User Manual

Introduction

The CTRF system is a labour saving system that allows the testing of the emergency light units within one or more buildings from a single location. The CTRF system is a completely wireless system, where the devices communication is by means of radio frequency signals.
The CTRF system is composed by a set of *EMERGENCY LIGHT UNITS* (also called emergency lamps in the following), spread all over the buildings and a *CONTROL UNIT* that manages the system's functionality (see fig. 1). Each unit is supplied by the power grid as usual.
The emergency lamps communicate to each other via radio signals. Each emergency light unit acts as a repeater; when the control unit needs to send or receive information to/from a certain emergency lamp, it simply reaches that unit through the best available path, the data packet passing from one unit to the other.

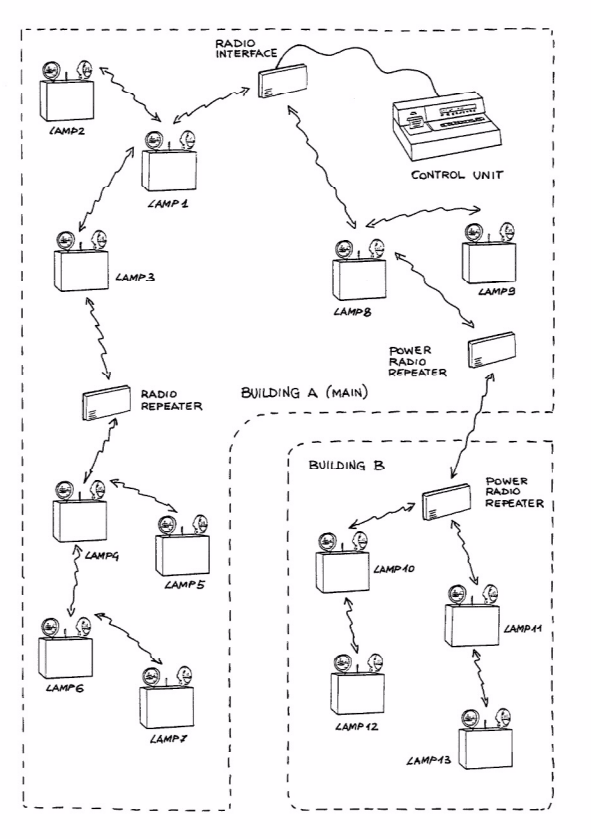
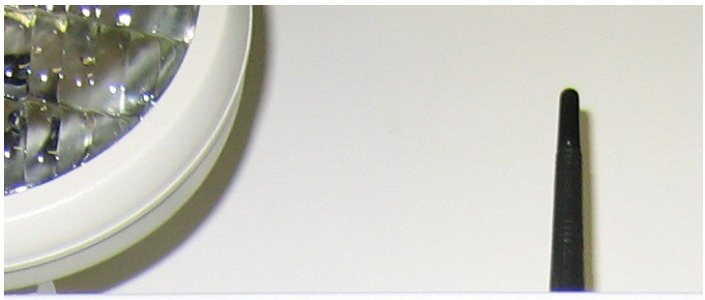
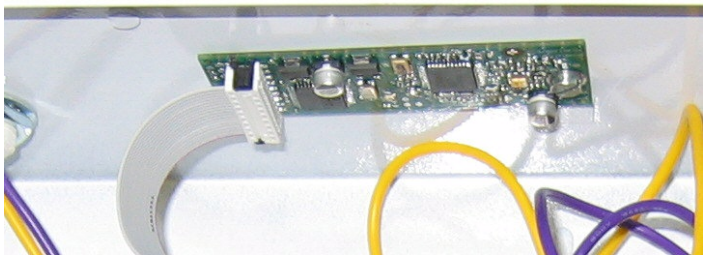


Fig. 1

Radio frequency communication

The CTRF **Radio Module 8976** is a digital radio communication device designed to be used inside Beghelli's emergency lighting fixtures. The module is a microprocessor controlled digital radio transceiver using spread spectrum modulation technology in the 902-928 MHz frequency band, that once installed in the emergency lighting fixture enables the complete remote self-diagnosis function of the emergency luminary. The CTRF module is installed inside the fixture's case as shown in the following picture.





The CTRF **Radio Module 8976** uses 32 channels, with frequency hopping spread spectrum modulation. The 32 channels are equally spaced inside the 902-928 MHz frequency band. The peak transmitted power is less than 20dBm. The antenna is a λ / 4 dipole; the ground plane of the dipole is the metal plate on which the dipole is mounted. Each channel is FSK frequency modulated by the transmitted data. The radio module's embedded microprocessor completely manages the proprietary radio protocol.
The module exchanges information with the other modules inside other emergency units by means of a protocol with automatic repetition of the data packets between the units and automatic routing of the data packets from the central panel to the emergency units and back.

The antenna is fixed to the module with the provided screw and must not be removed in any case by the user. The module is connected to the emergency lamp circuit with a flat cable.
The module is assembled in the emergency lamp in the factory by the manufacturer, and it is not intended to be modified by the user

Label

Based on the Public Notice from FCC, the product into which the our transmitter module is installed must display a label referring to the enclosed module.
The external label of Emergency lamp, which the **Radio Module 8976** is installed, report the following: “Contains Transmitter Module FCCID:TAE8976”.

Operational

Each module reports a label with its own radio address. The address is used by the user during the set up of the remote monitoring system. The unique address of the module identifies the module among the other modules in the system. For the proper use of the address information refer to the central unit user’s manual.

Special requirement for Limited Modular Approval

The following requirements are fulfilled:

1) The RF module fulfils the emission requirements of the FCC rules without additional shielding.
2) The radio transmitter is buffered by a microprocessor (PIC18LF452) embedded in the RF module that manages the modulation data inputs of the transmitter itself; the microprocessor manages completely the radio modulation with a proprietary protocol, compliant with the requirements of the FCC rules; the interface between the module and the host system is via dedicated inputs and outputs that do not affect directly the radio signals.
3) The RF module contains an own voltage regulation. The module is provided with two 3.3 V DC regulator to stabilize the input 5.0 V DC supply voltage provided by the host equipment.
4) The RF module is for OEM (Original Equipment Manufacturer) integration only. The end-user product will be professionally installed in such a manner that only the authorized antenna is used.
5) The RF module was tested in a stand-alone configuration. The module was connected to the electronic control board of an emergency light unit via extended flat-cable. Only the AC conducted emission measurement are performed with the RF module connected inside an host equipment (typical emergency lighting equipment).
6) The RF module will be labelled with its own FCC ID number. When the module is installed inside the end-product, the label is not visible. The OEM manufacturer is instructed how to apply the exterior label.

7) The EUT is integral part of Central Test Radio Frequency System for emergency light equipment (CTRF System) and the customer retain control over the final installation of the RF module. Detailed instruction are stated in the instructions manual of all the emergency equipment in which the module can be integrated.

8) The modular transmitter comply with any applicable RF exposure requirements.

- Maximum measured power output: 19,91 mW (12,99 dBm)
- Maximum antenna gain: 2,14 dBi = numeric gain 1,637
  (see also FCC test report)

Maximum permissible exposure defined in 47 CFR 1.1310: 0,6 mW/cm².

The distance from the EUT's transmitting antenna where the exposure level reaches the maximum permitted level is calculated using the general equation:

$$S = P*G / 4\pi R^2$$

Smax = 0,6 mW/cm²
P = 19,91 mW
G = 2,14 dBi = 1,637 (numeric gain)
R = distance in cm

Solving for R, the 0,6 mW/cm² limit is reached in a distance of 2,08 cm to the transmitting antenna.

The RF module operates at low power level so it does not exceed the Commission's RF exposure guidelines limits; furthermore, Spread spectrum transmitters operate according to the Section 15.247 are categorically excluded from routine environmental evaluation.

9) Special requirement for Limited Modular Approval:

The RF module is integral part of Central Test Radio Frequency System for emergency light equipment (CTRF System) and the customer retain control over the final installation of the RF module. The EUT is approved only for use when installed in device produced by the manufacturer (Grantee).

Important notices

The user must not remove and modify any part of the module included antenna that is already fixed to the module in the proper position.

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

In any case the antenna must not be modified by the user: only authorized personnel is allowed to service the antenna.

The 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;
(2) this device must accept any interference received, including interference that may cause undesired operation

Technical Specification

Operating Voltage:	from 3Vdc to 5Vdc
Frequency band:	902MHz to 928MHz
RF Power:	< 100mW eirp
Modulation:	Frequency Hopping Spread Spectrum
Dwell Time:	< 0.4Sec in 10Sec
Number of channel:	32
Canalization:	750KHz
Standard applied:	FCC 15 sub part 247
Antenna:	Dedicated λ / 4 dipole; 2,14 dBi Gain
FCC ID:	TAE8976

Note

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