

Device manual RFID evaluation unit

# efectoriad

**DTE104** 



# Contents

| 1  | Preliminary note  | 4<br>4   |
|----|---|--|
| 2  | Safety instructions   | 4  |
| 3  | Functions and features         3.1 Configuration via Ethernet interface         3.2 Functions for set-up  | 4<br>4<br>4  |
| 4  | Function       5         4.1 Connection   | 5<br>7   |
| 5  | Installation.   | 7  |
| 6  | Operating and display elements  | 7<br>7<br>8  |
| 7  | Set-up 9  |  |
| 8  | Web server         8.1 Verify and set the IP address of the PC         8.2 Tab "Home"         8.3 Tab "Network"         8.3 Tab "Network"         8.4 Tab "Firmware"         8.5 Tab "IO port"         8.5 Tab "IO port"         8.6 Tab "ERP"         8.7 Tab "Monitor"         8.8 Tab "Monitor" - Read/write head information         8.9 Tab "Monitor" - Antenna firmware         8.10 Tab "Monitor" - Tag monitoring         8.11 Tab "System"         8.12 Tab "SNTP"         8.13 Tab "Info"         8.14 Tab "Reset"  | .10<br>.10<br>.11<br>.12<br>.13<br>.14<br>.16<br>.18<br>.20<br>.22<br>.24<br>.25<br>.26<br>.27 |
| 9  | Operating mode of the evaluation unit         9.1 Set-up mode         9.2 Controller mode         9.3 Host mode         9.4 ERP mode         9.5 Set-up via the integrated web server   | .28<br>.28<br>.29<br>.30<br>.31<br>.32   |
| 10 | <ul> <li>Configuration</li> <li>10.1 Parameter setting of the Ethernet interface</li> <li>10.2 Determine the MAC address</li> <li>10.3 Connection concept of the Ethernet interface</li> <li>10.4 Overview of the communication methods via Ethernet TCP/IP</li> <li>10.5 Ethernet TCP/IP model of the RFID evaluation unit</li> </ul>  | .33<br>.33<br>.33<br>.35<br>.35<br>.35   |
| 11 | Binary protocol of the evaluation unit .11.1 Data frame format of the evaluation unit.11.2 Set-up of the data communication .11.3 Parameter frame of the evaluation unit.11.4 Data exchange frame .   | .40<br>.40<br>.40<br>.41<br>.44  |
| 12 | <ul> <li>Provide the protocol</li> <li>Protocol</li> <li>Protocol&lt;</li></ul> | .45<br>.45<br>.45  |

| 13 | Data frame examples for the binary protocol         13.1 Send configuration         13.2 Read UID on request         13.3 Read UID automatically         13.4 Read diagnostic information         13.5 Reset bit DR on all 4 channels         13.6 Read user data area of the tag         13.7 Write user data area to the tag   | 59<br>59<br>60<br>61<br>61<br>62<br>62  |
|----|--|---|
| 14 | ASCII protocol of the evaluation unit.<br>14.1 ASCII data frame format of the evaluation unit.<br>14.2 Set-up of the data communication  | 64<br>64<br>65<br>69  |
| 15 | Data frame examples for ASCII protocol15.1 Send configuration for the evaluation unit and the IO channels15.2 Read UID from the tag15.3 Receive UID from the tag15.4 Read diagnostic information from the evaluation unit15.5 Read user data memory of the tag15.6 Receive user data memory of the tag15.7 Write to the user data memory of the tag15.8 Write verified to the user data memory of the tag15.9 Read IO channel inputs15.10 Write outputs to IO channel15.11 Switch off the antenna field of the read/write head | 79<br>79<br>80<br>80<br>80<br>80<br>80<br>81<br>81<br>81<br>.81<br>.82<br>.82 |
| 16 | Error codes of the evaluation unit.<br>16.1 Error messaging of the binary protocol.<br>16.2 Error messaging of the ASCII protocol.<br>16.3 Failure codes   | 83<br>83<br>83<br>83<br>83  |

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## 1 Preliminary note

#### 1.1 Symbols used

| •             | Instructions   |
|---------------|--|
| >             | Reaction, result   |
| []            | Designation of pushbuttons, buttons or indications                         |
| $\rightarrow$ | Cross-reference  |
| !             | Important note<br>Non-compliance may result in malfunction or interference |
| ĺ             | Information<br>Supplementary note  |
| www.ifm.com   | Internet link  |

# 2 Safety instructions

Please read the operating instructions prior to set-up of the device. Ensure that the device is suitable for your application without any restrictions.

If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.

# 3 Functions and features

The RFID evaluation unit integrates an Ethernet interface and 4 channels for the connection of field devices. Each channel can be used either for the connection of a read/write head or as input/output to IEC 61131.

The device

- controls the data exchange to the read/write heads or the sensor/actuator level.
- communicates with the higher control level via Ethernet.
- allows device configuration via a web server.

Application examples:

- Material flow control in production lines
- Warehouse management by the automatic detection of stored products
- Tank management, order picking or product tracking

#### 3.1 Configuration via Ethernet interface

- 10 Mbps and 100 Mbps
- TCP/IP Transport Control Protocol/Internet Protocol
- IT functionality: HTTP server
- M12, twisted pair

#### 3.2 Functions for set-up

Via the integrated web server it is possible to

- read the UID of the tag
- read the user data area of the tag
- write to the user data area of the tag

- read the input of the IO channels
- write to the output of the IO channels
- read the device information of the evaluation unit
- read the device information of the connected read/write heads



# 4 Function

The evaluation unit processes data of up to 4 read/write heads (type ANT51x/ANT41x) or IEC 61131 inputs / outputs. The mode of operation for each port can be set individually via the Ethernet controller.

More information about the port configuration  $\rightarrow$  10 Configuration.

## 4.1 Connection



UK

## 4.1.1 "AUX" voltage supply

► Connect the device to the voltage supply using an M12 connection cable.

|     | Pin | Connection |
|-----|-----|------------|
| 1 2 | 1   | 24 V DC    |
| 5   | 2   | not used   |
|     | 3   | 0 V        |
| 4 3 | 4   | not used   |
|     | 5   | not used   |

## 4.1.2 Field bus connection Ethernet port 1 / port 2

► Connect the device to the Ethernet host using a suitable M12 Ethernet connection cable.

| 1 0   | Pin | Connection |
|-------|-----|------------|
|       | 1   | TD+        |
| lo or | 2   | RD+        |
| 4 3   | 3   | TD-        |
|       | 4   | RD-        |
|       |     |            |



Screened connection cable required.

#### Factory setting of the Ethernet parameters

The following values are preset at the factory:

| Parameters       | Factory setting |  |
|------------------|-----------------|--|
| IP address       | 192.168.0.79    |  |
| Gateway address  | 192.168.0.100   |  |
| Subnet mask      | 255.255.255.0   |  |
| Auto-negotiation | on              |  |
| DHCP             | off             |  |

The settings can be changed via the web server of the device or via the Ethernet host.

### 4.1.3 Process connections "IO-1 ... IO-4"

Each process connection can be used as input/output to IEC 61131 or for connection of an RFID read/ write head type ANT51x/ANT41x.

|       | Pin | Connection                                  |
|-------|-----|---|
|       | 1   | L+  |
| 1 2   | 2   | Switching input (I/Q)                       |
| 5-60) | 3   | L-  |
| 4 3   | 4   | Switching output (C/Qo) or input (C/<br>Qi) |
|       | 5   | not used                                    |



The evaluation unit has to be disconnected before field devices are connected.



Please note that the total current consumption of the device must not exceed 3 A.

You can find information about the matching read/write heads on our website at:

www.ifm.com  $\rightarrow$  Data sheet search  $\rightarrow$  e.g. ANT4 or ANT5

#### 4.2 Allowed network infrastructures



D: device

## **5** Installation

You can find information about installation and electrical connection in the operating instructions of the device at:

www.ifm.com  $\rightarrow$  Data sheet search  $\rightarrow$  DTE104  $\rightarrow$  Operating instructions

# 6 Operating and display elements

### 6.1 Reset to factory settings

The Ethernet parameters can be reset to the factory settings. To do so, proceed as follows:

- Disconnect all cables.
- ▶ Insert an electrically conductive bridge between pin 1 and pin 3 on the process connection IO-3.
- Switch on the device again and wait until the yellow LED on AUX and IO-3 flashes at approx. 8 Hz.
- ▶ Remove the conductive bridge from process connection IO-3.
- ► Disconnect the device from the voltage supply and connect it again.
- > The settings are reset.

## 6.2 LED indicators

The device indicates the current status of the interfaces via the status LEDs.

#### 6.2.1 LED AUX

| LED green | LED yellow      | Status                  | Note   |
|-----------|-----------------|-------------------------|--|
| Off       | Off             | No voltage supply       | UAUX < 5 V                                     |
| On        | Flashes at 2 Hz | Voltage supply too low  | $5 \text{ V} \le \text{UAUX} \le 18 \text{ V}$ |
| On        | Flashes at 8 Hz | Firmware update running | Do not switch off power supply                 |
| On        | Off             | Voltage supply OK       | 18 V ≤ UAUX ≤ 36 V                             |

### 6.2.2 LED Ethernet port 1 / port 2

| LED green | LED yellow              | Status   | Note                             |
|-----------|-------------------------|--|----------------------------------|
| Off Off   |                         | No connection to another Ethernet counterpart                            | Link status "no link"            |
| On Off    |                         | Connection to Ethernet counterpart is established, no data exchange      | Link status "link", "no traffic" |
| On        | Flashes<br>sporadically | Connection to Ethernet counterpart is established, data exchange running | Link status "link", "traffic"    |

## 6.2.3 LED SF (system failure)

| LED red | LED green | Status                 | Note  |
|---------|-----------|------------------------|---|
| Off     | Off       | No voltage supply      | Check the voltage supply                        |
| Off     | On        | Normal operation       | -   |
| Flashes | Off       | Error at channel level | - Overload<br>- Temperature<br>- Internal fault |
| On      | Off       | Error at device level  | - Undervoltage<br>- Temperature                 |
| Flashes | Flashes   | Self-test              | Start phase of the device                       |

### 6.2.4 LED BF (bus failure)

| LED red  | LED green | Status  | Note                      |
|--|-----------|---|---------------------------|
| Off  | Off       | No voltage supply   | Check the voltage supply  |
| Off Flashes Connection to the host co<br>there is no data exchange |           | Connection to the host controller is established, there is no data exchange | -                         |
| Off  | On        | Connection to the host controller is established, there is data exchange    | -                         |
| Flashing   | Off       | Connection to the host controller is established, no valid configuration    | Check configuration       |
| On   | Off       | No connection to the host controller  | Check connection          |
| Flashes  | Flashes   | Self-test   | Start phase of the device |

## 6.2.5 LEDs IO1 ... IO4

The LED indications of the process connections are different for each connection configuration.

#### Use as input to IEC 61131

| LED green | LED yellow | Status                                       | Note  |
|-----------|------------|--|---|
| Off       | Off        | Interface deactivated                        | Interface via Ethernet host not<br>configured |
| On        | Off        | Interface activated, input on L level (0 V)  | -   |
| On On     |            | Interface activated, input on H level (24 V) | -   |

| LED green       | LED yellow      | Status                    | Note |
|-----------------|-----------------|---------------------------|------|
| Flashes at 8 Hz | Flashes at 8 Hz | Overload or short circuit | -    |

#### Use as output to IEC 61131

| LED green       | LED yellow      | Status                                      | Note  |
|-----------------|-----------------|---|---|
| off             | off             | Interface deactivated                       | Interface via Ethernet host not<br>configured |
| On              | off             | Interface activated, output L-active (0 V)  | -   |
| On              | On              | Interface activated, output H-active (24 V) | -   |
| Flashes at 8 Hz | Flashes at 8 Hz | Overload or short circuit                   | -   |

#### Use with read/write heads

| LED green       | LED yellow      | Status   | Note  |
|-----------------|-----------------|--|---|
| Off             | Off             | Interface deactivated                          | Interface via Ethernet host not<br>configured |
| Flashes at 2 Hz | Off             | Interface activated, antenna off               | -   |
| On              | Off             | Interface activated, tag not in the field      | -   |
| On              | On              | Interface activated, tag in the field          | -   |
| Flashes at 8 Hz | Flashes at 8 Hz | Overload, short-circuit or communication error | -   |

#### 6.2.6 Special device LED indications

| LED   | Status  | Note   |  |  |
|---|---|--|--|--|
| Green AUX LED on  |   |  |  |  |
| Yellow AUX LED flashes at 8 Hz                                    | Device is in the service mode "emergency system started". | A firmware update is necessary and can be executed via the web server. |  |  |
| Yellow IO1IO4 LEDs flash at 8 Hz                                  |   |  |  |  |
| Green AUX LED on  |   |  |  |  |
| Yellow AUX LED flashes at 8 Hz<br>Green IO1IO4 LEDs flash at 8 Hz | Major error, device has to be returned.                   | Hardware fault or permanent data in the device is corrupt.             |  |  |
| Yellow IO1IO4 LEDs flash at 8 Hz                                  |   |  |  |  |
| Green AUX LED on  |   |  |  |  |
| Yellow AUX LED flashes at 8 Hz                                    | Reset to factory settings                                 | -  |  |  |
| Yellow IO3 LED flashes at 8 Hz                                    |   |  |  |  |

## 7 Set-up

- Connect the device according to the operating instructions.
- > After connection of the operating voltage, the unit is ready for use.



The green power supply LEDs of the read/write heads will light after enabling the corresponding module in the module configuration.

## 8 Web server

The device is equipped with an integrated web server that

- reads the UID of the tag
- reads from the user data area of the tag
- writes to the user data area of the tag
- configures the IP settings of the device
- updates the firmware

The settings are made via a web browser, e.g. Microsoft Internet Explorer® V7.0 or higher.

▶ To access the web server, connect the device to a PC using a suitable M12 Ethernet connection cable.

Please note that the evaluation unit and the PC must be set to the same IP address range.

Default setting: 192.168.0.x ( $\rightarrow$  8.1 Verify and set the IP address of the PC)

▶ Open the web browser on the PC and enter the IP address of the evaluation unit

Default setting: 192.168.0.79

#### 8.1 Verify and set the IP address of the PC

- ► Activate the menu "Internet Protocol Properties Version 4 (TCP/IPv4)". The Windows menu "Internet Potocol (TCP/IP) Properties" is accessible for example via: Start → Control Panel → Network and Sharing Center → Change adapter settings → Local Area Connection → Properties.
- Select the menu item "Use the following IP address".
- ▶ Verify and set the IP address, if necessary (here e.g. 192.168.0.10).
- Enter the subnet mask (255.255.255.0).
- Leave default gateway blank.
- Confirm the settings with [OK].

| LAN-Verbindung Properties   | ſ | Int | ernet Protocol Version 4 (TCP/IPv   | 4) Properties   |
|---|---|-----|---|---|
| Networking Sharing  |   | [   | General   |   |
| Connect using:  |   |     | You can get IP settings assigned au<br>this capability. Otherwise, you need<br>for the appropriate IP settings. | tomatically if your network supports<br>I to ask your network administrator |
| Configure This connection uses the following items:   |   |     | <ul> <li>Obtain an IP address automati</li> <li>Obtain an IP address</li> <li>Obtain an IP address</li> </ul>   | cally   |
| Client for Microsoft Networks   |   |     | IP address:   | 192.168.0.10  |
| File and Printer Sharing for Microsoft Networks   |   |     | S <u>u</u> bnet mask:   | 255.255.255.0   |
| ✓   |   |     | Default gateway:  |   |
| <ul> <li>✓ ▲ Link-Layer Topology Discovery Mapper I/O Driver</li> <li>✓ ▲ Link-Layer Topology Discovery Responder</li> </ul>                                      |   |     | <ul> <li>Obtain DNS server address au</li> <li>Use the following DNS server a</li> </ul>                        | tomatically<br>addresses:   |
| Install Uninstall Properties  |   |     | Preferred DNS server:   |   |
| Description   |   |     | Alternate DNS server:   |   |
| Transmission Control Protocol/Internet Protocol. The default<br>wide area network protocol that provides communication<br>across diverse interconnected networks. |   |     | Vaļidate settings upon exit   | Ad <u>v</u> anced   |
| OK Cancel   |   |     |   | OK Cancel   |

Changes in the network settings of the PC require extended user rights. Contact your system administrator.

|!|

## 8.2 Tab "Home"



This is the main menu from where all functions of the evaluation unit can be accessed. The user can select the language of the web interface of the evaluation unit.

## 8.3 Tab "Network"

| <b>fil</b> | I             |               | Web         | Inte      | erfac              | e DT   | E10  | 4    |       |                   |                   |   |
|------------|---------------|---------------|-------------|-----------|--------------------|--------|------|------|-------|-------------------|-------------------|---|
| Home       | Network       | Firmware      | IO-Port     | ERP       | Monitor            | System | SNTP | Info | Reset |                   |                   |   |
| Networ     | k settings:   |               |             |           |                    |        |      |      |       |                   |                   |   |
| TCP/IP p   | barameter     | Current s     | ettings     | News      | settings           |        |      |      |       |                   |                   |   |
| IP addre   | SS            | 192.168.      | .0.79       |           | · ·                |        |      |      |       |                   | 101 102           | _ |
| Subnet r   | mask          | 255.255.      | 255.0       |           | · ·                | •      |      |      |       | Port2             | DTE104            |   |
| Default g  | gateway       | 192.168.      | 0.100       |           | · 🗌 · 🗌            |        |      |      |       | ETHERNET          |                   |   |
| DHCP       |               | off           |             | O or      | n 💿 off            |        |      |      |       | - (O) Fort        | 103 104           |   |
| BOOTP      |               | off           |             | O or      | n 🖲 off            |        |      |      |       | <b></b> . [       |                   |   |
| Port 1 pa  | arameter      |               |             |           |                    |        |      |      |       |                   | 91 [9]            |   |
| Autoneg    | otiation      | on            |             | ⊙ or      | n <sup>O</sup> off |        |      |      |       | BF                |                   |   |
| Port spe   | ed            | Duplex 1      | LOOMB       | Dup       | lex 100MB          | -      |      |      |       |                   |                   |   |
| Port 2 pa  | arameter      |               |             |           |                    |        |      |      |       |                   |                   |   |
| Autoneg    | otiation      | on            |             | ⊙ or      | n <sup>O</sup> off |        |      |      |       |                   |                   |   |
| Port spe   | ed            | Simplex       | 10MB        | Sim       | plex 10MB          | -      |      |      |       | Hardware i        | nformation        |   |
|            |               |               |             |           |                    |        |      |      |       | Article:          | DTE104            |   |
|            |               |               |             |           |                    | Su     | bmit |      |       | Firmware version: | 5<br>T2.1.5.16526 |   |
| WARNING    | C: Changing # | he IP noromot | ere may car |           | s of connect       | tion   | _    |      |       | Serial number:    | 4419              |   |
| TTOWNING   | o. onanyiny u | ien paramen   | ere may cau | 100 0 100 | a or connec        | uon.   |      |      |       | Production date:  | 2015-02-05 10:09  | 9 |
|            |               |               |             |           |                    |        |      |      |       | MAC-address:      | 00:02:01:40:11:4  | 5 |
| L          |               |               |             |           |                    |        |      | ~    |       |                   |                   |   |

This menu allows to change various Ethernet interface settings of the evaluation unit.

Ask your network administrator which settings are necessary to integrate the device into the existing network.

If the evaluation unit is directly connected with the PC, a static IP address setting is recommended  $(\rightarrow 8.1$  Verify and set the IP address of the PC).

Please make sure that the network address of the PC is within the address range of the evaluation unit and is different from the address of the evaluation unit!

#### Example:

!

For the subnet mask 255.255.255.0 the address settings highlighted in red must be identical for the PC and the evaluation unit.

Ethernet IP address of the PC: 192.168.0.10 IP address of the evaluation unit: 192.168.0.79



When setting the IP address of the evaluation unit make sure that this address must not exist in the Ethernet network.

## 8.4 Tab "Firmware"



This menu allows to update the firmware of the evaluation unit:

Open the "Firmware" tab on the browser interface.

[]

Choose the firmware file DTE104.nxf and send it via the button [transfer].

Do not interrupt power or disconnect the network cable while the transfer is in progress!

UK

## 8.5 Tab "IO port"

| <b>f</b>              |                  |         | Web                 | Int | erfac           | :e D1            | E10  | )4       |       |  |
|-----------------------|------------------|---------|---------------------|-----|-----------------|------------------|------|----------|-------|--|
| Home                  | Network          | Firmwar | e IO-Port           | ERP | Monitor         | System           | SNTP | Info     | Reset |  |
| IO-Port               | Configura        | ation   |                     |     |                 |                  |      | ▲        |       |  |
| Global                |                  | Cı      | rrent settings      |     | New sett        | tings            |      |          |       |  |
| Fail-safe             | 9                | 01      | I<br>rrant sattings | _   | Von<br>Now soft | ©off             |      |          |       | 101 102  |
| Mode                  | _                | Ir      | active              | _   | RWH             | Tanys            |      |          |       |  |
| Data hol              | ld time          | 0       |                     |     | 0               | ▼ ms             |      |          |       |  |
| Overload              | d detection      | or      |                     |     | • on            | Coff             |      |          |       | 103 104  |
| Overcurr              | rent detection   | n or    |                     |     | €on             | Ooff             |      |          |       |  |
| Number                | of blocks        | 25      | 6                   |     | 256 1           | 256              |      |          |       |  |
| Block siz             | ze               | 8       |                     |     | 8 💌             | Byte             |      |          |       |  |
| TP bit de<br>hold tim | epending on<br>e | the of  | f                   |     | Con             | € <sub>off</sub> |      |          |       |  |
| IO-2                  |                  | Cı      | rrent settings      |     | New set         | tings            |      |          |       |  |
| Mode                  |                  | Ir      | active              |     | Input           | -                |      |          |       | Hardware information                                     |
| Data hol              | ld time          | 0       |                     |     | 0               | ▼ ms             |      |          |       | Article: DTE104<br>Hardware version: 5                   |
| Overload              | d detection      | or      |                     |     | €on             | Ooff             |      |          |       | Firmware version: T2.1.5.16526                           |
| IO-3                  |                  | Cı      | rrent settings      |     | New set         | tings            |      |          |       | Serial number: 4419<br>Production date: 2015-02-05 10:09 |
| Mode                  |                  | Ir      | active              |     | Output          | t 🔻              |      |          |       | MAC-address: 00:02:01:40:11:43                           |
| Data hol              | ld time          | 0       |                     |     | 0               | ▼ ms             |      | <b>-</b> |       |  |

This menu allows to configure the IO ports of the evaluation unit.

Each IO channel can be configured to the modes "Inactive", "Input", "Output" and "RWH".

| Mode     | Function                                |
|----------|---|
| Inactive | No function, inactive                   |
| Input    | IEC 61131 input                         |
| Output   | IEC 61131 output                        |
| RWH      | Read/write head (type ANT4xx or ANT5xx) |

- ▶ Optional: Enable "high current" to allow an output current of 1 A on port IO-3 and/or IO-4.
- ▶ "Number of blocks" define the number of blocks available on the tag.
- Block size" defines the number of bytes per block on the tag.

!

If this value does not correspond to the physical value of the tag, the read and write commands will fail.

- "Data hold time" defines how long the RFID data is kept stable. This is helpful if the time interval in which the RFID data is available is shorter than the time the host needs to read the data from the RFID evaluation unit.
- "TP bit depending on the data hold time" defines if the state of the TP bit is to be kept stable as long as defined in the field "Data hold time".
- Optional: Set "Overload detection" to "off" if the load on terminal "L+" is higher than 0.5 A. Please note that the current is limited to 0.7 A by the hardware.
- Optional: Set "Overcurrent detection" to "off" if the load on terminal "C/Qo" is higher than 0.5 A. Please note that the current is limited to 0.6 A by the hardware.

Optional: Set "High Current" to "on" if a current of 1 A is possible on port IO-3 and/or IO-4, terminal "C/ Qo". Please note that the maximum power input does not exceed 3.0 A, otherwise the device may be damaged.

| Menu button       | Function  | Note  |
|-------------------|---|---|
| Activate and save | The settings are activated and saved permanently. | After the next power-on the saved<br>settings are activated. If the host is<br>connected to the evaluation unit and<br>writes a new IO port configuration, the<br>saved values are overwritten. |
| Cancel            | Discard changes                                   | -   |

#### 8.6 Tab "ERP"

#### 8.6.1 Mode "web"

| f                |           |                            | Web       | Int                  | erfa           | ce D   | ГЕ1( | 04       |       |                                       |                                       |  |
|------------------|-----------|----------------------------|-----------|----------------------|----------------|--------|------|----------|-------|---------------------------------------|---------------------------------------|--|
| Home             | Network   | Firmware                   | IO-Port   | ERP                  | Monitor        | System | SNTP | Info     | Reset |                                       |                                       |  |
| Configu          | ration EF | RP server                  |           |                      |                |        |      | <b></b>  |       |                                       |                                       |  |
| ERP serv         | ver Cu    | urrent setting:            | s Ne      | w setting            | js             | 200    |      |          |       | <b>()</b>                             |                                       |  |
| Port             | 34        | 4000                       | 3         | 4000 (               | 100065         | 535)   |      |          | _     | - (3)] ret2                           | 101 102<br>DTE104                     |  |
| Mode<br>IO-1     | of<br>C   | ff<br>urrent settings      | w<br>s Ne | EB<br>w setting      | 15             | _      |      |          |       |                                       |                                       |  |
| Mode             | RI        | NH                         |           | IO port              | config         |        |      |          |       |                                       | 103 104                               |  |
| Commar<br>Offset | nd no     | ot used                    | <u>ت</u>  | ata<br>B             | vte (0         | 65534) |      |          |       |                                       |                                       |  |
| Length           | 31        | 2                          | 3:        | 2 B                  | yte (1         | 1024)  |      |          |       |                                       |                                       |  |
| IO-2<br>Mode     | C         | urrent settings<br>nput    | s Ne      | w setting<br>IO port | )S<br>: config |        |      |          |       |                                       |                                       |  |
| Commar           | nd no     | ot used                    | I         | Q & CQ               | •              | _      |      |          |       | Hardware i<br>Article:                | Information<br>DTE104                 |  |
| IO-3<br>Mode     | C1<br>01  | urrent setting:<br>utput   | s Ne      | w setting<br>IO port | s<br>config    |        |      |          |       | Hardware version<br>Firmware version: | : 5<br>T2.1.5.16526                   |  |
| Commar           | nd no     | ot used                    | n         | ot use               | d 🔻            |        |      |          |       | Production date:<br>MAC-address:      | 2015-02-05 10:09<br>00:02:01:40:11:43 |  |
| IO-4<br>Mode     | Ci<br>Ir  | urrent settings<br>nactive | s Ne      | w sétting<br>IO port | s<br>config    |        |      | <b>-</b> |       |                                       |                                       |  |

This menu allows the set-up of the ERP connection of the evaluation unit.

Server

Ask your network administrator which settings are necessary to connect the evaluation unit with the ERP system.

| Field ERP server                               | Function   |
|--|--|
| IP address                                     | IP address of the ERP server where the software package LRA Agent CP is installed  |
|  | [XXX.XXX.XXX.XXX]  |
| Port   | Port address of the ERP server [100065535]   |
|  | Default: port 34000  |
| Mode: off                                      | No function, inactive  |
| Mode: WEB / RWH / input                        | After connection of the evaluation unit to the ERP server, the evaluation unit automatically executes the command specified in the fields IO-1 IO-2. The command result is sent to the ERP system.   |
|  |  |
|  |  |
| Field IO-1 IO-4                                | Function   |
| Field IO-1 IO-4<br>Mode                        | Function           Under "current settings" the active mode of the IO channel is displayed. With the button "IO port config" the mode of the IO channel can be changed.  |
| Field IO-1 IO-4<br>Mode                        | Function         Under "current settings" the active mode of the IO channel is displayed. With the button "IO port config" the mode of the IO channel can be changed.         Mode: RWH -> see table "Mode RWH"  |
| Field IO-1 IO-4<br>Mode                        | Function         Under "current settings" the active mode of the IO channel is displayed. With the button         "IO port config" the mode of the IO channel can be changed.         Mode: RWH -> see table "Mode RWH"         Mode: Input -> see table "Mode Input"  |
| Field IO-1 IO-4<br>Mode<br>Command             | Function         Under "current settings" the active mode of the IO channel is displayed. With the button "IO port config" the mode of the IO channel can be changed.         Mode: RWH -> see table "Mode RWH"         Mode: Input -> see table "Mode Input"         Depends on the mode of the IO channel, different commands can be selected                          |
| Field IO-1 IO-4<br>Mode<br>Command             | Function         Under "current settings" the active mode of the IO channel is displayed. With the button "IO port config" the mode of the IO channel can be changed.         Mode: RWH -> see table "Mode RWH"         Mode: Input -> see table "Mode Input"         Depends on the mode of the IO channel, different commands can be selected                          |
| Field IO-1 IO-4<br>Mode<br>Command<br>Mode RWH | Function         Under "current settings" the active mode of the IO channel is displayed. With the button         "IO port config" the mode of the IO channel can be changed.         Mode: RWH -> see table "Mode RWH"         Mode: Input -> see table "Mode Input"         Depends on the mode of the IO channel, different commands can be selected         Function |

Each time the evaluation unit detects a tag, the UID information is sent to the ERP

UID

| Data       | Each time the evaluation unit detects a tag, the user memory is read according to the settings of the following parameter:<br>Offset = address where the evaluation unit starts to read the user memory of the tag |
|------------|--|
|            | •  |
| Mode Input | Function   |
| Not used   | No data is sent to the ERP server  |
| IQ & CQ    | Each time the evaluation unit detects a change of state of the inputs C/Qi and I/Q the state of these inputs is sent to the ERP server   |

#### 8.6.2 Mode "fieldbus"

| Web Interface DTE104 |               |                 |               |          |         |        |       |      |       |  |  |  |
|----------------------|---------------|-----------------|---------------|----------|---------|--------|-------|------|-------|--|--|--|
| Home                 | Network       | Firmware        | IO-Port       | ERP      | Monitor | System | SNTP  | Info | Reset |  |  |  |
| Configu              | ration ER     | P server        |               |          |         |        |       |      |       |  |  |  |
| ERP ser              | ver Cu        | ırrent settings | s Ne          | w settin | gs      | _      |       |      |       | <u>()</u>                              |  |  |
| IP addre             | ss 0.         | 0.0.0           | 19            | 92 . 16  | 1000 65 | . 200  |       |      |       |  |  |  |
| Mode                 | of            | f               | F             | ieldbu   | 3 🔽     |        |       |      |       |  |  |  |
|                      |               |                 |               |          |         | S      | ubmit |      |       | 103 104                                |  |  |
| Please no            | ote: Reboot t | the device to a | ctivate the s | ettings. |         |        |       |      |       |  |  |  |
|                      |               |                 |               |          |         |        |       |      |       |  |  |  |
|                      |               |                 |               |          |         |        |       |      |       |  |  |  |
|                      |               |                 |               |          |         |        |       |      |       | Hardware information                   |  |  |
|                      |               |                 |               |          |         |        |       |      |       | Article: DTE104<br>Hardware version: 5 |  |  |
|                      |               |                 |               |          |         |        |       |      |       | Firmware version: T2.1.5.16526         |  |  |
|                      |               |                 |               |          |         |        |       |      |       | Serial number: 4419                    |  |  |
|                      |               |                 |               |          |         |        |       |      |       | Production date: 2015-02-05 10:09      |  |  |
|                      |               |                 |               |          |         |        |       |      |       | MAC-address: 00:02:01:40:11:43         |  |  |
|                      |               |                 |               |          |         |        |       |      |       |  |  |  |

| Field ERP server | Function  |
|------------------|---|
| IP address       | IP address of the ERP server where the software package LR Agent CP is installed  |
|                  | [XXX.XXX.XXX.XXX]   |
| Port             | Port address of the ERP server [100065535]  |
|                  | Default: port 34000   |
| Mode: off        | No function, inactive   |
| Mode: fieldbus   | If the host sends a command request to the evaluation unit, the command response of the evaluation unit is also sent to the ERP server. |

## 8.7 Tab "Monitor"

| f        |              |                | Web        | Int                        | erfac         | e DT        | E10    | 4    |       |                   |                          |
|----------|--------------|----------------|------------|----------------------------|---------------|-------------|--------|------|-------|-------------------|--------------------------|
| Home     | Network      | Firmware       | IO-Port    | ERP                        | Monitor       | System      | SNTP   | Info | Reset |                   |                          |
|          |              |                |            |                            |               | FRP sta     | tus: 🔿 |      |       |                   |                          |
| ort mo   | onitoring    |                |            |                            |               | Fieldbus st | ate: 🌑 |      |       | 61                |                          |
| )-1 RWH  | H 🖌 (        |                |            |                            |               |             |        |      |       | AUX [             | 101 102                  |
| C        | <b>)</b> U   | ID: E0:08:01:4 | 47:FD:F4:5 | 3:CB                       | <b>(</b> p)   |             |        |      |       | CONTRACTOR        |                          |
| )-2 Inpu | t 🖌          |                |            |                            |               |             |        |      |       |                   | 103 104                  |
| 1 2      | Pi           | n Connection   | n Pin C    | onnectior                  | 1             | State       |        |      |       |                   |                          |
| 4 3      | 1            | L+             | 2 S        | witching ir<br>witching ir | nput (I/Q)    |             |        |      |       | BF                |                          |
| 3 Outr   | ut 🔽         | -              |            |                            | ipar (or all) | •••         |        |      |       |                   |                          |
| 1_2      | Pi           | n Connection   | n Pin C    | onnect <u>ior</u>          | 1             | State       |        |      |       |                   |                          |
|          | 1            | L+             | 2 s'       | witching ir                | nput (I/Q)    | •           |        |      |       | Hardware i        | nformation               |
| 4 3      | 3            | L-             | 4 s        | witching o                 | utput (C/Qo)  | <b>D</b> 0  |        |      |       | Article:          | DTE104                   |
|          |              |                |            |                            |               |             |        |      |       | Hardware version: | 5                        |
| -4 Inact | tive         |                |            |                            |               |             |        |      |       | Firmware version: | T2.1.5.16526             |
| hannel   | configured a | s inactive.    |            |                            |               |             |        |      |       | Production date:  | 4413<br>2015-02-05 10:09 |
|          |              |                |            |                            |               |             |        |      |       | MAC-address:      | 00:02:01:40:11:43        |
|          |              |                |            |                            |               |             |        | _    |       |                   |                          |
|          |              |                |            |                            |               |             | -      |      |       |                   |                          |

This menu shows the data of each port which is detected by the evaluation unit.

In this example the IO-1 port is configured as read/write head, IO-2 port as input, IO-3 port as output and IO-4 port as inactive.

- Click (1) to open the submenu "Read/write head information" (→ 8.8 Tab "Monitor" Read/write head information).
- ▶ Click  $\bigcirc$  to open to submenu "Read/write tag" ( $\rightarrow$  8.10 Tab "Monitor" Tag monitoring)

#### 8.8 Tab "Monitor" - Read/write head information



This menu shows the following information about the selected read/write head:

- Article number
- Device type
- Hardware version
- Firmware version
- ID link software
- Production date
- ▶ Click [Back] to return to the main menu.

| Menu button | Function                          | Note |
|-------------|-----------------------------------|------|
| Update      | Go to the menu "Antenna firmware" |      |
| Back        | Return to the main menu           |      |

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## 8.9 Tab "Monitor" - Antenna firmware



With this menu the firmware of the read/write head of the selected port can be updated.

- Choose firmware file for the read/write head.
- > Example for a firmware file: 11017564.afw

| Menu button | Function   | Note   |
|-------------|--|--|
| Select file | Open new dialogue window to browse the read/write head firmware file | -  |
| Transfer    | Send firmware to connected read/write head                           | When the update process is finished<br>the evaluation unit reboots the antenna<br>automatically. A restart of the evaluation<br>unit is not necessary. |
| Back        | Return to the main menu  | -  |



Do not interrupt the power supply or disconnect the cables from the evaluation unit during the firmware transfer.

#### Note:

If the firmware update fails or the read/write head is not detected by the evaluation unit at the selected IO port, the following direct link of the web server to the read/write head can be used:

http://<IP-ADDRESS>/rwhupdate?ioport=<IO-CHANNEL>1&anttype=<ANTENNA\_TYPE> &fwVersion=< NUMBER>&setLng=<LANGUAGE>

| Parameter name | Description                           | Note                           |
|----------------|---------------------------------------|--------------------------------|
| IP address     | IP address of the evaluation unit     | IPV4 address                   |
|                | [XXX.XXX.XXX.XXX]                     |                                |
| IO channel     | IO channel number                     | -                              |
|                | [14]                                  |                                |
| ANTENNA TYPE   | Article number of the read/write head | 6-digit article number         |
|                | [ANT512,ANT513,ANT410, ANT411]        |                                |
| Version        | Firmware version                      | 2-digit numer, is set to "01". |
|                | [01]                                  |                                |
| LANGUAGE       | Language of the website               | -                              |
|                | [de, en, es, fr, it, ko, pt, ru, zh]  |                                |

Example of an URL:

http://192.168.0.79/rwhupdate?ioport=1&anttype=ANT513&fwVersion=01&setLng=en

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## 8.10 Tab "Monitor" - Tag monitoring

This menu allows to:

- read the UID from the tag
- read the user data area of the tag or write to it

#### 8.10.1 Reading from the tag

| <b>f</b>                   |                            |                            | Web                               | Int              | terfac        | e DT    | Έ10  | 4    |       |   |
|----------------------------|----------------------------|----------------------------|-----------------------------------|------------------|---------------|---------|------|------|-------|---|
| Home                       | Network                    | Firmware                   | IO-Port                           | ERP              | Monitor       | System  | SNTP | Info | Reset |   |
| Tag R\<br>IO-1             | VH                         | UIE<br>Nu<br>bio<br>Bio    | )<br>mber of<br>cks:<br>ock size: | E0:0<br>250<br>8 | 18:01:47:FD:F | 4:53:CB | ]    |      |       |   |
| Read<br>Length:<br>Offset: | / Write 20 by 0 by 0000000 | Tag<br>ytes (1240)<br>ytes | 000012000                         | 000000           |               | F       |      |      |       |   |
| Data:                      |                            |                            |                                   |                  |               |         | Back | ~    |       | Hardware informationArticle:DTE 104Hardware version:5Firmware version:T2.1.5.16526Serial number:4419Production date:2015-02-05 10:09MAC-address:00:02:01:40:11:43 |

The UID data is displayed in real time with an update interval of 0.2 s.

Click local to read the user data area of the tag.

The data length can be set from 1...240 bytes. The address offset can be set from 0 byte to the last accessible address of the tag.

► Click [Back] to return to the main menu.

# 8.10.2 Write to tag

| Web Interface DTE104   |  |
|--|--|
| Home Network Firmware IO-Port ERP Monitor System SNTP Info   | Reset  |
| Tag RWH     UID     E0:08:01:47:FD:F4:53:CB       Number of blocks:     250       Block size:     8    |  |
| Read / Write Tag         Length:       5 bytes (1240)         Offset:       0 bytes         AABBCCDDEE |  |
| Data:  | Hardware informationArticle:DTE104Hardware version:5Firmware version:T2.1.5.16526Serial number:4419Production date:2015-02-05 10:09MAC-address:00:02:01:40:11:43 |

Click to write to the user data area of the tag.

The data length to be written can be set from 1...240 bytes. The address offset can be set from 0 byte to the last accessible address of the tag.

► Click [Back] to return to the main menu.

# 8.11 Tab "System"

| f                        | I                        |               | Web      | Int          | erfa     | ce D1                       | E10   | )4   |  |  |
|--------------------------|--------------------------|---------------|----------|--------------|----------|-----------------------------|-------|------|--|--|
| Home                     | Network                  | Firmware      | IO-Port  | ERP          | Monitor  | System                      | SNTP  | Info | Reset  |  |
| <b>System</b><br>Passwor | settings<br>d protection | configuration | 1        |              |          |                             |       |      | ()   |  |
| Parame<br>Passwo         | ter<br>rd protection     | Current s     | settings |              | New se   | ettings<br><sup>O</sup> off |       |      | 0  | 101 102<br>Pert2 DTE104  |
| Parame<br>User na        | ter<br>me:               |               | Va       | alue<br>imin |          |                             |       |      |  |  |
| Old pass                 | sword:<br>ssword:        |               | •<br> •  | ••••         | ••       |                             |       |      |  |  |
| Confirm                  | new passwo               | ord:          | •        | •••••        | ••<br>Su | ıbmit Ca                    | incel |      |  |  |
|                          |                          |               |          |              |          |                             |       |      | Hardwa<br>Article:<br>Hardware ver<br>Firmware vers<br>Serial number:<br>Production dat<br>MAC-address | are information<br>DTE104<br>sion: 5<br>sion: T2.1.5.16526<br>4419<br>e: 2015-02-05 10:09<br>: 00:02:01:40:11:43 |

This menu allows to define a password to protect the evaluation unit against unauthorised access To enable the password protection the button "New settings" has to be set to "on".

| Parameter            | Setting | Note   |
|----------------------|---------|--|
| Username             | admin   | User name could not be changed                             |
| Old password         | XXXXXX  | Default password is "admin"                                |
| New password         | XXXXXX  | Up to 10 characters are allowed                            |
| Confirm new password | XXXXXX  | Must correspond to the parameter setting<br>"New password" |

- Click [Submit] to save the password
- Click [Cancel] to delete all parameter settings



If the password is lost the default password "admin" can be retrieved by a reset to factory settings ( $\rightarrow$  6.1 Reset to factory settings).

## 8.12 Tab "SNTP"

| î                   | I                       |                   | Web           | Int       | erfa             | ce D      | TE1    | 04   |       |
|---------------------|-------------------------|-------------------|---------------|-----------|------------------|-----------|--------|------|-------|
| Home                | Network                 | Firmware          | IO-Port       | ERP       | Monitor          | System    | SNTP   | Info | Reset |
| SNTP se<br>To chang | ettings<br>ethe setting | s fill out the fo | rm in the tal | ble belov | v and press      | 'submit'. |        |      |       |
| Parame<br>NTP sur   | ter<br>oport:           | Current s         | settings      | New s     | ettings<br>O off |           |        |      |       |
| IP addre<br>server: | ss from NTF             | 0.0.0.0           |               | 174       | . 215 .          | 12 . 2    |        |      |       |
| Offset to           | UTC:                    | UTC               |               | UTC       | +0               | •         |        |      |       |
|                     |                         |                   |               |           |                  | S         | Submit |      |       |
|                     |                         |                   |               |           |                  | _         |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      |       |
|                     |                         |                   |               |           |                  |           |        |      | L     |

If an SNTP server is present in the Ethernet network, the internal clock of the evaluation unit can be synchronised with the external time server.

► Click [Submit] to transfer the settings to the evaluation unit.

## 8.13 Tab "Info"

| <b>The second seco</b> |              |          | Web     | b Interface DTE104 |         |        |        |      |   |  |  |  |  |  |
|--|--------------|----------|---------|--------------------|---------|--------|--------|------|---|--|--|--|--|--|
| Home   | Network      | Firmware | IO-Port | ERP                | Monitor | System | SNTP   | Info | Reset                                   |  |  |  |  |  |
| Hardwa   | ire:         |          |         |                    |         |        |        |      |   |  |  |  |  |  |
| Parame   | ter          |          | Va      | lue                |         |        |        |      |   |  |  |  |  |  |
| Power s  | upply state: |          | fu      | illy ope           | rable   |        |        |      |   |  |  |  |  |  |
| Tempera  | ature:       |          | 40      | °C 104'            | Ϋ́F     |        |        |      | 101 102                                 |  |  |  |  |  |
| System   | time:        |          | 00      | :21:45             | 628     |        |        |      |   |  |  |  |  |  |
| System   | date:        |          | 20      | 11-01-0            | 01      |        |        |      |   |  |  |  |  |  |
| Produc   | tion parar   | neters:  | 1/5     | duo                |         |        | _      |      |   |  |  |  |  |  |
| Product  | article numb | er:      | DI      | E104AB             | _       | _      |        |      |   |  |  |  |  |  |
| Producti   | ion number:  |          | 17      | 89261              |         |        |        |      |   |  |  |  |  |  |
| Version  | PermData:    |          | 1       |                    |         |        |        |      |   |  |  |  |  |  |
|  |              |          |         |                    |         | F      | Reload |      | Hardware information<br>Article: DTE104 |  |  |  |  |  |
|  |              |          |         |                    |         |        |        |      | Hardware version: 5                     |  |  |  |  |  |
|  |              |          |         |                    |         |        |        |      | Serial number: 4419                     |  |  |  |  |  |
|  |              |          |         |                    |         |        |        |      | Production date: 2015-02-05 10:09       |  |  |  |  |  |
|  |              |          |         |                    |         |        |        |      | MAC-address: 00:02:01:40:11:43          |  |  |  |  |  |
|  |              |          |         |                    |         |        |        |      |   |  |  |  |  |  |

This menu shows the following information about the evaluation unit:

- Power supply state
- Temperature
- System time
- System date
- Product article number
- Production number
- Version PermData

For a proper operation of the evaluation unit the "power supply state" must be "fully operable".

## 8.14 Tab "Reset"



This menu allows a remote reset of the evaluation unit.

If the device is reset, all connections are closed and the outputs are switched off.

- ▶ To reset the evaluation unit, tick "Please confirm you want to reboot the device".
- ► Click [Reset].

# 9 Operating mode of the evaluation unit

The evaluation unit can be set to different modes according to the application.

| Mode        | Function  | Note   |  |  |
|-------------|---|--|--|--|
| Set-up      | Configuration of the evaluation unit via the integrated web server.   | The configuration is saved permanently and has to be done once.  |  |  |
|             |   | TCP port of the evaluation unit 80   |  |  |
| Controller  | The evaluation unit is configured via<br>the controller. The data communication<br>is carried out via the protocol of the | With each connection establishment of<br>the controller the configuration is sent to<br>the evaluation unit. (1) |  |  |
|             | evaluation unit.  | TCP port of the evaluation unit 32000  |  |  |
| Host system | The evaluation unit is configured via<br>the host. The data communication is<br>performed via the ASCII protocol of the   | With each connection establishment of<br>the host the configuration is sent to the<br>evaluation unit. (1)       |  |  |
|             | evaluation unit   | TCP port of the evaluation unit 33000  |  |  |
| ERP system  | The evaluation unit is configured via the web server. The data communication is   | The configuration is saved permanently and has to be done once.  |  |  |
|             | performed via the ASCII protocol of the<br>evaluation unit  | TCP port of the host 34000 (preset)  |  |  |
|             | The evaluation unit is configured via the host. The data communication is   | With each connection establishment of the host the configuration is sent to the                                  |  |  |
|             | performed via the ASCII protocol of the   | evaluation unit. (1)   |  |  |
|             | evaluation unit   | TCP port of the host 34000 (preset)  |  |  |

(1) Recommended for an easy replacement of the evaluation unit in case of a fault. Another possibility is to save the configuration of the evaluation unit via the web server.

#### 9.1 Set-up mode

To set up the evaluation unit it is recommended to use the integrated web server. This allows individual setting and activation of the 4 IO channels. The selected channel configuration is saved and allows immediate use of the device in the plant without any further actions.



## 9.2 Controller mode

For the communication between a controller and the evaluation unit it is recommended to use the binary protocol. This protocol sends the information for all 4 IO channels in a data frame. The data content itself is coded in hexadecimal numbers and allows a fast and easy coding / decoding of the data content. The user data of the data frame for each IO channel is limited to 16 bytes.



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### 9.3 Host mode

For the communication between a host system and the evaluation unit it is recommended to use the ASCII protocol via the TCP port 33000. Each IO channel is transmitted in a separate TCP/IP frame. The length of the user data is variable. The data content itself is coded in a UTF-8 ASCII code with the code page 437.



#### 9.4 ERP mode

For the communication with an ERP system the evaluation unit offers a separate communication path via TCP. In this mode the ERP system needs the software product LR Agent CP from ifm electronic gmbh. This software product allows easy connection of the evaluation unit to the ERP system. The evaluation unit is configured via the integrated web server of the evaluation unit or via the host system by means the ASCII protocol. The data itself is sent to the ERP system by the LR Agent CP.



#### 9.5 Set-up via the integrated web server

The evaluation unit and the IO channels have to be configured via the web server.

The following steps need to be carried out:

- Setting of the IP address and the port number of the ERP system
- Configuration of the IO channels of the evaluation unit
- Setting of the data which has to be sent to the ERP system by the evaluation unit

The settings are saved and used at the next power on.

More information ( $\rightarrow$  8.6.1 Mode "web").

After these steps have been carried out the evaluation unit tries to connect to the LINERECORDER or the SMARTOBERSERVER of the ERP server. If a connection could be established, the evaluation unit sends the preset command response to the ERP server by means of the LINERECORDER Agent protocol. Please note that the data is only sent if the evaluation unit detects a change in the data content.

#### 9.5.1 Set-up via the host system

The evaluation unit and the IO channels are configured via a host system. The following steps need to be carried out:

- Setting of the IP address and the port number of the ERP system via the integrated web server of the evaluation unit. The settings are saved and used at the next power on.
- Setting of the evaluation unit with the commands "configure evaluation unit" and "configure IO channel"
- Request of the data content via the host system using the commands defined in the ASCII protocol of the evaluation unit.

More information ( $\rightarrow$  8.6.2 Mode "fieldbus").

#### 9.5.2 Command types

There are two types of commands:

- Synchronous commands For each command request of the host the evaluation unit returns one response.
- Asynchronous commands:

The command request of the host is done once. The evaluation unit immediately returns a response to the host. The next response of the evaluation unit is sent back when the data content of the response changes because a new information is detected by the read/write head or by the evaluation unit itself. In addition, the response of the evaluation unit is sent to the ERP system via the LINERECORDER Agent protocol.

# **10** Configuration

## 10.1 Parameter setting of the Ethernet interface

The following settings can be configured via the web server:

| Function         | Default value | Note    |
|------------------|---------------|---------|
| DHCP function    | off           | See (1) |
| IP address       | 192.168.0.79  |         |
| Gateway address  | 192.168.0.100 |         |
| Subnet mask      | 255.255.255.0 |         |
| Auto-negotiation | On            | See (2) |
| Port speed       | 10 MBit/s,    | see (2) |
| Duplex mode      | Half duplex   | See (2) |

- (1) If the device does not detect a DHCP server in the connected Ethernet network, the default address 192.168.0.79 is set. After rebooting the device the DHCP function is disabled and the default address is active. It is also possible to disable the DHCP function and to set the default address by resetting the device to the factory settings (→ 6.1 Reset to factory settings).
- (2) If the auto-negotiation of the data transmission between the evaluation unit and the connected Ethernet node fails, the device is set to 10 MBit/s, half duplex.

#### 10.2 Determine the MAC address

To determine the MAC address of the device several options are available:

• Look for the MAC address on the type label

The type label is on the upper side of the device above the AUX connector.



## DTE104 DTELF/HFABRWENUS00

Operating voltage 18...30 V DC Current consumption < 3 A



MAC-ID 00:01:23:45:67:89

Scan the MAC address with a data matrix code reader

The code is on the type label and can be read with any data matrix code scanner.

ifm electronic 45128 Essen Germany www.ifm.com Made in Germany

DTE104 DTELF/HFABRWENUS00 Operating voltage 18...30 V D Current consumption < 3 A



MAC-ID 00:01:23:45:67:89

• Look for the MAC address via the integrated web server The MAC address is on the "Network" tab under hardware information.

| lome       | Network    | Firmware      | IO-Port     | ERP        | Monitor     | System   | SNIP | Info     | Reset |  |  |   |
|------------|------------|---------------|-------------|------------|-------------|----------|------|----------|-------|--|--|---|
|            |            |               |             |            |             |          |      |          |       |  |  |   |
| etwork     | settings:  |               |             |            |             |          |      | <b>_</b> |       |  |  |   |
| TCP/IP pa  | rameter    | Current s     | ettings     | New s      | ettings     |          |      |          |       | <b>@</b> ] (   |  |   |
| P addres:  | Б          | 192.168       | .0.79       |            | · 🗌 · 🦳     |          |      |          |       | AUX  |  |   |
| Subnet m   | ask        | 255.255       | .255.0      |            | · 🗌 · 🦳     | <u> </u> |      |          | _     | CONT Port2   | DTE104   | _ |
| Default ga | teway      | 192.168       | .0.100      |            | ·           |          |      |          |       | CTHERNET   |  |   |
| DHCP       |            | off           |             | O on       | • off       |          |      |          |       | - (@)] Part  |  |   |
| BOOTP      |            | off           |             | O on       | • off       |          |      |          |       |  | 103 104  |   |
| Port 1 par | ameter     |               |             |            |             |          |      |          |       |  |  |   |
| Autonegot  | iation     | on            |             | ⊙ on       | O off       |          |      |          |       | BF   |  |   |
| Port spee  | d          | Duplex 3      | LOOMB       | Dupl       | ex 100MB    | v        |      |          |       |  |  |   |
| Port 2 par | ameter     |               |             |            |             |          |      |          |       |  |  |   |
| Autonegot  | iation     | on            |             | ⊙ on       | O off       |          |      |          |       |  |  |   |
| Port spee  | d          | Simplex       | 10MB        | Simp       | lex 10MB    | ~        |      |          |       | Hardware in  | nformation   |   |
| VARNING:   | Changing t | he IP paramet | ers may cau | ise a los: | s of connec | Sul      | omit |          |       | Article:<br>Hardware version:<br>Firmware version:<br>Serial number:<br>Production date:<br>MAC-address: | DTE104<br>5<br>T2:1.5.16526<br>4419<br>2015-02-05 10:09<br>00:02:01:40:11:43 |   |

#### 10.3 Connection concept of the Ethernet interface

The device can be connected to two Ethernet lines via the connectors "port 1" and "port 2". The integrated Ethernet switch enables to build a line structure: an external switch is not required. The device only has a MAC address which enables the host to address the evaluation unit with a single IP address.

Both Ethernet ports have the same functionality. However, a software update of the device is only possible via "port 1".

#### Connector port 1 and port 2:

M12 Ethernet socket, D-coded

| Signal | Name            | Core colour  | Pin     |
|--------|-----------------|--------------|---------|
| TD +   | Transmit Data + | White/orange | 1       |
| TD -   | Transmit Data - | Orange       | 3       |
| RD +   | Receive Data +  | White/green  | 2       |
| RD -   | Receive Data -  | Green        | 4       |
| Screen | Shield          | -            | Housing |



The colours refer to the standard T568B.

#### 10.4 Overview of the communication methods via Ethernet TCP/IP

The evaluation unit has a standard 10/100Base-TX Ethernet TCP/IP interface. The TCP layer is used to transport the data of the evaluation unit to the counterpart, e.g. PC or controller.



Only an exclusive owner can control the evaluation unit.

Each IO-1 ... IO-4 channel can be switched to the following modes:

- Inactive
- IEC61131 input
- IEC61131 output
- RWH\_RW
  - to read the UID of a tag
  - to read data from a tag
  - to write data to a tag
  - to read the inputs from the IO channel
  - to set the output of the IO channel

#### 10.5 Ethernet TCP/IP model of the RFID evaluation unit



#### 10.5.1 Binary protocol communication via Ethernet TCP/IP

The configuration data and the process data of the evaluation unit are transferred to the evaluation unit by a TCP host via a TCP/IP connection. The host is the requestor, the evaluation unit the responder.


Sequence model of the connection establishment, configuration of the evaluation unit, data exchange and connection termination ( $\rightarrow$  10.5.2 Binary protocol connection establishment between host and evaluation unit).

# **10.5.2** Binary protocol connection establishment between host and evaluation unit

| TCP sequence | Host (PC)   | Evaluation unit  | Note   |
|--------------|---|--|--|
| A            | Set IP address  | Set IP address,<br>i.e.192.168.0.79 and<br>open TCP port 32000         | Switch on  |
|              | Establish a communication with the evaluation unit via the IP address 192.168.0.79 and the TCP port 32000 |  | TCP port 32000: binary protocol  |
| В            | Host writes configuration ->  |  |  |
|              |   | <- Evaluation unit<br>sends the result of the<br>configuration request | <ul> <li>If configuration not OK:</li> <li>The evaluation unit sends NOT_<br/>READY, therefore data exchange<br/>is not possible. A new configuration<br/>must be sent by the host.</li> </ul> |
|              |   |  | If configuration OK:   |
|              |   |  | <ul> <li>The evaluation unit sends READY,<br/>data exchange is possible.</li> </ul>  |

#### Data exchange with "request -> response" relationship (1)

| С | Write output data -> |                     | Data exchange mode |
|---|----------------------|---------------------|--------------------|
|   |                      | <- Write input data |                    |

#### Data exchange with automatic response of the evaluation unit (2)

| C1 | Write output data -> |                     | Data exchange mode (2)                 |
|----|----------------------|---------------------|--|
|    |                      | <- Write input data |  |
|    |                      |                     |  |
| C2 | -                    |                     | Input data is sent by the host without |
|    |                      | <- Write input data | writing                                |
|    |                      |                     |  |
| C3 | -                    |                     | Input data is sent by the host without |
|    |                      | <- Write input data | writing                                |

## Port closed

| D | Close connection |  |  |
|---|------------------|--|--|
|   |                  | Close connection on<br>request of the host |  |

(1) Available for all channel modes

(2) Currently available only in channel mode RWH\_RW with reading of the UID



## 10.5.3 ASCII protocol communication via Ethernet TCP/IP

The configuration data and the process data of the evaluation unit are transferred to the evaluation unit by a TCP host via a TCP/IP connection. The host is the requestor, the evaluation unit the responder.



Sequence model of the connection establishment, configuration of the evaluation unit, data exchange and connection termination ( $\rightarrow$  10.5.4 ASCII protocol connection establishment between host and evaluation unit).

10.5.4 ASCII protocol connection establishment between host and evaluation unit

| TCP sequence | Host (PC)   | Evaluation unit  | Note  |
|--------------|---|--|---|
| A            | Set IP address  | Set IP address, i.e.<br>192.168.0.79 and open<br>TCP port 33000        | Switch on   |
|              | Establish a communication with the evaluation unit via the IP address 192.168.0.79 and the TCP port 33000 |  | TCP port 33000: ASCII protocol  |
| В            | Host writes configuration ->  |  |   |
|              |   | <- Evaluation unit<br>sends the result of the<br>configuration request | <ul> <li>If configuration not OK</li> <li>Evaluation unit sends "DIAG=01",<br/>therefore data exchange is not<br/>possible. A new configuration must<br/>be sent by the host.</li> <li>If configuration OK:</li> <li>Evaluation unit sends "DIAG=00",<br/>data exchange is possible.</li> </ul> |
| С            | Host writes IO channel configuration ->   |  |   |
|              |   | <- Evaluation unit sends   | If configuration not OK:  |
|              |   | result of configuration request  | > Evaluation unit sends "DIAG=01",<br>therefore data exchange is not<br>possible. New configuration must be<br>sent by the host.  |

## Data exchange with "request -> response" relationship (1)

| D | Read "UID" -> |             | Data exchange mode |
|---|---------------|-------------|--------------------|
|   |               | <- Read UID |                    |

## Data exchange with automatic response of the evaluation unit (2)

| D1 | Receive "UID" -> |                  | Data exchange mode (2)                 |
|----|------------------|------------------|--|
|    |                  | <- Send UID data |  |
|    |                  |                  |  |
| D2 | -                |                  | Input data is sent by the host without |
|    |                  | <- Send UID data | writing                                |
|    |                  |                  |  |
| D3 | -                |                  | Input data is sent by the host without |
|    |                  | <- Send UID data | writing                                |

## Port closed

| E | Close connection |  |  |
|---|------------------|--|--|
|   |                  | Close connection on<br>request of the host |  |

(1) Available for all channel modes

(2) Available in channel mode:

RWH\_RW: Read "UID"

Read user data memory of the tag

INPUT: Receive inputs

# 11 Binary protocol of the evaluation unit

The binary protocol of the evaluation unit is transferred within the user data field of the TCP/IP connection.

## 11.1 Data frame format of the evaluation unit

## 11.1.1 Request sent by the controller (controller -> evaluation unit)

| Byte  | Content                           | Note  |
|-------|-----------------------------------|---|
| 07    | Command header                    | $\rightarrow$ 11.2.1 General description of the command request (controller -> evaluation unit) |
| 8 47  | Parameters of the evaluation unit | $\rightarrow$ 11.3 Parameter frame of the evaluation unit                                       |
| or    |                                   |   |
| 8 151 | Data exchange                     | $\rightarrow$ 11.4 Data exchange frame  |

## 11.1.2 Response sent by the the evaluation unit (evaluation unit -> host)

| Byte  | Content                           | Note  |
|-------|-----------------------------------|---|
| 07    | Command header                    | → 11.2.1 General description of the command request (controller -> evaluation unit) |
| 8 151 | Parameters of the evaluation unit | $\rightarrow$ 11.3 Parameter frame of the evaluation unit                           |
|       | Data exchange                     | $\rightarrow$ 11.4 Data exchange frame  |

 $\int_{1}^{\infty}$  Frame data is identical for the parameters of the evaluation unit and data exchange.

## 11.2 Set-up of the data communication

After the host has established the TCP/IP connection, the parameters of the evaluation unit have first to be set. The controller can then change the evaluation unit into the "data exchange" mode ( $\rightarrow$  10.5 Ethernet TCP/IP model of the RFID evaluation unit).

## 11.2.1 General description of the command request (controller -> evaluation unit)

| Byte | Content           | Note   |
|------|-------------------|--|
| 0    | Function code 0x1 | Mode "Write configuration"                     |
|      | Function code 0x2 | Mode "Data exchange"                           |
| 17   | Reserved          | Reserved for future use, should be set to 0x00 |



A reconfiguration is only allowed if the evaluation unit is in the "data exchange" mode and the TCP/ IP connection was closed and opened again.

## 11.2.2 General description of the command response (evaluation unit -> controller)

| Byte | Content                        | Note  |
|------|--------------------------------|---|
| 0    | Mirroring of the function code | Mirroring of the function code of the request sent by the controller.   |
| 1 3  | Reserved                       | For future use. Should be set to 0x00.  |
| 4 7  | Status (1)                     | Status of the mode "write configuration".   |
|      |                                | 0x0F000000 Application ready  |
|      |                                | -> Change to the "data exchange" mode possible  |
|      |                                | 0x0F000001 Application not ready  |
|      |                                | -> Change to the "data exchange" mode requested, but configuration is not confirmed by the evaluation unit  |
|      |                                | 0x0F000101 Mode not allowed   |
|      |                                | -> A new "write configuration" request was done but the evaluation unit expects to change to the "data exchange" mode because a valid configuration is already set. |
|      |                                | Solution: First change to the "data exchange" mode and then send a new "write configuration" request.   |
|      |                                | 0x0F000102 Mode invalid   |
|      |                                | -> A mode other than "write configuration" and "data exchange" was requested by the user. Function code is not 0x1 or 0x2.  |
|      |                                | 0x0F000200 Parameter of the evaluation unit invalid   |
|      |                                | -> Please check the settings of the "global parameter of the evaluation unit" and the "channel parameter"   |
|      |                                | 0x0F000201 Reconfiguration failed   |
|      |                                | -> Reconfiguration not possible (internal error)  |

(1) Status is type of DWORD. Depending on the controller system it may be displayed in reverse order. Example: 0x0F000101 is transferred via TCP/IP with "01 01 00 0F".

## 11.3 Parameter frame of the evaluation unit

# 11.3.1 Request of the controller "write configuration" (controller -> evaluation unit)

| Byte  | Content                                      | Note  |
|-------|--|---|
| 07    | Command header                               | → 11.2.1 General description of the command request (controller -> evaluation unit) |
| 8 15  | Global parameters of the evaluation unit     | $\rightarrow$ 11.3.3 Coding of the global parameters of the evaluation unit         |
| 16 23 | Channel parameter Ch1 of the evaluation unit | $\rightarrow$ 11.3.4 Coding of the channel parameters of the                        |
| 24 31 | Channel parameter Ch2 of the evaluation unit | evaluation unit   |
| 32 39 | Channel parameter Ch3 of the evaluation unit |   |
| 40 47 | Channel parameter Ch4 of the evaluation unit |   |

# 11.3.2 Response sent by the evaluation unit in the mode "write configuration" (evaluation unit -> controller)

| Byte  | Content        | Note   |
|-------|----------------|--|
| 0 7   | Command header | $\rightarrow$ 11.2.2 General description of the command response (evaluation unit -> controller) |
| 8 151 | Set to 00h     | Not used   |

| Byte offset | Content                                     | Note  |
|-------------|---|---|
| 0 7         | Command header                              | $\rightarrow$ 11.2.1 General description of the command request (controller -> evaluation unit)   |
| 8           | Failsafe mode (default: off)                | Failsafe mode = off:  |
|             |   | If the connection to the controller is lost, all IO channels are deactivated.   |
|             |   | Failsafe mode = on:   |
|             |   | If the connection to the controller is lost, the IO channels hold the state set by the controller and the outputs C/Qo hold the last state set by the controller. |
| 9           | Reserved                                    | Future use  |
| 10          | Reserved                                    | Future use  |
| 11          | Control register 1 for all 4 output drivers | Default value: 0x00   |
|             |   | This value forces the evaluation unit to use the default settings of the firmware (1)   |
| 12          | Control register 2 for all 4 output drivers | Default value: 0x00   |
|             |   | This value forces the evaluation unit to use the default settings of the firmware (1)   |
| 13 15       | Reserved                                    | -   |

# **11.3.3** Coding of the global parameters of the evaluation unit

(1) In standard applications the default values can be used.

## 11.3.4 Coding of the channel parameters of the evaluation unit

The four channels of the evaluation unit have the same data structure.

| Byte (name) | Content                        | Note  |
|-------------|--------------------------------|---|
| N+0         | Channel IO-x number            | Used for channel separation   |
| (CN)        | [01h 04h]                      |   |
| N+1         | Channel configuration          | Used for settings of the channel mode   |
| (CC)        | [01h,02h,03h,0Bh]              |   |
|             |                                | 01h for the mode INACTIVE (32 bytes In/Out)                                       |
|             |                                | 02h for the mode INPUT (32 bytes In/Out)  |
|             |                                | 03h for the mode OUTPUT (32 bytes In/Out)   |
|             |                                | 04h 0Ah reserved  |
|             |                                | 0Bh for mode RWH_RW (32 bytes In/Out)   |
| N+2         | Data hold time                 | Hold time I/Q, UID, TP bit  |
| (DH)        | [00h FFh] in 10 x milliseconds |   |
|             | Default: 0 ms                  |   |
| N+3         | Block length of the tag        | -   |
| (TL)        | [1,2,4,8,16,32,64,128,255]     |   |
|             | Default: 4 bytes               |   |
| N+4.0       | Overload detection             | Overload at output L+ > 500 mA  |
| (OL)        | [01h=on / 00=off]              | Only valid for the channel configuration mode "output"                            |
|             | Default: on                    |   |
| N+4.1       | Overcurrent detection          | Overcurrent at output   |
| (OC)        | [on/off]                       | C/Qo > 500 mA   |
|             | Default: on                    |   |
| N+4.2       | Reserved for future use        | -   |
| N+4.3       | TP bit delayed                 | TP bit and UID data within the module RWH_RW are held for the                     |
| (TD)        | [01h=on / 00=off]              | time set in the DH byte.  |
|             | Default: off                   | Note: Data hold time has no effect if data is read from the user area of the tag. |
| N+5         | Reserved for future use        | -   |
| N+7         |                                |   |
| (-)         |                                |   |

Channel 1: N = 08 (end of data at byte 43) Channel 2: N = 44 (end of data at byte 79)

Channel 3: N = 80 (end of data at byte 115)

Channel 4: N = 116 (end of data at byte 151)

Example  $\rightarrow$  13.1 Send configuration

# 11.4 Data exchange frame

## 11.4.1 Content of the "data exchange" frame

The following modules can be transferred within the "data exchange" mode.

| Module name | Function   |
|-------------|--|
| Inactive    | Switch the IO channel of the evaluation unit to the mode inactive.   |
| Input       | Switch the IO channel of the evaluation unit to the mode input. Two IEC61131 inputs C/Qi and I/Q can be read.                                |
| Output      | Switch the IO channel of the evaluation unit to the mode output. One IEC61131 output C/Qo can be set and one IEC61131 input I/Q can be read. |
| RWH_RW      | Switch the IO channel of the evaluation unit to the RFID communication mode. There are 3 modes to access the read/write head:                |
|             | - Read the UID of the tag  |
|             | - Read the user data area of the tag   |
|             | - Write to the user data area of the tag   |
|             | Note: The diagnostic information can be read via every module.   |

## 11.4.2 Command request of the controller in the "data exchange" mode (controller -> evaluation unit)

| Byte    | Content                         | Note  |
|---------|---------------------------------|---|
| 07      | Command header                  | $\rightarrow$ 11.2.1 General description of the command request (controller -> evaluation unit) |
| 8 43    | Data exchange request channel 1 | ightarrow 11.4.1 Content of the "data exchange" frame   |
| 44 79   | Data exchange request channel 2 |   |
| 80 115  | Data exchange request channel 3 |   |
| 116 151 | Data exchange request channel 4 |   |

# 11.4.3 Command response of the evaluation unit in the "data exchange" mode (evaluation unit -> controller)

| Byte    | Content                          | Note  |
|---------|----------------------------------|---|
| 07      | Command header                   | $\rightarrow$ 11.2.1 General description of the command request (controller -> evaluation unit) |
| 8 43    | Data exchange response channel 1 | $\rightarrow$ 11.4.3 Command response of the evaluation unit in the "data                       |
| 44 79   | Data exchange response channel 2 | exchange" mode (evaluation unit -> controller)  |
| 80 115  | Data exchange response channel 3 |   |
| 116 151 | Data exchange response channel 4 |   |

Example for "read UID on request"  $\rightarrow$  13.2 Read UID on request

Example for "read UID automatically"  $\rightarrow$  13.3 Read UID automatically

Example for "read diagnostic information"  $\rightarrow$  13.4 Read diagnostic information

Example for "reset DR bit on all 4 channels"  $\rightarrow$  13.5 Reset bit DR on all 4 channels

Example for "read user data area of the tag"  $\rightarrow$  13.6 Read user data area of the tag

Example for "write user data area to the tag"  $\rightarrow$  13.7 Write user data area to the tag

# 12 Functional description of the binary protocol

## 12.1 Overview of the available modules

| Module                    | Module identifier | IO-n hardware mode                 | Note            |
|---------------------------|-------------------|------------------------------------|-----------------|
| Inactive (36 byte In/Out) | 01h               | Off                                | High impedance  |
|                           |                   | (Hi-Z C/Qo, C/Qi and I/Q)          |                 |
| Input (36 byte In/Out)    | 02h               | Input                              | IEC61131 input  |
|                           |                   | (input C/Qi and I/Q active)        |                 |
| Output (36 bytes In/Out)  | 03h               | Output                             | IEC61131 output |
|                           |                   | (output C/Qo and input I/Q active) |                 |
| Reserved                  | 04h 0Ah           | Reserved                           | -               |
| RWH_RW (36 bytes In/Out)  | 0Bh               | UART                               | Command channel |
|                           |                   | (communication mode ID-Link)       |                 |

ñ

The defined module length of the module identifiers 01h, 02h, 03h and 0Bh is 36 bytes. 36 bytes In => length per module within the process input image of the controller 36 byte Out => length per module within the process output image of the controller

## 12.2 Detailed module description

## 12.2.1 Module "inactive"

This module allows the user to

- switch off an unused process interface IO-1 ... IO-4.
- read the diagnostic information of the evaluation unit.

## Process output image of the controller (module "inactive")

| Byte no. | Bit  |      |   |   |   |   |   |   |
|----------|------|------|---|---|---|---|---|---|
|          | 7    | 6    | 5 | 4 | 3 | 2 | 1 | 0 |
| 1        | 0    | DR   | 0 | 0 | 0 | 0 | 0 | 0 |
| 2        |      | 0x00 |   |   |   |   |   |   |
| 3        |      | 0x00 |   |   |   |   |   |   |
|          |      |      |   |   |   |   |   |   |
| 35       | 0x00 |      |   |   |   |   |   |   |
| 36       | 0x00 |      |   |   |   |   |   |   |

## Description byte 1 "control byte"

| Bit    | Value  | Description                                  | Note   |
|--------|--------|--|--|
| DR (1) | 0      | No read request                              | Data bytes 2 36 of the process input image of the controller are set to 0x00 |
|        | 0 -> 1 | Read diagnostics of the evaluation unit      | -  |
|        | 1      | Read request of the diagnostics<br>activated | DR must be held on 1 until the<br>diagnostics response is available          |

(1) Diagnostics of the evaluation unit is only available if bit "Diag" is set within the command response.

## **Description bytes 2...36**

Not used. Should be set to 0x00 within the process output image of the controller.

## Process input image of the controller (module "inactive")

| Byte no. | Bit                                  |        |   |   |   |   |   |   |
|----------|--------------------------------------|--------|---|---|---|---|---|---|
|          | 7                                    | 6      | 5 | 4 | 3 | 2 | 1 | 0 |
| 1        | Diag                                 | DR-RDY | 0 | 0 | 0 | 0 | 0 | 0 |
| 2        | 0x00 / number of diagnostic messages |        |   |   |   |   |   |   |
| 3        | 0x00 / Function_Num                  |        |   |   |   |   |   |   |
| 4        | 0x00 / Error_Decode                  |        |   |   |   |   |   |   |
| 5        | 0x00 / Error_Code_1                  |        |   |   |   |   |   |   |
| 6        | 0x00 / Error_Code_2                  |        |   |   |   |   |   |   |
|          |                                      |        |   |   |   |   |   |   |
| 36       | Not used                             |        |   |   |   |   |   |   |

## Description byte 1 "status byte"

| Bit    | Value | Description Note  |   |
|--------|-------|---|---|
| DR-RDY | 0     | Reading not started or diagnostic data of the evaluation unit not ready | -   |
|        | 1     | Reading diagnostics ready   | Diagnostics reading response of the<br>evaluation unit is ready and available in<br>bytes 2n. |
| Diag   | 0     | No diagnostics available  | -   |
|        | 1     | Diagnostics of the evaluation unit<br>occurred                          | The command response is not influenced by setting the diagnostic bit.                         |

#### Description byte 2 "number of diagnostic messages"

Number of diagnostic messages. A message contains Func\_Num, Error\_Decode, Error\_Code\_1, Error\_Code\_2. (0 = no diagnostics, 1...4 = 1...4 diagnostic message(s)).

## Description bytes 3...n

If bit "DR-RDY" is set within the status byte, these bytes contain the error codes of the evaluation unit. Otherwise these bytes are set to the default value 0x00 by the evaluation unit.

If more than one diagnostic message is available, all will be transferred. Up to 4 diagnostic messages can be transferred ( $\rightarrow$  13 Data frame examples for the binary protocol).

## Description bytes (n+1)...36

Set to the default value 0x00 by the evaluation unit.

# 12.2.2 Module "input"

This module allows the user to

- read the binary inputs of the process interfaces IO-1 ... IO-4.
- read the diagnostic information of the evaluation unit.

## Process output image of the controller (module "input")

| Byte no. |      | Bit             |   |   |   |   |   |   |  |
|----------|------|-----------------|---|---|---|---|---|---|--|
|          | 7    | 7 6 5 4 3 2 1 0 |   |   |   |   |   |   |  |
| 1        | 0    | DR              | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 2        |      | 0x00            |   |   |   |   |   |   |  |
| 3        |      | 0x00            |   |   |   |   |   |   |  |
|          |      |                 |   | - |   |   |   |   |  |
| 35       | 0x00 |                 |   |   |   |   |   |   |  |
| 36       |      | 0x00            |   |   |   |   |   |   |  |

## Description byte 1 "control byte"

| Bit    | Value  | Description                             | Note   |
|--------|--------|---|--|
| DR (1) | 0      | No read request                         | Data bytes 2 36 of the process input image of the controller are set to 0x00 |
|        | 0 -> 1 | Read diagnostics of the evaluation unit | -  |
|        | 1      | Read request of diagnostics activated   | DR must be held on 1 until the<br>diagnostics response is available          |

(1) Diagnostics of the evaluation unit is only available if bit "Diag" is set within the command response.

## Description bytes 2...36

Not used. They should be set to 0x00 in the process output image by the controller.

## Process input image of the controller (module "input")

| Byte no. |      | Bit                 |      |                  |               |      |         |          |  |  |
|----------|------|---------------------|------|------------------|---------------|------|---------|----------|--|--|
|          | 7    | 6                   | 5    | 4                | 3             | 2    | 1       | 0        |  |  |
| 1        | Diag | DR-RDY              | 0    | 0                | OL            | 0    | I/Q (1) | C/QI (1) |  |  |
| 2        |      |                     | 0x00 | ) / number of di | agnostic mess | ages |         |          |  |  |
| 3        |      | 0x00 / Function_Num |      |                  |               |      |         |          |  |  |
| 4        |      | 0x00 / Error_Decode |      |                  |               |      |         |          |  |  |
| 5        |      |                     |      | 0x00 / Erro      | or_Code_1     |      |         |          |  |  |
| 6        |      | 0x00 / Error_Code_2 |      |                  |               |      |         |          |  |  |
|          |      |                     |      |                  |               |      |         |          |  |  |
| 36       |      | Not used            |      |                  |               |      |         |          |  |  |

(1) Diagnostics of the evaluation unit is only available if bit "Diag" is set within the command response.

## Description byte 1 "status byte"

| Bit      | Value | Description   | Note   |
|----------|-------|---|--|
| C/Qi (1) | 0     | Input voltage at C/Qi < 8 V   | Level of C/Qi is measured by hardware  |
|          | 1     | Input voltage at C/Qi > 11 V  | Level of C/Qi is measured by hardware  |
| I/Q (1)  | 0     | Input voltage at I/Q < 8 V  | Level of I/Q is measured by hardware   |
|          | 1     | Input voltage at I/Q > 11 V   | Level of I/Q is measured by hardware   |
| OL       | 0     | L+ OK   | Set by hardware  |
|          | 1     | Overload on L+  | Set by hardware  |
| DR-RDY   | 0     | Reading not started or diagnostic data of the evaluation unit not ready | -  |
|          | 1     | Reading diagnostics ready   | Diagnostics reading response of the evaluation unit is ready and available in bytes 25 |
| Diag     | 0     | No diagnostics available  | -  |
|          | 1     | Diagnostics of the evaluation unit occurred                             | The command response is not influenced by setting the diagnostic bit.                  |

(1) Diagnostics of the evaluation unit is only available if bit "Diag" is set within the command response.

## Description byte 2 "number of diagnostic messages"

Number of diagnostic messages. A message contains Func\_Num, Error\_Decode, Error\_Code\_1, Error\_Code\_2. (0 = no diagnostics, 1...4 = 1...4 diagnostic message(s)).

## Description bytes 3...n

If bit "DR-RDY" is set within the status byte, the subsequent data contains the error codes of the evaluation unit. Otherwise this data is set to the default value 0x00 by the evaluation unit.

If more than one diagnostic message is available, up to 3 more diagnostic messages will also be transferred. ( $\rightarrow$  13 Data frame examples for the binary protocol).

## Description bytes (n+1)...36

Set to the default value 0x00 by the evaluation unit.

# 12.2.3 Module "output"

This module allows the user to

- write to the binary outputs of the process interfaces IO-1 ... IO-4.
- read the binary inputs of the process interfaces IO-1 ... IO-4.
- read the diagnostic information of the evaluation unit.

## Process output image of the controller (module "output")

| Byte no. |      | Bit             |   |   |   |    |   |   |  |  |
|----------|------|-----------------|---|---|---|----|---|---|--|--|
|          | 7    | 7 6 5 4 3 2 1 0 |   |   |   |    |   |   |  |  |
| 1        | 0    | DR              | 0 | 0 | 0 | HC | 0 | С |  |  |
| 2        |      | 0x00            |   |   |   |    |   |   |  |  |
| 3        |      | 0x00            |   |   |   |    |   |   |  |  |
|          |      |                 |   |   |   |    |   |   |  |  |
| 35       | 0x00 |                 |   |   |   |    |   |   |  |  |
| 36       |      | 0x00            |   |   |   |    |   |   |  |  |

#### Description byte 1 "control byte"

| Dit    | Value  | Description  | Noto   |
|--------|--------|--|--|
| DIL    | value  | Description  | Note   |
| С      | 0      | Output C/Qo set to 0                                   | -  |
|        | 1      | Output C/Qo set to 1                                   | -  |
| HC     | 0      | Allow highside output current of max.<br>0.5 A at C/Qo | Bit HC only valid on channel IO-3 and channel IO-4                           |
|        | 1      | Allow highside output current of max. 1 A at C/Qo      | Bit HC only valid on channel IO-3 and channel IO-4                           |
| DR (1) | 0      | No read request  | Data bytes 2 36 of the process input image of the controller are set to 0x00 |
|        | 0 -> 1 | Read diagnostics of the evaluation unit                | -  |
|        | 1      | Read request of diagnostics activated                  | DR must be held on 1 until the diagnostics response is available             |

(1) Diagnostics of the evaluation unit is only available if bit "Diag" is set within the command response.

#### **Description bytes 2...36**

Not used. They should be set to 0x00 in the process output image by the controller.

## Process input image of the controller (module "output")

| Byte no. |      | Bit                 |      |                  |               |      |     |      |  |  |
|----------|------|---------------------|------|------------------|---------------|------|-----|------|--|--|
|          | 7    | 6                   | 5    | 4                | 3             | 2    | 1   | 0    |  |  |
| 1        | Diag | DR-RDY              | 0    | 0                | OL            | HC   | I/Q | C/QI |  |  |
| 2        |      |                     | 0x00 | ) / number of di | agnostic mess | ages |     |      |  |  |
| 3        |      | 0x00 / Function_Num |      |                  |               |      |     |      |  |  |
| 4        |      | 0x00 / Error_Decode |      |                  |               |      |     |      |  |  |
| 5        |      |                     |      | 0x00 / Erro      | or_Code_1     |      |     |      |  |  |
| 6        |      | 0x00 / Error_Code_2 |      |                  |               |      |     |      |  |  |
|          |      |                     |      |                  |               |      |     |      |  |  |
| 36       |      |                     |      | Not              | used          |      |     |      |  |  |

## Description byte 1 "status byte"

| Bit    | Value | Description   | Note   |  |
|--------|-------|---|--|--|
| C/Qi   | 0     | Input voltage at C/Qo = L   | The level at the input C/Qi is not measured but taken from the output value at C/Qo.   |  |
|        | 1     | Input voltage at C/Qo = H   | The level at input C/Qi is not measured but taken from the output value at C/Qo.       |  |
| I/Q    | 0     | Input voltage at I/Q < 8 V  | The level at input I/Q is measured by the evaluation unit.                             |  |
|        | 1     | Input voltage at I/Q > 11 V   | The level at input I/Q is measured by the evaluation unit.                             |  |
| HC     | 0     | Current of max 0.5 A enabled at C/Qo                                    | -  |  |
|        | 1     | Current of max 1 A enabled at C/Qo                                      | Only valid on channels IO-3 and IO-4   |  |
| OL     | 0     | L+ OK   | Set by hardware  |  |
|        | 1     | Overload on L+  | Set by hardware  |  |
| DR-RDY | 0     | Reading not started or diagnostic data of the evaluation unit not ready | -  |  |
|        | 1     | Read diagnostics ready  | Diagnostics reading response of the evaluation unit is ready and available in bytes 25 |  |
| Diag   | 0     | No diagnostics available  | -  |  |
|        | 1     | Diagnostics of the evaluation unit occurred                             | The command response is not influenced by setting the diagnostic bit.                  |  |

## Description byte 2 "number of diagnostic messages"

Number of diagnostic messages. A message contains Func\_Num, Error\_Decode, Error\_Code\_1, Error\_Code\_2. (0 = no diagnostics, 1...4 = 1...4 diagnostic message(s)).

## Description bytes 3...n

If bit "DR-RDY" is set within the status byte, these bytes contain the error codes of the evaluation unit. Otherwise these bytes are set to the default value 0x00 by the evaluation unit.

If more than one diagnostic message is available, up to 3 more diagnostic messages will also be transferred. ( $\rightarrow$  13 Data frame examples for the binary protocol).

## Description bytes (n+1)...36

Set to the default value 0x00 by the evaluation unit.

# 12.2.4 Module RWH\_RW

This module allows the user to

- read the UID of the tag via the read/write head at the process interfaces IO-1 ... IO-4.
- read the user data area of the tag via the read/write head at the process interfaces IO-1 ... IO-4.
- write to the user data area of the tag via the read/write head at the process interfaces IO-1 ... IO-4.
- read the diagnostic information of the evaluation unit and of the process interfaces IO-1 ... IO-4.

## Process output image of the controller (RWH RW)

| Byte no. |              | Bit             |    |        |         |    |    |     |  |  |
|----------|--------------|-----------------|----|--------|---------|----|----|-----|--|--|
|          | 7            | 7 6 5 4 3 2 1 0 |    |        |         |    |    |     |  |  |
| 1        | Res          | DR              | ER | UR     | RD      | WR | AO | Res |  |  |
| 2        |              | Data byte 1     |    |        |         |    |    |     |  |  |
| 3        |              | Data byte 2     |    |        |         |    |    |     |  |  |
|          |              |                 |    |        |         |    |    |     |  |  |
| 35       | Data byte 31 |                 |    |        |         |    |    |     |  |  |
| 36       |              |                 |    | Data b | oyte 32 |    |    |     |  |  |

#### Description byte 1 "control byte"

| Bit | Bit name | Bit = 1   | Bit = 0                                |
|-----|----------|---|--|
| 0   | Res      | Reserved  |  |
| 1   | AO       | Request "antenna field off"   | Request "antenna field on"             |
| 2   | WR       | Write data to the user data area of the tag   | No command                             |
| 3   | RD (1)   | Read data from the user data area of<br>the tag or receive UID controlled by<br>message   | No command                             |
| 4   | UR (2)   | Mode "access to the user data area of the tag" selected   | Mode "read UID of the tag" selected    |
| 5   | ER (3)   | Mode "message-controlled reception of the UID" selected   | Mode "receive UID on request" selected |
| 6   | DR       | Reading the diagnostics of the<br>evaluation unit set by the controller to<br>fetch the diagnostics, indicated by the<br>evaluation unit in the Diag status bit | No command                             |
| 7   | Res      | Reserved  |  |

(1) Bit must be set depending on the mode of bits UR and ER

(2) If the mode is changed, the data is set to the default value 0x00 within the process data image. The successful mode change can be evaluated with bit UD within byte 1 of the process data image.

- (3) If bit ER and bit RD are set to 1, an automatic reading process of the UID starts if a tag is detected. The controller receives the UID if the status of the tag changes from "not present" to "present" and from "present" to "not present" without sending a request to the evaluation unit. This helps to reduce the requests sent by the controller, thus reducing Ethernet traffic.
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The bits WR, RD, DR are edge-controlled bits. The change from status "0->1" activates the command request. The status "1" forces the evaluation unit to hold the command response. The status "0" forces the evaluation unit to set the data to the default value "0x00" within the process input image of bytes 2...36.



It is not allowed to set the bits WR, RD, DR simultaneously because the module can only process one request! Otherwise an error message is created (Diag =1).

#### Description bytes 2...36 "Data bytes 1...32"

Depending on the selected mode this data area contains command data to send to the evaluation unit.

## Process input image of the controller (RWH RW)

| Byte no. | Bit          |              |    |    |        |        |    |    |  |
|----------|--------------|--------------|----|----|--------|--------|----|----|--|
|          | 7            | 6            | 5  | 4  | 3      | 2      | 1  | 0  |  |
| 1        | Diag         | DR-RDY       | EA | UD | RD-RDY | WR-RDY | AI | TP |  |
| 2        |              | Data byte 1  |    |    |        |        |    |    |  |
| 3        |              | Data byte 2  |    |    |        |        |    |    |  |
|          |              |              |    | -  |        |        |    |    |  |
| 35       | Data byte 31 |              |    |    |        |        |    |    |  |
| 36       |              | Data byte 32 |    |    |        |        |    |    |  |

## Description byte 1 "status byte"

| Bit | Bit name   | Bit = 1   | Bit = 0  |
|-----|------------|---|--|
| 0   | TP         | Tag present   | Tag not present  |
| 1   | AI         | Antenna field inactive  | Antenna field active. This bit is to be set if the antenna is switched on by the read/write head.      |
| 2   | WR-RDY     | Write data to the user data area of the tag ready   | No command started or "write data to<br>the user data area of the tag" not ready<br>or error occurred  |
| 3   | RD-RDY (1) | Read data from the user data area<br>of the tag ready or UID is sent by the<br>evaluation unit if the tag status changes  | No command started or "read data from<br>the user data area of the tag" not ready<br>or error occurred |
| 4   | UD         | Mode "access to the user data area of the tag" active   | Mode "read UID of the tag" activated   |
| 5   | EA         | Mode "receive UID on change of<br>message" active   | Mode "read UID on request" activated   |
| 6   | DR-RDY     | Response to the reading of the<br>diagnostic data of the evaluation unit<br>is ready and available in the response<br>buffer.<br>Coding:<br>Byte 2: number of diagnostic messages<br>Byte 3: Function_Num,<br>Byte 4: Error_Decode,<br>Byte 5: Error_Code_1,<br>Byte 6: Error_Code_2 (2)<br>Byte 7: | Reading not started or diagnostic data of<br>the evaluation unit not ready                             |
| 7   | Diag       | Diagnostics of the evaluation unit<br>occurred but not yet written in the<br>response buffer. The response buffer<br>still contains tag data. The diagnostic<br>data will be copied to the response<br>buffer after detection that the DR control<br>bit is set by the controller                   | No diagnostics available   |

(1) Bit set depending on the selected mode by setting UD or EA.

(2) For coding of the diagnostic message see table 1..7.

## Description bytes 2...36 "Data bytes 1...32"

Depending on the selected mode this data area contains the command response read by the evaluation unit or diagnostics information.

# 12.2.5 Mode "read UID of the tag"

In this module the controller can read the UID of the tag. Two different read modes are possible:

- Read UID on request
- Receive UID whenever the evaluation unit detects a change of the UID data

#### Process output image of the controller (RWH RW)

| Byte no. |   | Bit      |    |            |        |   |    |   |
|----------|---|----------|----|------------|--------|---|----|---|
|          | 7 | 6        | 5  | 4          | 3      | 2 | 1  | 0 |
| 1        | 0 | DR (3)   | ER | UR = 0 (1) | RD (2) | 0 | AO | 0 |
| 2        |   | Not used |    |            |        |   |    |   |
|          |   |          |    |            |        |   |    |   |
| 36       |   | Not used |    |            |        |   |    |   |

#### Description byte 1 "control byte"

| Bit        | Value  | Description                             | Note   |  |
|------------|--------|---|--|--|
| AO         | 0      | Request "antenna field on" inactive     | Activate the antenna field   |  |
|            | 1      | Request "antenna field off"             | Deactivate the antenna field   |  |
| RD (2)     | 0      | No UID read request                     | UID length/data is deleted in the data<br>bytes 236 of the process input image<br>of the controller                                |  |
|            | 1      | UID read request                        | RD must be held on 1 to read the UID.<br>The UID length/data is transmitted in the<br>data bytes 236 of the process input<br>image |  |
| UR (1)     | 0      | Mode "read UID" selected                | Must be set to 0 for reading the UID of the tag (default value)  |  |
| ER (2) (4) | 0      | Mode "read UID on request" selected     | Read UID once after request is sent by the controller  |  |
|            | 1      | Mode "receive UID on change" selected   | See (4)  |  |
| DR (3)     | 0      | No read request                         | Data bytes 2 36 of the process input image set to 0x00   |  |
|            | 0 -> 1 | Read diagnostics of the evaluation unit | -  |  |
|            | 1      | Diagnostics reading request activated   | DR must be held on 1 until the command response is available   |  |

(1) The mode can always be changed if the bits DR, RD and WR are set to 0 => no command active.

- (2) The bit RD is only evaluated if the bit UR is set to 0. A simultaneous activation of the bits DR and ER is not allowed!
- (3) Reading the diagnostics is only possible if ER and RD are set to 0. The evaluation diagnostics is only available if bit "Diag" is set within the command response. Otherwise the command response returns the default data "0x00" within bytes 2...36 of the command response.
- (4) If bits ER and RD are set to 1, a reading process of the UID is started when a change of bit TP is detected. So the user only receives a message from the evaluation unit if the status of the tag changes from "not present" to "present" and from "present" to "not present". This helps to limit the read requests of the controller. Additionally the Ethernet data traffic is reduced.

Description byte 1 "control byte" is set to the default value 0x00. Mode: read UID on request, antenna field on.

## Process input image of the controller (RWH RW)

| Byte no. |                        | Bit                  |    |      |            |   |    |    |
|----------|------------------------|----------------------|----|------|------------|---|----|----|
|          | 7                      | 6                    | 5  | 4    | 3          | 2 | 1  | 0  |
| 1        | Diag                   | DR-RDY               | EA | UD=0 | RD-RDY (1) | 0 | AI | TP |
| 2        |                        | UID data length read |    |      |            |   |    |    |
| 3        | UID data byte 1 (MSBy) |                      |    |      |            |   |    |    |
| 4        | UID data byte 2        |                      |    |      |            |   |    |    |
|          |                        |                      |    |      |            |   |    |    |
| 18       |                        | UID data byte 16     |    |      |            |   |    |    |
|          |                        |                      |    |      |            |   |    |    |
| 35       |                        | 0x00                 |    |      |            |   |    |    |
| 36       |                        |                      |    | 0x   | 00         |   |    |    |

## Description byte 1 "status byte"

| Bit        | Value | Description  | Note   |
|------------|-------|--|--|
| TP         | 0     | No tag detected in front of the antenna                        | -  |
|            | 1     | Tag detected in front of the antenna                           | The bit is set until the tag is detected by the read/write head irrespective of the setting of the channel parameter "data hold time". |
| AI         | 0     | Request "antenna field on" active                              | -  |
|            | 1     | Request "antenna field off" active                             | -  |
| RD-RDY (1) | 0     | UID reading stopped  | UID length/data is deleted in data bytes 236 of the process input image of the controller.   |
|            | 1     | UID reading started  | Every time the TP bit changes, the UID length/data is transmitted<br>in data bytes 218 of the process input image of the controller.   |
| DU         | 0     | Mode "read UID" active   | Feedback of the selected mode  |
| EA (1)     | 0     | Mode "read UID on request" active                              |  |
|            | 1     | Mode "receive UID on change" active                            |  |
| DR-RDY     | 0     | No diagnostics reading request or<br>diagnostic data not ready | -  |
|            | 1     | Diagnostics reading request of the                             | Error code:  |
|            |       | evaluation unit ready  | Byte 2: number of diagnostic messages  |
|            |       |  | Byte 3: Function_Num,  |
|            |       |  | Byte 4: Error_Decode,  |
|            |       |  | Byte 5: Error_Code_1,  |
|            |       |  | Byte 6: Error_Code_2   |
|            |       |  | Byte 7:  |
| Diag       | 0     | No error detected  | · · · · · · · · · · · · · · · · · · ·  |
|            | 1     | Diagnostics of the evaluation unit available                   |  |

(1) Only valid if bit ER is set. The user can evaluate the detection of a new tag by evaluating bit TP or the byte "UID data length read".

## Description byte 2 "UID data length read"

UID data length read. Data length of the UID read from tag [bytes].

If no tag is detected by the read/write head, this data field is set to 0x00.

## Description bytes 3 ... 6/10/14/18 "UID data byte"

Read UID of the tag with a length of 32/64/96/128 bits. Unused bytes are set to 0x00.

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If no tag is detected by the read/write head, this data field is set to 0x00.

## Description bytes 19 ... 36

Always set to 0x00.

# 12.2.6 Example for mode "read UID of the tag"

## Read UID on request

| Byte 1 | Control byte | Comment                                    |
|--------|--------------|--|
| 1      | 00h          | Read UID                                   |
|        |              | As a response the current UID is received. |
| 2      | 00h          | Read UID again                             |
|        |              | As a response the current UID is received. |
|        |              |  |



This mode is ideal if the controller knows when the tag is within the reading field of the antenna ( $\rightarrow$  13.2 Read UID on request).

## **Receive UID automatically**

| Byte 1 | Control byte | Comment   |
|--------|--------------|---|
| 1      | 28h          | Read UID  |
|        |              | In the returned message the current UID is received                         |
| 2      | -            | New UID data is sent if the antenna detects a change within UID data field. |
|        |              | UID data is sent if the antenna detects a change within the UID data field. |

This mode is ideal if the controller does not know when the tag is within the reading field of the antenna. The evaluation unit only sends the UID data if the antenna detects a change of the tag status "tag in field"/"tag not in field" ( $\rightarrow$  13.3 Read UID automatically).

# 12.2.7 Mode "read/write to user data area of the tag"

In this mode the user data area of the tag can be read or written to.

## Process output image of the controller (RWH RW)

| Byte no. |   | Bit                          |   |                 |                |        |    |   |
|----------|---|------------------------------|---|-----------------|----------------|--------|----|---|
|          | 7 | 6                            | 5 | 4               | 3              | 2      | 1  | 0 |
| 1        | 0 | DR (3)                       | 0 | UR (1)          | RD (2)         | WR (2) | AO | 0 |
| 2        |   | Read/write data length       |   |                 |                |        |    |   |
| 3        |   | 16-bit start address [D15D8] |   |                 |                |        |    |   |
| 4        |   | 16-bit start address [D7D0]  |   |                 |                |        |    |   |
| 5        |   | Not used / write data byte 1 |   |                 |                |        |    |   |
|          |   |                              |   |                 |                |        |    |   |
| 36       |   |                              |   | Not used / writ | e data byte 32 |        |    |   |

## Description byte 1 "control byte"

| Bit      | Value  | Description                                     | Note   |  |
|----------|--------|---|--|--|
| AO       | 0      | Request "antenna field on" inactive             | Activate the antenna field                                       |  |
|          | 1      | Request "antenna field off"                     | Deactivate the antenna field                                     |  |
| WR (2)   | 0      | No write request                                | -  |  |
|          | 0 -> 1 | Request "write user data to the tag"            | Data bytes 5 36 are written to the tag                           |  |
|          | 1      | Write request activated                         | WR must be held on 1 until the<br>command response is available  |  |
| RD (2)   | 0      | No read request                                 | Data bytes 2 36 of the process input image are set to 0x00       |  |
|          | 0 -> 1 | Request "read user data of the tag"             | -  |  |
|          | 1      | Read request activated                          | RD must be held on 1 until the command response is available     |  |
| UR (1) 1 |        | Mode "read/write user data of the tag" selected | Must be set to 1 for reading/writing the<br>user data of the tag |  |
| DR (3)   | 0      | No read request                                 | Data bytes 2 36 of the process input image are set to 0x00       |  |
|          | 0 -> 1 | Read diagnostics of the evaluation unit         | -  |  |
|          | 1      | Diagnostics reading request activated           | DR must be held on 1 until the command response is available     |  |

(1) Mode can always be changed if the bits DR, RD and WR are set to 0 => no command active.

(2) A simultaneous activation of the bits DR, WR and RD is not allowed! Make sure that the reading length and the 16-bit start address are set before the bits RD or WR are activated.

(3) Diagnostics of the evaluation unit is only available if the bit "Diag" is set within the command response. Otherwise the evaluation unit will return the default data "0x00" within bytes 2...36 of the command response.

## Description byte 2 "read / write data length"

Read data length or write data length, limited to a maximum number of 32 bytes.

## Description bytes 3... 4 "16-bit start address"

Start address of the user data area where the data is to be read or to be written to.

## Description bytes 5... 36 "not used / write data byte"

In the read mode these bytes are ignored.

In the write mode the data to be written must be copied to this data area (write data bytes 1 ... 32).

## Process input image of the controller (RWH RW)

| Byte no. |                          | Bit                          |   |      |        |        |    |    |
|----------|--------------------------|------------------------------|---|------|--------|--------|----|----|
|          | 7                        | 6                            | 5 | 4    | 3      | 2      | 1  | 0  |
| 1        | Diag                     | DR-RDY                       | 0 | UD=1 | RD-RDY | WR-RDY | AI | TP |
| 2        | Read / write data length |                              |   |      |        |        |    |    |
| 3        |                          | Read data byte 1 / not used  |   |      |        |        |    |    |
| 4        |                          | Read data byte 2 / not used  |   |      |        |        |    |    |
|          |                          |                              |   |      |        |        |    |    |
| 34       |                          | Read data byte 32 / not used |   |      |        |        |    |    |
|          |                          |                              |   |      |        |        |    |    |
| 36       |                          | 0x00                         |   |      |        |        |    |    |
|          |                          |                              |   |      |        |        |    |    |

| Bit    | Value                                | Description  | Note   |  |  |
|--------|--------------------------------------|--|--|--|--|
| TP     | 0                                    | No tag detected in front of the antenna  | -  |  |  |
|        | 1                                    | Tag detected in front of the antenna   | The bit is set until the tag is detected by the read/write head irrespective of the setting of the channel parameter "data hold time". |  |  |
| AI     | 0                                    | Request "antenna field on" active  | -  |  |  |
|        | 1 Request "antenna field off" active |  | -  |  |  |
| WR-RDY | 0                                    | No command request detected or<br>command execution active or error<br>occurred. | -  |  |  |
|        | 1                                    | Command execution is ready   | -  |  |  |
| RD-RDY | 0                                    | No command request detected or<br>command execution active                       | The number of the read bytes and the data read in the bytes [217] are deleted within the process input image of the controller.        |  |  |
|        | 1                                    | Command execution is ready   | Diag bit is not set  |  |  |
|        |                                      |  | Command execution ok   |  |  |
|        |                                      |  | Read length / read data byte is set in data bytes 217 of the process input image of the controller                                     |  |  |
|        |                                      |  | Diag bit is set  |  |  |
|        |                                      |  | Command execution not ok.  |  |  |
|        |                                      |  | Bytes for read length / read data are set to zero.   |  |  |
| UD     | 1                                    | Mode "read/write user data of the tag" active                                    | Feedback of the selected mode  |  |  |
| DR-RDY | 0                                    | No diagnostics reading request or<br>diagnostic data not ready                   | -  |  |  |
|        | 1                                    | No diagnostics reading request or  | Error code:  |  |  |
|        |                                      | diagnostic data not ready  | Byte 2: number of diagnostic messages  |  |  |
|        |                                      |  | Byte 3: Function_Num,  |  |  |
|        |                                      |  | Byte 4: Error_Decode,  |  |  |
|        |                                      |  | Byte 5: Error_Code_1,  |  |  |
|        |                                      |  | Byte 6: Error_Code_2   |  |  |
|        |                                      |  | Byte 7:  |  |  |
| Diag   | 0                                    | No error detected  | -  |  |  |
|        | 1                                    | Diagnostics of the evaluation unit available                                     | Maybe a channel dependent or independent error<br>occurred   |  |  |

## Description byte 1 "status byte"

## Description byte 2 "read / write data length"

Read data length or write data length.

## Description bytes 3... 36 "read data byte 1... 32"

- In the write mode these bytes are set to 0x00.
- In the read mode this data area contains the data of the user data area of the tag. Unused bytes are set to 0x00.
- In the mode "read diagnostics" this data area contains detailed error codes.

## 12.2.8 Examples for the mode "read/write to user data area of the tag"

## Read "user data area of the tag" from the IO channel

| Byte 1 | Control byte | Comment   |
|--------|--------------|---|
| 1      | 18h          | Read "user data area"                           |
| 2      | 10h          |   |
| 3      | 01h          | Address offset to be read from, here 102h = 514 |
| 4      | 02h          |   |
| 536    | 00h          | Reserved  |

As a response the evaluation unit transmits the data of the user data area ( $\rightarrow$  13.6 Read user data area of the tag).

#### Read "diagnostic information" from the IO channel

| Byte 1 | Control byte | Comment          |
|--------|--------------|------------------|
| 1      | 40h          | Read diagnostics |
| 236    | 00h          | Reserved         |

As a response the evaluation unit transmits the diagnostic data ( $\rightarrow$  13.4 Read diagnostic information).

## Write data to the "user data area of the tag"

| Byte 1 | Control byte | Comment  |
|--------|--------------|--|
| 1      | 14h          | Control byte: read "user data area"  |
| 2      | 10h          | As a response the evaluation unit transfers the data of the user data area |
| 3      | 01h          | Address offset to be read from, here 102h = 514                            |
| 4      | 02h          |  |
| 536    | 00h          | Reserved   |

As a response the evaluation unit sends the diagnostic data ( $\rightarrow$  13.7 Write user data area to the tag).

Before changing to another mode the active mode must be reset.

Example: 18h -> 10h -> 14h -> 10h -> 50h -> 18h

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# 13 Data frame examples for the binary protocol

Example configuration for 4 read/write heads. Antennas are connected to channels IO-1 and IO-2. Channel 3 and channel 4 are not connected.



To clearly distinguish the channels in the examples they are highlighted in different colours. The examples can be copied to other programs with the key combinations <CTRL>+<C> and <CTRL>+<V>.

## 13.1 Send configuration

#### Command sent by the controller

Controller: Set default parameters and select the module RWH\_RW for channels IO-1...IO-4.

## Response sent by the evaluation unit

Evaluation unit: application ready.

or

Evaluation unit: application not ready.

Solution: Wait until "application ready" is sent by the evaluation unit.

or

**01**000000<u>**0101000F**</u>0000....0000

Evaluation unit: mode not allowed.

Solution: First change to the mode "data exchange" and then send the new configuration string:

## 13.2 Read UID on request

## Command sent by the controller

Controller: "Read UID of the tag" on channels IO-1 and IO-2.

## Response sent by the evaluation unit

Evaluation unit: Send IO-1 and IO-2 data of the UID with a length of 8 bytes, send diagnostic data present on IO-3 and IO-4.

The UID can be read again by sending the same control byte "00" to the evaluation unit.

# 13.3 Read UID automatically

## Command sent by the controller

Controller: UID of the tag automatically received on channels IO-1 ... IO-4.

## Response sent by the evaluation unit

Evaluation unit: Application ready, IO-1 and IO-2 detect a new tag and send UID with a length of 8 bytes; no read/write head available on IO-3 and IO-4.

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## Response sent by the evaluation unit

Evaluation unit: Application ready, IO-1 detects no tag, IO-2 has the same data as before.

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## 13.4 Read diagnostic information

## Command sent by the controller

Controller: Read diagnostic information.

## Response sent by the evaluation unit

Evaluation unit: Send diagnostic information.

## **Channel information**

Channel IO-1 has no diagnostic information:

41000000000 -> no diagnostics present

Channel IO-2 has no diagnostic information:

41000000000 -> no diagnostics present

Channel IO-3 has diagnostic information:

C001F4FE9000 -> no antenna detected on port

Channel IO-4 has diagnostic information:

C001F4FE9000 -> no antenna detected on port

## 13.5 Reset bit DR on all 4 channels

Before new diagnostic information can be read, bit DR must be reset within the control byte.

## Command sent by the controller

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Controller: Remove diagnostics reading request and "read UID of the tag" on channels IO-1 and IO-2.

## Response sent by the evaluation unit

Evaluation unit: Send UID of channels IO-1 and IO-2 with a length of 8 bytes, send diagnostic data present on IO-3 and IO-4.

## 13.6 Read user data area of the tag

## Command sent by the controller

Controller: Read 32-byte user data from channels IO-1 and IO-2.

#### Response sent by the evaluation unit

Evaluation unit: Send "read user data from channels IO-1 and IO-2", send "diagnostics present on IO-3 and IO-4".

## Command sent by the controller

Controller: Remove read request of the user data on channels IO-1 and IO-2.

#### Response sent by the evaluation unit

Evaluation unit: Acknowledge removal of the read request of the user data

Use the following string to read the diagnostic data in the mode "read user data area of the tag":

## Command sent by the controller

Controller: Read diagnostic information on channels IO-1 and IO-2.

## 13.7 Write user data area to the tag

## Command sent by the controller

Controller: Write 20h = 32 bytes at the address offset 40h = 64 to the user data area of the tag on channel IO-1, write 10h = 16 bytes at the address offset 00h to the user data area of the tag on channel IO-2, no command request on IO-3 and IO-4.

#### Response sent by the evaluation unit

Evaluation unit: Write data on channels IO-1 and IO-2 not finished.

#### Response sent by the evaluation unit

Evaluation unit: Write data on channel IO-1 not finished, write data on channel IO-2 finished.

#### Response sent by the evaluation unit

Evaluation unit: Write data on channel IO-1 finished, write data on channel IO-2 finished.

#### Command sent by the controller

Controller: Remove write request.

## Response sent by the evaluation unit

Evaluation unit: Removal of the write request acknowledged.

Use the following string to read the diagnostic data in the mode "write user data area to the tag":

#### Command sent by the controller

Controller: Read diagnostic information on channels IO-1 and IO-2.

# 14 ASCII protocol of the evaluation unit

The ASCII protocol of the evaluation unit is transferred within the user data field of the TCP/IP connection.

## 14.1 ASCII data frame format of the evaluation unit

## 14.1.1 Send host request

| Character No. | Content                                | Note   |
|---------------|--|--|
| 0104          | Ticket number [0001 9999]              | The ticket number is a unique identifier the host can send to the evaluation unit (1). It enables the host to check if the response of the evaluation unit refers to the command. "0000" is reserved and cannot be used. |
| 05            | Separator [_]                          | Default setting: "_" = 0x5F (2)  |
| 0609          | Frame length [0003nnnn]                | The frame length describes the total telegram length, including the end of line characters. Indication in decimal coding. (1)  |
| 10            | Separator [_]                          | Default setting: "_" = 0x5F (2)  |
| 1112          | Command code [CU,CI,RU,RI              | Command code, 2 characters   |
|               | ]                                      | See XX for command codes   |
| 13            | Separator [_]                          | Default setting: "_" = 0x5F (2)  |
| 14nn          | Command data                           | Command parameter  |
|               |  | See XX for command codes   |
| nn+1 nn+2     | End of line characters <cr lf=""></cr> | End of line characters 0xD, 0xA. They must be sent with every command.   |

(1) Ticket number and telegram length must be send together in the command request. It is allowed to omit these and send the command request beginning with the "command code".

(2) The separator can be set by the command CU.

## 14.1.2 Response sent by the evaluation unit

| Character no. | Content                                | Note  |
|---------------|--|---|
| 0104          | Ticket number [0001 9999]              | The ticket number sent by the host is mirrored by the evaluation unit (1)   |
| 05            | Separator [_]                          | Default setting: "_" = 0x5F (2)   |
| 0609          | Frame length [XXXX]                    | The frame length describes the total telegram length of the response, including the end of line characters. Indication in decimal coding. (1) |
| 10            | Separator [_]                          | Default setting: "_" = 0x5F (2)   |
| 1112          | Response code [XX]                     | The command code sent by the host is mirrored in the response code.   |
|               |  | See XX for response codes   |
| 13            | Separator [_]                          | Default setting: "_" = 0x5F (2)   |
| 14nn          | Command response [XXXX]                | Command response.   |
|               |  | See XX for response codes   |
| nn+1 nn+2     | End of line characters <cr lf=""></cr> | End of line characters 0xD,0xA  |

(1) The ticket number and frame length are only sent by the evaluation unit if the host sent the ticket number in the command request.

(2) The evaluation unit sends the separator defined by the command "CU".

## 14.2 Set-up of the data communication

After the host has established the TCP/IP connection, the parameters of the evaluation unit must first be set. The host can then change to the "data exchange" mode ( $\rightarrow$  10.2 Communication via Ethernet TCP/IP).

## 14.2.1 Configuration of the evaluation unit

Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | CU              | Command code "configure evaluation unit"  |
| 03            | _               | Separator. For this command it must be set to "underscore" = 0x5F   |
| 0405          | 00              | Failsafe mode   |
|               |                 | [00] = If the TCP connection is closed the IO outputs are switched off  |
|               |                 | [01] = If the TCP connection is closed the IO outputs hold the last state before the connection was closed  |
| 06            | _               | Separator   |
| 0708          | 00              | Control register 1 of the IO output driver  |
|               |                 | [00] = default value  |
| 09            | _               | Separator   |
| 1011          | 00              | Control register 2 of the IO output driver  |
|               |                 | [00] = default value  |
| 12            | _               | Separator   |
| 1314          | 00              | Ticket number   |
|               |                 | [00] = No ticket number is sent by the host   |
|               |                 | [01] = A ticket number is sent by the host  |
| 15            | _               | Separator   |
| 1617          | 00              | Reserved  |
| 18            | -               | "Set-up of the separator". This character is used for the following communication between the host and evaluation unit. Each character of the UNICODE UTF-8 code can be set. Exception: |
|               |                 | If the character '#' = 0x23 is set the host sends the next data frames without any separator. The evaluation unit will then also send the response without separator.                   |
| 1920          | AS              | Data format   |
|               |                 | [AS] = ASCII UNICODE UTF-8 Codepage 437 format  |
| 2122          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

## Examples:

| CU_01_00_00_00_AS <cr lf=""></cr>              | Responce without ticket number and with separators   |
|--|--|
| 1107_0032_CU_00_00_00_01_00_AS <cr lf=""></cr> | Responce with ticket number and separators           |
| CU_00_00_00_00.AS <cr lf=""></cr>              | Command with separators set to "."                   |
| CU_00_00_00_00#AS <cr lf=""></cr>              | Command with separators set to "#"                   |
|  | -> no separator for the following data communication |

Notes

- A reconfiguration is only possible if the TCP connection is closed and opened again.
- The frame format for this command is static. No ticket number and no telegram length are sent by the host.
- The configuration of the evaluation unit can be read with the command "GU<CR/LF>". The response corresponds to the response of the command "CU".
- The separator for this command must be "\_" = 0x5F.

## Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | CU              | Response code of the command "configure evaluation unit"   |
| 03            | _               | In this response all separators are "_" = 0x5F irrespective of the setting of the "separator set-up"       |
| 0405          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                              |
| 06            | _               | Separator  |
| 0708          | 00              | Failsafe mode  |
|               |                 | [00] = If the TCP connection is closed the IO outputs are switched off                                     |
|               |                 | [01] = If the TCP connection is closed the IO outputs hold the last state before the connection was closed |
| 09            | _               | Separator  |
| 1011          | 00              | Control register 1 of the IO output driver   |
|               |                 | [00] = default value   |
| 12            | _               | Separator  |
| 1314          | 00              | Control register 2 of the IO output driver   |
|               |                 | [00] = default value   |
| 15            | _               | Separator  |
| 1617          | 00              | Acknowledge the mode "ticket number"   |
|               |                 | [00] = No ticket number is sent by the host  |
|               |                 | [01] = A ticket number is sent by the host   |
|               |                 | From this moment the mode is set.  |
| 18            | _               | Separator  |
| 1920          | 00              | Reserved   |
| 21            | _               | Acknowledge the setting "separator set-up".  |
|               |                 | From this moment this character must be sent by the host.  |
| 2223          | AS              | Data format  |
|               |                 | [AS] = ASCII UNICODE UTF-8 Codepage 437 format   |
| 2425          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

## Examples:

| CU_00_00_00_00_00_AS <cr lf=""></cr>              | Responce without ticket number and with separators                                  |
|---|---|
| 1107_0035_CU_00_00_00_00_01_00_AS <cr lf=""></cr> | Responce with ticket number and separators  |
| CU_00_00_00_00_00.AS <cr lf=""></cr>              | Response with separators set to "."   |
| CU_00_00_00_00_00#AS <cr lf=""></cr>              | Response with separators set to "#" -> no separator in following data communication |

## Notes

• The separator in this response is always "\_" = 0x5F.

# 14.2.2 IO channel configuration

Each channel must be configured separately. Unused channels do not have to be configured.

Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | CI              | Command code "configure IO channels"  |
| 03            | -               | Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | IO channel number to be configured [0104]   |
| 06            | _               | Separator   |
| 0708          | 11              | Channel mode  |
|               |                 | [01] = inactive [02] = input [03] = output [11] = RFID channel                          |
| 09            | _               | Separator   |
| 1013          | 0000            | Data hold time, [milliseconds] [0000 2550]  |
| 14            | _               | Separator   |
| 1517          | 004             | Length of the tag block in bytes [004,008,016,032,064,128,256]                          |
| 18            | _               | Separator   |
| 1921          | 256             | Number of blocks on the tag -> see documentation of the tags [001 256]                  |
| 22            | _               | Separator   |
| 2324          | 01              | Overload protection at output L+  |
|               |                 | [00] = off [01] = on (default)  |
| 25            | _               | Separator   |
| 2627          | 01              | Overcurrent protection at output C/Q0   |
|               |                 | [00] = off [01] = on (default)  |
| 28            | _               | Separator   |
| 2930          | 00              | TP bit and UID data are held for the time set in the data hold time                     |
|               |                 | [00] = no data hold time  |
|               |                 | [01] = TP bit and UID data are held stable  |
| 3132          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| CI_01_11_0000_004_256_01_01_00 <cr lf=""></cr>           | Command without ticket number and with separators |
|--|---|
| CI01110000004256010100 <cr lf=""></cr>                   | Command without ticket number and separators      |
| 1107_0042_CI_01_11_0000_004_256_01_01_00 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070032CI01110000004256010100 <cr lf=""></cr>           | Command with ticket number and without separators |

Notes

- A reconfiguration is only possible if the TCP connection is closed and opened again
- The configuration of the IO channels can be read from the evaluation unit with the command "GI\_XX<CR/LF>"; XX stands for the IO channel number. The response corresponds to the response of the command "CI".
- The possible commands which can be sent by the host depend on the preset channel mode. For more information see description of the commands (→ 14.3 Data exchange frames).

## Response of the evaluation unit:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | CI              | Response code of the command "configure IO channels"  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field<br>"separator set-up" |
| 0405          | 00              | Diagnostic information  |
|               |                 | [00] = no diagnostic information  |
|               |                 | [01] = diagnostic information available It can be read with the command "DI"                    |
| 06            | _               | Separator   |
| 0708          | 01              | Channel mode  |
|               |                 | [01] = inactive [02] = input [03] = output [11] = RFID channel                                  |
| 09            | _               | Separator   |
| 1011          | 11              | IO channel number to be configured  |
|               |                 | [0104]  |
| 12            | _               | Separator   |
| 1316          | 0000            | Data hold time, [milliseconds]  |
|               |                 | [0000 2550]   |
| 17            | _               | Separator   |
| 1820          | 004             | Length of the tag block in bytes  |
|               |                 | [004,008,016,032,064,128,256]   |
| 21            | _               | Separator   |
| 2224          | 256             | Number of blocks on the tag -> see documentation of the tags                                    |
|               |                 | [001 256]   |
| 25            | _               | Separator   |
| 2627          | 01              | Overload protection at output L+  |
|               |                 | [00] = off [01] = on (default)  |
| 28            | _               | Separator   |
| 2930          | 01              | Overcurrent protection at output C/Q0   |
|               |                 | [00] = off [01] = on (default)  |
| 31            | _               | Separator   |
| 3233          | 00              | TP bit and UID data are held for the time set in the data hold time                             |
|               |                 | [00] = no data hold time  |
|               |                 | [01] = TP bit and UID data are held stable  |
| 3435          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

| CI_01_00_11_0000_004_256_01_01_00 <cr lf=""></cr>           | Response without ticket number and with separators |
|---|--|
| CI0100110000004256010100 <cr lf=""></cr>                    | Response without ticket number and separators      |
| 1107_0045_CI_01_00_11_0000_004_256_01_01_00 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070034CI0100110000004256010100 <cr lf=""></cr>            | Response with ticket number and without separators |

# 14.3 Data exchange frames

## 14.3.1 Read IO channel inputs

This command is supported in the channel mode "input" and "output".

Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | RA              | Command code "read all inputs"  |
| 03            | -               | Must be identical to the character defined in the command CU, field<br>"separator set-up" |
| 0405          | 01              | Number of the IO channel to be read from  |
|               |                 | [0104]  |
| 0607          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| RA_01 <cr lf=""></cr>           | Command without ticket number and with separator  |
|---------------------------------|---|
| RA01 <cr lf=""></cr>            | Command without ticket number and separator       |
| 1107_0017_RA_01 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070014RA01 <cr lf=""></cr>    | Command with ticket number and without separators |

## Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | RA              | Response code of the command "read all inputs"   |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel which was read from [0104]  |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1011          | 00              | State of the channel input C/Qi  |
|               |                 | [00] = off [01] = on   |
| 12            | _               | Separator  |
| 1314          | 00              | State of the channel input IQ  |
|               |                 | [00] = off [01] = on   |
| 15            | _               | Separator  |
| 1617          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

| RA_01_00_00 <cr lf=""></cr>              | Response without ticket number and with separators |
|--|--|
| RA0100000 <cr lf=""></cr>                | Response without ticket number and separators      |
| 1107_0026_RA_01_00_00_00 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070020RA01000000 <cr lf=""></cr>       | Response with ticket number and without separators |

# 14.3.2 Write outputs to IO channel

This command is supported in the channel mode "output".

## Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | WO              | Command code "write output"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | Number of the IO channel to be written to  |
|               |                 | [0104]   |
| 06            | _               | Separator  |
| 0708          | 00              | State of the channel output C/Q0   |
|               |                 | [00] = off [01] = on   |
| 09            | _               | Separator  |
| 1011          | 00              | High current enabled ( only for channels IO-3 and IO-4 valid )                                     |
|               |                 | [00] = off [01] = on   |
| 1213          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

## Examples:

| WO_01_00_00 <cr lf=""></cr>           | Command without ticket number and with separators |
|---------------------------------------|---|
| WO010000 <cr lf=""></cr>              | Command without ticket number and separators      |
| 1107_0023_WO_01_00_00 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070023WO010000 <cr lf=""></cr>      | Command with ticket number and without separators |

## Response of the evaluation unit:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | WO              | Response code of the command "write output"   |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field<br>"separator set-up" |
| 0405          | 01              | Number of the IO channel [0104]   |
| 06            | _               | Separator   |
| 0708          | 00              | Diagnostic information  |
|               |                 | [00] = no diagnostic information  |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                   |
| 09            | _               | Separator   |
| 1011          | 00              | State of the channel input C/Qi   |
|               |                 | [00] = off [01] = on  |
| 12            | _               | Separator   |
| 1314          | 00              | State of the channel input IQ   |
|               |                 | [00] = off [01] = on  |
| 15            | _               | Separator   |
| 1617          | 00              | State of "high current enabled" (only valid for channels IO-3 and IO-4)                         |
|               |                 | [00] = off [01] = on  |
| 1819          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

| WO_01_00_00_00 <cr lf=""></cr>              | Response without ticket number and with separators |
|---|--|
| WO010000000 <cr lf=""></cr>                 | Response without ticket number and separators      |
| 1107_0029_WO_01_00_00_00_00 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070022WO010000000 <cr lf=""></cr>         | Response with ticket number and without separators |

# 14.3.3 Read UID of the tag

This command is supported in the channel mode "RWH".

## Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | RU              | Command code "read UID"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | Number of the IO channel from which is to be written   |
|               |                 | [0104]   |
| 0607          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

## Examples:

| RU_01 <cr lf=""></cr>           | Command without ticket number and with separator  |
|---------------------------------|---|
| RU01 <cr lf=""></cr>            | Command without ticket number and separator       |
| 1107_0040_RU_01 <cr lf=""></cr> | Command with ticket number and separators         |
| RU01 <cr lf=""></cr>            | Command with ticket number and without separators |

## Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | RU              | Response code of the command "read UID"  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel from which is to be written [0104]                                  |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1011          | 08              | Length of the UID read from the tag (example)  |
|               |                 | [bytes]  |
| 12            | _               | Separator  |
| 13nn          | 0FCE            | UID read from the tag (example)  |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA   |

| RU_01_00_08_0FE0A23C4A5612CE <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| RU0100080FE0A23C4A5612CE <cr lf=""></cr>               | Response without ticket number and separators      |
| 1107_0040_RU_01_00_08_0FE0A23C4A5612CE <cr lf=""></cr> | Response with ticket number and separators         |
| 11070034RU0100080FE0A23C4A5612CE <cr lf=""></cr>       | Response with ticket number and without separators |

# 14.3.4 Receive UID from the tag automatically

This command is supported in the channel mode "RWH".

#### Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | XU              | Command code "receive UID automatically"   |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | Number of the IO channel to be written to  |
|               |                 | [0104]   |
| 0607          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

#### Examples:

| XU_01 <cr lf=""></cr>           | Command without ticket number and with separators |
|---------------------------------|---|
| XU01 <cr lf=""></cr>            | Command without ticket number and separators      |
| 1107_0017_XU_01 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070014XU01 <cr lf=""></cr>    | Command with ticket number and without separators |

## Response of the evaluation unit:

| Character no. | Content         | Note   |  |
|---------------|-----------------|--|--|
| 0102          | XU              | Response code of the command "receive UID automatically"                                     |  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |  |
| 0405          | 01              | Number of the IO channel from which is to be written [0104]                                  |  |
| 06            | _               | Separator  |  |
| 0708          | 00              | Diagnostic information   |  |
|               |                 | [00] = no diagnostic information   |  |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |  |
| 09            | _               | Separator  |  |
| 1011          | 08              | Length of the UID read from the tag (example)  |  |
|               |                 | [bytes]  |  |
| 12            | _               | Separator  |  |
| 13nn          | 0FCE            | UID read from the tag (example)  |  |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA   |  |

## Examples:

| XU_01_00_08_0FE0A23C4A5612CE <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| XU0100080FE0A23C4A5612CE <cr lf=""></cr>               | Response without ticket number and separators      |
| 1107_0040_XU_01_00_08_0FE0A23C4A5612CE <cr lf=""></cr> | Response with ticket number and separators         |
| 11070034XU0100080FE0A23C4A5612CE <cr lf=""></cr>       | Response with ticket number and without separators |

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This command is ideal if the host does not know when the tag is within the reading field of the read/write head. The evaluation unit only sends the UID data if the read/write head detects a change of the tag status "tag in field"/ "tag not in field".

| Host request          | Command response of the evaluation unit      | IO channel state |
|-----------------------|--|------------------|
| XU_01 <cr lf=""></cr> | XU_01_00_00 <cr lf=""></cr>                  | No tag detected  |
| <none></none>         | XU_01_00_04_023A324E <cr lf=""></cr>         | Tag detected     |
| <none></none>         | XU_01_00_00 <cr lf=""></cr>                  | No tag detected  |
| <none></none>         | XU_01_00_08_0FE0A23C4A5612CE <cr lf=""></cr> | New tag detected |
# 14.3.5 Read user data memory of the tag

This command is supported in the channel mode "RWH".

### Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | RD              | Command code "read user data"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up".                       |
| 0405          | 01              | Number of the IO channel to be read from   |
|               |                 | [0104]   |
| 06            | _               | Separator  |
| 0711          | 00100           | Start address from which the tag is read (example). Note the possible length indicated in the data sheet of the tag.     |
| 12            | _               | Separator  |
| 1316          | 0008            | Number of characters to be read from the tag (example). Note the possible length indicated in the data sheet of the tag. |
| 1718          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

## Examples:

| RD_01_00100_0012 <cr lf=""></cr>           | Command without ticket number and with separators |
|--|---|
| RD010010000012 <cr lf=""></cr>             | Command without ticket number and separators      |
| 1107_0028_RD_01_00100_0012 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070023RD01001000012 <cr lf=""></cr>      | Command with ticket number and without separators |

## Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | RD              | Response code of the command "read user data"  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel to be written to [0104]   |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1014          | 00100           | Start address where data was read (example)  |
| 15            | _               | Separator  |
| 1619          | 0008            | Number of characters read  |
| 2027          | _               | Separator  |
| 28nn          | Plant A12B      | Characters read from the tag (example)   |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA   |

# Examples:

| RD_01_00_08_PLANT A12B <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| RD010008PLANT A12B <cr lf=""></cr>               | Response without ticket number and separators      |
| 1107_0032_RD_01_00_08_PLANT A12B <cr lf=""></cr> | Response with ticket number and separators         |
| 11070028RD010008PLANT A12B <cr lf=""></cr>       | Response with ticket number and without separators |

# 14.3.6 Receive user data memory of the tag

This command is supported in the channel mode "RWH".

#### Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | XD              | Command code "receive user data"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up".                    |
| 0405          | 01              | Number of the IO channel to be read from  |
|               |                 | [0104]  |
| 06            | _               | Separator   |
| 0711          | 00100           | Start address from which the tag is read (example). Note the possible length indicated in the data sheet of the tag.  |
| 12            | _               | Separator   |
| 1316          | 0008            | Number of characters to read from the tag (example). Note the possible length indicated in the data sheet of the tag. |
| 1718          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| XD_01_00100_0008 <cr lf=""></cr>           | Command without ticket number and with separators |
|--|---|
| XD01001000008 <cr lf=""></cr>              | Command without ticket number and separators      |
| 1107_0028_XD_01_00100_0008 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070023XD01001000008 <cr lf=""></cr>      | Command with ticket number and without separators |

#### Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | XD              | Response code of the command "receive user data"   |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel to be written to [0104]   |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1014          | 00100           | Start address where data was read (example)  |
| 15            | _               | Separator  |
| 1619          | 0008            | Number of characters read (example)  |
| 2027          | _               | Separator  |
| 28nn          | PLANT A12B      | Characters read from the tag ( example )   |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA   |

#### Examples:

| XD_01_00_08_PLANT A12B <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| XD010008PLANT A12B <cr lf=""></cr>               | Response without ticket number and separators      |
| 1107_0032_XD_01_00_08_PLANT A12B <cr lf=""></cr> | Response with ticket number and separators         |
| 11070028XD010008PLANT A12B <cr lf=""></cr>       | Response with ticket number and without separators |



This command is ideal if the host does not know when the tag is within the reading field of the antenna. The evaluation unit only sends the user data memory of the tag if the antenna detects a change of the tag status "tag in field"/ "tag not in field".

#### Examples

| Host request                     | Command response of the evaluation unit | IO channel state |
|----------------------------------|---|------------------|
| XD_01_00100_0008 <cr lf=""></cr> | XD_01_00_00 <cr lf=""></cr>             | No tag detected  |
| <none></none>                    | XD_01_00_08_PLANT A12B <cr lf=""></cr>  | Tag detected     |
| <none></none>                    | XD_01_00_00 <cr lf=""></cr>             | No tag detected  |
| <none></none>                    | XD_01_00_08_MATERIAL 5 <cr lf=""></cr>  | New tag detected |

# 14.3.7 Write to user data memory of the tag

This command is supported in the channel mode "RWH".

#### Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | WR              | Command code "write to user data memory"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up".                        |
| 0405          | 01              | Number of the IO channel  |
|               |                 | [0104]  |
| 06            | _               | Separator   |
| 0711          | 00100           | Start address (example). Note the possible address range indicated in the data sheet of the tag.                          |
|               |                 | [000 65535]   |
| 12            | _               | Separator   |
| 1316          | 0008            | Number of characters to be written to the tag (example). Note the possible length indicated in the data sheet of the tag. |
|               |                 | [0001 1400]   |
| 1724          | Prod.015        | Characters to be written to the tag   |
| 2526          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| WR_01_00100_0008Prod.015 <cr lf=""><cr lf=""></cr></cr> | Command without ticket number and with separators |
|---|---|
| WR0100100008Prod.015 <cr lf=""><cr lf=""></cr></cr>     | Command without ticket number and separators      |
| 1107_0037_WR_01_00100_0008_Prod.015 <cr lf=""></cr>     | Command with ticket number and separators         |
| 11070031WR01001000008Prod.015 <cr lf=""></cr>           | Command with ticket number and without separators |

#### Response of the evaluation unit:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | WR              | Response code of the command "read user data memory"  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field<br>"separator set-up" |
| 0405          | 01              | Number of the IO channel [0104]   |
| 06            | _               | Separator   |
| 0708          | 00              | Diagnostic information  |
|               |                 | [00] = no diagnostic information  |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                   |
| 09            | _               | Separator   |
| 1014          | 00100           | Start address to which data was written (example) (1)   |
| 15            | _               | Separator   |
| 1619          | 0008            | Number of characters written to the tag (example) (1)   |
| 2027          | _               | Separator   |
| 28nn          | Prod.015        | Characters written to the tag (example) (1)   |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| WR_01_00_00100_0008_Prod.015 <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| WR0100001000008Prod.015 <cr lf=""></cr>                | Response without ticket number and separators      |
| 1107_0040_WR_01_00_00100_0008_Prod.015 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070033WR0100001000008Prod.015 <cr lf=""></cr>        | Response with ticket number and without separators |

(1) If the command was executed without any error, the start address, the number of characters and the data are returned by the evaluation unit with the values set by the host. Please note that the characters which are sent by the evaluation unit are not read back from the tag but only mirrored back by the command.

2) In case of an error the start address is set to "00000" and the number of characters is set to "0000". No characters are sent by the evaluation unit.

# 14.3.8 Write verified to the user data memory of the tag

This command is supported in the channel mode "RWH".

#### Host command:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | WV              | Command code "write verified to user data memory"   |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up".                        |
| 0405          | 01              | Number of the IO channel  |
|               |                 | [0104]  |
| 06            | _               | Separator   |
| 0711          | 00100           | Start address (example). Note the possible address range indicated in the data sheet of the tag.                          |
|               |                 | [000 65535]   |
| 12            | _               | Separator   |
| 1316          | 0008            | Number of characters to be written to the tag (example). Note the possible length indicated in the data sheet of the tag. |
|               |                 | [0001 1400]   |
| 1724          | Prod.015        | Characters to be written to the tag   |
| 2526          | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| WV_01_00100_0008Prod.015 <cr lf=""><cr lf=""></cr></cr> | Command without ticket number and with separators |
|---|---|
| WV01001000008Prod.015 <cr lf=""><cr lf=""></cr></cr>    | Command without ticket number and separators      |
| 1107_0037_WV_01_00100_0008_Prod.015 <cr lf=""></cr>     | Command with ticket number and separators         |
| 11070031WV01001000008Prod.015 <cr lf=""></cr>           | Command with ticket number and without separators |

#### Response of the evaluation unit:

| Character no. | Content         | Note  |
|---------------|-----------------|---|
| 0102          | WV              | Response code of the command "read user data"   |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field<br>"separator set-up" |
| 0405          | 01              | Number of the IO channel [0104]   |
| 06            | _               | Separator   |
| 0708          | 00              | Diagnostic information  |
|               |                 | [00] = no diagnostic information  |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                   |
| 09            | _               | Separator   |
| 1014          | 00100           | Start address to which data was written (example) (1)   |
| 15            | _               | Separator   |
| 1619          | 0008            | Number of characters written to the tag (example) (1)   |
| 2027          | _               | Separator   |
| 28nn          | Prod.015        | Characters written and read back by the tag (example) (2)                                       |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA  |

#### Examples:

| WV_01_00_00100_0008_Prod.015 <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| WV0100001000008Prod.015 <cr lf=""></cr>                | Response without ticket number and separators      |
| 1107_0040_WV_01_00_00100_0008_Prod.015 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070033WV0100001000008Prod.015 <cr lf=""></cr>        | Response with ticket number and without separators |

(1) If the command could be correctly executed the following data is sent back:

- Start address of the user memory area of the tag
- Number of characters written to the tag
- Characters which are read back from the user data memory of the tag

(2) In case of an error the start address is set to "00000" and the number of characters is set to "0000". No characters are sent by the evaluation unit.

# 14.3.9 Switch off the antenna field of the read/write head

This command is supported in the channel mode "RWH".

### Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | AN              | Command code "antenna field off"   |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | Number of the IO channel to be written to  |
|               |                 | [0104]   |
| 06            | _               | Separator  |
| 07            | 00              | Set antenna status   |
|               |                 | [00] = antenna off   |
|               |                 | [01] = antenna on  |
| 0607          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

# Examples:

| AN_01_01 <cr lf=""></cr>           | Command without ticket number and with separators |
|------------------------------------|---|
| AN0101CR/LF>                       | Command without ticket number and separators      |
| 1107_0020_AN_01_01 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070016AN0101 <cr lf=""></cr>     | Command with ticket number and without separators |

#### Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | AN              | Response code of the command "switch antenna field off"                                      |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel to be written to  |
|               |                 | [0104]   |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1011          | 03              | Number of diagnostic codes. Each code has a size of 4 characters.                            |
|               |                 | [0004]   |
| 1213          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

# Examples:

| AN_01_00_00 <cr lf=""></cr>           | Response without ticket number and with separators |
|---------------------------------------|--|
| AN010000 <cr lf=""></cr>              | Response without ticket number and separators      |
| 1107_0023_AN_01_00_00 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070010AN010000 <cr lf=""></cr>      | Response with ticket number and without separators |

# 14.3.10 Read diagnostic information of the evaluation unit

This command is supported in the channel mode "input, output and RWH".

#### Host command:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | DI              | Command code "read diagnostics"  |
| 03            | -               | Separator. Must be identical to the character defined in the command CU, field "separator set-up". |
| 0405          | 01              | Number of the IO channel to be written to  |
|               |                 | [0104]   |
| 0607          | <cr lf=""></cr> | End of line characters 0xD,0xA   |

# Examples:

| DI_01 <cr lf=""></cr>           | Command without ticket number and with separators |
|---------------------------------|---|
| DI01 <cr lf=""></cr>            | Command without ticket number and separators      |
| 1107_0017_DI_01 <cr lf=""></cr> | Command with ticket number and separators         |
| 11070014DI01 <cr lf=""></cr>    | Command with ticket number and without separators |

#### Response of the evaluation unit:

| Character no. | Content         | Note   |
|---------------|-----------------|--|
| 0102          | DI              | Response code of the command "read diagnostics"  |
| 03            | -               | Separator. Is identical to the character defined in the command CU, field "separator set-up" |
| 0405          | 01              | Number of the IO channel to be written to [0104]   |
| 06            | _               | Separator  |
| 0708          | 00              | Diagnostic information   |
|               |                 | [00] = no diagnostic information   |
|               |                 | [01] = diagnostic information available. It can be read with the command "DI"                |
| 09            | _               | Separator  |
| 1011          | 03              | Number of diagnostic codes. Each code has 4 characters.                                      |
|               |                 | [0004]   |
| 12            | _               | Separator  |
| 13nn          | F400            | Diagnostic code (example)  |
| nn+1nn+2      | <cr lf=""></cr> | End of line characters 0xD,0xA   |

#### Examples:

| DI_01_00_03_F4FE0100F4FE0300F4FE8900 <cr lf=""></cr>           | Response without ticket number and with separators |
|--|--|
| DI010003F4FE0100F4FE0300F4FE8900 <cr lf=""></cr>               | Response without ticket number and separators      |
| 1107_0048_DI_01_00_03_F4FE0100F4FE0300F4FE8900 <cr lf=""></cr> | Response with ticket number and separators         |
| 11070042DI010003F4FE0100F4FE0300F4FE8900 <cr lf=""></cr>       | Response with ticket number and without separators |

# 15 Data frame examples for ASCII protocol

## 15.1 Send configuration for the evaluation unit and the IO channels

1. Command "configure evaluation unit" sent by the host

CU\_01\_00\_00\_00\_AS<CR/LF> Host: Set default parameters for the evaluation unit.

## Response sent by the evaluation unit

CU\_00\_00\_00\_00\_00\_AS<CR/LF> Evaluation unit: evaluation unit ready

## 2. Command "configure channel IO-1 as RFID channel" sent by the host

CI\_01\_11\_0000\_004\_256\_01\_01\_00<CR/LF> Host: Set channel IO-1 as RFID channel with default parameters for the tag

## Response sent by the evaluation unit

CI\_01\_00\_11\_0000\_004\_256\_01\_01\_00<CR/LF> Evaluation unit: Write data on channel IO-1 finished

# 3. Command "configure channel IO-2 as RFID channel" sent by the host

CI\_01\_11\_0000\_004\_256\_01\_01\_00<CR/LF> Host: Set channel IO-2 as RFID channel with default parameters for the tag

## Response sent by the evaluation unit

CI\_01\_00\_11\_0000\_004\_256\_01\_01\_00<CR/LF> Evaluation unit: Write data on channel IO-2 finished

## 4. Command "configure channel IO-3 as input" sent by the host

CI\_03\_02\_0000\_000\_000\_01\_01\_00<CR/LF> Host: Set channel IO-3 as input

## Response sent by the evaluation unit

CI\_03\_00\_02\_0000\_000\_000\_01\_01\_00<CR/LF> Evaluation unit: Write data on channel IO-3 finished

5. Command " onfigure channel IO-4 as output" sent by the host

CI\_01\_03\_0000\_000\_01\_01\_00<CR/LF> Host: Set channel IO-4 as output with default parameters

## Response sent by the evaluation unit

CI\_04\_00\_03\_0000\_000\_000\_01\_01\_00<CR/LF> Evaluation unit: Write data on channel IO-4 finished UK

# 15.2 Read UID from the tag

Command sent by the host RU\_01<CR/LF>

Response sent by the evaluation unit RU\_01\_00\_00\_00000000000000<CR/LF>

# 15.3 Receive UID from the tag

Command sent by the host XU\_01<CR/LF>

 Response sent by the evaluation unit

 XU\_01\_00\_00\_00000000000000000

 ...

 Response sent by the evaluation unit

 XU\_01\_00\_08\_0FE0A23C4A5612CE<CR/LF>

 ...

 Response sent by the evaluation unit

 XU\_01\_00\_08\_0FE0A23C4A5612CE<CR/LF>

 ...

 Response sent by the evaluation unit

 XU\_01\_00\_00\_000000000000

# 15.4 Read diagnostic information from the evaluation unit

Command sent by the host DI\_01<CR/LF>

## Response sent by the evaluation unit

DI\_01\_00\_03\_F4FE0100F4FE0300F4FE8900<CR/LF>

# 15.5 Read user data memory of the tag

Command sent by the host RD\_01\_0005\_0019<CR/LF>

## Response sent by the evaluation unit

RD\_01\_00\_0005\_0019\_ifm electronic gmbh<CR/LF>

# 15.6 Receive user data memory of the tag

## Command sent by the host

XD\_01\_0005\_0019<CR/LF>

#### Response sent by the evaluation unit

XD\_01\_00\_00100\_0000<CR/LF>

> No tag detected

...

#### Response sent by the evaluation unit

XD\_01\_00\_0005\_0019\_ifm electronic gmbh<CR/LF>

> Tag detected

...

# Response sent by the evaluation unit

XD\_01\_00\_00100\_0000<CR/LF>

> No tag detected

## 15.7 Write to the user data memory of the tag

#### Command sent by the host

WR\_01\_0008\_00034\_Plant 203, Engine 3203142475, pass<CR/LF>

#### Response sent by the evaluation unit

WR\_01\_00\_0008\_00034\_Plant 203, Engine 3203142475, pass<CR/LF>> User data sent by the evaluation unit is mirrored by the command request.

## 15.8 Write verified to the user data memory of the tag

#### Command sent by the host

WV\_01\_0012\_00034\_Plant 203, Engine 3203142475, pass<CR/LF>

## Response sent by the evaluation unit

WV\_01\_00\_0012\_00034\_Plant 203, Engine 3203142475, pass<CR/LF>

> User data sent by the evaluation unit is read from the tag.

## 15.9 Read IO channel inputs

Command sent by the host RA\_03<CR/LF>

Response sent by the evaluation unit RA\_03\_00\_00<CR/LF>

# **15.10 Write outputs to IO channel**

Command sent by the host WO\_04\_00\_00<CR/LF>

Response sent by the evaluation unit

WO\_04\_00\_00\_00<CR/LF>

# 15.11 Switch off the antenna field of the read/write head

Command sent by the host AN\_01\_00<CR/LF>

Response sent by the evaluation unit AN\_01\_00\_00<CR/LF>

# 16 Error codes of the evaluation unit

# 16.1 Error messaging of the binary protocol

Errors are indicated with the bit "Diag" within the status byte of the command response of the evaluation unit. If more diagnostic messages are available, the channel can transfer up to 4 diagnostics simultaneously.

Device-relevant hardware diagnostic messages are indicated by the bit Diag of all channels and the user can choose any of the channels to read the diagnostic message. The inactive channel only transfers hardware diagnostic messages.

Example:

Response of the evaluation unit to a diagnostic request with control byte = 0x40

C001F4FE9000

## 16.2 Error messaging of the ASCII protocol

Errors are indicated with the bit "Diag" set to "01" in the command response of the evaluation unit. The error code itself can be read with the command "DI".

Example:

Command response of the evaluation unit for the command "DI"

DI\_01\_01\_01\_**F4FE9000**<CR/LF>

Note: Error codes of both protocols are similar.

## 16.3 Failure codes

| Error group F1  | Error code | Description  |
|-----------------|------------|--|
| Tag/transponder | F1FE0200   | Tag not present, tag left the transmission window                              |
| Tag/transponder | F1FE0300   | Address or command does not match the tag characteristics, memory size invalid |
| Tag/transponder | F1FE0400   | Tag is defective, replace tag or battery                                       |
| Tag/transponder | F1FE0500   | Overflow of the tag memory UID > 16 bytes                                      |
| Tag/transponder | F1FE0900   | Command not supported by the tag   |
| Tag/transponder | F1FE0A00   | Access error, e.g. block locked. See ISO18000-x                                |
| Tag/transponder | F1FE0B00   | General tag error which is not specified in detail                             |
| Tag/transponder | F1FE0C00   | Unknown internal error   |

| Error group F4  | Error code | Description  |
|-----------------|------------|--|
| Evaluation unit | F4FE0100   | Power supply failure   |
| Evaluation unit | F4FE0200   | Hardware failure, short circuit and overload                             |
| Evaluation unit | F4FE0201   | Allowed temperature exceeded   |
| Evaluation unit | F4FE0300   | Read/write head does not function because time out occurred              |
| Evaluation unit | F4FE0400   | Command buffer overflow of the IO server queue                           |
|                 |            | (internal error)   |
| Evaluation unit | F4FE0500   | Data buffer overflow, memory allocation (internal error)                 |
| Evaluation unit | F4FE0600   | Command is not supported in this mode (internal error)                   |
| Evaluation unit | F4FE8100   | ID-Link master inactive. i.e. after power on (internal error)            |
| Evaluation unit | F4FE8200   | Internal IO port server error (internal error)                           |
| Evaluation unit | F4FE8300   | Invalid IO port parameter, e.g. channel (internal error)                 |
| Evaluation unit | F4FE8400   | Vendor-specific error with the command PUT                               |
| Evaluation unit | F4FE8500   | IO port server resets channel  |
| Evaluation unit | F4FE8600   | Data not available for delayed C/Q inputs or delayed UID                 |
|                 |            | (internal error)   |
| Evaluation unit | F4FE8700   | Reconfiguration of the IO port channel not yet allowed (internal error ) |
| Evaluation unit | F4FE8800   | Parameter flag of the IO port parameter not set (internal error)         |
| Evaluation unit | F4FE8900   | General error detected by ID-Link master                                 |
| Evaluation unit | F4FE8A00   | CRC error detected by ID-Link master                                     |
| Evaluation unit | F4FE8B00   | Object not found detected by ID-Link master                              |
| Evaluation unit | F4FE8C00   | Data read/write area in the command not valid                            |

| Evaluation unit | F4FE8D00 | IO port channel reconfigured  |
|-----------------|----------|---|
| Evaluation unit | F4FE8E00 | The read/write head could not process the command, i.e. read/write length exceeded, tag memory error, write to locked block |
| Evaluation unit | F4FE8F00 | Tag data length exceeded (block size * block number)  |
| Evaluation unit | F4FE9001 | Short circuit at output driver detected (C/Qo)  |
| Evaluation unit | F4FE9002 | Undervoltage at output driver detected (AUX or L+)  |
| Evaluation unit | F4FE9003 | Overload at output driver detected (L+ or C/Qo)   |
| Evaluation unit | F4FE9004 | Over-temperature at output driver detected  |
| Evaluation unit | F4FE9005 | Wire break on the read/write head   |
| Evaluation unit | F4FE9006 | Upper limit reached at output driver  |
| Evaluation unit | F4FE9007 | Undervoltage at C/Qo detected   |
| Evaluation unit | F4FE9008 | General read/write head error detected  |
| Evaluation unit | F4FE9009 | Read/write head communication error   |
| Evaluation unit | F4FE900A | I <sup>2</sup> C communication error (internal error)   |
| Evaluation unit | F4FE900B | I <sup>2</sup> C communication parity error (internal error)  |
| Evaluation unit | F4FE9401 | Frontend error detected by the read/write head  |
| Evaluation unit | F4FE9402 | General error detected by the read/write head   |
| Evaluation unit | F4FE9403 | ID-Link error detected by the read/write head   |
| Evaluation unit | F4FE9404 | Buffer overflow error detected by the read/write head   |
| Evaluation unit | F4FEA000 | Invalid command code detected   |
| Evaluation unit | F4FEA001 | Invalid command parameter detected  |
| Evaluation unit | F4FEA002 | Invalid command data detected   |
| Evaluation unit | F4FEA003 | Invalid ticket number or ticket length detected   |
| Evaluation unit | F4FEA100 | Configuration of the evaluation unit failed (CR1 / CR2)   |
| Evaluation unit | F4FEA200 | Configuration of the IO channel failed (internal error)   |
| Evaluation unit | F4FEA300 | Reading of C/Qi/IQ inputs (internal error)  |
| Evaluation unit | F4FEA400 | Writing to output C/Qo failed (internal error)  |
| Evaluation unit | F4FEA500 | High current setting failed (internal error)  |
| Evaluation unit | F4FEA600 | Reading of UID failed (internal error)  |
| Evaluation unit | F4FEA700 | Reading of the user data memory of the tag failed (internal error)  |
| Evaluation unit | F4FEA800 | Writing to the user data memory of the tag failed, command WU (internal error)  |
| Evaluation unit | F4FEA900 | Writing to the user data memory of the tag failed, command WV (internal error)  |
| Evaluation unit | F4FEAA00 | Verification of the user data memory of the tag failed, command WV (internal error)   |
| Evaluation unit | F4FEAB00 | Setting of the antenna field on/off failed, command AN  |
| Evaluation unit | F4FEAC00 | ID-Link master could not read the tag blocks (internal error)   |
|                 |          |   |

| Error group F5                          | Error code | Description   |
|---|------------|---|
| Communication user                      | F5FE0800   | Command is processed by another user                                    |
| - evaluation unit                       |            | (indicated by the evaluation unit)                                      |
| Communication user - evaluation unit    | F5FE8000   | More than one command requested by user (DR, WR, Diag)                  |
| Communication user<br>- evaluation unit | F5FE8100   | It is attempted to abort the command for synchronous reading or writing |
| Communication user<br>- evaluation unit | F5FE8300   | Command parameter for asynchronous reading invalid                      |

| Error group F6 | Error code | Description                                |
|----------------|------------|--|
| Command error  | F6FE0300   | Invalid command parameter (e.g. data area) |

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