ZEG-ENERGETYKA

OPG-6

Optical Star Coupler

POWER SYSTEM PROTECTION EQUIPMENT

TABLE OF CONTENT

1. MANUFACTURER COMMENTS

1.1. General safety rules

WARNING!
During normal operation of the device, some of its parts are under hazardous voltage. Inappropriate or improper use of the device can pose a danger to persons serving, also leads to damage of the device.

1.2. List of applied standards

The device described in this manual has been designed and manufactured for industrial purposes. In the process of development and production, compliance with the standards has been assumed, the fulfilment of which ensures the implementation of the assumed principles and safety measures, provided that the user complies with the installation, commissioning and operating instructions.

This device complies with the essential requirements of the Low Voltage Directive (2014/35/UE) and the Electromagnetic Compatibility Directive (2014/30 / EU), in compliance with the following standards:

- **PN-EN 60664-1:2011** Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
- **PN-EN 61010-1:2011** Safety requirements for electrical equipment for measurement, control, and laboratory use -- Part 1: General requirements
- **PN-EN 60255-26:2014-01** Measuring relays and protection equipment -- Part 26: Electromagnetic compatibility requirements
- **PN-EN 61000-6-2:2008** Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- **PN-EN 61000-6-4:2008/A12:2012** Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Related standards:

- **PN-EN 61000-4-2:2011** Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
- **PN-EN 61000-4-4:2013-05** Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
- **PN-EN 61000-4-5:2014-10** Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques -- Surge immunity test
- **PN-EN 61000-4-11:2007** Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
- **PN-IEC 255-11:1994** Electrical relays - Part 11: Interruptions to and alternating component (ripple) in d.c. auxiliary energizing quantity of measuring relays

1.3. Storage and transport

The devices are packed in individual packages to protect them from damage during transport and storage. Equipment should be stored in transport packs, indoors, free of vibration and direct atmospheric, dry, airy, free from harmful vapors and gases. Ambient air temperature should not be below -20 ° C and above + 70 ° C and relative humidity should not exceed 80%.

1.4. Place of installation

The equipment should work in areas free of water, dust and gases and explosive, flammable and chemically active gases where the mechanical exposure is moderate. Installation height should not exceed 2000 m above sea level at an ambient temperature of -5 ° C to + 40 ° C and relative humidity not exceeding 80%.
The device terminal marked with the PE symbol should be connected to ground potential. It is recommended to use stranded wire of cross section min. 2,5 mm^2 and insulation strength min. 500 V with a length of no more than 3 m.

1.5. Device documentation

The device comes with:

- Operating manual
- Test protocol
- Warranty Card

1.6. Disposal

The device has been manufactured mostly from materials that can be recycled or disposed of without endangering the environment. A recalled device may be recaptured for re-processing, provided that its condition corresponds to normal wear and tear. All components that are not regenerated will be removed in an environmentally friendly manner. The device should be disposed of in accordance with local law or passed on to an electronic waste disposal company.

1.7. Warranty and service

The warranty period is 24 months from the date of sale, unless a longer period agreed in the contract or the sales contract.
The warranty covers free of charge removal of defects revealed during use, under the conditions specified in the warranty card.
ZEG-ENERGETYKA SP. Z O.O. gives a guarantee subject to the following conditions:

- the installation and operation of the device should be in accordance with that manual
- the seal on the device's housing must not be affected
- no corrections or changes can be made to the warranty card

The warranty does not cover:

- defects caused in result of inappropriate transport or storage conditions
- defects caused in result of inappropriate installation or operation of the device
- defects caused in result of tampering within the unit, structural modifications, alterations and repairs carried out without the consent of the manufacturer

BUYER TIPS:

- Proper and trouble-free operation of the device requires proper transport, storage, mounting and commissioning, as well as proper operation, maintenance and service.
- The equipment must be handled by properly trained and qualified personnel
- When complaining, please state the reason for the complaint (symptoms related to malfunction) and factory serial number
- After receiving of the complaint confirmation, send the complaint device with the warranty card to the manufacturer's address
- The warranty period is extended by the time of successful complaint filling

1.8. How to order

The order should specify the full name of the device and all the necessary parameters:

- type and version of the device
- OPG-6 – Optical Star Coupler

Example of order:

- OPG-6 - 220V DC/AC – Optical Star Coupler
- OPG-6 - 24V DC/AC – Optical Star Coupler

1.9. Manufacturer’s data

ZEG-ENERGETYKA Sp. z o.o. Oddział Tychy
ul. Fabryczna 2
43-100 Tychy
Poland
tel: +48 32 775 07 80
tel/fax: +48 32 775 07 83
NIP: 6381805949
REGON: 242933572
VAT ID-No.: PL6381805949
e-mail: biuro@zeg-energetyka.pl
www.zeg-energetyka.pl

2. TECHNICAL DESCRIPTION

2.1. Application

The devices installed at power substation are usually equipped with two communication channels:

- telecontrol channel – used for transmission telecontrol data (control commands, events)
- diagnostic purpose channel – enabling access to data like: disturbance recorders data, measurment and diagnostic data, events recorder, settings

In most cases the substation is unmanned. The substation devices are connected to the star point, and the star point is joined to computer network, which enables continuous monitoring of substation. The connection of a few star couplers OPG-6 serves as communication equipment which allows to configure both telecontrol ans diagnostic purpose communication channels. OPG-6 enables connecting many different devices of different types and transfer data through one communication channel.

2.2. Main features

Urządzenie wyposażone jest w:

- 6 optic-fibre communication ports (ST, 820 nm – multimode fibre)
- port 1 ST – MASTER/SLAVE (customizable operation mode: MASTER, SLAVE, ECHO ON/OFF)
- ports: 2, 3, 4, 5, 6 ST – SLAVE
- RS-485 MASTER port
- RS-232 MASTER port
- auxilliary voltage: 220-250 V AC/DC. Other voltage levels also available: ex. 24 V AC/DC

2.3. Construction

Optical Star Coupler OPG-6 is enclosured in casing of type CN-100AK (Fig. 1a) it allows to mount on TS-35 rail. Supply voltage terminal is located on the device bottom. Contacts of relay indicating lack of voltage are also led out to bottom terminal. Terminal Z1 is described in Table 1. On the front panel (Fig 1b) , the terminal for configuration purposes and RS-232, RS-485 MASTER ports are located.

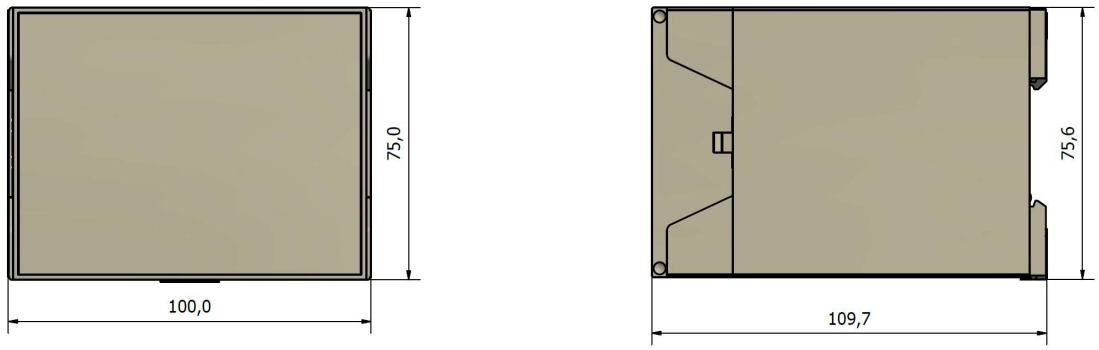

Fig. 1a. Dimensionan drawing

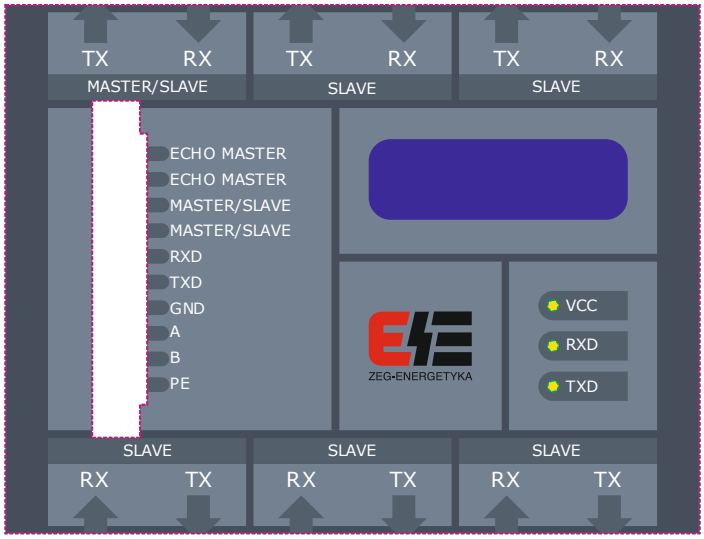

Fig. 1b. Device front panel

Table 1. Supply voltage and signalling contact

Pin no.	Z1 terminal
1	+/- 220V DC/AC
2	or other on request ex. 24V DC
3	PE
4	COM
5	Relay contact – OK
6	Relay contact – fail or lack of aux. volt.

3. TECHNICAL DATA

Rated supply voltage	U = 110V - 220 V DC or 230V AC or other value on request
Burden in supply voltage	PZ ≤ 2 W
Communication ports	Master – fiber optic type ST Master – RS232 Master – RS485HD (half duplex) SLAVE1 - 5 – fiber optic type ST
Operating temperature	-5°C – +40°C
Dimensions	75 × 100 × 110 mm
Weight	0,3 kg
Ingress Protecion	IP40
Mounting	TS-35 rail

4. FUNCTIONALITY

4.1. Principle of operation

Optical Star Coupler is equipped with fiber optic SLAVE ports. They are used to connect with substation devices. Fiber-optic MASTER allows to connect to SCADA system or diagnostic channel. Substation systems can be also connected by RS-485 HD (half-duplex) or RS-232 ports. OPG-6 devices can be parallelly connected by RS-485 HD ports. If RS-485HD is connected to supervision system, the fiber-optic ports can be used by switching them to SLAVE mode. MASTER/SLAVE switching is possible by the jumper located on the front panel. Operation on any baudrate or any configuration is possible. Slave ports can be used to connect up to 5 substation devices. The devices should be configured to operate with the same communication protocol and each should have different address set. Fiber optic no. 1 port can operate with ECHO function ON (jumper on pins ECHO) or OFF.

There are three options of connecting OPG-6 devices:

- OPG-6 MASTER port with ECHO OFF. In this solution in next OPG-6 devices, the number of possible SLAVE ports is reduced by one (Fig. 2)
- OPG-6 MASTER port with ECHO OFF what allows to connect any number of devices without losing one of SLAVE ports. OCHO functions makes connection of RXD and TXD in master channel (Fig. 3)
- OPG-6 – MASTER port with ECHO OFF. Supervision system is connected by RS-485HD port. It is recommended to switch MASTER to port to SLAVE mode. Up to six SLAVE devices can be connected. In case of necessity to connect more of devices, connection should be performed according to fig. 4 connection diagram.

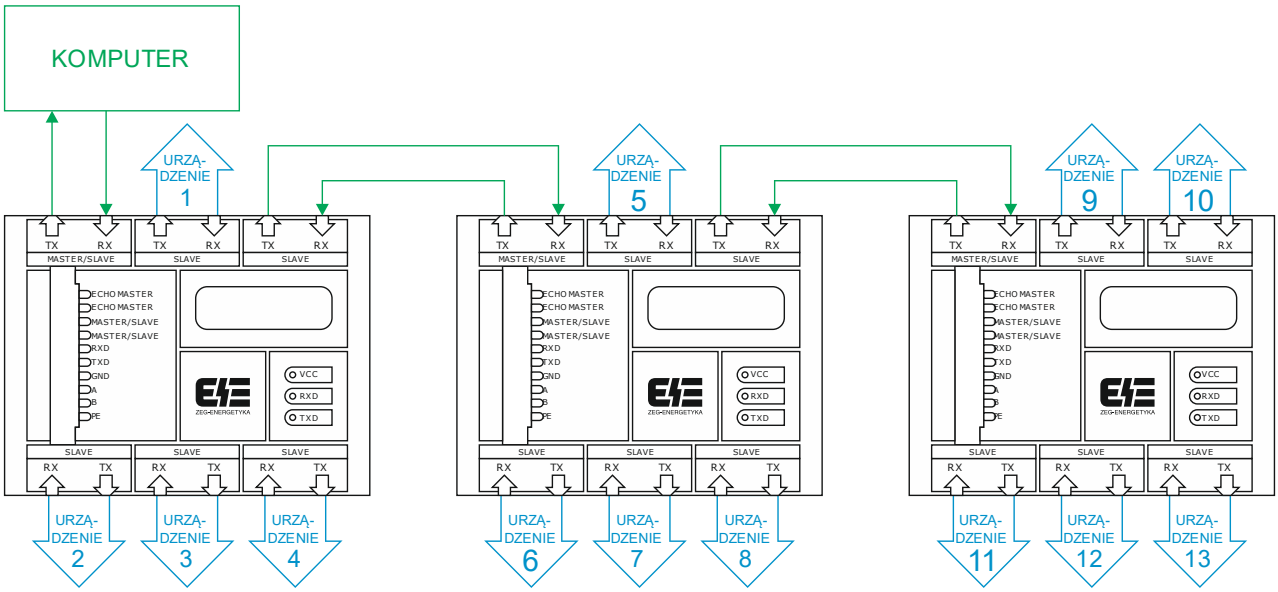

Fig. 2. Wiring diagram of connection of OPG-6 devices in loop with ECHO OFF

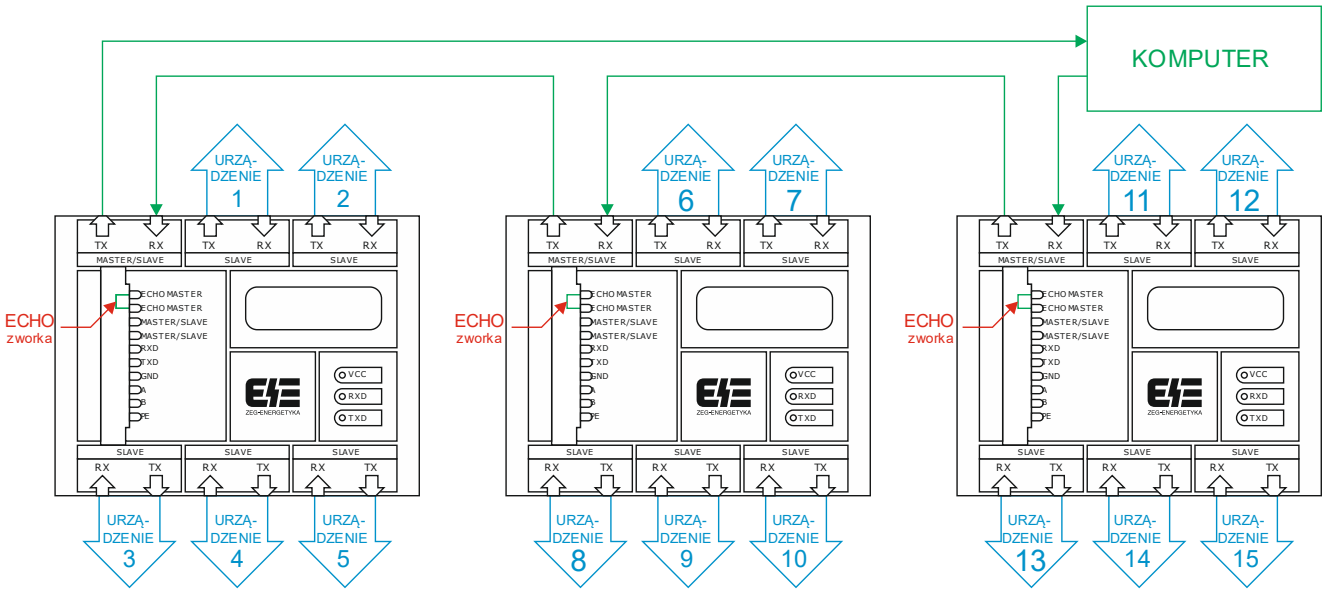

Fig. 3. Wiring diagram of connection of OPG-6 devices in serial loop with ECHO ON

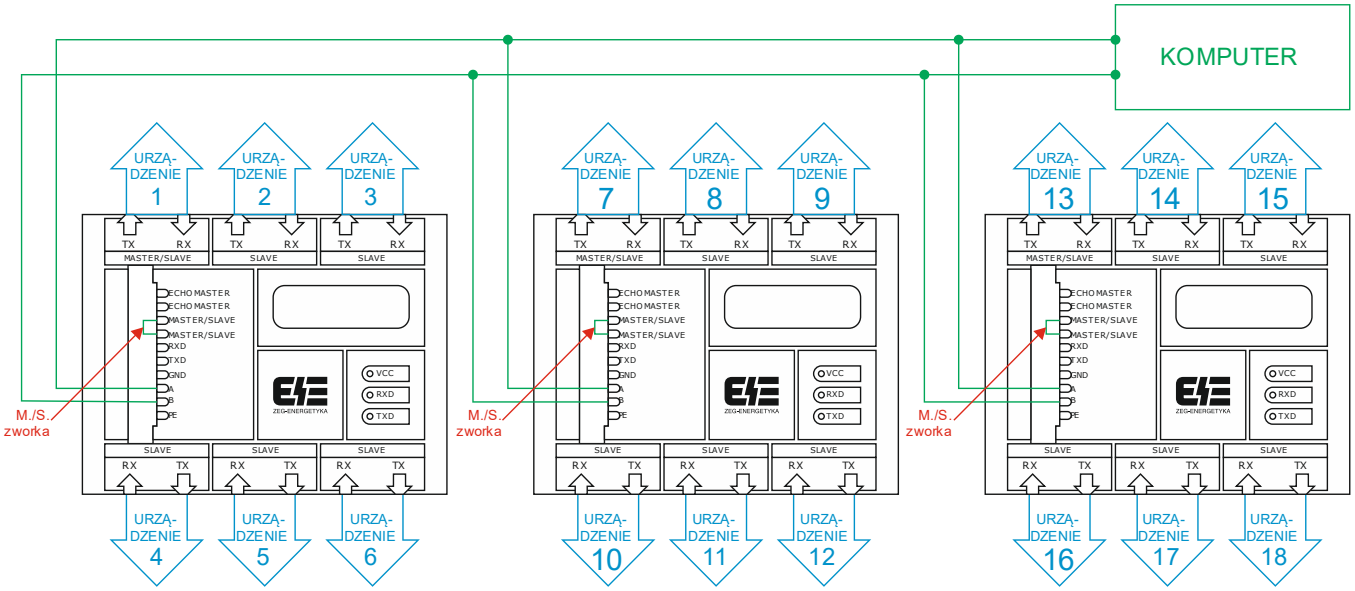

Fig. 4. Wiring diagram of OPG-6 devices connection in star loop with ECHO OFF using RS-485 MASTER port

5. INSTALLATION AND COMMISIONING

5.1. Storage and preparing OPG-6 for operation

Optical Star Coupler OPG-6 is delivered to the customer in packs to ensure that device is protected against external influences that could cause damage. Therefore, do not unpack them for storage. Transport packages should be transported and reloaded with care, avoiding shocks and maintaining the position specified on their packaging. Storage is possible in indoors, dry (relative humidity <80%), free of corrosive vapors at ambient temperature -20 ºC to 70 ºC.

5.2. Operation and maintenance

As part of the periodic inspection, the Optical Star Coupler OPG-6 should be checked at least once a year.

NOTICES

NOTICES

ZEG-ENERGETYKA Sp. z o.o.
Oddział Tychy
ul. Fabryczna 2, 43-100 Tychy
tel: +48 32 775 07 80
fax: +48 32 775 07 83
biuro@zeg-energetyka.pl
www.zeg-energetyka.pl