

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

# PRG\_22-14 IDTRONIC LEUZE RFID SYSTEMS HF PROFINET COMMUNICATION PROTOCOL AND DEVICE CONFIGURATION

**RDH 348i 00**

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>1</b> / <b>54</b>
----------	-----------------------------------	---------------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Version	Date	Author	Changelist
01	13/01/2025	Fabrizio Picotto	First draft
02	24/02/2025	Fabrizio Picotto	Corrected the commands table with interfaces support Removed the MIFARE Classic support in read/write commands Micro-typo in some paragraphs of this document

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

# 1 Table of Contents

1 Table of Contents .....	3
2 Scope .....	7
3 Field of Application .....	7
4 Definitions and Abbreviations.....	7
5 Device Description .....	8
6 Transponder (Tag) Types .....	9
7 Configuration of the Device .....	10
7.1 Configuration AFI (Application Family Identifier) Filter (Address 00h) .....	10
7.2 Configuration Functions Register 1 (Address 01h).....	11
7.3 Configuration Functions Register 2 (Address 02h).....	11
7.4 Configuration Transponder Type (Addresses 03h-04h) .....	12
7.5 Configuration Trigger Pulse Time (Addresses 06h-07h) .....	13
7.6 Configuration Start Address Read (Addresses 0Ah-0Bh) .....	14
7.7 Configuration Read Number of Blocks (Address 0Ch) .....	14
7.8 Configuration Start Address Write (Addresses 0D-0Eh) .....	14
7.9 Configuration Write Number of Blocks (Address 0Fh) .....	14
7.10 Configuration Write data (Addresses 10h-57h) .....	14
7.11 Configuration dependencies .....	15
8 PROFINET-IO Fieldbus Communication Interface .....	16
8.1 Identification and Maintenance Functions .....	16
8.2 PROFINET-IO Start Topology .....	17
8.3 PROFINET-IO Linear Topology.....	17
9 Structure of the PROFINET-IO Fieldbus Telegrams .....	18
9.1 Description of the Input Bytes (Status Bytes) .....	18
9.1.1 Structure and Meaning of the Input Bytes (Status Bytes) .....	18
9.1.2 Detailed Description of the Bits (Input Byte 0) .....	19
9.1.3 Detailed Description of the Bits (Input Byte 1) .....	19
9.2 Description of the Output Bytes (Control Bytes) .....	20
9.2.1 Structure and Meaning of the Output Bytes (Control Bytes) .....	20

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

9.2.2 Detailed Description of the Bits (Output Byte 0) .....	20
9.2.3 Detailed Description of the Bits (Output Byte 1) .....	21
9.3 Functionality of the Data Exchange .....	21
10 USB Virtual COM Service Interface .....	22
11 Structure of the USB Virtual COM Telegrams .....	23
12 Messages Definitions of the Device .....	24
12.1 Get Firmware Version .....	25
12.2 Reset to Default .....	26
12.3 Reset Software .....	26
12.4 Set Trigger On .....	26
12.5 Set Trigger Off .....	28
12.6 Inventory .....	29
12.7 Switch Field .....	29
12.8 Read Configuration .....	30
12.9 Write Configuration .....	30
12.10 Read Block .....	31
12.11 Read Transponder .....	32
12.12 Write Block .....	33
12.13 Firmware Download .....	34
13 Transponder (Tag) Specific Information .....	36
13.1 Memory Organization NXP I-CODE 1 .....	36
13.2 Memory Organization NXP I-CODE SLI .....	36
13.2.1 Unique Identifier (UID) NXP I-CODE SLI .....	37
13.3 Memory Organization NXP I-CODE SLI-S .....	37
13.3.1 Unique Identifier (UID) NXP I-CODE SLI-S .....	37
13.4 Memory Organization NXP I-CODE SLI-L .....	37
13.4.1 Unique Identifier (UID) NXP I-CODE SLI-L .....	38
13.5 Memory Organization NXP I-CODE SLIX .....	38
13.5.1 Unique Identifier (UID) NXP I-CODE SLIX .....	38
13.6 Memory Organization NXP I-CODE SLIX-S .....	39
13.6.1 Unique Identifier (UID) NXP I-CODE SLIX-S .....	39

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

13.7 Memory Organization NXP I-CODE SLIX-L .....	39
13.7.1 Unique Identifier (UID) NXP I-CODE SLIX-L .....	40
13.8 Memory Organization NXP I-CODE SLIX2 .....	40
13.8.1 Unique Identifier (UID) NXP I-CODE SLIX2 .....	40
13.9 Memory Organization TI Tag-it HF-I Standard .....	41
13.9.1 Unique Identifier (UID) TI Tag-it HF-I Standard .....	41
13.10 Memory Organization TI Tag-it HF-I Plus.....	41
13.10.1 Unique Identifier (UID) TI Tag-it HF-I Plus.....	42
13.11 Memory Organization TI Tag-it HF-I Pro.....	42
13.11.1 Unique Identifier (UID) TI Tag-it HF-I Pro.....	42
13.12 Memory Organization STM LRI 512.....	43
13.12.1 Unique Identifier (UID) STM LRI 512.....	43
13.13 Memory Organization Infineon my-d (02P) .....	43
13.13.1 Unique Identifier (UID) Infineon my-d (02P) .....	43
13.14 Memory Organization Infineon my-d (10P) .....	44
13.14.1 Unique Identifier (UID) Infineon my-d (10P).....	44
13.15 Memory Organization EM EM4135.....	44
13.15.1 Unique Identifier (UID) EM EM4135.....	45
13.16 Memory Organization Fujitsu MB89R118C.....	45
13.16.1 Unique Identifier (UID) Fujitsu MB89R118C.....	45
13.17 Memory Organization NXP MIFARE Classic 1k .....	46
13.18 Memory Organization NXP MIFARE Classic 4k .....	46
13.18.1 Manufacturer block NXP MIFARE Classic 1k / 4k .....	48
13.18.2 Sector trailer NXP MIFARE Classic 1k / 4k.....	48
13.19 Memory Organization NXP MIFARE Ultralight C.....	48
13.19.1 Unique Identifier NXP MIFARE Ultralight C .....	49
13.20 Memory Organization NXP NTAG 210 .....	49
13.20.1 Unique Identifier NXP NTAG 210 .....	50
13.21 Memory Organization NXP NTAG 212 .....	50
13.21.1 Unique Identifier NXP NTAG 212 .....	51
13.22 Memory Organization NXP NTAG 213 .....	51

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

13.22.1 Unique Identifier NXP NTAG 213 .....	52
13.23 Memory Organization NXP NTAG 215 .....	52
13.23.1 Unique Identifier NXP NTAG 215 .....	53
13.24 Memory Organization NXP NTAG 216 .....	53
13.24.1 Unique Identifier NXP NTAG 216 .....	54

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 2 Scope


This document refers to the Leuze RDH 348i 00 device and describes in detail the communication protocol and the configuration parameters.

## 3 Field of Application

This document applies to the Leuze RDH 348i 00 device with firmware version v1.0.0.

## 4 Definitions and Abbreviations

Term / Abbreviation	Definition
TBD	To Be Determined
UID	Unique Identifier

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 5 Device Description

The device object of this manual is a mid-range RFID read/write device operating at 13.56MHz with integrated antenna and suitable for industrial application. It communicates with a 'host' system (typically a PC or a PLC) through a fieldbus (PROFINET-IO) connection. The device acts as a joint through a set of commands between the host system and the RFID tag/s (or transponder/s) present near the antenna/s. For this purposes it is equipped with an integrated decoder for the identification of standard transponders (data carriers) acc. to ISO/IEC 15693 and ISO/IEC 14443 A. An USB connection, working as Virtual COM, is also available and is used as service port to configure the functional parameters and to update the firmware of the device.



	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 6 Transponder (Tag) Types

In many commands and acknowledgements, the transponder type (tag type) is also transmitted. Listed in the following table are the supported transponder types.

Tag Type	Transponder Type	Number of Bytes	Start Block / Pages (when Writing)	Number of Blocks / Pages	Block / Page Size
01h	NXP I-CODE 1	44	5	11	4
02h	STM LRI 512	60	0	16	4
03h	Reserved	-	-	-	-
04h	NXP I-CODE SLI	112	0	28	4
	NXP I-CODE SLI-S	160	0	40	4
	NXP I-CODE SLI-L	32	0	8	4
05h	Infineon my-d (02P)	224	0	56	4
	Infineon my-d (10P)	992	0	248	4
06h	EM EM4135	288	13	36	8
07h	TI Tag-it HF-I Standard	32	0	8	4
	TI Tag-it HF-I Plus	256	0	64	4
	TI Tag-it HF-I Pro	32	0	8	4
08h	NXP I-CODE SLIX	112	0	28	4
	NXP I-CODE SLIX-S	160	0	40	4
	NXP I-CODE SLIX-L	32	0	8	4
09h	NXP I-CODE SLIX2	320	0	80	4
0Ah	Fujitsu MB89R118C	2000	0	250	8
0Bh	NXP MIFARE Classic 1k	1024	0	64	16
	NXP MIFARE Classic 4k	4096	0	256	16
0Ch	NXP MIFARE Ultralight C	144	4	36	4
	NXP NTAG 210	48	4	12	4
	NXP NTAG 212	128	4	32	4
	NXP NTAG 213	144	4	36	4
	NXP NTAG 215	504	4	126	4
	NXP NTAG 216	888	4	222	4
...	...	...	...	...	...
FEh	Reserved	-	-	-	-
FFh	Reserved	-	-	-	-

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 7 Configuration of the Device

The setting parameters of the device are stored in different registers that can be accessed in read and write. The following table shows a list of the configuration registers:

Address	Parameters / Function	Default settings
00h	AFI (Application Family Identifier) filter	00h
01h	Functions register 1	71h
02h	Functions register 2	50h
03h	Transponder type High byte	12h
04h	Transponder type Low byte	00h
05h	Reserved	20h
06h	Trigger pulse time (ms) High byte	00h
07h	Trigger pulse time (ms) Low byte	00h
08h	Reserved	01h
09 h	Reserved	2Ch
0Ah	Start address Read High byte	00h
0B h	Start address Read Low byte	00h
0Ch	Read operation Number of blocks	01h
0D h	Start address Write High byte	00h
0Eh	Start address Write Low byte	05h
0Fh	Write operation Number of blocks	01h
10h-57h	Write data (max. 9 x 8 bytes)	00h
58h-FFh	Reserved	00h

### 7.1 Configuration AFI (Application Family Identifier) Filter (Address 00h)

The AFI filter is a legitimization for the ISO15693 transponder in this application: only if the AFI on the transponder and the data stored in this register are the same, the transponder can be read or written. The AFI filter can be enabled setting to 1 the bit 3 of Functions Register 2 (address 02h).

*Default setting: 00h*

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 7.2 Configuration Functions Register 1 (Address 01h)

Bit	Function	Level	Description
0...1	Operation mode	00	Write Mode
		01	Read Mode
		10	Multiple Read
2	Reserved	0	
3	Reserved	0	
4	Trigger	0	Permanent ready for read
		1	Read on trigger pulse
5	Read mode	0	Permanent read and data output
		1	Single shot. Read once while in field
6	Write forward	0	Not active, a write command must be sent with the tag in the reading field
		1	Active, a write command can be sent before the tag enters the field
7	Reserved	0	

The parameter to set is combined via Bit column. The MSB (most significant Bit) is Bit 7 on first position.

*Default setting: 71h*

The operation mode defines, what function a trigger pulse (or '+' command) causes. The factory setting is "Read", that means after a trigger the serial no. or data blocks is read: if the parameter Start Address Read (addresses 0Ah-0Bh) is set to 4000h the device reads the serial no., if not the device reads blocks of data from transponder. The number of blocks and the starting block to read are defined by Read operation Number Of Blocks (address 0Ch) and Start Address Read (address 0A-0Bh) parameters. The response is the same as after an "N" command: state, block no. (or @0), tag type, data. With operation mode "Write" the stored data (address 10h following) is written into every tag after trigger, answer is "Q5". In this case the number of blocks and the starting block to write are defined by Write operation Number Of Blocks (address 0Fh) and Start Address Write (address 0Dh-0Eh) parameters. The operation mode "Multiple read" delivers the whole tag data on trigger pulse. Note that this operation takes more time (about double the time) than a read operation for one block.

## 7.3 Configuration Functions Register 2 (Address 02h)

Bit	Function	Level	Description
0	Serial number	0	Not active, no transmission

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Bit	Function	Level	Description
	(W and N command)	1	Active, serial number must be transmitted
1	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, AFI code in address 00h
4	Reserved	0	
5	Data block size	0	4 Byte
		1	8 Byte
6	Large data	1	Further data is sent automatically (> 256 bytes)
7	Reserved	0	

The parameter to set is combined via Bit column. The MSB (most significant Bit) is Bit 7 on first position.

Default setting: 50h

## 7.4 Configuration Transponder Type (Addresses 03h-04h)

Address 03h:

Bit	Description
0	Reserved
1	NXP I-CODE 1
2	STM LRI 512
3	Reserved
4	NXP I-CODE SLI NXP I-CODE SLI-S NXP I-CODE SLI-L
5	Infineon my-d (02P) Infineon my-d (10P)
6	EM EM4135
7	Tag-It HF-I Standard Tag-It HF-I Plus

The parameter to set is combined via Bit column. The MSB (most significant Bit) is Bit 7 on first position.

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>12 / 54</b>
----------	-----------------------------------	---------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

If the bit level is 1, the device operations are enabled for the corresponding transponder type.

*Default setting: 12h*

Address 04h:

Bit	Description
0	NXP I-CODE SLIX NXP I-CODE SLIX-S NXP I-CODE SLIX-S
1	NXP I-CODE SLIX2
2	Fujitsu MB89R118C
3	NXP MIFARE Classic 1k NXP MIFARE Classic 4k
4	NXP MIFARE Ultralight C NXP NTAG 210 NXP NTAG 212 NXP NTAG 213 NXP NTAG 215 NXP NTAG 216
5	Reserved
6	Reserved
7	Reserved

The parameter to set is combined via Bit column. The MSB (most significant Bit) is Bit 7 on first position.

If the bit level is 1, the device operations are enabled for the corresponding transponder type.

*Default setting: 00h*


## 7.5 Configuration Trigger Pulse Time (Addresses 06h-07h)

These registers store the value of the time after the trigger pulse, represented in hexadecimal numeric system. The time can be set in a range from 0 to 9000 ms.

*Default setting: 0000h*

### Examples:

- 500 ms    01F4h
- 1000 ms    03E8h

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 7.6 Configuration Start Address Read (Addresses 0Ah-0Bh)

These registers store the address of the first block read from the transponder after trigger in the operation mode 'Read'.

*Default setting: 0000h*

### Example:

- Block 05    0005h

## 7.7 Configuration Read Number of Blocks (Address 0Ch)

This register stores the number of data blocks read from the transponder after trigger in the operation mode 'Read'. The number of blocks can be set from 1 to 9.

*Default setting: 01h (1 block)*

### Examples:

- 5 blocks    05h
- 9 blocks    09h

## 7.8 Configuration Start Address Write (Addresses 0D-0Eh)

These registers store the address of the first block written into the transponder after trigger in the operation 'Write'.

*Default settings: 0005h*

### Example:

- Block 10    00A0h

## 7.9 Configuration Write Number of Blocks (Address 0Fh)

This register stores the number of data blocks written into the transponder after trigger in the operation 'Write'. The number of blocks can be set from 1 to 9.

*Default setting: 01h*

### Examples:

- 5 blocks    05h
- 9 blocks    09h

## 7.10 Configuration Write data (Addresses 10h-57h)

These registers store the data that is written into the transponder data blocks after trigger in the operation 'Write'.

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>14 / 54</b>
----------	-----------------------------------	---------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 7.11 Configuration dependencies

Some configuration settings are mutually exclusive because of the dependence on other setting parameters.

Setting	Dependencies
Anticollision = Active (Adress 02h, Bit 1)	Seral Number transmission = Active (Address 02h, Bit 0) Trigger Mode = Read in multi tag mode (Address 05h) Write forward = Not Active (Address 01h, Bit 6)
Write forward = Active (Address 01h, Bit 6)	Trigger = Read on trigger pulse (Address 01h, Bit 4)
Operation mode = Multiple Read (Address 01h, Bit 0-1)	Anticollision = Not Active (Address 02h, Bit 1)
Read mode = Permanent read (Address 01h, Bit 5)	Trigger = Permanent ready for read (Address 01h, Bit 4) Write forward = Not Active (Address 01h, Bit 6)



Before setting one of this four parameters all the dependencies must be set correctly, otherwise the device responds with error code 'E10'

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 8 PROFINET-IO Fieldbus Communication Interface

The device is designed as a PROFINET-IO device (acc. To IEEE 802.3). It supports a transmission rate of up to 100Mbit/s (100Base TX), full-duplex as well as auto-negotiation and auto-crossover. The functionality of the device is defined via parameter sets which are clustered in modules. These modules are contained in a GSDML file.

Each device is sealed with a unique MAC-ID on delivery. This information is used to assign a unique, plant-specific device name ("NameOfStation") to the device via the "Discovery and Configuration Protocol" (DCP). When configuring a PROFINET-IO system, the assignment of the device names to the configured IO devices creates a name-based relationship for the participating IO devices ("device naming"). Further information can be found in section Configuration of the device name – device naming.

The device features multiple M12 connectors/sockets for the electrical connection of the supply voltage, the interface and the switching inputs and outputs. Further information can be found in the data sheet of the device.

The device supports:

- PROFINET-IO device functionality based on the PROFINET profile for identification systems
- Modular structure of the IO data
- Standard Fast Ethernet (100Mbit/s) connections (M12 technology)
- Integrated Ethernet switch / 2 Ethernet ports
- PROFINET-IO Conformance Class B (CC-B)
- I&M support: I&M 0-3
- Diagnostics / alarms

### 8.1 Identification and Maintenance Functions

The device supports the base record I&M0:

Contents	Index	Data Type	Description	Value
Header	0	10 bytes	Manufacturer specific	
MANUFACTURER_id	10	UNSIGNED16	Leuze PNO manufacturer ID	338
ORDER_ID	12	ASCII string 20	Leuze order no.	Device-dependent
SERIAL_NUMBER	32	ASCII string 16	Unique device serial number	Device-dependent
HARDWARE_REVISION	48	UNSIGNED16	Hardware revision number	Device-dependent
SOFTWARE_REVISION	50	1xCHAT, 3xUNSIGNED8	Software version number	Device-dependent

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>16 / 54</b>
----------	-----------------------------------	---------------------



	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Contents	Index	Data Type	Description	Value
REVISION_COUNTER	54	UNSIGNED16	It is incremented when updating individual modules. Not supported	0
PROFILE_ID	56	UNSIGNED16	PROFINET application profile number	0xF600 (Generic Device)
PROFILE_SPECIFIC_TYPE	58	UNSIGNED16	Info about subchannels and submodules. Not relevant	0x01.0x01
IM_VERSION	60	2xUNSIGNED8	Implemented I&M version 1.1	0x01.0x01
IM_SUPPORTED	62	Bit[16]	Optional I&M record available	0

The device supports further protocols and services for communication:

- TCP/IP (firmware upload via web server)
- DCP
- ARP
- PING

## 8.2 PROFINET-IO Start Topology


The device can be operated as a single device (standalone) with individual device name in a star topology. The PLC must communicate this device name to the participant during the “device naming”.

## 8.3 PROFINET-IO Linear Topology

The innovative further development of the device with integrated switch functionality offers option connecting multiple connection units of the same type to another one without direct connection to a switch. In addition to the classic “start topology”, a “linear topology” is thus also possible.

Each participant in this network requires its own unique device name that is assigned by the PLC during the “device naming”. Further information can be found in section Configuration of the device name – device naming.

The maximum length of a segment (connection from the hub to the last participant) is limited to 100m.

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 9 Structure of the PROFINET-IO Fieldbus Telegrams

All operations are performed by control and status bits. Two bytes of control information and two bytes of status information are available for this purpose. The control bits are a part of the output bytes and the status bits are a part of the input bytes. The data starts with the third byte.

The following telegram structure is used between **PLC -> fieldbus device**:

7	6	5	4	3	2	1	0	
					MORE	R-ACK	W-REQ	Control byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Control byte 1
Data byte 1								
...								Data
Data byte n								

The following telegram structure is used between **fieldbus device -> PLC**:

7	6	5	4	3	2	1	0	
ALIVE				BUSY	MORE	W-ACK	R-REQ	Status byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Status byte 1
Data byte 1								
...								Data
Data byte n								

### 9.1 Description of the Input Bytes (Status Bytes)

#### 9.1.1 Structure and Meaning of the Input Bytes (Status Bytes)

7	6	5	4	3	2	1	0	
ALIVE				BUSY	MORE	W-ACK	R-REQ	Status byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Status byte 1
Data byte 1								Data
...								
Data byte n								

Where the bits of the input byte (status byte) 0 have the following meaning:

Bit no.	Designation	Meaning
0	R-REQ	Read-Request
1	W-ACK	Write-Acknowledge
2	MORE	More

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Bit no.	Designation	Meaning
3	BUSY	Busy
7	ALIVE	Alive, toggles every second

Where the bits of the input byte (status byte) 1 have the following meaning:

Bit no.	Designation	Meaning
0 ... 7	DLC0 ... DCL7	Data Length Code (length of the following data)


The messages consist of one or more data packets. If the length of the message is shorter than n bytes, the message will be composed of only 1 data packet. If the length of the message is bigger than n bytes, the message will be composed of more than 1 data packet; in this case the header of all the transmitted data packets, apart the last one, will present at 1b the flag MORE indicating that the message is not completed and another data packet will follow.

### 9.1.2 Detailed Description of the Bits (Input Byte 0)

Input Data	Description	Value Range	Default
R-REQ	Read-Request Indicates that the device is ready to transmit data to the PLC	0b->1b: ready to transmit data	0b
W-ACK	Write-Acknowledge Indicates that data is successfully sent by the PLC to the device	0b->1b: data successfully sent	0b
MORE	More Indicates that the message is composed of several data packets	0b: no more data packets 1b: more data packets	0b
BUSY	Busy Indicates that the device is processing the message received from the PLC	0b: device not busy 1b: device busy	0b
ALIVE	Alive Indicates that the device is alive and running correctly	0b->1b: device alive 1b->0b: device alive	0b

### 9.1.3 Detailed Description of the Bits (Input Byte 1)

Input Data	Description	Value Range	Default
DLC0 ... DCL7	Data Length Code (length of the following data) Stored in these bits is the number of data bytes transmitted to the PLC	1h ... FFh	0h

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 9.2 Description of the Output Bytes (Control Bytes)

### 9.2.1 Structure and Meaning of the Output Bytes (Control Bytes)

7	6	5	4	3	2	1	0	
					MORE	R-ACK	W-REQ	Control byte 0
DLC7	DLC6	DLC5	DLC4	DLC3	DLC2	DLC1	DLC0	Control byte 1
Data byte 1								Data
...								
Data byte n								

Where the bits of the output byte (status byte) 0 have the following meaning:

Bit no.	Designation	Meaning
0	W-REQ	Write-Request
1	R-ACK	Read-Acknowledge
2	MORE	More


Where the bits of the output byte (status byte) 1 have the following meaning:

Bit no.	Designation	Meaning
0 ... 7	DLC0 ... DCL7	Data Length Code (length of the following data)

The messages consist of one or more data packets. If the length of the message is shorter than n bytes, the message will be composed of only 1 data packet. If the length of the message is bigger than n bytes, the message will be composed of more than 1 data packet; in this case the header of all the transmitted data packets, apart the last one, will present at 1b the flag MORE indicating that the message is not completed and another data packet will follow.

### 9.2.2 Detailed Description of the Bits (Output Byte 0)

Input Data	Description	Value Range	Default
W-REQ	Write-Request Indicates that the PLC has to transmit data to the device	0b->1b: has data to transmit	0b
R-ACK	Read-Acknowledge Indicates to the PLC that the data has been received	0b->1b: data successfully received	0b
MORE	More Indicates that the message is composed of several data packets	0b: no more data packets 1b: more data packets	0b

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

### 9.2.3 Detailed Description of the Bits (Output Byte 1)

Input Data	Description	Value Range	Default
DLC0 ... DLC7	Data Length Code (length of the following data) Stored in these bits is the number of data bytes transmitted to the device	1h ... FFh	0h

## 9.3 Functionality of the Data Exchange

The communication between the PLC and the device for a command message take place with the following handshake:

1. the PLC loads the buffer with the command message and subsequently sets to 1b the flag W\_REQ to inform the device that a data packet is ready to be send;
2. the device receives the data packet from the PLC and confirm the completion of the operation by setting to 1b the flag W\_ACK;
3. after having received the acknowledgment of the completion of the operation through the flag W\_ACK at 1b, the PLC resets to 0b the flag W\_REQ;
4. after having verified that the flag W\_REQ is reset to 0b, the device resets to 0b the flag W\_ACK;
5. during the execution time of the received command, the device sets to 1b the flag BUSY to inform the PLC that it is temporarily not available for further communication.

In the case of a message length that needs more than one data packet, the previous handshake will be repeated for every data packet until the end of the message.

The communication between the device and the PLC for an answer message take place with the following handshake:

1. the device loads the buffer with the answer message and subsequently sets to 1b the flag 'R\_REQ' to inform the PLC that a data packet is ready to be received;
2. the PLC receives the data packet from the device and confirm the completion of the operation by setting to 1b the flag R\_ACK;
3. after having received the acknowledgement of the completion of the operation through the flag R\_ACK at 1b, the device resets to 0b the flag R\_REQ;
4. after having verified that the flag R\_REQ is reset to 0b, also the PLC resets to 0b the flag R\_ACK.

In the case of a message length that needs more than one data packet, the previous handshake will be repeated for every data packet until the end of the message.

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>21</b> / <b>54</b>
----------	-----------------------------------	----------------------------

 <small>a Lutech Group Company</small>	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
--	---	--------------------------------	---------------------------

# 10 USB Virtual COM Service Interface

TBD

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 11 Structure of the USB Virtual COM Telegrams

The following telegram structure is used between **host -> device**:

STX	Data	CR LF
-----	------	-------

Where:

<b>STX</b>	=0x02, start of the message
<b>Data</b>	Data of the message
<b>CR LF</b>	=0x0D 0x0A, end of the message

The following telegram structure is used between **device -> host**:

STX	Data	CR LF
-----	------	-------

Where:

<b>STX</b>	=0x02, start of the message
<b>Data</b>	Data of the message
<b>CR LF</b>	=0x0D 0x0A, end of the message

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 12 Messages Definitions of the Device

The data from and to the device is always coded in ASCII-Hex coding and always read out or written in complete data blocks. Usable as data are all characters of the ASCII table.

Messages are recognized in capital letters as well as in small letters. To address the device several commands codes are defined. Then, to receive acknowledgment to specific commands and to recognize transmission errors, several acknowledgment and error codes (in the standard response structure specified above) are defined.

Command Code	Description/meaning	PROFINET-IO	USB Virtual COM
'V/v'	Get Firmware Version	✓	✓
'R/r'	Reset to Default	✓	✓
'H/h'	Reset Software	✓	✓
'+'	Set Trigger On	✓	
'-'	Set Trigger Off	✓	
'I/i'	Inventory	✓	✓
'F/f'	Switch Field	✓	✓
'G/g'	Read Configuration	✓	✓
'C/c'	Write Configuration	✓	✓
'N/n'	Read Blocks Data	✓	✓
'M/m'	Read Transponder	✓	✓
'W/w'	Write Blocks Data	✓	✓
'D/d'	Firmware Upgrade	✓	✓

Acknowledgement Code	Description/meaning
'Q0'	Command could not be carried out
'Q1'	Configuration change carried out



	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Acknowledgement Code	Description/meaning
'Q2'	Action carried out
'Q4'	Write command understood
'Q5'	Data successfully written

Error Code	Description/meaning
'E01'	Invalid command
'E02'	Invalid parameter
'E04'	Data frame error
'E08'	CRC checksum error
'E10'	Controvert configuration settings
'E20'	Firmware not valid

## 12.1 Get Firmware Version

This command is used to get the current version of the firmware installed in the device.

### Command:

**V**

Where:

Designation	Bytes	Description
<b>V</b>	1	Command code

### Response:

**RDH 348i 00 V x.y.z yyyy-mm-dd**

Where:

Designation	Bytes	Description
<b>RDH 348i 00</b>	11	Device name, it is a fixed field
<b>V x.y.z</b>	8	Version of release in the format major.minor.release, for example V 1.0.0
<b>yyyy-mm-dd</b>	10	Date of release, for example 2024-02-16

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 12.2 Reset to Default

This command is used perform a restart and to set the device to factory configuration.

### Command:

**R**

Where:

Designation	Bytes	Description
<b>R</b>	1	Command code

### Response:

**Q2**

Where:

Designation	Bytes	Description
<b>Q2</b>	2	Action carried out

## 12.3 Reset Software

This command is used to perform a software restart maintaining all the current settings.

### Command:

**H**

Where:

Designation	Bytes	Description
<b>H</b>	1	Command code

### Response:

**Q2**

Where:

Designation	Bytes	Description
<b>Q2</b>	2	Action carried out

## 12.4 Set Trigger On

This command is used to turn the trigger on, activating a read or write operation depending on the configuration. Using only the command itself does not get a response from the device. The device sends a response when a transponder enters in the device

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>26 / 54</b>
----------	-----------------------------------	---------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

reading/writing field and the operation is completed. Once the transponder enters the reading/writing field and the operation is completed the trigger turns off.



This command works with MIFARE Classic only in Read Mode (Serial Number). If the configuration is set to Read Mode (Block Data), Multiple Read, Write Mode, when a MIFARE Classic enters in reading/writing field the device behaves like that transponder is not present.

#### Command:

+

Where:

Designation	Bytes	Description
+	1	Command code

#### Response, Read Mode, Serial Number:

**F@0TagtypeSNR**

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes out)
<b>@0</b>	2	The designator for following serial number
<b>Tagtype</b>	2	The transponder type
<b>SNR</b>	...	The serial number of the transponder

#### Response, Read Mode, Block Data

**FB#TagtypeData**

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes of data)

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Designation	Bytes	Description
<b>B#</b>	2	Number of the first block read
<b>Tagtype</b>	2	The transponder type
<b>Data</b>	...	1 to 9 blocks of the transponder starting from the first block read

### Response, Read Mode, Multiple Read

#### FB#TagtypeData

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes of data)
<b>B#</b>	2	Number of the first block read
<b>Tagtype</b>	2	The transponder type
<b>Data</b>	...	All blocks of the transponder starting from the first block read

### Response, Write Mode with Write Forward

#### Q5

Where:

Designation	Bytes	Description
<b>Q5</b>	2	Data successfully written

## 12.5 Set Trigger Off

This command is used to terminate the read process.

#### Command:


-

Where:

Designation	Bytes	Description
-	1	Command code

#### Response:

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>28</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

No answer. If no transponder was read, a NO READ (0x18) is output.

## 12.6 Inventory

This command is used to get the serial number of the tags in the reading field of the device. It normally detects just one tag at every use of the command. If it's needed to detect multiple tags in the reading field is necessary to activate the anticollision mode.

### Command:

**I**

Where:

Designation	Bytes	Description
<b>I</b>	1	Command code

### Response:

**F@0TagtypeSNR**

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes out)
<b>@0</b>	2	The designator for following serial number
<b>Tagtype</b>	2	The transponder type
<b>SNR</b>	...	The serial number of the transponder

Or if no transponder was read, a NO READ (0x18) is output.

## 12.7 Switch Field

This command is used to switch on/off the RF field. The RF field is generally off. It is automatically switched on after a new trigger.

### Command:

**Fx**

Where:

Designation	Bytes	Description
<b>F</b>	1	Command code

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Designation	Bytes	Description
<b>x</b>	1	=1, field on =2, field off =3, reset field

**Response:**

**Q2**

Where:

Designation	Bytes	Description
<b>Q2</b>	2	Action carried out

## 12.8 Read Configuration

This command is used to read the content of the configuration registers.

**Command:**

**Gxxxx**

Where:

Designation	Bytes	Description
<b>G</b>	1	Command code
<b>xxxx</b>	4	=FF00: completely read out the configuration =1000: only addresses 00 ... 0Fh =01xx: only one address

**Response:**

**0Gxxyy**

Where:


Designation	Bytes	Description
<b>xx</b>	2	The register (if only one address requested)
<b>yy</b>	2	The configuration read from the device

## 12.9 Write Configuration

This command is used to write the configuration data of the device.

**Command:**

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>30 / 54</b>
----------	-----------------------------------	---------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## Cyyzz

Where:

Designation	Bytes	Description
<b>C</b>	1	Command code
<b>yy</b>	2	Address of the first configuration register to write
<b>zz</b>	...	Configuration data to write to the device

**Response:**

## Q1

Where:

Designation	Bytes	Description
<b>Q1</b>	2	Configuration change carried out



This command allows to write every contiguous register after the specified first one. The number of the register to be written depends on the length of field 'zz' (2 bytes for every register).

## 12.10 Read Block

This command is used to read one or several blocks of data of a transponder.

**Command:**

**NB#TagtypeNOBSNR**

Where:

Designation	Bytes	Description
<b>N</b>	1	Command code
<b>B#</b>	2	Number of the first block to read
<b>Tagtype</b>	2	The transponder type
<b>NOB</b>	1	Number of blocks to read, from 1 to 9
<b>SNR</b>	...	<i>Optional</i> Serial number of the transponder to be read. It is necessary if multiple transponders are in the field

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>31</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## Response:

### FB#TagtypeData

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes of data)
<b>B#</b>	2	Number of the first block to read
<b>Tagtype</b>	2	The transponder type
<b>Data</b>	...	Content of the blocks of data specified by the command



It is absolutely necessary that a read process first be performed by means of trigger and that the transponder remains in the field



If anticollision is active, serial number transmission must be activated and the serial number of the desired transponder must be specified in the command. An average answer time of 50 ms can be assumed per data block

## 12.11 Read Transponder

This command is used to read the entire blocks of data of a transponder.

### Command:

#### MTagtypeSNR

Where:

Designation	Bytes	Description
<b>M</b>	1	Command code



	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Designation	Bytes	Description
<b>Tagtype</b>	2	The transponder type
<b>SNR</b>	...	<i>Optional</i> Serial number of the transponder to be read. It is necessary if multiple transponders are in the field

**Response:**

**FTagtypeData**

Where:

Designation	Bytes	Description
<b>F</b>	1	Telegram flag: =0: only 1 telegram is output =1: multiple telegrams are output (for more than 256 bytes of data)
<b>Tagtype</b>	2	The transponder type
<b>Data</b>	...	All data beginning with block 0



It is absolutely necessary that a read process first be performed by means of trigger and that the transponder remains in the field



This command works only with one transponder simultaneously in the reading field. If the transponder has more than 256 byte of data then the answer will be splitted. This command is not provided with the EM4135

## 12.12 Write Block

This command is used to write one or several blocks of data of the transponder.

**Command:**

**WB#TagtypeNOBSNRData**

Where:

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>33 / 54</b>
----------	-----------------------------------	---------------------

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Designation	Bytes	Description
<b>W</b>	1	Command code
<b>B#</b>	2	Number of the first block to write
<b>Tagtype</b>	2	The transponder type
<b>NOB</b>	1	Number of blocks to write, from 1 to 9
<b>SNR</b>	...	<i>Optional</i> Serial number of the transponder to be written. It is necessary if multiple transponders are in the field
<b>Data</b>	...	Data to be written (hexadecimal) for 1 block

**Response:**

**yy**

Designation	Bytes	Description
<b>yy</b>	2	=Q4: command understood (if write forward activated) =Q5: write operation successful (after trigger) =Q0: write operation failed



If write forward is disabled in the configuration registers, it is necessary to have a trigger operation before and the transponder must stay in the writing field. If write forward is enabled, the command is received even if the transponder is not in the writing field and the data is written after a trigger

## 12.13 Firmware Download

This command is used to download the firmware to the device.

**Command:**

**DBlockData**

Where:

Designation	Bytes	Description
<b>D</b>	1	Command code

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------


Designation	Bytes	Description
<b>Block</b>	4	The block number of firmware image (0000h for the first block of firmware image, 0001h for the second block, ..., FFFFh to start the firmware upgrade).
<b>Data</b>	64	<i>Optional</i> The data of the block (64 bytes). It is necessary for every block of firmware image to transmit

#### Response:

**yy**

Where:

Designation	Bytes	Description
<b>yy</b>	2	=Q2: Action carried out =Q0: Command could not be carried out
	3	=E02: Invalid parameter =E20: Firmware not valid

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 13 Transponder (Tag) Specific Information

### 13.1 Memory Organization NXP I-CODE 1

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 / App Id / User data
5	x	x	x	x	User data
6	x	x	x	x	User data
...	...	...	...	...	...
14	x	x	x	x	User data
15	x	x	x	x	User data

### 13.2 Memory Organization NXP I-CODE SLI

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
26	32	User data
27	32	User data

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

### 13.2.1 Unique Identifier (UID) NXP I-CODE SLI

64	57	56	49	48	41	40										1
E0	04	01	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0									

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '00'.

### 13.3 Memory Organization NXP I-CODE SLI-S

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
38	32	User data
39	32	User data

#### 13.3.1 Unique Identifier (UID) NXP I-CODE SLI-S

64	57	56	49	48	41	40										1
E0	04	02	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0									

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '00'.

### 13.4 Memory Organization NXP I-CODE SLI-L

Block	Bits	Description
UID	64	Fixed serial number

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Block	Bits	Description
0	32	User data
1	32	User data
...	...	...
7	32	User data
8	32	User data

#### 13.4.1 Unique Identifier (UID) NXP I-CODE SLI-L

64	57	56	49	48	41	40									1
E0	04	03	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '00'.

#### 13.5 Memory Organization NXP I-CODE SLIX

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
26	32	User data
27	32	User data

##### 13.5.1 Unique Identifier (UID) NXP I-CODE SLIX

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>38</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

64	57	56	49	48	41	40									1
E0	04	01	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '10'.

### 13.6 Memory Organization NXP I-CODE SLIX-S

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
38	32	User data
39	32	User data

#### 13.6.1 Unique Identifier (UID) NXP I-CODE SLIX-S

64	57	56	49	48	41	40									1
E0	04	02	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '10'.

### 13.7 Memory Organization NXP I-CODE SLIX-L

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Block	Bits	Description
1	32	User data
...	...	...
6	32	User data
7	32	User data

### 13.7.1 Unique Identifier (UID) NXP I-CODE SLIX-L

64	57	56	49	48	41	40										1
E0	04	03	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0									

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '10'.

### 13.8 Memory Organization NXP I-CODE SLIX2

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
77	32	User Data
78	32	User data
79	32	Counter

#### 13.8.1 Unique Identifier (UID) NXP I-CODE SLIX2



	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

<b>64</b>	<b>57</b>	<b>56</b>	<b>49</b>	<b>48</b>	<b>41</b>	<b>40</b>									<b>1</b>
E0	04	03	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

To differentiate it from the other I-CODE types of transponder bits 37 and 36 are programmed to '01'.

### 13.9 Memory Organization TI Tag-it HF-I Standard

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
6	32	User Data
7	32	User data

#### 13.9.1 Unique Identifier (UID) TI Tag-it HF-I Standard

<b>64</b>	<b>57</b>	<b>56</b>	<b>49</b>	<b>48</b>	<b>41</b>	<b>40</b>									<b>1</b>
E0	07	C0 / C1	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

### 13.10 Memory Organization TI Tag-it HF-I Plus

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Block	Bits	Description
...	...	...
62	32	User Data
63	32	User data

### 13.10.1 Unique Identifier (UID) TI Tag-it HF-I Plus

64	57	56	49	48	41	40										1
E0	07	00 / 01 / 80 / 81	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0									

### 13.11 Memory Organization TI Tag-it HF-I Pro

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
6	32	User Data
7	32	User data

### 13.11.1 Unique Identifier (UID) TI Tag-it HF-I Pro

64	57	56	49	48	41	40										1
E0	07	C4 / C5	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0									

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

## 13.12 Memory Organization STM LRI 512

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
14	32	User Data
15	32	User data

### 13.12.1 Unique Identifier (UID) STM LRI 512

64	57	56	49	48											1
E0	02	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

## 13.13 Memory Organization Infineon my-d (02P)

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
54	32	User Data
55	32	User data

### 13.13.1 Unique Identifier (UID) Infineon my-d (02P)

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>43</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

<b>64</b>	<b>57</b>	<b>56</b>	<b>49</b>	<b>48</b>	<b>41</b>	<b>40</b>									<b>1</b>
E0	05	40	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

### 13.14 Memory Organization Infineon my-d (10P)

Block	Bits	Description
UID	64	Fixed serial number
0	32	User data
1	32	User data
...	...	...
246	32	User Data
247	32	User data

#### 13.14.1 Unique Identifier (UID) Infineon my-d (10P)

<b>64</b>	<b>57</b>	<b>56</b>	<b>49</b>	<b>48</b>	<b>41</b>	<b>40</b>									<b>1</b>
E0	05	00	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

### 13.15 Memory Organization EM EM4135

Block	Bits	Description
UID	64	Fixed serial number
13	64	User data
14	64	User data
...	...	...

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Block	Bits	Description
47	64	User Data
48	64	User data

### 13.15.1 Unique Identifier (UID) EM EM4135

64	57	56	49	48											1
E0	16	IC manufacturer serial number													
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

### 13.16 Memory Organization Fujitsu MB89R118C

Block	Bits	Description
UID	64	Fixed serial number
0	64	User data
1	64	User data
...	...	...
248	64	User Data
249	64	User data

### 13.16.1 Unique Identifier (UID) Fujitsu MB89R118C

64	57	56	49	48	41	40									1
E0	08	01	IC manufacturer serial number												
UID 7	UID 6	UID 5	UID 4	UID 3	UID 2	UID 1	UID 0								

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

### 13.17 Memory Organization NXP MIFARE Classic 1k

Sector	Block	Bits	Description
0	0	128	Manufacturer Block
	1	128	User Data
	2	128	User Data
	3	128	Sector Trailer
1	0	128	User Data
	1	128	User Data
	2	128	User Data
	3	128	Sector Trailer
	...	...	...
15	0	128	User Data
	1	128	User Data
	2	128	User Data
	3	128	Sector Trailer

### 13.18 Memory Organization NXP MIFARE Classic 4k

Sector	Block	Bits	Description
0	0	128	Manufacturer Block
	1	128	User Data
	2	128	User Data
	3	128	Sector Trailer
...	...	...	...

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Sector	Block	Bits	Description
31	0	128	User Data
	1	128	User Data
	2	128	User Data
	3	128	Sector Trailer
32	0	128	User Data
	1	128	User Data
	2	128	User Data
	3	128	User Data
	...	...	...
	13	128	User Data
	14	128	User Data
	15	128	Sector Trailer
...	...	...	...
39	0	128	User Data
	1	128	User Data
	2	128	User Data
	3	128	User Data
	...	...	...
	13	128	User Data
	14	128	User Data
	15	128	Sector Trailer

	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

### 13.18.1 Manufacturer block NXP MIFARE Classic 1k / 4k

<b>128</b>	<b>49</b>	<b>48</b>	<b>1</b>
Manufacturer Data		UID (32 bits if NUID)	

### 13.18.2 Sector trailer NXP MIFARE Classic 1k / 4k

<b>128</b>	<b>81</b>	<b>80</b>	<b>49</b>	<b>48</b>	<b>1</b>
Key B (optional)		Access Bits		UID (32 bits if NUID)	

### 13.19 Memory Organization NXP MIFARE Ultralight C

Pages	Byte	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number
	1	8	Internal
	2 – 3	16 - 31	Lock Bytes
3	0 – 3	32	One Time Programmable
4	0 – 3	32	User Memory
...	...	...	...
39	0 – 3	32	User Memory
40	0 – 1	16	Lock Bytes
	2 – 3	16	Reserved
41	0 – 1	16	16-bit Counter
42	0 – 4	32	Authentication Configuration



	DOCUMENT:  <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE:  <b>24/02/2025</b>	VERSION:  <b>02</b>
---	---	--------------------------------	---------------------------

Pages	Byte	Bits	Description
43	0 – 4	32	Authentication Configuration
44	0 – 4	32	Authentication Key
45	0 – 4	32	Authentication Key
46	0 – 4	32	Authentication Key
47	0 – 4	32	Authentication Key

### 13.19.1 Unique Identifier NXP MIFARE Ultralight C

Page	Byte 3	Byte 2	Byte 1	Byte 0
0	Check Byte 0	Serial Number part 1		
1	Serial Number part 2			
2	Lock Bytes		Internal	Check Byte 1

### 13.20 Memory Organization NXP NTAG 210

Pages	Bytes	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number
	1	8	Internal
	2 – 3	16	Lock Bytes
3	0 – 3	32	Capability Container
4	0 – 3	32	User Memory
...		...	...
15	0 – 3	32	User Memory

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>49</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Pages	Bytes	Bits	Description
16	0 – 3	32	Configuration page CFG 0
17	0 – 3	32	Configuration page CFG 1
18	0 – 3	32	Configuration page PWD
19	0 – 1	16	Configuration page PACK
	2 – 3	16	Configuration page RFUI

### 13.20.1 Unique Identifier NXP NTAG 210

Pages	Byte 3	Byte 2	Byte 1	Byte 0
0	Check byte 0	Serial number part 1		
1	Serial number part 2			
2	Lock Bytes		Internal	Check byte 1

### 13.21 Memory Organization NXP NTAG 212

Pages	Bytes	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number
	1	8	Internal
	2 – 3	16	Lock Bytes
3	0 – 3	32	Capability Container
4	0 – 3	32	User Memory
...	...	...	...
35	0 – 3	32	User Memory

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>50</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Pages	Bytes	Bits	Description
36	0 - 2	24	Dynamic Lock Bytes
	3	8	Dynamic Lock Bytes RFUI
37	0 – 3	32	Configuration page CFG 0
38	0 – 3	32	Configuration page CFG 1
39	0 – 3	32	Configuration page PWD
40	0 – 1	16	Configuration page PACK
	2 – 3	16	Configuration page RFUI

### 13.21.1 Unique Identifier NXP NTAG 212

Pages	Byte 3	Byte 2	Byte 1	Byte 0
0	Check byte 0	Serial number part 1		
1	Serial number part 2			
2	Lock Bytes		Internal	Check byte 1

### 13.22 Memory Organization NXP NTAG 213

Pages	Bytes	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number
	1	8	Internal
	2 – 3	16	Lock Bytes
3	0 – 3	32	Capability Container
4	0 – 3	32	User Memory

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>51</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Pages	Bytes	Bits	Description
...		...	...
39	0 – 3	32	User Memory
40	0 - 2	24	Dynamic Lock Bytes
	3	8	Dynamic Lock Bytes RFUI
41	0 – 3	32	Configuration page CFG 0
42	0 – 3	32	Configuration page CFG 1
43	0 – 3	32	Configuration page PWD
44	0 – 1	16	Configuration page PACK
	2 – 3	16	Configuration page RFUI

### 13.22.1 Unique Identifier NXP NTAG 213

Pages	Byte 3	Byte 2	Byte 1	Byte 0
0	Check byte 0	Serial number part 1		
1	Serial number part 2			
2	Lock Bytes		Internal	Check byte 1

### 13.23 Memory Organization NXP NTAG 215

Pages	Bytes	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number
	1	8	Internal
	2 – 3	16	Lock Bytes

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>52</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Pages	Bytes	Bits	Description
3	0 – 3	32	Capability Container
4	0 – 3	32	User Memory
...		...	...
129	0 – 3	32	User Memory
130	0 - 2	24	Dynamic Lock Bytes
	3	8	Dynamic Lock Bytes RFUI
131	0 – 3	32	Configuration page CFG 0
132	0 – 3	32	Configuration page CFG 1
133	0 – 3	32	Configuration page PWD
134	0 – 1	16	Configuration page PACK
	2 – 3	16	Configuration page RFUI

### 13.23.1 Unique Identifier NXP NTAG 215

Pages	Byte 3	Byte 2	Byte 1	Byte 0
0	Check byte 0	Serial number part 1		
1	Serial number part 2			
2	Lock Bytes		Internal	Check byte 1

### 13.24 Memory Organization NXP NTAG 216

Pages	Bytes	Bits	Description
0	0 – 3	32	Serial Number
1	0 – 3	32	Serial Number
2	0	8	Serial Number

RESERVED	Mod. 8.2.07 Rev. 0 del 16/05/2024	Page <b>53</b> / <b>54</b>
----------	-----------------------------------	----------------------------

	DOCUMENT: <b>03.3 PRG_22-14 - IDTronic Leuze RFID Systems - HF ProfiNet Communication and Configuration - Specifications Mod.8.2.07 20250224 v02eng.docx</b>	DATE: <b>24/02/2025</b>	VERSION: <b>02</b>
---	---	----------------------------	-----------------------

Pages	Bytes	Bits	Description
	1	8	Internal
	2 – 3	16	Lock Bytes
3	0 – 3	32	Capability Container
4	0 – 3	32	User Memory
...		...	...
225	0 – 3	32	User Memory
226	0 - 2	24	Dynamic Lock Bytes
	3	8	Dynamic Lock Bytes RFUI
227	0 – 3	32	Configuration page CFG 0
228	0 – 3	32	Configuration page CFG 1
229	0 – 3	32	Configuration page PWD
230	0 – 1	16	Configuration page PACK
	2 – 3	16	Configuration page RFUI

### 13.24.1 Unique Identifier NXP NTAG 216

Pages	Byte 3	Byte 2	Byte 1	Byte 0
0	Check byte 0	Serial number part 1		
1	Serial number part 2			
2	Lock Bytes		Internal	Check byte 1