



ZBP-1

MV PLC Equipment for Secondary Substations



The **ZBP-1** is a good option for **data** transport between **Distribution Transformer Centers**, using the **existing infrastructure** (medium-voltage power lines)

There are two **ZBP-1** models: the **5 MHz** model and the **6 MHz** model.

The **5 MHz** ZBP-1 model allows a data rate transmission of up to 28 Mbit/s in a frequency range between **2 and 12 MHz**.

The **6 MHz** ZBP-1 model allows a data rate transmission of up to 36 Mbit/s in a frequency range between **2 and 14 MHz**.

The ZBP-1 allows high data rate transmission over medium-voltage power lines. To achieve this goal, the system makes use of an Orthogonal frequency-division multiplexing (**OFDM**) modulation.

The bit stream is dynamically assigned to a set of carriers of different frequencies, each of which carries information modulated in **QPSK** or **QAM**.

The channel is constantly evaluated in such a way that the carriers that are affected by noise or interferences can automatically reduce its modulation or even not be used at all. In addition, to get a more reliable communication, the **Turbo Code ratio** can also change.



Main Applications

- ✓ Data transmission in mid-distance levels (urban environment).
- ✓ Connectivity between Distribution Transformer Centers (DTC).

Equipment Interfaces

- ✓ 1 Ethernet 10/100Base-Tx (RJ-45 female) port for user data connection, and for ZBP-1 configuration.
- ✓ 1 BNC female connector (RG-58) for connection to the medium-voltage power line.
- ✓ 1 DB9 female connector (service port) for CLI (Command Line Interface) console access.

ZBP-1 models

- ✓ 5 MHz model (4ZBP010001000100).
- ✓ 6 MHz model (4ZBP010000000100).

Main Facilities

- Possibility to operate as a **level 3 router** for IPv4 (**router**) or as a **level 2 switch (bridge)** between the Ethernet interface and the PLC interface.
- Support for **IEEE802.1Q** (Management of up to 8 **VLANs**).
- The connection protocol between ZBP-1 nodes is based on the search of routes for **IP/MAC addresses** and consists of two distinct phases: the **PLUG&PLAY connection** phase and the **Route search and selection** phase.
- The MAC medium access layer is based on **IEEE 802.15.4** that provides access to a shared medium, security and automatic packet recovery.
- The **LOADnG** protocol is a dynamic routing system that easily adapts to the topology changes of the medium using the redundant paths and the overreaching capacity of the device.

Management System

Local and remote access via **console** or built-in **web server** (HTTP/HTTPS), **Telnet** and **SSH** connection.

Additional Services

SNMP v1, v2c and v3 agent. DHCP client. DNS server. TACACS+ client.

Technical Information

PLC transmission characteristics

- ✓ The connection protocol between ZBP-1 nodes is based on the search of routes for **IP/MAC addresses**.
- ✓ **LOADnG** routing protocol.
- ✓ The frequency range and bandwidth is selectable between:

Spectrum	5 MHz model	6 MHz model
Full band	2 ÷ 12 MHz	2 ÷ 14 MHz
High band	8 ÷ 13 MHz	8 ÷ 14 MHz
Low band	2 ÷ 7 MHz	2 ÷ 8 MHz
Compact band	2 ÷ 3.25 MHz	2 ÷ 3.5 MHz

- ✓ Transmission data rate of up to 28 Mbit/s (5 MHz model) or of up to 36 Mbit/s (6 MHz model). The ZBP-1 automatically selects the data rates for each of the carriers, depending on the noise measured in the line.
- ✓ OFDM modulation of up to 296 useful carriers (5 MHz model) or of up to 380 useful carriers (6 MHz model). Depending on the noise measured in the line, the ZBP-1 can automatically cancel the affected carriers.
- ✓ QPSK/16-QAM modulation independently applied to each carrier. The ZBP-1 automatically selects this value for each of the carriers, depending on the noise measured in the line.
- ✓ Turbo Code with FEC (Forward Error Correction). The ZBP-1 automatically selects the ratio of the Turbo Code for each of the carriers, depending on the noise measured in the line.
- ✓ Dynamic output power. The ZBP-1 selects this value, depending on the signal measured in the line.
- ✓ Distance of up to 5 km.

Installation

Wall mount. The device has 4 fixing holes suitable for standard M4 screws.

DIN rail mounting by means of optional accessory.

Dimensions: Height: 150 mm; Width: 40 mm; Depth: 177 mm

Weight: 539 g

Power supply

48 Vdc isolated (19 - 72 Vdc)

Minimum power consumption at 48 Vdc: 6 W

Maximum power consumption at 48 Vdc: 48 W

Temperature range From -25° C to +60°C

Material Varnishing AL 6060 T5 alloy & Fireproof (UL 94 V0) plastic

EMI immunity & environment compliance

IEC 61850-3. IEC 61000-6-5

