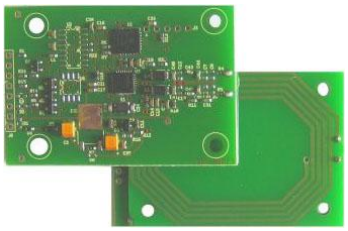
RFID TRANSPONDER TECHNOLOGY

DOC. 147-R3

FRW 13.56MHz ISO14443A MIFARE READER/WRITER

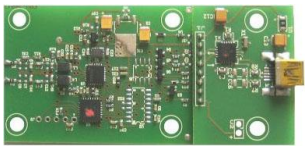


FRW-PCB

FRW-ONDA

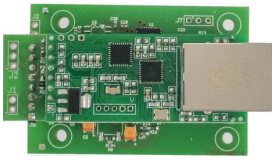
FRW-SHELL

FRW-BOX



FRW-USBN-PCB

FRW-USBN-POCKET



FRW-LAN

1.0 FEATURES AND SPECIFICATIONS

The FRW is a Front Side Serial Tag Reader/Writer with **built-in Antenna**, with five interface options.

TRANSPONDERS SUPPORTED:

CLASSIC 1K Protected against duplication by Crypto Authentication using KEYA.
Is structured in **16 SECTORS** any with 4 BLOCK of 16 bytes each.
The 4th BLOCK of each SECTOR is reserved for CRYPTO KEYS and is not usable for DATA.
BLOCK0 of SECTOR0 is the MANUFACTURE DATA containing UID.

CLASSIC 4K Protected against duplication by Crypto Authentication using KEYA.
Is structured in **32 SECTORS** any with 4 BLOCK of 16 bytes each and in **8 SECTORS** any with 16 BLOCKS of 16 bytes each.
The 4th BLOCK and the 16th BLOCK of each SECTOR is reserved for CRYPTO KEYS and is not usable for DATA.
BLOCK0 of SECTOR0 is the MANUFACTURE DATA containing UID.

ULTRALIGHT Is structured in **16 BLOCKS** 4 bytes each.
The DATA block available for READ WRITE are from the 4 to the 15 block.
BLOCK0-1 is the MANUFACTURE DATA containing a 7 bytes UID.

PLUS Serial Code Number 7bytes.

DESFIRE,EV1,EV2 Serial Code Number 7bytes.

- No anticollision.
- Automatic detect of the Transponder type.

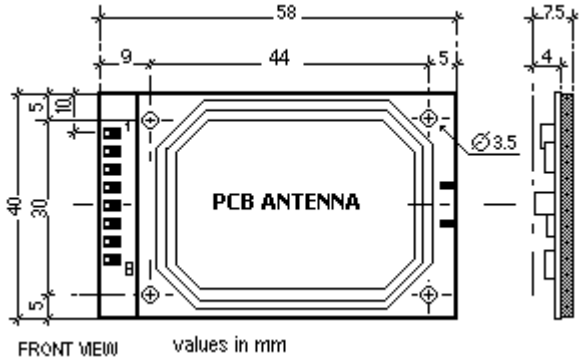
2.0 VERSIONS

FRW-TTL-MS-5-(Case)	TTL interface. Polling.
FRW-TTL-MH-5-(Case)	TTL interface. Spontaneous.
FRW-232-MS-5-(Case)	RS232 interface. Polling.
FRW-232-MH-5-(Case)	RS232 interface. Spontaneous.
FRW-485-MS-12-(Case)	RS485 interface. Polling. 125 device address.
FRW-USB-MS-5 –(Case)	USB interface. Polling. COM PORT emulation. Powered by USB.
FRW-USB-MH-5 –(Case)	USB interface. Spontaneous. COM PORT emulation. Powered by USB
FRW-LAN-MS-5 –(Case)	LAN interface. Polling.
FRW-LAN-MH-5 –(Case)	LAN interface. Spontaneous.

Glossary: **FR/FRW=**Model Interface: **TTL 232 485 USB LAN**
M= TAG MIFARE
S= Polling **H**= Spontaneous
5/12=5V(standard)/12V power supply
Case= PCB/SHELL/ONDA/BOX/ POCKET

2.0 MOUNTING

DIMENSION FRW-TTL/232/485 (see also Par.6.0)



CONNECTION FRW-TTL

The on-board connector is an 8 pin .1" soldering type.

Pin Number	Description	
1	**+3.3 to 5VDC**	
2	**GND**	
3	**RX**	TTL input
4	**TX**	TTL output
5	**No Connect**	
6	**No Connect**	
7	**Out1**	Open Collector output.
8	**LED-OUT**	TTL output trough internal 1kΩ

CONNECTION FRW-485

The on-board connector is an 8 pin .1" soldering type.

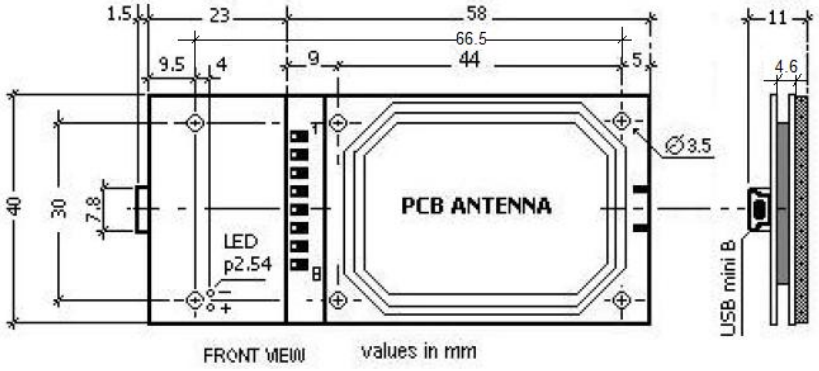
Pin Number	Description	
1	**+12VDC**	
2	**GND**	
3	**RS485-A**	
4	**RS485-B**	
5	**No Connect**.	
6	**No Connect**	
7	**Out1**	Open Collector output.
8	**LED-OUT**	TTL output trough internal 1kΩ

CONNECTION FRW-232

The on-board connector is an 8 pin .1" soldering type.

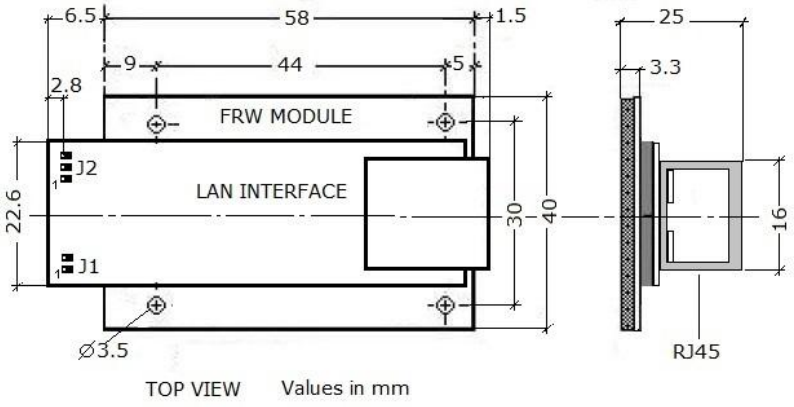
Pin Number	Description	
1	**+5VDC**	
2	**GND**	
3	**RX**	**RS232** input
4	**TX**	**RS232** output
5	**No Connect**	
6	**No Connect**	
7	**Out1**	Open Collector output.
8	**LED-OUT**	TTL output trough internal 1kΩ

DIMENSIONS PCB USBN(see also Par.7.0)



The TRW-USB module is powered by the 5VDC on the USB connector.

DIMENSIONS PCB LAN (see also Par 8.0)



CONNECTION J1

The on-board connector is a 2 pin .1" .

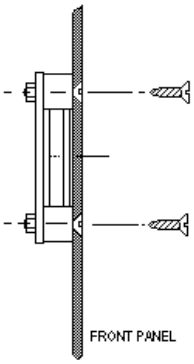
Pin Number	Description
1	**+5VDC**
2	**GND**

CONNECTION J2

Pin Number	Description	
1	**LED-OUT**	TTL output trough internal 1kΩ
2	**GND**	LED ground
3	**OUT1**	Open collector output

INSTALL

Due to the Radio Frequency emissions of the Reader Antenna is important to avoid the usage of metal panels in front, rear and lateral sides of the Reader.
Although the FRW provides an high resistance to EMC corruption, avoid to install it in high RF emission environments, the reading distance may result reduced.



3.0 PROTOCOL

The standard protocols for the TRW are:
-MS Polling Suitable for application where the Host continuously polls the FRW.
-MH Spontaneous Suitable for application point to point. The FRW transmits data only when a TAG is really present.
The HOST normally works in receive mode and can operate on other task in absence of TAG.
Not with RS485.

The protocol FORMAT is described below.
STX Start of string synchronization code.
DEVICE..... Is the Device Number **(for RS485 only). For the FRW-TTL/RS232 is always 00H.**
LENGTH..... Is the number of bytes following the LENGTH.
Example: STX-DEVICE-LENGTH-FUNCTION-DATA0....DATA11-BCC
The length is 14 DEC = 0D HEX.
FUNCTION /STATUS..... Is the FUNCTION to be executed or the STATUS of an operation executed.
SPARE0 to SPARE3..... Is an area reserved for future use.
DATA0 to DATAn..... Are the data exchanged.
BCC..... Is calculated as the XOR of all bytes from STX to last DATA included.
Example: STX-DEVICE-LENGTH-STATUS-BCC → 02H-00H-02H-01H-BCC where BCC= 01H.

3.1 PROTOCOL MS

The FRW-MS operates in Polling mode. The HOST is Master.
With any Command the RF Field has turned on and remain till the end of the sequence.

3.1.1 COMMANDS from HOST to FR

COMMAND #S : SET DEVICE (VALID ONLY FOR FR-485)

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	DATA0	BCC
HEX VALUE	02H	FFH	03H	61H	00H to 7CH	00H-FFH

FUNCTION **VALUE** **DESCRIPTION**
SET DEVICE **61H** The device number is set into the FR memory.
Must be executed on any FR one-by-one before to install.
In DATA0 insert the DEVICE NUMBER assigned to FR.

COMMAND#P : POLL DATA

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	FRB	N-BLOCKS	BCC
HEX VALUE	02H	00H-7CH	04H	04H	00H-3FH	00H-01H	00H-FFH

FUNCTION VALUE DESCRIPTION

POLL SCN 04H **FRB=0 N-BLOCKS=0** The FRW read for a valid **Serial Code Number** on the TAG. Replay with a **READ** string. Otherwise with a proper **STATUS** string.

POLL BLOCK 04H If detected **a MIFARE CLASSIC**:
FRB=00H to 3FH N-BLOCKS=1.
The FRW read for a valid **DATA BLOCK** (16 bytes) on the TAG.
If valid replay with **READ** string. Otherwise with a proper **STATUS** string.
Before send the replay this command exec the AUTHENTICATION Crypto Algorithm.
Only these BLOCKS are available for read:

HEX 00-01-02 04-05-06 08-09-0A 0C-0D-OE 10-11-12 14-15-16
18-19-1A 1C-1D-1E 20-21-22 24-25-26 28-29-2A 2C-2D-2E
30-31-32 34-35-36 38-39-3A 3C-3D-3E

The BLOCK 0 is a Read Only and contains the SCN and the Manufacturer Code.

If detected a **MIFARE ULTRALIGHT**:
FRB=00H to 0FH N-BLOCKS=1.
Replay with a **READ** string. Otherwise with a proper **STATUS** string.

COMMAND#0 : WRITE BLOCK

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BLOCK	N-BLOCKS	SPARE (4 bytes)	DATAn	BCC
HEX VALUE	02H	00H-7CH	0CH/18H	22H	01H-3FH	01H	00-00-00-00H	HEX	HEX

FUNCTION VALUE DESCRIPTION

WRITE BLOCK 22H If write on a MIFARE CLASSIC:
LENGHT=18H. DATAn 16 bytes (1 Block), are written in sequential order into the defined BLOCK.
Before write this command exec the AUTHENTICATION Crypto Algorithm.
After a correct write sequence the FRW exec an internal read and send a **READ BLOCK** reply.
Only these BLOCKS are available for WRITE:

HEX 01-02 04-05-06 08-09-0A 0C-0D-OE 10-11-12 14-15-16
18-19-1A 1C-1D-1E 20-21-22 24-25-26 28-29-2A 2C-2D-2E
30-31-32 34-35-36 38-39-3A 3C-3D-3E
The BLOCK 00 is Read Only .

If write on a MIFARE ULTRALIGHT:
LENGHT=0CH. DATAn 4 bytes (1 Block), are written in sequential order into the defined BLOCK.
After a correct write sequence the FRW exec an internal read and send a **READ BLOCK** reply.
Only these BLOCKS are available for WRITE:

HEX 04-05-06-07-08-09-0A-0B-0C-0D-OE-0F

COMMAND#WKT : WKEY_ON_ TAG

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	SECTOR	O_KEY (6 bytes)	N_KEY (6 bytes)	BCC
HEX VALUE	02H	00H-7CH	0FH	A0H	00H-27H	HEX	HEX	HEX

FUNCTION VALUE DESCRIPTION

WKEY_ON_TAG A0H This command exec only the WRITE of KEY-A into a TRAILER SECTOR of the MIFARE CLASSIC TAG.
The user has to insert in the data field:

SECTOR: The number of the SECTOR on which want to change the KEY-A.
Sectors available from **0 to 39 Dec (0 to 27H).**
Sectors from **36 to 39 Dec** use the **same** key.

O_KEY: The KEY-A value actually set in the specified SECTOR of MIFARE CLASSIC.
The O_KEY has to be **remembered** to avoid the lost of the entire SECTOR.

N_KEY: The KEY-A value to be set into the specified SECTOR of MIFARE CLASSIC.
The N_KEY has to be **remembered** to avoid the lost of the entire SECTOR.

ATTENTION:
BEFORE to exec COMMAND#WKT pose the card in the RF FIELD and VERIFY by a POLL DATA COMMAND that the SECTOR specified is correctly working with the actual key (O-KEY).

COMMAND#WKC : WKEY_ON_ CHIP

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	SECTOR	O_KEY (6 bytes)	N_KEY (6 bytes)	BCC
HEX VALUE	02H	00H-7CH	0FH	B0H	00H-0FH	All 00H	HEX	HEX

FUNCTION VALUE DESCRIPTION

WKEY_ON_CHIP B0H This command exec only the WRITE of KEY-A into the FRW EEPROM KEY memory.
Don' t make any change in the TAG, so don't need the TAG posed in the RF FIELD.
The user has to insert in the data field:
SECTOR: The number of the SECTOR on which want to change the KEY-A.
Sectors available from **0 to 39 Dec (0 to 27H).**
Sectors from **36 to 39 Dec** use the **same** key.
O_KEY: Filled with 6 zeroes.
N_KEY: The KEY-A value to be changed into the specified SECTOR of the FRW EEPROM KEY memory.
The N_KEY has to be **remembered** to avoid the lost of the entire SECTOR.
After exec of this command all the TAG will be AUTHENTICATED, for the sector specified, via the N_KEY memorized.

COMMAND #5: **TURN ON/TURN OFF** the OUT1 transistor.

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BCC
HEX VALUE	02H	00H-7CH	02H	01H/02H	HEX

FUNCTION VALUE DESCRIPTION

TURN-ON 02H The HOST send this Command to TURN-ON (closed) the OUT1 open collector.
TURN-OFF 01H The HOST send this Command to TURN-OFF (open) the OUT1 open collector.

COMMAND#V : READ VERSION

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BCC
HEX VALUE	02H	00-7CH	03H	76H	HEX

FUNCTION VALUE DESCRIPTION

READ VERSION 76H Read the actual firmware version of the module.

3.1.2 STRINGS from FRW to HOST

IN RS485 MODE THE DEVICE BIT7 IS ALWAYS SET TO 1. So the address 00H is 80H and the 7CH is FCH.

REPLY#0 : READ

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	FRB	DATAn (n=4-7-16)	BCC
HEX VALUE	02H	00H-7CH	07H or 13H	See below	00H-3FH	HEX	HEX

FUNCTION VALUE DESCRIPTION

MIFARE CLASSIC:
READ SCN 04H LENGHT=07H DATAn=4 bytes contains the **Serial Code Number**.
READ BLOCK 04H LENGHT=13H DATAn=16bytes from block (FRB) are complete.
MIFARE ULTRALIGHT:
READ SCN 44H LENGHT=0AH DATAn=7 bytes contains the **Serial Code Number**.
READ BLOCK 44H LENGHT=13H DATAn=(4 BLOCKs of 4 BYTES each) 16 Bytes from block (FRB) are complete.
MIFARE DESFIRE D40:
READ SCN 43H LENGHT=0AH DATAn=7 bytes contains the **Serial Code Number**.
MIFARE DESFIRE EV1:
READ SCN 45H LENGHT=0AH DATAn=7 bytes contains the **Serial Code Number**.
MIFARE DESFIRE EV2:
READ SCN 46H LENGHT=0AH DATAn=7 bytes contains the **Serial Code Number**1.
MIFARE PLUS:
READ SCN 42H LENGHT=0AH DATAn=7 bytes contains the **Serial Code Number**.

REPLY#V : VERSION

DESCRIPTION	STX	DEVICE	LENGTH	VERSION (2 bytes)	BCC
HEX VALUE	02H	00-7CH	03H	MMH-RRH	HEX

FUNCTION DESCRIPTION

VERSION Show the actual version (MM=Model RR=Firmware release).
For this model the value **MM** is:TTL/RS232-XS=**30H** TTL/RS232-XH=**31H** RS485-XS=**32H.**
Firmware Release **RR** example: 10H has to be intended as version 1.0

REPLY#1 : STATUS

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	BCC
HEX VALUE	02H	00H-7CH	02H	See below	HEX

FUNCTION	**VALUE**	**DESCRIPTION**
READ DATA ERR	**01H**	The data detected on the TAG are corrupted or incomplete. RF noise environment detected.
NO TAG	**02H**	The FRW has detected a no valid tag present during a COMMAND or POLLING sequence.
AUTH ERR	**10H**	The command was not executed because a bad parameter in the Authentication Keys was detected.
COMMAND ERR	**20H**	The command was not executed because a parameter out of limit on the command string or a data error was dectected.
COMMAND OK	**04H**	The command has been correctly executed.

In the case the FRW detects a BCC error on the received string, don't exec the Command and don't transmit any Reply.

3.1.3 DATA FLOW FRW-MS

The exchange of strings in a typical operation is described below. The HOST is considered as Master, the FRW as Slave.

HOST			**FRW-MS**
		READ SEQUENCE	
POLL SCN	===>	(poll time min 150ms)	<=== if OK **READ SCN**
			<=== if NOTAG/ERROR **STATUS**
POLL BLOCK	===>	(poll time min 200ms)	<=== if OK **READ BLOCK**
			<=== if ERROR **STATUS**
		WRITE SEQUENCE	
WRITE BLOCK	===>	(response time max 200ms)	<=== if OK **READ BLOCK**
			<=== if ERROR **STATUS**
		KEY CHANGE PROCEDURE on TAG MIFARE STANDARD	
POLL BLOCKxx	===>	(poll time min 200ms)	<=== if OK **READ BLOCKxx**
			<=== if ERROR **STATUS**
If POLL BLOCKxx ok:			
WKTxx	===>	(poll time min 200ms)	<=== if OK **STATUS**
		KEY CHANGE PROCEDURE on CHIP FRW	
WKCxx	===>	(poll time min 1000ms)	<=== if OK **STATUS**
Pose in the RF-Field the TAG before changed and test with the new key:			
POLL BLOCKxx	===>	(poll time min 200ms)	<=== if OK **READ BLOCKxx**
			<=== if ERROR **STATUS**

3.2 PROTOCOL FRW-MH

The FRW-MH operates in spontaneous mode.
The POLL SCN interrogation is internally generated by the FRW module waiting for a TAG in the RF field.
THe RF Field is always turned on.

3.2.1 STRINGS from FRW to HOST

REPLY#0 : READ

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	FRB	DATAn (n=4-7-16)	BCC
HEX VALUE	02H	00H-7CH	07H or 13H	See below	00H-3FH	HEX	HEX

FUNCTION	**VALUE**	**DESCRIPTION**
MIFARE CLASSIC:		
READ SCN	**04H**	**LENGHT=07H DATAn=4 bytes** contains the **Serial Code Number**.
READ BLOCK	**04H**	**LENGHT=13H DATAn=16bytes** from block (FRB) are complete.
MIFARE ULTRALIGHT:		
READ SCN	**44H**	**LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
READ BLOCK	**44H**	**LENGHT=13H DATAn=(4 BLOCKs of 4 BYTES each) 16 Bytes** from block (FRB) are complete.
MIFARE DESFIRE D40:		
READ SCN	**43H**	**LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
MIFARE DESFIRE EV1:		
READ SCN	**45H**	**LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.
MIFARE DESFIRE EV2:		
READ SCN	**46H**	**LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**1.
MIFARE PLUS:		
READ SCN	**42H**	**LENGHT=0AH DATAn=7 bytes** contains the **Serial Code Number**.

REPLY#V : VERSION

DESCRIPTION	STX	DEVICE	LENGTH	VERSION (2 bytes)	BCC
HEX VALUE	02H	00-7CH	03H	MMH-RRH	HEX

FUNCTION **DESCRIPTION**

VERSION Show the actual version (MM=Model RR=Firmware release).
For this model the value **MM** is:TTL/RS232-XS=**30H** TTL/RS232-XH=**31H** RS485-XS=**32H.**
Firmware Release **RR** example: 10H has to be intended as version 1.0

REPLY#1 : STATUS

DESCRIPTION	STX	DEVICE	LENGTH	STATUS	BCC
HEX VALUE	02H	00H-7CH	02H	See below	HEX

FUNCTION VALUE DESCRIPTION

READ DATA ERR 01H The data detected on the TAG are corrupted or incomplete. RF noise environment detected.
NO TAG 02H The FRW has detected a no valid tag present during a COMMAND or POLLING sequence.
AUTH ERR 10H The command was not executed because a bad parameter in the Authentication Keys was detected.
COMMAND ERR 20H The command was not executed because a parameter out of limit on the command string or a data error was dectected.
COMMAND OK 04H The command has been correctly executed.

3.2.2 STRINGS from HOST to FRW

COMMAND#0 : WRITE BLOCK

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BLOCK	N-BLOCKS	SPARE (4 bytes)	DATAn	BCC
HEX VALUE	02H	00H-7CH	0CH/18H	22H	01H-3FH	01H	00-00-00-00H	HEX	HEX

FUNCTION VALUE DESCRIPTION

WRITE BLOCK 22H If write on a MIFARE CLASSIC:
LENGHT=18H. DATAn 16 bytes (1 Block), are written in sequential order into the defined BLOCK.
Before write this command exec the AUTHENTICATION Crypto Algorithm.
After a correct write sequence the FRW exec an internal read and send a **READ BLOCK** reply.
Only these BLOCKS are available for WRITE:
HEX 01-02 04-05-06 08-09-0A 0C-0D-OE 10-11-12 14-15-16
18-19-1A 1C-1D-1E 20-21-22 24-25-26 28-29-2A 2C-2D-2E
30-31-32 34-35-36 38-39-3A 3C-3D-3E
The BLOCK 00 is Read Only .

If write on a MIFARE ULTRALIGHT:
LENGHT=0CH. DATAn 4 bytes (1 Block), are written in sequential order into the defined BLOCK.
After a correct write sequence the FRW exec an internal read and send a **READ BLOCK** reply.
Only these BLOCKS are available for WRITE:
HEX 04-05-06-07-08-09-0A-0B-0C-0D-OE-0F

COMMAND#4 : ACK

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BCC
HEX VALUE	02H	00H	02H	10H	HEX

FUNCTION VALUE DESCRIPTION

ACK 10H The HOST send this Command to the FRW to close a sequence. After this command the FRW wait for a TAG extraction.

COMMAND #5: **TURN ON/TURN OFF** the OUT1 transistor.

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BCC
HEX VALUE	02H	00H-7CH	02H	01H/02H	HEX

FUNCTION	**VALUE**	**DESCRIPTION**
TURN-ON	**02H**	The HOST send this Command to TURN-ON (closed) the OUT1 open collector.
TURN-OFF	**01H**	The HOST send this Command to TURN-OFF (open) the OUT1 open collector.

COMMAND#V : READ VERSION

DESCRIPTION	STX	DEVICE	LENGTH	FUNCTION	BCC
HEX VALUE	02H	00-7CH	03H	76H	HEX

FUNCTION	**VALUE**	**DESCRIPTION**
READ VERSION	**76H**	Read the actual firmware version of the module.

3.2.3 DATA FLOW FRW-MH

The FRW continously send a POLL SCN command , waiting for a valid READ SCN-SCNU.
When fully received, the HOST can send a COMMAND in a **time window** of 250 ms.
Over this time, if no command has been sent, the FRW automatically repeat a POLL SCN sequence till TAG extraction or a COMMAND receive, except for COMMAND#4 ACK.
If receive COMMAND#4 ACK the FRW close the sequence and wait for a TAG extraction.
The **time window** on FRW is **reloaded** at any reply during a COMMAND sequence, except for critical errors.
A tipycal data flow, in spontaneous mode, is described below.

HOST			**FRW**
		READ DATA sequence	
Internal POLL SCN is generated and a TAG is correctly read			<=== READ SCN
		Open time window……250ms……	
		COMMAND sequence in time window	
NO COMMAND	===>		**Repeat READ DATA sequence**
POLL BLOCK	===>	(max response time 200ms)	<=== if OK **READ BLOCK**
		New time window…..	
WRITE BLOCK	===>	(max response time 300ms)	<=== if OK **READ BLOCK**
			<=== if ERROR **STATUS**
		New time window…..	
TURN-ON/OFF	===>	(max response time 150ms)	<=== if OK **STATUS**
		New time window…..	
ACK	===>		**Wait for TAG extraction….**

4.0 OUT1 AND LED

OUT1

The Out1 is an Open Collector output driving a max. load of 80 ma at 12VDC.
It will goes ON/OFF using the COMMAND#5.

LED-OUT

The LED-OUT is a TTL output, active high, with a 1 kΩ internal series resistor suitable to drive an external LED connected to GND.
It will turn ON when a KEY/CARD is moved in the RF-Field and is correctly read.
It will turn OFF when the KEY/CARD is removed by the RF-Field.

5.0 FRW-USBN-MS/MH-5 USB modules

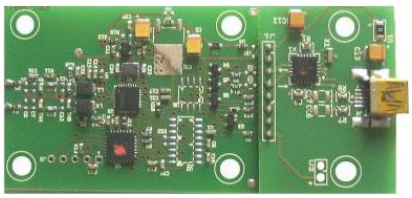
Before any operation need to INSTALL the USB drivers.
1)Unzip the package "MCP2200 Windows Driver.zip"
2)Open the folder "Driver Installation Tool"
3)Open the folder "x64" for 64bit platforms or "x86" for 32bit platforms.
4)Launch the application "MCP2200DriverInstallationTool.exe".
5)Connect the FRW-USB device and follows the Microsoft instructions to complete the INSTALL on your platform.
6)The install assign a COM PORT to your device. Now you can communicate on this PORT.

To connect the FRW-USB module use a cable of the desired length mounting the connectors:
USB 2.0 TYPE A PLUG (side HOST) and USB2.0 MINI TYPE B PLUG (side FRW)

The TRW-USB module is powered by the 5VDC on the USB connector.

The available models for order are:
FRW-USBN-MS/MH-5 (PCB version) and FRW-USBN-MS/MH-5-POCKET

Dimension POCKET	H 75 x L 115 x D 25 mm



FRW-USBN- PCB

FRW-USBN- POCKET

6.0 FRW-MS/MH-12-ONDA or SHELL

Dimension SHELL	H 77 x L 112 x D 30 mm
Dimension ONDA	H 51 x L 115 x D 24 mm

ONDA

CABLE PIN FUNCTION

COLOUR	232	485
WHITE	+12VDC	+12VDC
BROWN	GND	GND
YELLOW	RX 232	RS485-A
GREEN	TX 232	RS485-B
GREY	GND	GND

SHELL

EXAMPLE: HOW TO CONNECT TO A 9 PIN D-TYPE S (Female)

TR 232-S cable	**D-TYPE S connector**
YELLOW(RX)	PIN 3
GREEN(TX)	PIN 2
GREY(GND)	PIN 5

IMPORTANT:
DURING A WRITE COMMAND THE TAG MUST BE MANTAINED IN THE PROPER RF FIELD TILL A REPLAY#1 OR STATUS ERROR STRING HAS BEEN RECEIVED.

7.0 FRW-232-MS-12-BOX

The module FRW is inserted into a BOX plastic enclosure.
Has the same electrical functions of the standard FRW-232.
A Cannon 9S connect all the signals. Connection with PC through a STRAIGHT CABLE.
The 12VDC power supply is connected by a standard 2,1mm plug-in:
Internal PIN +12V
External PIN GND
The TRW is protected against polarity inversion.

FRW-232-12-BOX

MECHANICAL

Length Width Height	11.2cm 6.8cm 2.8cm
Weight	Typ 100g

OPERATING

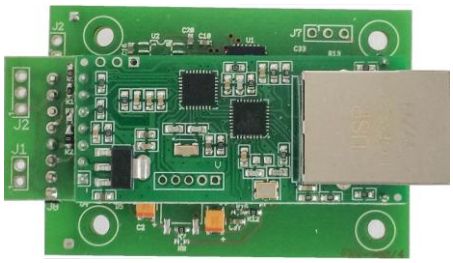
Power Requirements	9 to 12 VDC not stabilized max. current 50mA
Serial interface **Data=8 Parity=N Stop=1**	Polling Mode
Speed	9600 baud
Read Distance (TAG in center of RF field)	CARD typ 60 mm

PIN	DESCRIPTION
1	
2	TX 232
3	RX 232
4	
5	GND
6	NOT CONNECTED
7	NOT CONNECTED
8	NOT CONNECTED
9	NOT CONNECTED

Cannon 9S Connector

8.0 FRW-LAN-MS/MH-5-PCB

This module operate in Transparent Mode.
All the commands and reply are executed on the FRW Reader module through a RJ45 port 10/100Mbps ETHERNET at the same mode as described in the above 3.0 Protocol paragraph.



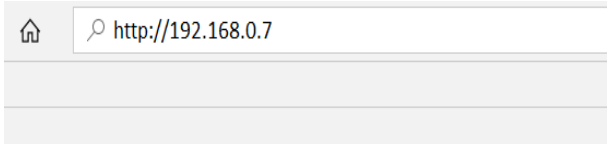
Length Width Height	66mm 40mm 25mm

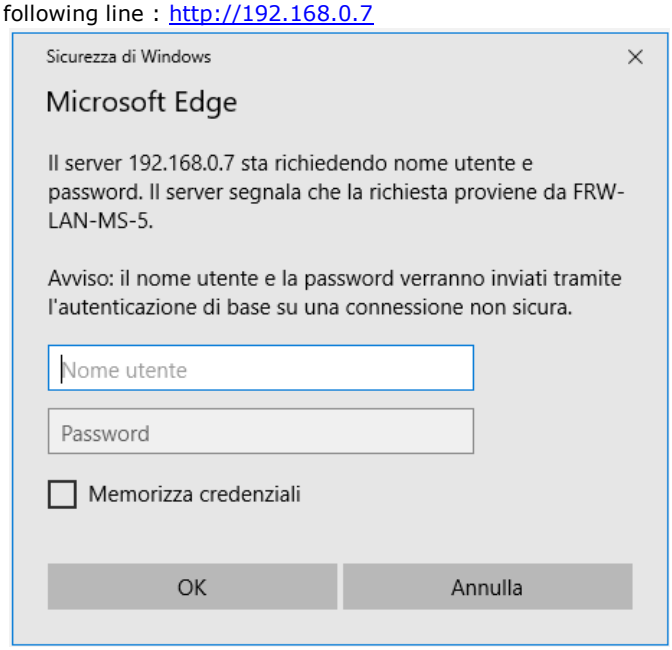
Power Requirements	5VDCstabilized max. current 160mA
Serial interface **Data=8 Parity=N Stop=1**	Polling/Spontaneous Mode
Speed	9600 baud
Read Distance (TAG in center of RF field)	CARD tip. 50 mm

See also par 2.0 MOUNTING for proper connections.

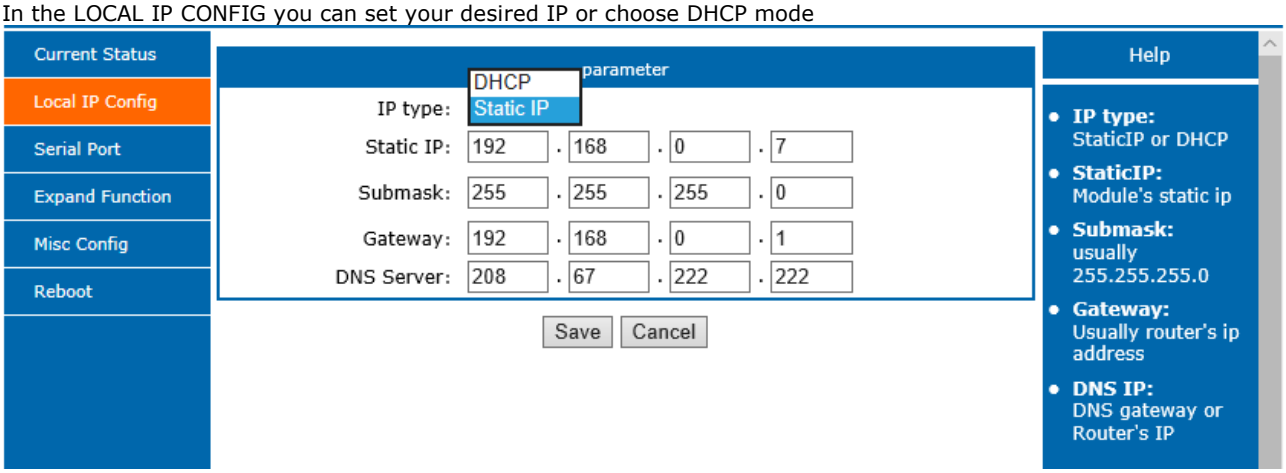
8.1 SETUP

Connect the module to an ETHERNET LAN.
The module has inside a web server, the default IP is:
Using a web browser like Chrome or Internet Explorer type the following line : http://192.168.0.7
Will appear the login page containing the Default Login items:
User Name: admin
Password: admin



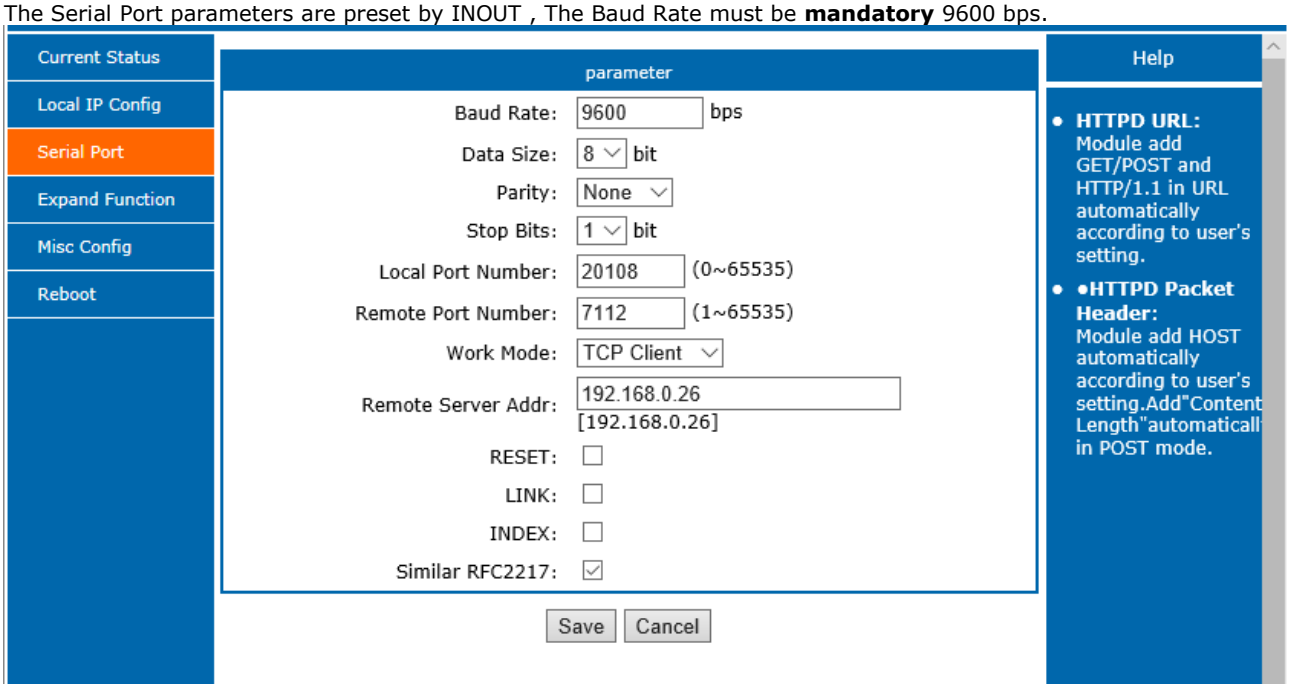


Press OK to enter the LOCAL IP CONFIG.
In the LOCAL IP CONFIG you can set your desired IP or choose DHCP mode

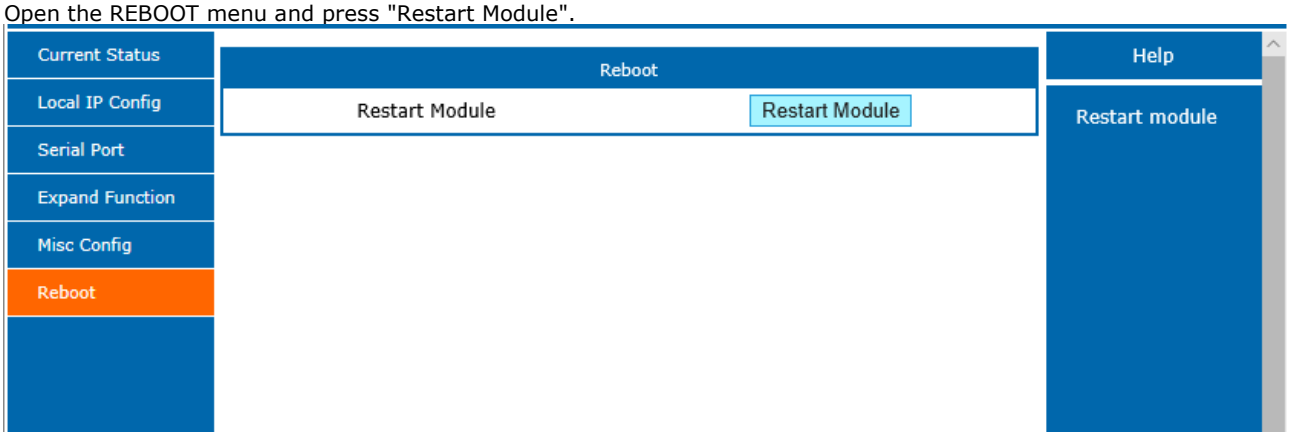


Insert your IP parameters and press SAVE.

The Serial Port parameters are preset by INOUT , The Baud Rate must be **mandatory** 9600 bps.



Open the REBOOT menu and press "Restart Module".

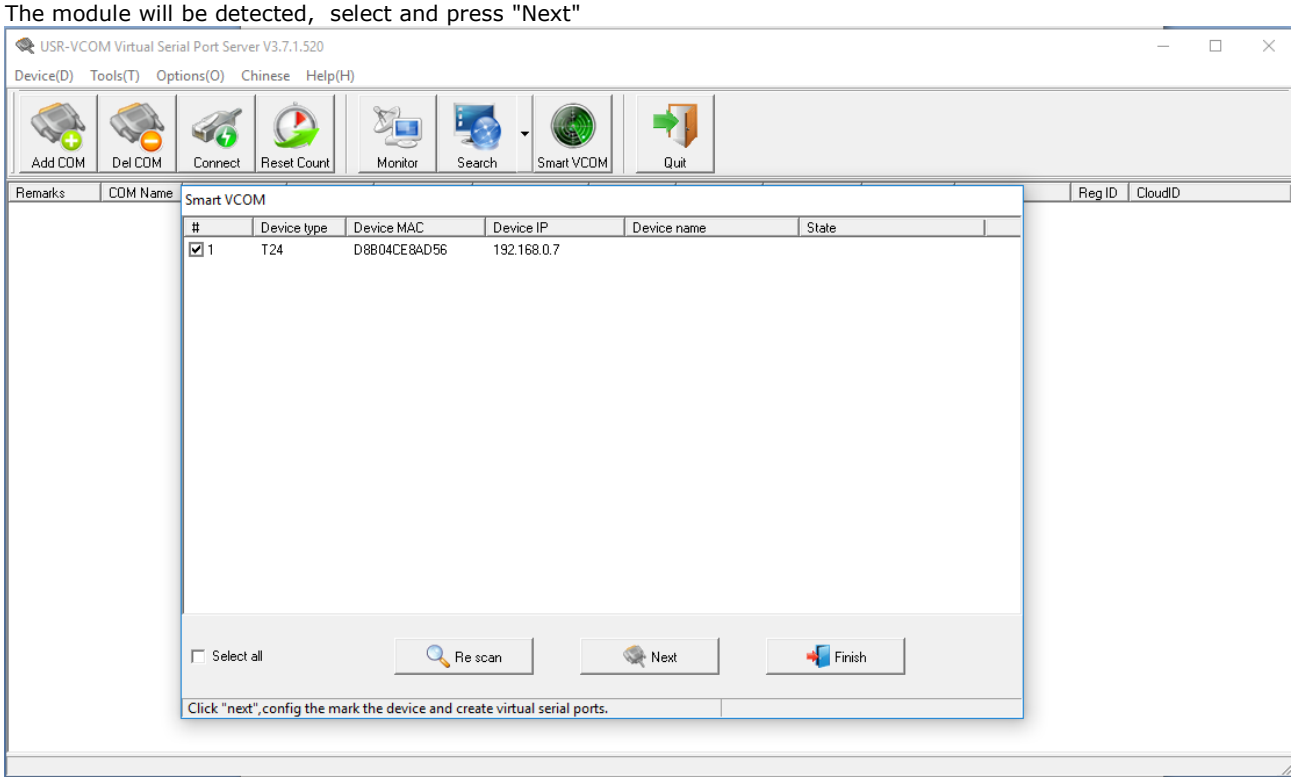


Now the module is ready to operate according to our protocol as described in our documentation.
If you have an your SW to communicate with the FRW module just operate from this.
Otherwise if you want make a TEST you can use our "Demo TRW-FRW" following the instruction in par 8.2 TEST .

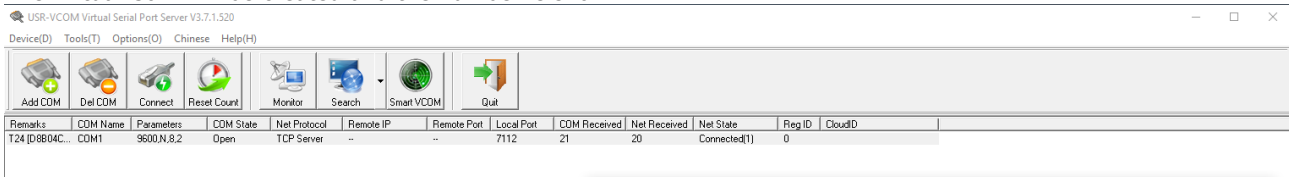
8.2 TEST (optional)

To test the module using our Serial demo program TRW/FRW, we need to create a TCP IP virtual comm.
Install the Virtual-Serial-Software(VSS.exe) program that you can find on our site to create a virtual comm.
Run the program and press "Start VCOM" button.

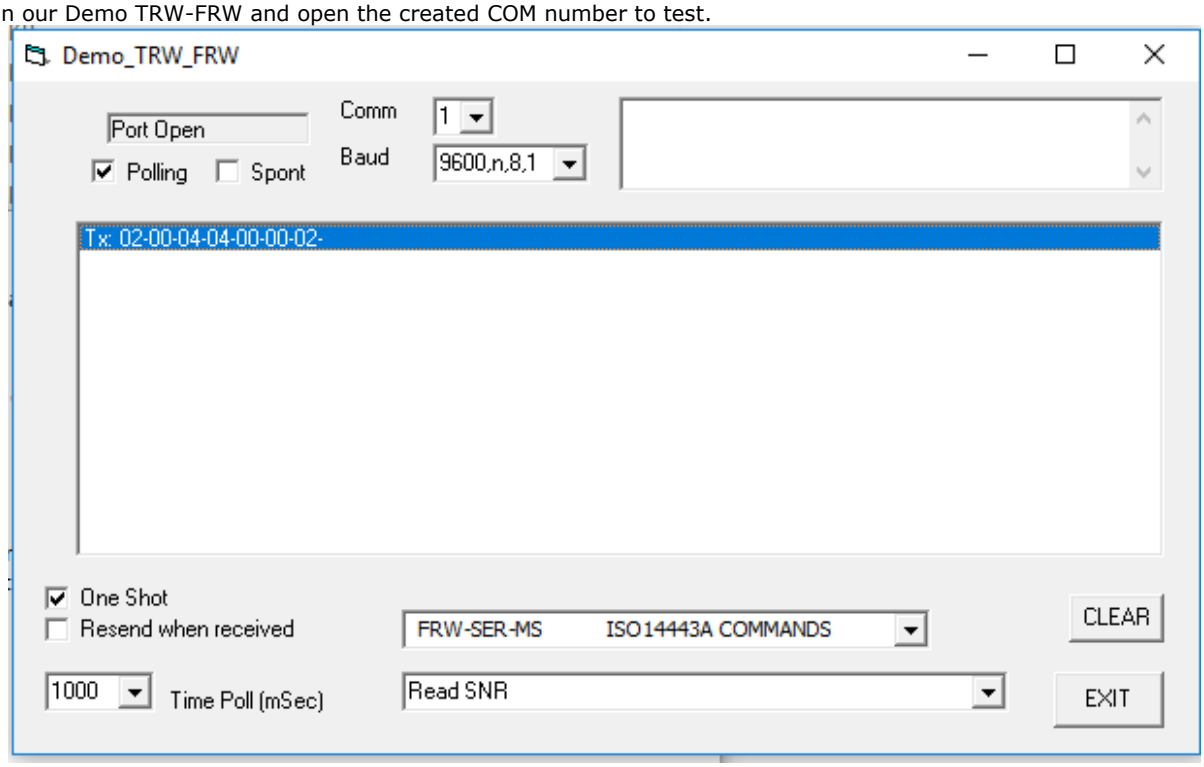
The module will be detected, select and press "Next"



The Virtual Com will be created and the number is shown



Run our Demo TRW-FRW and open the created COM number to test.



9.0 READER SPECIFICATIONS

OPERATING

Power Requirements max. Ripple 10mVp-p	5 VDC ± 5% at max 90mA (peak) 3.3 VDC ± 5% at max 90mA (peak) only for TTL version.
Serial interface **Data = 8bit Parity = none Stop = 1bit**	MS: BiNARY asynchronous half duplex, polling protocol . MH: BINARY asynchronous half duplex, spontaneous protocol .
Baud Rate	9600 bits per second
Reading Distance (with TAG in center of RF field)	CARD: typ. 60mm
Writing Distance (with TAG in center of RF field)	CARD: typ. 50mm

MECHANICAL PCB

Dimensions	40mm x 58mm x 10 mm
Weight	Max 60g

ENVIRONMENTAL

Temperature	Operating Storage	-10°C to 60°C -30°C to 70°C
Humidity	Operating Storage	10% to 90% non condensing 0% to 95% non condensing

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