



HF-PRODUCTS - AUREL WIRELESS - FAQ - Oct. 2006

FAQ - Technical support

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FAQ - Technical support

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What does Wireless technology mean?

Wireless is referred to the type of communication, monitoring and control system in which signals are conveyed through the space and not through cables. The most important means of transport in wireless technology are radiofrequency (RF) and infrared (IR).

What does FREQUENCY MODULATION mean?

The Frequency Modulation provides a higher immunity to noises and a better pass band that make this modulation almost compulsory where the data transmission has to be reliable and quick also in environment endowed with obstacles or noises of electromagnetic nature.

What does AMPLITUDE MODULATION mean?

The Amplitude Modulation is the simplest modulation to be realized and allows to contain the prices of the devices limiting the immunity to noises and the maximum data frequency that could be transmitted to values suitable in fields like burglar alarms, where lower costs are preferred to performances.

Which criterion has to be used to choose an AM or FM product?

It is useful to choose an AM product when the radio link is placed in a not hostile environment and when the application requires only to send a code. It is used also when high data rates of transmission are not required. These are the typical features of alarms, gate door openers, home security applications. Instead FM devices have to be used when it is necessary an high level of protection against noises in order to have a reliable transmission. It has also to be chosen when the transmission occurs in adverse scenarios (for examples in industrial environment or in proximity of noises sources as motors).





Which are the reasons to use the FM modulation?

Frequency modulation (FM) is featured with the highest immunity against noises and interferences and this represents the most important difference with the amplitude modulation (AM). At parity of signal to noises ratio FM modulation offers an higher protection to transmitted data, opposite to AM, specially in presence of noises signals coming from motors, inverters and other electro-mechanical devices with impulsive operation. At the opposite side FM modulation implies a greater power consumption in transmission that effects in a lower battery life.

Which criterion has to be used to choose a product at 434 MHz or 868 MHz?

There are no significant differences in using a transmission at 434 MHz or at 868 MHz. In the first case the band is quite crowded of wireless devices, while the second one is not yet very exploited. The shorter wave length belonging to the 868 MHz frequency effects in a greater probability of positive combination of every radio wave but also in a lower capacity of penetration through materials.

Which are the reasons to utilize the new frequency of 868,35 MHz?

The frequency of 868 MHz has been recently liberalized for our applications allowing then to use radiofrequency devices also in places endowed with several devices operating at the very crowded frequencies of 433,92 MHz, 30,875 MHz and 27,195 MHz. This further frequency will allow to use contemporary and bidirectional communication systems (with a reply).

What does SENSITIVITY mean?

Sensitivity is the capability of a receiver to receive weak signals and is measured in dBm (or μV in antenna). A receiver is as more sensitive as the sensitivity is high in negative value (-100 dBm is a good sensitivity) or as the sensitivity value in μV is small. This two unit of measurement are equivalent and -100dBm are equal to 2,2 μV . It is important to know that if the sensitivity increases of 6 dB the transmission is theoretically valid at a double distance. For example if a receiver endowed with a sensitivity equal to -94 dBm reaches a distance of 80 meters, a receiver featured with -100dBm of sensitivity can correctly decode a signal transmitted from 160 meters of distance (obviously if it is used the same transmitter).

What does SELECTIVITY mean?

Selectivity is the feature that allows the receiver to distinguish among the received frequencies the only one belonging to the receiver itself. The more selective the receiver is less it will be influenced from noises and from signals transmitted on different frequency. The selectivity is measured in MHz and is one of the most important peculiarity that differentiates the heterodyne reception from reactive one.





What is a reactive receiver?

A reactive receiver (or super-reactive) is featured with both the maximum efficiency and the very low cost: though it uses the minimum number of necessary components the reactive receiver has a very good behaviour. At the opposite side the reactive receiver needs attention in order not to send out spurious emissions in antenna. Besides it doesn't provide a high selectivity and doesn't allow to transmit data at a frequency higher than some KHz. Furthermore because the reactive receiver has not quartz elements it has a limited stability in temperature and only the not high selectivity minimizes the thermal drift.

What is an heterodyne receiver?

The heterodyne receiver uses a conversion of the received frequency into a lower one as demodulation technique: this is possible thanks to the quartz oscillator present in the heterodyne receiver allowing to obtain both a very good selectivity and a very high stability in frequency. Using an heterodyne receiver it is possible to receive data with a frequency that goes from 5 KHz to 10 KHz. The fault are higher absorption in comparison with reactive receiver and an increase of complexity and expense. The sensibility that is possible to obtain with the two different demodulation technique is approximately the same but the better selectivity of the heterodyne receiver provides an higher immunity against noises that implies a more reliable device.

What does RSSI (Received Signal Strength Indicator) mean?

RSSI - Received Signal Strength Indicator.

RSSI is an initialism for Received Signal Strength Indication. RSSI is a measurement of the strength (not necessarily the quality) of the received signal strength in a wireless environment, in arbitrary units. RSSI can be used internally in a wireless networking card to determine when the signal is below a certain threshold at which point the network card is clear to send (CTS). Once the card is clear to send, a packet of information can be sent. The end-user will likely observe a RSSI value when measuring the signal strength of a wireless network through the use of a wireless network monitoring tool like Network Stumbler.

RSSI measurements will vary from 0 to 255 depending on the vendor. It consists of a one byte integer value. A value of 1 will indicate the minimum signal strength detectable by the wireless card, while 0 indicates no signal. The value has a maximum of RSSI_Max. For example, Cisco Systems cards will return a RSSI of 0 to 100. In this case, the RSSI_Max is 100. The Cisco card can report 101 distinct power levels. Another popular Wi-Fi chipset is made by Atheros. An Atheros based card will return a RSSI value of 0 to 60. See converting RSSI values to other signal strength indicators: [Converting Signal Strength.pdf](#)

Not only defined by 802.11 protocol family, RSSI is also widely used in other wireless environment. A good example is the signal strength indicator on your cell phone. RSSI is often done in the IF stage before the IF amplifier. In zero-IF systems, it is done in the baseband signal chain, before the baseband amplifier. RSSI output is often a DC analog level. It can also be sampled by an internal ADC and the resulting codes available directly or via peripheral or internal processor bus.





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What is Radio antenna?

Aerial redirects here. For other uses, see Aerial (disambiguation). Most simply, an antenna (U.S.) or aerial (UK) is an electronic component designed to transmit or receive radio waves. The words "antenna" and "aerial" are used throughout this article with precisely the same meaning.

More specifically, an antenna is an arrangement of conductors designed to radiate (transmit) an electromagnetic field in response to an applied alternating electromotive force (EMF) and the associated alternating electric current.

Alternatively, if an antenna is placed into an electromagnetic field, that field will induce an alternating current upon the antenna, and EMF between its terminals.

What is a High gain antenna?

The High Gain Antenna (HGA) is an antenna with a focused, narrow radiowave beam width. This narrow beam width allows for more precise targeting of where you want the radio signal to go - also known as a directional antenna.

Most commonly referred to during space missions, these antennas are also in use all over Earth, most successfully in flat, open areas where no mountains lie to disrupt radiowaves.

What is Ground Plane antenna?

A type of antenna consisting of a defined radiating element, usually a 1/4 wave rod or wire, and a metallic ground plane. Commercial ground plane antennas often use a number of 1/4 wave or longer radial rods as the ground plane; the rods may be tilted downwards into a cone to improve the antenna pattern.

Which kind of antennas does AUREL manufacture?

AUREL designs and manufactures antennas for external use at frequencies from 434 MHz to 2,4 GHz.





Which of your modules are each other compatible?

The compatibility varies according to the frequency, modulation and other elements. In the detailed information of the product you will find the list of the models compatible with the selected module.

What is the difference between a fixed code or a rolling code?

Fixed code

The transmitter sends always the same code then it could be observed and repeated. For these reasons it is recommended to use these devices only when the security is not the main requirement of the system as for example for enclosure gate.

Dynamic code (rolling code)

In this case the code produced by the transmitter is always different every time according to an algorithm known only by the manufacturer. The receiver, thanks to an his own feature, is able to be always synchronized with its correspondent transmitter. It is not possible to clone systems of this kind that therefore represent, at the present, the maximum level of security also thanks to the high number of code words. This sort of devices is to be advised in all the situations when it is necessary the highest level of security (control of private entry, garage entrance, doorway, activation or deactivation of alarm systems).

Does the greater range of a transmitter mean a better quality of the product?

The quality of a radio control is given by the quality of the transmission and by the security and complexity of the transmitted code.

What is a remote control?

A remote control is a system that allows a device to work giving a command via electromagnetic waves. It is made up of two different units:

- an handheld transmitter provided to the user
- a receiver in a fixed location linking via wire the device to be commanded

The transmitter sends a message to the receiver via RF. The information belonging to the transmitted message consists of a security code (user code) and the command the device has to execute. As soon as the transmitted signal reaches the destination, the receiver extracts the message and compares the security code with the one on its own memory: if the two codes are the same the receiver activates the relè output giving the actuation command.





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Which are the applications for your remote control devices?

The most important are gate door openers, burglar alarms, car alarms, personal security, home security.

Are the AUREL remote control universal?

Our remote controls are of AUREL's property, then are not compatible with other manufacturers ones. Our transmitters are compatible only with our receivers. An universal radio control is not feasible for at least two reasons:

- 1) Compatible radio controls that cover a very large frequency band outward the limit of the established regulations are illegal 2) Some frequencies used in the past by different manufacturers are no more legally available for open-door devices

Which kind of handheld transmitter does AUREL manufacture?

AUREL designs and manufactures handheld transmitters with one channel or multi-channel at frequencies that go from 434 MHz to 868 MHz and different encoding. For more detailed information you can download our Wireless catalogue

Which radio frequency modules do you manufacture?

We make OOK & FSK receivers, hybrid transmitters, key-fob OOK & FSK transmitters, transceivers of digital data, radio modem, decoders, CATV modules, interfaces, I.R sensors.

What are self-learning receivers?

The self-learning receivers allow in a simple way to memorize the codes of the correspondent transmitters inside their permanent memory. In this case it is not possible to read the combination of the code as it happens in receiver featured with dip switch. This guarantees a higher protection also in case of fixed code radio control. Aurel makes available also this kind of receivers.

Which distances do your radio frequency modules achieve?

The achievable distances depend mainly on the used modulation (AM or FM), on the power of transmission and the type of antenna of the transmitter and the receiver. The greater the RF power and the gain of the antenna are the greater is the distance that the signal can reach. Besides it is important also the sensitivity of the receiver. Also the environment in which the transmission takes place affects on the range of the wireless link.





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What does POWER OF TRANSMISSION mean?

The power of transmission characterizes a transmitter from the point of view of the distance that will be possible to cover. Our applications are all limited to the maximum power of 10 mW effective in order to belong to the "low power devices" class and to be therefore subjects to a not restrictive normative in the comparisons of the radio frequency band: this allows to obtain distances of transmission of about 100÷200 meters in free air with the maximum of cheapness.

Is the CE marking present in your products?

Yes, our products are designed in compliance with CE regulations.

Which are the applications for your Special products?

Home security and audio applications.

Which are the applications for data transmission devices?

The most considerable are POS, signboard, remote meter reading, handheld terminals, security, mobile telemetry, access control, home automation, data transmission.

Which are the applications for your remote control devices?

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Which are the applications for data transmission devices?

The most considerable are POS, signboard, remote meter reading, handheld terminals, security, mobile telemetry, access control, home automation, data transmission.





What is a radio modem?

A radio modem is used in conjunction with separate 2-way radio transceiver to transfer data over distance. Radio modems are radio frequency transceivers for serial data. They connect to serial ports (RS232, RS422, etc.) and transmit to and receive signals from other matching radio modems. Radio modems can be configured for internal or external mounting. Internal radio modems are computer cards that are attached to the wired network through a computer that is part of the network. External radio modems are modules that are connected to the wired network by means of a physical port or interface. Bus or interface types available for radio modems include Type II card, Type III card, CardBus, ISA, PCI, MIC, RJ-45, SC, ISDN BRI S/T interface, serial ports (RS232, RS422, RS485), ST, USB, and PLC slot mount. The data rate is also important to consider. The data rate is the maximum data transfer rate at which the modem can deliver data. It is normally expressed in bits/second. Important radio link specifications to consider when searching for radio modems include frequency band, operating mode, and radio technique. Frequency band choices include 900 MHz, 2.4 GHz, 5 GHz, 23 GHz, VHF, and UHF. Operating modes for radio modems include point-to-point, point-to-multipoint, and repeater mode. Point-to-point radio modems can transmit to only one modem / radio modem at a time. Point-to-multipoint modems can transmit to several modems / radio modems at a time. Radio techniques include direct sequence spread spectrum and frequency hopping spread spectrum. Spread spectrum is a technique that is used to reduce the impact of localized frequency interferences. To achieve this, it uses more bandwidth than the system needs. There are two main spread spectrum modalities: direct sequence and frequency hopping. The principle of direct sequence spreads the signal on a larger band by multiplexing it with a code (signature) to minimize localized interference and noise. The system works over a large band. To spread the signal, each bit is modulated by a code. Frequency hopping uses a technique where the signal walks through a set of narrow channels in sequence. The transmission frequency band is divided in certain number of channels, and periodically the system hop to a new channel, following a predetermined cyclic hopping pattern. The system avoids interference by never staying in the same channel a long period of time. Common performance specifications for radio modems include full duplex transmission, maximum output power, number of channels, and sensitivity. Full duplex radio modems can transmit and receive at the same time. Maximum output power is the transmission power of the device. It is defined as the strength of the signals emitted, often measured in mW. The number of channels defines the number of transmitting and receiving channels of the device. The sensitivity is the measure of the weakest signal that may be reliably sensed by the receiver. Sensitivity is measured in dBm, and the lower the value (higher in absolute value) the better is the receiver. Common features include antennas and RF connectors.





What is the Wi-Fi technology?

Wi-Fi is a wireless technology used to transmit data. It allows to link more PC and peripherals with a central point (called hub) that is about 10 meter far from them, without any cable. Wi-Fi can be used to realize a local area network made up of devices linked via radio (both the access point and PC and peripherals). A wireless local area network (WLAN) is composed by an Access Point, the transceiver base station, and by the Wireless Transceiver Cards, that can be of different type (for example PCMCIA on notebook, USB on PC). Cards talk with the base station through radiofrequency channels at 2,4 GHz with a standard protocol called 802.11b that can reach a band speed up to 11 Mbps. If the access point is connected to a modem or a router all the PC endowed with a Wi-Fi card can access to Internet.

What is the new Bluetooth technology?

Bluetooth is a wireless interconnection low power (mW) technology suitable to link up to 16 electronic devices as phones, stereo, notebook, PC, PDA: this occurs by means of radio waves transmitted by the transmitter unit inside the device. It is possible to send both voice and data without any connection cable, but simply through radio wave at frequency from 2,45 to 2,56 GHz (ISM band). Bluetooth can support up to 7 data channels (asynchronous with upstream data rate of 57,6 Kbps and 721 Kbps downstream) and 3 voice channels (synchronous with a 64Kbps data rate). The maximum speed of data transfer is 1 Mbps full duplex with a range from 10 to 100 meters. Bluetooth supports tiny proximity networks (PAN) with low range.

What do you mean for range of a remote control?

The range of a remote control is the distance of operation between transmitter and receiver. Considering the same declared range, it's possible to obtain different results depending on the place where the receiver is installed, from the positioning and the quality of the antenna. During the transmission, the transmitter sends many times the same coding word in proportion to the time of transmission (for example 10 codes any second). In order to have a successful transmission it is sufficient that only one of them reaches correctly the receiver. The nearer the transmission is greater are the possibilities that the signal gets to the receiver.





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What do harmonics mean?

The RF signal on output from a transmitter is made up of not only his carrier frequency but also spurious frequencies. These frequencies (harmonics) are not useful for the functioning of a remote control and cause electromagnetic pollution. For these reasons the International Standards put some limits to the transmitted signals for these frequencies. The homologation and the CE marking point out the respect for the established limits. The manufacturing and the selling of different type of radio control is illegal.

Which European Regulations do your RF products follow?

Our RF products suit the European Directives R&TTE 99/5/CE. The current regulations set the rules of both radioelectric (EN 301 489, EN 300 220, EN 60950) and general (CE) type related to the selling of devices. The EN 300 220 regulations define the maximum level of emissions and the maximum level of harmonics allowed for a transmitter (limiting at maximum 10 mW ERP on the carrier frequency) and also the maximum level of emissions in antenna that a receiver can irradiate as an unwanted effect. [...more details](#)

What mean R&TTE?

R&TTE - R&TTE/RTTE Directive 1999/5/EC is the European radio and telecommunications regulation which affects manufacturers, suppliers and importers of radio equipment and telecommunications terminal equipment who wish to place such equipment on the market of the European Economic Area (EEA).

The EEA includes the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom [...more details](#)

What does the new R&TTE 99/5/CE Regulation say?

It concerns the CE marking of Radio and Telecommunication Equipments. With the application of the R&TTE directive the type-approval is not more mandatory to put into the market Radio and Telecommunication Equipments and will be replaced by the declaration of conformity issued by the manufacturer. An integral part of the process of evaluation of the conformity is the preparation of a technical documentation that must at disposal of the Authority of Surveillance of the market. [...more details](#)

What is a duty cycle?

Duty cycle is the relative proportion of time during which the transmitter is operational. A 20% duty cycle means a transmitter must be in receive mode or idle for 8 minutes for every 2 minutes spent in continuous transmission.





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What mean M2M communications?

Machine to Machine or M2M communications is a new business concept, borne from the original telemetry technology, used for automatic transmission and measurement of data from remote sources by wire, radio or other means.

Machine to machine utilizes similar technologies, just modern versions of them. The main difference between telemetry and M2M are the business and operational aspects that will allow machine to machine to proliferate in many ways. M2M utilized the modern, ubiquitous PCS networks to convey their field-based data readings to an internet-based central server. A machine to machine solution comprises of three essential elements: The Field-deployed wireless device, the wireless carrier network and the back-end server network.

Machine to machine technology is already developed and exists as it has done so in many forms for some time. What is unique about M2M is the business side of it, and how, pivotal to its success are such issues as wireless carrier services, business models for broad market penetration and the regulatory issues surrounding the entire matter.

Wireless service is one of the many important links in a machine to machine deployment chain. Carriers have to be in a position to sell a series of new data plans that accommodate an M2M's solutions business requirements, as well as provide some form of second or third tier support. These two items are demands being placed on a carrier whose core expertise is providing mass-market generic voice and data services to consumers.

Despite the technology existing in its various forms, machine to machine comprises of a number of separate technologies that need to be mixed and matched in the appropriate manner to enable a broad market deployment in the most prudent manner. This leads to the dilemma of which wireless data technology to choose and then which bearer. The choices are numerous and represent an integral part of the entire machine to machine business dynamic.

Machine to machine devices have to be approved by a number of governing bodies in the North American market that also includes the carrier itself. Despite a GSM modem receiving approval form the vendor for deployment in a network, once a hardware manufacture integrates an interface device to the modem, the carrier will require to approve that new device for subsequent deployment on their network.





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Quality management systems requirements?

AUREL, leader into Low Power Devices (LPD) is ISO 9001 Quality Management System certified for Thick-film hybrid , SMT microcircuits and SRD radio systems production.

ISO 9001 quality certification

AUREL is specialized in thick film technology High thermal conductivity substrates, fine line & multilayers, COB, automatic assembling of SMD components, environmentally safe cleaning, functional trimming, certified and traceable 100% testing give the company the highest level of specialization to support your technological demands.

The high versatility of the thick film technology allows economical benefits in many different application fields like biomedical, industrial control, automotive, consumer, military and scientific research.

ISO 9001/UNI EN ISO 9001:2000

AUREL, leader into Low Power Devices (LPD) is **ISO 9001 Quality Management System certified for Design and production of Thick-film hybrid and SMT microcircuits and SRD radio systems.**





What mean for RoHS compliant?

European Union Directive 2002/95/EC banning the marketing and use of products containing brominated fire retardants and heavy metals.

AUREL will start the production of RoHS compliant modules within the end of the year. The transition of each model towards its RoHS brother will be depending on the availability of the necessary components

European Union Directive 2002/95/EC banning the marketing and use of products containing brominated fire retardants and heavy metals.

AUREL will start the production of RoHS compliant modules within the end of the year. The transition of each model towards its RoHS brother will be depending on the availability of the necessary components. AUREL understands that compliance with this directive is necessary to the benefit of the community for the support in the development of an ecologically and morally responsible reduction in the use of hazardous substances, and that compliance is not optional in support of our global business. For the purpose of this communication "RoHS compliant" shall be implied mean to "lead free" as considered by industry, also if some companies have separated the two requirements with somewhat different definitions.

Compliance certification

As AUREL is mainly a designing and assembly company, AUREL intends to self-certify products as RoHS compliant, based upon obtaining assurances and certifications from our suppliers that the materials and components provided are RoHS compliant, from which it follows that compliant materials, components and process produce a compliant final product. The 9 digit Ordering code will not be changed; instead at the end of the description name it will be added "-G", where G stays for "green".

AUREL Wireless products can be roughly divided into 3 categories: **Components:** modules that must be assembled and hardware connected to other components to work (Receivers, Transmitters, Transceivers, etc...).

Finished parts: modules that need only a power connection or battery to work (key-fob transmitters, Radio modem, etc...).





What mean for RoHS compliant?

Group 1 & 2 Marking

If space permits on the circuit it will be printed the category between brackets : eg: (e1).
On the lowest level shipping container there will be a label with : updated description (-G at the end); Pb-free logo;
Pb-free category (note1); max. safe temperature (note 1). In case of lead-containing parts, comprehended in the exemptions of the directive (e.g. thick-film pastes) it is not allowed to use a Pb-free logo, but there will be a "2-nd level interconnect" label reporting the Category, the Max. Safe Temperature and the absence of Pb from the soldering alloy (note 2).

Group 3 Marking

No marking on the components. All the informations will be on the label on the lowest shipping level container.

Note 1

The Pb-free categories for terminal finish or solder paste used defined by JESD97 are:

- e1 - SnAgCu alloys (shall not be included in category e2).
- e2 - Sn alloys with no Bi or Zn (excluding SnAgCu already in category e1).
- e3 - Sn.
- e4 - Precious metal (e.g., Ag, Au, NiPd, NiPdAu).
- e5 - SnZn, SnZnX (no Bi).
- e6 - contains Bi.
- e7 - Low temperature solder (< 150 °C) containing Indium no Bi).

Important

For Group 1 products the category is referred to the terminal finish; for group 2 products the category is referred to the solder composition used for assembly. In both cases the "Max. safe temperature" is the peak temperature used during the assembly. All the Group 1 parts will be qualified for the "Resistance to Soldering Temperature for through hole devices" accordingly to JESD22-B106C.

Note 2

Works and technical advances are in progress both form AUREL and from manufactures or thick-film materials to eliminate completely lead from thick-film pastes. AUREL is already testing conductors and glazes completely lead-free.
At the moment thick-film pastes containing lead are exempted by the EC directive (lead in glass-frit or in ceramic matrix..) but it is not possible to identify as lead-free modules manufactured with these materials and for this we will have to use the "2nd level interconnect" label until we will have finished the qualification work for the new green materials.#





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What mean for RoHS compliant?

Current activities

AUREL is working very hard to be able to deliver "RoHS compliant" products in advance to the terms defined by the EU Directive. The most important part of this activity is in defining exactly the status (RoHS or not) of all the components existing in AUREL or arriving every day and in this AUREL is working in strict contact with all the suppliers. In the same time there is a technical and practical activity in testing and defining the new lead-free materials and process. Information about timing and availability of "RoHS" products will be supplied in AUREL website. **However there are a number of exempted applications for these substances.**

The aim of the WEEE Directives is to encourage and to set criteria for the collection, treatment, recycling and recovery of waste electrical and electronic equipments that contain dangerous substances such as disposed by the law 2002/95/CE.

AUREL has always made every effort in the research of new technical solutions compatible with low environmental impact. For this reason, and in order to fulfil the regulations within the framework of the RoHS and WEEE guidelines, AUREL is no longer using hazardous substances in its plastic standard enclosures and is working to coordinate and to certify the metal enclosures and accessories with the RoHS within the timescales set by the directives.

AUREL s.p.a.

