Leuze RFID Systems

RFI 32 L120
RFI 32 L120-L10

Description of Commands and Configuration

(direct communication via terminal software)

1 Command structure

For the data interface we use the Leuze-standard with 9600 Bd, 1 Startbit, 8 Databits, none Parity,1 Stoppbit. The data frame is the mainly used type within Leuze electronic.

STX		CR LF

The data from and to the RFI is coded in ASCII-Hex and always read or written in complete data blocks. Applicable as data content are all characters of the ASCII table. Two words are in use for the data carrier: transponder and tag. Between receiving data and sending data to the RFI there should be a delay of about 250 ms.

1.1 Short commands without data

STX	Command	CR LF
02h	ASCII-Character	0Dh 0Ah

Command: **R** *Reset to factory settings*
Answer: **Q2** *Acknowledge, action performed*

Command: **V** *get version of firmware*
Answer: 030226 1234 RFI32
with 03=year,02=month, 26=day
1234=Code., RFI32=device type

Command: **+** *sets Trigger (start operation)*

Command: **-** *stops Trigger (stop operation)*

1.2 Further commands

Command Read Data Block L (one block) L@0 @0=SNR

EM has only a Serial no.
The answer gives the block no as start sign

1.3 Data output / response telegram of the devices

Data output after trigger (parameter setting via configuration: operation mode)
The devices deliver different data after a trigger:

Serial number (factory setting)

e.g. @000010000AAAF
This response contains the following informations (starting from left):

@0	sign for serial number
00	transponder type, EM4102
010000AAAF	5 Byte serial number of the transponder (not unique)

Data output after Online-command(via terminal software)

Response after command Read Blocks L@0 (EM has Serial No only)

@000010000AAAF
same response as after trigger:
@0 sign for serial number
00 transponder type, EM4102
010000AAAF 5 Byte serial number of the transponder (not unique)

1.4 Commands for setting up or test purposes

Command set Output A **A0FF** **On**
A000 **Off**

This command sets the output permanent and gets no response! This works only when the output is **not activated** automatically !!

Command Switch Field ON/OFF **F1** **Switch ON**
F2 **Switch OFF**
F3 **HF-Reset**

The answer on this command is Q2, and the field is switched ON/OFF. The field is switched on automatically after a new trigger pulse.

1.5 Commands for configuration

The RFID devices have a record for the parameter settings with 16 addresses altogether (00 to 0Fh). Dependent om the functions one or two addresses belong to one parameter (see chapter 2)

Command Read configuration G **GFF00 (complete)**
Response G00xxxxxxx
G1000 (only Addresses 00-0Fh)
. G01xx (only one Address)
.

Command Configure C **C0199**
01 parameter address
99 configuration data

When using this command it is important to know that only the **Start address** is to print and all data is transmitted serial to the configuration register. This allows either to send the configuration data with one string or address by address. The change of configuration is answered by the 'Q1' response.
Answer Q1 (see Chapter 3)

The configuration parameters and the possible settings were printed in the next chapter.

2 Configuration of the RFID-devices

With the Leuze RF-Config-tool the parameter setting is very easy and transparent. All functions are displayed in menus and klick buttons. But all devices can be activated and configured directly from a PLC or via standard terminal software, too. With the printed information below you can choose your preferred and easiest way. The used structure is always like described in paragraph 1.

Command configure C
Structure: C [record address] [data]

The number of data must fit a byte length (2 characters / byte), if not you receive an error message (E02). The data is in hexadecimal system.
If you communicate via field bus with the RFI all characters of the command are to handle as a separate ASCII sign in transmission..

Structure of the configuration parameters

Address	Parameter/Function
00	AFI (Application Family Identifier) Filter
01	Functions Register 1
02	Functions Register 2
03	Transpondertype Highbyte
04	Transpondertype Lowbyte
05	Triggermode
06	Trigger pulse time(ms) Highbyte
07	Trigger pulse time(ms) Lowbyte
08	Output pulse time (ms) Highbyte
09	Output pulse time (ms) Lowbyte
0A	Start address Read Highbyte (H64 only)
0B	Start address Read Lowbyte (H64 only)
0C	Read operation: number of blocks (H64 only)
0D	Reserved
0E	Reserved
0F	Reserved
10-57	Reserved

Very important are the two functions registers, but all parameters are described in the following chapters.

2.1 Configuration Functions Register 1 Address 01h

Bit	Function	Level	Description
0	Read	**1**	
1	Reserved	**0**	
2	Reserved	**0**	
3	Reserved	**1**	
4	Trigger	0	Permanent ready for read
		1	Read on trigger puls
5	Read mode	0	Permanent Read and data output
		1	Singleshot (read once while in field)
6	**Reserved**	**0**	
7	Reserved	**0**	

The set parameters are combined via Bitcolumn. The MSB (most significant Bit) is Bit 7 on first position.
Bitcolumn: 00111001 = 39 h *factory setting 39h*

2.2 Configuration Functions Register 2 Address 02h

Bit	Function	Level	Description
0	Reserved	**1**	
1	Reserved	**0**	
2	Reserved	**0**	
3	Reserved	**0**	
4	Output switch	0	Not active
		1	Automatical activated, Address 05h
5	Reserved	**0**	
6	Reserved	**0**	
7	Reserved	**0**	

factory setting 11h

2.3 Configuration Transpondertype (Tagtype) Addresses 03 /04h

Address 03h
The RFI 32 is setting for Tag types is fixed. The device reads tag with fixcode EM4002/4102 Chips
factory setting: EM4002 = 00h

2.4 Configuration Trigger / Output switch Address 05h

The trigger is a combination of the trigger functionality and the trigger pulse time. For the output it is similar: the functionality and the output pulse time. In the address 05h the functionality for both output and trigger is combined. The trigger pulse time is in address 06/07h and the output pulse time in 08/09h.

2.4.1 Configuration Address 05h

Only the Bits 0/1 of this Byte are used for trigger and the Bits 3-5 for the output functionality.Other Bits are set to "0"Therefore the possible combinations are as follows:

Value	Description
00	Trigger: Read as long High level at input Output: Good Read Signal on Low Level
01	Trigger: Read for time after positive slope Output: Good Read Signal on Low Level
02	Trigger: Read for time after pos. slope, time counts after neg. slope Output: Good Read Signal on Low Level
08	Trigger: Read as long High level at input Output: No Read Signal on Low Level
09	Trigger: Read for time after positive slope Output: No Read Signal on Low Level
0A	Trigger: Read for time after pos. slope, time counts after neg. slope Output: No Read Signal on Low Level
20	Trigger: Read as long High level at input Output: Good Read Signal on High Level
21	Trigger: Read for time after positive slope Output: Good Read Signal on High Level
22	Trigger: Read for time after pos. slope, time counts after neg. slope Output: Good Read Signal on High Level
28	Trigger: Read as long High level at input Output: No Read Signal on High Level
29	Trigger: Read for time after positive slope Output: No Read Signal on High Level
2A	Trigger: Read for time after pos. slope, time counts after neg. slope Output: No Read Signal on High Level

Factory setting : 20h

2.4.2 Configuration Trigger puls time Addresses 06/07h

This is the time after the trigger puls in a range from 00 to 9000 ms. The chosen value is hexadecimal.
Factory preset: 00h

Examples	*300 ms*	*012Ch*
	500 ms	*01F4h*
	1000 ms	*03E8h*

2.4.3 Configuration Output pulse time Addresses 08/09h

The activation time for "Good read" or "No read" is set between 30 ms and 9000 ms. The value is hexadecimal.
Factory setting : 12Ch is 300 ms.

Examples	*50 ms*	*0032h*

500 ms	*01F4h*
1000 ms	*03E8h*

2.5 Configuration Start address Read operation Addresses 0A/0Bh

Start address Read (after Trigger) Because the fixed type has a Serial no. only this setting is fixed, too. *factory setting : @0* SNR = @0

3 Response codes and Error messages

For receiving some infornation after commands we have several codes and messages implemeted in the firmware of the devices.

3.1 Response codes

Sign for a response is the letter `Q`. A response with 'Q' makes sure the command was understood from the device. The telegram is as usual.

STX	**Q**	Code	CR LF

The table shows the meaning of the Code:

Code	Description/meaning
Q0	Command could not be performed
Q1	Command executed
Q2	Action performed

3.2 Error messages

An error occurs, if a command or string is not complete or send with false characters.The letter `E`is the sign for errors. The errors in detail:

Code	Meaning
E01	Invalid command
E02	Invalid parameter
E10	Controverse configuration settings (e.g.Trigger and Anticollision)

Transponder specific information (Tag info)

4.1 Fixcode protocol: EM 4002 (Read Only)

The EM-protocol contains 64Bit (9Bit Header, 40Bit Data, 10Bit line parity, 4Bit row parity and a Zero-(NULL)-Bit. Example for an EM-Tag with no: 0902160121

0	1	2	3	4	5	6	7	8	
1	1	1	1	1	1	1	1	1	Header
				9	10	11	12	13	
				0	0	0	0	0	1.Nibble (0) + line parity
				14	15	16	17	18	
				1	0	0	1	0	2.Nibble (9) + line parity
				19	20	21	22	23	
				0	0	0	0	0	3.Nibble (0) + line parity
				24	25	25	27	28	
				0	0	1	0	1	4.Nibble (2) + line parity
				29	30	31	32	33	
				0	0	0	1	1	5.Nibble (1) + line parity
				34	35	36	37	38	
				0	1	1	0	0	6.Nibble (6) + line parity
				39	40	41	42	43	
				0	0	0	0	0	7.Nibble (0) + line parity
				44	45	46	47	48	
				0	0	0	1	1	8.Nibble (1) + line parity
				49	50	51	52	53	
				0	0	1	0	1	9.Nibble (2) + line parity
				54	55	56	57	58	
				0	0	0	1	1	10.Nibble (1)+ line parity
				59	60	61	62	63	
				1	1	1	0	0	Row parity + 0Bit