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1. General

For integration in a host device the following must be observed. The module will be only integrated in professional industrial radio applications and will be exclusively used for systems of HBC-radiomatic.

There are several host devices in which the module can be installed:

- In portable devices (e.g. bellyboxes or handhelds), subsequent called “control unit”
- In mobile and fixed devices installed on a machine, subsequent called “receiver”

During development of the host the integration requirements are observed as defined in this manual. Integration examples are described in chapter 3.

1.1. Labeling

The host must be labeled as applicable with:

Contains FCC ID: NO9TC241B

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.

Contains IC: 2977A-TC241B

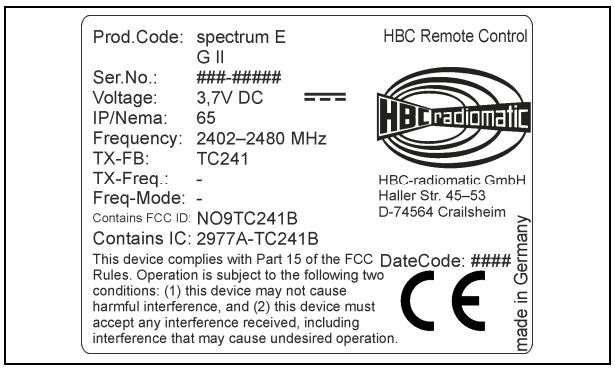

Figure 1: Example type plate of a host device

1.2. Statement FCC §15.105 for host manual

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

1.3. Statement IC for host manual

This device complies with Industry Canada's license-exempt RSSs. 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;
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

1.4. IC RSS-Gen 6.8

This radio transmitter 2977A-TC241B has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Manufacturer	Model / No.	Antenna Type	Gain	Impedance
HBC-radiomatic GmbH	012-05-00228	λ/4 wire antenna (if used, then soldered on module instead of coax connector)	0 dBi	50 Ω
HBC-radiomatic GmbH	AB157010	dipole	2,15 dBi	50 Ω
HBC-radiomatic GmbH	AB144010	dipole	2,15 dBi	50 Ω
HBC-radiomatic GmbH	AA080016	wire antenna	2,14 dBi	50 Ω
HBC-radiomatic GmbH	AA080018	Sleeve antenna (Sperrtopf)	6 dBi	50 Ω
HBC-radiomatic GmbH	AA080019	Dipole	6 dBi	50 Ω
HBC-radiomatic GmbH	AA080020	Wire antenna	6 dBi	50 Ω
HBC-radiomatic GmbH	AA080021	collinear antenna	6 dBi	50 Ω
HBC-radiomatic GmbH	AA080022	λ/4 panel antenna	6 dBi	50 Ω
Procom A/S	MU 2404-MMS	collinear antenna	2 dB (compared to a λ/4 whip)	50 Ω
Procom A/S	CXL 2400-1	Dipol	2 dBi	50 Ω
Celphone	C80950 / 60603030	λ/4 panel antenna	2,15 dBi	50 Ω
WiMo	Z47242-0005	λ/4 panel antenna	2,15 dBi	50 Ω
Procom	MU 2404-LX	collinear antenna	2 dB (compared to a λ/4 whip)	50 Ω
PCTEL	MYP24010PTNF	Yagi	10 dBi	50 Ω
ELRO	012-01-00052	Sleeve antenna (Sperrtopf)	3 dBi	50 Ω
Compotek	CTA2458/2/DB/SM/S1	Sleeve antenna (Sperrtopf)	2 dBi	50 Ω
Liard	EXE2400TRNM-001	dipole	2,15 dBi	50 Ω
Molex	146153	Dipole	3,27 dBi	50 Ω
Molex	146175	SMT MID Chip Antenne	3 dBi	50 Ω
Molex	47948	SMT MID Chip Antenne	3,3 dBi	50 Ω
Molex	203006	SMT Keramik Antenne	2,3 dBi	50 Ω

Table 1: Antenna Specification

1.5. Modification statement, FCC §15.21

In the host manual the following statement will be included:

“Changes or modifications made to this equipment not expressly approved by the party responsible for compliance may void the FCC authorization to operate this equipment.”

2. RF exposure

All final host devices are exclusively marked as Controlled Use Devices (Controlled Environment) where the users are well aware about the risks and operating conditions regarding RF Exposure.

This manual describes the integration into two typical host applications:
portable (such as professional crane control units) and mobile/fixed (receivers)

For any application the necessary separation distance between the radiating part (antenna) and the human body incl. bystander will be calculated based on the different antenna type/gain and position with respect to FCC KDB447498 and ISED RSS-102.

3. Exemplary integration process

For integration the following steps has to be done:

- The module has to be installed in such manner that all requirements of the user manual and this integration manual are fulfilled.
- An antenna in accordance to chapter 1.4 shall be used.
- Define position of module and antenna in accordance to the separation distances.
- Compliance measurements shall be performed to assure that the final device incl. the modular approved transmitter still comply with the regulations.
- Define necessary equipment authorization of the host device itself (typically digital device or periphery) and perform appropriate equipment authorization (FCC Certification, SDoC).
- Include appropriate FCC / IC statements (see chapter 1.2 and 1.3) in host manual.
- Include applicable RF Exposure statements (see chapter 3.1 and 3.2) in host manual.
- Include Modification statement (see chapter 1.5) in host manual.
- The host will be labeled in accordance to chapter 1.1.

3.1. Integration control unit (portable host)

Exemplary the position of module and antenna in a control unit:

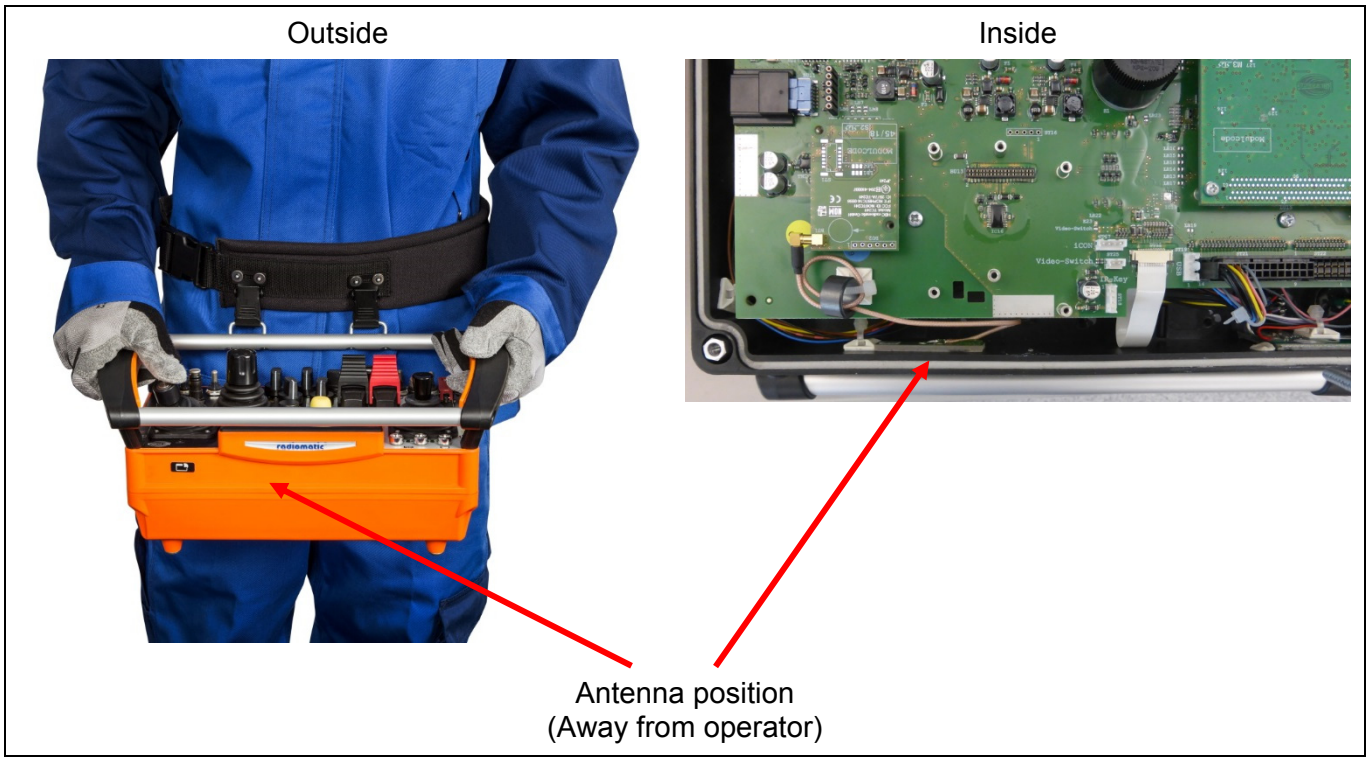

Figure 2: Control unit spectrum E

Separation distance consideration for this case:

- Dipole antenna 2,15 dBi
- Region of body is trunk in carrying position.
- Exposure tier is Controlled use.

The antenna has a minimum separation distance of about 16 cm to the human body and therefore well complies with the SAR exemption limit for FCC and ISED.

For RF exposure the following statement will be included:

“The radiated output power of the device is far below the RF exposure limits.
Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.”

All necessary statements will be included in the host manual.

The host will be labeled as described in chapter 1.1.

3.2. Integration receiver (mobile / fixed host)

If the module will be used in a receiver, for example FSE 737 radiobus® with external antenna connector and direct mounted antenna:

Figure 3: Receiver FSE 737 radiobus®

Several antennas are possible:

- Internal antenna
- Direct mounted on receiver, as shown above
- Remote antenna (e.g. Yagi antenna) connected to receiver by cable mounted by professional installer on machine

The device is categorized as mobile/fixed where a minimum separation distance of >20 cm between the antenna and any human body is assured during normal operating conditions.

For RF exposure the following RF Exposure Warning will be included:
“To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter”.

All necessary statements will be included in the host manual.

The host will be labeled as described in chapter 1.1.