Leuze electronic

Leuze RFID systems

RFM 12 SL200
RFM 32 SL200/Exn
RFM 62 SL200
[RFM 82 SL200]

Read- /write devices according to ISO 15693

Description of commands and configuration

(direct communication via terminal software)

5
0
1
1
9
5
4
7

Version V4.2

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 typically used type at Leuze electronic.

STX		CR LF

The data from and to the RFM is coded in ASCII-Hex and always read or written in complete data blocks. Applicable as data conternt are all characters of the ASCII table. Two words are in use for the data carrier: transponder and tag. Between receive data and send data to the RFM should be a delay of about 150 ms.

1.1 Commands

Commands are recognized in Capital letters as well as in small letters for firmware versions 080513 at RFM12, RFM32 and RFM62. Earlier versions and the RFM82 expect capital letters as a command.

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

Command:	**R/r**	*Reset in factory settings*
Answer:	**Q2**	*Acknowledge, action performed*
Command:	**H/h**	*stop command & warm start, setting stays*
Answer:	**Q2**	*Acknowledge, action performed*
Command:	**V/v**	*get version of firmware*
Answer:		0302261234RFM32 *with 03=year,02=month, 26=day* *1234=Code, RFM32=device type*
Command:	**+**	Sets Trigger (LED red =ON)
Command:	**-**	Stops Trigger (LED red = OFF*)*

Command inventory I delivers all serial numbers of all tags in the reader field. **(TAG dectect function!)** The answer starts with the state, @0 and the transponder type, details see Chapter 1.2.

For the commands 'N ', 'M' und 'W without write forward' it is **neccessary to have** a **READ** operation (via Trigger) **before** that **and** the tag has to stay within the field ! Otherwise an error occurs.

Command Read Data Blocks N N05011(SNR) for read one or several blocks, also

with different tags in the field possible

05 = Start Blockno.
01 = tag type (01=I-Code) see table page 4
1 = number of blocks to read (1-9)
SNR = Serial number, neccessary with several tags in the field

Note: If Multi tag mode (antcollison) is active the SNR number transmission must be active too and with any command the SNR has to be sent (all charcaters after `0@0`tagtype`). You get the serial no. with "I" command. The answer starts with a state, the start block number and the tag type. The state is '0' and with a '1' it shows that more data comes with a second telegram. Structure of answers please see Chapter 1.2. Per data block an average response time of 50 ms can be calculated.

Command Read Transponder M **M01**

01 = Tag type I-Code, see table on page 4

This command allows to read the tag in total from the first data block to end of memory. This function works **with single transponders** only. The answer starts with a state and the transponder type (tag). The state is '0' and with a '1' it shows more data comes with a second telegram. If the transponder has more than 256 byte of data then the answer will be splitted.
The M command is not provided with the EM 4135(Tag Type 06).

Command Write Data Block W W05011(SNR)xxxxxxxx

05 =Block number (depends on tag (see 4.Taginfo)
01 =Tag type (01=I-Code) see table below
1 =number of blocks to write (1-9)
SNR= only if used with several tags, anticollision
xxxxxxxx = Data (full block)

The write operation always writes complete data blocks on the tags (that means 8 characters/ block at 4 byte/ block)
The response on 'W' command with "write forward" is ´Q4´ (Q4=command received), after a trigger or '+' the data is written to the tag and the response is 'Q5´ (Q5= write operation successful)
Without "write forward" the tag has to be in the field when sending the command and directly 'Q5' is the response then.

Answer	Q4 / Q5	Q4	Command received (with write forward)
		Q5	Write operation successful

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

This command sets the output permanent and gets no response! This will work only if the output is **not activated** automatically !! Reaction time 10 ms.

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

With the F-command, the magnetic field of the RFM´s can be switched.
The answer on this command is Q2, and the field is switched ON/OFF.
The reaction time on F commands is 10 ms
The field is switched on automatically after a new trigger pulse.

1.2 Transponder(tag-) types within the telegram

Some commands and answers transmit the transponder type within the telegram. See the following table for the several types. Please note the difference to the configuration values (address 03h in chapter 2.4).

N0	Description
01	I-CODE 1 (44 characters, from block 05 on writeable)
02	ST_M LRI 512 (60 characters, from block 00 on writeable)
03	TAG IT (32 characters, from block 00 on writeable)
04	I-CODE SLI (112 characters, from block 00 on writeable)
05	INFINEON (256/1024 characters, from block 03 on writeable)
06	EM4135 (288 characters, from block 13 on writeable)
07	TAG IT HFI (256 characters, from block 00 on writeable)

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. 0@00101000000011AAAF6
This response contains the following informations (starting from left):
0 character, if there are more telegrams. (0 means only one telegram)
@0 sign for serial number
01 transponder type, see table on page 3
01000000011AAAF6 unique serial number of the transponder

Block data (user data), 1 to 9 blocks possible (depends on transponder)

e.g. 005014672616E (1 Block, starting with Block 05)
In this response are several informations included, too (starting from left):
0 character, if there are more telegrams. (0 means only one telegram)
05 Start-Block number
01 transponder type, see table on page 3
4672616E data in hexadecimal presentation (2 characters /byte)

Multiple Read

e.g. 00001011AAAF601000000FFFFFFF0000000033331323346726l6E6B2057756573746572FFF.....
With this setting all information of the transponder from the first to the last block is delivered.
The response contains the informationen (starting from left):
0 character, if there are more telegrams. (0 means only one telegram)
00 Start-Block number
01 transponder type, see table on page 3
011AAF6..... data in hexadecimal presentation (2 characters /byte)

Data output after Online-command(via terminal software)

Response after command Read Blocks N05011 (see.chapter 1.1)

e.g. 005014672616E (1 Block, starting with Block 05)
In this response are several informations included, too (starting from left):
0 character, if there are more telegrams. (0 means only one telegram)
05 Start-Block number
01 transponder type, see table on page 3
4672616E data in hexadecimal presentation (2 characters /byte)

Response after command Read all data M04 (see.chapter 1.1)

e.g. 004616361626F75FFFF..... (all data, starting with Block 00)
In this response are several informations included, too (starting from left):
0 character, if there are more telegrams. (0 means only one telegram)
04 transponder type, see table on page 3
616361626F... data in hexadecimal presentation (2 characters /byte)

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 click 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.
The RFID devices RFM 12, RFM 32 and RFM 62 have a record for the parameter settings with 16 addresses altogether (00 to 0Fh). The RFM 82 has some additional addresses (60-66h). Dependent on the function, one or two addresses can belong to one parameter. The factory setting is printed in bold letters.

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 configurations register. This allows either to send the configuration data with one string or address by address. Each valid address can be the start address. The change of configuration is answered by the 'Q1' response. The data for operation mode "Write" must be stored with this command beginning at the address 10h.

Answer Q1 (see Chapter 3. messages)

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 presentation.
If you communicate via field bus with the RFM all characters of the command are to handle as a separate ASCII sign in the transmission.

For operation mode "Write" the data has to be stored **before** in the same way (C10xxxx). The memory area for the data to write is 10h to 57h (9 Blocks)
Example: C1087654321 stores write data (1Block/4 Byte) starting address 10h.

Structure of the configuration parameters

Address	Parameter/Function
00	AFI (Application Family Identifier) Filter
01	Functions Register 1
02	Functions Register 2
03	Transponder type Highbyte
04	Transponder type 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
0B	Start address Read Lowbyte
0C	Read operation: number of blocks
0D	Start address Write Highbyte
0E	Start address Write Lowbyte
0F	Write operation: number of blocks
10-57	Write data (max. 9*8Byte)
58-5F	*Reserved*
60	*RF-power(Multiicator for 1/4W*
61	*Net work address(SW)*
62	*Reserved*
63	*Reserved*
64	*I Code 1: Number of Tags (Transponders)*
65	*Reserved*
66	*Reserved*

Only RFM 82

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		**1**	Operation mode see 2.1.1
1		**0**	
2	Reserved	**0**	
3	Reserved	**0**	Reserved, for RFM12/32/62
3	Network	**0**	Reader is slave in RS485 net
		1	Stand alone, without network
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	Write forward	0	Not active, for Write command a transponder must be within the reader field !
		1	Active, after write command data is written in the next transponder entering the field
7	Reserved	**0**	No action
		1	Activate 10ms Field reset after 3 trials (for Icode1)

Only RFM82

The parameter to set is combined via Bit column. The MSB (most significant Bit) is Bit 7 on first position.
Bitcolumn: 10100111 = 71 h *factory setting: 71h*

Configuration Operation mode (Bit 0/1 Address 01h)

Bit 1	Bit 0	Description
0	0	Operation mode: Write
0	**1**	Operation mode: Read
1	0	Operation mode: Multiple Read

The operation mode defines, what function a trigger pulse (or '+') causes.
The factory setting is "Read", that means after a trigger the serial no. or data blocks is read (addresses 0A-0Ch). The response is the same as after a "N" command: state, block no.(or @0), tag type, data.
With operation mode "Write" the stored data (address C10 following) is written into every tag after trigger, answer is "Q5".
The operation mode "Multiple read" delivers the whole tag data on trigger puls.
Note :This operation takes more time (about double the time) than a read operation for one block.

2.2 **Configuration Functions Register 2** Address 02h

Bit	Function	Level	Description
0	Serial number (W and N command)	**0**	Not active, no transmission
		1	Must be transmitted, active
1	Multi tag mode (anticollision)	**0**	Not active, only one tag in field
		1	Active, several tags in field
2	Reserved	**0**	
3	Filter (AFI)	**0**	Not active
		1	Active, code in Address 00h
4	Output switch	0	Not active
		1	Automatical activated, Address 05h
5	Data Block size	**0**	4 Byte
		1	8 Byte
6	Large data (>232Byte)	**1**	Further data is sent automatically
7	Reserved	**0**	

The readers are also designed for transponders of the new generation with larger memory (data block size 8 Byte).
factory setting: 50h

Important note:

Some functions belong to each other, some are mutually exclusive!
Especially the "Multi Transponder mode/ anti collision" is affected. Below the most important reliances of configuration settings with this affections are listed:

Dependent settings in the configuration:

Multi Transponder Mode = active (Adr. 02, Bit 1)	Transmission of serial number = **active** (Adr.02, Bit 0) Trigger = **active** (Adr.01, Bit 4) Trigger **= Trigger with anticollision** (Adr.0 5) Write forward = **not active** (Adr.01, Bit 6)
Write forward = "Active" (Adr. 01, Bit 6)	Trigger **active** (Adr.01, Bit 4)
Operation mode "Multiple Read" choosen (Adr. 01, Bit 1)	Multi Transponder Mode = **Not** active (Adr. 02, Bit 1)
Read mode = "permanent read" (Adr. 01,Bit 5)	Trigger = **not** active (Adr. 01, Bit 4), write forward = **not active** (Adr.01, Bit 6)

If any of these points is not or in parts only taken notice of, the device gives back an error "E10" for invalid configuration and nothing is changed.

In "Multi Transponder Mode (anticollision)" the devices can handle several transponders at the same time:

RFM 32 max. 4 transponders, fix
RFM 62 max. 4 transponders, fix
RFM 82 max. 30 transponders, parameter setting tag dependent

2.3 Configuration Transponder type (tagtype)

Addresses 03 /04h

Address 03h

Bit	Description
0	Reserved
1	ICODE
2	ST_M LRI 512
3	TAG IT
4	ICODE SLI (2)
5	INFINEON
6	EM4135
7	TAG IT HFI

To get the parameter value, remember the MSB is Bit 7:

factory setting ICODE + Icode SLI (Bit 1+4) Bit column: 00010010 = 12h

examples:	Tag-It	08h
	I-Code SLI	10h
	TAG-It HFI	80h

Address 04h

The devices are prepared for further tag types to be set in this area.
Today is none to set here.
factory setting: FFh

2.4 Configuration Trigger / Output switch Addresses 05-09h

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.

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
03	Trigger: Read in multi tag mode Output: Good Read Signal on Low level
0B	Trigger: Read in multi tag mode Output: No Read Signal on Low level
23	Trigger: Read in multi tag mode Output: Good Read Signal on High level
2B	Trigger: Read in multi tag mode Output: No Read Signal on high level

Factory setting : 20h

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 in hexadecimal numeric system.
Factory setting: 00h

Examples	*300 ms*	*012Ch*
	500 ms	*01F4h*
	1000 ms	*03E8h*
	2000 ms	*07D0h*

Configuration Output pulse time Addresses 08/09h

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

Examples	*50 ms*	*0032h*
	500 ms	*01F4h*
	1000 ms	*03E8h*
	2000 ms	*07D0h*

2.5 Configuration Start address Read Addresses 0A/0Bh

Start address Read (after Trigger) *factory setting : @0 (4000h),*SNR=@0

Example: Block 05= 0005h;
In the operation mode "Read" the configured type of data is given after a trigger (or '+') on the RS232 interface. The possible block number depends on the tag type (see Chapter 4 Taginfo)

2.6 Configuration Read number of Blocks (after Trigger) Address 0Ch

This is the number of data blocks read on one read operation after a trigger (or '+').
factory setting : 01h gives 1 Data block range 01-09h

2.7 Configuration Start address Write operation Addresses 0D/0Eh

Please note the block address depends on the tagtype (see Chapter 4 Taginfo) I-Code has 16 Blocks! This parameter is only valid in operation mode "Write"!
factory setting : 0005h Block no 05
further details and tag types see chapter 4

2.8 Configuration Write number of Blocks Address 0Fh

In the operation mode "Write" this number of blocks will be written to the tag after a trigger. The data to write must be stored **before** starting from address 10h. This number of data blocks is written on one write operation. Please note the data must fit the block size!
factory setting : 01h range 01-09h

2.9 Configuration AFI Filter Address 00h

The filter AFI (Application Family Identifier) is a kind of legitimation for the transponder in this application. Only if the AFI on tag and in reader are the same, the tag can be read or written.
factory setting : 00h range 00 -FFh

2.10 Further Configuration addresses for RFM82 only

Configuration Output Power Address 60h

In steps of 1/4 Watts it´s possible to set the output power. The value to set is the factor to 0,25W. The value to set is in hexadecimal system.
Please note the max. power values for the seperate antennas. We do not recommend power values over 4W. This power is reached with optimized adjustment of the antenna only (Z=R=50Ω).

Factory setting 10h	Output power 4W	
Examples	*1W*	*04h*
	2W	08h
	2.5W	0Ah
	3W	0Ch

Important note: Please take care of the local limits for the allowed output power rate!

Configuration Network address RS485 Address 61h

The software address for using the device as a network slave can be set between 00-FFh (0-255). This parameter is only active if in address 01h the network operation is active.
Factory setting: 00h

Configuration I-Code: Expected number of tags Address 64h

The value in this address optimizes the multi transponder mode (anticollision). The higher the value the longer the time frame for one operation (Read/Write). Possible numbers of time slots are 1;2;4;8;16;32;64;128. In anticollision mode the number of time slots should be double of the number of tags. The value is a hexadecimal value.
Factory setting 20h (32 slots) for 16 tags

3 Response codes and Error messages

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

Response codes

Sign for a response is the letter `Q`. A response with 'Q' makes shure the command was understood from the device. The telegram looks like 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
´Q4´	Write Command understood
´Q5´	Write Block successful

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
E04	Data Frame error
E08	CRC Error
E10	Controvert configuration settings (e.g.Trigger and permanent reading)

If an „E08“ message occurs the CRC was activated. For Reset please use the Command „R“ and D2h via interface.

4 Transponder specific information (Tag Info)

4.1 Memory organisation I-CODE 1(44 Byte, 4 Byte per block)

Block	Byte 0	Byte 1	Byte 2	Byte 3	Description
0	SNR0	SNR1	SNR2	SNR3	Serial number (low)
1	SNR4	SNR5	SNR6	SNR7	Serial number (high)
2^^	F0	FF	FF	FF	Write access
3	X	x	X	X	Special functions
4	X	x	X	X	Filter Code / Application Identifier / User Data
5	X	x	X	X	User Data
6	X	x	X	X	User Data
7	X	x	X	X	User Data
8	X	x	X	X	User Data
9	X	x	X	X	User Data
10	X	x	X	X	User Data
11	X	x	X	X	User Data
12	X	x	X	X	User Data
13	X	x	X	X	User Data
14	X	x	X	X	User Data
15	X	x	X	X	User Data

The serial no. in Block 0 and Block 1 is fix.

Write access conditions (Block 2)

MSB Byte 0 LSB								MSB Byte 1 LSB								MSB Byte 2 LSB								MSB Byte 3 LSB							
1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3		2		1		0		7		6		5		4		11		10		9		8		15		14		13		12	

Block 2 Write access (3 line is the block number).

Set of a Bit pair to 0|0 causes write protection for the chosen block.

!! Warning: this operation is not reversable!!

Special functions (Block 3)

MSB Byte 0 LSB								MSB Byte 1 LSB								MSB Byte 2 LSB								MSB Byte 3 LSB							
x	x	x	x	q	q	e	e	x	x	x	x	x	x	x	x	x	X	x	X	x	x	x	x	x	x	x	x	x	x	x	x

q|q = 1|1 => QUIET mode enabled
e|e = 1|1 => EAS mode enabled

q|q = 0|0 => QUIET mode disabled
e|e = 0|0 => EAS mode disabled

Family Code and Application Identifier (Block 4)

MSB Byte 0 LSB								MSB Byte 1 LSB								MSB Byte 2 LSB								MSB Byte 3 LSB							
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	X	x	X	x	x	x	x	x	x	x	x	x	x	x	x
Family Code								Application ID								User Data								User data							

4.2 Memory organisation I-CODE SLI (112 Byte, 4 Byte per Block)

Block	Bits	Description
UID	64	Fixed Serial number
00	32	User Data
01	32	User Data
02	32	User Data
25	32	User Data
26	32	User Data
27	32	User Data

4.3 Memory organisation TAG-IT (32 Byte, 4 Byte per Block)

Block	Bits	Description
SID ADDRESS	32	Fixed Serial number
R/O Memory	32	Manufacturer code, Chip/Tag version etc.
0	32	User Data
1	32	User Data
2	32	User Data
3	32	User Data
4	32	User Data
5	32	User Data
6	32	User Data
7	32	User Data

4.4 Memory organisation TAG-IT HFI (256 Byte, 8 Byte per Block)

Block	Bits	Description
UID	64	Fixed Serial number
0	64	User Data
1	64	User Data
2	64	User Data
3	64	User Data
28	64	User Data
29	64	User Data
30	64	User Data
31	64	User Data

4.5 Memory organisation ST Microelectronics LRI 512 (60 Byte, 4 Byte per Block)

Block	Bits	Description
UID	64	Fixed serial number
00	32	User Data
01	32	User Data
02	32	User Data
13	32	User Data
14	32	User Data
15	32	User Data

4.6 Memory organisation INFINEON my-d (8 Byte per Block)

SRF 55V10P: 10kBit Memory in 128 Blocks 1024Byte
SRF 55V02P: 2,5kBit Memory in 32 Blocks 256 Byte

Block	Bits	Description
00	64	Fixed serial number
01	64	Service Area
02	64	Service Area
03	64	User Data
	64	User Data
	64	User Data
31/127	64	User Data

The chip SRF 55V10P with 10 kBits does NOT provide the M-command!

4.7 Memory organisation EM Microelectronic EM4135 (288Byte, 8 Byte per Block)

Blocks 0-11 cannot be used

Block	Bits	Description
12	64	Fixed serial number
13	64	User Data
14	64	User Data
15	64	User Data
	64	User Data
47	64	User Data
48	64	User Data

This chip does NOT provide the M-command!

4.8 Not supported Transponderchips

Still new transponder are devellopped for this frequency. Because of this it may occure there is no function with the firmware you have. Please ask for actual versions if neccessary.

Hardware dependend following types cannot be supported:

- FRAM-Technology from Fujitsu
- Gem-Plus / Picco-Tag
- Mifare Chips

5 ASCII-Table

HEX	DEC	CTRL	ABV	ENGLISH	GERMAN
00	0	^@	NUL	NULL	Null
01	1	^A	SOH	START OF HEADING	Kopfzeilenbeginn
02	2	^B	STX	START OF TEXT	Textanfangszeichen
03	3	^C	ETX	END OF TEXT	Textendezeichen
04	4	^D	EOT	END OF TRANSMISSION	Ende der Übertragung
05	5	^E	ENQ	ENQUIRY	Aufforderung zur Datenübertragung
06	6	^F	ACK	ACKNOWLEDGE	Positive Rückmeldung
07	7	^G	BEL	BELL	Klingelzeichen
08	8	^H	BS	BACKSPACE	Rückwärtsschritt
09	9	^I	HT	HORIZONTAL TABULATOR	Horizontal Tabulator
0A	10	^J	LF	LINE FEED	Zeilenvorschub
0B	11	^K	VT	VERTICAL TABULATOR	Vertikal Tabulator
0C	12	^L	FF	FORM FEED	Seitenvorschub
0D	13	^M	CR	CARRIAGE RETURN	Wagenrücklauf
0E	14	^N	SO	SHIFT OUT	Dauerumschaltungszeichen
0F	15	^O	SI	SHIFT IN	Rückschaltungszeichen
10	16	^P	DLE	DATA LINK ESCAPE	Datenübertragungsumschaltung
11	17	^Q	DC1	DEVICE CONTROL 1 (X-ON)	Gerätesteuerzeichen 1
12	18	^R	DC2	DEVICE CONTROL 2 (TAPE)	Gerätesteuerzeichen 2
13	19	^S	DC3	DEVICE CONTROL 3 (X-OFF)	Gerätesteuerzeichen 3
14	20	^T	DC4	DEVICE CONTROL 4	Gerätesteuerzeichen 4
15	21	^U	NAK	NEGATIVE (/Tape) ACKNOWLEDGE	Negative Rückmeldung
16	22	^V	SYN	SYNCRONOUS IDLE	Synchronisierung
17	23	^W	ETB	END OF TRANSMISSION BLOCK	Ende des Datenübertragungsblocks
18	24	^X	CAN	CANCEL	Ungültig
19	25	^Y	EM	END OF MEDIUM	Ende der Aufzeichnung
1A	26	^Z	SUB	SUBSTITUTE	Substitution
1B	27	^[	ESC	ESCAPE	Umschaltung
1C	28	^\	FS	FILE SEPARATOR	Hauptgruppentrennzeichen
1D	29	^]	GS	GROUP SEPARATOR	Gruppentrennzeichen
1E	30	^^	RS	RECORD SEPARATOR	Untergruppentrennzeichen
1F	31	^_	US	UNIT SEPARATOR	Teilgruppentrennzeichen
20	32		SP	SPACE	Leerzeichen
21	33		!	EXCLAMATION POINT	Ausrufungszeichen
22	34		"	QUOTATION MARK	Anführungszeichen
23	35		#	NUMBER SIGN	Nummerzeichen
24	36		$	DOLLAR SIGN	Dollarzeichen
25	37		%	PERCENT SIGN	Prozentzeichen
26	38		&	AMPERSAND	Kommerzielles UND-Zeichen
27	39		'	APOSTROPHE	Apostroph
28	40		(	OPENING PARENTHESIS	runde Klammer (offen)
29	41		)	CLOSING PARENTHESIS	runde Klammer (geschlossen)
2A	42		*	ASTERISK	Stern
2B	43		+	PLUS	Pluszeichen
2C	44		,	COMMA	Komma
2D	45		-	HYPHEN (MINUS)	Bindestrich (Minuszeichen)
2E	46		.	PERIOD (DECIMAL)	Punkt
2F	47		/	SLANT	Schrägstrich (rechts)
30	48		0		
31	49		1		
32	50		2		
33	51		3		
34	52		4		
35	53		5		
36	54		6		
37	55		7		
38	56		8		
39	57		9		
3A	58		:	COLON	Doppelpunkt
3B	59		;	SEMI-COLON	Semikolen
3C	60		<	LESS THEN	Kleiner als
3D	61		=	EQUALS	Gleichheitszeichen
3E	62		>	GREATER THEN	Größer als
3F	63		?	QUESTION MARK	Fragezeichen
40	64		@	COMMERCIAL AT	Kommerzielles a-Zeichen

HEX	DEC	CTRL	ABV	ENGLISH	GERMAN
41	65		A		
42	66		B		
43	67		C		
44	68		D		
45	69		E		
46	70		F		
47	71		G		
48	72		H		
49	73		I		
4A	74		J		
4B	75		K		
4C	76		L		
4D	77		M		
4E	78		N		
4F	79		O		
50	80		P		
51	81		Q		
52	82		R		
53	83		S		
54	84		T		
55	85		U		
56	86		V		
57	87		W		
58	88		X		
59	89		Y		
5A	90		Z		
5B	91		[	OPENING BRACKET	eckige Klammer (offen)
5C	92		\	REVERSE SLANT	Schrägstrich (links)
5D	93		]	CLOSING BRACKET	eckige Klammer (geschlossen)
5E	94		^	CIRCUMFLEX	Zirkumflex
5F	95		_	UNDERSCORE	Unterstrich
60	96		`	GRAVE ACCENT	Gravis
61	97		a		
62	98		b		
63	99		c		
64	100		d		
65	101		e		
66	102		f		
67	103		g		
68	104		h		
69	105		i		
6A	106		j		
6B	107		k		
6C	108		l		
6D	109		m		
6E	110		n		
6F	111		o		
70	112		p		
71	113		q		
72	114		r		
73	115		s		
74	116		t		
75	117		u		
76	118		v		
77	119		w		
78	120		x		
79	121		y		
7A	122		z		
7B	123		{	OPENING BRACE	geschweifte Klammer (offen)
7C	124		|	VERTICAL LINE	Vertikalstrich
7D	125		}	CLOSING BRACE	geschweifte Klammer (geschlossen)
7E	126		~	TILDE	Tilde
7F	127		DEL	DELETE (RUBOUT)	Löschen

Leuze electronic GmbH+Co.KG
Postbox 1111
In der Braike 1
D-73277 Owen / Teck
Tel +49 (07021) 573-0
Fax +49 (07021) 573199
E-mail: info@leuze.de
http://www.leuze.de

State 02 / 2012
document UM_RFM-commands_en_50119547