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RS232-Transponder Reader
(SEMI SECS-1-Protocol)

Technical Reports

***** Draft *****

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1 System Description

The HERMOS Transponder Reader System is a high frequency identification system using the FM-transmission.

The basic item is a transponder working as a forgery-proof electronic identity disc.

The reading unit of the system sends an energy impulse via the antenna. The capacitor of the passive, battery-less 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 transponder and 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.

2 Important Notes:

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

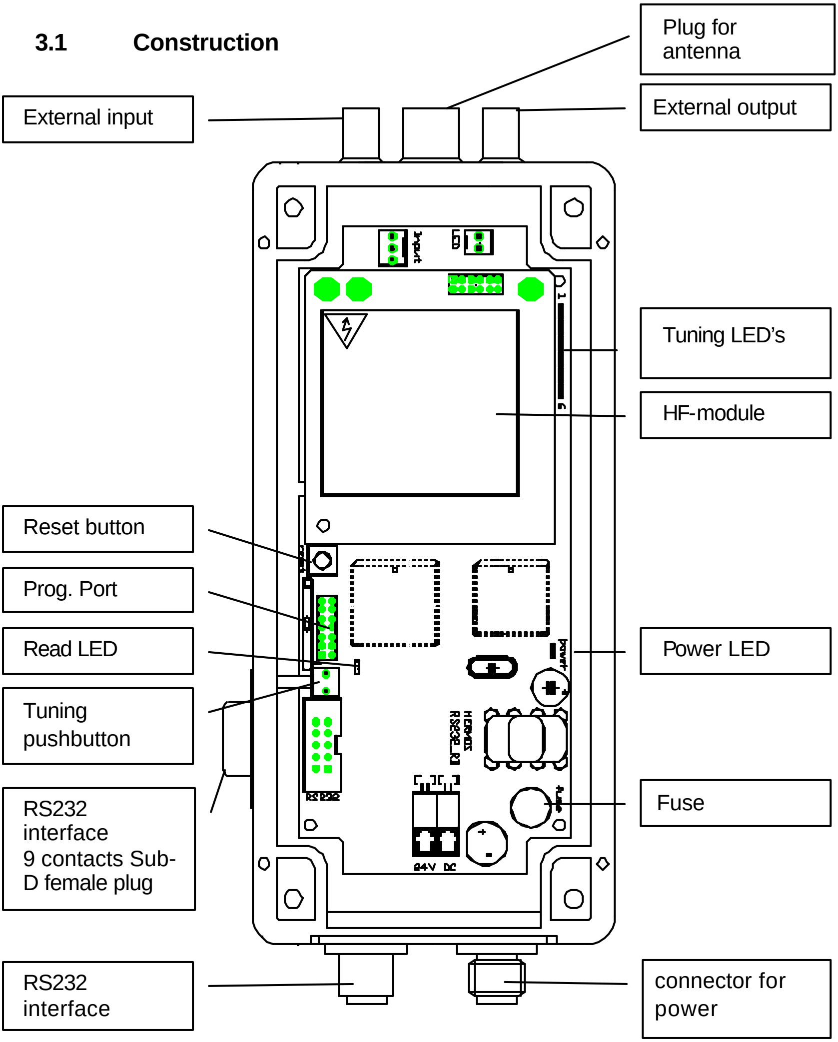
1) this device may not cause harmful interference , and
2) this device must accept any interference received, including interference that may cause undesired operation.

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

NOTE:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to 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, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

3 Hardware

3.1 Construction



Attention:

ALL ANTENNA RESONANT CIRCUIT COMPONENTS CAN CARRY HIGH VOLTAGE!

The **power LED** signalizes whether 5V are existing on the board.

The **HF-module** is the analog part of the device. It triggers the antenna and transmits the received data to the controller.

The 6 **tuning LED's** show the switch status of the adjustment-relays (only valid if automatic tuning integrated).

The data are passed down serially at the **RS232 interface** (9 contact Sub-D female plug) with the different protocols. Baudrates of 300 Bd up to 115,2 kBd are possible.

Tuning-pushbutton, the reader start an automatic antenna tuning (only valid if automatic tuning integrated).

The **read-LED** shortly flashes green, if the device tries to read respectively write.

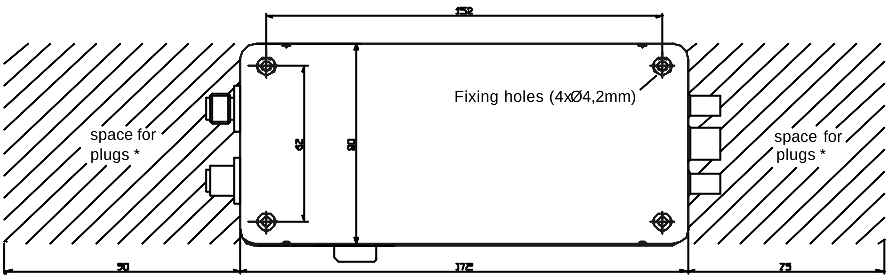
The **programming-port** is scheduled for service purposes.

The **external output**, usually a LED, shows the switch status of the device (depends on the software).

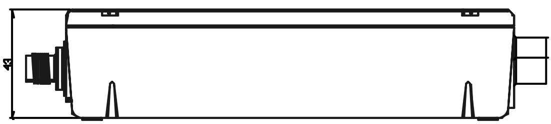
A sensor (for example an optical sensor) can be connected at the **external input**.

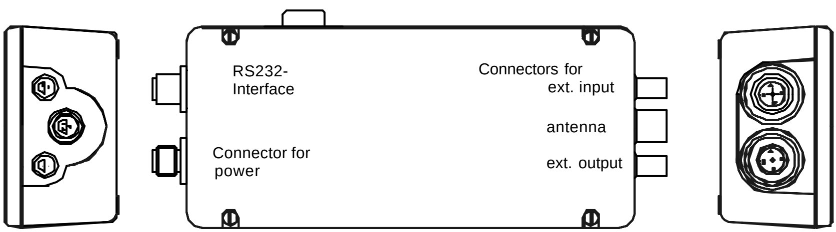
Fuse
TR5-housing, 500 mA T (low breaking)

3.2 Standard-Housing



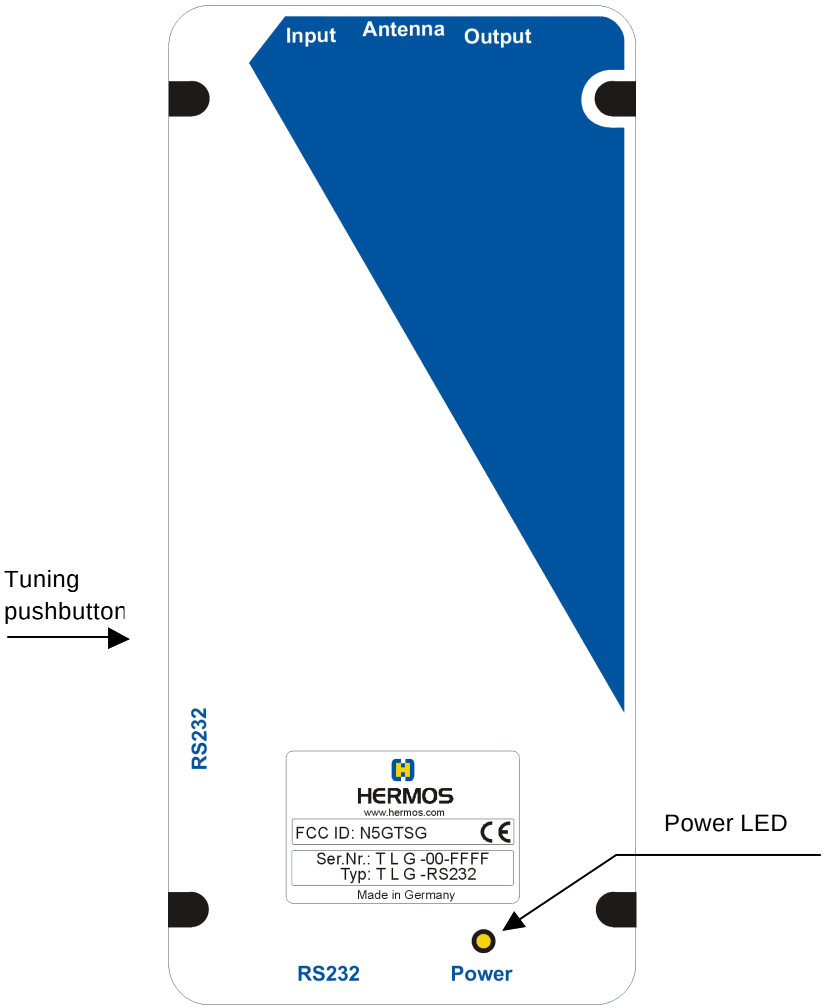
* Keep space free for plugs. Dimensions for straight cable plugs. Angled cable plugs decrease space





3.3 Housing Lid

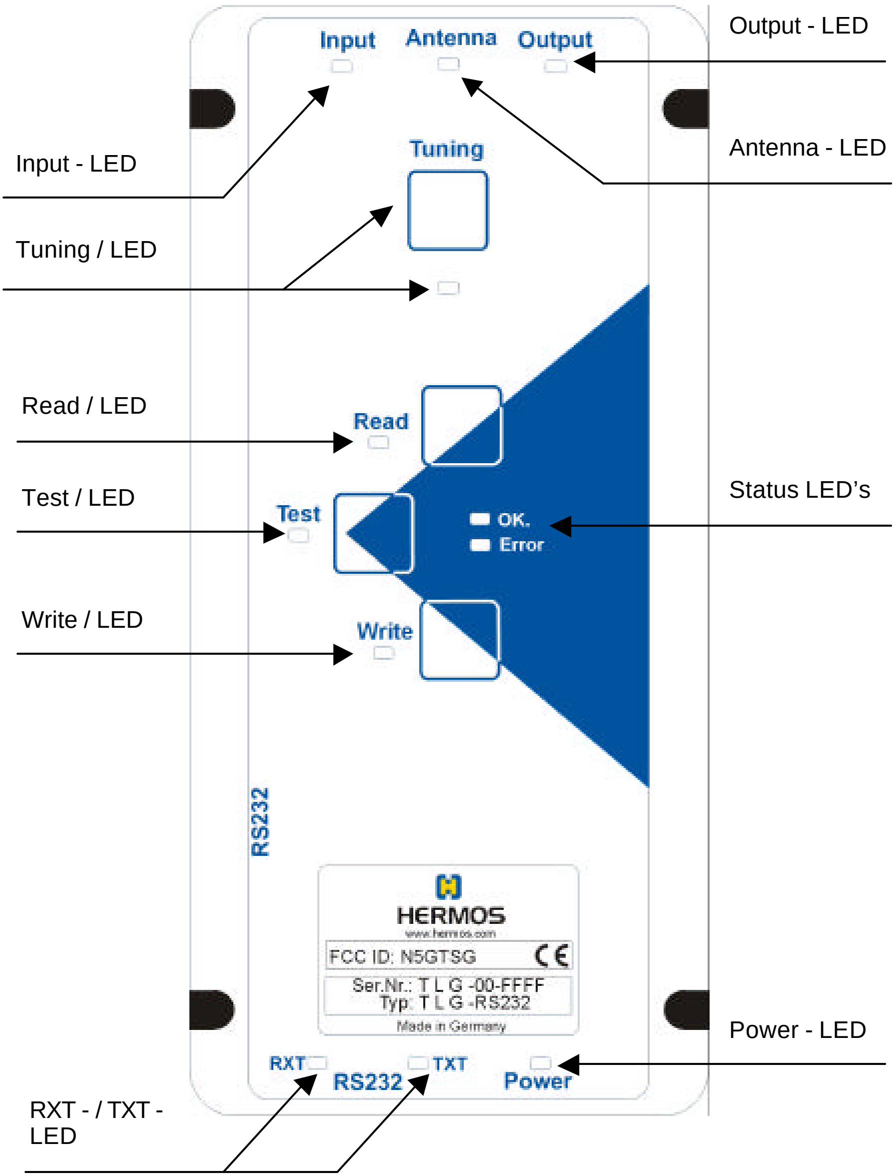
3.3.1 Without Membrane Keyboard



Power LED:
The LED lights after the device had been connected to the power supply.

Tuning pushbutton:
The automatic calibration is carried out after pushing the button which can be reached by a drilled hole at the side of the housing (only valid if automatic tuning integrated).

3.3.2 With Membrane Keyboard



Power - LED:
If the device is connected to a power supply, the LED lights green and the reader is ready for use.

Tuning / LED:
The antenna's efficiency is optimized by pushing the automatic calibration key. The LED lights up red during the calibration process and subsequently goes out when the tuning had been successful. If a fault occurs, then the LED flashes as long as a calibration initialized again had proceeded positively.
Possible faults could be a defect antenna or a strong metallic surrounding at the antenna.

Antenna - LED:
If the antenna sends HF-signals (for example for loading a transponder or for sending data), the LED is activated for this period.

Input - LED:
The input-LED signalizes a triggering of the external sensor respectively the actuating of an external potential-free contact.

Output - LED:
If the external output is set, the LED lights; otherwise is does not light.
For a detailed description please see 3.9

RXT - und TXT - LED:
When data are transmitted via the RS232-interface the corresponding transmit- or receive-LED lights.
TXT-LED (transmit) : Data are transmitted from the reader to the terminal. R ? T
RXT-LED (receive) : Data from the terminal are received in the reader. R ? T

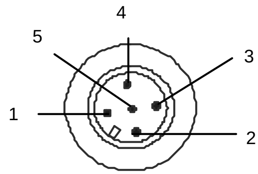
Test / LED:
The test mode serves for the checking of the most important reader features, the reading respectively the writing, which are operated by pushing the corresponding key in polling mode. If the device is in test mode, this is signalised by the test -LED. The test-key has to be pushed again to leave the mode.

Read / - and Write / LED:
If the test mode is activated, then it is possible to bring the reader to permanent reading respectively writing (polling) by pushing the read- respectively write-key. This state is shown by a LED next to Read or Write.
By pushing the key which is not activated currently, the device changes its state from Read to Write or vice versa. But if the activated key is pushed, the polling mode is left, and the LED at Read respectively Write goes out.
If the reader is in one of these two states, the status-LED's are showing whether the process had been successful (green OK) or not (red ERROR).

3.4 Terminal Connection

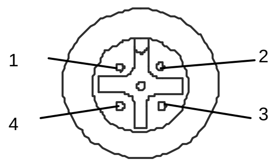
Built-in male plug, plastic (supply)

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



Built-in female plug, metal (RS232-interface)

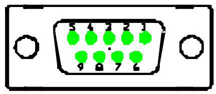
PIN	Signal
1	NC
2	GND
3	RxD
4	TxD

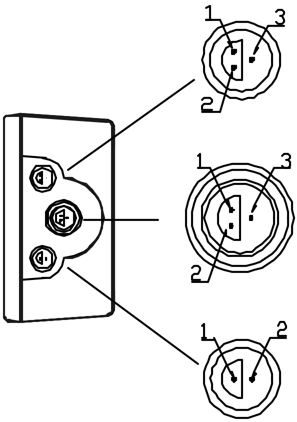


Sub-D female plug

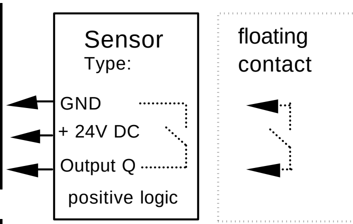
The serial interface is also carried out with the Sub-D female plug (9 contacts), a serial connection line (switched 1:1) can be used.

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



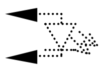


Ext. Input	
Pin	Signal
1	GND
2	+24V
3	IN npn



Antenna	
Pin	Signal
1	Antenna "+"
2	Antenna "-"
3	NC

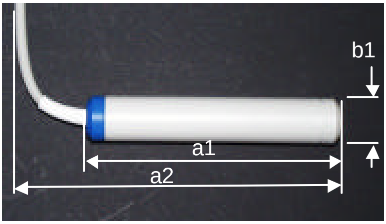
Ext. Output	
Pin	Signal
1	+5V
2	OUT LED



The ext. output is dimensioned for connecting a LED (without resistor).

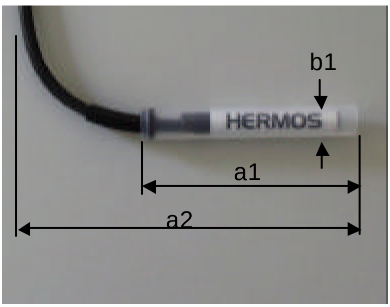
3.5 Antenna

3.5.1 Rod Antenna



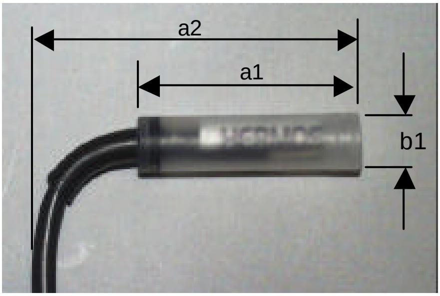
a1	length of antenna cylinder	125mm
a2	complete mounting dimensions (cable with 90° angle)	150mm
b1	diameter of antenna cylinder	23.0mm

3.5.2 Mini Antenna



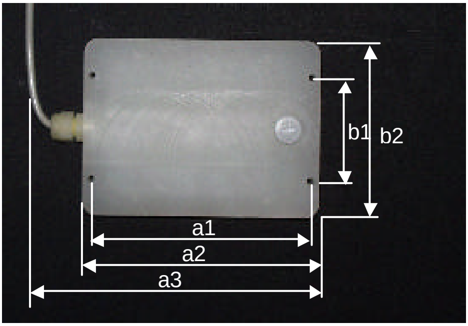
a1	length of antenna cylinder	68mm
a2	complete mounting dimensions (cable with 90° angle)	85mm
b1	diameter of antenna cylinder	10.0mm

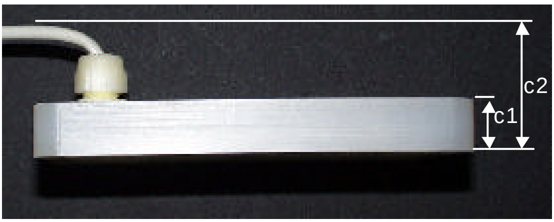
3.5.3 Micro Antenna



a1	length of antenna cylinder	40mm
a2	complete mounting dimensions (cable with 90° angle)	60mm
b1	diameter of antenna cylinder	10.0mm

3.5.4 Frame Antenna





a1	distance between the mounting holes (length)	148mm
a2	length frame antenna	161mm
a3	complete mounting dimensions length (cable screwing at the side)	210mm
b1	distance between the mounting holes (width)	70mm
b2	width frame antenna	120mm
c1	high frame antenna	19mm
c2	complete mounting dimensions high (cable screwing at the top)	70mm

3.6 Technical Data Antenna Cable

3.6.1 Cable of Rod Antenna and Frame Antenna

diameter : 5,5mm
bending radius: 15 x diameter, only once 6 x diameter
material: PVC

3.6.2 Cable of Mini Antenna and Micro Antenna

diameter : 4,1mm
bending radius: 20 x diameter, only once 5 x diameter
material: PVC

3.7 Technical Data Transponder-Reader

Parameter	**Value**
Operation temperature	0 to +50°C
Stock temperature	-25 to +70 °C
Permissible humidity @ 50C°	25 - 80 %
Transmitter frequency	134.2 kHz
Max. transmitting level in 3m distance	104 dBµV/m
Typ. period of charging impulse	50ms
Max. repeat of reading	4/s
Max. repeat of programming	1/s
Protection mode	IP 40
Housing material	ABS (UL94-V0)
Weight (with rod antenna and presence sensor)	about 440g
Fuse type TR5	500mA (T)
Serial interface RS232	300 Bd – 115,2 kBd

3.8 Power Supply and Current Input

Description	min	Type	max	unit
Voltage (proof against connecting to the wrong terminal)	18	24	30	VDC
Current with/without presence sensor (starting process excluded)		30 / 55		mA
Reading/writing impulse rod antenna without/with presence sensor micro antenna without/with presence sensor		160 / 185 140 / 165		mA mA

3.9 External Output (LED)

Normally a LED is connected to the external output which is only relevant combined with a read triggered by the external input.

The LED lights as long as a page is automatically read from a transponder.
If several pages are read in succession, the LED pulses because an acknowledgement of the terminal has to follow each page.

If the terminal does not return any acknowledgement after a page of the automatic read, the LED blinks as long as either a read process initialized again had been completed successfully or a reset had been triggered.

If the reader cannot identify any transponder during the automatic read, the LED lights permanently. This state can be reset by a reset or by a faultless automatic reading cycle.

3.10 Additional Instruction for Use

Never expose the device to a intense change in temperature. Otherwise, water of condensation can develop inside the device what can lead to damages.

Never bend or extend the antenna cable or expose it to other mechanical loads.

4 Licenses and Certificates

- EC-Type Certification Registration Number: in preparation
- FCC ID: N5GTSG

5 Warranty and Liability

The warranty period is 6 months and starts with the moment of the delivery of the device which has to be proved by invoice or other documents.

The warranty includes the repair of all damages of the device, occurring within the warranty period, which are evidently caused by faults of the material or productional defects.

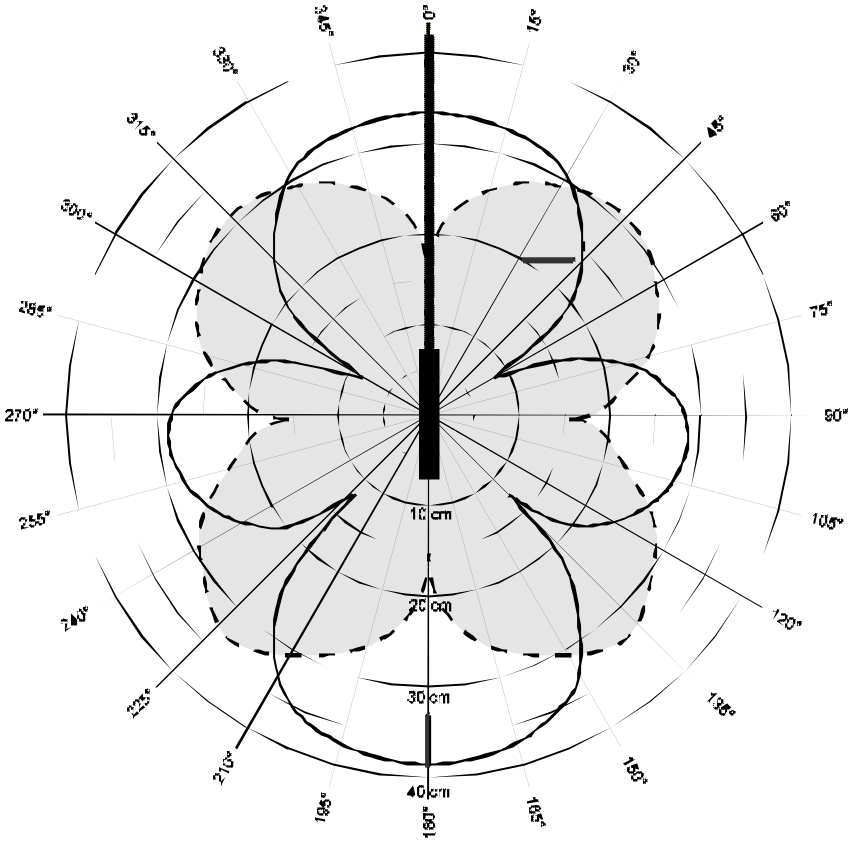
Not included into the warranty are damages caused by not prescribed connection, inappropriate handling and non-observance of the technical reports.

6 Reading and Writing Ranges

These diagrams have been taken at optimal conditions.

6.1 Reading Range Rod Antenna

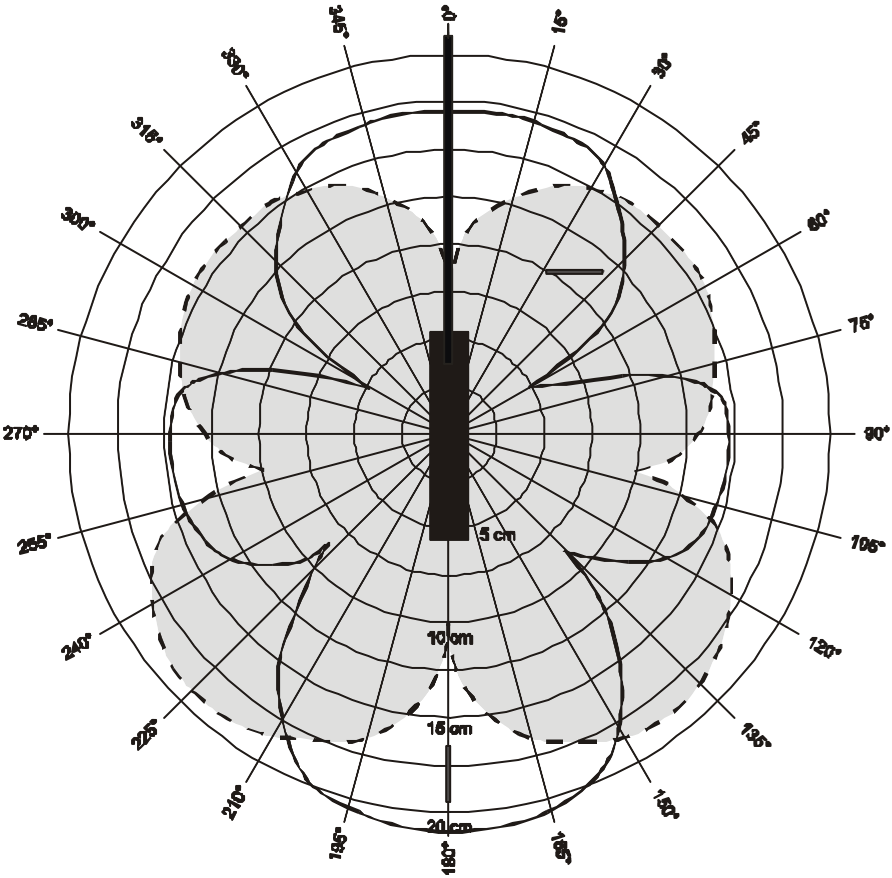
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS rod antenna (up to 1000mm lead)



__________ Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

6.2 Writing Range Rod Antenna

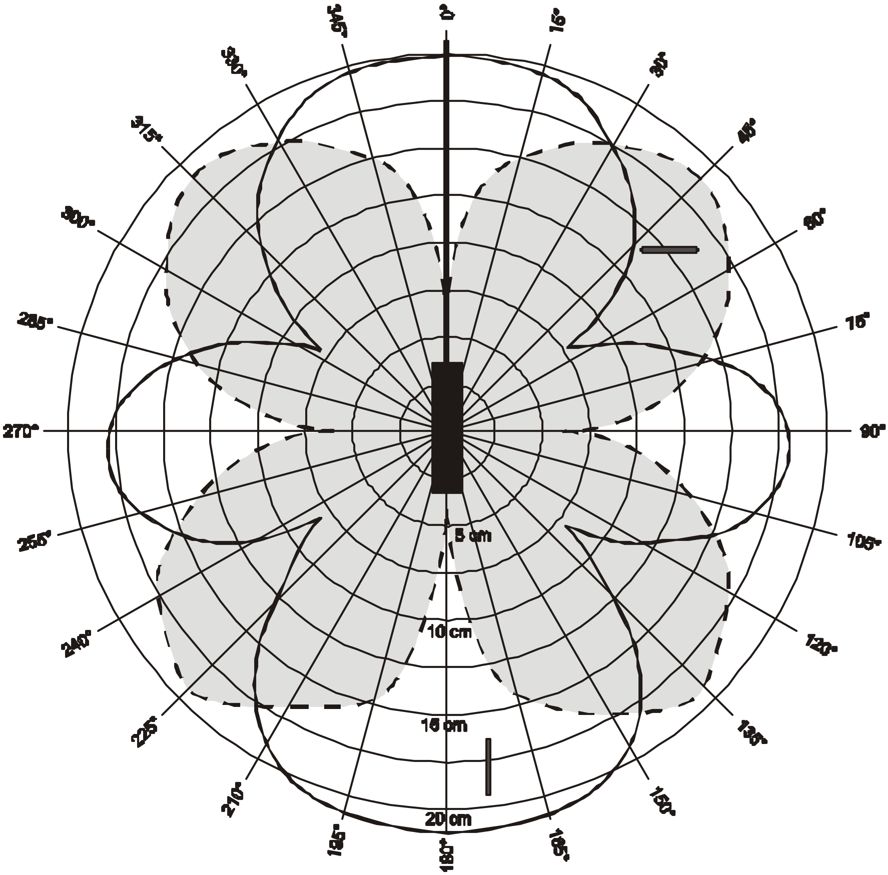
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS rod antenna (up to 1000mm lead)



_________ Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

6.3 Reading Range Mini Antenna

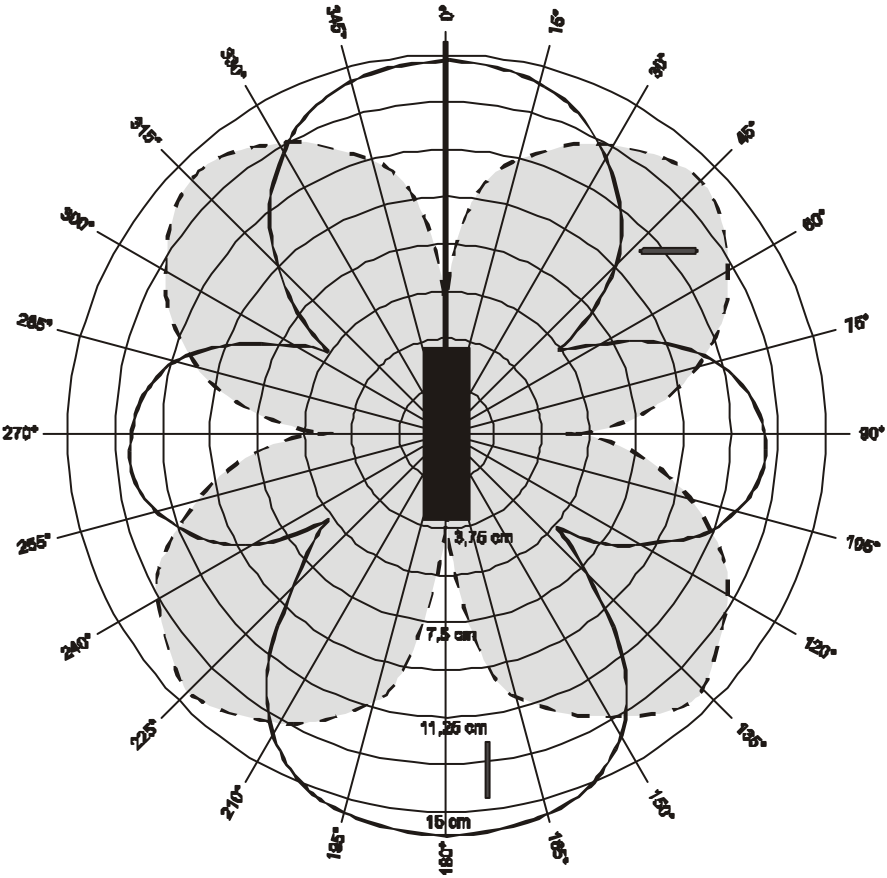
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS mini antenna (up to 1000mm lead)



_________ Transponder parallel to antenna
\- - - - - - - - Transponder 90° to antenna

6.4 Writing Range Mini Antenna

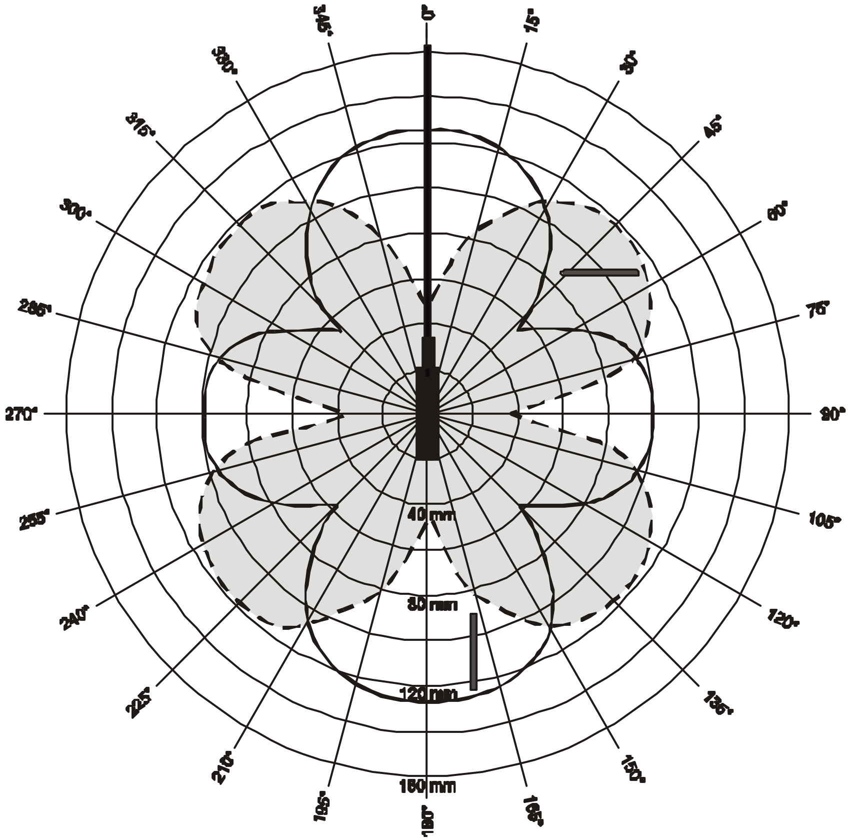
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS mini antenna (up to 1000mm lead)



———— Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

6.5 Reading Ragen Micro Antenna

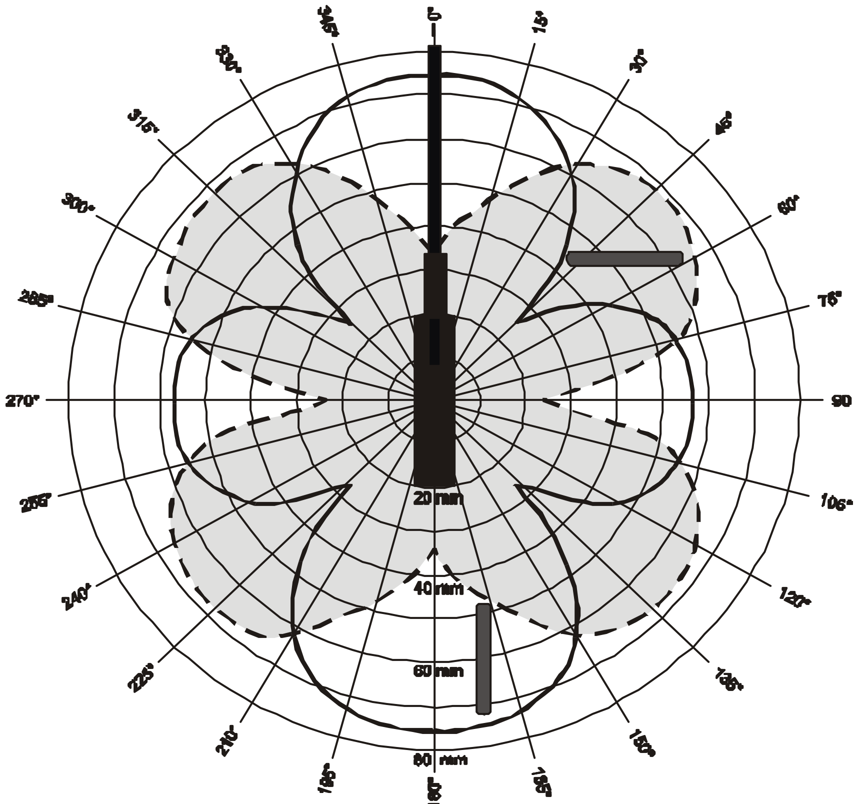
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS micro antenna (up to 1000mm lead)



__________ Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

6.6 Writing Range Micro Antenna

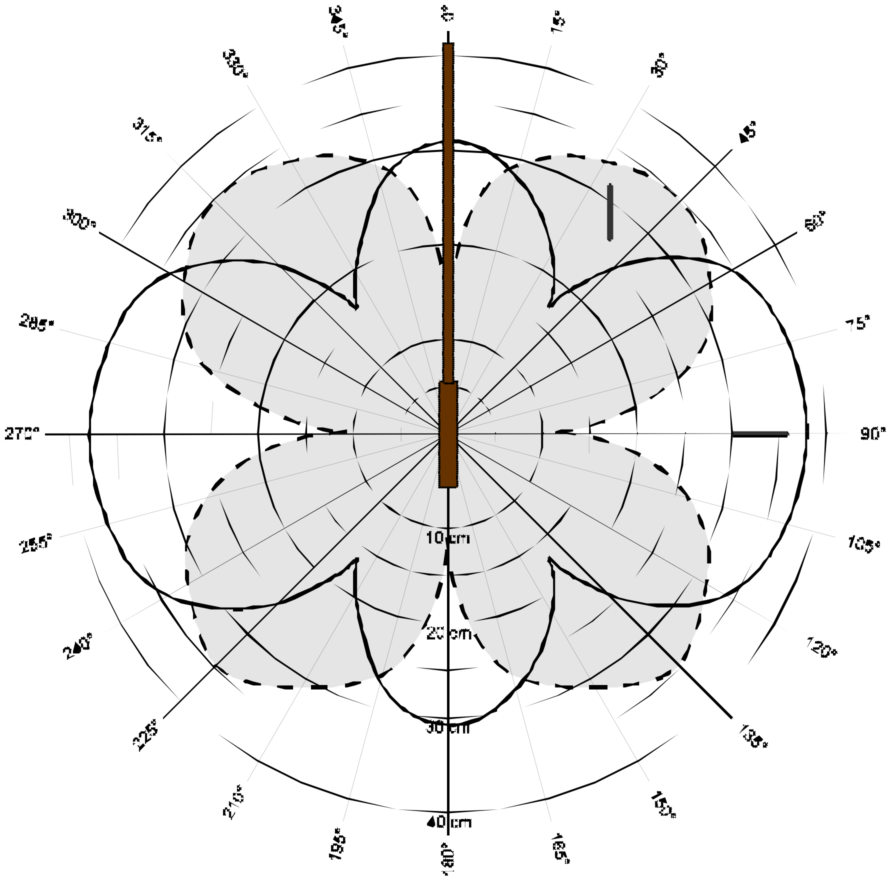
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS micro antenna (up to 1000mm lead)



_________ Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

6.7 Reading Range Frame Antenna

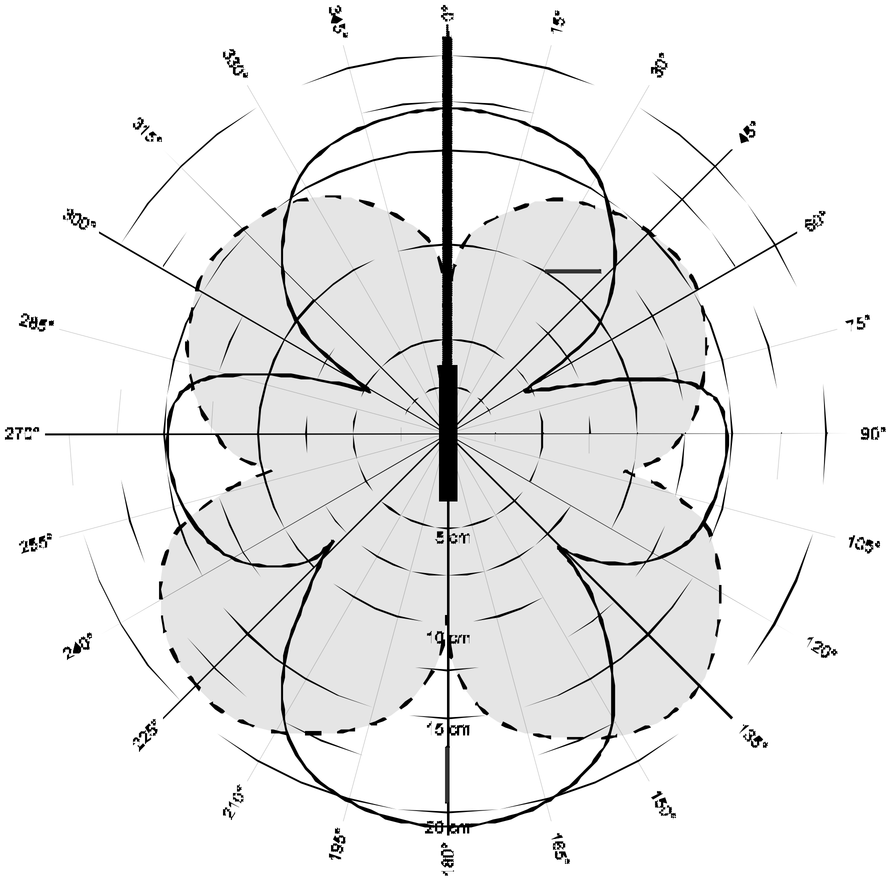
Transponder: 32 mm multipage glass transponder
Antenna: HERMOS frame antenna (up to 1000mm lead)



_________ Transponder parallel to antenna
\- - - - - - - - Transponder 90° to antenna

6.8 Writing Range Frame Antenna

Transponder: 32 mm multipage glass transponder
Antenna: HERMOS frame antenna (up to 1000mm lead)



_________ Transponder parallel to antenna
- - - - - - - - Transponder 90° to antenna

7 Accessories

7.1 Plugs / Cabling of Power

• Female plug, straight :	KBV-GK
• Female plug, angled :	KBV-WK
• Current connector with two cores :	KBV24

7.2 Plugs of RS232-Interface

• Shielded male plug, straight :	KSRS-GM

7.3 Plugs of the External Sensor/Actor

• Cable plug, ext. sensor, metal :	KS-SENS1
• Cable plug, ext. output, metal :	KS-LED1
• External optical coupler for top-hat rail installation (can be connected directly on the LED, output data: 48V DC 100mA) :	LDOP

7.4 Power Supply

• Power supply, input: AC 120-230 V, output: DC 18V / 0,3 A:	SVG0,3

8 Introduction

The SECS-1 standard defines a communication interface suitable for the exchange of messages between semiconductor processing equipment and a host. A host is a computer or network of computers which exchanges information with the equipment to accomplish manufacturing.
The standard does not define the data contained within a message. The meaning of messages must be determined through some 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 which can be connected without requiring specific knowledge of each other.
The SECS-1 protocol can be thought of as a layered protocol used for point to point communication. The levels 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 of time, such as might be required by high speed functional test applications.
In a network, the roles of host and equipment might 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:

E|A RS-232-C	Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.

8.1 SECS-1 Implementation

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

8.1.1 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.

8.1.2 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.

1. Master-Slave

The **host** connects to the reader. When there is contention the **host** "gives in" (i.e. receives before sending).
In the communication course the reader takes on the part of the master and the host the part of the slave!

2. Control Characters

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

<ENQ>	0x05	Request to Send
<EOT>	0x04	Ready to Receive
<ACK>	0x06	Correct Reception
<NAK>	0x15	Incorrect Reception

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 Blocknumber
	6		Lower Blocknumber
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 the 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-bit12 = 0x01).
Bit13 to Bit14 are reserved for future extensions!

Upper Device-ID	R	Not used	0x01
Lower Device-ID	serial number of the reader		

Direction reader to host: 0x81xx *
Direction Host to equipment (HERMOS SECS-1 Reader): 0x01xx *

* … the serial number is on a sticker on the cap of each reader
The **W-Bit** is used to indicate 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 contents of the message being sent.
A primary message is defined as any odd numbered message.
A secondary message is defined as even any numbered message.

The **end bit** is used to determine if a block is the last block of message. A value of one 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 ever 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 satisfy the following requirements:

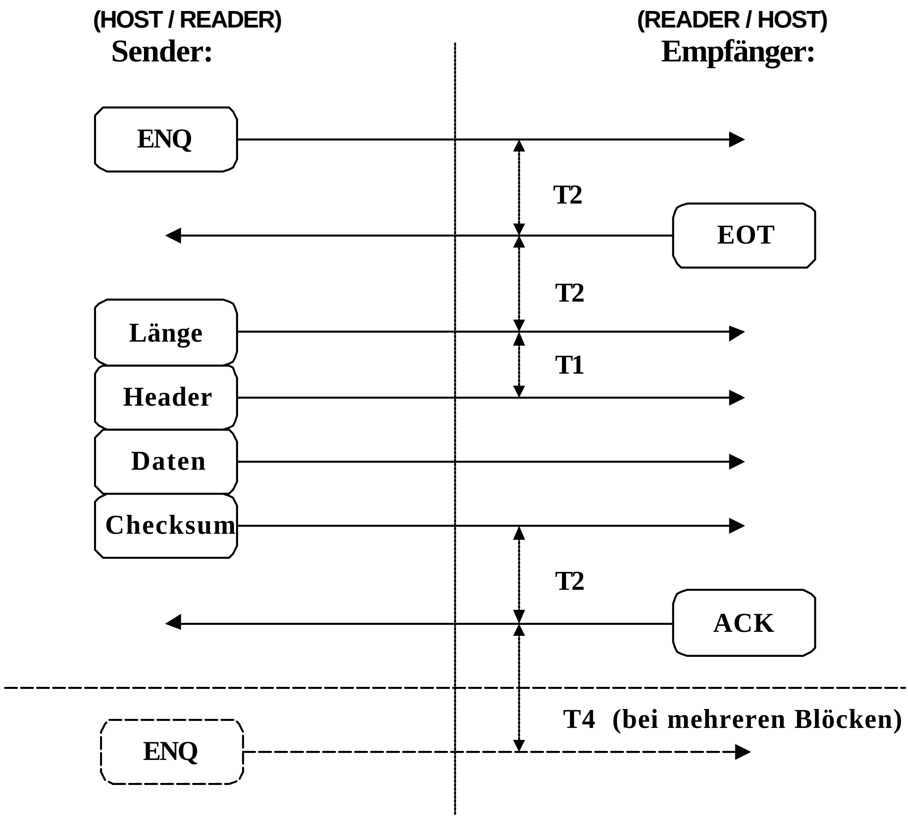
- The system bytes of a primary message has to be distinct from those of all currently open transactions initiated from the same end of the communications link.
- The system bytes of the reply message are required to be the same as the system bytes of the corresponding primary message.

The system bytes are incremented for each primary message. Only the two lowest bytes (byte 9 and 10 of the header) are incremented. For a primary message of the reader, additionally byte 8 of the header is used for the reader action number.

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.

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.
Sending and receiving via the SECS-1 interface alternate with each other!

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 he has to receive the equipment message because the reader is the master. Only now the host is allowed to send his message.

For more detailed information about all possible cases see SEMI E4-0997.
(SEMI Equipment Communication Standard 1 Message Transfer SECS-1)

8.2 SECS-2 Implementation

8.2.1 Introduction

The SEMI Equipment Communication Standard Part 2 (SECS-2) defines the details of the interpretation of messages exchanged between intelligent equipment and a host.
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 HERMOS SECS-1 transponder reader.
SECS-2 gives form and meaning to messages exchanged between equipment and host using a message transfer protocol, such as SECS-1.
SECS-2 defines the method of conveying information between equipment and 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 distinct message identification.

SECS-2 defines the structure of messages into entities called items and list 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 which 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.

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.

8.2.2 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	<I1 123>
10	21	Binary	Byte sequence of the length „Length“	<I1 123>
20	41	Ascii	Printable Ascii signs	
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 items 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	

8.2.3 Message set

The SECSII-message-set used by the HERMOS SECS-1 reader consist of 6 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

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

In attention of the SEMI E99 Carrier ID Read/Writer functional standard for SECS-1 and SECS-2 protocol, the HERMOS SECS-1 reader supports the defined Stream 18 messages.

Stream 18 : (Equipment status)

- S18F1 and S18F2 read attribute request /data
- S18F3 and S18F4 write attribute request/acknowledge
- S18F5 and S18F6 read request/data
- S18F7 and S18F8 write request/acknowledge
- S18F9 and S18F10 read ID request/data
- S18F11 and S18F12 write ID request/acknowledge
- S18F13 and S18F14 subsystem command request/acknowledge

8.2.4 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 allowable item format code which can be used for this standard data item. Item format codes are shown in hex and octal, as described inchapter 1.2.2 data items. The notification "3()" indicates any of the signed integer formats (30,31,32,34).
Description:	A description of the data item, with the meanings of specific values.
Where used:	The standard messages in which this data items appears.

8.2.5 Data Item Dictionary:

ACKC3	Format: B[1]

Acknowledge Code

0	:	Sensor 0 was the initiator
1	:	Sensor 1 was the initiator
>1	:	error, not accepted

Where used: S3F6, S3F8

ACKC5	Format: B[1]

Acknowledge Code

0	:	no error
>0	:	error, not accepted

Where used: S5F2

ALCD	Format: B[1]

Alarm Code Byte.
Only the occurring of a failure is told. Failures will not be reset on principle.

Bit 8 = 1 : alarm is set

Where used: S5F1

ALID	Format: U1[1]

Alarm Identifier

0:	none error
1:	auto read failed, the reader is engaged in doing something
2:	reserved
3:	reserved
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 write
11:	reserved
12:	bad type of transponder
13:	external read or write failed because the sensor is not covered (no carrier detected)
14:	reserved
15:	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 of the sensor respectively of the sensors are also transmitted during a failure message of the reader.
The information has to be interpreted as follows:

ALTX[0]	Initiator of a failure message
“0”:	Sensor 0
“1”:	Sensor 1
“F”:	cannot be assigned

ALTX[1] State of sensor 0
“0”: Sensor not occupied
“1”: Sensor is occupied
“E”: Sensorstate is not available
“F”: Sensor not defined

ALTX[2] State of sensor 1
“0”: Sensor not occupied
“1”: Sensor is occupied
“E”: Sensorstate 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: Identifies for an attribute for a specific type of object.

CIDRW Attributes definitions:

“Configuration”…	Number of heads
“AlarmStatus”	Current CIDRW substate of ALARM STATUS
“OperationalStatus”	Current CIDRW substate of OPERATIONAL
“SoftwareRevisionLevel”	Revision (version) of Software 8 byte maximum

Head Attribute Definitions:

“HeadStatus”	The current state
“HeadID”	Head number 0-31 (2 digits)

Where used: S18F1, S18F3

ATTRVAL	Format: A[max4]

Description: Value of the specified attribute.

CIDRW Attributes definitions:

"Configuration"	Number of heads		
	"01"		
"AlarmStatus"	Current CIDRW substate of ALARM STATUS		
	"0"	…	NO
	"1"	…	ALARMS
"OperationalStatus"	Current CIDRW substate of OPERATIONAL		
	"IDLE"	…	reader in IDLE mode
	"BUSY"	…	reader is busy
	"MANT"	…	maintenance mode
"SoftwareRevisionLevel"	Revision (version) of Software 8 byte maximum		

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[max8]

Description: A vector or string of unformatted data.
The first page **(page 1)** of each transponder contains the **MID**.
Be careful: A modification of this page would also cause a modification of the MID!

Multipage-transponder:	DATA area page 2 – page 17
Read/Write-Transponder:	DATA correspond to MID
Read/Only-Transponder :	DATA correspond to MID

Where used: S18F6, S18F7

DATALENGTH	Format: UI2

Description: Total bytes to be sent.
The DATALENGTH corresponds to the quantity of bytes a transponder page consists of.
Valid range is from 0x0001 up to 0x0008 Bytes.

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

Multipage-transponder (page 1 up to page 17) :
In case of reading only one page of the multipage-transponder, please note the following:

"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 set successfully
1: parameter could not be set

Where used: S2F16

ECID	Format U1[1]

Parameter number of reader (look data item ECV)

Where used: S2F13, S2F15

ECV	Format U1[1]

Reader parameters definition. The values here are shown as decimal-values!

Parameters:

Parameter 0: **Gateway-ID**
The gateway-ID is a part of the device-ID. The HERMOS SECS-1 reader works simultaneously as gateway and reader.
In the header of a message it is the “lower message ID”.
00 .. 255
default: last two characters of serial number.

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:	(200)	38400 Baud	(look covering letter of the reader)

Parameter 2: **Inter-Character-Timeout T1**
1 .. 100 1/10s
default: (5) 0.5s

Parameter 3 : **Block-Protocol-Timeout T2**
2 .. 250 1/10s
default: (100) 10s

Parameter 4: **Reply-Timeout T3**
1 .. 120 1s
default: 45s

Parameter 5: **Inter-Block Timeout T4**
This parameter is without effect at the moment when no used message is larger than a block.
1 .. 120 1s
default: 45s

Parameter 6: **Retry-Limit RTY**
Number how often a question or a message shall be repeated.
0 .. 31
default: 3

Parameter 7-19: **not defined !**

Parameter 20: **sensordelay for sensor 0**
Delay for auto read if using a sensor:
0 .. 255 1/10 s
default: (10) 1s

Parameter 21: **not defined!**

Parameter 22: **sensor triggered action for sensor 0 and sensor 1**
0 : read all transponders
1 : read the page 1 of a multipage-transponder
...
17 : read the 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**
Time between two attempts to read or write a transponder;
the read-frequency if there is a triggered read (no polling).
15 .. 100 % from 1s
default: (50%) 500ms

Parameter 24: **r/w maxrepeat**
Maximum number of repeat attempts to read or write a transponder
0 .. 255
default: 20

Parameter 25: **not defined** !

Parameter 26: **sensor activity**
The transponder reader offers the possibility to deactivate the connected sensor.
Parameter 26 realizes this with the following values:
0 No sensor defined
1 Only sensor 0 defined
default: 1

Parameter 27: **watchport for sensor 0**
Enables a message to the host, if a cassette is detected on I/O port or is removed from I/O port.
A sensor is needed to use this message! :
0 report nothing
1 report cassette is removed
2 report cassette is detected
3 report cassette is detected and cassette is removed
default: (1) report cassette is removed

Parameter 28: **transmitter-level**
The intensity of field strength to load a transponder.
The default value (1) should not change!

0	reduced field strength
1	maximum field strength
default:	(1) maximum field strength

Parameter 29**: transponder load duration**
The used time to load a transponder.
The default value (50ms) should not change!

00 .. 255 ms
default: (50) 50ms

Parameter 30: **not defined !**

Parameter 31: **not defined !**

Parameter 32: **not defined !**

Parameter 33: **automatic environment adjustment**
The influence of interferences in the environment of the readers can be minimized by an automatic adjustment during the operation. If the automatic adjustment is deactivated, an adjustment to the environment will only be effected in case of a reset.

0:	deactivated automatic environment adjustment
1:	activated automatic environment adjustment
default:	(0) deactivated

Parameter 34: **sensortype for sensor 0**
Type of sensor signal to start the auto read if using one sensor:

0:	auto read starts if sensor 0 is covered
1:	auto read starts if sensor 0 is interrupted
default:	(0) sensor 0 is covered

Where used: S2F13, S2F15

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[max16]

Description: Material ID.
The MID corresponds to the first page (16 characters from '0'…'F') of the TIRIS transponder. Depend on the transponder-type, it is possible to modify the MID.

Multipage-transponder:	MID is stored in page 1	(writeable)
Read/Write-Transponder:	MID correspond to DATA	(writeable)
Read/Only-Transponder :	MID correspond to DATA	(fix)

Where used: S18F10, S18F11

MIDAC	Format: B[1]

Acknowledge Code

0 : material-ID acknowledged; the sensor 0 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 initiator can be determined from the data item Portnumber PTN.

Where used: S3F14, S3F68

MIDRA	Format: B[1]

Material ID acknowledge code
2: acknowledge, will send MID later in S3F13 or S3F67

Where used: S3F12

OBJSPEC	Format: A[x]

Description: A text string that has an internal format and that is used to point to a specific object instance. The string is formed out of a sequence of formatted substrings, each specifying an object’s type and identifier. The substring format has the following four fields.

Object type, colon character ”:” object identifier, greater-than symbol “>”

Where the colon character “:” is used to terminate an object type and the greater than symbol “>” is used to terminate an identifier field. The object type field may be omitted where it may be otherwise determined. The final “>” is optional.

OFLACK	Format: B[1]

Acknowledge code for offline request.
0: gateway is offline

Where used: S1F16

ONLACK	Format: B[1]

Acknowledge code for online request.
0: gateway is online

Where used: S1F18

PAGE_ID	Format: B[1]

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

Multipage-transponder (page 1 up to page 17) :
In case of reading only one page of the multipage-transponder, please 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 only the one page

Read/Write-Transponder:

0xF1 : (241) read or write only the one page

Where used: S3F11

PAGEDATA	Format: B[9]

The cassette identifier that has been read or shall be written. The PAGEDATA corresponds to the value of a transponder page.

PAGEDATA [0] corresponds to the page number. The values of the page number (MID[0]) are shown in the data item “PAGE_ID”.

PAGEDATA [1] – the 8 byte (one page) of the transponder-ID are following.
PAGEDATA [8]

Where used: S3F7, S3F12, S3F13, S3F65

PTN	Format: B[1]

Information about the state of up to 2 sensors and the initiator of the message. For special applications, the reading process of the transponder reader is triggered by 2 sensors. In this case it is necessary to be able to distinguish between the 2 sensors. The initiator represents the number of the sensor which has caused the generation of a message.

Default: only sensor 0 is defined!

bit 7 .... bit 0

Initiator	Sensor 1	Sensor 0

Sensor 0: bit0 – bit2

The actual 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 actual 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 which has caused the generation of a message

0	Sensor 0	
1	Sensor 1	(not realized at present)
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 still has to be confirmed by the Host!

Where used: S9F9

SSACK	Format: A[2]

Description: Indicates the success or failure of a requested action.

"NO"	…	normal operation
"EE"	…	execute error
"CE"	…	communication error
"HE"	…	hardware error
"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 different subsystem commands indicated.

"ChangeState"	…	change state
"GetStatus"	…	get state
"PerformDiagnostics"	…	perform diagnostic
"Reset"	…	reset CIDRW

Where used: S18F13

STATUS	Format: A[2]

Description: Provides status information for a subsystem component.

"NE"	…	normal execution
"MR"	…	maintenance required

Where used: S18F2, S18F12

TARGETID	Format: A[max10]

Description: Identifies where a request for action or data is to be applied. The text conforms to OBJSPEC. The TARGETID corresponds to the serial number situated on a sticker on top of the reader box

Example : “TLG-00-xxxx” (xxxx … dependent on the individual reader)

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

8.3 SEMI E99-0600

8.3.1 Introduction

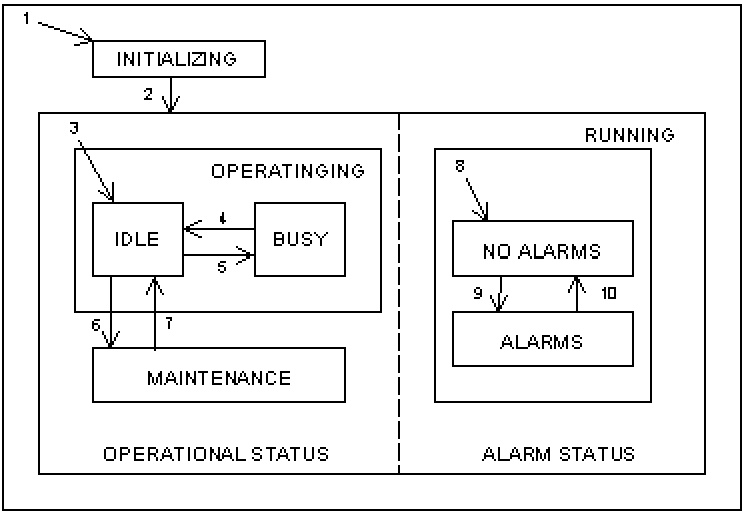
The purpose of the Carrier ID Read/Writer Functional Standard effort is to provide a common specification for concepts, behavior, and services provided by a Carrier ID Reader/Writer to an upstream controller. A standard interface will increase interchangeability of Carrier ID Reader/Writer so that users and equipment suppliers have a wide range of choices.

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 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.

8.3.2 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 HERMOS SECS-1 reader combines the CIDRW subsystem and the head together.
The state model for the HERMOS reader is shown in the state model.



The shown table defines the states of the HERMOS SECS-1 transponder reader.

State	Definition
ALARM STATUS	Shows the presence or absence of alarms.
ALARMS	An alarm condition exists.
BUSY	A service is being performed that affects the state of the hardware
CIDWR	Superstate of CIDRW state model. Always active when CIDRW powered on.
IDLE	No service is being 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 shown table defines the transitions of the HERMOS SECS-1 transponder reader state model.

#	Previous State	Trigger	New State	Actions	Comment
1	Any	Powerup or reset	INITIALIZING	Initialize hard- and software	Default entry on powerup
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	

9 MESSAGE DETAILS

9.1 Equipment status

9.1.1 S1F0: ABORT TRANSACTION (reader <-> host)

Used in lieu 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

9.1.2 S1F1: ARE YOU THERE REQUEST (reader <-> host, reply)

Establishes if the gateway or host is online.

S1F1 W . * Header Only

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

The host signifies that it is online.

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

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

The gateway signifies that it is online.

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

9.1.5 S1F15: REQUEST OFF_LINE (host ->reader, reply)

The reader should change the communication state to offline.
The reader can only be put online again by message S1F17 (or reset S2F19), and the other messages are aborted by the SxF0 message !

S1F15 W. *Header Only

9.1.6 S1F16: OFFLINE ACKNOWLEDGE (reader -> host)

Acknowledge.

S1F16
<B[1] OFLACK>.

9.1.7 S1F17: REQUEST ON_LINE (host ->reader, reply)

The reader should change the communication state to online.

S1F17 W. *Header Only

9.1.8 S1F18: ONLINE ACKNOWLEDGE (reader -> host)

Acknowledge.

S1F18
<B[1] ONLACK>.

9.2 Equipment Control

9.2.1 S2F0: ABORT TRANSACTION (reader <-> host)

Used in lieu 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

9.2.2 S2F13: EQUIPMENT CONSTANT REQUEST (host-> reader , reply)

The host requests one constant from the gateway or reader.

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

9.2.3 S2F14: EQUIPMENT CONSTANT DATA (reader -> host)

The reader sends the requested constant to the host.

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

9.2.4 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>
        >
>.
```

9.2.5 S2F16: NEW EQUIPMENT CONSTANT ACKNOWLEDGE (reader -> host)

The reader acknowledges the new host constant.

S2F16
<B[1] EAC>.

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

The host requests the reader to reset the hard- and software.
In both cases there will be a communication inquiry with S1F1.
The powerup reset requires a few seconds.

S2F19 W
<B[1] RIC>.

9.2.7 S2F20: RESET ACKNOWLEDGE (reader -> host)

The reader acknowledges the reset.
In case of a powerup-reset, the S2F20 message requires a few seconds.

S2F20
<B[1] RAC>.

9.3 Material Status

9.3.1 S3F0: ABORT TRANSACTION (reader <-> host)

Used in lieu 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

9.3.2 S3F5: CASSETTE FOUND SEND (reader -> host, reply)

The reader sends the information that a cassette was detected by the sensor. This message will only be sent, if a sensor is connected and activated (see ‘watchport’ and ‘sensor activity’).

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

9.3.3 S3F6: CASSETTE FOUND ACKNOWLEDGE (host -> reader)

The host acknowledges the *cassette found* message.

```
S3F6
   <B[1] ACKC3>.
```

9.3.4 S3F7: CASSETTE LOST SEND (reader -> host, reply)

The reader sends the information that the cassette was removed from I/O port (sensor).
This message will only be sent, if a sensor is connected and activated (see 'watchport' and 'sensor activity'). The PAGEDATA can only be given, if the PAGEDATA 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)
>
```

9.3.5 S3F8: CASSETTE LOST ACKNOWLEDGE (host -> reader)

The host acknowledges the *cassette lost* message.

```
S3F8
   <B[1] ACKC3>
```

9.3.6 S3F11: READ MID AT I/O PORT (host ->reader , reply)

The host requests that the reader reads the PAGEDATA.

```
S3F11  W
   <B[1] PAGE_ID>
```

9.3.7 S3F12: READ ACKNOWLEDGE (reader -> host)

The reader only acknowledges the receipt of the reading command.
The reading ID will be sent later!

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

9.3.8 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 >
>.

9.3.9 S3F14: MID ACKNOWLEDGE (host -> reader)

The host acknowledges the received data.

S3F14
<B[1] MIDAC>.

9.3.10 S3F65: WRITE MID AT I/O PORT (host -> reader, reply)

The host requests that the reader writes the PAGEDATA.

S3F65 W
<B[9] PAGEDATA >

9.3.11 S3F66: WRITE ACKNOWLEDGE (reader -> host)

The reader only acknowledges the receipt of the writing command.
The writing acknowledge will be sent later!

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

9.3.12 S3F67: RETURN WRITE SUCCESS (reader -> host, reply)

The reader reports the successful writing of the transponder. The reader sends information about sensor 0.

S3F67 W
<B[1] PTN>.

9.3.13 S3F68: WRITE SUCCESS ACKNOWLEDGE (host -> reader)

The host acknowledges the received data.

S3F68
<B[1] MIDAC>.

9.3.14 S3F73: LOCK MID AT I/O PORT (host -> reader, reply)

The host requests that the reader lockes the wanted page.

S3F73 W
<B[1] PAGE_ID>.

9.3.15 S3F74: LOCK ACKNOWLEDGE (reader -> host)

The reader only acknowledges the receipt of the locking command.
The locking acknowledge will be sent later!

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

9.3.16 S3F75: RETURN LOCK SUCCESS (reader -> host, reply)

The reader reports the successful writing of the transponder. The reader sends information about sensor 0.

S3F75 W
<B[1] PTN>.

9.3.17 S3F76: LOCK SUCCESS ACKNOWLEDGE (host -> reader)

The host acknowledges the received lock success message (S3F67).

S3F76
<B[1] MIDAC>.

9.4 Exception Handling

9.4.1 S5F0: ABORT TRANSACTION (reader <-> host)

Used in lieu 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

9.4.2 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
   <U1[1] ALID >             * alarm ID
   <A[MAX 40] ALTX >         * alarm text
> .
```

9.4.3 S5F2: ALARM REPORT ACKNOWLEDGE (host-> reader)

The host acknowledges an alarm.

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

9.5 System Errors

9.5.1 S9F1: UNRECOGNIZED DEVICE ID (reader -> host)

The device-ID in the message block header did not correspond to the equipment device ID's.

S9F1
<B[10] MHEAD > .

9.5.2 S9F3: UNRECOGNIZED STREAM TYPE (reader -> host)

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

S9F3
<B[10] MHEAD > .

9.5.3 S9F5: UNRECOGNIZED FUNCTION TYPE (reader -> host)

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

S9F5
<B[10] MHEAD > .

9.5.4 S9F7: ILLEGAL DATA (reader -> host)

The reader does not recognize the data in the message block header.

S9F5
<B[10] MHEAD > .

9.5.5 S9F9: TRANSACTION TIMER TIME-OUT (reader -> host)

This message indicates that a transaction timer has timed out and that the corresponding transaction has been aborted. Only the last sent message which has to be confirmed by the host is stored and controlled.

S9F9
<B[10] SHEAD > .

9.6 Subsystem Control and Data

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

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

S18F1 W

L,2
1. A,8 <TARGETID>
2. L,n
    1. <$ATTRID_1$>
    …
    n. <$ATTRID_n$>

If n=0 then all attributes of the target component are requested.

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

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

S18F2

L,4
1. A,8 <TARGETID>
2. A,2 <SSACK>
3. L,n
    1. <$ATTRVAL_1$>
    …
    n. <$ATTRVAL_n$>
4. L,s
    1. <$STATUS_1$>
    …
    s. <$STATUS_s$>

Both n=0 and s=0 if the target component is unknown.

9.6.3 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. A,8 <TARGETID>
  2. L,n
     1. L,2
        1. <ATTRID$_1$>
        2. <ATTRVAL$_1$>

        …

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

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

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

S18F4
- L,3
  1. A,8 <TARGETID>
  2. A,2 <SSACK>
  3. L,s
     1. <STATUS$_1$>

     …

     s. <STATUS$_s$>

s=0 if the target component is unknown

9.6.5 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. A,8 <TARGETID>
2. A,2 <DATASEG>
3. UI2 <DATALENGTH>

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

9.6.6 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. A,8 <TARGETID>
2. A,2 <SSACK>
3. A,8 <DATA>

If TARGETID is unknown, then DATA is zero length.

9.6.7 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 data to be written or overwritten.

S18F7 W

L,4
1. A,8 <TARGETID>
2. A,2 <DATASEG>
3. UI2 <DATALENGTH>
4. A,8 <DATA>

If DATASEG and DATALENGTH are both omitted (zero length items) then all data is 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.

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

s=0 if TARGETID is unknown

9.6.9 S18F9: READ ID REQUEST (RIR) (host -> reader, reply)

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

S18F9,W
L,3
1. A,8 <TARGETID>

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

s=0 if and only if TARGETID is unknown.

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

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

S18F11 W
L,2
1. A,8 <TARGETID>
2. A,8 <MID>

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

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

S18F12
L,3
1. A,8 <TARGETID>
2. A,2 <SSACK>
3. L,s
    1. <STATUS$_1$>
    …
    s. <STATUS$_s$>

s=0 if TARGETID is unknown

9.6.13 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,2
1. A,8 <TARGETID>
2. A,18 <SSCMD>
3. L,n
    1. <CPVAL>
    …
    n. <CPVAL$_n$>

If n=0 no parameters are provided.

9.6.14 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,s
    1. <STATUS$_1$>
    …
    t. <STATUS$_s$>

s=0 if and only if TARGETID is unknown.

10 SECS-1 MESSAGE EXAMPLES

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

1. S1F1 Message from the reader to the host

Gateway to Host: S1F1
16:54:47 Incoming: ENQ (05)
16:54:47 Outgoing: EOT (04)
16:54:47 Incoming: Length Byte (0A)
16:54:47 Incoming: Header (81 FF 81 01 80 01 00 00 00 01)
16:54:47 Incoming: Checksum (02 84)
16:54:47 Outgoing: ACK (06)

Host to Gateway: S1F2
16:54:48 Outgoing: ENQ (05)
16:54:48 Incoming: EOT (04)
16:54:48 Outgoing: Length Byte (10)
16:54:48 Outgoing: Header (01 FF 01 02 80 01 00 00 00 01)
16:54:48 Outgoing: Data (01 02 41 00 41 00)
16:54:48 Outgoing: Checksum (09 03)
16:54:48 Incoming: ACK (06)

2. S1F1 Message from the host to the reader

Host to Reader: S1F1
16:59:20 Outgoing: ENQ (05)
16:59:20 Incoming: EOT (04)
16:59:20 Outgoing: Length Byte (0A)
16:59:20 Outgoing: Header (01 FF 81 01 80 01 00 00 00 01)
16:59:20 Outgoing: Checksum (03 03)
16:59:20 Incoming: ACK (06)

Reader to Host: S1F2
16:59:20 Incoming: ENQ (05)
16:59:20 Outgoing: EOT (04)
16:59:20 Incoming: Length Byte (1C)
16:59:20 Incoming: Header (81 FF 01 02 80 01 00 00 00 01)
16:59:20 Incoming: Data (01 02 41 06 67 61 74 65 53 32 41 06 56)
16:59:20 Incoming: Data (31 2E 31 2E 30)
16:59:20 Incoming: Checksum (06 00)
16:59:20 Outgoing: ACK (06)

3. Message S1F15 sets the reader offline

Host to Reader: S1F15
17:06:57 Outgoing: ENQ (05)
17:06:57 Incoming: EOT (04)
17:06:57 Outgoing: Length Byte (0A)
17:06:57 Outgoing: Header (01 FF 81 0F 80 01 00 00 00 03)
17:06:57 Outgoing: Checksum (13 03)
17:06:57 Incoming: ACK (06)

Reader to Host: S1F16
17:06:57 Incoming: ENQ (05)
17:06:57 Outgoing: EOT (04)
17:06:57 Incoming: Length Byte (0D)
17:06:57 Incoming: Header (81 FF 01 10 80 01 00 00 00 03)
17:06:57 Incoming: Data (21 01 00)
17:06:57 Incoming: Checksum (02 37)
17:06:57 Outgoing: ACK (06)

4. Message S1F17 sets the reader online

Host to Reader: S1F17
17:10:00 Outgoing: ENQ (05)
17:10:00 Incoming: EOT (04)
17:10:00 Outgoing: Length Byte (0A)
17:10:00 Outgoing: Header (01 FF 81 11 80 01 00 00 00 05)
17:10:00 Outgoing: Checksum (17 03)
17:10:00 Incoming: ACK (06)

Reader to Host: S1F18
17:10:00 Incoming: ENQ (05)
17:10:00 Outgoing: EOT (04)
17:10:00 Incoming: Length Byte (0D)
17:10:00 Incoming: Header (81 FF 01 12 80 01 00 00 00 05)
17:10:00 Incoming: Data (21 01 00)
17:10:00 Incoming: Checksum (02 3B)
17:10:00 Outgoing: ACK (06)

5. Request reader constant with message S2F13

Host to Reader (Gateway): S2F13

17:21:37 Outgoing: ENQ (05)
17:21:37 Incoming: EOT (04)
17:21:37 Outgoing: Length Byte (0F)
17:21:37 Outgoing: Header (01 FF 82 0D 80 01 00 00 00 08)
17:21:37 Outgoing: Data (01 01 21 01 05) => parameter „5“
17:21:37 Outgoing: Checksum (41 02)
17:21:37 Incoming: ACK (06)

Reader to Host: S2F14

17:21:37 Incoming: ENQ (05)
17:21:37 Outgoing: EOT (04)
17:21:37 Incoming: Length Byte (0F)
17:21:37 Incoming: Header (81 FF 02 0E 80 01 00 00 00 08)
17:21:37 Incoming: Data (01 01 A5 01 14) => parameter „5“ and the value „20“
17:21:37 Incoming: Checksum (02 D5)
17:21:37 Outgoing: ACK (06)

The host requests the reader parameter „25“ (r/w maxrepeat).
Reader1 (gateway) sends the value „20“ from parameter „25“ .

6. New Reader constant send with S2F15

Host to Reader: S2F15

17:41:53 Outgoing: ENQ (05)
17:41:53 Incoming: EOT (04)
17:41:53 Outgoing: Length Byte (14)
17:41:53 Outgoing: Header (01 FF 82 0F 80 01 00 00 00 0C)
17:41:53 Outgoing: Data (01 01 01 02 A5 01 07 A5 01 03) => parameter „7“ , value „3“
17:41:53 Outgoing: Checksum (7A 01)
17:41:53 Incoming: ACK (06)

Reader to Host: S2F16
17:41:53 Incoming: ENQ (05)
17:41:53 Outgoing: EOT (04)
17:41:54 Incoming: Length Byte (0D)
17:41:54 Incoming: Header (81 FF 02 10 80 01 00 00 00 0C)
17:41:54 Incoming: Data (21 01 00) => setting was successful
17:41:54 Incoming: Checksum (02 41)
17:41:54 Outgoing: ACK (06)

The Host sets the reader2 parameter „7“ (watchport) with the value „3“.
Reader2 acknowledges the new constant.

7. Host requests a reader reset with S2F19

Host to Reader: S2F19
17:58:22 Outgoing: ENQ (05)
17:58:22 Incoming: EOT (04)
17:58:22 Outgoing: Length Byte (0D)
17:58:22 Outgoing: Header (01 FF 82 13 80 01 00 00 00 13)
17:58:22 Outgoing: Data (21 01 01)
17:58:22 Outgoing: Checksum (4E FF)
17:58:22 Incoming: ACK (06)

Reader to Host: S2F20
17:58:23 Incoming: ENQ (05)
17:58:23 Outgoing: EOT (04)
17:58:23 Incoming: Length Byte (0D)
17:58:23 Incoming: Header (81 FF 02 14 80 01 00 00 00 13)
17:58:23 Incoming: Data (21 01 00)
17:58:23 Incoming: Checksum (02 4C)
17:58:23 Outgoing: ACK (06)

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

Reader to Host: S3F5
19:39:15 Incoming: ENQ (05)
19:39:15 Outgoing: EOT (04)
19:39:15 Incoming: Length Byte (12)
19:39:15 Incoming: Header (81 FF 83 05 80 01 00 01 00 09)
19:39:15 Incoming: Data (01 02)
19:39:15 Incoming: Data (21 01 14) ->Initiator=1, Sensor 0=0, Sensor 1=1
19:39:15 Incoming: Data (21 01 48)
19:39:15 Incoming: Checksum (03 36)
19:39:15 Outgoing: ACK (06)

Host to Reader: S3F6

19:39:15 Outgoing: ENQ (05)
19:39:15 Incoming: EOT (04)
19:39:15 Outgoing: Length Byte (0D)
19:39:15 Outgoing: Header (01 FF 03 06 80 01 00 01 00 09)
19:39:15 Outgoing: Data (21 01 01) ->Sensor 1 Acknowledge
19:39:15 Outgoing: Checksum (B7 01)
19:39:15 Incoming: ACK (06)

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

Reader to Host: S3F13

19:39:15 Incoming: ENQ (05)
19:39:15 Outgoing: EOT (04)
19:39:15 Incoming: Length Byte (1A)
19:39:15 Incoming: Header (81 FF 83 0D 80 01 00 01 00 0A)
19:39:15 Incoming: Data (01 02)
19:39:15 Incoming: Data (21 01 48) ->Initiator=1, Sensor 0=0, Sensor 1=1
19:39:15 Incoming: Data (21 09 F1) ->Page=241 (Read/Write-Transponder)
19:39:15 Incoming: Data (11 11) ->ID="17 17 17 17 17 17 17 17" (decimal)
19:39:15 Incoming: Data (11 11 11)
19:39:15 Incoming: Data (11 11 11)
19:39:16 Incoming: Checksum (04 AC)
19:39:16 Outgoing: ACK (06)

Host to Reader: S3F14

19:39:16 Outgoing: ENQ (05)
19:39:16 Incoming: EOT (04)
19:39:16 Outgoing: Length Byte (0D)
19:39:16 Outgoing: Header (01 FF 03 0E 80 01 00 01 00 0A)
19:39:16 Outgoing: Data (21 01 01) ->Sensor 1 Acknowledge
19:39:16 Outgoing: Checksum (C0 01)
19:39:16 Incoming: ACK (06)

The material-ID-acknowledge MIDAC depends on the sensorstate PTN. The initiator was the sensor 0 and the host acknowledges with „0".

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

Reader to Host: S3F7
19:39:17 Incoming: ENQ (05)
19:39:17 Outgoing: EOT (04)
19:39:17 Incoming: Length Byte (1D)
19:39:17 Incoming: Header (81 FF 83 07 80 01 00 01 00 0B)
19:39:17 Incoming: Data (01 03)
19:39:17 Incoming: Data (21 01 14)
19:39:17 Incoming: Data (21 01 40) ->Initiator=1, Sensor 0=0, Sensor 1=0
19:39:17 Incoming: Data (21 09 F1) ->Page=241
19:39:17 Incoming: Data (11 11 11) ->ID="17 17 17 17 17 17 17 17" (decimal)
19:39:17 Incoming: Data (11 11 11)
19:39:17 Incoming: Data (11 11)
19:39:17 Incoming: Checksum (04 D6)
19:39:17 Outgoing: ACK (06)

Host to Reader: S3F8
19:39:17 Outgoing: ENQ (05)
19:39:17 Incoming: EOT (04)
19:39:17 Outgoing: Length Byte (0D)
19:39:17 Outgoing: Header (01 FF 03 08 80 01 00 01 00 0B)
19:39:17 Outgoing: Data (21 01 01) ->Sensor 1 Acknowledge
19:39:17 Outgoing: Checksum (BB 01)
19:39:17 Incoming: ACK (06)

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

Host to Reader: S1F1
08:17:16 Outgoing: ENQ (05)
08:17:16 Incoming: EOT (04)
08:17:16 Outgoing: Length Byte (0A)
08:17:16 Outgoing: Header (01 D2 81 01 80 01 00 00 00 03)
08:17:16 Outgoing: Checksum (D9 02)
08:17:16 Incoming: ACK (06)

Reader to Host: S9F1

08:17:16 Incoming: ENQ (05)
08:17:16 Outgoing: EOT (04)
08:17:16 Incoming: Length Byte (16)
08:17:16 Incoming: Header (81 FF 09 01 80 01 00 00 00 04)
08:17:16 Incoming: Data (21 0A 01 D2 81)
08:17:16 Incoming: Data (01 80 01 00 00 00 03)
08:17:16 Incoming: Checksum (04 12)
08:17:16 Outgoing: ACK (06)

The device-ID in the message block header did not correspond to the device-ID in the reader detecting the error.

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

Host to Reader: S4F1

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

Reader to Host: S9F3

20:03:20 Incoming: ENQ (05)
20:03:20 Outgoing: EOT (04)
20:03:20 Incoming: Length Byte (16)
20:03:20 Incoming: Header (81 FF 09 03 80 01 00 00 00 09)
20:03:20 Incoming: Data (21 0A 01 FF 84) =>the wrong message header
20:03:20 Incoming: Data (01 80 01 00 00 00 08)
20:03:20 Incoming: Checksum (04 4F)
20:03:20 Outgoing: ACK (06)

The stream „4“ isn’t part of the SECS-2 message-set, so a S9F3 error message will appear.

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

Host to Reader: S1F3
19:54:43 Outgoing: ENQ (05)
19:54:43 Incoming: EOT (04)
19:54:43 Outgoing: Length Byte (0A)
19:54:43 Outgoing: Header (01 FF 81 03 80 01 00 00 00 06)
19:54:43 Outgoing: Checksum (0B 02)
19:54:43 Incoming: ACK (06)

Reader to Host: S9F5
19:54:43 Incoming: ENQ (05)
19:54:43 Outgoing: EOT (04)
19:54:43 Incoming: Length Byte (16)
19:54:43 Incoming: Header (81 FF 09 05 80 01 00 00 00 07)
19:54:43 Incoming: Data (21 0A 01 FF 81) =>the wrong message header
19:54:43 Incoming: Data (03 80 01 00 00 00 06)
19:54:43 Incoming: Checksum (04 4C)
19:54:43 Outgoing: ACK (06)

The function „3“ is nt part of the SECSII-message-set, so a S9F5 error message will appear.

14. The secondary message fails and the reader sends the S9F9 message

Reader to Host: S1F1
20:07:16 Incoming: ENQ (05)
20:07:16 Outgoing: EOT (04)
20:07:16 Incoming: Length Byte (0A)
20:07:16 Incoming: Header (81 FF 81 01 80 01 00 00 00 01)
20:07:16 Incoming: Checksum (02 84)
20:07:16 Outgoing: ACK (06)

Host to Reader: S9F9

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

After sending the S1F1 message, the reader waits for an answer from host.
If the secondary message will not appear, a transaction timeout arises and the reader sends the S9F9 message.