BALYO

COMBOX

User manual

History of data changes

AUTHOR	MODIFICATIONS	DATE	VERSION
Floriane	Creation	02/10/2019	v.0
EDF	Illustrations update / Battery deletion / Procedure update / FCC IC statement added	17/05/2022	v.1.0

SUMMARY

I. SYMBOLS

Indicates the presence of a danger that can cause accidents to people or damage to the Robot or other material

Indicates notes or important information to be taken into account

Electrical shock hazard

Disposal bin

II. Legal Information

Manufacturer of the Automation Kit

BALYO SA
3 , rue Paul Mazy
94200 Ivry sur Seine
FRANCE

III. Introduction

1. General Scope

The COMBOX

The COMBOX and its accessories have been designed for integration in a global solution of Balyo automation. It permits communication between the environment, the Robots and the Balyo automation solution supervisor.

It is your responsibility to maintain this equipment in good working order, in particular by respecting the instructions of the present document. This notice presents all you are required to know for start-up, maintenance, configurations and normal use of this accessory. In order to guarantee safe operation during the life of the COMBOX, it is indispensable to respect all instructions in this manual.

The COMBOX and its documentation

The COMBOX must be delivered accompanied by the present instruction manual.

The declarations of conformity are complementary and do not release each party from their responsibilities. Respect of this instruction manual is not sufficient: it is indispensable to have knowledge of the complementary instructions - the instructions of the **COMBOX manual** and the **Installation manual** must be rigorously respected. If one or more documents are missing on delivery of the COMBOX, it is absolutely essential to contact the distributor who sold the goods and request the missing document(s). Use of the COMBOX without its complete documentation is strictly forbidden. Do not use the COMBOX if the regulatory marking does not exist or is no longer legible.

The plant manager is bound by the following obligations :

- Make known the instructions of the manual to the users
- Ensure that the regulations in force are implemented
- Keep the present instructions for future reference during the life of the equipment, including in the cases of resale, change of operator or manager.

The instruction manual is not a training manual.

The personnel must read the present instruction manual before using a Balyo COMBOX. The COMBOX can only be used by operators that are trained and qualified, and in the conditions prescribed by the manufacturer in the present instruction manual.

Any use that is non-compliant with the prescriptions of the present instruction manual may result in a risk of injury to the personnel and damage to property and the environment.

2. Legal Requirements

EC Declaration of Conformity ongoing

3. Safety Instructions

- The wall socket for the COMBOX must be accessible.
- Maintenance of this equipment must be performed by a qualified and trained technician.
- Use the standard fuse specified and do not use, under any circumstances, another fuse.
- Only use the COMBOXs indoors. (If it is used in an area presenting a mechanical risk, put in place a peripheral protection.)

For COMBOX Std - ExtIO - 3But - Dis powered by the 230 V :

- The power supply cord must be connected to a wall socket equipped for 2-pins. This cable must be a 2-core flexible cable with current 10 A for 230V and male type.
- Do not use cords with signs of cracking or wear.

For COMBOX Std - ExtIO - 3But - Dis powered by the PoE :

- The RJ45 ethernet cable must be connected to the ethernet port. This cable must be flexible with a minimum current 1.5 A.
- Do not use cords with signs of cracking or wear

4. Labelling

Electrical danger: Before all cleaning and maintenance operations, disconnect the COMBOX.

The manufacturer's label is on the back side of the COMBOX casing. See the label example below in Illustration 1 .

Illustration 1 : Combox CE label

IV. COMBOX COMPONENTS

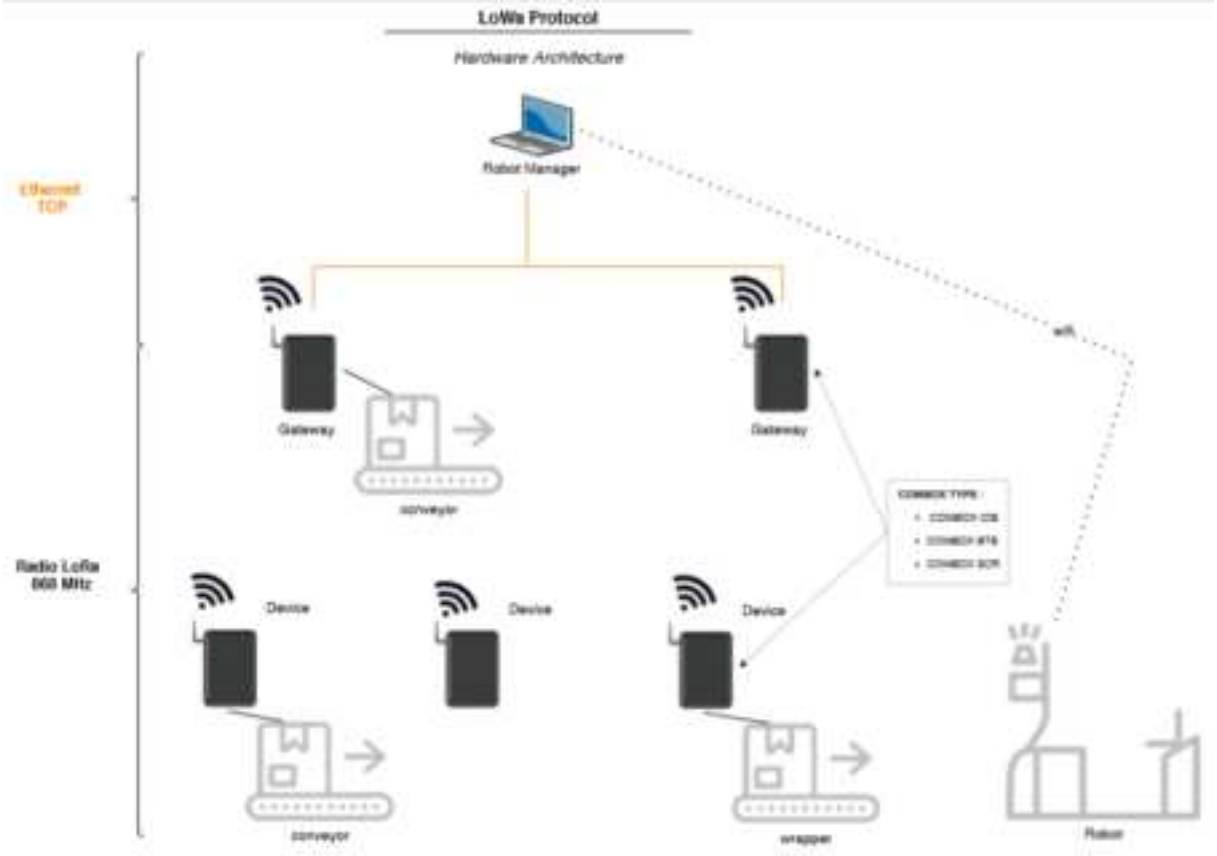
1. COMMON COMPONENTS

All wireless COMBOX have the following external interfaces :

- A connector for connection of the power supply cable fitted with a main plug
- An Ethernet RJ45 connector for connection of the COMBOX to the local network and for the power supply
- A usb connector used to configure the COMBOX software
- 3 light indicators at the top of the COMBOX to inform users of the COMBOX status
- 1 light indicator for each Relays to indicate their status
- 1 light indicator for each Input to indicate their status
- 2 inputs
- 2 outputs (relays)
- A LoRa (Long Range Low Power) antenna. Frequence : 150MHz~960MHz. General ISM band < 1GHz

2. ARCHITECTURE

All 4 types of COMBOX are installed with the same software. This way, a COMBOX can be configured as a *device* or as a *gateway*. A COMBOX configured as a *device* can only communicate with the LoRa radio. For this reason, to exchange information with the *Robot Manager*, a *gateway* needs to be installed as well, so it can forward the messages. A COMBOX configured as a *gateway* can communicate with the LoRa radio and ethernet. This *gateway* COMBOX will forward all the radio messages received to the *Robot Manager* through ethernet, and it's own messages.



3. COMBOX STANDARD

The standard COMBOX (COMBOX-STANDARD) is a single component module composed of the main casing module presented in illustration 2. It provides the strict minimum of a COMBOX service.

illustration 2 : Combox Std

4. COMBOX 3 BUTTONS

The 3 buttons COMBOX (Combox-3But) is a single component module composed of the main casing module presented in illustration 3. It provides an interface between the operators and the Robot Manager system of the Balyo automation system.

Illustration 3 : Combox 3But

This COMBOX has the following external interfaces in addition :

- 3 push button switches
- 3 lights indicator integrated in the push buttons (RED

5. COMBOX TOUCHSCREEN

The Touchscreen COMBOX (Combox-TS) is a single component module composed of the main casing module presented in illustration 4. It provides an interactive interface between the operators and the Robot Manager system of the Balyo automation system

Illustration 4 : Combox TS

This COMBOX has the following external interfaces in addition :

- A touch screen integrated in the middle of the combox front side

6. COMBOX EXTENDED I/O

The Extended I/O COMBOX (Combox-ExtI/O) is a single component module composed of the main casing module presented in illustration 5. It provides additional Inputs (+6) and Outputs (+6).

Illustration 5 : Combox Ext I/O

V. PUTTING INTO SERVICE

1. RECEIVING AND ACCEPTANCE OF THE COMBOX

During acceptance of your COMBOX, inspect it for any apparent damage. Do not accept an automation kit that seems to be damaged. Verify that all COMBOX have received a LoRa antenna before going forward with the installation.

2. INSTALLATION OF THE COMBOX

The COMBOX is wall-mounted using the supplied mounting accessories. All other mounts must be approved by the manufacturer.

In the case of the COMBOX-BTE and the COMBOX-SCR, they must be mounted at a height of between 1.1 and 1.6 meters, otherwise it won't be accessible at human height.

In the case of the COMBOX STANDARD, they can be mounted at very high heights, as long as you can supply the power and connect Inputs/Outputs signals.

Mounting the main casing

The main casing is wall-mounted using the 2 mounting lugs (drilling template), 2 at the top and 2 at the bottom as indicated in illustration 10.

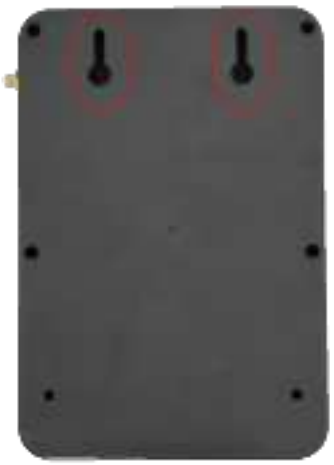


Illustration 10 : Bottom of the Combox

Mounting of the radio antenna

The radio antenna must be fixed on the COMBOX by screwing the Wave Whip antenna on the RP-SMA connector (female), as shown in the illustration 11 :

Illustration 11 : Antenna location to Combox

The antenna must have a clear **30 cm perimeter** and be directed toward the ceiling if possible. If a huge obstacle is right above the combox, avoid directing the antenna toward it and choose another direction.

Once mounted, the operating frequency range is: 863 MHz - 870MHz.

3. Mounting the wires

Motherboard connector interfaces

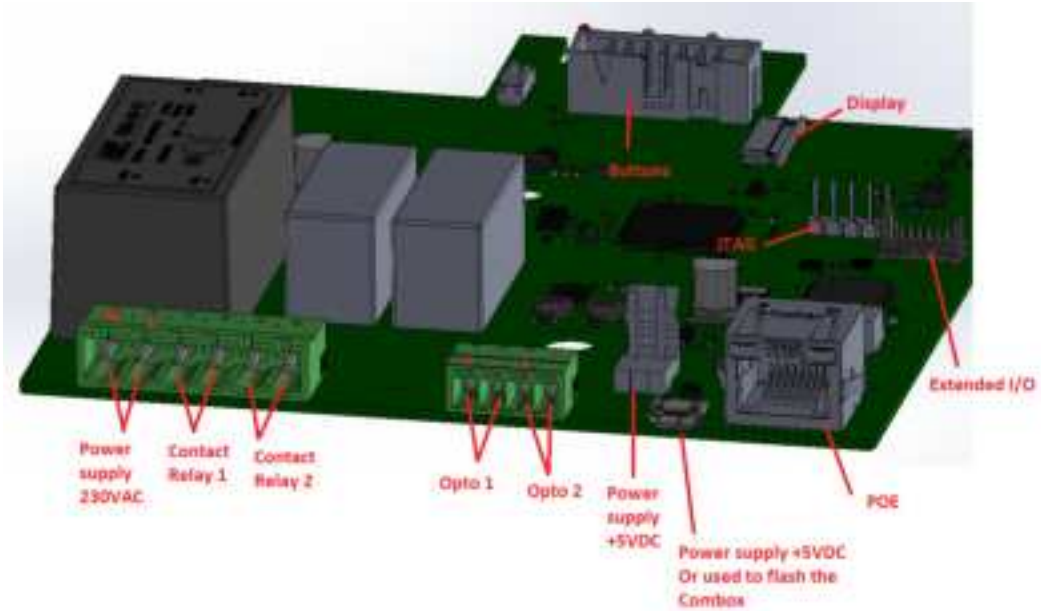


Illustration 12 : Motherboard connectors

Extended I/O board connector interfaces

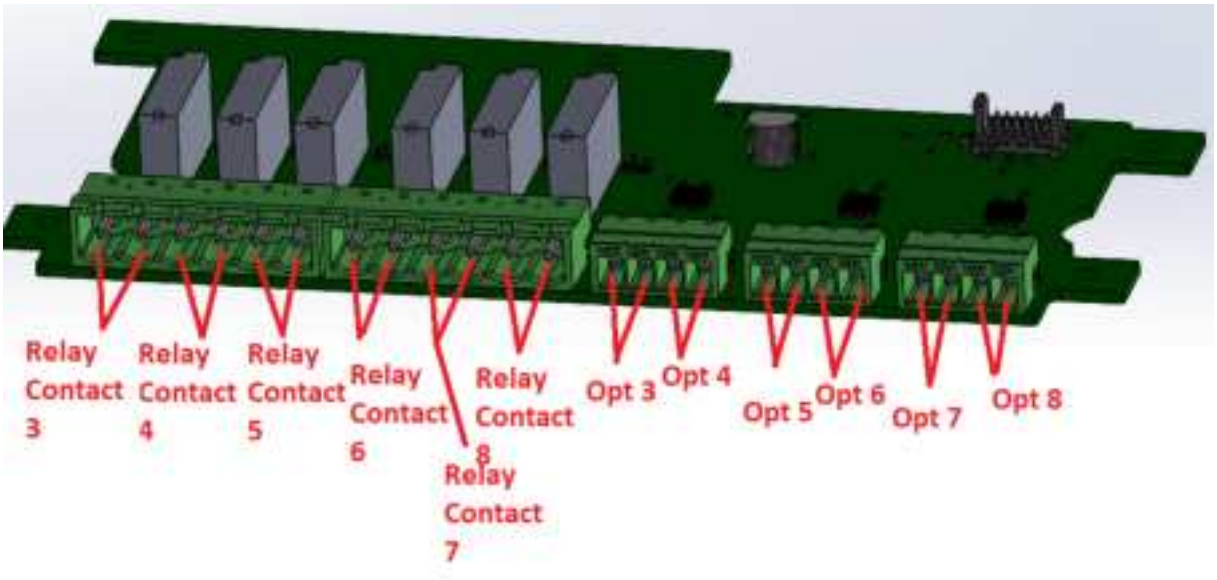


Illustration 13 : Extended I/O board connectors

Inputs Connection

All 3 types of COMBOX are installed with 2 optocouplers / opto-isolator (*input*) , that can be used or not :

- Working range 10-30 V
- Minimal operation 4 mA
- Maximum power 500mW
- Protective diode for reversal polarity
- Floating ground in entry
- 2 pins per pole (pin OPTO1_IN+ and pin OPTO1_IN- for example)
- Wire acceptance 3.50mm (14–20 AWG)

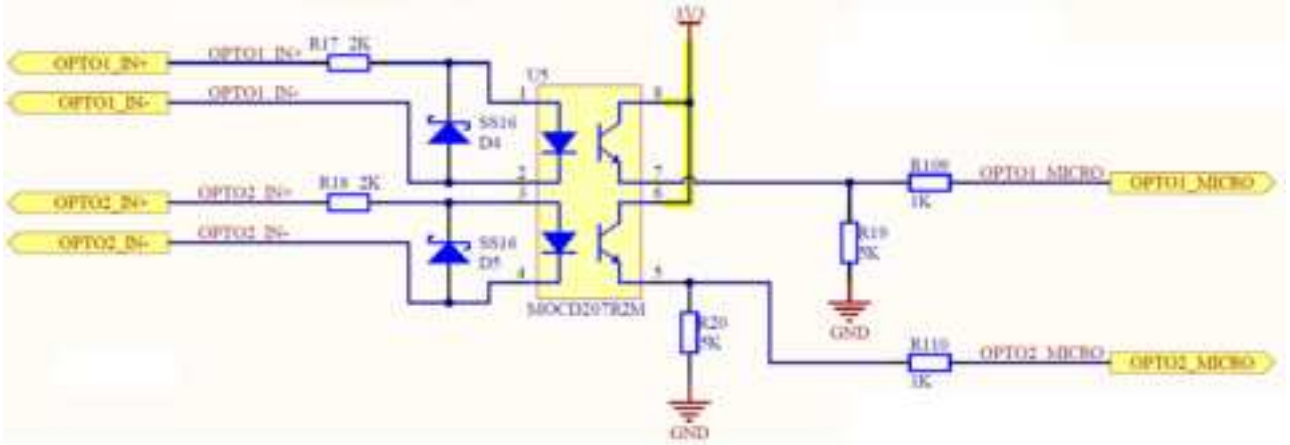


Illustration 14 : Schematics of optocouplers inputs

Outputs Interfaces

All 3 types of COMBOX are installed with 2 relays (*output*) that can be used or not as ***interrupts*** :

- Contacts current: 16 A
- Rated voltage: 250 VAC
- Maximum switching voltage : 400 VAC
- 2 pins per pole (pin PHASE_IN1 and pin PHASE_OUT1 for example)
- Wire acceptance 0.08-4mm (28-12 AWG)

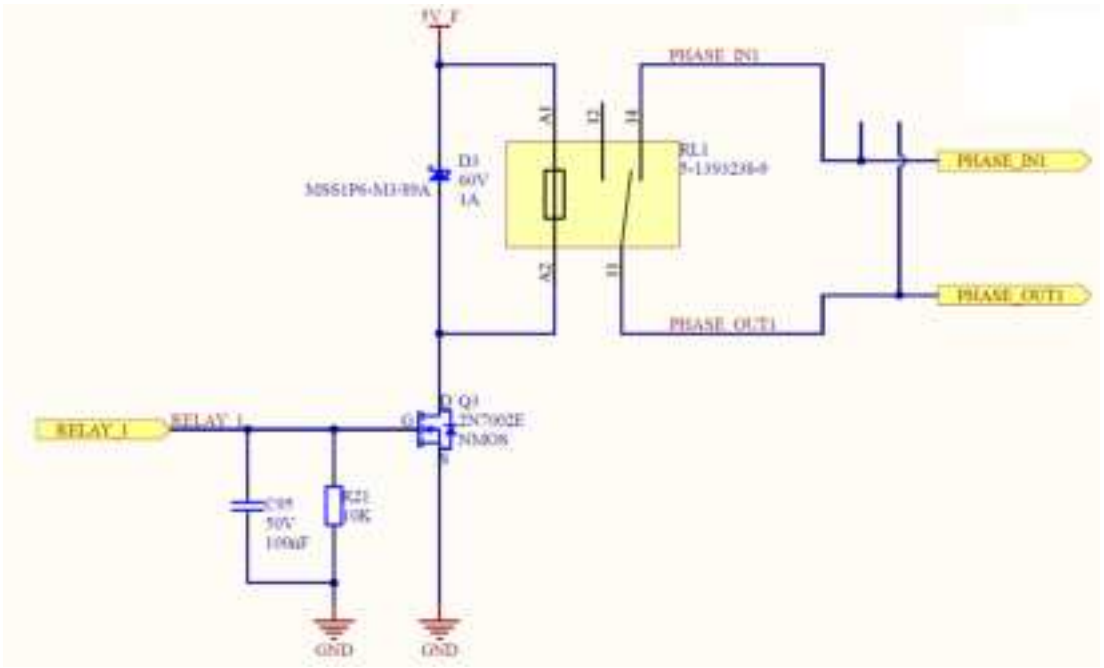


Illustration 15 : Schematics of relays outputs

Power Supply

The power supply can be done in 3 different ways :

- PoE
- 230 VAC
- 5 VDC

The power supply 230 VAC must be connected with 2 pins per pole. The wire acceptance is 0.08-4 mm (28-12 AWG).

The PoE must be connected with an ethernet cable supporting PoE (RJ45 cable) .

The 5VDC must be connected with 2 pins per pole.

If the COMBOX is configured as a *device*, the Ethernet doesn't need to be connected. However if the COMBOX is configured as a *gateway*, the Ethernet cable is necessary.

4. Switching on the COMBOX

Before switching on the COMBOX, check the following components:

- The COMBOX and its accessory components (depending on the version) must be correctly mounted
- The COMBOX and its accessory components must be correctly interconnected
- The main casing of the COMBOX must be correctly closed (2 screws on the bottom front panel)

Once these conditions have been met, the COMBOX can be powered by connecting its power supply cable to a mains supply socket.

VI. Operation of the COMBOX

1. General Scope

The COMBOX are an interface elements between the site environment (warehouse,factory) and the Robot Manager system of the Balyo automation solution.

2. Operation of the COMBOX - 3But – Dis

The COMBOX 3But and the COMBOX TS provides the interface between the operator and the Robot Manager of the Balyo automation solution. The operator can interact with the COMBOX - 3But using the 3 illuminated push buttons on the front panel. For the COMBOX-TS, the operator can use the push buttons set out on the touch screen.

The function of each push button and the LEDs is specific for each installation. Refer to the user manual of the overall installation.

VII. Maintenance / Repairs

1. General Scope

For safety reasons and in order to benefit from the full manufacturer's warranty, repairs should be carried out by a certified distributor, using only genuine spare parts. All modifications, additions etc., should be subject to verification by a certified distributor during the return to service.

For all modifications, additions and combinations with material of another origin, the manufacturer is released from liability and the operator takes sole responsibility for the manufacturer for such modifications.

Programming and diagnostics of the module using an Ethernet interface or USB cable is reserved to the solution installer. All modifications may impact the operation of the Robot.

For all other preventive and curative maintenance operations, it is highly recommended to use maintenance services that are authorized by the manufacturer. All damage resulting from improper handling by non-authorized personnel will void the warranty.

2. Switching Off

Before any maintenance operation, the COMBOX must be switched off and disconnected from the mains supply.

To power down the COMBOX simply disconnect it from the main supply socket or disconnect the ETHERNET cable in the downer part of the COMBOX's case., if the COMBOX is using PoE.

3. Regular maintenance

The COMBOX has been designed so as to require little maintenance. The present procedure should be performed every year. However, the frequency should be increased to take into account difficult environmental conditions (dust and sudden severe temperature changes). Refer to the instructions of the authorized distributor.

- Inspection of external cables
- Check the cable connections: the latter must be correctly tightened and show no visible traces of burning or have no metallic wire visible, even partially. In the case of unfastened connections or apparently defective cables, please contact the distributor to repair.

VIII. SCRAPPING THE COMBOX

Disposal (dismantling, scraping and/or recycling) of the COMBOX should be carried out in accordance with effective regulatory dispositions for waste management.

SCRAP MANAGEMENT

Part	Scrapping
Electronic boards, connectors	Recycling process for electronic waste
Plastic components	Recycling for plastics
Cables / screws , bolts	Materials recycling process

Refer to the effective regulatory dispositions at the time of scrapping

IX. APPENDIX

APPENDIX 1 : Combox User manual Robot Manager : *Combox_User_manual_Robot_Manager*

APPENDIX 2 : Combox User manual PC tools : *Combox_User_manual_PC_tools*

APPENDIX 3 : Functional electrical drawing of the COMBOX - Std - 3But - TS

APPENDIX 4 : COMBOX communication - Lowa protocol : *lowa_protocol_diagram*

APPENDIX 5 : EC Declaration

FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution:

Any Changes or modifications not expressly approved by the part 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."

IC statement:

This device complies with Industry Canada license-exempt RSS standard(s).

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.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Radiation Exposure

This equipment complies with FCC & Industry Canada exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located operating in conjunction with any other antenna or transmitter. This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.

L'équipement est conforme aux limites d'exposition établies par FCC et Industrie Canada pour les environnements non contrôlés. L'émetteur ne doit pas fonctionner en même temps qu'une autre antenne ou un autre émetteur. Cet émetteur doit être installé pour fournir une distance de séparation d'au moins 20 cm de toute personne.