LMUs & Accessories

Coupling devices for Power Line Carrier systems

- Line Matching Units
- Differential Hybrid circuits
- Adaptable attenuator
Introduction

Power-Line Carrier (PLC) systems form part of the power utilities’ communication networks using high-voltage electrical power lines to transmit information related to the operation of the power system.

The line trap and line-trap tuner are devices installed in series with the conductor used for signal transmission. The set has a higher impedance at the PLC link transmission frequencies and a lower impedance at the power system frequency (50 or 60 Hz). Installing line trap and line-trap tuners at the ends and tie points of HV lines, allows using them as communication lines since the PLC link is separated from the energy transmission at the power frequency.

The line matching units, together with the coupling capacitors, make up filters which adapt the impedances between the high voltage line, used as a signal transmission line, and the PLC equipment. Line matching units are also the elements in charge of isolating the PLC terminal and personnel from the HV line.

A line matching unit contains tuning elements, an isolating transformer and protection devices.

ZIV COMMUNICATIONS wide range offering includes adaptable line-tuning units with different tuning circuits, allowing optimal settings according to the bandwidth and the line parameter requirements of each application. Also available, are line matching units with integrated hybrid circuit, reducing the number of devices required for phase-to-phase and three-phase couplings.

Quality Control You Can Rely On

Quality is built into our products in every step. ZIV COMMUNICATIONS has its own test laboratory for type testing of line matching units in order to verify IEC 60481 compliance.

Special models on request

Line matching units with different specifications and models for underground cables can be developed on request. Please contact ZIV COMMUNICATIONS with your special application details.

Key features:

- Designed according to IEC 60481 standard (composite loss ≤2dB and return loss ≥12dB in the selected bandwidth)
- Distortion and intermodulation: 80 dB below the level corresponding to the nominal power (P.E.P.)

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Applications

These are the most common types of line coupling applications:

**Phase-to-earth coupling**
The PLC terminal is connected between one of the line’s phases and earth.

**Phase-to-phase coupling**
The signals are injected equally in two phases of a line. The phases can be in the same or in different arms.

It is possible to use a differential transformer acting as a hybrid circuit to separate the phases and increase the reliability of the link.

**Three-phase coupling**
The signals are injected in the three conductors of the line, half of the power in the central conductor and the other half distributed equally between the external conductors.

**Key features:**

- Easy to install
- Highest safety and protection for personnel and communication equipment
- Frequency range from 40 to 500 kHz
### Technical specifications

**UAPA-1  High-pass/Band-pass unit**

**Electrical characteristics**

- Frequency range: 40 to 500 kHz
- Coupling capacitor: 2 to 10 nF. Specific model for 2 to 12.5 nF
- Nominal power (p.e.p.): 400 W for two tones
- Equipment-side nominal impedance: 50 and 75 Ω. Others on request
- Line-side nominal impedance: 100 to 600 Ω, selected by tap connection
- Resonant circuit: Configurable as:
  - Third-order high-pass filter
  - Second-order band-pass filter
- Power frequency insulation: >10 kVrms
- Impulse voltage insulation: >5 kV (1.2/50 µs)
- Protection elements:
  - Line side: drain coil (optional), earthing switch, air-gap surge arrester and an optional solid-state surge arrester
  - Equipment side: gas surge arrester

**Versions**

- Drain coil and earthing switch outsider the chassis (option)
- Solid-state surge arrester (option)
- Hybrid circuit (option)
- Band-pass or High-pass configuration
- Line connection at the bottom of the chassis (option)

**Mechanical characteristics**

- Dimensions: Height: 400 mm; Width: 344 mm; Depth: 200 mm
- Weight: 11.5 kg (25 lb)
- Mounting: Four Ø8.5 mm holes
- Connection to line: M12 rod or M8 terminal
- Connection to earth: M10 rod
- Material: Glass-fibre reinforced polyester and specific model in stainless steel

**UAMC  Compact Band-pass unit**

**Electrical characteristics**

- Frequency range: 40 to 500 kHz
- Coupling capacitor: 2 to 10 nF
- Nominal power (p.e.p.): 400 W for two tones
- Equipment-side nominal impedance: 75 and 150 Ω, selected by jumpers.
- Others on request
- Line-side nominal impedance: 25 to 750 Ω, selected by tap connection
- Power frequency insulation: >5 kVrms
- Impulse voltage insulation: >2 kVrms
- Protection elements:
  - Line side: drain coil, earthing switch, air-gap surge arrester and an optional solid-state surge arrester
  - Equipment side: gas surge arrester

**Mechanical characteristics**

- Dimensions: Height: 429 mm; Width: 304 mm; Depth: 176 mm
- Weight: 7 kg aprox. (15 lb)
- Mounting: Four Ø7 mm holes
- Connection to line: M8 screw
- Connection to earth: M10 rod
- Material: Glass-fibre reinforced polyester and policarbonate (cover)

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**Key features:**

- Band-pass or high-pass filter configurations available.
- Differential transformer acting as a hybrid circuit available in specific models.

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**UAPA-1**

**UAMC**
## Technical specifications

### UAM-4  Band-pass Line Matching Unit

**Electrical characteristics**
- **Frequency range**: 40 to 500 kHz
- **Coupling capacitor**: 2 to 10 nF
- **Nominal power (p.e.p.)**: 400 W for two tones
- **Equipment-side nominal impedance**: 75, 125, 150 and 250 Ω, selected by jumpers. Others on request
- **Line-side nominal impedance**: 25 to 750 Ω, selected by tap connection
- **Power frequency insulation**: >5 kVrms
- **Impulse voltage insulation**: >2 kVrms
- **Protection elements**: Line side: drain coil, earthing switch, air-gap surge arrester and an optional solid-state surge arrester. Equipment side: gas surge arrester

**Available models**
- **UAM-4**: Drain coil and earthing switch outsider the chassis
- **UAM-4/D**: Same as above with additional solid-state surge arrester

**Mechanical characteristics**
- **Dimensions**: Height: 264 mm; Width: 214 mm; Depth: 132 mm
- **Weight**: 6.5 kg (14 lb)
- **Mounting**: Four Ø8.5 mm holes
- **Connection to line**: M8 rod
- **PLC equipment side connection**: By means of cable glands type PG-21, suitable for cables of between 9 and 18 mm diameter
- **Earthing**: M10 rod
- **Material**: Die-cast aluminium with outdoor polyester paint

### CIAV-1  Adaptable attenuator

**Electrical characteristics**
- **Nominal impedance**: 75 Ω, symmetrical
- **Frequency range**: 40 to 500 kHz
- **Nominal power (p.e.p.)**: 400 W
- **Selectable attenuation**: Between 1 dB, 2 dB and 3 dB

### CHD-4  Differential Hybrid circuit

**Electrical characteristics**
- **Application**: Phase-to-phase coupling. Two PLC terminals coupling. Three-phase coupling
- **Nominal impedance**: 75 Ω. Others on request
- **Bandwidth**: 40 to 500 kHz
- **Nominal power (p.e.p.)**: 400 W
- **Insulation between primary and secondary**: >2.5 krms / 50 Hz
- **Protection elements**: Gas surge arrester

**Mechanical characteristics**
- **Dimensions**: Height: 264 mm; Width: 214 mm; Depth: 132 mm
- **Weight**: 5 kg (11 lb)
- **Mounting**: Four Ø8.5 mm holes
- **Connections**: By means of cable glands type PG-21, suitable for cables of between 9 and 18 mm diameter
- **Earthing**: M10 rod
- **Material**: Die-cast aluminium with outdoor polyester paint

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**Key features:**
- **UAM-4**
  - Low impedance matching for underground cables.

- **CIAV-1**
  - Especially designed for use when impedance mismatching occurs between the PLC terminals and the line-tuning units.

- **CHD-4**
  - Allows connection of a PLC terminal to two or three phases of a power line to improve signal transmission reliability.
  - Enables coupling of two PLC terminals using adjacent frequency bands to avoid interferences.
  - HPFA is the model for cabinet mounting.