



RML-HFMR101

Mid-Range RFID Reader

User Manual



Revision History

Revision	Description	Revised by	Approved by	Date
1.1		Sam Aghigh		Nov. 2008

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1. Safety Instructions / Warning - Read before start-up !

- The device may only be used for the intended purpose designed by for the manufacturer.
- The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices which have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.
- Repairs may only be executed by the manufacturer.
- Installation, operation, and maintenance procedures should only be carried out by qualified personnel.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes .
- When working on devices the valid safety regulations must be observed.
- Special advice for carriers of cardiac pacemakers:
Although this device doesn't exceed the valid limits for electromagnetic fields you should keep a minimum distance of 25 cm between the device and your cardiac pacemaker and not stay in an immediate proximity of the device respective the antenna for some time.

2. Performance Features of the readers

2.1. Performance features

The Reader is designed for reading passive data carriers, so-called „Smart Labels“ at an operating frequency of 13.56 MHz.

The reader RML-HFMR101 is suitable for all applications in which moderate reading distances are required. Also required is an external antenna connected to the Reader

An anti-collision function enables simultaneous reading of up to 30 transponders per second.

The Reader electronics is contained in a plastic housing having an IP30 enclosure rating. The Reader comes with an asynchronous port which can be configured for RS232 and RS485. The address of the RS485 interface can be configured via software.

2.2. Available Reader-Types

Table 1: Reader-Types

Reader-Types	Description
RML-HFMR101-A	asynchronous interface and external antenna-IC Certified
RML-HFMR1 01 -A-M	asynchronous interface and external antenna - Module
RML-HFMR1 01 -USB	USB-Interface and external antenna

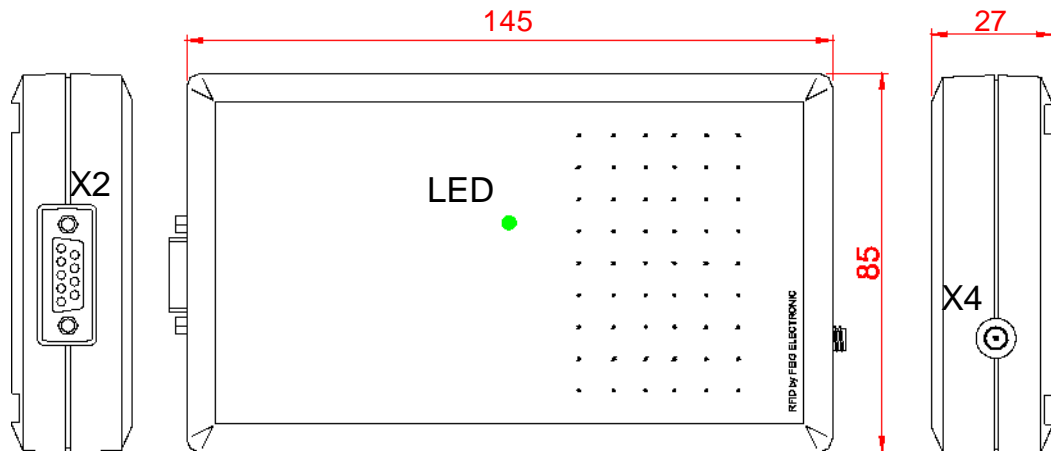
3. Assembly and Wiring

Notes:

- *The distance between two readers of the same type should not fall below 4m.*
- *Before any installation the intended position of the reader should be tested for its suitability.*

3.1. Dimensions

3.1.1. Enclosure



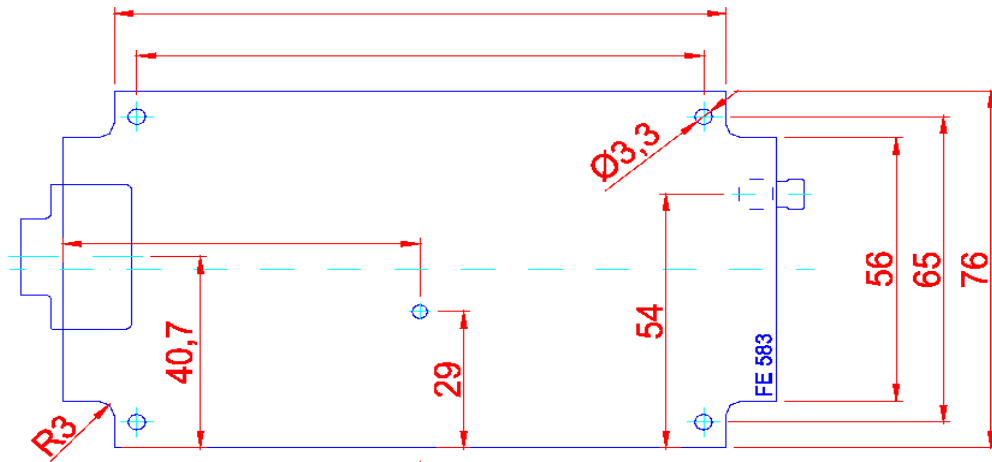


Fig. 2: Module dimensions

3.2. Power

Fig. 1: enclosure dimensions A 9-pin D-sub female socket is located on the circuit board for connecting the supply voltage and asynchronous interface. See also [Fig. 2: Module dimensions](#)

X2	Interface + Supply voltage
2	A-
3	B+
5	GND
7	GND
9	Vcc
1;4;6;8	n.c.

Table 2: Pin configuration X2

A serial data cable with integrated power connection is available for the Reader.

Part Name.	Part No.
Serial Cable	RML-HFRS232

Table 3: Serial data cable

3.3 Supply voltage

Connect the 12-24 V DC supply voltage to terminal X2 on the circuit board.

Terminal	Name	Description
X2 ! Pin 9	Vcc	Vcc – supply voltage (+)
X2 ! Pin 7	GND	Ground – supply voltage (-)

Table 4: Connecting the supply voltage

Note:

Reversing the polarity of the supply voltage may destroy the device.

Power supply recommendations:

To take full advantage of the Reader module performance, you must use a sufficiently regulated and noise-free power supply. Table 5 shows the power supply specified with Industry Canada approval.

Part Name	Part No.	Description.
Power Supply	RML-HFDC12V	Input voltage 230V AC

Table 5: Recommended power supply

Note:

The power supply is supplied with a DC plug 2.5mm x 5.5mm. This is compatible with the serial data cable RML-HFRS232.

3.4. Antenna terminal X4 (only RML-HFMR101)

A SMA socket is provided on the circuit board for connecting the external antenna.

The maximum tightening torque for the SMA socket is 0.45 Nm.

Caution:

Higher tightening torque will damage the connector.

Terminal	Description
X4	Connecting the external antenna (input impedance 50?)

Table 6: Connecting the external antenna

Note:

- **The input impedance for the antenna should be calibrated to a value of $50 \pm (3 \text{ ? } 3^\circ)$.**
- **The optimum operating Q factor of the antenna should be in a range of $Q_B = 10 \dots 20$. To determine the operating Q the antenna must be supplied with a 50 Ohm source such as a network analyzer or frequency generator.**
- **For Industry Canada Approved installations, only R Moroz specific antennas which are IC Certified are allowed to use with this reader.**

3.5. Asynchronous interface

The asynchronous interface can be configured as either RS232 or RS485. The interface can be configured via software.

Note:

All Readers are factory set with RS232

It is not possible to run both RS232 and RS485 at the same time.

3.5.1. RS232 interface

The RS232 interface is connected through X2.

The transmission parameters can be configured using software protocol.

Terminal	Abbrev.	Description
X2 / Pin 2	TxD	RS232 – TxD
X2 / Pin 3	RxD	RS232 – RxD
X2 / Pin 5	GND	RS232 – GND

Table 7: Wiring assignments for the RS232

3.5.2. RS485 interface

The RS485 interface is connected through X2.

The transmission parameters can be configured using software protocol.

Pin	Abbrev.	Description
X2 / Pin 2	A-	RS485 – (A -)
X2 / Pin 3	B+	RS485 – (B +)
X2 / Pin 5	GND	RS485 – GND

Table 8: Wiring assignments for the RS485 interface

3.5.3. Interface configuration using jumpers

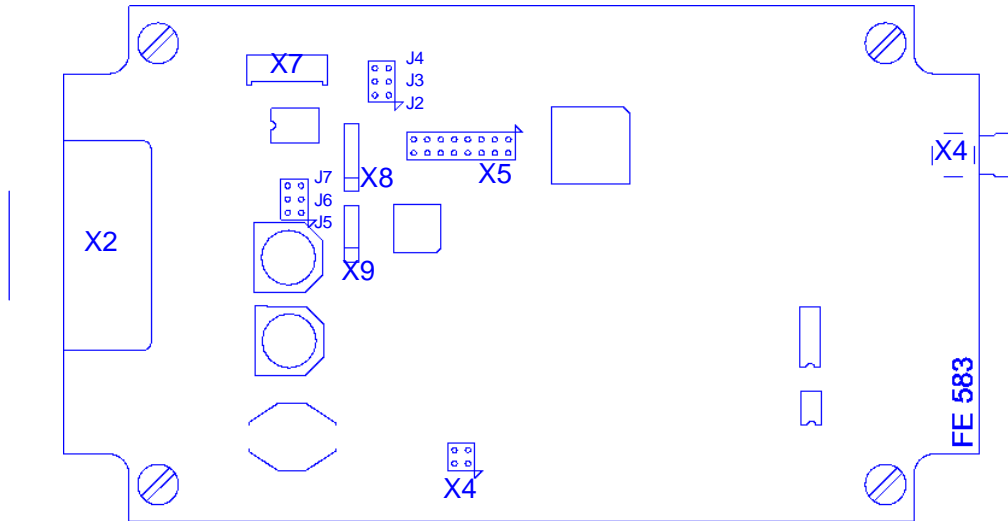


Fig. 3: Position of the Jumpers

3.5.3.1. Jumper J4 - RS232

Jumper **J4** is used to configure the asynchronous interface firmly as RS232 interface.

Jumper	in	out (default)
J4	RS232	RS232 / RS485 Software configuration

Table 9: Configuration RS232/RS485 interface

3.5.3.2. Termination resistors RS485

At RS485 configuration, the termination resistors which may be required can be inserted using jumpers **J5**, **J6** and **J7**.

Jumper	in	out
J5	Pull-Up on RS485 - B	no Pull-Up on RS485 - B
J6	Pull-Down on RS485 - A	no Pull-Down on RS485 - A
J7	Termination resistor RS485 - A ? RS485 - B	no termination resistor RS485 - A ? RS485 - B

Table 10: Configuring the RS485 interface

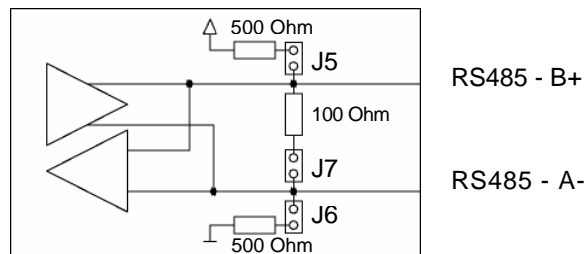


Fig. 4: Jumper of the RS485 interface

3.5.4. Setting the address for bus mode

For bus operation the Reader can be assigned a bus address using software.

Addresses are assigned by the host computer. Using the software, addresses "0" to "254" can be assigned to the Reader.

Note:

Since all Readers are factory set with Address 0, you must connect and configure them one after the other.

4. Control and Display Elements

4.1. LED

The Reader's LED can be configured through software.

Abbreviation	Description
LED green	"RUN " - Turns on when the Reader is ready
LED red	„LABEL“ - Turns on when a transponder is detected.
LED orange	„INITIALIZING“ - Flashes during Reader initialization after power-up.

Table 11: Standard configuration of the LEDs

5. Technical Data

Mechanical Data

- **Housing** ABS plastic with Copper Tape Shields
Enclosed
- **Dimensions (W x H x D)** 85 x 145 x 31 mm
- **Weight** 200 g
- **Degree of Protection** IP 30
- **Color** similar RAL 9018 (papyrus white)

Electrical Data

- **Supply voltage
– ID ISC.MR101-A** typical. 12 V DC!
max. voltage range 12 – 24 V $\pm 15\%$
- **Current Draw** max. 0.5A
- **Operating frequency** 13,56 MHz
- **Transmitting power** 1,0 W ± 2 dB
- **Antenna connection
(only ID ISC.MR101)** SMA female (50?)
- **Interfaces** RS232 and RS485 (configurable)

Functional Properties

- **Supported transponders** ISO 15693 compatible, I•Code 1
(optional I•Code EPC and I•Code UID)
- **Address setting for interface** Software (up to 254 addresses)
- **Visual indicators** 1 LED (multicolor – red ! green)

Ambient Conditions

- **Temperature range**
 - Operation -25°C to +60°C
 - Storage -25°C to +70°C

Applicable Norms

- **Radio approval**
 - Europe EN 300 330
 - Canada IC RSS-210
 - USA FCC 47 CFR Part 15
- **EMC** ICES-003
- **Safety**
 - Low-Voltage UL 60950-1
 - Human Exposure EN 50364

6. Approvals

Industry Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This device has been designed to operate with the antennas listed below, and having a maximum gain of -30dBi. Antennas not included in this list or having a gain greater than -30dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

For installations where Industry Canada approval is required, only the following antenna may be used with the RML-HFMR101:

- 1) ID ISC.ANT340/240
- 2) RML-HFANT500/500
- 3) RML-HFANT500/500-B
- 4) RML-HFANT500/300-B

FCC

Caution: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For installations where FCC approval is required, only the following antenna may be used with the RML-HFMR101:

- 1) RML-HFANT500/500-B
- 2) RML-HFANT500/300-B