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IREM *AI*

INTEGRATED POWER SUPPLIES FOR FM/TV RELAY STATIONS

Integrated power supplies for telephone plants and FM/TV relay stations

The power supply of telephone plants and FM/TV relay stations has always entailed numerous problems and specific needs which are difficult to meet, among them:

- to assure the safety of operators working on the plants, according to the law;
- to assure continuity of operation to the plants;
- to build a compact distribution system for all loads usually present in relay stations;
- to limit the costs of installation and management;
- to allow a cheap and effective technical assistance.



The integrated power supplies **AI**, including safety, protection, distribution, connection and signal devices, satisfy all the above mentioned needs.

Safety of operators

In order to assure the safety of the operators working on the plant, the following safety measures must be taken:

- access to the rooms in which the telecommunication plants are installed must be reserved to skilled personnel only;
- the parts of the equipment with live voltage must be protected by guards removable only by means of special tools;
- the electric plants must be realized in compliance with IEC 364-4 Standards “**Electrical installations – Protection for safety**”. The paragraphs regarding transmission plants are the following:

Para. 41 “**Protection against direct or indirect contacts**”

Art. 412 “**Protection against direct contacts**”

Art. 412.1 Protection by insulation of live parts

Art. 412.2 Protection by barriers or enclosures

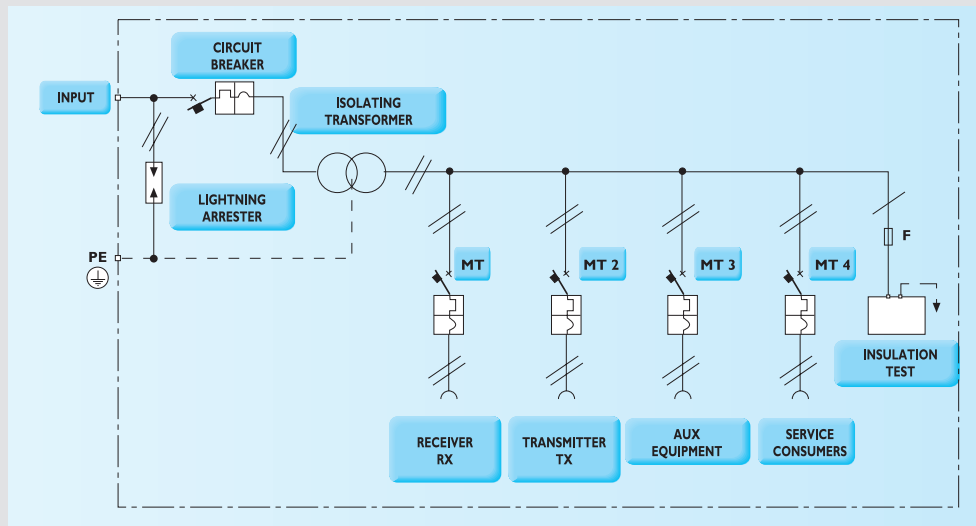
Art. 413 “**Protection against indirect contacts**”

Art. 413.1.1.1 Emergency switching

Art. 413.1.1.2 Grounding

Art. 413.1.2 Equipotential connections

Art. 413.5 Protection by electrical separation



Continuity of operation

Considering the high costs resulting from plant failures and, above all, the economic losses caused by service interruptions, the continuity of operation is as important as the safety of operators.

The first problem is represented by the need of protection against atmospheric discharges. Due to the coupling of electromagnetic fields and the conduction in cables, the effect of lightnings spreads for several kilometers from the impact point. This problem is not only frequent in telecommunication plants on account of the sites they are installed in, but it is also extremely difficult to tackle.

On the other hand, the protections against overloads and short circuits are subject only to suitable dimensioning.

The use of earth leakage trips for protection against direct contacts must be ruled out, as even overcurrents of feeble intensity caused by factors such as merely even inductance can result in the untimely opening of the circuit.

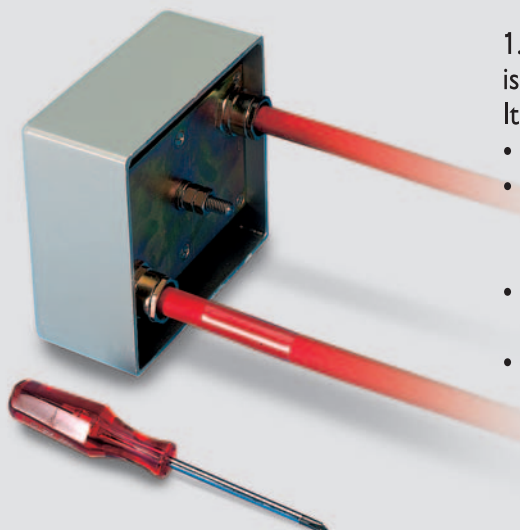
Controls and functions

The integrated power supply AI is housed in a 19" rack cabinet. It includes the following components:

1. a **spark-gap magnetic blow-out lightning arrester**. This is an essential component of the integrated power supply.

It is characterized by:

- high precision striking voltage with any overvoltage waveform;
- restoration of the plant normal operating conditions interrupting the arc current at its first passage through 0 after the exhaustion of the overvoltage wave;
- capability of withstanding currents with peak value of 100 kA (10/350 μ s), charge of 80 As and specific energy of 1,25 MJ/ Ω ;
- auto-regenerability. Thanks to this characteristic, the arrester does not need to be replaced, as it happens with other overvoltage protection systems.



2. An **input circuit breaker**, providing protection against short circuits and acting as main circuit breaker. It has a high magnetic tripping characteristic, avoiding untimely openings following impulse type overcurrents caused by atmospheric discharges. On the secondary winding of the isolating transformer there are



4 output circuits breakers (magneto-thermal switches), used for the protection of the output lines dedicated to the power supply of: a receiver (RX); a transmitter (TX); auxiliary equipment (e.g. air conditioner) and service consumers (welder, drill).

The five switches are fixed on a fiberglass support with high mechanical resistance, in order to assure an adequate isolation from the metal frame.

3. A single-phase **isolating transformer** compliant with Standard EN 60472, equipped with electrostatic shield between the windings. In addition to the galvanic separation of the users from the line, it also ensures a good attenuation against common and transverse mode conducted noise.



The output connection is carried out by means of multistandard sockets and an ECC socket (only in the 6 kVA model).

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4. An optical **reporting device signalling breakdown of insulation** with relative contact wired to the terminal board. This device intervenes when the insulation is below 100kΩ.





The devices described above show that the integrated power supplies AI have been designed and manufactured to solve many of the problems which afflict the user when building an electric installation for radio and TV relay stations. Every single component has been designed to work in extremely critical conditions.

Terminal board. In order to ensure the declared insulation between the input terminals and ground and prevent that an arc is struck between them on account of overvoltages up to 20 kV, the integrated power supplies AI have been equipped with a terminal board built with specific distances, criteria and materials.



Ground connection. The cable section permits to discharge up to 100 kA after the intervention of the magnetic blow-out arrester.

Characteristics/Models	AI122-1E/R-3	AI122-1,6E/R-6	AI122-3E/R-10	AI122-4E1/R-10	AI122-6E/R-25	AI122-7,5EC/R-25
Nominal input voltage	220 / 240 V					
Nominal output voltage	220 / 240 V					
Rated power	1 kVA	1,6 kVA	3kVA	4 kVA	6kVA	7,5 kVA
Voltage drop at full load	<3%					
Full load efficiency	96%					
Operating temperature	-10°C +45°C					
Isolation test voltage 1' at 50Hz						
between input and ground	6500 Vac					
between output and ground	6500 Vac					
between input and output	6500 Vac					
Impulse type insulating voltage (full wave 1,2/50µs)	20 kV					
Overvoltage protection	no. 1 magnetic blow-out lightning arrester					
Insulators class	B					
Isolation class	I					
Fittings	1 input circuit breaker					
	3 output circuit breakers	4 output circuit breakers		6 output circuit breakers	4 output circuit breakers	5 output circuit breakers
	isolation test device					
	3 multistandard sockets	4 multistandard sockets		6 multistandard sockets	3 multistandard sockets	3 multistandard sockets
					1 x 32A IEC309 socket	2 outputs on term.board
Net weight	50 kg	60 kg	70 kg	75 kg	110 kg	120 kg
Dimensions mm	482 x 554 x 310h					
Protection degree	IP 20					
Reference Standards	CEI EN 60742					

IREM. Experience and Quality



IREM is a leading company in the manufacture of electromechanical and electronic equipment for the control of the mains power in the following sectors:

- **powering of discharge lamps for professional applications;**
- **protection of electric users against line disturbances;**
- **luminous flux regulation in lighting plants;**
- **power generation by micro hydroelectric plants.**

Since its foundation in 1947, IREM has gained wide recognition due to the reliability and innovative content of its high-tech products. A reliable company deserving the Oscar-Award. In 1992, in Los Angeles, **Mario Celso** - founder of IREM - was granted the "**Scientific-Technical Award**" by the Academy of Motion Picture Arts and Sciences.

Two production plants, a philosophy based on "quality upgrading" as the company's primary concern and direct export exceeding 50% of the global turnover are a warranty of continuity and development.

Experience, quality and professional skill: these are the factors that permitted IREM to achieve in 1993 the certification of its quality system in compliance with **UNI EN ISO 9001** standard, a further confirmation of IREM commitment to constant improvement to ensure the maximum satisfaction of the customer and its capacity to guarantee:

- **a constant quality standard**
- **precision and repeatability of all working processes**
- **dropping of acceptance control at the customer's plant**
- **identification and traceability of a product through the years.**

In year 2000, IREM obtained the certification of its environment management system according to **UNI EN ISO 14001** standard. This certification is a firm demonstration of the company's will to protect the environment not just through its products, but also via precise patterns of behaviour.

