RM5 Manual

This Manual covers the RM5 Module

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I. REGULARITY NOTICES AND CONFORMITY

Australia and New Zealand RMA

This device has been tested and meets the Electromagnetic Compatibility requirements for CISPR 32 and Radio testing AS/AZS 4268

This device meets Electromagnetic Radiation Human Exposure Standard 2003 for EME -Meets Category A under the Compliance Labelling Notice 2014

USA – FCC

Information to the user (FCC Part 15.105)

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

Modification warning (FCC Part 15.21)

Any changes or modifications not expressively approved by Allflex could void the user's authority to operate this equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This portable equipment with it’s antenna complies with FCC’s radiation exposure limits set forth for an uncontrolled environment. To maintain compliance, follow the instructions below :

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna, or keep contact to a minimum while using this equipment.

IC Canada

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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.

IC Radiation Exposure Statement

This equipment complies with RSS102's radiation exposure limits set forth for an uncontrolled environment. To maintain compliance, follow the instructions below:

(1) This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
(2) Avoid direct contact to the antenna or keep contact to a minimum while using this equipment.

Cet équipement portable avec ses antennes est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé. Pour maintenir la conformité suivez les instructions ci-dessous :

(3) Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur.
(4) Évitez tout contact direct avec l'antenne ou gardez le contact au minimum pendant l'utilisation de cet équipement.

II. LABEL INSTRUCTIONS

The outside of final products that contain a RM5 device must display a label referring to the enclosed module. This exterior label can use wording such as the following:

Contains Transmitter Module
FCC ID: NQY-RM5
IC: 4246A-RM5

Any similar wording that expresses the same meaning may be used.

III. PRODUCT SAFETY NOTICES

The system must be installed in plastic enclosure compliant with UL94-V0 or in metallic enclosure.

The system should not be used in weather conditions where lightning strike may be possible.

The data ports are treated as TNV-1. The device (PC or other) to be connected to this unit should comply with the corresponding requirements for TNV-1 circuits as per AS/NZS 60950.1”

1.0 RM5 OPERATING DESCRIPTION

The RM5 is a standalone near field 12VDC RFID reader, design to read ISO11784/5 compliant passive tags.
The module consists of an ARM based microcontroller clocked by 17.1776MHz VCXO. An internal PLL generates a 60MHz internal clock that is not used outside the CPU core.
The microcontroller generates a 134.2kHz PWM drive signal to a MOSFET Half Bridge whose power input is heavily low pass filtered to drive an antenna output in series resonant configuration.
An automatic tuning circuit can adapt to antenna inductances from 100uH to 250uH with a maximum resonant voltage of 600Vpk.
The output carrier is turned on and off in a programmable cadence that is normal 80ms of transmit and 20ms of receive.
The transmitter is CW only. During in transmission, the peak antenna voltage is AM demodulated to communicate with FDX passive RFID tags. During the reception period, the HDX tag transmits a 124/134kHz FSK signal which is demodulated by mixing the antenna input with a 322kHz IF, generated by the microcontroller, to up mix the 134kHz tag signal to 450kHz. The filtered and limited output is digitally decoded by the microcontroller. There are no sensitive parts that need screening as the IF and demodulation are digital.
The module also contains 4 analogue inputs, 2 relay outputs, 2 RS485 comms ports for synchronisation and communication, and 1 RS232 comm port, 4 LED indicators.

2.0 RM5 EQUIPMENT USE

The RM5 module is used in all the NX Series products (cf. Table 1), and it can be used with different antennae (cf. Table 2).

		
NX-R01	NX-R02	NX-M

Table 1 – list of NX series products

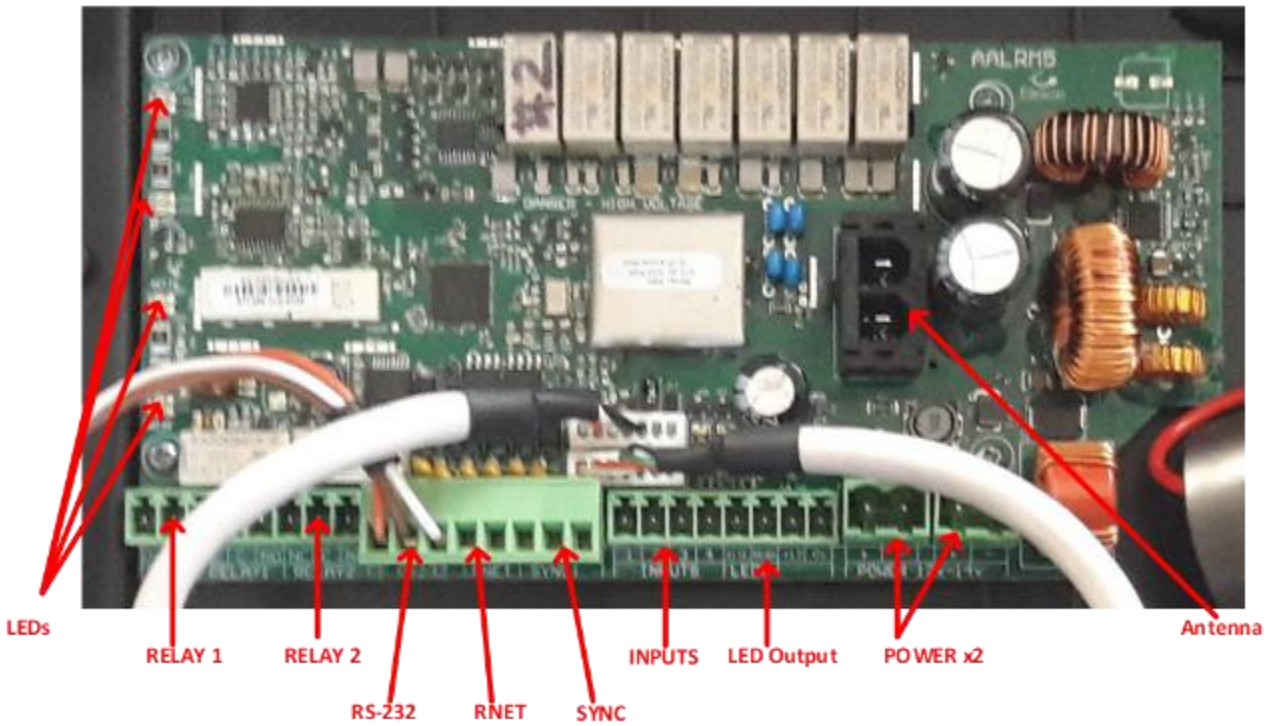
Model	Description
NX-R01	Reader Box – 1x RFM. No connectors. LED indicators for power, read, exciter and high noise.
NX-R02	Reader Box – 2x RFM. No connectors. LED indicators for power, read, exciter and high noise.
NX-R01C	Reader Box – 1x RFM. Connectors for power and Rnet. LED indicators for power, read, exciter and high noise. Includes 10m power cable and 6m serial data cable.
NX-R02C	Reader Box – 2x RFM. Connectors for power and Rnet. LED indicators for power, read, exciter and high noise. Includes 10m power cable and 6m serial data cable.
NX-R01CA	Reader Box – 1x RFM. Connectors for power, Rnet and antenna. LED indicators for power, read, exciter and high noise. Includes 10m power cable and 6m serial data cable.
NX-R02CA	Reader Box – 2x RFM. Connectors for power, Rnet and antenna. LED indicators for power, read, exciter and high noise. Includes 10m power cable and 6m serial data cable.
NX-M01C	Master Box – 1x RFM. Connectors for power and Rnet. High resolution touch screen LCD. Includes 10m power cable, 6m serial data cable, USB cable and slide on bracket.
NX-M02C	Master Box – 2x RFM. Connectors for power and Rnet. High resolution touch screen LCD. Includes 10m power cable, 6m serial data cable, USB cable and slide on bracket.
NX-M01CA	Master Box – 1x RFM. Connectors for power, Rnet and antenna. High resolution touch screen LCD. Includes 10m power cable, 6m serial data cable and USB cable.
NX-M02CA	Master Box – 1x RFM. Connectors for power, Rnet and antenna. High resolution touch screen LCD. Includes 10m power cable, 6m serial data cable and USB cable.

			
NX-AP12060	NX-AP9045	NX-AP6040	NX-AW50

Table 2 - List of antennae

Model	**Description**
NX-AW50	Antenna Wand 50cm
NX-AP6040	Antenna Panel 60x 40cm
NX-AP9045	Antenna Panel 90x 45cm
NX-AP12060	Antenna Panel 120x 60cm

3.0 RM5 BOARD CONNECTIONS



- LEDS – See section 4.0
- RELAY1 – Used in Hooktraka mode
- RELAY 2 -Used in Hooktraka mode
- RS232- Serial tag output
- RNET – Communications to a NX-M
- SYNC – Syncronization input
- INPUTS – Used in Hooktraka mode
- LED Output -Output to drive a READ and TXS led
- POWER – 12v power input. Both connected.

4.0 LED INDICATORS

1. Power LED – Illuminates green when power is supplied. It also is used as an antenna fault condition LED. See table below.

Power LED	Power Led time duty cycle	Fault	Notes
Continuous fast flash	100m/s on off cycle	Find reader Identification	Initiated from Master to find a RM4 in the system
1 Flash	100m/s on pause for 1 second repeat.	No Ant Connected	< 10 Volts detected on antenna
2 Flash	100m/s on 250m/s off x 2 pause for 1 second repeat.	Auto tune error	could not tune Checked all 256 steps
3 Flash	100m/s on 250m/s off x 3 pause for 1 second repeat.	Low Ant Voltage	10- 50 Volts -
4 Flash	100m/s on 250m/s off x 4 pause for 1 second repeat.	High Ant Voltage	> 700 Volts - Transmitter shut down
5 Flash	100m/s on 250m/s off x 5 pause for 1 second repeat.	Sync Tune Error	Unable to sync tune with other readers
6 Flash	100m/s on 250m/s off x 6 pause for 1 second repeat.	Tune Over Voltage	Overvoltage condition during auto-tuning
1 single Flash	1 single 100ms flash		Input pin state change

2. Read LED – Flashes green when a RFID Transponder is in range of the Antenna

Read LED	Read LED time duty cycle	Fault	Notes
Off	None		
On	Flashes every Cycle when a tag is in Range		

3. Exciter LED – Flashes red to let you know the transmitter is on

Exciter LED	Exciter Led time duty cycle	Fault	Notes
Constant flashing	Constant 80/20, 40/20 or 50/50 flashes		Transmitting in Slave Mode
Constant with 1 long flash	Constant cadence pulse + long flash every 20 cycles for 10 cycles		Transmitting in Master Mode
Constant with off periods	Constant flash with 200ms off every 2 sec		Transmitting in wireless sync mode
1 flash per second	1 Short flash every 10 cycles (1 sec in 80/20 mode)	Phase Sync not locked	Attempting to lock phase sync with other RM4s

4. High Noise – Illuminates orange when high background electrical noise is detected. This will reduce the performance on the equipment and is likely you will miss reads.

High Noise LED	High Noise time duty cycle	Fault	Notes
Off	None		
On	On Solid	High Noise Detected	This is set to 50 by default but can be changed. Variable 202

5. All indicators

All LEDs	All Leds time duty cycle	Fault	Notes
All 4 leds flashing together	All leds flashing together every 500ms	Master module not connected	Error communicating with master module or no address received
4 leds flashing in sequence	Each led flashes one after each other		Bootloader mode or no valid firmware programmed

5.0 RM5 SPECIFIACTIONS

General	
Frequency:	134.2Khz, Bit 1 124.2Khz +/-2Khz, Bit 0 134.2Khz +/-1.5khz
RFID Compatibility:	ISO 11784 & 11785, HDX and FDX-B
User Interface:	RS-232 Serial Port
RS-232 Port:	9600bps, 8 Data Bits, No Parity, 1 Stop Bit.
RFID Code output:	Decimal or Hex
Input Power:	DC 12-14V, 1.5A

Physical	
Operating Temperature:	-20c to +60c
Storage Temperature:	-40c to +85c
Humidity:	0 to 100%

Performance	
HDX:	Up to 1.4M Antenna Dependant
FDX:	Up to 1.2M Antenna Dependent
Read Rate:	50/50 40/20 or 80/20
Read Error Rate:	less than 1 in 1 million.