
# MCR0X Ethernet Readers

## ISO14443 MIFARE®

# User Manual

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## Revision History

Changes of this document are listed below:

| Date | Revision | Note |
|---|---|---|
| 14.12.2018 | 3.0 | Third release |
| | | |

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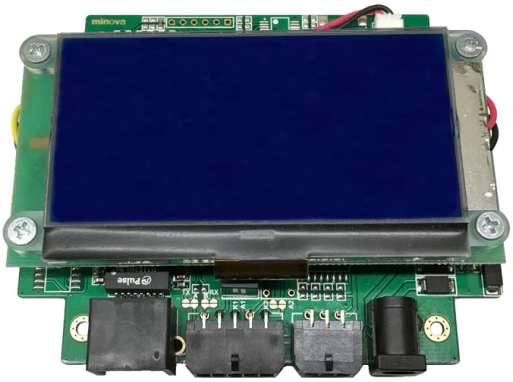
# 1 Introduction

MCR02



MCR04

MCR series are high performance and flexible ISO14443-A OEM contactless smart card readers supporting read-write capabilities. The readers are based on the 13.56 MHz contactless technology and are fully compatible with the entire MIFARE® family, as well as supporting ISO14443A contactless standard. The readers come with Ethernet connectivity and have extensive software support package that is optimized for easy integration.

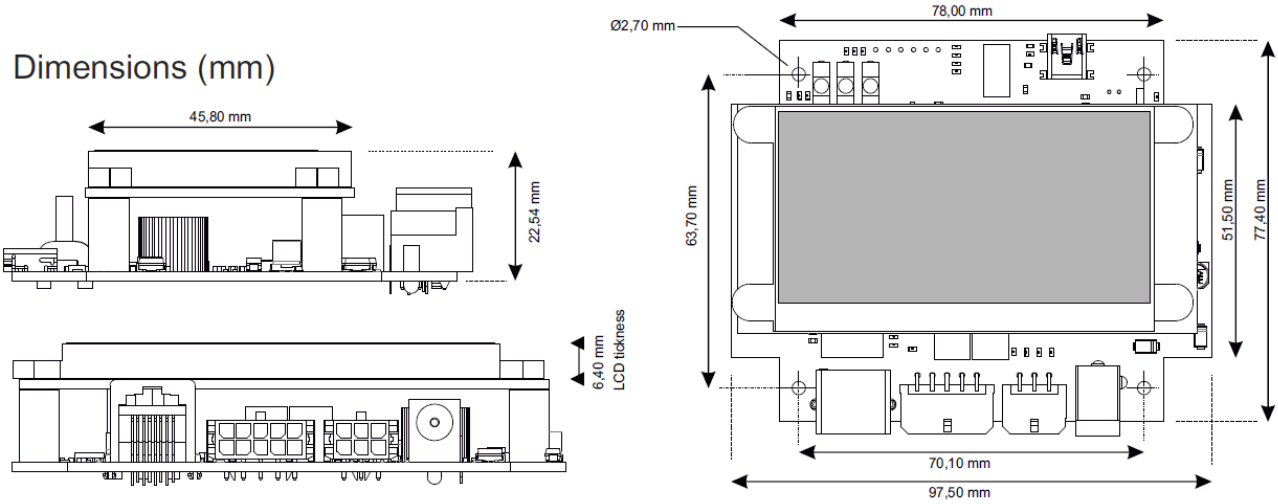
# 2 Features

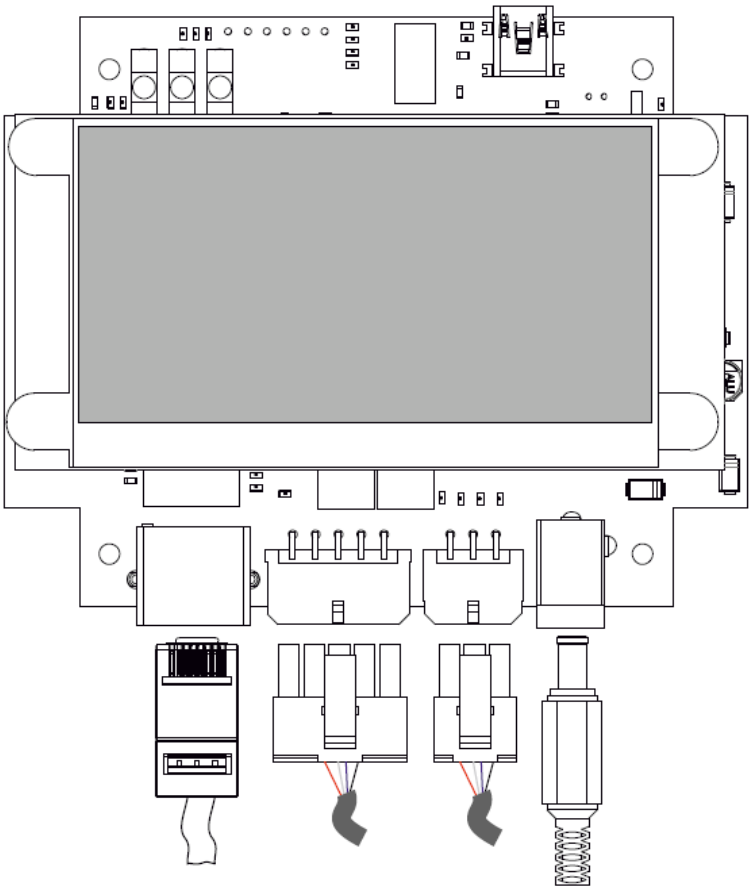
- ISO14443 & Mifare Support
- Ethernet 10BaseT Full Duplex
- Integrated TCP/IP Stack
- TCP/IP Client-Server Connection Support
- Integrated DNS Client
- DHCP or Static Operation
- UDP, TCP, ARP, ICMP(ping) Support
- TCP/IP Server or Client Mode Operation
- Easy Configuration over a Network (LAN)
- RS232/ RS485 / USB Options
- Offline Operation Mode
- Globally Unique MAC
- 2xRelay Output
- 4xDigital Input for peripherals i.e. gates, turnstiles etc.
- RTC with Battery Backup & NTP Server Support
- TFTP & FTP Support
- Remote Firmware Update over Network
- -40 °C … +70 °C Industrial Operation

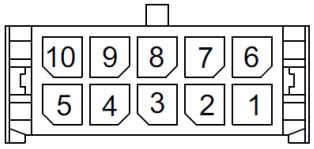
## 2.1 Electrical Specifications

| Parameter | Min. | Nominal | Max. |
|---|---|---|---|
| **Operation Voltage** | 7.5 V | 12 V | 35 V |
| **Power Consumption** | 1.6 W | 2.4 W | 3 W |
| **Operation Temp.** | -20 C° | ~ | +85 C° |
| **CPU** | ARM Cortex CPU | | |
| **External Memory** | 128 Byte EEPROM & 1Mbyte Flash Memory | | |
| **CPU RAM** | 8 KB SRAM | | |
| **Led Indicators** | 2xLED Onboard | | |
| **Global Unique MAC ID** | Yes | | |
| **Ethernet** | 10BaseT, IP, PING, DHCP, UDP, TCP, ARP | | |
| **IO / Relays** | 2xRelay; 4xInput | | |
| **RS485** | Yes* (RS232) | | |
| **RS232** | Yes | | |
| **RTC with Backup Battery** | Yes | | |

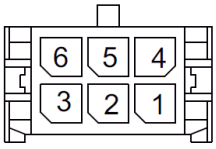
## 2.2 MCR02 Mechanical View & Dimensions



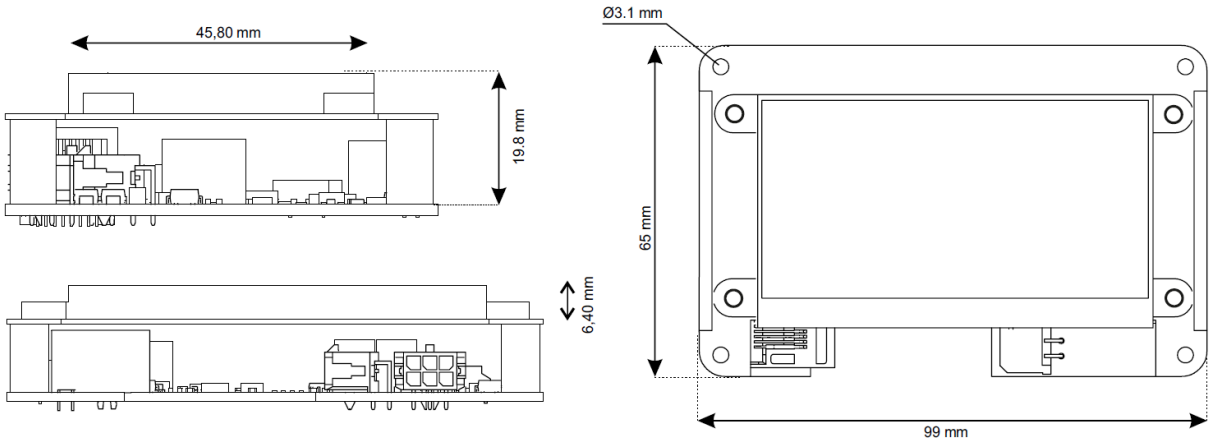


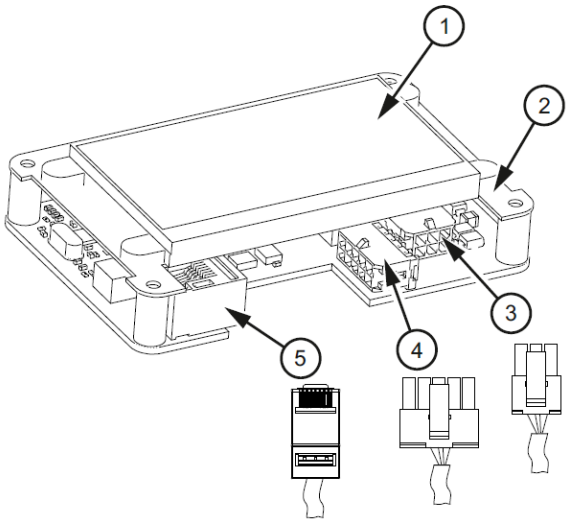

1 DC IN
2 GND
3 ROLE 1 NO
4 GND
5 RS232 TX or RS485 A
6 ROLE 2 NO or NC (Preset)
7 ROLE 2 COM
8 ROLE 1 NC
9 ROLE1 COM
10 RS232 RX or RS485 B




1 GND
2 INPUT X3
3 INPUT X1
4 5V Out
5 INPUT X2
6 INPUT X0

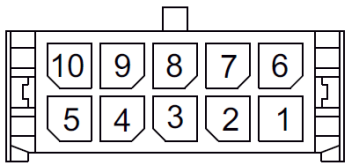
## 2.3 MCR04 Mechanical View & Dimensions



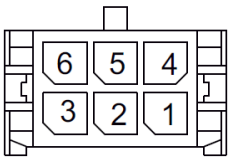

1. LCD
2. Antenna
3. Digital Inputs Connector
4. Relay & Power & Comm. Connector
5. Ethernet (Network) Connector

### Relay Connector Pinning




1 RS232 RX or RS485 B - *orange*
2 RS232 TX or RS485 A - *violet*
3 RELAY 1 NO - *green*
4 RELAY 1 NC - *green*
5 RELAY 1 COM - *green*
6 GND - *brown*
7 GND - *black*
8 DC IN - *red*
9 RELAY 2 COM - *blue*
10 RELAY 2 NO/NC - *blue*

### Input Connector Pinning

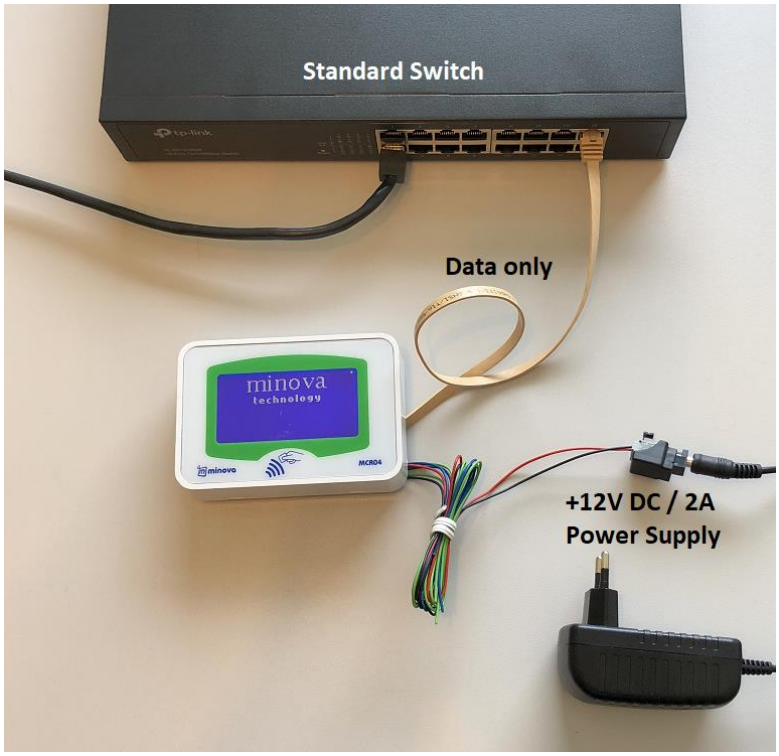



1 GND - *black*
2 INPUT X3 - *blue*
3 INPUT X1 - *green*
4 +5V OUT - *red*
5 INPUT X2 - *brown*
6 INPUT X0 - *violet*

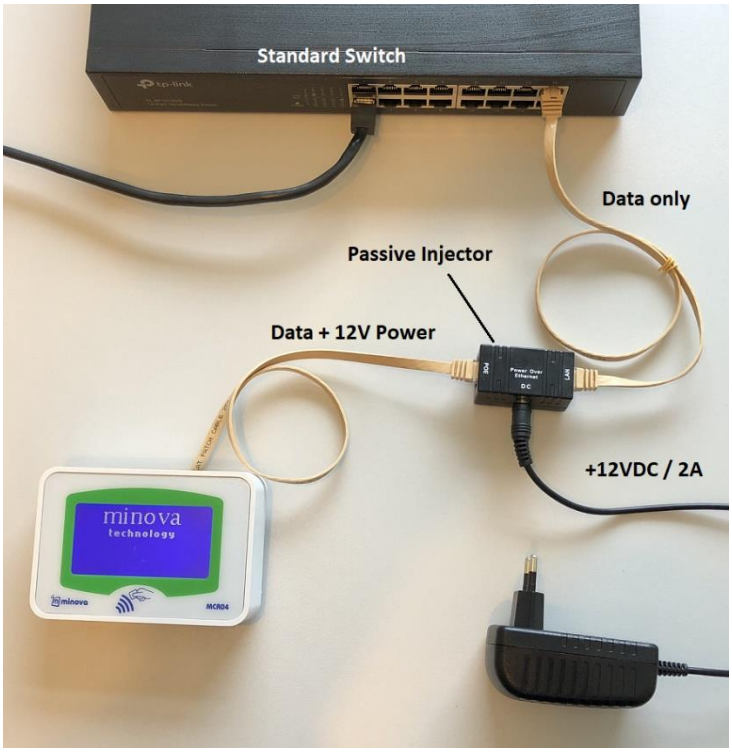
# 3 Powering the Reader

Ethernet cable and +12VDC power input is required to operate the reader.

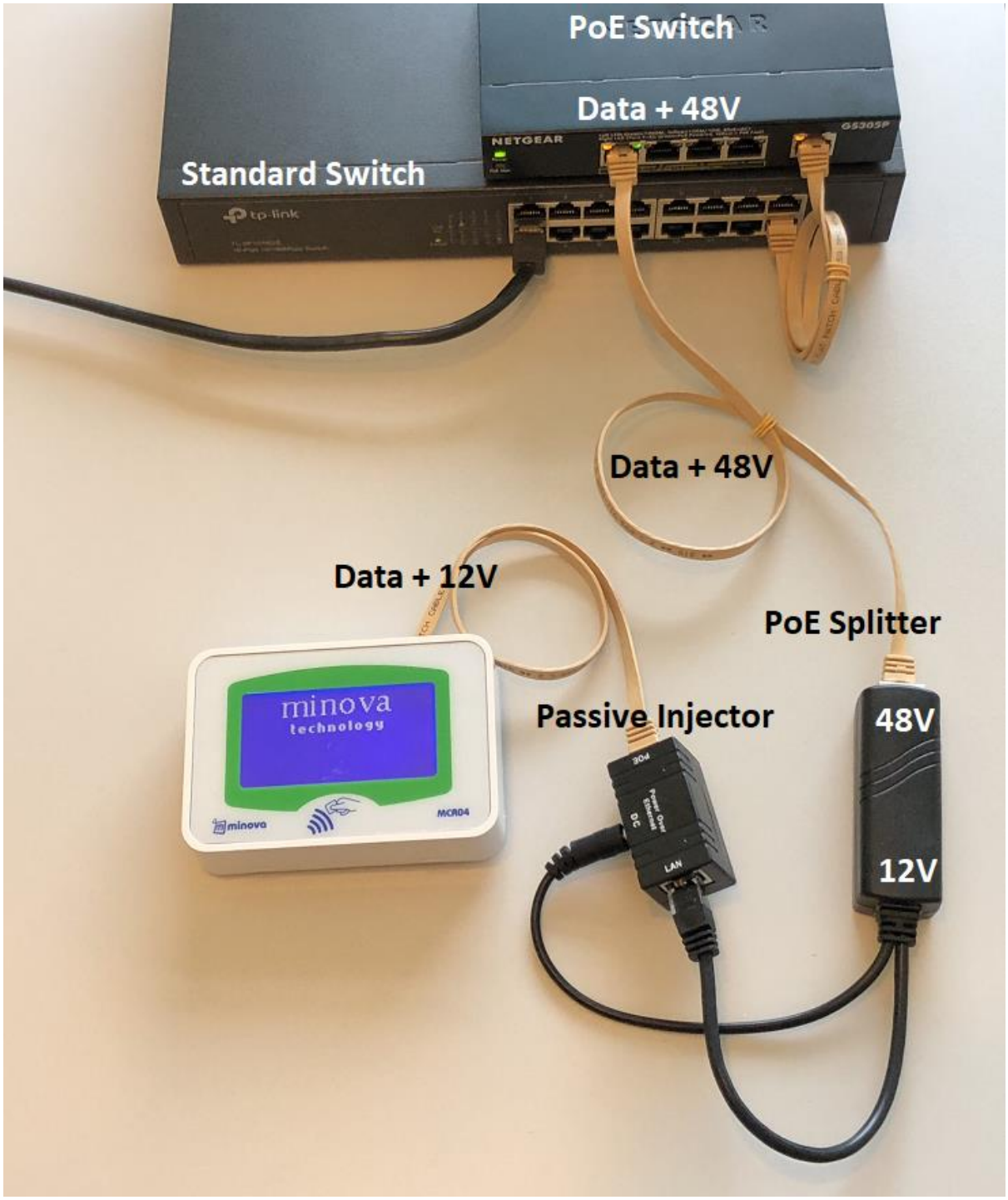
## 3.1 Standard Configuration



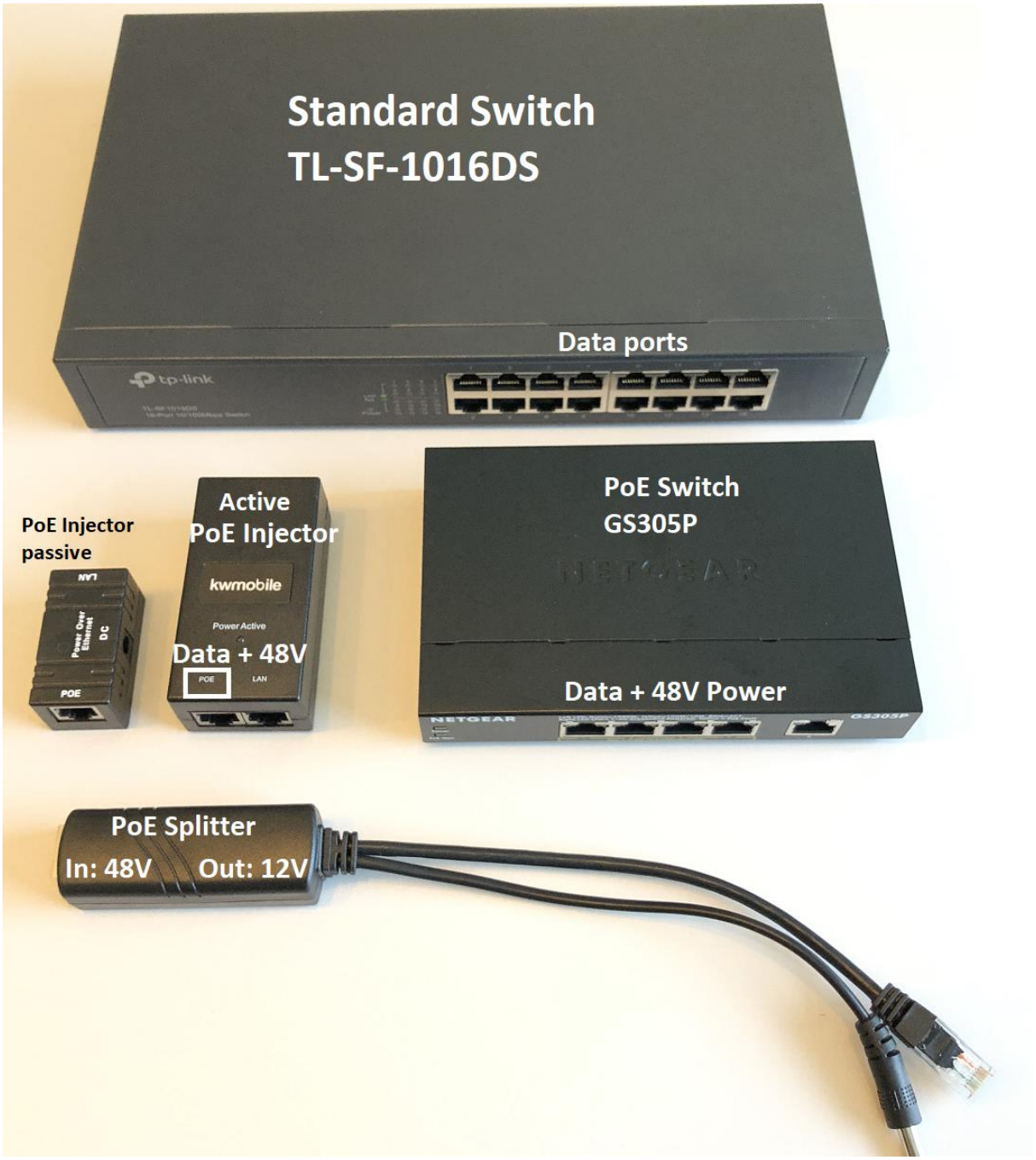

## 3.2 Ethernet Powered (Passive PoE-Injector)



## 3.3 Ethernet Powered (Active PoE-Splitter)



## 3.4 Possible Device Alternatives



# 4 Operating Modes & Setup

## 4.1 Server & Client Protocols

MCR0x Ethernet Terminals can be used in either Client or Server. In client mode the terminal connect to a remote server that it listening a TCP/UDP port. Server may accept multiple connections. MCR0x Terminals can be used as Server. The terminal listens own port and can accept a connection request from outside. In this case terminal's IP number is to be static. It depends on the application whether the terminal is in Client or Server mode.

### 4.1.1 TCP/IP Client Mode Operation

When the terminal is set to operate in client mode it tries to connect a remote server IP & Port set in configuration.

### 4.1.2 TCP/IP Server Mode Operation

When the terminal is set to operate in server mode it listens own TCP port to accept outcoming request from other clients.

## 4.2 Terminal Setup & Settings

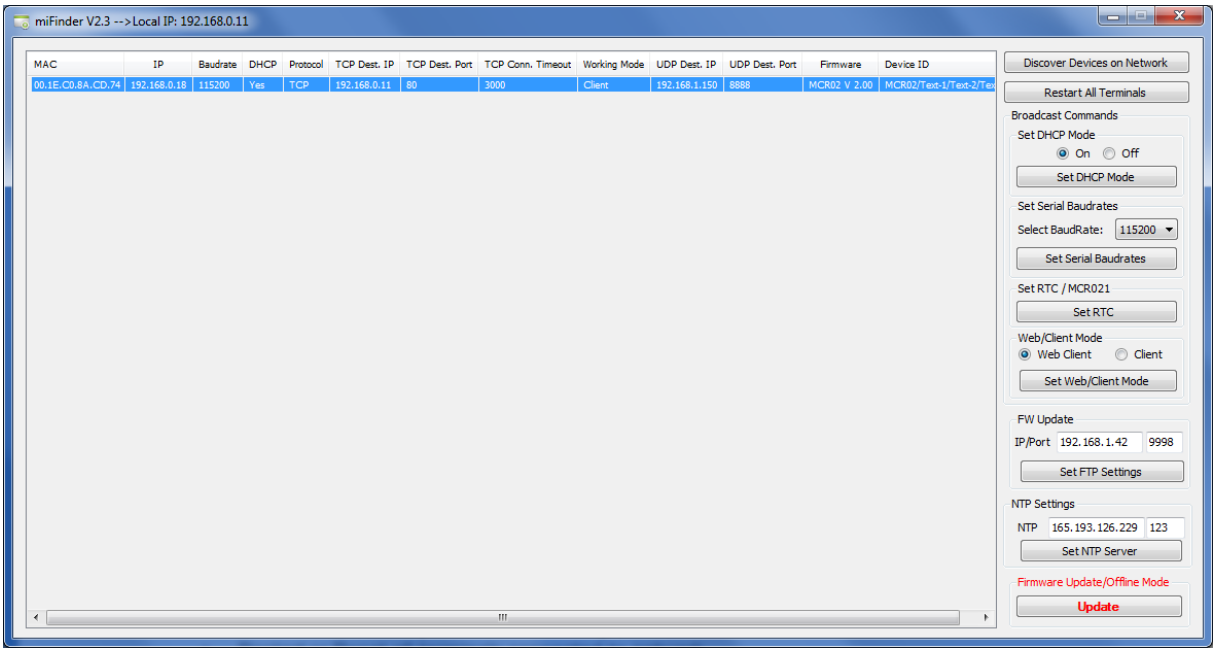
The terminal can be configured on a network (LAN). To start setup terminal must be in a network that supports DHCP. The terminal needs to acquire an IP from a DHCP server on your network. Configuration is made through and UDP protocol so it advisable to use a firewall free network. Most of the firewalls filter UDP.

For the first time setup you can use miFinder software. miFinder can discover all terminals on your network. After MCR0x is up i.e. (after gained an IP from your network) you can use miFinder. It is also advisable to turn off any firewall & antivirus software before running miFinder. As stated before, firewalls on PC may prevent to discover the network.

## 4.3 miFinder Configuration Software

Using miFinder you can set various parameters related to terminals. Some parameters are specific to each terminal and some parameters are global to all terminals. After all setup, your device is listed or discovered as given below.

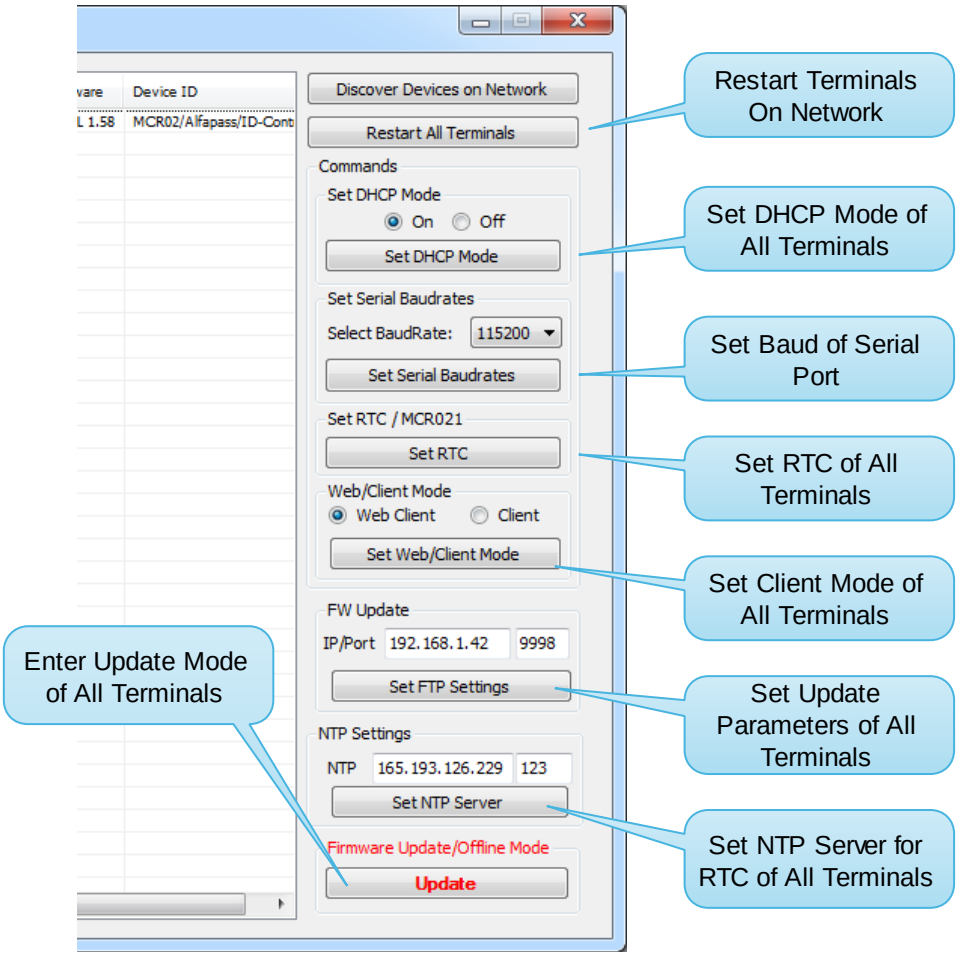
If your terminal is not discovered, press Discover button again.




miFinder Main Screen

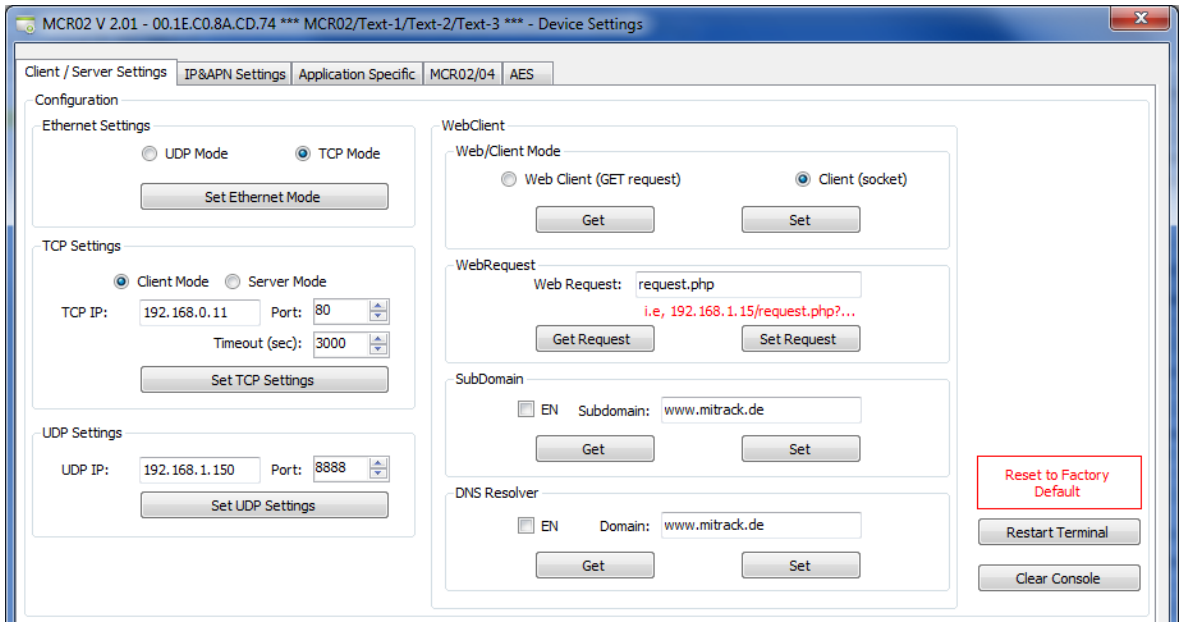
In main window of miFinder you can the following parameters

- Restart or Reset all terminals connected to network.
- Setting DHCP parameter of all terminals connected to network.
- Setting the baud-rate of the RS232 port.
- Setting the Real Time Clock of all terminals connected to network.
- Setting the Client mode type: Web or Normal Socket Client of all terminals connected to network.
- Setting the remote parameters or firmware update of all terminals connected to network.
- Setting the remote NTP server parameters of all terminals connected to network. NTP server can be used to set automatically if the device can access internet (www).
- Enter to update mode to check firmware update of all terminals connected to network.




miFinder main window view

To enter a detailed setup of a particular terminal select a device from the list and double click to see a particular terminal setting window in miFinder. This window gives you a detailed setup of each terminal. Please note that these settings are specific to each terminal. Below given a snapshot of detailed settings window of miFinder.



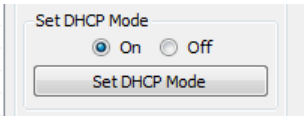

miFinder Terminal Setting Window

This setting window gives you to:

- Set the terminal IP static or dynamic
- Set protocol type of operation of the terminal: UDP or TCP
- Set UDP remote ip & port
- Set TCP operation mode: Client or Server
- Set TCP remote ip and server port
- Set remote request file with GET in Web-Client mode
- Set / Clear Relays to test
- Give a alias name to terminal (i.e. MCR_Gate1 etc.)
- Set & View LCD Screen Texts ( App. Specific section )
- Set RTC synchronized with PC clock.
- Reset to factory default configuration of selected terminal.
- View Firmware version of the terminal.

### 4.3.1 Automatic IP (DHCP) Mode

In miFinder's main screen, in Set DHCP Mode section, select ON and press Set DHCP Mode button. Then all terminals restart and try to access a DHCP server to get an IP address from your network. Please note that your network must have a DHCP enabled management device.




DHCP Mode Setting

### 4.3.2 Constant / Static IP Mode

The terminal is set up with the following IP parameters for static operation at factory.

| Parameter | Value |
|---|---|
| IP Address | 192.168.1.100 |
| Gateway Address | 192.168.1.1 |
| Net Mask | 255.255.255.0 |
| Primary DNS | 192.168.1.1 |
| Secondary DNS | 192.168.1.1 |

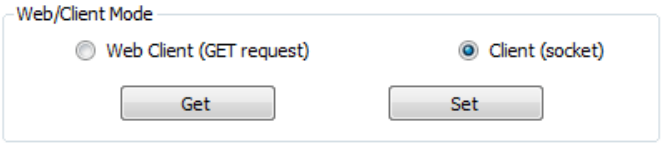
However, most of the terminals manufactured are set to operate in DHCP mode. Static IP mode is not preferred for mass productions. The default setting for all terminals is DHCP.
To set a terminal to be run in static IP mode, in miFinder's main window enter the desired terminal's settings screen. Then enter your desired IP, GW, Mask and DNS values in Device IP Settings section.


IP Parameters Settings Section

Note that, after opening settings screen, this section gives your terminal's current IP parameters. After entering the values as above figure, then press Set IP Settings button. Then the terminal restarts again.
The last step is to set DHCP mode to OFF in main window of miFinder as given in above figure. The terminal restarts again in Static IP mode. Please note that you can skip this step if your terminal is already operating in static IP mode.

### 4.3.3 Client and Web Client Modes of Operation

Any MCR0x terminal can connect to web server or server as client. The terminal's client mode of operation can be altered in main screen of miFinder as in below figure.

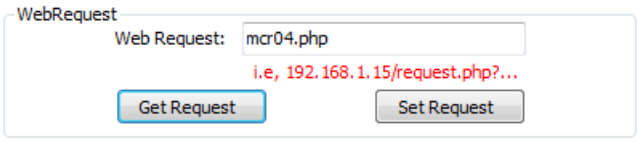



Web Client or Normal Client Mode Setting

When a contactless card is detected by the terminal, it tries to send card's UID to server as follows:

| Operation Type | Example Terminal Request |
|---|---|
| Web Client | ***GET /request.php?devID= MCR02-ABCD&uid=F0C189A5*** |
| Client ( Socket ) | ***MCR02-ABCD,UID= F0C189A5*** |

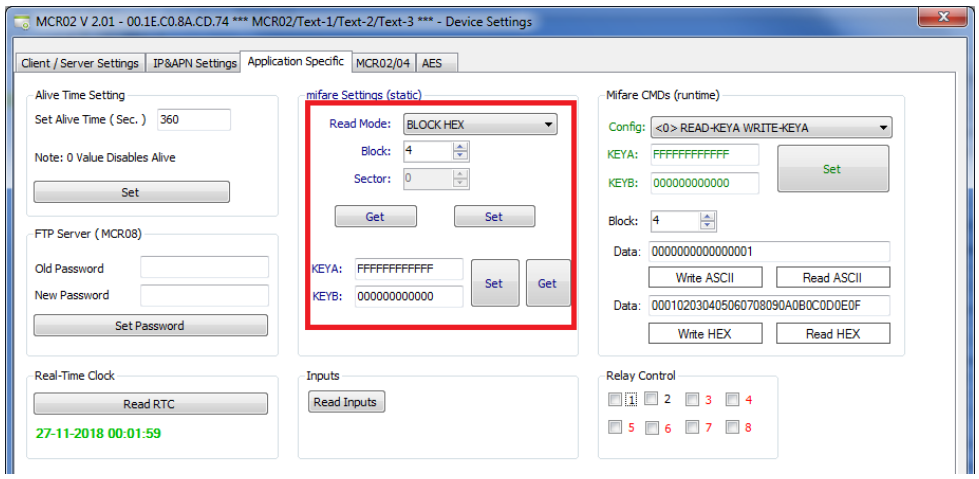
It is seen that the terminal tries to send data to a web-server by requesting a PHP file. You can also change this request in miFinder's setting window.




Http request file name for Web-Client Mode

### 4.3.4 BLOCK/SECTOR Auto-Read

The reader can be configured to read block or sector data automatically from a MIFARE card.




Example: ***MCR02-8ACD74,UID=26E400BE,DATA=00000000000000000000000000000000,IO=0F***

### 4.3.5 Message Formats from Server to Terminal

The message format from server to terminal is given by the following syntax.
**<Device ID>,<CMD1;parameter1;…ParameterN>,<CMD2;parameter1;…;ParameterN>,…**
This packet can be sent by a specific TCP server via socket_send API's or simple echo statements defined in a web server protocols.

| Command | Description | Parameter/Example |
|---|---|---|
| *LCDCLR* | *Clears LCD* | *None* |
| *LCDSET* | *Write Text to LCD* | *Left;Top;Font_Type;Text*<br>*Ex: LCDSET;0;0;0;Hello World* |
| *LCDLOCK* | *Locks the display* | *None* |
| *LCDUNLOCK* | *Releases the display* | *None* |
| *MSG_TEXT* | *Update line 3 default text parameter in the configuration* | *Ex: MSG_TXT;Active*<br>*(Change default text)* |
| *DISP=* | *Update line 3 in runtime (remains until reboot)* | *Ex: DISP=Active*<br>*(Display a new text)* |
| *BUZZER* | *Activate Buzzer* | *BUZZER;DelayMs,beepTimes*<br>*Ex: BUZZER;300;1 (300 msec. period with 1 time Beep)* |
| *ALIVE* | *Alive message is sent by the Terminal periodically* | *If desired the server can send commands as reply.* |
| *RELAY1=xx* | *Energize Relay-1 by Delay in Ms.* | *XX Delay in Milliseconds.*<br>*The Relay is ON with XX Delay.* |
| *RELAY2=xx* | *Energize Relay-2 by Delay in Ms.* | *XX Delay in Milliseconds.*<br>*The Relay is ON with XX Delay.* |
| *RELAY1=ON*<br>*RELAY1=OFF* | *Relay-1 ON or OFF all the time.* | *ON / OFF* |
| *RELAY2=ON*<br>*RELAY2=OFF* | *Relay-2 ON or OFF all the time.* | *ON / OFF* |
| *TSYNC=UNIX_TIME* | *Set Terminal's RTC from server.* | *UNIX_TIME*<br>*This is a Unix time stamp value.*<br>*Ex: TSYNC=256984235* |
| *WLIST_ADD* | *White list add UID*<br>*Type*<br>*UID*<br>*Start date/time*<br>*End date/time* | *TYPE;UID;START;END*<br>*TYPE=0 UID only, T=1 UID with date/time control*<br>*UID= UID in HEX (4 or 7 bytes)*<br>*START=Unix time stamp*<br>*END= Unix time stamp*<br>*Ex:*<br>*WLIST_ADD;1;FA1025AA;1420074061;1422842522*<br>*Terminal answer: WLIST_ADD,ACK* |
| *WLIST_REM* | *White list remove UID* | *UID*<br>*Ex: WLIST_REM; FA1025AA*<br>*Terminal answer: WLIST_REM,ACK* |
| *WLIST_CLR* | *Clear white list* | *NONE*<br>*Terminal answer: WLIST_CLR,ACK* |
| *WLIST_GET=xx* | *Read UID form list* | *INDEX*<br>*Ex: WLIST_GET=12*<br>*Terminal answer:*<br>*WLIST_GET,TYPE,UID,START,END*<br>*or WLIST_GET,NAK (index not exists)* |
| *LIST_INFO* | *Get list counters* | *NONE*<br>*Terminal answer: LIST_INFO,WLIST_COUNT,WLIST_CHKSUM,BLIST_COUNT,ACTIVITY_COUNT* |
| *ACT_CLR* | *Clear activity file* | *NONE*<br>*Terminal answer: ACT_CLR,ACK* |
| *ACT_GET=* | *Read activity record* | *INDEX*<br>*Ex: ACT_GET=12*<br>*Terminal answer:* |

| | | |
|---|---|---|
| | | *ACT_GET,TYPE,INF,UID,TIMESTAMP*<br>*or ACT_GET,NAK (index not exists)* |
| *ACK_STR* | *Set offline ACK string*<br>*Max. 120 Bytes long* | *Command string*<br>*Ex: ACK_STR;RELAY1=1500,BUZZER;50;2* |
| *NAK_STR* | *Set offline NAK string*<br>*Max. 120 Bytes long* | *Command string*<br>*Ex: ACK_STR;BUZZER;500;1,*<br>*LCDCLR,LCDSET;10;20;2;DENIED;* |
| *INPUTS* | *Return inputs* | *NONE*<br>*Terminal answer:*<br>*INPUTS,INPUT0,INPUT1,INPUT2,INPUT3*<br>*Ex: INPUTS,IO0=0,IO1=0,IO2=0,IO3=1* |
| *INP0_STR* | *Set input 0 string* | *Command string*<br>*Ex: INP0_STR;LCDCLR,LCDSET;7;25;3;DO NOT DISTURB,LCDLOCK* |
| *INP1_STR* | *Set input 1 string* | *Command string*<br>*Ex:*<br>*INP1_STR;LCDCLR,LCDSET;7;25;3;EMPTY,LCD LOCK* |
| *STR_GET* | *Get stored strings*<br>*0: ACK, 1: NACK, 2: INP0, 3: INP2*<br>*8: CONFIG* | *INDEX*<br>*Terminal answer: Command String*<br>*Ex: STR_GET=0;* |
| *BARCODE* | *Activate and scan* | *NONE*<br>*Terminal answer:*<br>*ACK,BAR_CODE,INPUTS* |
| *GET_UID* | *Get last UID* | *NONE*<br>*Terminal answer: UID in HEX format* |
| *LOADKEYS;TYPE;KEYA;KEYB* | *Load mifare keys* | *LOADKEYS;0;A0A1A2A3A4A5;*<br>*B0B1B2B3B4B5* |
| *BLOCKREAD;BLOCKNR*<br>*BLOCKREADX;BLOCKNR* | *Read 16 bytes mifare block*<br>*Read 16 bytes in HEX mode* | *BLOCKREAD;2*<br>*Answer: BLOCKDATA=Test string 1*<br>*Answer:*<br>*BLOCKDATAX=000102030405060708090A0B 0C0D0E0F*<br>*Answer: NAK block authentication error* |
| *BLOCKWRITE;BLOCKNR;DATA*<br>*BLOCKWRITEX;BLOCKNR;DATA* | *Write max 16 bytes mifare block*<br>*Write max 16 bytes in HEX mode* | *BLOCKWRITE;2;Test*<br>*BLOCKWRITEX;2;000102030405..* |
| *FORMATSECTOR;SECTORNR;DATA* | *Format a sector* | *FORMATSECTOR;1;*<br>*FFFFFFFFFFFFFF078069FFFFFFFFFFFF* |
| *SECTORREAD;SECTORNR*<br>*SECTORREADX;SECTORNR* | *Read 48 bytes of sector data*<br>*Read 48 bytes in HEX mode* | *SECTORREAD;1*<br>*SECTORREADX;1* |
| *SECTORWRITE;SECTORNR;DATA*<br>*SECTORWRITEX;SECTORNR;DATA* | *Write max 48 bytes of sector data*<br>*Write max 48 bytes in HEX mode* | *SECTORWRITE;1;MAX MUSTERMAN*<br>*MUSTERSTRASSE 2 MUSTERSTADT* |
| *CONFIG_ERASE* | *Erases the configuration sector of the flash memory* | *CONFIG_ERASE* |
| *DELAY;MS* | *Wait command for a defined time* | *DELAY;1000 (do nothing 1s long)* |
| *TRST* | *Terminal reset* | *Resets the reader* |

### 4.3.6 Example Operation

***The Terminal sends the following to Server:***

*MCR02-8AC64C,UID=1255CCF0,IO=0F*

***The Server may send the following to Terminal:***

*MCR02-8AC64C,BUZZER;500;1,LCDCLR,LCDSET;0;0;0;Test1,LCDCLR,LCDSET;0;10;0;Hello World!*
*or MCR02-8AC64C,BUZZER;500;1,LCDCLR,LCDSET;0;0;0;Test1,LCDCLR,LCDSET;0;10;0;Hello World!,RELAY1=500*

***Web-Client Mode* Message:**

*GET /request.php?devID=MCR02-8ACD74&uid=1255CCF0&block=0000000000000002&io=0F\r\n\r\n*

***Web-Client Mode* Alive Message:**

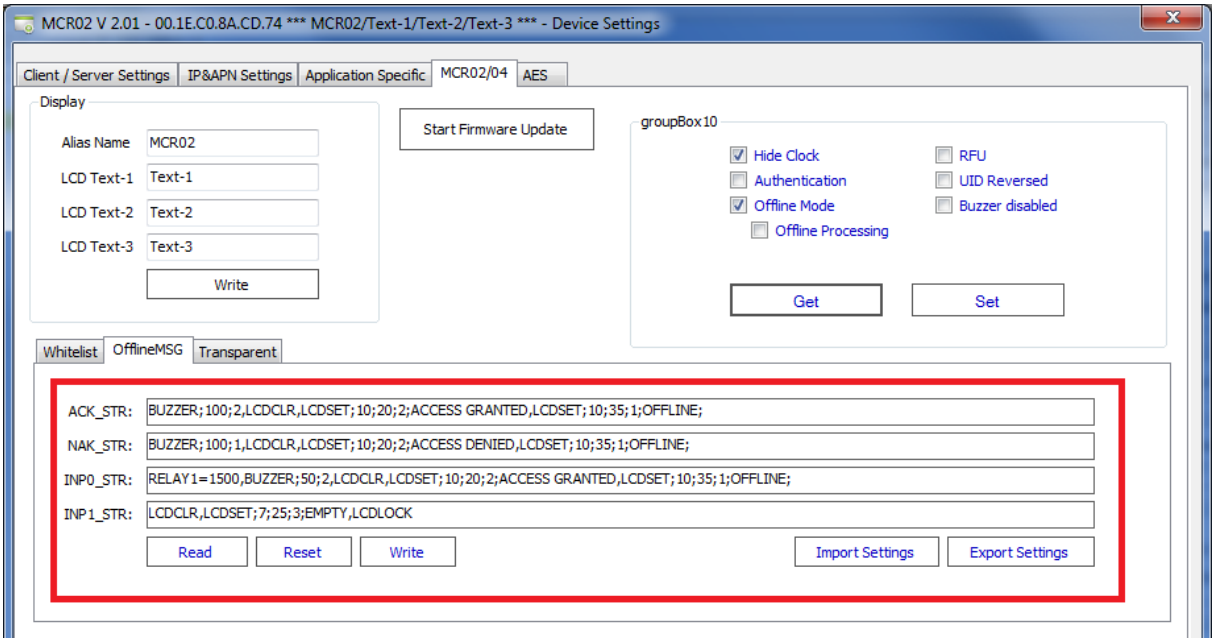
*GET /request.php?devID=MCR02-8ACD74&cmd=ALIVE&io=0F\r\n\r\n*

## 4.3.7 Offline Mode of Operation

Offline mode is automatically activated as soon as the server connection is broken or the Ethernet cable was disconnected. To be sure that this mode works correctly, the following offline strings must be defined.

- ACK_STRING: Will be called in case of a card is tagged and the UID is in white list
- NAK_STRING: Will be called in case of denied card
- INP0_STR: Will be called when the input 0 is activated
- INP1_STR: Will be called when the input 1 is activated

After the server is again reachable or the Ethernet cable is reconnected, the reader switches to online mode within some seconds.




Offline Configuration

***Hide Clock***: Removes the date-time info from the display.
***Authentication***: not in use
***Offline Mode***: Whitelist operation in case of no connection.
***Offline Processing***: Always whitelist operation, online mode only to download activity and upload whitelist.
***UID Reversed:*** The UID is byte wise reversed
***Buzzer disabled***: Buzzer is disabled (Buzzer command still works)

### *Offline Whitelist and Activity File*

Up to 10000 UIDs and 10000 activity records can be stored in the internal memory.

Examples to initialize the whitelist:

* Clear the white list. All stored UIDs will be deleted.
MCR02-8ACD74,WLIST_CLR

* Add an UID to the list. Type = 1, UID =E50485F2, time/control between 20.03.2011 - 20:49:57 and 20.03.2015 - 20:49:57
MCR02-8ACD74,WLIST_ADD;1;E50485F2;1300650597;1426880997

* Remove an UID from the list. UID =E50485F2
MCR02-8ACD74,WLIST_REM;3187729446

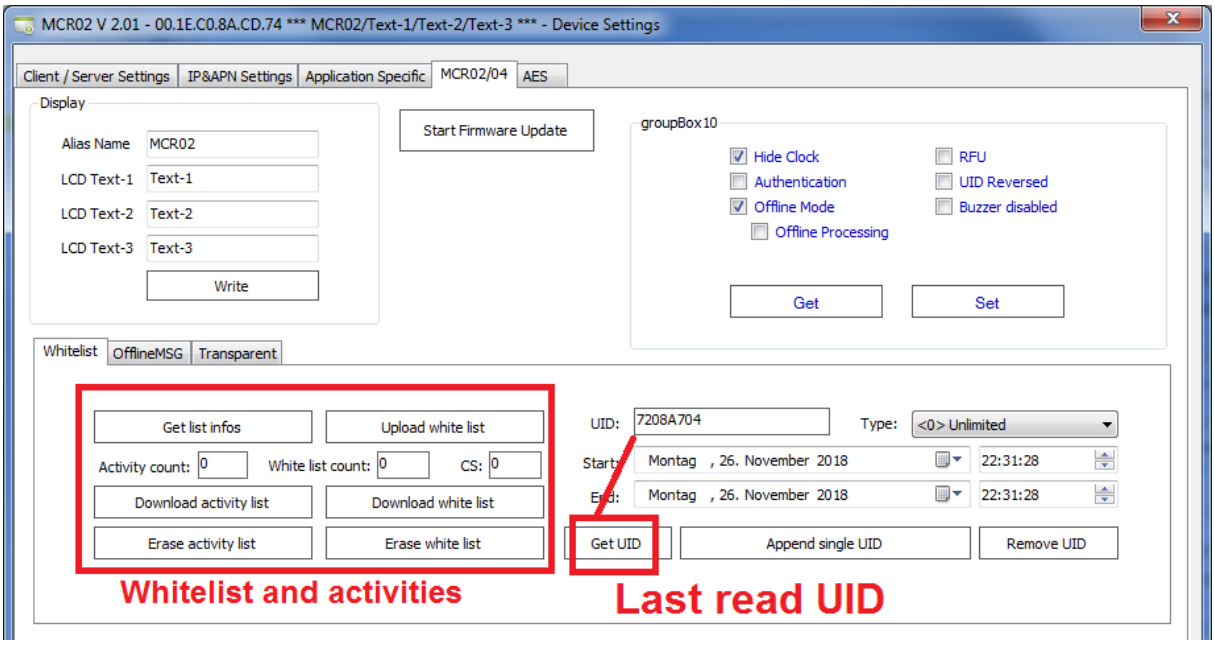
* Get the UID index 0
MCR02-8ACD74,WLIST_GET=0

* Get list info.
MCR02-8ACD74,LIST_INFO

After this command, the UID list count, the list checksum and the activity length will be returned. The server can check the list checksum to update the complete list.
* Get an activity record.
MCR02-8ACD74,ACT_GET=0

**Example:** MCR02-8ACD74,ACT_GET,0,0,E50485F2,1422913388
Activity type 0 (UID activity)
Activity info 0
UID E50485F2
Timestamp 02.02.2015 - 22:43:08

* Clear the activity list. All activity records will be deleted.
MCR02-8ACD74,ACT_CLR




Offline Configuration and adding manually UIDs

## 4.3.8 Offline examples

***Activity file***
MCR02-8ACD74,LIST_INFO
MCR02-8ACD74,ACT_GET=0
MCR02-8ACD74,ACT_CLR
***White list***
MCR02-8ACD74,WLIST_GET=0
MCR02-8ACD74,WLIST_CLR
MCR02-8ACD74,WLIST_ADD;1;E50485F2;1300650597;1426880997
MCR02-8ACD74,WLIST_REM;E50485F2
***Offline strings***
MCR02-8ACD74,ACK_STR;RELAY1=500,BUZZER;50;2,RELAY2=1000,LCDCLR,LCDSET;10;20;2;ACCESS GRANTED,LCDSET;10;35;1;OFFLINE;
MCR02-8ACD74,NAK_STR;BUZZER;300;1,LCDCLR,LCDSET;10;20;2;ACCESS DENIED,LCDSET;10;35;1;OFFLINE;
MCR02-8ACD74,MSG_TXT;TAG YOUR CARD
MCR02-8ACD74,INP0_STR;LCDCLR,LCDSET;7;25;3;DO NOT DISTURB,LCDLOCK
MCR02-8ACD74,INP1_STR;LCDCLR,LCDSET;7;25;3;EMPTY,LCDLOCK

## 4.4 Loading MIFARE Keys

The terminal needs the sector keys in order to read/write the related blocks. There are two keys (KeyA and KeyB) for each sector.

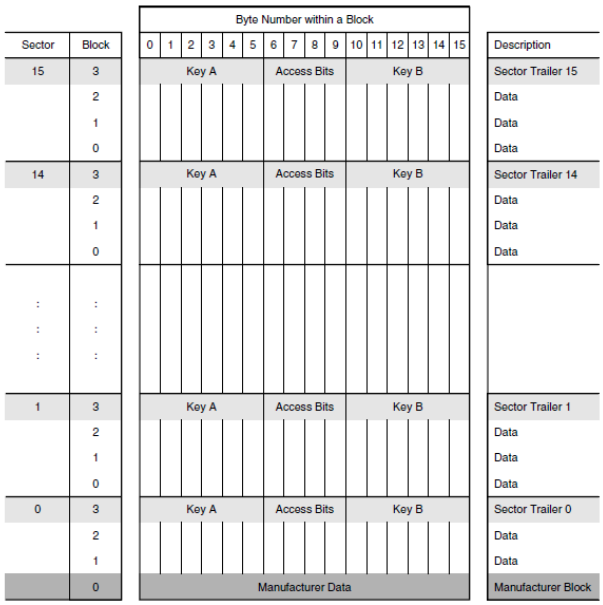
MCR02-8ACD74,LOADKEYS;TYPE;KEYA;KEYB
Example; MCR02-8ACD74,LOADKEYS;0;FFFFFFFFFFFF;FFFFFFFFFFFF

The key usage is defined in the following table.

| TYPE | READ | WRITE |
|---|---|---|
| 0 | Key A | Key A |
| 1 | Key A | Key B |
| 2 | Key B | Key A |
| 3 | Key B | Key B |

### *MIFARE Card Memory Layout*

1024 × 8 bit EEPROM memory




### *Formatting mifare® Sectors*

Blocks 3,7,11,15,..63 are sector trailer blocks and store the KEYA, KEYB and the access conditions.

The sector trailer data must be defined correctly.

*MCR02-8ACD74,FORMATSECTOR;SECTORNR;DATA*
*SECTORNR = 0 to 15*
*DATA = KEYA-ACCESSBITS-KEYB*

Examples:
MCR02-8ACD74,FORMATSECTOR;1;FFFFFFFFFFFFFF078069FFFFFFFFFFFF // Transport config R&W with KEYA
MCR02-8ACD74,FORMATSECTOR;1;FFFFFFFFFFFF78778800FFFFFFFFFFFF // R/W-Blocks read: KEYA, write: KEYB
MCR02-8ACD74,FORMATSECTOR;1;FFFFFFFFFFFF08778F00FFFFFFFFFFFF // INC/DEC-Blocks
MCR02-8ACD74,FORMATSECTOR;1;FFFFFFFFFFFF7F00F800FFFFFFFFFFFF // DEC-Only-Blocks
MCR02-8ACD74,FORMATSECTOR;1;FFFFFFFFFFFF68778900FFFFFFFFFFFF // B0;INC/DEC, B1-2 R/W blocks

### *Reading/Writing mifare® Blocks*

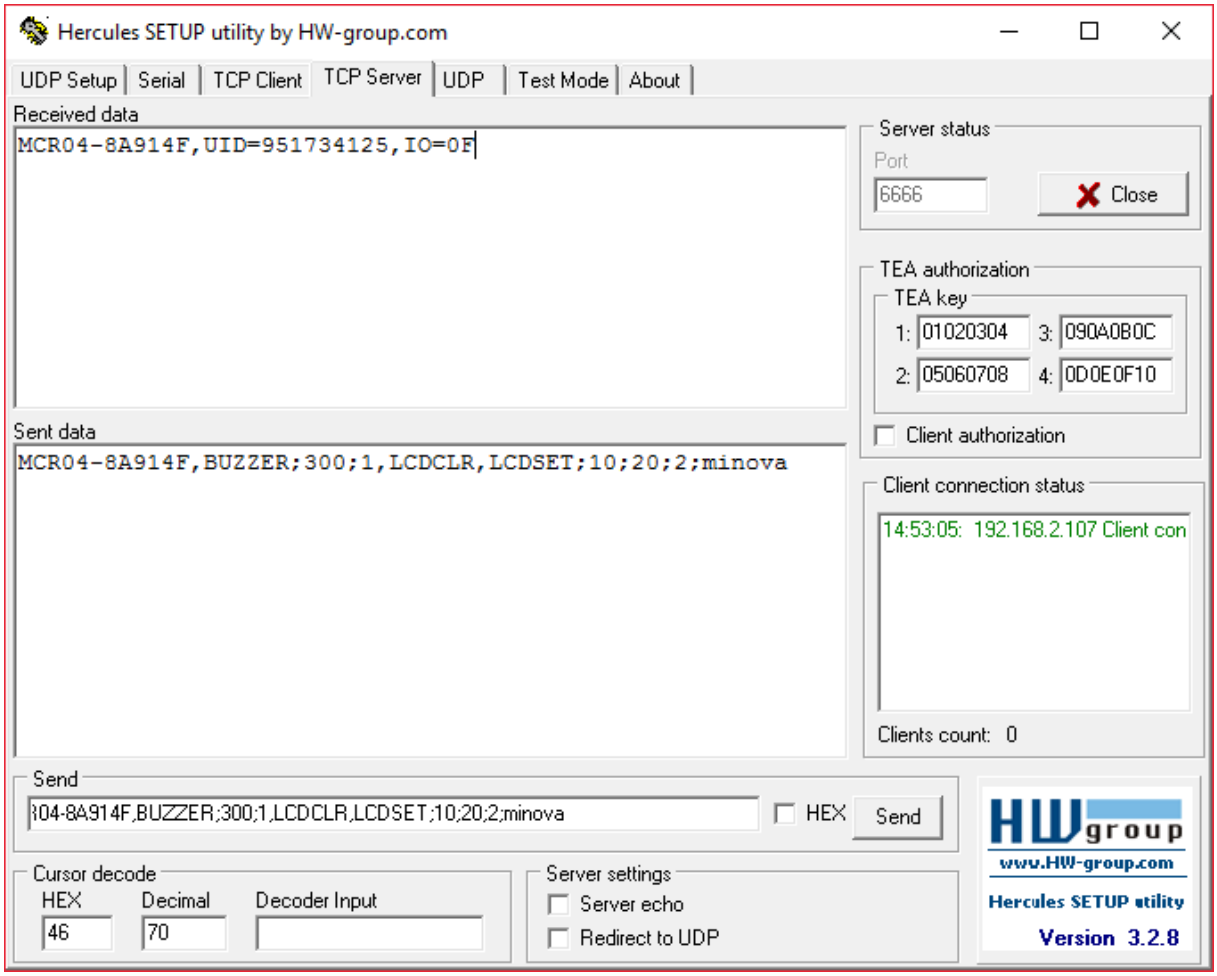
MCR02-D59505,LOADKEYS;0;FFFFFFFFFFFF;FFFFFFFFFFFF,BLOCKREADX;1 // Block read with loadkey
MCR02-D59505,BLOCKDATAX=48414c4c4f2020202020202020202020 // Blockread answer

// Blockwrite with loadkey
MCR02-D59505,LOADKEYS;0;FFFFFFFFFFFF;FFFFFFFFFFFF,BLOCKWRITEX;1;000102030405060708090A0B0C0D0E0F
MCR02-D59505,ACK // Blockwrite ok

# 5 Test Connection with Hercules

Hercules Setup Utility can be used to test the terminals behavior.

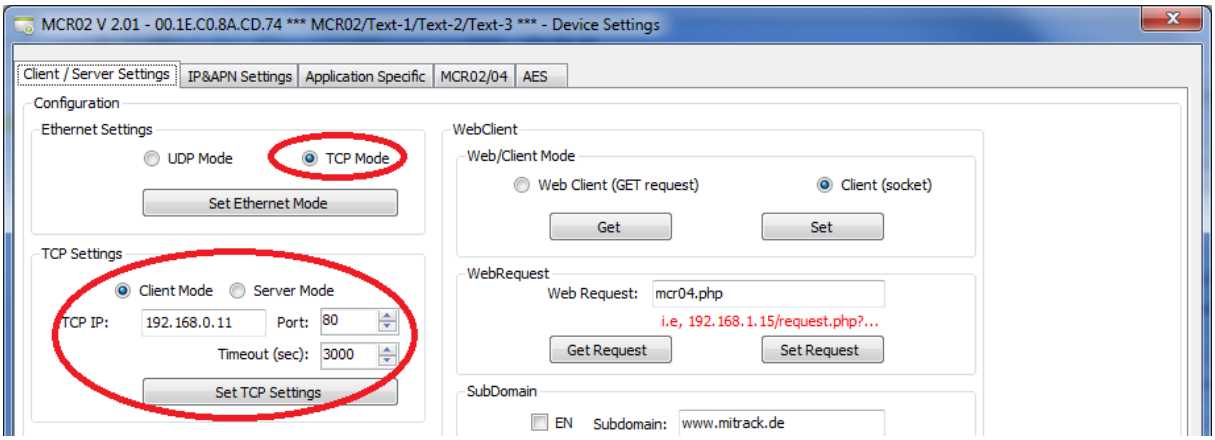
- Select TCP Server and enter the Terminals port number
- Click on ***Listen***
- The terminal will connect automatically as seen in the connection status
- After presenting a card, the message will be displayed in the ***Received data*** window
- Enter the response message and send to the terminal. The device ID must be the same in the received and sent data
- As the TCP connection is open, we can send commands directly to the terminal



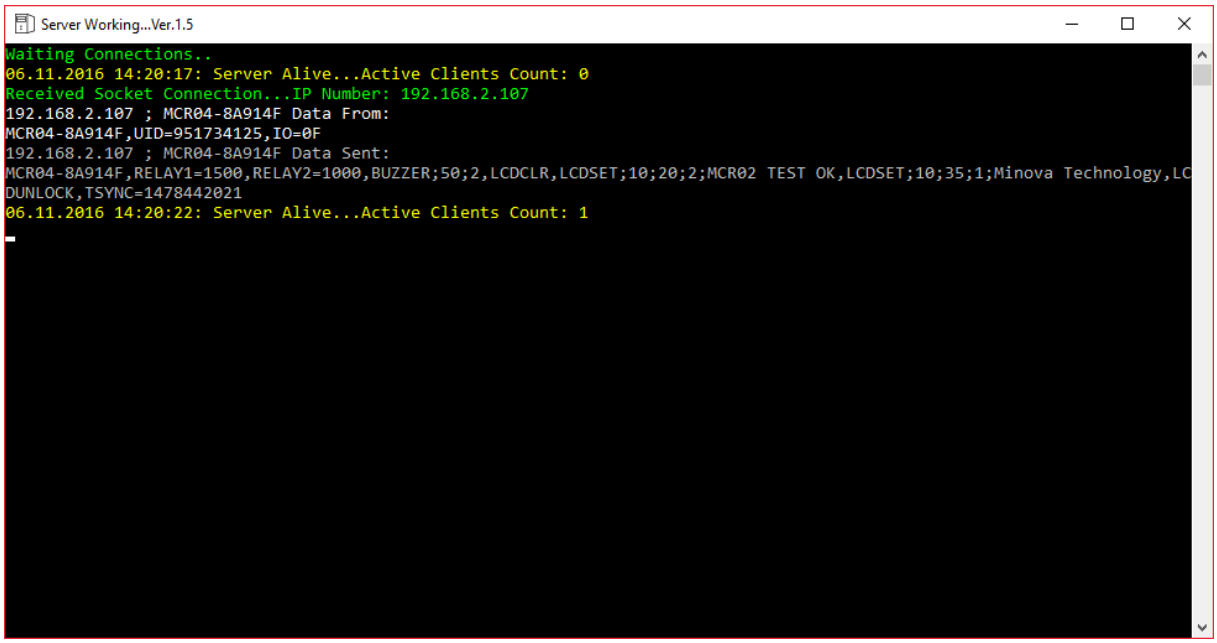
# 6 Example Operation with GSA

The ***GSA_Testserver.exe*** can be used to test the server connection. More than one terminal can connect to this multi-thread server application.

- Set your servers (PC) TCP IP and port (use same port in Updater.ini file)




- Run the ***GSA_Testserver.exe*** application and wait until the terminal is connected
- Present a contactless card to the terminal




***The Terminal sends the following to Server:***

*MCR04-8A914F,UID=1E2C8E94*

***The Server may send the following to Terminal:***

**To approve**:
*MCR04-8A914F,RELAY1=1500,BUZZER;50;2,LCDCLR,LCDSET;10;20;2;ACCESS GRANTED,LCDSET;10;35;1;Minova Technology,TSYNC=1475792451*
**To deny**:
*MCR04-8A914F,BUZZER;500;1,LCDCLR,LCDSET;10;20;2;ACCESS DENIED,LCDSET;10;35;1;Minova Technology,TSYNC=1475792451*

The server application adds to each response the TSYNC command with the actual Unixtime. This way the RTC is always synchronized with the server.

*The source code of this server project is included in the SDK.*

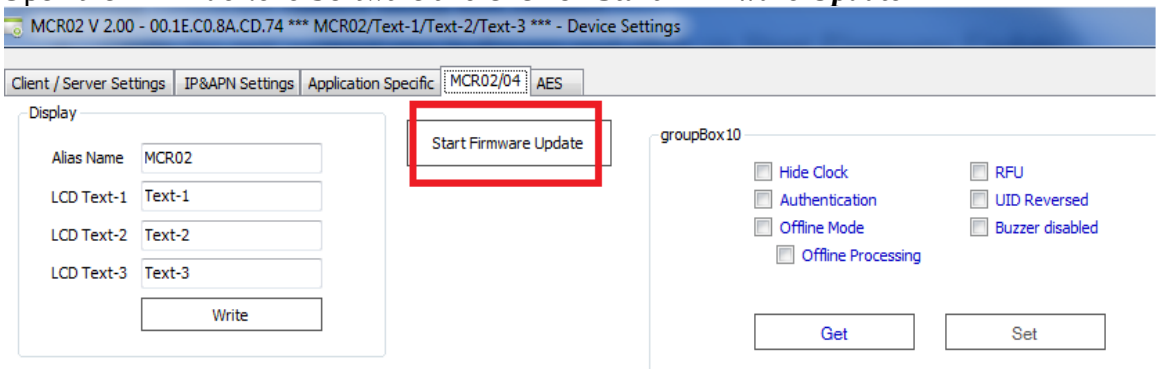
# 7 Firmware Update

We will describe the basic steps to update/load/modify or program a new firmware for the MCR0X terminal family.

## 7.1 Firmware Update via Ethernet

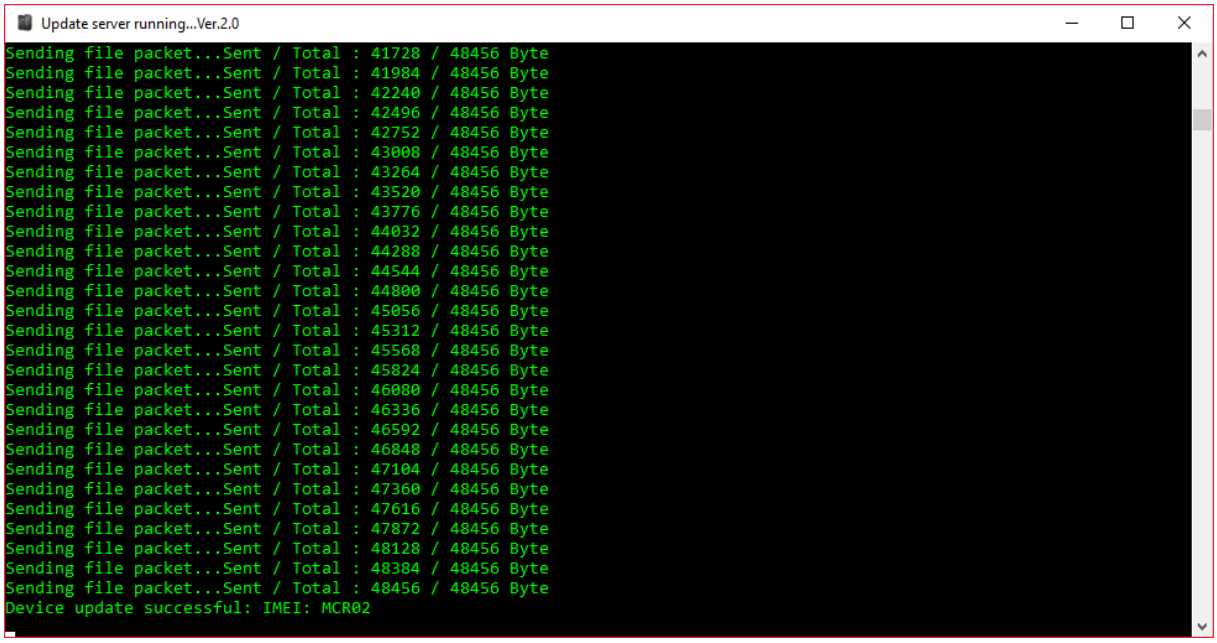
To update the firmware over the network, please do the followings.

- Run the RTU-Updater_2_0.exe
- Open the ***miFinder.exe*** Software and click on ***Start Firmware Update***




In this case, the IP of your host will be set and the reader will be reset automatically

The reader will restart and download and activate the new firmware



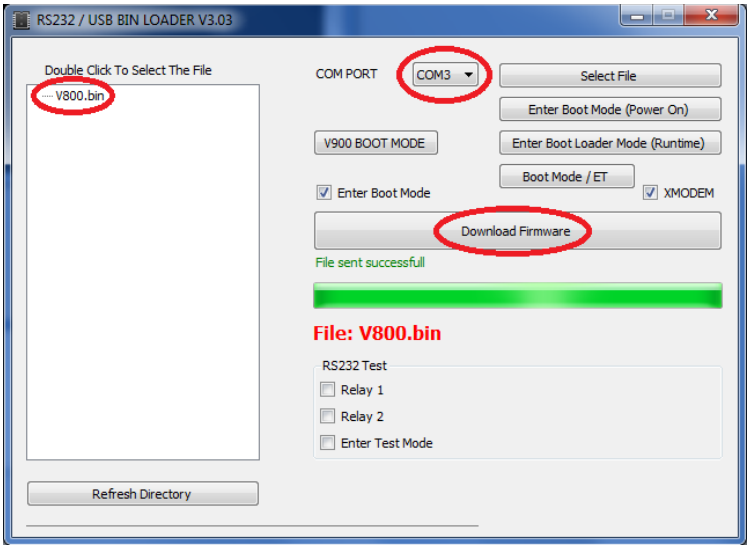
## 7.2 Firmware Update via RS232

### 7.2.1 Requirements

- RS232 download cable
- USB – Serial converter if PC does not have a serial port
- PC with Windows 7 or newer Windows OS
- RTU-FW-Downloader.exe program ( .NET framework is required to run this program )

### 7.2.2 Update Sequence

- Connect the RS232 download cable supplied with the terminal between COM1 port of the terminal and com port of the PC.
- You can use an USB-Serial converter if PC does not have any serial port.
- Run the ***RTU-FW-Downloader.exe***




- Select the bin file
- Select the ***COM PORT***
- Click on ***Download Firmware***
- The new firmware will be programmed and started automatically

### 7.2.3 Firmware Recovery via USB-Adapter

- Connect the USB – TTL adapter as below and update the firmware with the RTU-FW-Downloader.exe