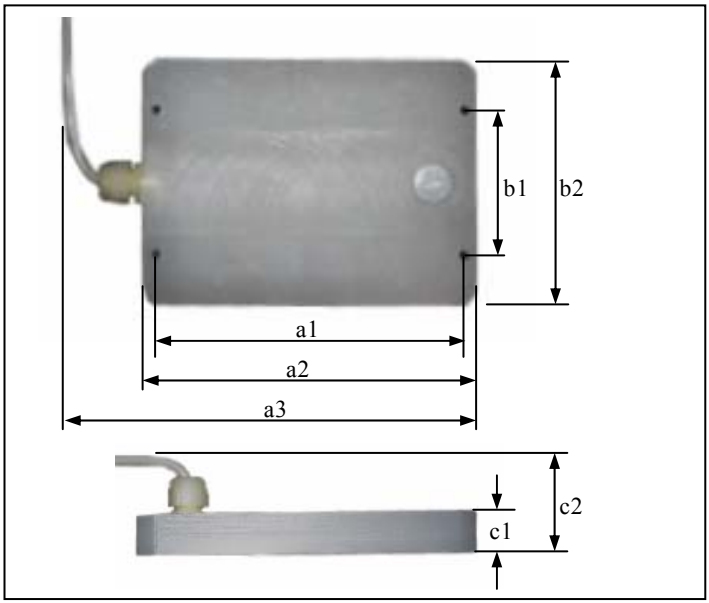
a1	Length of antenna cylinder	68mm / $2^{7}/_{10}$″
a2	Complete mounting dimensions (cable with 90° angle)	85mm / $3^{1}/_{3}$″
b1	Diameter of antenna cylinder	10.0mm / $^{2}/_{5}$″

4.5.3.3 Micro Antenna



a1	Length of antenna cylinder	40mm / $1^{3}/_{5}''$
a2	Complete mounting dimensions (cable with 90° angle)	60mm / $2^{2}/_{5}''$
b1	Diameter of antenna cylinder	10.0mm / $^{2}/_{5}''$

4.5.3.4 Frame Antenna



a1	Distance between the mounting holes (length)	148mm / $5^{9}/_{10}$″
a2	Length frame antenna	161mm / $6^{1}/_{3}$″
a3	Complete mounting dimensions length (cable screwing at the side)	210mm / $8^{1}/_{3}$″
b1	Distance between the mounting holes (width)	70mm / $2^{3}/_{4}$″
b2	Width frame antenna	120mm / $4^{3}/_{4}$″
c1	Height frame antenna	19mm / $^{3}/_{4}$″
c2	Complete mounting dimensions height (cable screwing at the top)	70mm / $2^{3}/_{4}$″

4.6 Connecting the Transponder Reader

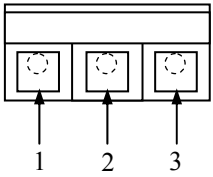
4.6.1 Antenna

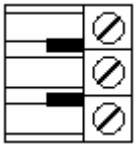
Connect the antenna to the antenna connector (see illustration page 16).

4.7 Power Connection

Built-in male plug, plastic (power supply)

PIN	Signal
1	+24V
2	0V
3	Screen / PE





The device can be connected to an interior DC power circuit of the equipment or to a DC adapter (see section “Accessories”).

Note the required voltage (see technical data, page 19). Use cables, plugs and adapters provided by the manufacturer only!

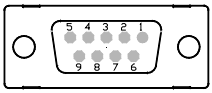
Once the device is connected to the power supply, the power LED is illuminated (see illustration page 16). If it is not illuminated, see section 6 for help.

4.8 Terminal Connection

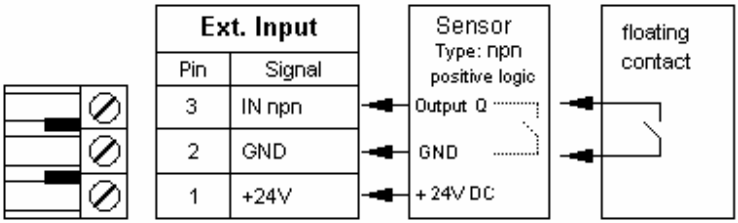
Sub-D female plug

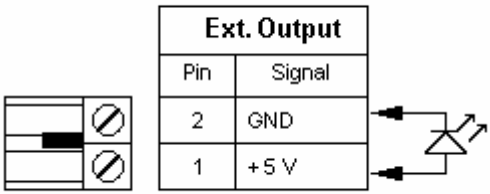
The serial interface is realized by a Sub-D female plug (9 contacts); a serial connection line (switched 1:1) can be used.

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



4.9 Input and Output





4.10 DIP-Switches

The DIP switches can be used to change the behavior of some features of the reader.

DIP-switch 1: not used in the current firmware version

DIP-switch 2: Start antenna tuning (see parameter 13)

OFF: Normal operation mode
ON: Switching from OFF to ON the reader starts an automatic tuning of the connected antenna

DIP-switch 3: Test-Mode

OFF: Normal operation mode
ON: Reader is in test mode (see 4.12)

DIP-switch 4: Behavior for test mode

OFF: Read action in test mode
ON: Write action in test mode

4.11 Starting Up

4.11.1 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.

4.12 Test Mode

The reading and writing capability can be tested without a host connection. The reader supports a mode to test the reading and the writing range. Therefore the reader tries to read or write permanently. The Test LED's show the success or failure of the reading or writing.

Start the test mode

Switch DIP switch 3 to ON to start the test mode. If the test mode is running, the 'Status LED' is flashing.

To test reading, DIP switch 4 must be OFF.

If the transponder is within the reading range and can be read, the green test mode LED (OK) is ON. If the transponder is out of range, the red test mode LED (error) is ON.

To test the writing range, DIP switch 4 must be ON. The test procedure is the same as on reading test.#

To leave the test mode switch DIP switch 3 to OFF. The Status LED and the test mode LED's go out.

5 OPERATION

5.1 Operating Personnel

The LF60 Transponder Reader is designed to be operated by specially trained personnel only. If you have doubts about the qualification required, contact the manufacturer.

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

5.2 Introduction

The SECS-1 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 Communications Standard E5 (SECS-2).

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-1 protocol can be seen as a layered protocol used for point-to-point communication. The layers within SECS-1 are the physical link, block transfer protocol and message protocol.

It is not intent of the standard 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 by high-speed functional test applications.

In a network, the roles of host and equipment may be assumed by any party in 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.

5.3 SECS-1 Implementation

This message set describes the communication between a SECS-1 reader and a host. The host and the transponder reader communicate via an RS232 interface (SECS-1).

5.3.1 Character Structure

Data will be 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.

SECS1 performs no parity or other verification of the individual bytes.

5.3.2 Block Transfer Protocol

The gateway will use an interpretation of SECS-1 by a serial transport layer. The following are some points to note about this implementation.

5.3.2.1 Master Slave

The host connects to the reader. If there is contention, 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.

5.3.2.2 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

5.3.2.3 Message Block Structure

SECS message blocks have the 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-1 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 set 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 (bit0-bit7), which is identical with the last two characters of the readers serial number, and a 5 bit fixed reader number (bit8-bit14 = 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 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 one 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 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 one 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 those 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.

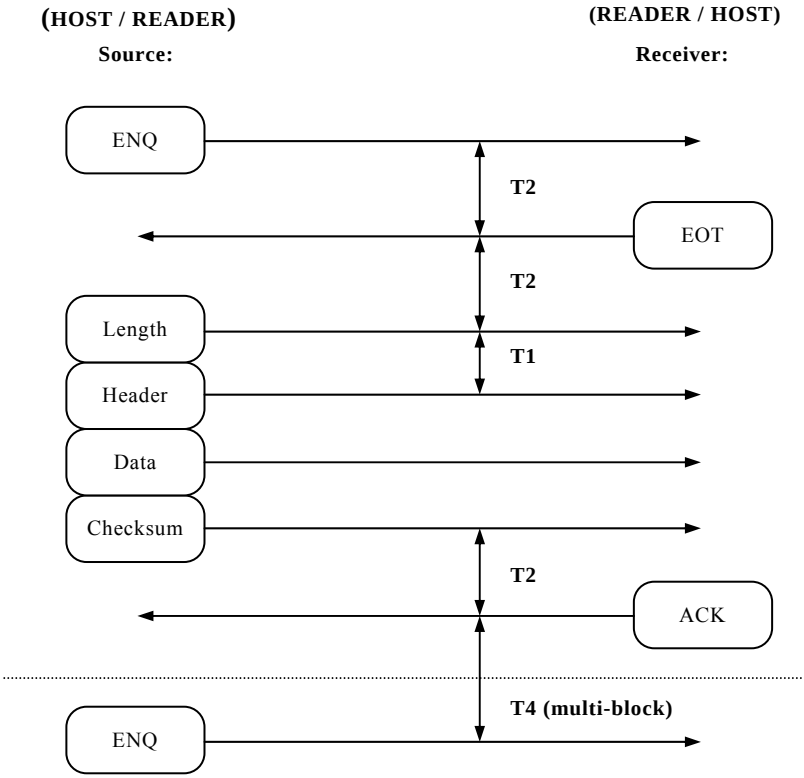
The **checksum** is calculated as the numeric sum of the unsigned binary values of all the bytes, after the length byte and before the checksum in a single block.

5.3.2.4 Block Transfer Protocol

The drawing below illustrates some simple message interactions between the host and the equipment. The figure shows the handshake sequence possible 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 works in slave mode. First, it must receive the equipment message because the reader is the master. Only now 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-1)

5.4 SECS-2 Implementation

5.4.1 Introduction

The SEMI Equipment Communication Standard Part 2 (SECS-2) defines details 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-1).

The messages defined in this specification support the typical activities required for the BROOKS SECS-1 transponder reader.

SECS-2 gives form and meaning to messages exchanged between the equipment and the host using a message transfer protocol, such as SECS-1. SECS-2 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-2, messages are identified by a stream code (0-127, 7bits) and a function code (0-255, 8 bits). Each combination of stream and function represents a unique message identification.

SECS-2 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, where 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.

5.4.2 Data Items

The formats represent arrays of types: <type>[number of elements] where <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 != 00	`<Boolean 0x00>`
10	21	Binary	Byte sequence of the length "Length"	`<B1 0x01>`
20	41	ASCII	Printable ASCII signs	`<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	1.chr	2.chr	3.chr	4.chr	5.chr	6.chr
zero-length	xx	00						
List Data Item	01	03	1. element		2. element		3. element	

5.4.3 Message set

The SECSII-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 Equipment constant request
- S2F15 and S2F16 New equipment constant request
- 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

According to SEMI E99 carrier ID read/writer functional standard for SECS-1 and SECS-2 protocol, the LDN reader supports the 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

5.4.4 Data Item Dictionary

This section defines the data items used in the standard SECS-2 messages described in the section “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 section data items (page 40). 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]

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 a failure is reported. Failures will not be reset on principle.

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 carrier had been removed prematurely (sensor uncovered!)

5: Invalid command or parameter detected

6: Unknown error

7: Reserved

8: Parity- 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

ALTX	Format: A[max40]

Alarm Text

The length of the alarm text is 0 to 40 signs.

According to the reader version, state information about the sensor or sensors is also transmitted during a reader failure message.

The information should be interpreted as follows:

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

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

ALTX[2] State 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 states

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 state of ALARM STATUS
"OperationalStatus"	Current CIDRW sub state of OPERATIONAL
"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=0)
"ECID_01" → parameter 1 – Baudrate (ECID=1)
"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
"ECID_10" → parameter 10 – FIX
"ECID_11" → parameter 11 – Reader ID
"ECID_12" → parameter 12 – HeadID
"ECID_13" → parameter 13 – Antenna tuning
"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_29" → parameter 29 – transponder load duration (read mode)
"ECID_35" → parameter 35 – special feature
"ECID_36" → parameter 36 – lock test buttons
"ECID_37" → parameter 37 – MID area
"ECID_38" → parameter 38 – Test after software reset
"ECID_40" → parameter 40 – transponder load duration (write mode)
"ECID_41" → parameter 41 – delay time between read cycle
"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 settings

Head Attribute Definitions: *

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

* In case of a LDN Transponder Reader, the head attribute definition "HeadStatus" is equal to the "OperationalStatus" of the CIDRW. The "HeadID" is also always 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 state of ALARM STATUS

"0" … NO

"1" … ALARMS

"OperationalStatus" Current CIDRW sub state of OPERATIONAL

"**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** parameter 0 to parameter 45

Head Attribute Definitions:

"HeadStatus" The current state

"**IDLE**"… reader in IDLE mode

"**BUSY**"… reader is busy

"**NOOP**"… not operating

"HeadID" Head number 0-31 (2 digits)

"00" … Reader 0

"31" … Reader 31

Where used: S18F1, S18F3

CPVAL	Format: A[max2]

Description: State request value

"**OP**" … operating state

"**MT**" … maintenance state

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 should be read or written.

The valid range depends on the length of the MID area (parameter 37).

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 the 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!

Parameters:

Parameter 0: Gateway ID

The gateway ID is a part of the device ID. The LDN reader works simultaneously as a gateway and 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. (Lowbyte TargetID)

Parameter 1: Baudrate

Data transmission rate to the SECS-Host

3:	300 Baud
6:	600 Baud
12:	1200 Baud
24:	2400 Baud
48:	4800 Baud
96:	9600 Baud
192:	**19200 Baud**
200:	38400 Baud
201:	57600 Baud
202:	115200 Baud

Default :(192) 19200 Baud (see accompanying letter of the reader)

Parameter 2: Inter-Character-Timeout T1

1 .. 100 1/10s

Default: (10) 1s

Parameter 3 : Block-Protocol-Timeout T2

2 .. 250 1/10s

Default: (20) 20s

Parameter 4: Reply-Timeout T3

1 .. 120 1s

Default: (45) 45s

Parameter 5: Inter-Block Timeout T4

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

1 .. 120 1s

Default: (45) 45s

Parameter 6: Retry limit RTY

Number how often a question or a message shall be repeated.

0 .. 31

Default: 3

Parameter 7: TARGETID HighByte

Highbyte of the predefined TARGETID (not changeable).

* Note parameter 12

Parameter 8: TARGETID LowByte

Lowbyte of the predefined TARGETID (not changeable).

* Note parameter 12

Parameter 9: Heartbeattime

The readers offer the option of generating a regular heartbeat. This means the reader sends a S1F1 message to the host in the defined interval.

0 …	No heartbeat
1 … 255	10s (10s - 2550s)

Default: 0 no heartbeat

Parameter 10: Not defined!

Parameter 11: Reader-ID

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 LDN 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: Head-ID

If you use a two-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 13: Antenna Tuning

The automatic antenna tuning features offers the possibility to operate different types of antennas and within different surroundings. When the automatic tuning has finished the reader is adjusted to the connected antenna and the current surroundings.

To tune the antenna the reader has 3 relay switches which have effect to the physical properties of the antenna circuit. The setting of the relay switches is stored in parameter 13.

Bit 0 to bit 2 shows the current setting of the switches.

0x00000000 : all switches are OFF

0x00000001 : switch 1 is ON

0x00000111 : all switches are ON

To start an automatic tuning of the antenna via protocol set parameter 13 to value 8. After the tuning was finished, the reader stores the current settings of the switches in parameter 13.

Parameter 14-19: Not defined!

Parameter 20: sensor delay for presence sensor

Delay time for sensor signal to start an automatic read.

0 .. 255 1/10 s

Default: (10) 1s

Parameter 21: Not defined!

Parameter 22: 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: 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 1s

Default: (5) 500ms

Parameter 24: r/w maxrepeat

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: 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.
01 …	Read and write free type Each transponder type consists of 10 data bytes. The validity of the data bytes is not checked by checksum.
02 …	Read free type without TIRIS type If the tag has a valid TIRIS format (valid checksum) a tag error occurs.

Default: 00

Parameter 26: sensor activity

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

0 Sensor not activated

1 Sensor activated

Default: 1

Parameter 27: 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 I/O port.

A sensor is required to use this capability!

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: Not defined!

Parameter 29: transponder load duration (read-mode)

The time required to load a transponder during a read process.

The default value (50ms) should not be changed!

00 .. 255 ms

Default: (50) 50ms

Parameter 30 – 33: Not defined!

Parameter 34: 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: special features

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

bit 0:	Auto read starts if sensor is covered (0..enabled/1..disabled)
bit 1:	Without function
bit 2:	Different load duration between read and write mode (0..disabled/1..enabled) (see parameter 29 and 40)
Default:	(0000 0001)

Parameter 36: DIP switch activation

Defines which DIP switch is active or not. Bit 1 to bit 4 correspond to DIP switch 1 to 4. Bit 0 is not used at this moment.

0x0001 1110 : all DIP switches are active.

0x0000 0000 : all DIP switches are deactivated.

Default: 0x1E (0001 1110)

Parameter 37: 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).

See also parameter 42 – 45 and 99.

Parameter 38: Test After Soft 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: Not defined!

Parameter 40: transponder load duration (write-mode)

The time required to load a transponder during a write process.

The default value (50ms) should not be changed!

00 .. 255 ms

Default: (50) 50ms

Parameter 41: delay time between read cycle

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.

00 .. 20 50ms

Default: (2) 100ms

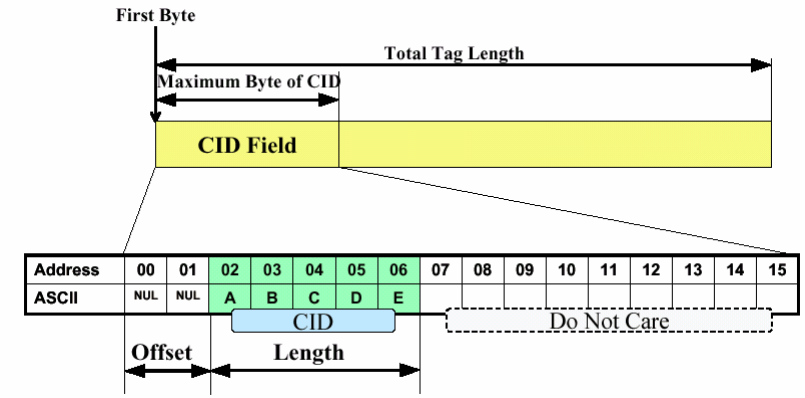
Parameter 42: CarrierIDOffset

Defines the offset of the CID within the CID field (MID area – parameter 37).

The valid value range depends on the value of the MID area and the value of CarrierIDLength.

Valid range: 0 … maximum bytes of CID -1

Default: 0



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

Parameter 43: CarrierIDLength

Defines the length of the CID within the CID field (MID area – parameter 37).

The valid value range depends on the value of the MID area and the value of CarrierIDOffset. (see parameter 42: CarrierIDOffset)

Valid range: 1 … maximum bytes of CID field

Default: 16

Parameter 44: FixedMID

Defines the read, write and error behavior regarding 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: 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 ‘0’ will displayed.
2	MID format right aligned – filler byte is ASCII ‘0’ (0x30) Reading: leading ‘0’ will not displayed.

If parameter 45 is not ‘0’ the parameters 42, 43 and 44 are not effective.

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: custom 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’ set the following parameters:

Reader is compliant to last revisions of SEMI E99-0303

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

‘03’ set the following parameter:

Reader is compliant to older reader versions before the revision of SEMI E99-0303.

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

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 state

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 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)

☞ Pay attention to parameter 42 – 45.

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 (page 1 up to page 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 cassette identifier 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] ... PAGEDATA [8] The 8 byte (one page) of the transponder ID are following.

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 state 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 transponder 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 which has caused the message.

Default: only sensor 0 is defined!

bit 7 ..... bit 0

Initiator	Sensor 1	Sensor 0

Sensor 0: *bit0 – bit2*

The current state of sensor 0 is described in three bits

0 Sensor not occupied

1 Sensor occupied

7 Sensor not defined

Sensor 1: *bit3 – bit5 (defined for future developments)*

The current state of sensor 1 is described in three bits

0 Sensor not occupied

1 Sensor occupied

7 Sensor not defined

Initiator: *bit6 – bit7*

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 to 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[6]

Software revision code.

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. But 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[max18]

Description: Indicates an action to be performed by the subsystem.

Used to differentiate between the different subsystem commands indicated.

"ChangeState"	…	Change state
"GetStatus"	…	Get state
"PerformDiagnostics"	…	Perform diagnostics
"Reset"	…	Reset CIDRW

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, OperationalStatus, and HeadStatus.

List of a Status

L,4

<PMInformation>

<AlarmStatus>

<OperationalStatus>

<HeadStatus>

For data items OperationalStatus and HeadStatus see data item ATTRVAL.

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

TARGETID	Format: A[max4]

Description: Identifies where a request for action or data is to be applied. The TARGETID corresponds to the last four characters of the serial number on a label on the reader. Alternatively, you can use the **HeadID**.

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

Example : "00-xxxx-LDN" (xxxx … dependent on the individual reader)

The 4 ASCII character TARGETID xxxx is set by delivery.

The predefined **TARGETID is fixed** and cannot be changed.

The 2 ASCII character HeadID is changeable and defined in parameter 12 ('ECID_12').

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

5.5 SEMI E99

5.5.1 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 will increase the interchangeability of a Carrier ID Reader/Writer, so that users and equipment suppliers have a wide range of choice.

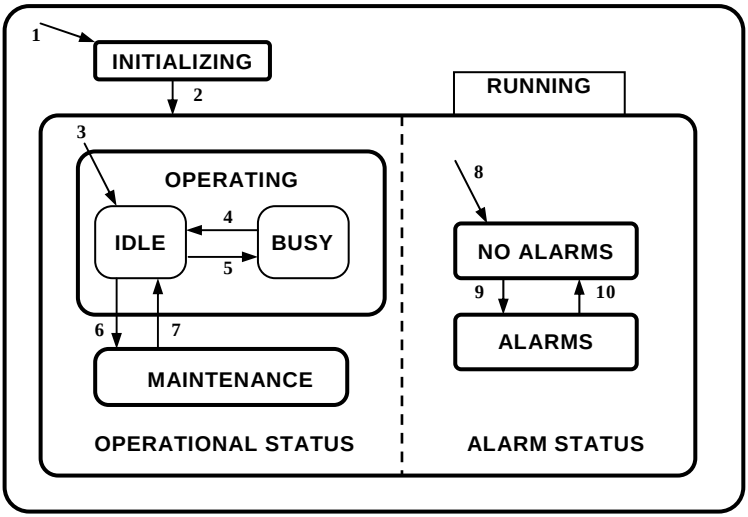
Scope:

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

5.5.2 State Models

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

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



The table below defines the states of the LDN transponder reader.

State	Definition
ALARM STATUS	Displays the presence or absence of alarms.
ALARMS	An alarm condition exists.
BUSY	A service is being performed that affects the state of the hardware
CIDRW	Super-state of CIDRW state model. Always active when the CIDRW is powered on.
IDLE	No service is performed. All heads are idle.
INITIALIZING	CIDRW is performing initialization and self diagnostic. Presence or absence of alarms is initially determined in this state.
NO ALARMS	No alarm condition exists.
OPERATING	Normal operational states where reading and/or writing operations can be performed
OPERATIONAL 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-1 state model of the transponder reader.

#	Previous State	Trigger	New State	Actions	Comment
1	Any	Power up or reset	INITIALIZING	Initialize hard- 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 diagnostic is received.	BUSY	None	
5	BUSY	All services request that affect	IDLE	None	
6	IDLE	A user selects the MAINTENANCE state 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 state. Maintenance and setup activities may now be performed.
7	MAINTENANCE	A user selects the OPERATING state 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 state. 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	

5.5.3 Valid Services per State

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

	Service									
	Write ID	Write Data	Set Attributes	Reset	Read ID	Read Data	Perform Diag.	Get Status	Get Attributes	Change State
Reader State										
INIT										
IDLE/BUSY		X	X	X	X	X	X	X	X	X
MANT	X		X	X	X		X	X	X	X

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

5.6 Message Details

5.6.1 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 or host is online.

S1F1 W . * Header Only

S1F2: ON-LINE DATA (host -> reader)

The host signifies that it is online.

S1F2

<L[2]

<A[6] MDLN >

<A[6] SOFTREV >

>.

S1F2: ON-LINE (reader -> host)

The reader signifies 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 state to offline.

The reader can only be set online again by using message S1F17 (or reset S2F19), all other messages will be 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 state to online.

S1F17 W. *Header Only

S1F18: ONLINE ACKNOWLEDGE (reader -> host)

Acknowledge.

S1F18

<B[1] ONLACK>.

5.6.2 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 one constant from the gateway or reader.

S2F13 W

<L[1]

<U1[1] ECID>

>.

S2F14: EQUIPMENT CONSTANT DATA (reader -> host)

The reader sends the requested constant to the host.

S2F14

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

S2F15: NEW EQUIPMENT CONSTANT SEND (host-> reader, reply)

The host changes one reader constant.

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 constant.

S2F16

<B[1] EAC>.

S2F19: RESET SEND (host -> reader, reply)

The host requests the reader to reset the hardware and software.

If a heartbeat time is set (parameter 9) the reader sends a S1F1 message when the reset was finished.

The power up reset requires a few seconds.

S2F19 W

<B[1] RIC>.

S2F20: RESET ACKNOWLEDGE (reader -> host)

The reader acknowledges the reset.

In case of a power up reset, the S2F20 message requires a few seconds.

S2F20

<B[1] RAC>.

5.6.3 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 SEND (reader -> host, reply)

The reader sends the information that a cassette was detected by the presence sensor.

This message will be sent only if a sensor is connected and activated (see parameters 27 ‘watchport’ and 26 ‘sensor activity’).

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 will be sent only if a sensor is connected and activated (see parameters 27 ‘watchport’ and 26 ‘sensor activity’). The PAGEDATA can be given only if the PAGEDATA that was read at last is still known.

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 will be 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 will be 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>.

Pay attention: Locking of a transponder page is permanent.

You can not unlock a transponder page!

S3F74: LOCK ACKNOWLEDGE (reader -> host)

The reader acknowledges the receipt of the locking command only.

The locking acknowledgement will be 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>.

5.6.4 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>.

5.6.5 System Errors

S9F1: UNRECOGNIZED DEVICE ID (reader -> host)

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

S9F5

<B[10] MHEAD > .

S9F9: TRANSACTION TIMER TIME-OUT (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 controlled.

S9F9

<B[10] SHEAD > .

5.6.6 Subsystem Control and Data

S18F0: 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.

S18F0 W . * Header Only

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

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

S18F1 W

L,2
1. <TARGETID>
2. L,n
    1. <ATTRID$_1$>
    …
    n. <ATTRID$_n$>

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 TARGETID.

S18F2

L,4
1. <TARGETID>
2. <SSACK>
3. L,n
    1. <ATTRVAL$_1$>
    …
    n. <ATTRVAL$_n$>
4. L,1
    L,s
        1. <STATUS$_1$>
        …
        s. <STATUS$_s$>

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 read/write attributes of the component specified in TARGETID.

S18F3 ,W

L,2
1. <TARGETID>
2. L,n
   1. L,2
      1. <ATTRID$_1$>
      2. <ATTRVAL$_1$>
      …
   n. L,2
      1. <ATTRID$_n$>
      2. <ATTRVAL$_n$>

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

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

S18F4

L,3
1. <TARGETID>
2. <SSACK>
3. L,1
   L,s
   1. <STATUS$_1$>
   …
   s. <STATUS$_s$>

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 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, then all data within the indicated section are requested.

S18F6: READ DATA (RD) (reader -> host)

This message is used to return requested information from the subsystem indicated in TARGETID, or to acknowledge the result of the request.

S18F6

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

If TARGETID is unknown, then 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 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 omitted (zero length items) the value of DATALENGTH set the length of data that shall be written. If the length of the data that shall 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 TARGETID.

S18F8

L,3
1. <TARGETID>
2. <SSACK>
3. L,1
   L,s
   1. $<STATUS_1>$
   …
   s. $<STATUS_s>$

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 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 TARGETID.

S18F10

L,4

1. <TARGETID>
2. <SSACK>
3. <MID>
4. L,1
   L,s
   1. $<STATUS_1>$
   …
   s. $<STATUS_s>$

S18F11: WRITE ID REQUEST (WIR) (host -> reader, reply)

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

S18F11 W

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

Pay 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 failure of writing the MID to the subsystem indicated in TARGETID.

S18F12

L,3
1. A,8 <TARGETID>
2. A,2 <SSACK>
3. L,1
   L,s
   1. <$STATUS_1$>
   …
   s. <$STATUS_s$>

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 TARGETID to perform a specific action.

S18F13 W

L,3
1. A,8 <TARGETID>
2. A,18 <SSCMD>
3. L,n
   1. <CPVAL>
   …
   n. <CPVAL$_n$>

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

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

S18F14

L,3
1. A,8 <TARGETID>
2. A,2 <SSACK>
3. L,1
   L,s
   1. <STATUS$_1$>
   …
   s. <STATUS$_s$>

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

5.7 SECS-1 MESSAGE EXAMPLES

All examples are produced with the default gateway-ID 255 (decimal) or 0x00FF (hexadecimal) and reader ID 1!

S1F1 Message from the reader to the host

Gateway to Host: S1F1

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0A )
In : Header ( 81 FF 81 01 80 01 00 01 00 01 )
In : Checksum ( 02 85 )
Out: ACK ( 06 )
```

Host to Gateway: S1F2

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 10 )
Out: Header ( 01 FF 01 02 80 01 00 01 00 01 )
Out: Data 01 02
             41 00
             41 00
Out: Checksum ( 0B 02 )
In : ACK ( 06 )
```

S1F1 Message from the host to the reader

Host to Reader: S1F1

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 01 FF 81 01 80 01 00 00 00 05 )
Out: Checksum ( 08 03 )
In : ACK ( 06 )
```

Reader to Host: S1F2

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 1C )
In : Header ( 81 FF 01 02 80 01 00 00 00 05 )
In : Data
       01 02
          41 06 4C 43 52 31 2E 30
          41 06 52 53 32 4C 31 30
In : Checksum ( 05 8E )
```

Message S1F15 sets the reader offline

Host to Reader: S1F15

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 01 FF 81 0F 80 01 00 00 00 02 )
Out: Checksum ( 13 02 )
In : ACK ( 06 )
```

Reader to Host: S1F16

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0D )
In : Header ( 81 FF 01 10 80 01 00 00 00 02 )
In : Data ( 21 01 00 )
In : Checksum ( 02 36 )
Out: ACK ( 06 )
```

Message S1F17 sets the reader online

Host to Reader: S1F17

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 01 FF 81 11 80 01 00 00 00 04 )
Out: Checksum ( 17 02 )
In : ACK ( 06 )
```

Reader to Host: S1F18

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0D )
In : Header ( 81 FF 01 12 80 01 00 00 00 04 )
In : Data ( 21 01 00 )
In : Checksum ( 02 3A )
Out: ACK ( 06 )
```

Request reader constant with message S2F13

Host to Reader (Gateway): S2F13

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0F )
Out: Header ( 01 FF 82 0D 80 01 00 00 00 05 )
Out: Data 01 01
             21 01 01   →Parameter 1
Out: Checksum ( 3A 02 )
In : ACK ( 06 )
```

Reader to Host: S2F14

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0F )
In : Header ( 81 FF 02 0E 80 01 00 00 00 05 )
In : Data 01 01
            A5 01 C0   →Value 192
In : Checksum ( 03 7E )
Out: 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 constant send with S2F15

Host to Reader: S2F15

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 14 )
Out: Header ( 01 FF 82 0F 80 01 00 00 00 07 )
Out: Data 01 01
            01 02
               A5 01 14                  →Parameter 20
               A5 01 05                  →Value 5
Out: Checksum ( 83 02 )
In : ACK ( 06 )
```

Reader to Host: S2F16

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0D )
In : Header ( 81 FF 02 10 80 01 00 00 00 07 )
In : Data 21 01 00    →ECV 0
In : Checksum ( 02 3C )
Out: ACK ( 06 )
```

The Host sets the reader parameter “20” (sensordelay) to the value “5”.
The reader acknowledges the new constant with ECV = 0.

Host requests a software reset with S2F19

Host to Reader: S2F19

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0D )
Out: Header ( 01 FF 82 13 80 01 00 00 00 1C )
Out: Data 21 01 02   →Software reset
Out: Checksum ( 56 02 )
In : ACK ( 06 )
```

Reader to Host: S2F20

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0D )
In : Header ( 81 FF 02 14 80 01 00 00 00 1C )
In : Data 21 01 00   →RAC
In : Checksum ( 02 55 )
Out: ACK ( 06 )
```

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

Reader to Host: S3F5

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

Host to Reader: S3F6

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0D )
Out: Header ( 01 FF 03 06 80 01 00 03 00 04 )
Out: Data 21 01 00    → ACKC3
Out: Checksum ( B4 01 )
In : ACK ( 06 )
```

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

Reader to Host: S3F13

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

Host to Reader: S3F14

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0D )
Out: Header ( 01 FF 03 0E 80 01 00 03 00 05 )
Out: Data 21 01 00    → ACKC3
Out: Checksum ( BD 01 )
In : ACK ( 06 )
```

The material ID acknowledgement 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

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 1D )
In : Header ( 81 FF 83 07 80 01 00 03 00 06 )
In : 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
In : Checksum ( 04 34 )
Out: ACK ( 06 )
```

Host to Reader: S3F8

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0D )
Out: Header ( 01 FF 03 08 80 01 00 03 00 06 )
Out: Data 21 01 00    → ACKC3
Out: Checksum ( B8 01 )
In : ACK ( 06 )
```

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

Host to Reader: S1F1

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 02 FF 81 01 80 01 00 00 00 31 )
Out: Checksum ( 35 02 )
In : ACK ( 06 )
```

Reader to Host: S9F1

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 16 )
In : Header ( 81 FF 09 01 80 01 00 07 00 18 )
In : Data
     21 0A 02 FF 81 01 80 01 00 00 00 31 →MHEAD error message
In : Checksum ( 04 8A )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 01 FF 84 01 80 01 00 00 00 06 )
Out: Checksum ( 0C 03 )
In : ACK ( 06 )
```

Reader to Host: S9F3

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 16 )
In : Header ( 81 FF 09 03 80 01 00 14 00 39 )
In : Data
     21 0A 01 FF 84 01 80 01 00 00 00 06 → wrong message
                                           header
In : Checksum ( 04 91 )
```

The stream “4” is not part of the BROOKS SECS-2 message set, so a S9F3 error message will appear.

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

Host to Reader: S1F3

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0A )
Out: Header ( 01 FF 81 03 80 01 00 00 00 06 )
Out: Checksum ( 0B 02 )
In : ACK ( 06 )
```

Reader to Host: S9F5

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 16 )
In : Header ( 81 FF 09 05 80 01 00 00 00 07 )
In : Data
     21 0A 01 FF 81 03 80 01 00 00 00 06 → wrong message
                                           header
In : Checksum ( 04 4C )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 0F )
Out: Header ( 01 FF 82 0D 80 01 00 00 00 36 )
Out: Data ( 01 01 21 01 0F )
Out: Checksum ( 79 02 )
In : ACK ( 06 )
```

Reader to Host: S2F14

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0E )
In : Header ( 81 FF 02 0E 80 01 00 00 00 36 )
In : Data 01 01
            A5 00
In : Checksum ( 02 EE )
Out: ACK ( 06 )
```

Reader to Host: S9F7:

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 16 )
In : Header ( 81 FF 09 07 80 01 00 07 00 1F )
In : Data 21 0A 01 FF 82 0D 80 01 00 00 00 36
In : Checksum ( 04 A8 )
Out: 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

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 0A )
In : Header ( 81 FF 81 01 80 01 00 00 00 01 )
In : Checksum ( 02 84 )
Out: ACK ( 06 )
```

Host to Reader: S9F9

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 16 )
In : Header ( 81 FF 09 09 80 01 00 00 00 02 )
In : Data
     21 0A 81 FF 81 01 80 01 00 00 00 01 → stored data
In : Checksum ( 04 C3 )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 5A )
Out: Header ( 01 FF 92 01 80 01 00 00 00 03 )
Out: 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 )
Out: Checksum ( CD 02 )
In : ACK ( 06 )
```

Reader to Host: S18F2

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 44 )
In : Header ( 81 FF 12 02 80 01 00 00 00 03 )
In : 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"
In : Checksum ( 0C 29 )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 77 )
Out: Header ( 01 FF 92 03 80 01 00 00 00 04 )
Out: 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 "1"
            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 )
Out: Checksum ( F2 02 )
In : ACK ( 06 )
```

Reader to Host: S18F4

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 2D )
In : Header ( 81 FF 12 04 80 01 00 00 00 04 )
In : 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"
In : Checksum ( 08 54 )
Out: ACK ( 06 )
```

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

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

Host to Reader: S18F5

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

Reader to Host: S18F6

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 20 )
In : Header ( 81 FF 12 06 80 01 00 00 00 08 )
In : 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"
In : Checksum ( 05 F9 )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 24 )
Out: Header ( 01 FF 92 07 80 01 00 00 00 18 )
Out: 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"
Out: Checksum ( 1A 02 )
In : ACK ( 06 )
```

Reader to Host: S18F8

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 2D )
In : Header ( 81 FF 12 08 80 01 00 00 00 18 )
In : 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"
In : Checksum ( 08 3B )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 10 )
Out: Header ( 01 FF 92 09 80 01 00 00 00 2D )
Out: Data
       41 04 31 32 33 34     → TARGETID “1234”
Out: Checksum ( 58 02 )
In : ACK ( 06 )
```

Reader to Host: S18F10

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 37 )
In : Header ( 81 FF 12 0A 80 01 00 00 00 2D )
In : 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”
In : Checksum ( 0A 80 )
Out: 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”. (For chapter data items, see page 43).

Host writes material ID of a multipage transponder with S18F11

Host to Reader: S18F11

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

Reader to Host: S18F12

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 2D )
In : Header ( 81 FF 12 0C 80 01 00 00 00 66 )
In : 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"
In : Checksum ( 08 BD )
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 25 )
Out: Header ( 01 FF 92 0D 80 01 00 00 00 67 )
Out: 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”
Out: Checksum ( 13 02 )
In : ACK ( 06 )
```

Reader to Host: S18F14

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 2D )
In : Header ( 81 FF 12 0E 80 01 00 00 00 67 )
In : 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”
In : Checksum ( 08 C0 )
Out: 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.

(5.5.3 Valid Services per State).

Host requests a reset with S18F13

Host to Reader: S18F13

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 1F )
Out: Header ( 01 FF 92 0D 80 01 00 00 00 3F )
Out: 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”
Out: Checksum ( A1 02 )
In : ACK ( 06 )
```

Reader to Host: S18F14

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 2D )
In : Header ( 81 FF 12 0E 80 01 00 00 00 3F )
In : 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”
In : Checksum ( 08 68)
Out: 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

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 1A )
Out: Header ( 01 FF 92 05 80 01 00 00 00 40 )
Out: Data
     01 03
        41 04 30 30 30 30    → TARGETID “0000”
        41 02 30 31          → DATASEG “01”
        A9 02 00 08          → DATALENGTH 0x08
Out: Checksum ( B8 02 )
In : ACK ( 06 )
```

Reader to Host: S18F6

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 18 )
In : Header ( 81 FF 12 06 80 01 00 00 00 40 )
In : Data
     01 03
        41 04 31 32 33 34    → TARGETID “1234”
        41 02 43 45          → SSACK “CE”
        41 00                → DATA “”
In : Checksum ( 04 78 )
Out: ACK ( 06 )
```

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

The reader detects no tag

Host to Reader: S18F5

```
Out: ENQ ( 05 )
In : EOT ( 04 )
Out: Length Byte ( 1A )
Out: Header ( 01 FF 92 05 80 01 00 00 00 43 )
Out: Data
     01 03
        41 04 31 32 33 34    → TARGETID “1234”
        41 02 30 31          → DATASEG  “01”
        A9 02 00 08          → DATALENGTH  0x08
Out: Checksum ( C5 02 )
In : ACK ( 06 )
```

Reader to Host: S18F6

```
In : ENQ ( 05 )
Out: EOT ( 04 )
In : Length Byte ( 18 )
In : Header ( 81 FF 12 06 80 01 00 00 00 43 )
In : Data
     01 03
        41 04 31 32 33 34    → TARGETID “1234”
        41 02 54 45          → SSACK “TE”
        41 00                → DATA “”
In : Checksum ( 04 8C )
Out: 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”.

6 SERVICE AND ERROR HANDLING

6.1 General

☞ The transponder 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 the contact information on page 115 of this manual). Have the serial number of the transponder reader ready as shown on the label (see page 19) when contacting the manufacturer.

6.2 Qualified Error Handling Personnel

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

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!

6.3 Safety Instructions

All antenna resonant circuit components carry high voltages!

When replacement parts are required, use replacement parts specified by the manufacturer only. Unauthorized substitutions may result in fire, electric shock, or other hazards.

Static electricity can harm electronic components inside the device. ESD protection measures must be observed when opening the device (see page 11).

Do not short-circuit the fuse. This may result in fire or damage to the device. When changing fuses, use fuses specified by the manufacturer only.

6.4 Errors Indicated by the LEDs

6.4.1 Power LED Not Illuminated

1. Check the power supply and the connection cables.
2. Disconnect the device from the power supply and carefully remove the fuse (see illustration page 17). Test the fuse. If it is faulty, replace it by a fuse specified by the manufacturer.

If the above measures do not solve the problem, leave the reader disconnected and contact the manufacturer.

6.5 Reader Does Not Respond or Transmit or Cannot be Controlled by the Host

1. Check if the interface connection cable is undamaged and correctly connected to both reader and host.
2. Check the status as indicated by the LEDs (see section 6.4).

If these measures do not solve the problem, contact the manufacturer.

6.6 Reset

In the case of software errors, a power reset can be carried out by stopping and restarting the power supply.

6.7 Customer Service

BROOKS Automation (Germany) GmbH
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Tel: +49 9279 991 910
Fax: +49 9279 991 900
E-mail: rfid.support@brooks.com
24 hour technical support hotline (Brooks): +1 978 262 2900

7 DEINSTALLATION AND STORAGE

7.1 Deinstallation

1. Disconnect the power supply.
2. Disconnect all cables.
3. Loosen and remove the mounting screws.
4. Remove the reader from its installation surface.

7.2 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 (for technical data, see page 19).

8 TRANSPORTATION AND DISPOSAL

8.1 Transportation

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

8.2 Disposal

The transponder reader and its components consist of different materials. Dispose of these materials separately in accordance with the relevant legislation in your country. Do not throw them away with everyday household trash.

Separate the interior electronic components from the case. Dispose of

- The case as metal trash
- The electronic components, antennas and cables as electronic trash.

9 ACCESSORIES

9.1 Antennas

Type	Part-No.	Picture
Mini antenna	ANT-6K10	

Other antennas are available on request.

9.2 Plugs

Type	Part-No.	Picture
Plug for external output	KS-PH2	
Plug for external input	KS-PH3	

9.3 Cables

Not available yet.

9.4 Power Supply

Type	Part-No.	Picture
Power supply 0.33A (IN: 100/230V OUT: 24VDC)	SVG 0,33 HF	
Cable plug for power supply	KS-PH3